Recycloscope VII

Global views and local itineraries on recycling circuits and waste pickers

Pablo Schamber, Francisco Suárez and Claudia Cirelli (editors)

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Recycloscope: global views and local itineraries on recycling circuits and waste pickers

Brief clarifications about this book and acknowledgments

Since 2007, we have been editing the Recicloscopio book series, which explores various aspects of the waste–society relationship, with a particular focus on the recycling circuit initiated by urban waste pickers. Published by the national universities where we work (Lanús, Quilmes, and General Sarmiento), the name of the series (Recicloscopio) and the recurring word in the subtitles ("views" or "perspectives") reflect the open and collaborative spirit of these collective works. While primarily focused on Argentina, the series also covers other Latin American countries and brings together a wide range of authors and viewpoints. Recicloscopio is both a collection of books and an academic initiative dedicated to sharing analyses on the dynamics of waste management, its connection to urban waste pickers (known as cartoneros or informal recyclers), and the recycling industry. It originated in Argentina in 2007, mainly from research projects funded by public universities. The series has been published by the presses of the Universidad Nacional de General Sarmiento (UNGS) and the Universidad Nacional de Lanús (UNLa); this volume also includes contributions from the Universidad Nacional de Quilmes and the University of Tours (France).

The contributors to these volumes come from diverse professional backgrounds: urban waste pickers, anthropologists, sociologists, archaeologists, ecologists, lawyers, engineers, geographers, architects, social workers, communicators, and others. Their perspectives represent a rich and varied sample of research on material recovery and recycling in Latin America. These books show how the issue has evolved and diversified, while waste pickers have become more organised, forming regional and global associations, strengthening their engagement with the state, and influencing policies towards more inclusive approaches.

For this seventh volume, we benefited from the valuable collaboration of Dr Claudia Cirelli (UMR CITERES, Université de Tours/CNRS). Through her expertise and network, we expanded the geographic scope of contributions to include regions previously not covered (Africa, Asia, Europe), given that until now, most contributions came from Argentina and other Latin American countries. The authors' contributions were received towards the end of 2019, some in Spanish and others in English. Since then—and throughout the COVID-19 pandemic—we have been in regular contact with them to ensure that the descriptions of specific contexts are accessible to readers from different continents and allow for meaningful comparisons. The Spanish edition was published in 2024 (https://www.ungs.edu.ar/libro/recicloscopio-vii) and with this English edition, we hope to expand our community of readers. Translating the title Recicloscopio into English is challenging because it is a coined term combining "recycling" and -scopio (from Greek, meaning observation or study), which has no direct equivalent in English. However, several options can convey its meaning, depending on the context. For example, Recycloscope is the most literal translation, preserving the neologism's structure and understandable if the concept is explained. A similar option, but with a hyphen for clarity, is Recycling-scope. Other alternatives are more descriptive, such as The Recycling Observatory, which evokes a space or initiative for systematic study of recycling; Recycling Studies, which highlights the field of research; Insights into Recycling, emphasising a deeper understanding of the topic; or The Recycling Lens, a more metaphorical option suggesting a way of looking at and analysing recycling. Considering that Recicloscopio is a book series and an academic project investigating recycling and its actors—particularly urban waste pickers—among the options that best capture its essence while recognising its trajectory, we have chosen to title this volume in English with a version that preserves its sound and origin. Therefore, this volume is titled: Recyclo-scope: global views and local itineraries on recycling circuits and waste pickers.

We would like to thank the authors of the chapters for sending their contributions and for their patience and willingness to respond to our editorial suggestions and ongoing feedback. We extend our thanks to Zoë Lenkiewicz for her invaluable help with the English translations, and to the generous team at the English Translation Program of the National University of Lanús for their translation work. Special thanks go to Julián Del Russo, certified translator, for reviewing and editing the final English text. We would like to express our gratitude to Marcelo Galeazzi, official translator in the UK, for his revision. We also thank Javier Areco and the team at the Rodolfo Puiggrós Library, as well as Cecilia Andrea Munafó and Lautaro Nicolás Suárez for producing the maps and graphics. Additionally, we are grateful to the authorities and staff of the institutions we belong to, who have consistently supported us and helped ensure the continuity of this series. This volume also received support from the UMR CITERES Research Center at the University of Tours. As with previous volumes, this book underwent external peer review, whose feedback encourages us to continue and improve this ambitious endeavour.

Pablo J. Schamber and Francisco M. Suárez

Introduction

Local cases and global trends in recovering recyclable waste

Francisco Suárez[*], *Claudia Cirelli*[**] *and Pablo Schamber*[***]

Building on the work of previous volumes, volume VII is a compilation of diverse articles dealing with different aspects of waste management, focusing on the role of waste pickers within or without the official waste management systems. The defining feature of the *Recycloscope* collection, published since 2007, is that of pushing borders. The scope of cases put together in this book goes beyond the boundaries of South America to include cases in Africa, Asia, and Europe, thus creating an amazing opportunity to contrast different regional trends and make cross-continental comparisons. The methodological approach of these research studies was mostly ethnographic, but quantitative, cartographic, and photographic approaches were included as well.

The most remarkable features in each country are introduced and briefly summarized based on these compiled articles. Finally, an overall comparison is presented making it possible to outline aspects of equality and divergence among countries and be aware of future challenges.

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Cases in Africa

In 2018, the International Labour Organization (ILO) reported that the informal economy, which includes waste management, accounts for 85.8 percent of total employment in Africa. The sectors that make up this type of economy exist in a context defined by multiple vulnerabilities such as low income, social and legal vulnerability, health risks, stigmatization and child labor exploitation, and other indicators of precariousness. In addition, the document *Africa Waste Management Outlook*, published by the United Nations Environment Programme (UNEP) in 2018, emphasized that "informal waste pickers are active in recovering valuable resources from waste at little to no cost to the public and private sectors.''

Three significant pieces of data from this report can be highlighted: the coverage of waste collection services reaches 55% of the population, more than 90% of total waste is disposed of at open dump sites, and 57% of waste is organic. Additional estimations indicate that daily per capita waste generation in Africa is around 0.78 kg (UNEP, 2018), far below the 1.2 kg world average. Generation rates, however, vary across different areas of the country, spanning a range from 0.09 kg to 3.01 kg per person per day due to differences in consumer habits, level of earnings, and different criteria when calculating waste quantities (Emenike, 2013; Hoornweg and Bhada-Tata, 2012).

Due to accelerated urbanization, the amount of waste in Africa is estimated to double over the next 10 or 15 years (Yoshida 2018). The presence of work informality, institutional inefficiency in waste management, lack of an appropriate infrastructure, and a substantial and ongoing increase in waste generation foreshadow greater challenges for waste management in this country, especially for waste pickers.

Research studies about the situation in Africa show that during the last decade of the twentieth century, strong investments towards urban infrastructure were made by the World Bank, other financing agencies, and international cooperation. For instance, as seen in cities such as Cairo, Antananarivo, and Ouagadougou, which are discussed in this book, there are urban development projects aimed at sanitation with funds from the World Bank and other NGOs. These investments paved the way for the arrival of international private companies specialized in waste management (Ngnikam, Tanawa 2006; Desvaux 2009; Debout 2012; Pierrat 2014). However, neither waste valorization alternatives nor long-established actors of waste management were taken into account.

Articles compiled in this book dealing with this country discuss a poor level of regulation regarding waste recovery agents and mention that when the implementation of policy was at least partially possible, its impact was generally poor, improving only in specific places outside the most consolidated informal waste recovery chains. In general, public policy limited the work of waste pickers through sheer indifference or restrictions on their activity. Even so, recycling is carried out in the streets and in authorized and unauthorized dumpsites. Recovered materials are either recycled or traded in collection warehouses, or sold to certain locations using intermediaries, and either sold to local factories or exported.

International recycling chains specialized in iron, different kinds of plastic, and waste from electrical and electronic equipment (WEEE) can be found in Africa. In the Gulf of Guinea, commercialization of recycled waste through intermediary chains is aimed mostly at the export of iron to India, Southeast Asia, and China. The ports of Lomé in Togo and Kribi in Cameroon, among others, operate as transit ports for collected iron. Since the first years of the 21st century, the demand from China for metal scrap and diverse types of plastics, polyethylene terephthalate (PET) in particular, has increased.

As for Lagos in Nigeria, huge volumes of WEEE from Europe and the United States are imported through this city and redistributed to Ghana, Togo, Cameroon, Niger and Sudan. As shown in highly circulated videos, Accra in Ghana is the most important center of electronic waste disposal and recycling, comprising the largest e-waste dump site, Agbogbloshie, where thousands of Ghanaian workers perform recycling of waste and materials.

In addition, trading chains of recycled items have an outstanding presence in local markets. Discarded items from pound shops are recycled and sold at fairs and alongside several highways. In these types of chains, the proximity from the places of collection to the places of trade is essential, and different techniques are applied to diverse recycled materials such as furniture, tools, clothing, and shoes, items that demand knowledge of specific crafts and skills to be recycled. In Madagascar, this type of trading chain is of importance.

Another waste recycling chain can be found in Cairo, the capital city of Egypt. The work of the Zabbaleen is crucial in this region, especially in the recycling of plastics which are brought from Libya and Sudan. The Zabbaleen have improved their plastic revalorization techniques by incorporating plastic washing and pelletizing. These improvements have been made possible thanks to the contributions of some local and foreign NGOs, whose involvement brought these processes to the attention of academic circles. However, several

studies concur that their actual contributions to the industry of waste management and recycling have been exaggerated.

In regard to organic waste recycling, different experimental initiatives are emerging at both street and municipal levels. On some occasions, the Zabbaleen have carried out the recycling of this type of waste, which can then be used to feed livestock such as pigs. These peoples are Orthodox Christians, which brings ethnic and religious factors into play, since Islam forbids the consumption of pork meat. Waste pickers working in Cairo were stigmatized on the grounds of pig consumption during the so-called pig flu of 2009-2010. Thus, in addition to the burden of religious stigma, these workers suffer from "sanitary" discrimination as well. As we will discuss below, the same applies to waste pickers in Cape Town, who also suffer from stigma due to their association with dirt and putrefaction. This makes them invisible both to the residents of the neighborhoods where they scavenge for resources, and to policy-makers whose policies do not favor their empowerment.

Summary of articles about the cases in Africa compiled in this book

In *The controversial infrastructures of plastic recycling in Cairo*, Pierre Desvaux examines the complexity of the circulation of plastic waste in Cairo, which has been the target of many controversies. Based on methodology with a qualitative approach supported by interviews and participant observation, the subsequent emergence of political ecology and social metabolism is used as a framework to understand infrastructure as a connection between people and spaces, materials, technology, energy, and economic resources. The article underscores the lack of public policy regarding waste reuse and recycling, and also points out the lack of coordination between private and community actors for the adaptation of waste. The three main actors that propel the activity are characterized in these articles, and are stated as follows: the recycling industry, large buyers of waste referred to as the Bekkia, and the Zabbaleen community. Focusing on the latter of these groups, research describes the progressive shift of the Zabbaleen traditional economy, from being centered on the recycling of organic waste and pig farming towards an economy based on plastic recycling, a material which they get from other cities and neighboring countries through interconnections, allowing for a regular flow of this resource. However, technological limitations and the quality of the recycled plastic itself are factors that restrict the transactions related to this activity to the local market.

In *Waste markets in Antananarivo: centers and gateways of waste valorization in the capital of Madagascar*, Adeline Pierrat analyzes the flow of materials recovery, its territorial distribution, and the actors involved in Antananarivo from 2006 to the present day. This text focuses on the issue involving the recovered items markets. Within the framework of the research program *ORVA2D* (for its acronym in French, meaning *Organization for Waste Recycling in Developing Cities*), this article underlines the limits of the public system in the management of waste due to the low coverage of waste collection services, saturation of landfills and lack of resources. The text also highlights that informal employment has consolidated an integrated system comprised of the following actors: the waste pickers who operate under the "door-to-door" method, those who work in the Andralanitra landfill, street waste pickers, the craftspeople, and the traders. Each of them performs specific tasks in specific areas of the city of Antananarivo. This work organization in the area is illustrated with maps that show the flow of recycled objects and materials, for example, kitchen tools and electrical appliances for neighbors, containers for traders, among others goods and subjects. The study shows that consumer habits of products that come from waste recovery is very rooted in the daily life of the inhabitants of Madagascar, even when they can afford new products. The author of this article underscores the insular condition of these people, which, on the one hand, makes it difficult to obtain goods, but on the other hand, makes it easy to recover and resell products. Pierrat indicates that these long-established markets are not taken into account by public policies for waste management in Antananarivo, even though they have been functioning and reducing waste generation for several years.

In *Collective organizing of informal waste workers and urban governance: perspectives from Nigeria*, Thaddeus Chidi Nzeadibe and Chinedu Josephine Onyishi analyze the activity of waste pickers and middlemen and their contributions to waste reduction and to the development of industrial supplies. As it is done in other texts, this text highlights the failure of the public sphere to acknowledge their activities. The authors also explain the recovery and recycling chain as a pyramid, in which there are waste pickers of final disposal sites, and itinerant street waste pickers, which are at the bottom, followed by the small middlemen. Then, there are materials recovery facilities (MRF), and, finally, in the upper part of the pyramid, there are manufacturers and exporters of recycled waste. It should be noted that the support of international and local non-governmental organizations (NGOs) was crucial for the organization of informal waste pickers in some cities of Nigeria. It is estimated that there are

around one million waste pickers working in the cities of that country. This article focuses on the study of two cases: the cities of Aba and Lagos. On the one hand, in Aba, the market for recycled materials is organized in groups converging around the main market, where the most important products are wine bottles, and plastic and metal waste. On the other hand, Lagos is distinguished for recovering electronic waste but also for receiving these same materials from other continents. Fifty percent of these recovered materials come from that waste stream, and are used as raw material for industries in Lagos and Nigeria in general, while the remaining fifty percent is exported to some neighboring African countries. The authors highlight the great potential of the waste recovery chains for job creation and for the development of a recycling economy.

In *The recovery of waste in Yaoundé (Cameroon): actors, chains, and flows of recovered materials*, Jules Ngambi presents recycling and reuse chains within the waste valorization system in Yaoundé. Through mainly qualitative field research, the author shows the diversity of participating actors and the links between the informal and the formal sector. The first sector consists of waste pickers, independent traders (people who sell the recovered products in an itinerant way), unprocessed waste resellers, craftspeople, collective interest groups (CIGs), and different associations. On the other hand, the formal group is made up of private companies, state institutions, and other types of non-governmental organizations. Waste pickers provide secondary raw materials to all the people who are part of the valorization process. By doing this, they are considered key to the urban ecosystem of Cameroon. The author highlights the existence of financial support by international organizations. These funds are allocated to associations, NGOs, and CIGs to provide technical training in the recovery process and to conduct several development projects. The formal sector has almost no presence in the collection of materials from the "deposits" (garbage bins, clandestine dumps, and official landfills). Jules Ngambi differentiates four ways of valorization and recovering: the ones made with industrial purposes (that is to say, the sale of ferrous, non-ferrous and plastic materials); the ones connected with the use of organic waste for animal rearing; those that involve the valorization through the sale of washed recovered objects, which are given a second life with the same use (reapplication) or a new use (reuse), for example with plastic bottles, jam jars, beer bottles and kitchen tools. This activity, which in the past carried a huge stigma, has now become a well-known profession in Yaoundé. Finally, another method of waste valorization is repair: it is a very diversified activity that encompasses all the areas of consumption regardless of purchasing power. The author presents two products originated from recovery/

recycling that highlight the innovation capacity of the waste pickers. On one hand, an aluminum pot made with recycled materials, and on the other hand, cobblestones made with plastic. Even though the results are encouraging, such enterprises find it difficult to develop on a large scale, considering that they are scattered and have no state support.

In the article *From decline to valorization of gakpogblégblé in Lomé, Togo: socio-spatial circuit and impacts*, Cyprien Coffi Aholou and Prosper Sékdja Samon examine the socio-environmental impacts of scrap metal recovery in Lomé. This study is based on a bibliographic analysis, in addition to interviews and observations, as well as a photographic record that was implemented as a strategy to get involved in the fieldwork. Finally, a cartography of the activity was made. The scrap metal recovery activity started in the year 2000 with a huge demand from China. The recovery starts in the streets, where waste pickers, while singing *"gblégblé"* (spoiled), go to houses and workshops to pick up waste. After that, these materials are sold to warehouses, and they are subsequently exported. Lomé also receives ferrous wastes from other countries of the Gulf of Guinea, especially from Benin. This study highlights that waste recovery activity has increasingly been seen as a viable job option, especially among young people. In addition, they highlight that this job opportunity has led to migration from bordering countries. From an environmental point of view, hundreds of thousands of tons of metal scrap are recovered, and the final disposal of vehicles in landfills and warehouses is reduced. However, the authors highlight that there is no capacity to process the recovered material industrially and that this activity is carried out in an informal way. Finally, they ask themselves about the risks (especially the ones connected with sanitation) to which the waste pickers are exposed.

In *Public policies and waste recovery in Ouagadougou (Burkina Faso): actors and logics*, Issa Sory analyzes the coordination between public policies for waste management and informal chains of recovery and reuse of waste. This qualitative research was carried out based on interviews conducted during the 2009-2019 period. This article highlights the influence of World Bank plans in urban public policies and, particularly, in the participation of the private sector in waste management. Until 2010, the local management did not consider stages of waste valorization, but since then, a new experimental program in some areas of the city started. This plan was based on differentiating paper, plastic, and organic waste collection. However, the lack of options to commercialize these materials was a challenge for developing this experience. Furthermore, this article highlights a women's organization dedicated to plastic recovery and

another organization that processes organic waste. The informal sector has been organized based on permanent and occasional waste pickers. The permanent waste pickers build business relationships with waste generators, to whom they offer a waste pick-up service. The authors also underscore that the lack of coordination between the formal and informal systems and the parallel waste pick-up circuits can easily increase clandestine garbage dumps.

In *Stigma and agency: street waste pickers in South Africa*, Teresa Perez provides a reflection and some evidence for an important aspect of waste management: the representations created and replicated by society about this activity and the people who carry it out. This text looks into the reasons why policies to promote green employment and circular economy (aimed at registering the waste pickers who work with recyclable waste) have a small impact on the most vulnerable sectors. As a result of her ethnographic study in Cape Town, while she followed the work of a group of waste pickers, the author discovered that waste pickers are highly stigmatized. Not only are they stigmatized by the organizations in charge of introducing said policies (considering they ignore the waste pickers' skills and have no interest in deeply getting to know the areas where they want to participate), but also by the people who live in the neighborhoods where the waste pickers travel through. This stigmatization is regularly reinforced in a subtle but powerful way and causes negative stereotypes. This reduces the chances of having successful policies that could help informal workers improve their life and income conditions through their work with waste. The author states that waste pickers are considered an undesirable presence in the streets and that waste collection is seen as archaic and dirty. This situation undermines the effectiveness of policies intended to support waste pickers, who are thereby compelled to engage in continuous negotiations to secure access to waste materials.

Cases in Europe

In Europe, there was no acknowledgement of the need to legalize and assimilate the long-standing informal waste recycling labor into the formal system until quite recently. As a matter of fact, it continues to be a topic equally complex and far from the agenda of public and private actors in the waste management sector, who still perceive informal waste pickers as a group that has no place in managing waste (Scheinberg et al, 2016). In European cities, waste pickers are perceived as marginalized people. The arrival of undocumented immigrants

or the impoverishment of specific socioeconomic groups who resort to waste picking and trade of recycled materials or second-hand products to make a living "make visible once again a precariousness that we thought as minimal and regulated" (Milliot 2010: 18). Paradoxically, while in some countries there seems to be an improvement in the working conditions of waste pickers, especially in the areas dedicated to waste sorting and valorization, and in regards to their integration into the municipal waste management system (Gutberlet, 2010; Schamber and Suárez in this book), in other places such as cities in Europe and North America, waste pickers still suffer from social stigma and distrust (Milliot, 2010; Olivera, 2015; Florin and Garret, 2019; Peres, Chemas Rendón, Guien, and Havard dit Duclos in this book). This stereotype is especially worse for those of Romani ethnic origin and new incoming migrants, and it is connected to representations of these subjects as a cultural, social, and economic minority which is both impoverished and unproductive.

The scope of European cases discussed in this book is not broad enough to outline a continental perspective on the matter. The presence of African migrants among scrap metal waste pickers in Barcelona adds the illegality of the foreigner to the public perception of waste pickers, which already has features of informality and vulnerability. Consequently, African migrants, mostly from Senegal, live in constant persecution, stigma, eviction, and precariousness. Similar situations can be found in other capital cities of Europe. On the other hand, it is worth noting that there was an emergence of markets for the trade of second-hand products, e.g., the *biffin* community marketplace in Paris. These endeavors receive support from academic groups and NGOs such as the association called *Amelior*, comprised of pickers and traders of waste, and activists, or *Rues Marchandes* (in French, market streets), composed of independent researchers and social workers who provide support to waste pickers with the aim of spreading information about recycling and sale (this particular association has contributed to the study of the case of Paris, France, further explored in the article authored by Jeanne Guien and Elise Harvard dit Duclos contained in this book). In Turin, Italy, the association called *Vivi Balon* managed to transform an informal market place (referred to as free trade zone) which emerged as an extension of the largest flea and antiquity market of Balon, into a popular market for street vendors who get their goods from foraging basements or from scavenging trash containers (Rosa, Cirelli, 2018). Another association operating in Italy that provides support to different projects and initiatives is *Occhio del Riciclone*, bringing together waste pickers and traders, college students, and members of civil society to create spaces for trade

with informal actors (Occhio del Riciclone, 2018). Nevertheless, some research studies have shown that informal waste pickers in Europe are excluded from legal recycling niches and increasingly collide with the formalized urban waste management systems: i.e. packaging recovery schemes, formal re-use enterprises, and extended producer liability (Scheimberg et al., 2016).

In addition, there are groups or communities of Romani ethnic origin whose activity shifts from scavenging for products and materials in trash containers to taking part in recycling activities, subject to the demands of the city. Unlike other groups performing similar activities, and while taking part in urban recycling processes by recovering objects, these groups choose not to identify themselves as waste pickers (Rosa and Cirelli, 2018).

The following is a summary of the articles in this book discussing European cases

In *Senegalese scrap metal waste pickers from Barcelona (Spain): between urban survival and garbage-commodities*, Mauricio Chemas Rendón presents the results of a ethnographic research study carried out with a group of undocumented Senegalese scrap metal trash pickers working in Barcelona (Spain). Despite their marginal position (described by the author as “residual"), this group of immigrants, mostly single men, manages to carry out a waste recycling activity through which they can at least subsist. In this way, they have created a solidarity network among them, making it possible to recreate living and work spaces that, though precarious, are organized based on their ethnic origin: the Sunu Village (defined by the author as “an actual informal system of collective survival"). Mauricio Chemas Rendón emphasizes how these waste pickers suffer not only due to informality, precariousness, vulnerability, and marginalization but also due to a structural type of social invisibilization. It can be defined as “low level visibility”, meaning that while being visible to society when performing their work on the streets, pushing supermarket carts to carry huge materials and items, they remain invisible in terms of integration into formalized or legal collection systems. In sum, they are visible to a certain extent through their recycling work, but this activity places them on the marginal end of a waste recovery chain that is described as complete and self-sufficient in other European cities. These waste pickers possess extensive knowledge of their territory of action and apply a particular set of skills and strategies in the processes of recycling scrap metal waste. In regards to their relationship with authorities, they are pursued due to their undocumented status, and because they reside

in occupied places using abandoned buildings or industrial spaces to live and carry out their work (which includes sorting, classification and, on occasion, collection of recyclable materials), they are frequently evicted by the authorities, forced to move frequently from one place to the next, which increases both their precariousness and their marginal status. The article is an account of how the local government has tasked an association to gather a group of marginalized scrap metal waste pickers and help them organize into a cooperative, and of the poor results of this initiative. Finally, the article provides a description of the "residuation" process of the scrap metal waste pickers: while recovered and recycled materials go through many processes of revalorization, through which waste is converted into goods (Appadurai, 1986), scrap metal recovery workers taking part in this process of waste resignification and refetishization, end up being regarded as "waste material in structural terms, people who just don't belong […] with no definable social position".

In the article *From "nuisance" to "social acceptability"? 15 years of biffins' struggles for second-hand markets in the Paris area*, Jeanne Guien and Elise Havard dit Duclos provide an analysis of the claims of the so-called *biffin* community (men and women who take part in *la biffe*, a French term for the recycling and trade of discarded items). For the past 15 years, informal street markets have multiplied, sparking protests from residents, particularly due to their association with poverty markets and the negative connotations that they carry: degradation of public space and trade of stolen or dangerous items. The response of local authorities has been to repress street activity, by harassing of waste pickers and traders through police operations and confiscation of goods. The Amelior association, composed of several sellers, residents, and committed citizens (including members of the academic circles, with a strong presence of experts in human sciences), has provided continued support to the legal organization of the activity and raised public awareness on the environmental value of recycling. In this regard, the role of scientific research, especially of action-oriented research and researchers' support for the demands of waste pickers, has been crucial in the deconstruction process of the social stereotype associated with these actors and their activity, and in the planning of strategies aimed towards the improvement of the political, social and economic conditions of *la biffe*. The impact of the COVID-19 pandemic on waste pickers has caused many established marketplaces to shut down since then, because during the many stages of the lockdowns, the recovery of objects and materials was declared a risk activity due to possible transmission of disease. Because of this situation, the Amelior association has organized several plans involving food

assistance. Many waste pickers of Romani origin have returned to their country of origin. Most of these workers had to look for other sources of income and self-sufficiency.

Cases in Asia

As it occurs in Europe, the abovementioned cases do not help identify clear trends. In broad terms, there are two facts which are highlighted: the presence of recovery waste pickers in many Asian cities and the fact that the recovery work is absorbed not only by local industry but also by the global market. In addition, some regions of Asia receive waste from other continents.

The case of Istanbul presents a turning point between Europe and Asia. In a context of significant recovery activity, public policies concerning waste management were crossed by the unfinished annexation of Turkey to the European continent. Said policies were supposed to comply with the European Union standards, and in that context, a privatization process on waste management started at the same time that the recovery activity was limited. Regarding the recovery in Istanbul, there is a strong presence of migrants from some European countries (Romani ethnic groups coming mainly from Romania and Bulgaria) and Asians close to Turkey (Kurds, Afghans) or from internal regions (Central Anatolia) displaced for economic or political reasons. The recovered materials are absorbed by the local industry.

In January 2018, China began to close its doors to waste imports from foreign countries (different types of plastics, car parts, paper, textiles, and even steel or wood scrap), which has caused an accumulation of materials for recycling in high-production countries. These import restrictions have displaced European waste streams to other Asian countries. By the year 2019, for example, approximately 2 million tons of plastic waste were shipped to countries such as Turkey, Malaysia, Indonesia, Vietnam and India. In 2015-2016, before these restrictions, nearly double these amounts were exported mainly to China and Hong Kong. Some importing countries in Southeast Asia have followed China and returned to Western countries the waste they had disposed of. By the end of May 2019, Malaysia returned 3,000 tons of waste to 14 exporting countries. Shortly after that, Indonesia did the same, shipping back waste containers to Canada, the United States, and Australia, alleging poor quality of the plastics sent, lack of adequate permits, risks to health and the environment, and rejection by the inhabitants and organizations.

In Europe, countries that are paradoxically considered environmentally virtuous, such as Luxembourg, the Netherlands, and Germany, top the list of the largest exporters of plastics. This practice is no longer possible: as of January 1, 2021, European regulations have prohibited Member States from exporting their unsorted plastic waste to non-OECD countries. This provision aims to end the transfer of waste to countries with more competitive treatment costs, thanks to less restrictive environmental regulations or less monitoring by public authorities, and, above all, it aims to hold the European member states responsible for the destination of the waste they produce. One of the effects of the closure of imports is that some cities, unable to take on the treatment of new waste, have simply stopped recycling or resorted more to incineration. Regarding the movement of WEEE, the Basel Convention, since 1992, regulates the cross-border transit of hazardous waste through a consent procedure. The Convention left open a debate on what is waste and what is not, since it can be reused or recovered. In 2006, European Regulation No. 1013 prohibited exports of waste destined for disposal to countries outside the EU and hazardous waste destined for recovery, except in cases where waste is sent to countries subject a OECD decision. However, this does not prevent approximately 15% of used WEEE from being exported from the EU and 8% of that generated in the US (Forti et al. 2020), revealing widespread illegal trade of WEEE with Africa and Southeast Asia.

The following cases from Asia are presented

In *Recyclable waste management in Turkey: waste pickers in Istanbul at the intersection of formal and informal waste recycling*, Irem Nihan Balci analyzes the position of informal waste pickers and their interaction with collectors and public authorities. The research consisted of an ethnographic study conducted between 2017 and 2019. The author highlights that public policies in Turkey do not protect waste pickers. Indeed, due to Turkey's expected accession to the European Union (which ultimately did not happen), efforts were made to privatize waste management and to ban the informal sector. In practice, however, this led to a tolerated form of illegality. Waste recovery begins with informal waste pickers, continues in warehouses and materials recovery facilities, and ends in the industry. There are permanent and seasonal waste pickers. Some warehouse owners allow waste pickers to stay temporarily in their facilities, favoring paternalistic relationships between waste pickers and warehouse owners. In Istanbul, waste recovery activity is carried out by people from different

ethnic and national groups, Romanies, Afghans, Kurds, Syrians, all migrants for political and economic reasons. The author highlights that the informal collection activity is carried out by men, except in the case of the Romanies, an ethnic group who is strongly stigmatized, where men and women participate.

In *Contesting urban metabolism: struggles over waste-to-energy in Delhi, India*, Federico Demaria and Seth Schindler carry out a situated analysis of the concept of political ecology in the context of an environmental conflict caused by the installation of waste-to-energy incineration plants. in New Delhi. The concept of urban metabolism is presented with different approaches, emphasizing the co-evolution between flows of materials and political economy. This article describes the waste management system and the privatization process initiated in the 2000s. The authors state that waste management policies have been oriented towards urban planning and social discipline. The privatization process involved concentrating waste management in the hands of private companies and implementing a waste incineration method. By that time, the urban waste pickers were organized into two union groups. Their demands and protests for access to waste converged on a claim of environmental NGOs regarding ecological risks. On the other hand, citizens from the middle class considered privatization positive at first due to the persistent accumulation of waste, but later perceived the risks of waste incineration and organized themselves to resist. The authors state that conflict modifies urban metabolisms, which are areas of socialization and confrontation.

In *"Surabaya Green & Clean": genesis of a community-based, semi-decentralized waste management model*, Jérémie Cavé and Warma Dewanthi describe and analyze the background and main characteristics of the program that is implemented in one of the most important cities in Indonesia, based on bibliographic and field studies. Notably, the initiatives that gave rise to this public policy originated during the crisis caused by the untimely judicial decision to close the only final disposal site for waste, which caused the city to be flooded with garbage for three weeks. The authors also highlight the importance of continuous assistance from the private sector in the form of corporate social responsibility actions until the local government itself takes charge of this situation. The neighborhood-wide scale of the innovative actions in terms of waste classification (both for recycling and composting) responds to the very features of this urban network, and it enables the active participation of civil organizations within the territory. In this sense, and in addition to reasons related to environmental awareness, it is also worth mentioning the fact that citizen participation allows noticeable savings, which means reducing the price of their water or electricity bills.

Cases in South America

According to reports from the ILO, informal employment in Latin America reaches 50% of the population. Additionally, the document *Waste Management Outlook for Latin America and the Caribbean,* published by the UN Environmental Program (UNEP), shows that waste collection services cover only 7% of the population, and 27% of total waste is disposed of in open dumps (around 145,000 tons per day). With regards to waste composition, 50.7% is estimated to be organic. Furthermore, the estimated per capita waste generation is 1 kg per day and according to future projections on consumption, it is bound to increase by 23% between 2014 and 2050.

The articles compiled in this book dealing with South America concur that the matter of recycling and waste pickers became of public interest in the first two decades of the twentieth century. Also, in this period, waste pickers and their activity thrived in the face of neoliberal economic recession. This kind of countercyclical development of recycling with respect to periods of economic crisis is a trait of this persisting phenomenon. The resurgence of waste pickers has found a new political context defined by the extension of civil rights and the recognition of minorities. Accordingly, recognition and expansion of recovery workers is in accordance with the rise of the international environmental agenda, which prioritizes urban solid waste collection and recycling.

Thus, in the cities of Buenos Aires (Argentina) and Bogotá (Colombia), the current issue of waste pickers and their claims for a legal framework has been at the center of legal controversies and heated debates that ultimately foster the recognition of waste pickers and their claims. The surge of regulatory frameworks around the world regarding this activity is noteworthy. In some cases, such as Brazil, regulation was based on preexisting national policies, while in others, such as the countries previously mentioned, it originated from local laws. The situation in the intermediate city of Cuenca, Ecuador, explored in one of the articles in this book, mirrors that of many other cities where legal frameworks for waste-picking activity have been established. Regulation addresses multiple aspects, from the nuisances of the activity to the integration of waste pickers into the urban cleaning and waste collection services. All systems, even the most inclusive ones, combine several formal and informal work practices. Throughout twenty years of regulation, laws concerning waste management have remained the same despite changes in government. During those administrations leaning towards conservative and privatization-oriented policies, waste pickers were strongly questioned about the efficacy of their

recycling processes. In general, when the discussion is narrowed down to the technological and logistical aspects of the activity, there are more questions and concerns about the issue. However, when the discussion also covers labor inclusion and citizen awareness, the arguments for the cause of waste pickers gain strength.

As the organizational core of the activity, cooperatives of recyclers have consolidated their position in the business. Many of them are under co-management agreements with local governments concerning waste classification or collection facilities in different areas of the city. In the streets and dumps, members of these cooperatives coexist with independent collectors (not integrated into the system). The number of cooperative members is relatively fixed and contingent on the capacity of collection and trade, and the agreements reached with government bodies in charge of assigning work areas, incentives, public subsidies and additional contributions. The number of independent waste pickers is variable, and depends on the economic situation, as it increases significantly when demand for formal and odd jobs decreases.

In some South American countries, many second-tier organizations have been consolidated, such as the National Movement of Recycled Material Collectors (Brazil), the Federation of Waste Pickers and Horse Cart Drivers (Argentina), the National Movement of Grassroots Recyclers (Chile). The emergence of these associations has strengthened the capacity of political action and involvement of waste pickers in local policy-making processes. In addition, there has been an impact on both regional-level supranational organizations, such as the Latin American and Caribbean Network of Waste Pickers ("*Red Lacre*"), and international-level ones, such as the International Alliance of Waste Pickers. The presence of the academic sector is important for monitoring organizational processes, performing diverse diagnostic research processes, and producing data useful for management. An example of this is Argentina's recently created Network for Research and Action on Waste ("*RIAR*", for its Spanish acronym), comprised of more than 100 researchers and academics who have a passion for promoting and fostering inclusive recycling.

The materials recovered and sorted are intended for the domestic market as inputs for industrial processes. In certain industrial sectors such as paper and plastic, recyclable materials from waste pickers are the main source of raw material. Inter-Latin American market networks of recyclable materials are scarce. Specific inputs, such as PET or WEEE, have international markets in Asia and Europe.

The following is an introduction of the South American cases discussed in this book

The inclusion system for urban waste pickers in solid waste management in the Autonomous City of Buenos Aires (2008–2020) by Pablo Schamber and Francisco Suárez. Since 2014, a waste picker formalization system has been implemented in the Autonomous City of Buenos Aires. According to the authors, it surpasses any other existing program worldwide. Since 2008, in this area, home to the federal government, with three million inhabitants and a surface area of 200 km², the growing relationship between associations of waste pickers and the city council has led to the creation of twelve cooperatives, employing almost 6,000 urban waste pickers, who perform differentiated sorting of dry and organic waste (both from common households and drop off points of large generators alike) throughout the city. Additionally, this has allowed cooperatives to recycle materials by managing specialized facilities known as "green centers", and they operate independently on how they market the recyclable materials to third parties. Based on a methodology grounded in participant observation and interviews with waste pickers, managers, and technicians of cooperatives, as well as city council officers who served during different administrations of the City Government of Buenos Aires ("*GCABA*"), this article provides details of the main characteristics of this system.

In *Perspectives for the socio-productive inclusion of waste pickers in the Brazilian recycling scenario*, Jutta Gutberlet and Carlos Henrique A. Oliveira provide an analysis of the current state of implementation of the National Waste Management Act in Brazil, created to support inclusive waste management. The authors, with more than 20 years' experience aiding waste pickers organizations and analyzing data production techniques carried out with the active participation of waste pickers, show that since the federal government launched the waste and citizenship (*Lixo e cidadania*) nationwide program in 1998 and until the approval of the abovementioned Act in 2010, collaboration between local governments and waste pickers organizations has been scarce. Due to the lack of current support from local government and the absence of political initiative from municipalities, regions, and states, waste pickers continue to challenge and question governments and their waste management systems.

In *Mapping of the recycling chain of Criciúma (SC), Brazil: actors, links and relationships*, Mário Ricardo Guadagnin, Viviane Kraieski de Assunção, Sabrina Baesso Cadorin, Leandro Nunes, Danrlei De Conto present the results of an interdisciplinary research, aiming to build a map of the chain of actors

involved in recycling in the municipality of Criciúma, in Southern Santa Catarina, a state in Brazil. In this municipality, selective collection is carried out by a company hired by the municipality, and the collected material is sent to a waste pickers association. This organization faces several problems, such as failures in administrative management, lack of adequate infrastructure, high turnover of its members, and dependence on some buyers of recyclable materials. These difficulties affect the already precarious working conditions and low income of the workers. In addition to the waste pickers who work in the association, it is common to see independent waste pickers on the streets of Criciúma who collect different types of waste. There is no official data on these informal workers, who are not considered by municipal management. Through field research, with on-site visits, observations, and interviews, it was possible to map the recycling networks in Criciúma, identifying the social actors, their connections, and their spatial location in the city. Thus, cartography made it possible to classify the main characteristics of the actors according to the type of material they work with, the functions they perform, and the hierarchical relationships they establish among themselves. Notably, recycling of materials is carried out by generating processes of invisibility and informality of certain social actors, and the recycling chain is maintained through the appropriation of the precarious work of waste pickers. Regarding employment, the chain can be seen as a pyramid, with waste pickers, who act as waste recovery agents, at the bottom; the middlemen and classifiers in the middle; the revalorization agents, and finally, at the upper part, the recycling industry made up by the waste processors. The criteria for classifying the companies at different levels of the recycling chain considered company size, company infrastructure, equipment used, materials collected, received and commercialized, in addition to (inter) dependence relationships between the links of the recycling chain.

In *Formalization of waste pickers in Bogotá: between optimization and change in the waste management system*, Luisa Fernanda Tovar y Roger Camilo Alfonso Leal analyze the main obstacles in the implementation of Bogotá's policies for the inclusion and use of waste, through a normative analysis of public policy that was carried out during the 2012-2018 period. In order to carry out these studies, semi-structured interviews were conducted with officials, academics, and members of waste picker organizations in the process of formalization. The authors study the implementation of Executive Order No. 596 of 2016, which establishes the process of formalizing the recycling population as providers of the public cleaning service in the exploitation activity. They observe that, in terms of efficiency of the Integrated Solid Waste Management (ISWM) (measured

according to the amount of valorized waste), the results are not satisfactory. Although the amount of tons of reused materials increased, the number of waste disposed of in the sanitary landfill continued to grow. They warn that in the case of Bogotá, previous governments have had an opposite vision on waste management. The Zero Waste Policy (2012-2015) allowed waste pickers, supported by an organized social movement, to gain significant recognition thanks to political and legal advocacy processes. However, since 2016, there has been a setback caused by the adoption of policies that tend to stabilize the linear economy, since the inclusion process of the recycling population was affected, and waste pickers were not recognized as fundamental actors for transforming the system towards the valorization of waste.

In the article *Intersectionality and recycling in Cuenca (Ecuador): living conditions, work and exclusion*, Marco Ambrosi de la Cadena, Santiago Cajamarca Cajamarca, William Bueno Sagbaicela, and Santiago Jimbo Días analyze the reality of recycling work in the city of Cuenca, Ecuador, considering the subordination and living conditions of primary recyclers, mainly those related to: feminization of work, precariousness and impoverishment, family work, age and organizational and gender roles. With this aim, they surveyed 242 recyclers and conducted focus groups with the seven associations of recyclers in Cuenca. This allowed them to conclude that the general characteristics of the primary recycler in the city of Cuenca are as follows: a woman, not associated with any organization, 50-year-old, with primary education, four children on average, with two relatives who also collect, who has a monthly income average of 114 dollars and collects around 473.07 kg monthly, living in rented housing, without employment contract or social security and with regular health problems. This empirical recognition contradicts the concept of 'primary recycler' that emerges from local laws on recycling and shows that the implementation of such laws would provide no benefits.

Comparisons

Recycling in Africa, South America, and Asia has developed independently and existed prior to the establishment of public policies that promote employment and recycling. This situation presents challenges for government management, as it involves activities that can significantly impact urban, social, economic, and environmental policies.

In both Africa and South America, authors depict the structure of recycling actors as a pyramid, with waste pickers at the base, collectors in the middle, and industry plus large waste traders/exporters at the top. Within these chains, varying degrees of labor, commercial, and productive informality coexist. A higher degree of formality, regulation, and recognition of recycling is evident in South America, in a context characterized by significant levels of precariousness, social vulnerability, and considerable gaps between the more formalized groups and those excluded from social policy.

In most of the analyzed cases, a division can be perceived between waste management models centered on technological improvement and those that prioritize formalization of waste pickers into waste collection and sorting plants that demand an intensive workforce. This has stirred several heated debates around the installation of waste incineration and energetic revalorization plants in New Delhi and Buenos Aires, cities where waste pickers, perceiving these initiatives as a potential threat to their access to high energy recyclable waste (such as plastics, paper and cardboard) have voiced a firm opposition, with the support of environmentalist NGOs.

The issue is further shown in different conflicts with local authorities. Hostilities related to the presence of waste pickers in cities where the activity is forbidden are frequent. One of the main controversies is the use of animal traction vehicles (specifically the use of horse-drawn carts). In cities where the activity has been legally forbidden, it is a somewhat tolerated illegal activity, though strongly stigmatized. However, when the activity is recognized by law and public policy, waste pickers gain empowerment and a positive image by being associated with carrying out urban and environmental services, which are usually recognized as socially inclusive recycling.

In most cases, praise should be given to the creativity of waste pickers, which is aimed at improving materials collection and creating new ways to reuse items. When the end-product of the recycling process is mostly used as an industrial supply, innovations focus on increasing cargo capacity and improving the logistics of collection, sorting, preparation, and sales. Innovations of this type are commonly done in South America, e.g., improving carts, introducing new clients, removing labels from some packages meant for recycling, to name a few. Insofar as recycling aims towards reusing or selling the product, innovation is focused on new ways of using the articles and their material and symbolic redefinition. In such cases, recycling can be related to a craft: shoemaking, tailoring, blacksmithing, and so on, as it happens in some African cases, such as Madagascar and Cameroon. However, in the case of the *biffin*

community in Paris and several undocumented immigrants or waste pickers of Romani ethnic origin, the scope of reuse of the recycled object is restricted: once a product is collected (either from trash containers, sidewalks or buildings under construction) it can be repaired, cleaned and sold directly (in street markets, for instance) or recycling can involve, as is the case with scrap metal waste, the disassembling of a product and the extraction of raw metal from it (iron, copper and so on) and then sold by the pound to or, if specific parts were found during the process, as spare parts to scrap wholesalers.

The analysis of the different texts shows the spatial organization of recycling, structured around personal itineraries or specific collection routes, as well as the areas used for sorting and storage. Firstly, there are the practices and forms of appropriation of the city through daily routes taken to search for, collect, or sell recovered materials or objects. These routes are planned using an itinerary and considering the relationship of waste pickers with other social actors. Collection routes are either created based on a criterion of proximity or in connection with the areas of residence (Barcelona), but also based on the relationship with residents and businesses of certain neighborhoods (Cairo) or, as it occurs for those waste pickers formalized into the waste collection system, according to specific areas assigned for waste collection (Buenos Aires). These itineraries also contain the routes to waste dumpsites, frequently located near vulnerable areas where waste pickers coexist with and live off waste.

Secondly, there is a neighborhood-wide scale where the spatial dimension of the activity is associated with the places where the activities of classification and preparation of the materials for their trade are carried out, which are the same as the residential areas of waste pickers. It is an activity that can have a negative environmental impact, since classification implies discarding and accumulation of waste. These are negative external aspects of work, which often affect the lives of waste pickers and represent health risks and increased vulnerability for people living in these areas. The same applies to sales locations (warehouses, storehouses), which involve the movement of materials and carts that may lead to local micro-conflicts. The itineraries and sorting sites leave traces across the city, consolidating actors, circuits, transport flows, storage sites, and markets in certain cases.

On a national and international scale, waste flow outlines both routes and spaces. At the national level, these ones correspond to the places where the treatment facilities and places are located (sorting and recycling of certain materials, landfills or incinerators) or where points of departure to other countries (ports) and sales are negotiated. Lastly, it is at this level (export) where the

national policy is defined and conditioned by economic, technical and social circumstances of a different order. It is a macro scale (international) formed by the waste flows that circulate between the places of generation and those of final disposal or use as recycling inputs. It is at this level that the issue of distributing environmental externalities arises (for example through exports of waste from Europe to Asia or Africa). The process of internationalization of the waste economy highlights the interdependence between the territories that generate waste and those that receive it. For example, the cascading closing of Southeast Asian markets to waste from Europe, America, Australia or Japan is putting pressure on the recycling sectors of exporting countries and challenging public policies aimed at waste recovery (as seen in decisions to reduce the share of waste sent to incineration).

The aspirations, claims and struggles of waste pickers are uneven. Those who have already claimed the streets and occupied positions in public waste management are actors who seek to consolidate themselves in those places and climb towards the consolidation of second-tier, national, and international organizations (*RedLacre*) (Spanish for "Latin American and Caribbean Network of Waste Pickers"). They have representatives in the legislative power through which they promote containers and packaging laws oriented towards inclusive recycling, and they usually participate in various events linked to waste management or related to environmental problems. The groups who are most excluded seek access to the city and to its waste, and do not wish to be stigmatized or symbolically identified with the waste they handle. In such cases, they are far from establishing themselves as a craft-based organization, even though eventually there may be rapprochement with members of civil organizations or the academic sector. Precisely, allying themselves with these sectors of society (NGOs, universities) or interacting with public authorities, there is a symbolic capital that connects them with the environmental, social, and economic function they perform.

In South America, there is coexistence between organized groups that discuss public policies concerning waste management and waste pickers emerging from periodic economic crises. The most empowered groups support the gains made in growth periods to preserve the rights already conquered. The passage to another period of organizational and economic consolidation begs the question of whether there will be continuity or rupture regarding their stories of origin.

The abovementioned texts reflect how waste pickers from Africa, Europe, South America, and Asia have been forerunners in recovery and recycling practices. They are part of a particular historical process that links self-generated

employment with environmental care, a process that calls for reflection and involvement.

References

Africain Clean Cities Platform (2019) AFRICA SOLID WASTE MANAGEMENT, DATA BOOK 2019.

Appadurai, A. (éd.), (1986) The Social Life of Things. Commodies in Cultural Perspectives, Cambridge University Presse.

Debout Lise (2012) Gouvernements urbains en régime autoritaire: le cas de la gestion des déchets en Égypte, thèse de doctorat en Géographie, Université Lyon 2.

Desvaux P. (2009) Les impacts de la délégation de la gestion des déchets au Caire sur la filière informelle des ordures, Master de geografia, Université de Tours.Emenike, C. et al Waste Management in Africa: An Invitation to Wealth Generation in Proceedings of the International Conference on Waste Management and Environment, 2013, ICWME, University of Malaya, Kuala Lumpur, Malaysia, 26-27th August, 2013.

Florin B., Garret P., (2019) "Faire la ferraille" en banlieue parisienne: glaner, bricoler et transgresser", EchoGéo [En ligne], 47 | 2019, mis en ligne le 21 avril 2019, consulté le 19 juin 2020.

Forti V., Baldé C.P., Kuehr R., Bel G. (2020) Observatorio Mundial de los Residuos Electrónicos: Cantidades, flujos y potencial de la economía circular. Universidad de las Naciones Unidas (UNU)/Instituto de las Naciones Unidas para Formación Profesional e Investigaciones (UNITAR) – coorganizadores del programa SCYCLE, Unión Internacional de Telecomunicaciones (UIT) y Asociación Internacional de Residuos Sólidos (ISWA), Bonn/Ginebra/Rotterdam.

Hoornweg, D; Bhada-Tata, P. (2012) World Bank Report 2012 WHAT A WASTE. A Global Review of Solid Waste Management March 2012, No. 15.

Milliot V (2010) La ville informelle ou le travail des marges. In: Milliot V and Tastevin YP (eds) Les archipels de la goutte d'or. Analyse anthropo-

logique d'une "métropolisation par le bas". Cultures et territoires en Ile-de-France Project. Report. Paris, pp. 7-59.

Ngnikam E, Tanawa E., (2006) Les villes d'Afrique face à leurs déchets, Université de Technologie de Belfort-Montbéliard, Belfort.

Occhio del Riciclone (2018) Rapporto Nazionale sul Riutilizzo, Occhio del Riciclone, UTILITALIA., 164 p.

Olivera M., (2015) "Insupportables pollueurs ou recycleurs de génie? Quelques réflexions sur les "Roms" et les paradoxes de l'urbanité libérale", Ethnologie Française, XVL, 2015, 3, p. 499-509.

Pierrat A., (2014) Les lieux de l'ordure de Dakar et d'Addis Abeba. Territoires urbains et valorisation non institutionnelle des déchets dans deux capitales africaines, Tesis de Geografia, Université Paris 1 La Sorbonne.

Raoulx B., (1999) " La pratique de l'espace urbain des populations marginales: l'exemple des "binners" de Vancouver ", Espace, populations, sociétés 17(2): 353–357.

Rosa E., Cirelli, C., (2018) "Scavenging: Between precariousness, marginality and access to the city. The case of Roma people in Turin and Marseille", in Environment & Planning A, 2018, Vol. 50 (7), pp. 1407-1424.

Scheimberg Anne, Jelena Nesić, Rachel Savain, Pietro Luppi, Portia Sinnott, Flaviu Petean, and Flaviu Pop (2016) "From collision to collaboration–Integrating informal recyclers and re-use operators in Europe: A review", Waste Management & Research 2016 34:9, 820-839.

UNEP (2018) Future of Waste Management in Africa. United Nations Environment Program, Nairobi, Kenya.

Yoshida (2018) Situation of Municipal Solid Waste Management in African Cities - An Interpretation of the Information provided by the First ACCP Meeting in The Second Meeting of African Clean Cities Platform (ACCP), June 2018, Rabat.

Cases in Africa

The controversial infrastructures of plastic recycling in Cairo

*Pierre Desvaux**

Introduction

Cairo is estimated to be the largest metropolitan area in Africa, with a population of approximately 20 to 25 million inhabitants, generating around 25,000 tons of waste on a daily basis. Cairo's wastescape is famous for its Zabbaleen community, which has been largely studied during the past decades (Desvaux, 2019). These works mainly focus on two aspects: the organization of the community's livelihoods and the complex relationship between waste collectors and urban public policies. The community is now well known for its activities, ranging from door-to-door waste removal and collection within the city to waste reuse. Their livelihoods have been adapted through historical structuration, and their organization has been stable for several decades, even longer if we consider previous actors (Desvaux, 2017), and relied largely on the valorization of waste through pig farming or recycling. However, although the community is present in multiple scientific works, it is important to note that it is not the only actor involved in waste management in Cairo.

Centering on plastic collecting and recycling, this article aims to present an overview of the complex and disputed infrastructures allowing waste to flow through the Egyptian capital. Based on the concept of 'social infrastructures'

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(McFarlane & Silver, 2017), the following analysis highlights the diverse practices that contributed to the growth of a major recycling industry in the city, and the evolution that supported its expansion. Those infrastructures have been established through practices of many actors (recycling machine manufacturers, technicians, workers, importers, drivers, wholesalers, industrials, etc.), and they are connected to the work of emerging figures and intermediaries whose actions are too often overlooked. This paper will then focus on the recent evolutions of the Cairene plastic recycling sector to underline the issues associated with waste reuse in Egypt.

Theoretical framework

In order to understand the regulation of waste flows in cities, this article is based on urban political ecology (Gandy, 2004; Heynen, Kaika, and Swyngedouw, 2006; Keil and Boudreau, 2006; Kooy and Bakker, 2008; McFarlane, 2013; Monstadt, 2009; Swyngedouw, 2006). Flows are considered in their own right with secondary regard for administrative or political boundaries, which are understood as contexts that either facilitate or hinder circulation rather than as starting points for analysis. This approach aims to understand the socio-political processes at stake in the regulation and control of circulation, establishing that "power manifests itself by determining what can or cannot circulate; by provoking, canalizing, and planning circulations. In this sense, circulations are not only movements of humans and non-humans in space but constitute a technological materialization of authority" (Garcier & Martinais, 2017).

Studies within the field of political ecology highlight the role of socio-natural assemblages that allow the circulation, exchange, and transformation of matter and energy (Keil and Boudreau, 2006; Swyngedouw, 2004). A useful point of entry to study those assemblages is to understand them as infrastructures. Several authors have stressed the fact that we need to extend our traditional understanding of infrastructures to include elements within these assemblages that go beyond technical apparatuses. Southern urban experiences help us deepen our conceptualization of infrastructure. This process integrates not only technical devices (such as roads, trucks, pipes, etc.) but also social ones (norms, interpersonal networks etc.). It implies that infrastructures must be understood not only as technical means but also as practices —actions that connect different spaces and peoples, allowing the circulation and transformation of individuals, materials, energy and capital. This is not an isolated

position as it has been the object of recent scientific attention around notions of "social", "incremental," or "relational" infrastructures (Lawhon, Nilsson, Silver, Ernstson, and Lwasa, 2017; Silver, 2014; Simone, 2004, 2014, 2015). This view is consistent with the definition provided by Colin McFarlane and Jonathan Silver, who describe them as:

> (…) a practice of connecting people and things in socio-material relations that sustain urban life. It is not just a context or a noun, but a verb: social infrastructure is made and held stable through work and changing ways of connecting. (McFarlane & Silver, 2017)

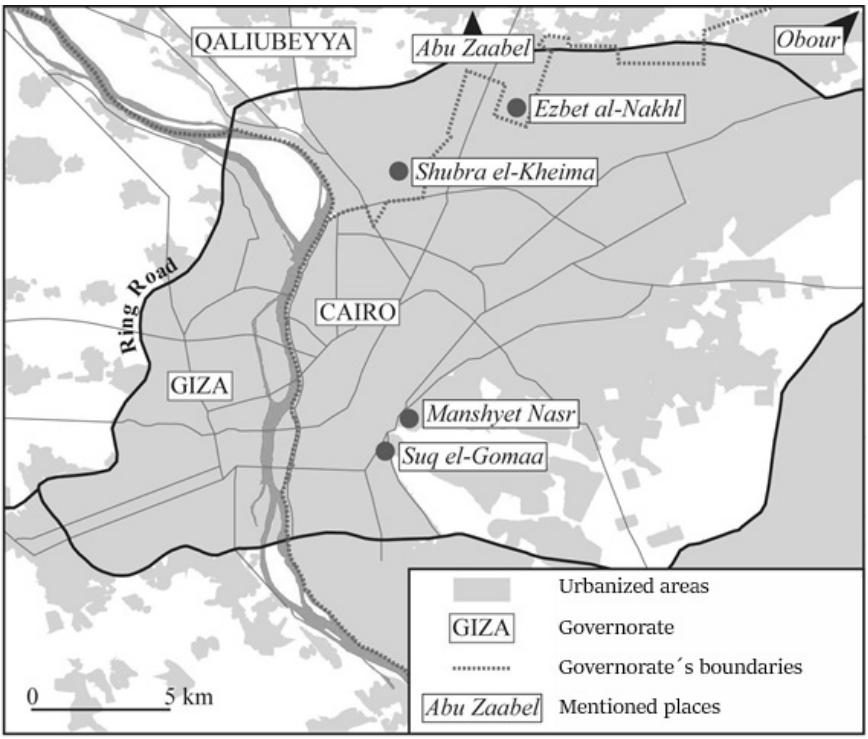
Extending the traditional way to think infrastructures allows us to define waste flow beyond "physical terms, as reticulation systems of highways, pipes, wires, or cables" (Simone, 2004, p. 407), to more flexible and unstable assemblages that allow the everyday functioning of cities. It also implies that we need to acknowledge the partially formalized way in which infrastructures are managed, so that the processes that occur exceptionally with state regulation can be included in its definition (Roy, 2005). The process of canalizing flows must therefore be understood as highly contested, involving the confrontation of several rationalities and strategies that shape circulation through the socio-material fabric of cities.

Methodology

This theoretical framework has been drawn from several fieldwork sessions conducted between 2013 to 2016, within the context of a North/South comparison involving the city of Lyon (France), as part of the author's PhD research project. It was conducted through a qualitative methodology based on repeated presence in the community's neighborhoods, thus allowing me to build trust with local actors. About fifty interviews (with Zabbaleen people, recyclers, waste pickers, companies, officials, etc.) were conducted, alongside many direct and participant observations, during an extended stay of one year in Egypt. The idea was to develop a "follow-the-matter" methodology by following the flows of plastic waste both upstream (towards picking activities) and downstream (towards industrial buyers and exporters). Interviews and multiple exchanges with members of the Cairene waste economy were conducted in both English and Arabic.

Part of the fieldwork was conducted in collaboration with a research team associated with the MUCEM (Museum of Europe and Mediterranean Civilizations in Marseille, France) in relation to an exhibition held in 2017 called "Lives of Garbage".

Map 1. Fieldwork area



Source: Sims, 2012 (datas Séjourné and Sims, 2009; Google Maps©, 2017, Production: Desvaox, 2017.

Cairo's wastescape: the withdrawal of the State and the primacy of private initiative

Publicly deployed waste infrastructures in Cairo are relatively recent and remain insufficient to manage the city's daily waste production, which continues

to be a major issue. Egyptian waste policies primarily focus on removal and disposal rather than on recovery or recycling. In both volume and technical sophistication, recycling activities are largely led by the private sector, which operates mostly outside the scope of direct state regulation. While it is widely recognized that informal systems rarely function entirely beyond public oversight, the Egyptian state plays a minimal role in this sector. This absence has given rise to a hybrid system where officially recognized actors, such as private companies, coexist with informal ones, shaping the city's waste management landscape (Furniss and Desvaux, 2015).

A quasi-absence of public policies dedicated to waste repurposing

The role of public institutions (ministers, governorates, and sanitation agencies) and private companies (local and foreign ones) working with public powers is marked by a weak implication towards waste valorization. Government action is more focused on waste removal, which is a pressing issue, as only 65% of Cairo's population has access to a proper waste collection service. In the drafting of the 2000 waste management reform, NGOs and international donors pushed for the integration of recycling and recovery goals (Debout, 2012). However, these objectives were only weakly implemented, and their impact remains limited to this day. For instance, although sorting, recycling, and composting plants were included in the contracts awarded to foreign companies in 2002, they have consistently shown low repurposing rates— estimated between 10% and 15%. Some facilities, such as the one in Giza, never became operational, with the companies in charge citing a lack of funding (interview, GCBA, August 2015).

The nomination of Leïla Iskandar[1] as Minister of Environment in 2014 and then as Minister of Urban Development (including jurisdiction over waste management issues), allowed the development of several pilot projects in intermediate Egyptian cities, including notably composting plants. The integration

[1] Leïla Iskandar is a public Egyptian figure on environmental issues, specialized in waste management issues, since she built her reputation through her work as a consultant in Zabbaleen settlements. She has an excellent understanding of community organization and waste management issues in Egyptian cities, and therefore she raised a lot of expectations when she was nominated as Minister.

of informal practices into official services is yet to be operationalized (interview conducted at the Ministry of Urban Development, September 2015). The future of those projects remains unclear, as she was evicted in October 2015 in line with her position against the importation of coal[2], and they are likely to be severely slowed down if not abandoned. Since then, the rare public initiatives are mainly thought as incentives dedicated to the improvement of industrial production (such as scraps limitation, incorporation of recycling plant in factories), as evidenced by the creation in 2005 of the Egyptian National Cleaner Production Center (ENCPC) by the then Minister of Trade and Industrial Production, Rachid Mohamed Rachid.

International funding agencies stay involved in valorization issues but focus on local and limited-scope projects, which have no national range. The national project entrusted to the GIZ and dedicated to the implementation of a new waste management system included considerations towards reuse, but it has ended in 2016 with no significant impact on public policies. Cairo's wastescape is then heavily relying on non-governmental practices, especially when it comes to reuse and recycling. However, the withdrawal of public authorities from the sector allowed multiple small operators to develop their own infrastructures that enable the city's functions and dispose of its own waste.

The diversity of Cairo's wastescape

Although public authorities do not engage fully with waste reuse, Cairo acknowledges multiple practices dedicated to the valorization of waste. In the absence of truly enforced public policy, those practices remain largely uncoordinated but are proof of action of several agents engaged in this sector. This section does not focus on the role of private companies operating in the city, as their activities are primarily oriented toward waste removal, with limited involvement in recovery or reuse efforts. Instead, three main groups of practices involved in waste-related activities in Cairo are identified: industrial recycling actors, bulky waste buyers commonly referred to as the Bekkia, and household waste collectors known as the Zabbaleen. Each of those groups reflects different infrastructures that have been historically constructed by the actors engaged in waste collection and repurposing. While connections between them do exist, each can be examined separately. It is by no means an exhaustive list of the

[2] www.madamasr.com/news/environment/enviro-minister-refuses-concede-coal-imports

numerous practices related to waste operating in Cairo, but it offers an overview of the three main areas of informal waste management that comprise most of the city's recycling. It is important to acknowledge the role of the Bekkia in industrial recycling. Research on waste management in Cairo has predominantly focused on the Zabbaleen community, leading to what several authors have identified as an overrepresentation of their practices and infrastructures (Desvaux, 2019; Sukarieh and Tannock, 2013). This imbalance has contributed to a skewed portrayal of the city's broader wastescape. The following section briefly examines the roles and organizational structures of industrial recyclers and the Bekkia, before turning to a more detailed analysis of the infrastructures developed by the Zabbaleen for plastic recycling and reuse.

Bulky waste buyers (the Bekkia)

The Bekkia collectors are itinerant buyers who wander the city, mainly on motorized tricycles, to buy objects that owners want to get rid of. They mostly work in groups of two. They look for repairable or valuable objects such as household appliances, old furniture, paper scraps, or even construction waste (doors, windows, lights, iron scraps, etc.). They announce themselves by shouting a distinctive sound "*bekkia, bekkia, rubaʿ bekkia*" to get the attention of people while wandering on the streets. One of the group members then engages with potential sellers to examine the goods and negotiate with the inhabitants while the other stays on the tricycle in case thieves want to steal the collected goods. The Bekkia collectors thus form a professional category, distinctive from others, because they normally pay for the materials and objects that they are collecting. Itinerant buyers mainly work for *maʿalemīn* ("bosses", sing. *maʿallem*). The bosses supply the tricycles and entrust the collectors with a daily capital (usually around EGP 500)[3] that they have to return every evening. As the *maʿalemīn* are most often specialized in a category of materials (metal, plastic, wood, etc.), they have a direct opportunity to buy for a good price the materials their workers have collected during the day (and have some leverage on the negotiation regarding debts, for example). The worker is then free to sell the remaining materials and objects to other buyers in the neighborhood. Thus, the pay that workers receive is directly connected to their capacity for negotiation with inhabitants first and then with wholesalers.

[3] EGP stands for Egyptian pound. 1 USD ≈ 8,33 EGP as of the date of the article.

The activity of the Bekkia collectors in Cairo is mainly performed on the central neighborhood of Ezbet Abu-Hachich, located under slip roads close to the Central Station of Cairo, where the collected objects and materials are brought. The neighborhood consists of a series of workshops and warehouses where the collected objects are sorted, repaired and/or disassembled. A majority of workers in the area come from the oasis of Fayoum and are settled permanently or temporarily in Cairo. Each of these workshops is dedicated to a specific type of object—for example, fridges or gas stoves—and to a specific activity: either repairing or dismantling. Repaired objects are then sold in second-hand markets such as Port Said Street or the *Suq al-Goma'a* (Friday market),[4] near Kobri Al Ebageah on Autostrad Road. Non-repairable objects are dismantled for spare parts or for recycling (copper, aluminum, wood, some plastics, etc.). *Ma'alemīn* buy the materials from the collectors and then sell them (mainly through other middlemen) to recyclers located in specialized neighborhoods such as Kafr Ashar in the village of Abu Za'abal located in the northern fringes of the Cairene urban area in Qalyubeyya governorate.

Industrial recycling in factories' plastic recycling

Industrial recycling practices are common in Cairo, especially in connection with industrial or commercial activities involving the production of valuable waste. As an example, the famous market of Khan el-Khalili is well known for its gold and silver artisans and they are several specialized small workshops linked with the jewelry stores dedicated to recycling scraps. Such practices exist around industrials areas of Cairo, such as in the neighborhood of Shubra el-Kheima or in the city of Obour to the north of the capital. The factories outsource production to recycling workshops, thus forming very localized networks involving few actors — in contrast to the infrastructures of the Bekkia and Zabbaleen, which operate across the city and involve a wide range of actors. The materials (scraps) are sold directly from the factories to the recyclers, who process and resell them back to the same factories, ready to be reintegrated into production processes.

Available information suggests that the volume of material processed in these networks is substantial when compared to that of Zabbaleen-operated

[4] There are several second-hand markets scattered throughout Cairo, named after the day of the week on which they take place.

workshops. This is due in part to the use of more efficient crushing machines—Taiwanese models equipped with 50-horsepower motors, as opposed to the 30-horsepower models typically found in Zabbaleen facilities—and more stable supply chains. This observation raises broader questions about the role of the Zabbaleen within Cairo's wastescape, particularly in relation to plastic recycling. A 2008 report estimated that the two largest Zabbaleen settlements, Manshiyet Nasr and Ezbet el-Nakhl, accounted for approximately 53% of all plastic recycled in the urban area (Plastic Technology Center & Industrial Modernization Center, 2008). While this figure is substantial, it nonetheless suggests a possible overrepresentation of the Zabbaleen in academic literature, where their prominence may exceed their actual share of the recycling system (Desvaux, 2019).

Those workshops have been meeting growing difficulties as factories internalize more and more recycling to reduce costs, or they raise the prices of their scraps (interviews conducted in Shubra el-Kheima, December 2014).

As it has been shown above, Cairo's wastescape relies on a vast diversity of practices that go beyond the Zabbaleen community and involve numerous types of infrastructures, mainly built through social networks based on community or interpersonal relations. Although it is important to keep in mind that many operators are part of waste removal and reuse in Cairo, this first overview of the variety and complexity of social infrastructures is nevertheless best exemplified through the examples of the Zabbaleen community and its recent evolution.

The evolution of Zabbaleen infrastructures regarding plastic waste recovery and recycling

The Zabbaleen community is located in seven peripheral neighborhoods in Cairo called *zarrayeb*. Their members are mainly Copts, a branch of Christianity that adheres to the Coptic Orthodox Church of Alexandria, who represent approximately 8% of the Egyptian population. The relations between those neighborhoods are characterized by hierarchical commercial relations that reflect their power in terms of inhabitants and equipment. The *zarrayeb* of Manshiyat Naser is then the biggest one by far and includes the vast majority of the recycling workshops of the community. Family relationships are of great importance in the structuration of the community, and entering a job in the waste sector is mainly related to birth or marriage. The activities of the

Zabbaleen consist of collecting household waste door-to-door and bringing it back to their neighborhoods, where it is sorted and then sold for recycling (plastic, cardboard, cans, clothes, etc.) or for pig farming (organic waste). The dominating position of the community in the Cairo's wastescape is the result of the history of waste management in the city, and it has been made possible thanks to the withdrawal of public authorities, which allowed the community to deploy its own infrastructures (Desvaux, 2013; Florin, 2015; Furniss and Desvaux, 2018).

The place of the community historically relied on pig farming, which offered an outlet for urban organic waste when the community arrived in Cairo during migration waves from the South in the 1930s. At that time, organic matter comprised the vast majority of waste produced in the city and was previously used for purposes such as heating public baths and cooking ful[5]. With the introduction of pig farming, the community established an informal waste removal service as early as the 1940s, based on oral agreements with local residents. This arrangement ensured a steady supply of organic waste to support livestock operations in the *zarrayeb* (Desvaux, 2017). The stabilization of organic waste flows was made possible by a combination of technical resources (transportation, space for livestock, sorting facilities) and social mechanisms (agreements with residents, personal networks, informal payments to local officials). However, this system has experienced a series of disruptions in recent years, leading to the gradual decline of this traditional infrastructure. The weakening of the community's role in waste recovery is closely tied to a set of regulatory measures introduced by public authorities over the past few decades.

The decline of the Zabbaleen's traditional organization

The first measures against them date back to the 1980s when the local governorates of Giza and Cairo implemented cleanliness agencies, namely the Giza Cleanliness and Beautification Agency (GCBA), and the Cairo Cleanliness and Beautification Agency (CCBA), to organize the dedicated cleanliness services of public spaces within the city. Several measures were then taken to regulate

[5] Ful, a traditional Egyptian dish made from slow-cooked fava beans, requires prolonged heating and therefore consumes significant amounts of fuel. Given the scarcity of wood in Egypt, organic waste was commonly dried and used as an alternative fuel source until the early 20th century, when coal began to be imported and gradually replaced these practices.

waste removal practices, such as the interdiction of donkey or horse carts in the city or the implementation of mandatory paying licenses for collectors. Those measures were thought of as a means to rationalize the organization of waste management and to improve the capital's image with a highly modernist approach of how a modern city is supposed to function and look like (Furniss, 2017). Consequently, the poorest collectors from the community, who could not afford the licenses or trucks, were put in a state of illegality that made them vulnerable and subject to fines from police officers or blackmail from other street actors. It deepened inequalities inside the community between those who could afford to invest in technical equipment, buy licenses, and bribe officials, and those who could not.

The second wave of reforms occurred in the early 2000s as a result of the influence of the IMF and the World Bank through a structural adjustment program (1991), and an "Integrated Program for Solid Waste Management" was published by the Ministry of Environment and USAID in the year 2000. The program relied heavily on imported and standardized means, focusing on developing private-public partnerships, and led to the delegation of waste management to foreign companies, notably in Alexandria (2000) and then Cairo (2002). The Zabbaleen were completely absent from the new strategy, and it weakened their dominant position over Cairene waste. Notably, they lost a large part of the fees formerly paid by the inhabitants, now paying for the new service indexed on their electricity bills. The traditional payment system based on oral agreements and direct negotiation between the Zabbaleen and the inhabitants or building caretakers shrank, and the collectors now depend on the generosity of the inhabitants and their willingness to tip them. Some collectors managed to become subcontractors for foreign companies, but their income remained lower than it had been previously. Moreover, the introduction of waste containers in the streets by these companies replaced the community's traditional door-to-door collection system, in which only the collectors were permitted to enter private buildings. This shift increased competition for valuable materials, as waste became accessible to a wider range of actors. New forms of scavenging emerged—by independent street pickers known as Sariha or Nabbashin—which had previously been unfeasible due to the community's control over access to household waste. These street pickers now sort materials directly from public containers, bypassing the Zabbaleen's historical infrastructures that once ensured a near-monopoly on waste recovery. Nevertheless, some members of the community—particularly the more affluent—were able to benefit from these changes. They took advantage of the difficulties met by foreign companies in

the field to place themselves as intermediaries between traditional collectors and companies. Indeed, companies were not keen to negotiate with each individual collector and rather addressed members of the community owning registered licenses and compelled to take substantial areas. In most cases, subcontractors do not provide the service themselves but rather delegate the right to collect to their personal and familial networks, while retaining a large portion of the company's payments for themselves. Those reforms weakened the infrastructures deployed by the community (oral agreements with residents and/or building caretakers), and intensified internal inequalities, thus demonstrating the unevenness of the power struggle around the control of waste flows. The community was systematically ignored, if not implicitly targeted, by the new norms, which led to several confrontations with the authorities and the companies (Desvaux, 2009; Fahmi and Sutton, 2006). Although the wealthiest Zabbaleen benefited from the reforms, most of them saw their incomes shrink, and their daily work in the city became increasingly difficult.

In addition to that structural evolution, the government undertook to slaughter all pig farming in 2009 as a preventive measure during the H1N1 pandemic, wrongly named "swine flu" in Egypt, an event known as the "pigs' crisis" (Tadros, 2010). The stigmatization of the community within Egyptian society played a large role in this decision. The Zabbaleen are thus affected by a negative image associated with their religious belief (Coptic), their geographical origins from Southern Egypt (Southerners are seen as rude and uneducated in Egypt), their work related with waste and their pig farming activities (pigs are impure animals according to Islam, and their presence in the city is perceived very negatively). The loss of most of their livestock was a serious blow to the traditional structure of the community, leading to a significant loss of income.

Finally, Cairene consumption patterns evolved through time, and the objects that can be found in household waste changed in line with the new products. The proportion of organic waste decreased (estimations show that the proportion of organic waste dropped from around 80% in the 1970s to around 56% nationwide in 2014; cf. EQI, 1981, GIZ and SweepNet, 2014) while there was an increase in the amount of other materials such as plastic, aluminum, and cardboard.

All those factors led to the decline of the old organization that relied on the link between household recovery and pig farming, which had been effective since the middle of the 20th century. It is important to note that the Zabbaleen never truly provided a homogeneous service across the city, as the poorest neighborhoods, where the proportion of valuables and the amount of

waste is less significant, never benefited from a real collecting service for the community. Nevertheless, the increased competition over Cairene household waste, which used to be protected through the social infrastructures of the community, and the shrinkage of the former payment system led to a progressive yet important transformation within the community itself. The traditional economy based on organic waste and pig farming is gradually being replaced by a recycling economy based on mechanization and redeployment of the community's infrastructure. Collectors are increasingly dependent on recycling business owners and activities, with their income directly tied to globalized material exchange rates.

The development of plastic recycling among the community

Alongside the decline of the pig-based economy, the community started to engage in the recycling industry in the 1980s, especially in Cairo. The first recycling workshops in Manshiyat Naser have been developed through a consulting firm, EQI (which stands for Environmental Quality International). The first machines brought into the neighborhood were shredders designed for textile recycling. Clothes recycling activities have quasi-disappeared today while hundreds of plastic recycling workshops are active in the neighborhood, dealing with all types of plastic resins. Especially in the 2000s, the plastic recycling sector witnessed an important growth thanks to a favorable economic context linked to the high oil exchange rates until 2008.

The industrial workshops are mainly located in the *zarrayeb* of Manshiyat Naser (see Fig. 1), where the first crushers were introduced.

Figure 1. View of Manshiyat Naser

Source: Pierre Desvaux (personal collection, 2014).

Figure 2. View of Manshiyat Naser

Source: Pierre Desvaux (personal collection, 2014).

The Plastic Technology Center estimates that the two biggest *zarrayeb*—Manshiyat Naser and Ezbet el-Nakhl— where the vast majority of recycling workshops operated by Zabbaleen are concentrated, particularly in the former, account for 55% of the total plastic deposit recycled of the city. This makes the area a major hub of plastic flows, not only at the urban scale but also at a nationally. The neighborhood has shifted from an area dedicated to pig farming to a proto-industrial one, marked by numerous physical transformations (see Fig. 2). The physical environment of the *zarrayeb* reflects those changes. The entrance of the neighborhood has been heavily constructed after the Revolution of January 2011 (Furniss, 2016), with new buildings featuring high ground-floor ceilings to accommodate large recycling machines, while upper floors are used for residential purposes. Older buildings, originally intended for rearing and sorting activities, have been adapted for recycling activities, but their design does not suit such purposes, leading to multiple issues regarding working conditions and material storage. In parallel, the social stratification of the community has changed in the same way: while old generations of *ma'allemin* were mainly pig breeders, the new generation largely consists of recycling workshops owners.

Recyclers have developed an impressive vernacular knowledge of different types of plastic resins. Today, they have a strong expertise that allows the identification of both resin types from objects and the state of exchange rates in international markets.

While the profitability of pig farming has decreased, it has become increasingly interesting to invest in recycling, especially in plastics. The profitability of plastic recycling has increased rapidly alongside the evolution of consumption patterns, as more materials have become available. In addition, the machines are relatively inexpensive, particularly local handmade ones. A common pattern for recyclers is to begin with crushing and cleaning activities that do not require sophisticated machines. A washing line, as shown in Fig. 3, could be handmade by the recyclers, while crushing machines, as presented below, cost approximately EGP 25,000 or USD 3,000.

The machines were initially imported from Europe or Asia, but a local manufacturing industry soon emerged alongside the recycling sector, reproducing imported models at low cost in settlements like Shubra el-Kheima. This type of equipment is the most commonly found in Zabbaleen workshops and often serves as an entry point for new recyclers. These initial steps in the recycling process—sorting, crushing, cleaning, and drying—are relatively simple to operate, as they do not require complex procedures. The capital investment is modest for many, and the machines are easily repairable. While the profits

remain low due to the limited technical sophistication of the operations, this stage provides a stable source of income.

Extrusion, which is the process of melting crushed plastic into pellets, is a significantly more complex operation that requires a different type of equipment: extruders (see Fig. 4). Egyptian-made extruders are available starting at around EGP 250,000 (approximately USD 30,000), a level of investment that remains out of reach for most members of the community, and even for many established recyclers involved in crushing activities. The extrusion process itself is technically demanding, presenting several challenges. Locally produced extruders are often of low quality and prone to frequent breakdowns, which can force workshops to shut down entirely until repairs are completed. Additionally, any plastic inside the machine at the time of failure is typically lost.

These sophisticated machines require new skills and technical expertise, as skilled workers capable of maintaining and occasionally repairing them are essential for the proper functioning of the workshops. Additionally, low-quality Egyptian extruders do not produce high-grade pellets at the end of the process. This issue is particularly critical when dealing with high-quality resins such as PET, where any material loss can lead to significant economic consequences for the workshop. If the final product fails to meet standard quality, the entire batch may be rejected by buyers and forced to be sold at a reduced price—an issue faced by recyclers attempting to export pellets to markets like China (Furniss, 2015).

As a result, many recyclers working with high-quality plastics prefer to limit their operations to crushing and cleaning scraps, thereby avoiding the risks associated with extrusion. Another strategy adopted to circumvent the low quality of pellets produced in Manshiyat Naser is to focus on quantity rather than quality. The recent introduction of fully automated lines for crushing, cleaning, and drying plastic (see Fig. 5) has enabled some recyclers to process low-grade plastics such as LDPE. These machines offer a much faster process compared to traditional manual methods, and since the resins used are of relatively low quality, a failed extrusion poses less of a threat to the workshop's economic viability.

Figure 3. Automatic lines for crushing and cleaning plastic bags

Source: Pierre Desvaux (personal collection, 2014).

Figure 4. Handmade washing line

Source: Pierre Desvaux (personal collection, 2014).

Figure 5. Extruder in a workshop

Source: Pierre Desvaux (personal collection, 2014).

Mastering technical processes is thus vital for recyclers, since machines now play a central role in the community. The industrialization of Manshiyat Naser is accompanied by a complex network of actors that sustain the plastic recycling industry. These include workers, technicians, machine manufacturers, repairmen, drivers, truck operators, and others. However, as the industry grows, the need for plastic waste has risen sharply. As shown above, the community has lost its monopoly over waste collection over the past two decades, and the volume of plastic entering the neighborhood is no longer sufficient to meet the needs of all workshops. Furthermore, as recyclers engage in a mass production strategy to offset the low quality of their extrusion processes, the demand for plastic continues to grow. To keep the entire industry functioning, the Zabbaleen need to secure a steady and massive flow of plastic waste into the neighborhood. A potential solution lies in sourcing industrial scraps, which offer large volumes, but the market is mainly saturated because of the local workshops existing alongside industrial areas, as previously mentioned. Issues of supply lines are addressed with new emergent infrastructures dedicated to keeping a constant flow of waste to the *zarrayeb*, by creating ways of connecting spaces, people, and materials.

New infrastructures for plastic waste supply

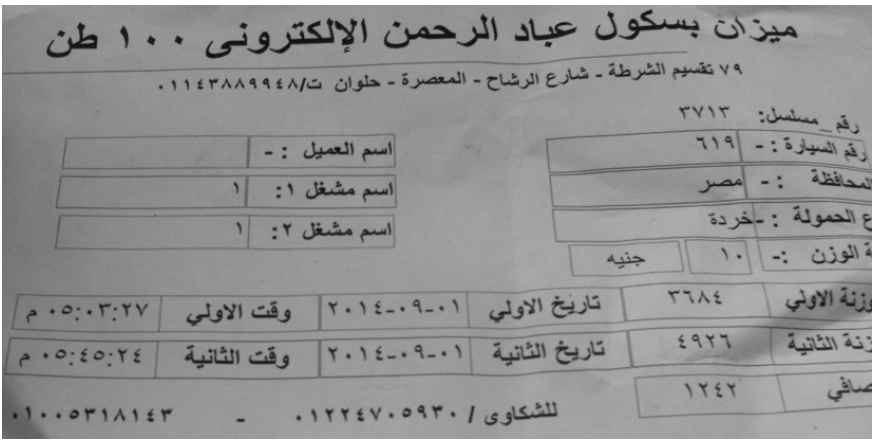
The continuous flow of plastic waste into the *zarrayeb* is sustained by linking the urban waste deposits to the neighborhood's recyclers. As the share collected directly by members of the community has declined, new sources of material are needed to supply the growing number of workshops. In response, the recyclers of Manshiyat Naser have developed strategies to attract plastic waste flows not only from across Cairo but also from other parts of the country—particularly small and medium-sized cities that lack recycling infrastructure—and even from abroad, including countries such as Libya and Sudan.

The transformation of the city's infrastructure is evident in the emergence of new actors whose work is devoted to facilitating the circulation of materials and capital. Their role involves crisscrossing the city in search of plastic stocks that can be recycled in local workshops. They approach wholesalers not only in the *zarrayeb* but also in other areas—whether *zarrayeb* or not—to inspect inventories, negotiate prices, and secure transactions (see Fig. 6).

Figure 6. Loading a plastic stock in Manshiyat Naser

Source: Pierre Desvaux (personal collection, 2014).

Figure 7. receipt testifying for the weight of the loading



Source: Pierre Desvaux (personal collection, 2014).

It is therefore essential for these actors to maintain vast networks of connections with informants and wholesalers, as well as strong working relationships with the latter. Given the intense competition over stocks, they must be able to rapidly assess the quality of available materials and negotiate prices with sellers. Prices are extremely volatile and depend on various factors such as color and resin type: "There are no fixed prices—everything depends on the negotiation you have with the person in front of you and the current going rates" (interview in Manshiyat Naser, July 2015). These negotiations require deep expertise in several areas of the recycling process, including knowledge of current exchange rates to estimate potential margins and an understanding of the technical capabilities of workshop machines. This technical knowledge is particularly important, as the materials recovered from the city must match the specifications of the machinery to be properly recycled. For this reason, many people working in these roles previously managed workshops themselves in order to acquire the necessary knowledge.

The multiplicity of transactions also demands a constant availability of cash. When exchange rates narrow, a shortage of cash in circulation can bring transactions to a halt and threaten the entire material supply chain for the community. It is thus crucial to raise the money required for purchases—including transport costs—quickly, in order to outpace competitors. The volatility of plastic waste prices is directly tied to international exchange rates, making them highly unstable. During periods of low rates, such as during the 2009 oil crisis,

speculative behavior becomes common: "When prices are low, stocks become worthless. If you have cash at that time, it's great, because you can buy a lot of plastic at really cheap prices and resell it when prices go back up" (interview in Manshiyat Naser, July 2015).

The redeployment of community infrastructures—originally focused on organic waste—toward plastic waste has made it possible to supply the recycling workshops. Traditional door-to-door collection systems have been weakened by changes in institutional frameworks, shifting consumption patterns, and the rise of more profitable forms of material reuse. These evolving extraction practices require new infrastructures tailored to the highly unstable and competitive nature of plastic recycling. Such systems are characterized by flexible configurations and responsiveness. People engaged in these connecting practices ensure, through their networks and expertise, the links between spaces, individuals, and technical systems that sustain the circulation of plastic waste both within the city and abroad.

Struggling over plastic flows: the internationalization of the community's trade and the predatory nature of the state

The success of the Zabbaleen recycling industry during the 2000s, when prices were high, led to the development of internationalized trade networks. The growth of recycling capacity and production, especially in Manshiyat Naser, together with a relative improvement of the quality and a positive economic background, allowed the development of massive exportation practices, especially towards China (as oil prices were high, so were first-hand plastic prices, and recycled plastic was comparatively competitive). The extent of the exportations quickly drew attention from national producers and industrials who used to benefit from this cheap local deposit of recycled plastic. They also saw an opportunity to take control of this source of income by acting as middlemen. Indeed, the weakness of the Zabbaleen recyclers lies in the extrusion process that rarely meets international quality standards, and most of the exportations were scraps (crushed and washed plastic).

Those large plastic industrialists are gathered under the Egyptian Plastic Exporters and Manufacturers Association (EPEMA), an organization presenting itself as "the voice of the plastic industry in Egypt." Through this association, they leveraged personal and family ties with the then Minister of Trade and

Industry, Rachid Mohamed Rachid, to secure the enactment of Decree No. 464/2007. This decree, introduced in 2007, imposed a tax on the export of plastic waste—initially set at EGP 1,000 per ton, and later increased to EGP 1,600 per ton in 2008. While some exporters were still able to turn a profit, many had to halt operations, leading to a stagnation in the growth of export practices. In fact, the Plastic Technology Centre estimated in 2008 that during the first year of the tax's enforcement, exports of crushed PETP dropped by 30%, and exports of low-quality plastics such as crushed PP, PE, PVC, and PS[6] came to a halt. It is worth noting that during the same period, exports of recycled pellets rose by 5% (Plastic Technology Centre & Industrial Modernization Centre, 2008). As community recyclers are unable to produce pellets (extruded plastic) of sufficient quality for export, they focused instead on scrap material. The decree thus created a favorable legislative framework for large industrial actors while simultaneously cutting off access to international markets for the Zabbaleen. As a result, the community has turned to the national market for outlets, particularly within industrial areas in Cairo.

This episode is a testimony to the ongoing struggle over waste flows in Cairo, where different actors compete for control of plastic waste. This widespread competition occurs not only within the community itself but also with external actors seeking to profit from the sector. It is worth noting how large industrialists and the state cooperate in ways that predate and undermine informal sources of income.

Conclusion

The evolution of Zabbaleen activities highlights the complex and heterogeneous strategies developed to control the circulation and transformation of waste. The elements presented here could be deepened through a broader analysis of the associated networks that sustain the recycling industry, including manufacturers, importers, technicians, and workers. Recycling activity involves numerous factors that must be considered to grasp the full complexity of how waste flows operate within cities and beyond, and to untangle the intertwining of different scales that influence urban daily life. The growing role of recycling within the community, alongside the decline of traditional activities, has led to a profound

[6] PETP: polyethylene terephthalate; PP: polypropylene; PE: polyethylene; PVC: polyvinyl chloride and PS: polystyrene.

economic and social transformation of its internal organization. The Zabbaleen have shifted from a spatially anchored system of activities based on controlling collection territories to a more fluid and fluctuating model. This new approach requires strategies and practices that rely on flexibility and provisionality. These are designed to respond to the highly unstable nature of plastic recycling, where the multiplication of interconnections helps stabilize a "social field of interaction" (Simone, 2004) that supports their activities.

However, these new strategies inevitably compete with others, resulting in a constant struggle over waste stocks and flows, marked by the significant role played by the Egyptian State. The episode involving export taxation reveals how the alliance between industrialists and the State reflects an unequal dynamic, indicative of their predatory stance (Furniss & Desvaux, 2018). It draws a clear boundary between the rhetoric of laissez-faire economic policies and the harsh reality of economic and political authoritarianism that characterizes most neoliberal regimes.

Reference

Debout, L. (2012). Gouvernements urbains en régime autoritaire. Le cas de la gestion des déchets ménagers en Égypte. (Thèse de doctorat en Géographie, Aménagement et Urbanisme), Université Lumière Lyon II, Lyon.

Desvaux, P. (2009). Les impacts de la délégation de la gestion des déchets au Caire sur la filière informelle des ordures. (Master 1 Mémoire de Master 1 en Géographie), Université François Rabelais, Tours.

Desvaux, P. (2013). Tribulations de fin de vie d'une bouteille en plastique. Déchets, flux et territoires. In Géographie et cultures (Vol. 91-92, pp. 197-211).

Desvaux, P. (2017). L'arraisonnement des milieux urbains. Analyse des flux cataboliques au Caire (Égypte) et à Lyon (France). (Thèse de doctorat en Géographie), Université Grenoble Alpes, Grenoble.

Desvaux, P. (2019). Introduction. Les zabbâlîn, un objet surétudié? Égypte Monde Arabe, IIIe Série(19), 11-34.

EQI (1981). Solid waste management practices in Cairo. Report n°2. Solid waste component. First Egypt urban development project.

Fahmi, W., & Sutton, K. (2006). Cairo's Zabbaleen garbage recyclers: Multinationals' takeover and state relocation plans. Habitat International, 30, 809-837. doi:10.3390/su2061765

Florin, B. (2015). Les chiffonniers du Caire. Soutiers de la ville ou businessmen des ordures? In Ethnologie française (Vol. 153, pp. 487-498).

Furniss, J. (2015). Alternative framings of transnational waste flows: Reflections based on the Egypt-China PET plastic trade. Area, 47(1), 24-30. doi:10.1111/area.12160

Furniss, J. (2016). Postrevolutionary land encroachments in Cairo: Rhizomatic urban space making and the line of flight from illegality. Singapore Journal of Tropical Geography, 37(3), 310-329. doi:10.1111/sjtg.12164

Furniss, J. (2017). What type of problem is waste in Egypt? Social Anthropology, 25(3), 301-317. doi:10.1111/1469-8676.12421

Furniss, J., & Desvaux, P. (2015). Hybridations formelles informelles. Gestion des déchets au Caire après la délégation à des entreprises internationales. In K. Bennafla (Ed.), Acteurs et pouvoirs dans les villes du Maghreb et du Moyen-Orient. Actes du colloque, Lyon, 29-30 octobre 2012 (pp. 219-238). Paris: Karthala.

Furniss, J., & Desvaux, P. (2018). L'État et la valorisation informelle des déchets au Caire: renforcement des logiques marchandes et prédation économique. In S. Jaglin, L. Debout, & I. Salenson (Eds.), Du rebut à la ressource. Valorisation des déchets dans les villes du Sud (pp. 135-152). Paris: Éditions AFD.

Gandy, M. (2004). Rethinking urban metabolism: Water, space and the modern city. City, 8(3), 363-379. doi:10.1080/1360481042000313509

Garcier, R., & Martinais, E. (2017). Désigner, mesurer, réguler: la mise en politique des flux et circulations. In Géocarrefour (Vol. 91, pp. 15).

GIZ, & SweepNet (2014). Country profile on the solid waste management situation in Egypt.

Heynen, N., Kaika, M., & Swyngedouw, E. (2006). In the nature of cities: Urban political ecology and the politics of urban metabolism. New York: Routledge.

Keil, R., & Boudreau, J.A. (2006). Metropolitics and metabolics. Rolling out environmentalism in Toronto. In N. Heynen, M. Kaika, & E. Swyngedouw (Eds.), In the nature of cities: urban political ecology and the politics of urban metabolism (pp. 20-39). New York: Routledge.

Kooy, M., & Bakker, K. (2008). Splintered networks: The colonial and contemporary waters of Jakarta. Geoforum, 39(6), 1843-1858. doi:10.1016/j.geoforum.2008.07.012

Lawhon, M., Nilsson, D., Silver, J., Ernstson, H., & Lwasa, S. (2017). Thinking through heterogeneous infrastructure configurations. Urban Studies(June), 720-732. doi:10.1177/0042098017720149

McFarlane, C. (2013). Metabolic inequalities in Mumbai: Beyond telescopic urbanism. City, 17(4), 498-503. doi:10.1080/13604813.2013.812354

McFarlane, C., & Silver, J. (2017). Navigating the city: Dialectics of everyday urbanism. Transactions of the Institute of British Geographers, 42(3), 458-471. doi:10.1111/tran.12175

Monstadt, J. (2009). Conceptualizing the political ecology of urban infrastructures: Insights from technology and urban studies. Environment and Planning A, 41(8), 1924-1942. doi:10.1068/a4145

Plastic Technology Center, & Industrial Modernization Center. (2008). National study: To reach a development strategy & action plan on how to upgrade the Egyptian Plastic Recycling Sector to face its future challenges and attract Foreign Direct Investment. Plastic recycling sector. Final report. Retrieved from Cairo:

Roy, A. (2005). Urban informality: Toward an epistemology of planning. Journal of the American Planning Association, 71(2), 147-158. doi:10.1080/01944360508976689

Silver, J. (2014). Incremental infrastructures: Material improvisation and social collaboration across post-colonial Accra. Urban Geography, 35(6), 788-804. doi:10.1080/02723638.2014.933605

Simone, A. (2004). People as infrastructure: Intersecting fragments in Johannesburg. Public Culture, 16(3), 407-429.

Simone, A. (2014). Infrastructure, real economies and social transformation: assembling the components for regional urban development in Africa. In S. Parnell & E. Pieterse (Eds.), Africa's urban revolution (pp. 309). London: Zed Books.

Simone, A. (2015). Relational infrastructures in postcolonial urban worlds. In S. Graham & C. McFarlane (Eds.), Infrastructural lives: Urban infrastructure in context (pp. 17-38). New York: Routledge.

Sukarieh, M., & Tannock, S. (2013). On the problem of over-researched communities: The case of the Shatila Palestinian refugee camp in Lebanon. Sociology, 47(3), 494-508. doi:10.1177/0038038512448567

Swyngedouw, E. (2004). Social power and the urbanization of water: Flows of power. Oxford: Oxford University Press.

Swyngedouw, E. (2006). Circulations and metabolisms: (Hybrid) natures and (cyborg) cities. Science as Culture, 15(2), 105-121. doi:10.1080/09505430600707970

Tadros, M. (2010). Scagepigging: H1N1 influenza in Egypt. In M. Leach & S. Dry (Eds.), Epidemics: Science, Governance, Social Justice (pp. 213-238). New York: Earthscan.

Waste markets in Antananarivo

Centers and gateways of waste valorization in the capital of Madagascar

*Adeline Pierrat**

Introduction

This article examines the flows of items and workers that have expanded since 2006 as a result of the development of waste valorization in Antananarivo, the capital city of Madagascar, with a focus on waste markets, given their prominent position within these flows. The topic highlights the link between the consumption and recovery practices of inhabitants, artisans, and collectors (i.e., garbage pickers working from bins or public containers) and the challenges faced by waste management services, including insufficient or uneven collection, overfull dump sites, and a lack of resources. Although major projects related to solid and liquid sanitation are expanding to address the city's rapid population growth, these initiatives, aimed at improving public health, have not yet had an impact on valorization channels.

The Great Island is known for its tendency to recycle rather than discard. While poverty may partially explain these practices, the notable development of waste recovery appears to result from a well-planned structure in which door-to-door waste collectors (under the RF2 system), rag pickers at the Andralanitra

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landfill, street collectors (locally known as "4'mis"),[1] artisans and shopkeepers each perform specific roles in defined locations across Antananarivo.

This informal valorization process therefore hinges on collection, transformation and resale in a city where official ways of waste treatment offer few alternatives to open-air dumping and composting. Resale markets support this intricate organization both within the city and beyond. There are many of them, and tailored to the intended reuse of the items to be sold (kitchen utensils and appliances, containers for shopkeepers, etc.), which shows such a strong integration of these processes of daily life in Antananarivo, the waste origins of these goods often go unnoticed.

In addition to the identification of these valorization channels, this analysis considers how they are being integrated into ongoing development projects. The empirical data referenced were collected through the ORVA2D research program and field diagnoses conducted as part of development initiatives, particularly the ALISOTA project led by Gret.

Antananarivo

Antananarivo, the capital city of Madagascar, and its suburban areas had a population of roughly 3 million in 2018.[2] All cities of the country comprise more than 35% of the total population (27 million inhabitants) of this "small insular continent" (Dubresson et al, 1994). Madagascar is characterized by insularity and extreme poverty. It ranks fifth among the countries with the lowest wealth creation in terms of Gross Domestic Product (GDP), and has been for decades among the poorest countries in the world, where 75% of Malagasy people live below the poverty line (on less than $1.90 a day in 2018).

Despite significant expansion of its urban areas, this African capital city has been the subject of relatively few studies.[3] However, this expansion has triggered new enthusiasm for developing a territory that includes the *Commune Urbaine*

[1] This term is applied to those waste pickers who search waste containers in the centre of the capital. *4'mis* is formed after *tsymissy* "nothing" abbreviated in *mis*. *4'mis*, which literally means "4 times nothing" (no home, no work, no family, no income). Another explanation is that they indulge in four vices, the names of which have the prefix *mi*: *miloka* "bet", *mifoka* "take drugs", *misotro* "drink", *mijanga* "prostitute oneself".

[2] https://population.un.org/wup/Country-Profiles/ (Madagascar in 2018).

[3] When compared with scientific research related to other African French-speaking capital cities such as Dakar (Senegal), Ouagadougou (Burkina Faso), or Lomé (Togo).

d'Antananarivo (CUA) and the thirty-six surrounding districts, united under the FIFTAMA.[4] Three factors explain the fact that the population of the capital has recently grown more than 4%: demographic growth in surrounding townships, rural migration to urban areas, and, finally, intercity migrations—particularly from medium-sized cities to the capital (World Bank, 2018).[5]

With an area of 587,041 square meters, Madagascar is the fifth-largest island in the world. Due to deteriorated and poorly maintained public roads, the capital is not easily connected to the two main harbors (Toamasina on the East Coast and Mahajanga on the West Coast). The insular nature of the country also explains the intensity of some materials flows in comparison to the size of the country. This is the case of recycled, transformed, and resold waste, generally all over the island, and particularly in Antananarivo.

The history and spatial organization of Antananarivo are based on the upper town/lower town dichotomy. Its topography reveals a sharp contrast between the center—with its wealthy residential districts, business and service quarters, and municipal and national institutions—and the densely populated suburbs, where various agricultural (rice and watercress), commercial (small-scale distribution of daily items), and construction activities (especially brickworks) are intermingled.

The current development of facilities remains limited, but sufficiently new and visible to warrant examination. Transportation infrastructure has been improved, with major roads restructured or newly built to connect the city center to Ivato Airport, located twenty kilometers away—thus decongesting older routes and enabling new facilities in areas often flooded during the rainy season. The Ikopa River, which crosses the city, serves both as an outlet for sewage and as a reservoir for nearby cultivation.

In addition to this precariousness, the lack of urban planning makes the conception and implementation of essential public facilities particularly challenging. Following the 2009 crisis, which led to the temporary withdrawal of international assistance, three development projects were initiated: the Integrated Urban Development and Resilience Project in the Antananarivo Agglomeration (World Bank), the Urban Modernization Project by the French Development Agency (AFD) between 2010 and 2017, and the Urban Master

[4] These townships form the FIFTAMA (Farimbona Iombonan'ny Firaisan'ireo Tanàna Manodidina an 'Antananarivo).

[5] Rouhana, S. and Matera, M (2018). Antananarivo,. A city for whom? https://blogs.worldbank.org/nasikiliza/antananarivo-a-city-for-whom.

Plan by the Japan International Cooperation Agency (JICA). As of 2017, the AFD has also implemented a number of sanitation initiatives through its PIAA program (Integrated Program for the Sanitation of Antananarivo).

Solid waste management in Antananarivo[6]

The insignificant number of scientific surveys and the irregular reporting by official services partly explain the lack of data regarding solid waste management. However, due to the strong interest in this sector from the late 1990s until the 2009 crisis, a number of studies were conducted during this period.[7]

The scientific literature thus made available provides useful information on waste management in Antananarivo (Camacho, 1986; Harpet and Le Lin, 2001; Pierrat, 2006, 2015; Raharinjanahary, 2011, 2012, 2015), as well as on the city itself (Fournet Guérin, 2007; Morelle, 2007). However, no particular attention has been paid to the channels and places of waste valorization, despite being a structuring feature of the city and its urban areas.

Recently, the alarming situation of the city with regard to public facilities, along with worsening poverty in the suburbs due to ongoing political instability[8] has drawn the attention of various associations and private stakeholders. Numerous press articles and assessments have highlighted the lack of solid and liquid sanitation infrastructure, noting that only 10% of Madagascar's population has access to basic equipment—a dramatically low rate given the country's size—while 46% rely on unimproved or limited facilities (Gret and Gevalor, 2017). The rates are barely higher in the capital itself, where 16% of households have access to basic facilities and 71% use unimproved systems.

The consequences of such deficiencies in access to solid and liquid sanitation, as well as in effective waste management, became particularly evident in 2017 and again in 2018, when an epidemic of pneumonic plague broke out in Antananarivo and surrounding secondary towns.

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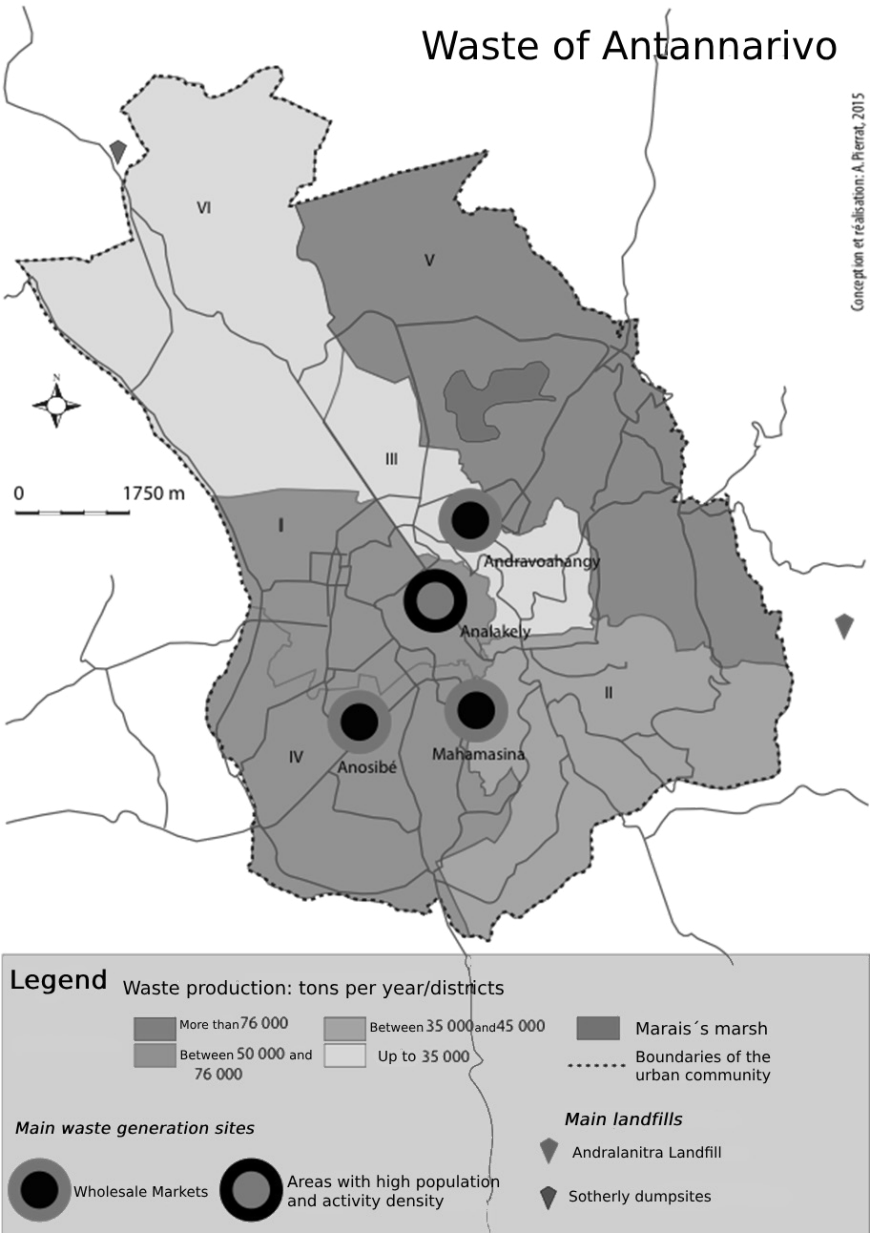
[6] The valorization of organic waste is highlighted in the reflections regarding Antananarivo, but this article does not deal with that topic. Those reflections were the subject of a report issued following a mission in 2015 within the framework of the ORVA2D and by the Franco-Malagasy CORUS ADURAA Programs.

[7] This interest is partly attributable to the high-profile presence of Father Pedro, founder of Akamasoa ("the good friends), and his actions in favor of the poorest in the mid-1990s, especially favoring rag pickers, locally called "*chiffonniers*" of the Andralanitra landfill.

[8] The election of President Andry Rajoelina in January 2019 took place without incidents.

Map 1. Waste in Antananarivo



Source: Adeline Pierrat, 2017.

It is estimated that each inhabitant in Antananarivo generates 0.6 kg of household waste per day (Ministere de l'Eau, 2014), which is more than in other African towns such as Lomé, Togo (0.51 kg/day/inhab.) or Addis Ababa, Ethiopia (0.37 kg/day/inhab.), but slightly less than the average of the African capitals, with an estimate of 0.65 kg/day/inhab. (idem).

In 2014, the deposit of household and similar waste amounted to 320,000 tons per year, for a total of 875 tons per day in Antananarivo (CUA), where waste is mainly generated by big city markets (such as the Mahamasina market in the first district or the Andravoahangy market in the fifth), as well as by households.

Despite efforts on the part of SAMVA[9], the facility that has been provided remains insufficient. The lack of material and financial resources explains the deficiencies in waste collection.

Figure 1. A district taken over by waste

Source: Adeline Pierrat (personal colletion, 2015).

[9] The Autonomous Maintenance Service of the City of Antananarivo (SAMVA, for its acronym in French) is a public service created in 1995 for the collection and treatment of solid waste.

The Great Island is known for its capacity to recycle rather than throw away, as illustrated in the film *Ady Gasy*[10]. Poverty explains the significant consumption of items derived from waste valorization, a branch of activity with a development largely attributable to the way the various actors involved are organized. Door-to-door waste collectors, rag pickers of the Andralanitra landfill, street collectors, artisans, and shopkeepers (Harpet, 2001; Pierrat, 2006, 2015; Raharinjanahary, 2011) each carry out specific tasks in those specific places which are behind the geographical distribution of valorization.

These non-institutional activities receive little attention from public authorities, who aim to conceal insalubrity and poverty, although extensive cleaning operations are increasingly publicized, as demonstrated during the 2016 *Sommet de la Francophonie*.

This article examines the flows and the places (of transformation and resale) resulting from the valorization processes related to consumption habits in Antananarivo.

To what extent are waste markets part of the daily life of the capital's inhabitants, and how can this integration ensure the continuity of workflows specific to Madagascar? It may be assumed that the setup of the entire process accounts for the large-scale development of these activities. Moreover, the context of poverty and the ongoing development projects warrant an examination of the role of waste valorization in daily life, not only as an economic objective (i.e., regarding waste as a resource) but also as a practice of frugality and reduction at the source (Durand, Cavé, Pierrat, 2019a).

The results of this research are based on surveys conducted by the French project ORVA2D[11] in six urban areas including Antananarivo. The reflections proposed in this article are also part of the ALISOTA[12] project.

The context in which the process of waste valorization is developing will be presented first. The role played by markets in the circulation of people and goods sustaining this system in Antananarivo will then be examined. The discussion

[10] *Ady Gasy* ("Malagasy Battle"): a film of 2015 by Lova Nantenaina.

[11] The objective of ORVA2D is to develop and implement, in six southern cities (Bogotá, Lima, Delhi, Surabaya, Lomé and Antananarivo), a tool to analyze and compare modalities of inclusion of waste valorization devices, already existing or created ex-nihilo, within the framework of waste management public service.

[12] ALISOTA (*Assainissement liquide et solide*) is a sanitation project set up by the Gret, and financed by the Ville de Paris, with the purpose of improving access to sanitation services and developing the waste treatment channels in three peripheral communes (Ampitatafika, Tanjombato and Ambohimangakely).

will address the integration of these workflows into the current management processes of the capital.

Results. Part 1
A favorable context for waste recovery and valorization

The many systems and participants in Antananarivo

The urban area of Antananarivo is currently facing a sanitation challenge directly related to the generation of solid and liquid waste, both in the CUA districts and in the peripheral townships of the "Grand Tana" (FIFTAMA) (see note 5), with a population increase likely to reach 3 to 4% in 2025 for the latter, compared to 1.2% for the CUA. According to these estimates, by 2020, the urban areas of Antananarivo were expected to be as populated as the CUA, with some 1.5 million inhabitants. The CUA comprises six administrative subdistricts (*arrondissements*) divided into 192 *fokontany*.[13] Each subdistrict has a town hall where a number of public facilities of the CUA such as the Register Office and Tax Collection, are decentralized.

Waste management services

As is the case in many African cities, several systems of waste management coexist and supplement each other in Madagascar (Pierrat, 2014) according to their own geographic distribution and their social and technical methods. For over twenty years, the waste management services of Antananarivo have been centralized by the commune through the SAMVA (see note 10). Therefore, there is no real autonomous administrative subdivision for waste management. The subdistricts, which are no longer able to handle solid waste management, limit themselves to maintaining the secondary sanitation network, leaving the primary network to SAMVA. Such a fragmentation of the sanitation services entails a number of issues, such as the clogging of sanitation sewers by garbage or open air toilets used as junkyards.

[13] The *fokontany* ("neighborhoods") represent the second point of reference, and the lowest level of the administrative structure of Antananarivo. Each district comprises between 27 and 44 *fokontany* headed by a chief. Since 2009, the chiefs have been appointed by the mayor, whereas before the political crisis, they were elected by the inhabitants.

The SAMVA collects some 1,200 cubic meters (approximately 480 tons) of household garbage per day. With an amount of waste of 0.48 kg/day/inhabitant (approximately one pound) collected every day of the year, the SAMVA collects 175,000 tons per year (Ministere de l'Eau, 2014), taking into account "high impact" operations to intensify collection, in compliance with the instructions of the municipality to cope with the overload of the waste containers. The SAMVA would therefore collect 5% of the total deposit of the DMA, with Antananarivo ranking within the average for African cities.

The collection of household waste in Antananarivo is done on a voluntary basis, in points of deposit delimited by three small brick walls, or in fixed metal containers. These are found only along main roads to allow garbage trucks to go through and empty them, since door-to-door collection by trucks is impracticable in the narrow and sloping streets.

The collection is organized daily, based on monitoring by control agents of overfilled garbage containers. An itinerary is then outlined and passed on to service providers to collect the garbage accordingly, not necessarily complying with the route initially scheduled by the SAMVA.

The sharp increase in population, combined with insufficient equipment (the average is one 200-liter container for 500 inhabitants), results in the containers being saturated, and collection services having to work "according to the most urgent matter".

The topography and the layout of the town, in addition to traffic jams and lack of resources make many areas inaccessible or accessible only on foot or via stairways. Moreover, people often have to walk long distances to reach the points of deposit.

Waste has been dumped since 1960 (see map 2) in the Andralanitra landfill. This sole open-air dump is located in the vicinity of Ambohimangakely, a rural township thirteen kilometers away from the city center.

Some 1,200 cubic meters of waste from Antananarivo are poured daily into this open-air, uncontrolled dump. A large-scale development project (2 million euros), financed by the AFD[14] between 2010 and 2017, has made it possible to secure the site and extend its duration while seeking a new site.

Peripheral communes are responsible for managing their own waste. Solid waste management is performed either by municipal services on a corporate-

[14] The French Development Agency (AFD, for its French acronym) is a public international financial institution that funds France's development and solidarity policies.

governance basis, by road-cleaning services[15] including waste collection on what is called a "minimalist" basis, or simply left to the care of the population.

Waste collection by a corporate-governance system is carried out with additional containers placed along tarred roads. When adequate trucks are available, people can use them to dispose of their waste as they pass by, following a random itinerary without any coordination between various collection zones. The waste is then dumped in "uncontrolled" and unsecured sites, which represent a major nuisance for the environment and for the surroundings.

Maintenance of equipment in the town and its suburbs suffers from the lack of resources, as well as from the need to replace the containers and renew the truck fleet. In this context, the competition between the AUC and the FIFTAMA is reflected on the population's side through their strong NIMBY-type opposition to the construction of a new landfill, mainly because there is no other space available in the outskirts. The search for a new site that could host a CET (a technical landfill) was frozen when neighboring communes objected to receiving waste from the capital. A project was set up in 2017 with the aim of excavating the site and exploiting its compost in order to extend its duration.

An original system, for waste precollection

Part of the response to the deficiencies in waste collection lies in accompanying the door-to-door pre-collection through an innovative system called RF2 (*Rafitna Fikajana ny Rano sy ny Fakadiovana* ("Cleanness and Salubrity in my neighborhood District").

This system is applied at the *fokontany* level, since these administrative structures, which benefit from some economic independence, handle the pre-collection of garbage themselves. It has been encouraged, for the last fifteen years, by various International NGOs (Care, Enda OI, East) that invest in the inceptive tools and trainings. Each district has been bound to apply the RF2 system since its accreditation by a municipal decree in 2006. The regulations provide for this system to be under the control of the DSP (Public Health Department) of the town.

The RF2 system is structured according to the following steps: first, the vital core of a district meets to form an association to present their request to

[15] As to street cleaning, it is the responsibility of the DPU (Direction de la Propreté Urbaine) and not of the SAMVA.

the township. The latter in turn applies to NGOs for financial and technical support with a view to starting up a given project. The households that benefit from this project then pay a monthly fee (varying from 50 to 2,000 ariary or US$ 0.15 to 0.55), used for paying the door-to-door precollectors (who are also street cleaners) who collect the garbage before dumping it in waste containers. The idea is to incite the unemployed people of each district to carry out precollection tasks in view of improving the salubrity in a predefined area. The equipment (200 liter containers) is most of the time the property of RF2.

This system allows for households to proactively participate in the recycling and recovery scheme. Waste management at the municipal level is generally inefficient both in the CUA and in the peripheral communes. The lack of resources available compared to the amount of non-collected waste leaves room for activities by the informal sector.

Participants and recovery issues

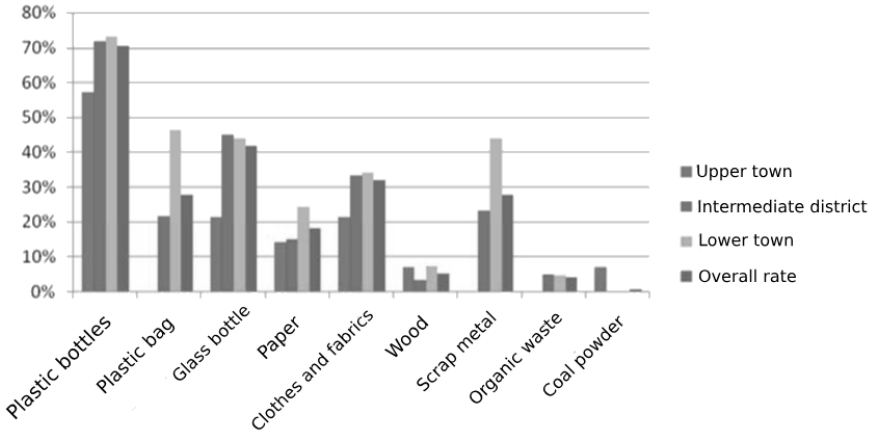
The RF2 precollection system in hard-to-reach areas encourages recycling by households and precollectors. The film *Ady Gasy* is a good illustration of the Madagascan practices in this respect. At the domestic level, numerous disposable items such as glass bottles, plastic containers, etc., are kept for reuse or transformation. But apart from a survey conducted by UN-Habitat on 726 households (see Graph 1), data on this matter are scarce and hard to obtain.

The above diagram shows the rate of households that practice waste recovery according to the type of material (out of the 19 % of the 726 households who stated that they generally recover waste in the city as a whole).

Waste recovery in the Andralanitra landfill has been extensively studied since the 1980s by researchers in various disciplines: anthropology (Camacho, 1986), geography (Pierrat, 2006, 2015), and within the framework of projects by UN-Habitat (2011) and the AFD (2015) set up to secure and exploit this dump site (Durand et al., 2019b).

A number of communities of collectors also play a major part in collecting domestic garbage in the capital. The best-known are the members of Father Pedro's association, Akamasoa ("The Good Friends", see note 8). They live on the Antananarivo landfill itself (Rabalimanana, 1999) where they rummage through the waste (Le Lin, Harpet, 2001), and are, for that reason, regarded as outsiders by the other inhabitants of Antananarivo. They owe their survival to the image they convey of a supportive and organized group, which carries the hope of the Malagasy society.

Graph 1. Data on the contribution of households to waste selection according to materials and dwellings



Source: ONU-Habitat (2011).

The case of the "4'mis", who recover waste directly from waste containers in city center, is different. They live in the streets or in Isotry and Ampefiloha, the poorest areas of the city. This group, which has been expanding since the 2009 crisis, both in number and organizational capacity, has played a major role as the first link in the recovery chain.

Surveys conducted over one month in 2015 and 2018[16] provided us with an overall view of the existing valorization channels, based on their specialization (type of materials) and their status as production units (informal, family-owned, industrial, public). We were also able to map these systems as a whole. The spatial analysis of the informal channels helped us examine the various stages (recovery, sorting, transformation, and resale) and develop a typology of the recovery chains. The main finding is that the informal sector has been expanding significantly, especially since the financial and economic crisis of 2009.

It was not possible to estimate the volume of materials in circulation through these informal channels, nor the quantity diverted from the Andralanitra landfill, its final destination as scheduled by the Solid Waste Management. However, a count conducted in resale stalls across various city-center markets allowed us to label the flows and obtain a quantitative estimate.

[16] Within the framework of the ORVA2D program, and of the ALISOTA project.

Itinerant collectors

Informal collectors operate in the streets under the RF2 system in partnership with the official precollectors during their routes under the AdQUA component of the Enda OI project, which aims at a "Sustainable Sanitation of the Districts of the Antananarivo Agglomeration", although this partnership is not formally included in RF2 protocols.

It was found that independently from the RF2, 19% of the households sort out a number of recyclable items. The collectors follow specific routes to collect what has been set aside by the households, particularly bottles, as shown in Graph 1.

Stationary collectors

The 4 mis' are the sole "stationary" collectors. They operate either at the Andralanitra landfill, at the collective containers or in the Réunion Kely district. They occupy a fixed spot, normally around one or two containers over which they have priority access, in accordance with tacit agreements passed down between collectors from generation to generation. Similarly, they are entitled to operate in the Vorodamba district, or at an open-air dumping site along the Andrianatany canal in the Réunion Kely district. In the latter case, these collectors, who may also act as resellers, pay a daily license fee of 200 ariary to the SAMVA.

Waste collection in Andralanitra

Roughly 1,200 men, women and children go to the Andralanitra dump at night to rummage through waste deposited by the SAMVA agents. Armed with hooks, they retrieve and place in baskets all items and materials that may have some value. These are later sold to "sorters" working at the landfill, who separate materials such as animal bones, fabrics, plastics, metals, and small containers like bottles and jars.

Most waste pickers are extremely poor. This activity enables the poorest of them, allows the most destitute among them (often itinerant pickers recently arrived from rural areas), to survive while trying to settle in the capital. They alternate between waste picking, recovery, and begging to meet their basic needs. Many women, especially widows, focus on recovering small items and kitchen utensils.

Figure 2. Waste collection and resale in the center of the city

Source: Adeline Pierrat (personal colletion, 2015).

As to the *4'mis*, although often poorly considered by the other inhabitants of the city, they are strongly rooted in their neighborhood. Most native to the capital and have been working as collectors for years (sometimes across generations). The distribution of the tasks among family members is remarkably similar within each *4'mis* group: children carry out door-to-door collection in the neighborhood while men search through collective waste containers, considered too contaminated and hazardous for children.

At Andralanitra, men, women and children all work directly on the landfill. Men search through the dump, while women are most often seen sorting materials.

Figure 3. Waste collection at Andralanitra

Source: Adeline Pierrat (personal colletion, 2015).

Results. Part 2
Results of field work. Channels and valorization sites

The significant part played by the markets

The tracking of waste valorization channels is facilitated by shopkeepers and artisans who act as intermediaries between collectors and consumers. These intermediaries enable the identification and monitoring of the waste valorization channels (see Table 1).

Table 1. Waste valorization channels

Channel 0	Collectors	→	Preparers or Sellers	→	Buyers
Channel 1	4'mis	→	Réunion Kely and Vorodamba (last resale market)	→	Very poor households
Channel 2	Dump rag pickers and door to door collectors	→	Intermediary resellers	→	Recycling businesses
Channel 3	Itinerant recoverers (door-to-door collection along the roads, or in no man's lands) Stationary collectors	→	Artisans' workshops	→	Customers of wholesale markets (Isotry, Anosibé, Andravoahangy) selling end products

Source: Adeline Pierrat, 2017.

Waste collection and recycling are studied through the subsequent operations of selection, transformation, and resale, which are carried out in three different steps.

In the first case, collected goods are selected according to the type of material (plastic, glass, metal), size, or use (kitchen utensils, containers, small electronic parts, telephone parts, fabrics, etc.). They are then washed for reuse, typically with soapy water for glass and plastic containers (such as glass or plastic bottles, and glass jars).

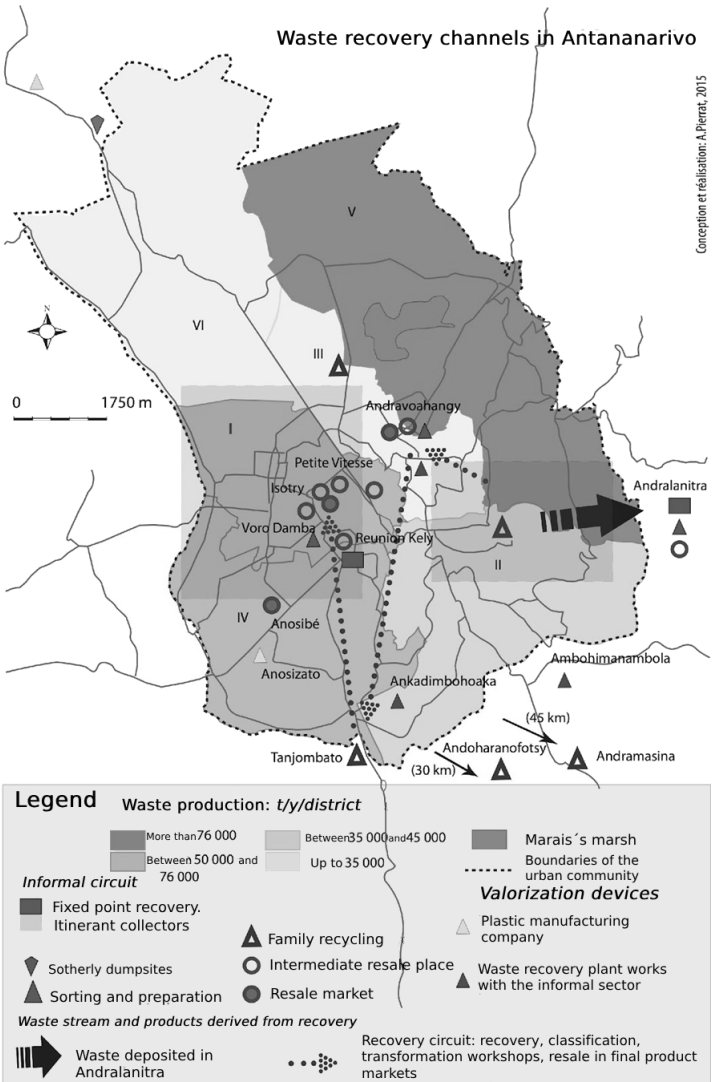
In the second case, collected items are methodically sorted by intermediary resellers according to size, type of plastic, and the extent of damage or dirtiness (e.g., damaged items or plastic bags). Due to this meticulous sorting, there are generally few refusals on the part of the factories, as stated by Mr Nadir Nazaraly, production director of the SMTP, a plastic recycling factory in Ambohibao.

The third channel involves more stages between recovery and resale. Once selected, washed and sold to artisans, items are processed and transformed in specialized workshops. Finished products are displayed at the Isotry market where they are purchased by wholesalers for resale in the local markets of the area. The packaging and transport of these items require the involvement of additional actors.

Since recovery is distributed throughout the town, a spatial analysis of informal valorization channels was conducted based on the resale markets of Réunion Kely and Isotry. This allowed the identification of what are referred to as "high places of valorization", characterized by high levels of activity, material

flow, participant diversity, and attractiveness, particularly for rural migrants looking for work in the capital.

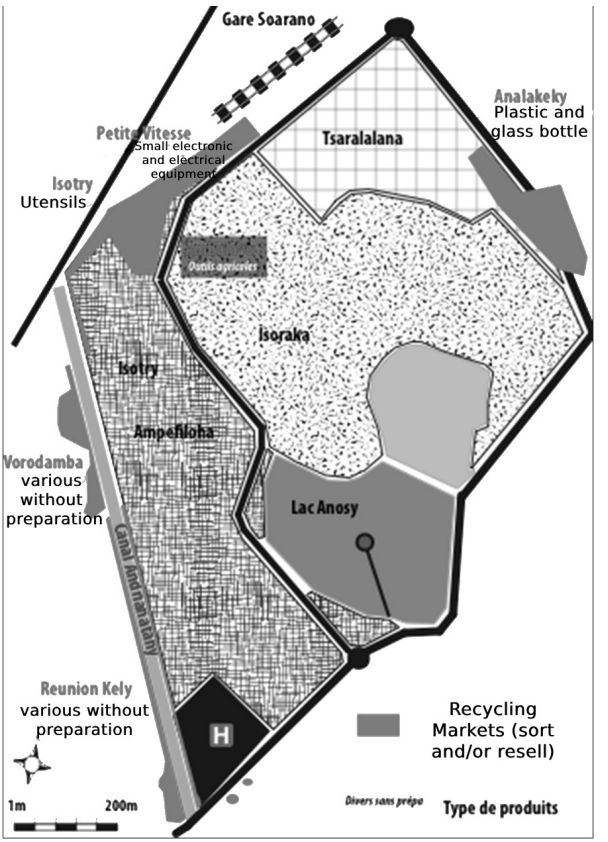
Map 2. Territorial organization of waste valorization in Antananarivo



Source: Adeline Pierrat, 2017.

This survey also shows other types of flows, notably labor. When arriving in Antananarivo many rural people often have no choice but to search the dumps or junkyards in the city center (e.g., Vorodamba). Some workers, aware that the sector can be lucrative, create workshops specialized in the transformation of waste items. This phenomenon has been observed in some outlying municipalities such as Tanjombato, which is crossed by National Route 7, one of the main thoroughfares of the island. These workshops, typically family-run, often employ additional labor to meet increasing demand for products derived from advanced valorization processes. They now serve more and more secondary towns such as Antsirabé or Tamatave.

Map 3. Market System



Source: Adeline Pierrat, 2017.

This activity is most often carried out in locations concealed from passers-by or buyers, but close enough to processing or resale places. In the case of items being too dirty, as is the case at Réunion Kely, these are first washed immediately after being collected, by workers specifically assigned to this task.

The market system: specific features, specialization and internal operation

The waste markets are gathered in the center of Antananarivo, around its main urban infrastructure and spatial structures (Avenue de l'Indépendance, Lake Anosy, the Adrianatany canal, the former colonial train station of Soarano).

The valorization sites form a continuum from la Réunion Kelly to Petite Vitesse markets. This specialization depends either on their proximity to other activities—enabling direct use of the Products Derived from Recovery (PIVD) such as the containers sold in Analakely and used by the shop-keepers of the "pavillons" area—, or on the type of recovery process. At the Vorodamba and Réunion Kely markets, products are primarily selected and washed, whereas at the market at Isotry, one finds objects created from materials recovered from waste in informal or family-run workshops in the suburbs. In total, 582 stalls were documented in six market places (see Map 3 and Table 2).

Figure 4. Market place in the city center (Analakely)

Source: Adeline Pierrat (personal colletion, 2015).

Table 2. Recovery processes in the central markets (Field work data: A. Pierrat, 2015)

Activities Places	Collection	Selection	Preparation and/or Transformation	Resale
Andralanitra landfill	X	X		
Waste Garbage containers (1 to 10 cub.meters)	X			
Andravoahangy market			X	X
"Pavillons" and "Les Escaliers"(Analakely)		X	X	X
Petite Vitesse market			X	X
Anosibé market				X
Isotry				X
La Réunion Kely	X	X		X
Vorodamba	X	X	X	X

Source: Adeline Pierrat, 2017.

This double-entry table shows the activities in the places identified. Each place, except the Isotry market, centralizes at least two phases of the valorization chain. Most often, these steps follow a three-stage process: collection, selection and resale in the markets of Vorodamba and Réunion Kely; selection, transformation and resale in other central markets. his distribution of activities clearly illustrates the final objectives of the two channels, which target different types of customers: on one hand, low-income families and wholesalers coming to buy cheap products (locally called *bonne occasion*, or "good bargain"), and on the other, finished goods (such as penny boxes, watering pans, oil lamps) intended for moderate-income households or secondary towns.

Development prospective

Concerning the development of the channels, its necessary to understand how the informal sector interacts with formal governmental and private-sector solid waste management activities (Scheinberg et al., 2010). The recovery sector has developed considerably, partly due to closer interactions between the formal and informal sectors, particularly in the plastic industry, a field which attracts many national and foreign enterprises (notably Chinese firms). These enterprises have settled in and developed contacts with those informal recoverers who make it a point to offer well-sorted products to ensure their commercial opportunities. A

complementarity between recovery and valorization has recently been observed in the cardboard sector.

This mode of operation between the informal sector and the manufacturers could be extended to other techniques of waste valorization, such as the production of plastic paving blocks. Cooperation in the plastic sector and more generally in material recovery has an incentive impact on the local recycling industry, who show little eagerness to provision themselves in secondary raw materials, due to the lack of outlets. In fact, the plastic material put on the market by recoverers often exceeds the needs of enterprises.

The local industry tends to develop, but at a slow pace because the recycling process of materials such as plastic requires significant investments. The Anosizato district is home to several small enterprises involved in this activity, among others Vitaplast, which produces items from recycled plastic like water bowls and basins (sold for 3,000 ariary each, retail price, or 2,400 ariary wholesale), or Prest, a factory at Ankadimbahoaka, and SFOI at Tanjombato, two towns located in the city outskirts.

As a general rule, recycled items are sold for half the price of new ones. As regards water recycled bowls or basins their quality varies depending on the thickness of the raw material originally used. Buyers are mainly retailers from the provinces, or dwellers from the capital.

Madagascar does not import any raw material. Taking into account the insular nature of the country, it would be advisable to carry out an in-depth study of the resale channels between the capital and secondary towns.

My surveys from 2015 show a strong correlation between the increase in valorization activities and quantity and quality of the recovered products that are now better selected upstream, sometimes even before being disposed of in dumps, which prevents the materials from becoming mixed and/or contaminated.

We also note a ripple effect between the increase in the recovery by households "downgraded" as a consequence of the crisis of 2009 (with more and more *4'mis* relocating to Vorodamba and Réunion Kely) and the higher number of (semi-formal) family-owned workshops.

These changes contribute to improved oversight of these fields and promote industrial and/or mechanical valorization, whereas valorization through the informal sector remains manual, family-owned, with low productivity and vulnerable to eviction.

Family-owned businesses and transformation workshops are all located in the suburbs. These places are the starting points of other types of flows studied

in the framework of ongoing research on movements between the capital and secondary towns. These flows are all the more important given that insularity does not always allow easy export of products that may have greater value outside Madagascar.

Reflections and conclusion

Insertion of the valorization processes and reflections about the Madagascar model

The close examination of the way waste markets work out shows that it is strongly connected to the consumption practices of the households–not necessarily the poorest–in the capital. Although it is difficult to gather data concerning households in Madagascar (people are usually reluctant to talk about their domestic habits) this survey shows that the habits of consuming products stemming from waste recovery is well rooted in their daily life, even when they can afford buying new products.

This unexpected result reflects the almost "traditional" frugality imposed by low incomes of many families, whereas in other developing countries, the consumption of waste recovery products only meet the needs and practices of the poorest part of the population. In the case of d'Antananarivo, the collectors have few connections with manufacturers, except in the case of plastic and, more recently, cardboard. Moreover, unlike in other African countries such as Senegal or Ethiopia, the State does not take over the most lucrative activities carried out informally (Pierrat, 2018).

Madagascar's insular situation also explains that products and circuits remain in the country, including metals which elsewhere (for example in Senegal) are sometimes exported, in particular to India and South-East Asia. (Pierrat, 2014).

Prospective for these waste markets

The present situation of the capital's waste markets does not look hopeful. These dangerous and unhealthy places of intense activities, right in the heart of the city, call for the restructuring of the "shop windows" areas.

Although these markets seem to be functioning on a long-term basis, they are not part of the official roadmap aiming at improving waste management

in Antananarivo. The State is above all eager to sanitize the capital by means of "high impact" operations. Nothing is planned to improve working conditions or to secure the sites. However, a number of projects reflect the awareness that these markets are important because they contribute to reducing waste at source and limiting the costs of waste treatment, as is the case with Petite Vitesse, a market devoted to waste transformation. This site, located near the former colonial train station, some ten meters away from the Place de l'Indépendance, could be highlighted through a permanent exhibit dedicated to waste recycling (Gérard and Juste, 2019).

These reflections are an invitation to underline the importance of the valorization channels in Madagascar, as they reveal another complex link between the inhabitants and the waste they produce.

Reference

Camacho, M., (1986), Les poubelles de la survie: la décharge municipale de Tananarive. L'Harmattan.

Dubresson A., Marchal Jean-Yves, Raison J.P. (1994). Géographie universelle: Les Afriques au Sud du Sahara. Paris (FRA), Brunet R. (dir.); Montpellier: Belin.

Durand, M., Cavé, J., Delarue, J., Le Bozec, A, & Salenson, I. (2019b). Détourner les déchets: innovations sociotechniques dans les villes du Sud. Notes techniques. Paris: Agence française de Développement.

Durand, M., Cavé, J., & Pierrat, A. (2019a, in press). Quand le low-tech fait ses preuves: la gestion des déchets dans les pays du Sud. Revue Urbanités, 12. La ville (s)low tech.

Fournet-Guérin, C., (2007). Vivre à Tananarive. Géographie du changement dans la capitale malgache. Paris: Karthala.

Gérard, A., & Juste, N., (2009), A la découverte de l'artisanat, Petite Vitesse. Rapport de fin d'étude. ENSA de Nantes: École d'architecture de Maurice.

Gret & Gevalor, (2017), Document du projet Alisota (Assainissement liquide et solide à Antananarivo). Agence Française de Développement & Ville de Paris.

Harpet, C., & B. Le Lin. (2001). Vivre sur la décharge d'Antananarivo. Regards anthropologiques, Paris: L'Harmattan.

Ministere de L'Eau (2014). Elaboration du schéma directeur du grand Tana. Rapport final. Nairobi: Artelia Madagascar / UN-Habitat.

Morelle, M. (2007). La rue des enfants. Les enfants des rues. París: CNRS.

Nantenaina, L., (2015), Ady Gasy: les chinois fabriquent les objets, les malgaches les réparent http://adygasy.com/

Pierrat, A., (2006), La gestion des déchets à Tananarive. Étude de la valorisation des déchets en produits fertilisants. Approche géographique. Master 1 de l'Université Paris 1 Panthéon-Sorbonne.

Pierrat, A. (2014). Les lieux de l'ordure de Dakar et d'Addis Abeba. Valorisation non institutionnelle des déchets dans deux capitales d'Afrique, Thèse de géographie, Paris 1 Panthéon-Sorbonne.

Pierrat, A. (2018). Tensions entre industrialisation et marginalisation de la valorisation informelle des déchets à Addis Abeba, capitale-vitrine de l'Éthiopie. In Jaglin, S., Debout, L., & Salenson, I. Du rebut à la ressource. Valorisation des déchets dans les villes du Sud (pp. 31-49). Paris: Agence française de Développement.

Pierrat, A., Lecointre, C., & Breselec, R., (2015). Valorisation des déchets à Antananarivo. Solution et innovation pour une gestion déficiente des déchets? Réflexion autour d'une capitale pauvre d'Afrique. Programme ORVA2D. Paris: Agence française de Développement.

Raharinjanahary, R. (2010). La question des ordures à Antananarivo: une gestion en déséquilibre permanent. Madagascar-Revue de Géographie. Volume 47 (Décembre 2010-Juin 2011), pp. 43-66.

——— (2011). Antananarivo et ses ordures: production, collecte, valorisation. Antananarivo: Foi & Justice Edition.

(2015). "Processus d'intégration de la filière des déchets à Antananarivo: des activités informelles à un système formel?". En Durand, M.; Djellouli, Y. y Naoarine, C., Gestion des déchets. Innovations sociales et territoriales. Rennes: PUR, pp. 53-72.

Rouhana,, S. & Matera, M (2018). Antananarivo,. A city for whom? https://blogs.worldbank.org/nasikiliza/antananarivo-a-city-for-whom.

Scheinberg, A., Simpson, M.H., Gupt, Y., & et al. (2010). The economics of the Informal Sector in Solid Waste Management. Eschborn, Germany: GTZ & CWG.

Collective organizing of informal waste workers and urban governance

Perspectives from Nigeria

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Introduction

African cities possess a dynamic informal economy which plays an increasingly important role in the management of solid waste (Adama and Nzeadibe, 2017). In Nigeria, there is a glaring absence of formal recycling of municipal solid waste and attempts by the Nigerian government to implement recycling programs of solid waste have largely failed (Nzeadibe and Ajaero, 2011; Nzeadibe, 2013).

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As a result, the informal economy has taken up the role of "critical but unacknowledged gap filler" in the waste recovery and recycling system (Nzeadibe and Adama, 2013). Although informal waste workers are traditionally excluded from mainstream urban governance, recent field evidence indicates that they often operate highly organized systems in many Nigerian cities.

Recent estimates by a Lagos-based non-governmental organization, the *Waste Collection Workers Welfare Initiative,* indicate that there are about one million waste pickers operating in Nigerian cities (Adepitan, 2012). If this estimate is reliable, then waste pickers may account for about 0.6% of Nigeria's urban population, which is quite significant as part of the urban labor force (Nwosu et al., 2016). While little research exists regarding the modes of organization among waste workers and how their informal organization can advance inclusive development, a distinction is often made between informal governance processes, which relate to the regulatory role of social networks, informal institutions and popular associations in urban areas, and formal governance processes, which involve formal political, economic and social institutions. Regrettably, very little is known about how people in the informal waste economy in Nigerian cities organize themselves at work and attempt to influence urban governance processes in Nigeria.

In terms of the relationship between the informal waste economy and academia, this study makes a modest contribution to research and advocacy efforts focused on the informal waste economy in Nigeria. A recent study systematically assessed the contribution to the development of this informal economy (Nzeadibe, 2013) and reviewed the evolution of informal waste management in Africa based on lessons learned from a decade of research and activism in Nigerian cities. It was a pioneering study that placed the development of the informal waste economy within Nigeria in the international academic discourse, drawing on literature published by researchers within and outside Nigeria.

Similarly, the volume "Dealing with waste" (Adama and Nzeadibe, 2017) provides unique perspectives and insights into the entrepreneurial skills and linkages of informal waste economy actors in African cities. It highlights the construction of markets and the dynamics within them, as different actors strive to maximise their profits and opportunities. The book also pays attention to the social power relations within and between the complex but structured networks that have emerged. The interest in social power relations is linked to the growing attention to the internal diversity of the informal economy. In this context, the book provides an opportunity to critically examine how the informal economy is differentiated and traversed by hierarchies, divisions, power relations, and

inequalities structured along lines of gender, age, income, ethnicity, and class, among others. This book is notable because it is perhaps the first time that so much attention has been paid to informal waste management in Africa in a single volume, with a majority of contributions from Nigerian scholars based in their country, supplemented by a few from abroad. Beyond this scholarly engagement, collective organization in the informal waste economy in Nigeria has received relatively little attention in the academic literature.

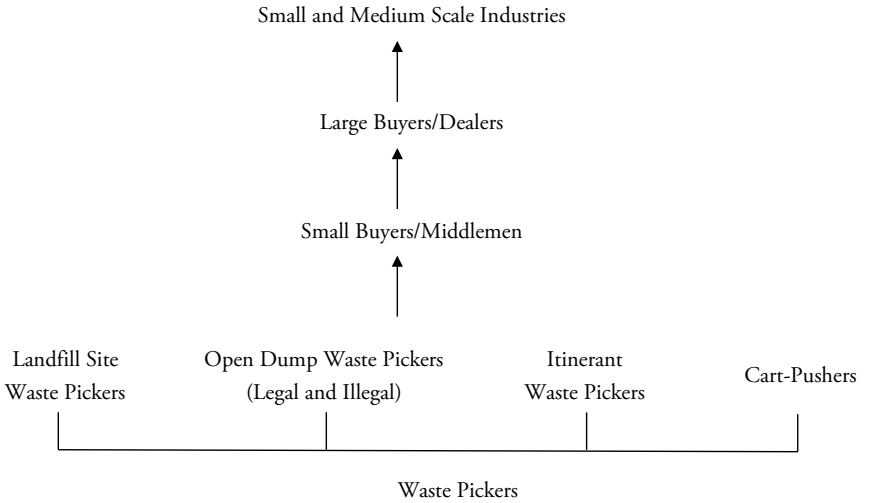
Focusing on waste pickers and scrap dealers and drawing on field experiences from two Nigerian cities, this chapter illustrates the effect of collective organization of waste workers on urban governance and inclusive development in Nigeria. Implications of the observations for the sustainable development goals are also considered.

Overview of the informal waste economy in Nigeria

There has been an increasing realization that informality represents a new mode of urbanism, and that most of the global population now tends to be "informal" rather than "formal". In recognition of the trend towards informality, livelihoods in the waste recycling system of Nigerian cities have also increasingly fascinated urban researchers.

The informal waste economy in Nigeria comprises waste pickers, scrap dealers, itinerant waste buyers, cart pushers, middlemen, and micro and small enterprises. In this study, we will focus on waste pickers and scrap dealers as they are the main drivers of informal recycling in Nigeria (Nzeadibe and Ajaero, 2011). Waste pickers act as the first link in the recycling chain and those involved in waste picking are consigned to the bottom of the waste value chain in Nigeria while scrap dealers and their activities connect the informal economy to industry.

Figure 1: Hierarchy of informal recycling in Lagos, Nigeria



Source: Nzeadibe and Iwuoha (2008).

Figure 1 shows the generalized model of the hierarchy of informal recycling in the megacity of Lagos, undoubtedly the cultural capital of Nigeria and economic hub of the West African sub-region (Mbah et al., 2019). The economic and power relations in this hierarchical structure of informal recycling need to be noted. It can be observed that there is a direct relationship between increasing influence, affluence, and specialization on the one hand, and an inverse relationship in the population of people involved on the other, as we move up the pyramid (Nzeadibe and Iwuoha, 2008; Nzeadibe and Ajaero, 2010). The pyramid shows many waste pickers with little economic power at the base but tapers off upwards to the small and medium scale industries (SMEs), who are few in number but dictate the prices of materials and terms of payment for other actors in the waste economy.

It is noteworthy that informal waste workers are frequently excluded from social and economic policy and planning of Nigerian cities (Nzeadibe and Anyadike, 2012). Yet, recent research has shown that the informal waste economy in Nigeria has increasingly become an asset in helping municipalities recover materials and reclaim value from waste, reducing the cost of waste management and protecting the environment (Nzeadibe and Mbah, 2015), while also contributing to economic wellbeing, with some local industries relying on

the supplies of secondary raw materials from waste pickers and scrap dealers. Waste pickers and scrap dealers are thus critical to the dynamic system of value reclamation from municipal solid waste in Nigerian cities. The next section attempts to articulate the associational status of waste workers by situating the discourse in African literature on collective organizing in the informal economy.

Collective organizing in the informal economy in African cities

This research is conducted within the political economy framework of the informal economy and collective organizing. Recent academic engagements have attempted to establish the link between informality, urban governance, and development in Africa through the lens of collective organizing by non-state actors (Ezeibe et al., 2017). While it is known that making a living in the informal economy is associated with deprivations, threats to wellbeing, struggles and sociopolitical contestations for rights, tensions and competitions for survival; cultivation and maintenance of social networks, agency, and collective organizing, determine or codetermine sustenance of livelihoods and are frequently drawn upon to overcome some of the vulnerabilities (Lourenço-Lindell 2010; Nzeadibe and Mbah, 2015). Interestingly, current international development discourse places a premium on giving voice to groups that have been traditionally absent from politics and politico-administrative systems (United Nations Department of Economic and Social Affairs, 2015). Hence, collective organizing is considered a useful approach to foster inclusion of vulnerable groups such as informal workers in the governance of cities (Nzeadibe and Anyadike, 2012; Ezeibe et al., 2017; Nzeadibe and Ochege, 2018).

Crucially, the theoretical argument around survival has been whether it is best attained as individuals (atomism) or as groups (collectives). Social atomization theorists contend that in the prevailing market economy, individualization is the most assured means of achieving success, and by extension, security and survival (Strauss, 2008). The major shortcoming of the atomization theory is that it treats every individual as equal and neglects unique dissimilarities (Gorz, 1989). Hence, the importance of organized groups for political and economic survival has been canvassed (Garson, 1978).

It has also been noted that associational groups originated from industrial societies with a complex web of competing political and economic interests,

and that such groups have become increasingly important in Africa today. These groups play crucial roles in reducing vulnerability and improving the coping strategies of the urban poor in African cities (Lourenço-Lindell, 2001). They also aid horizontal linkages that may enable groups of people with similar interests, who would otherwise be dispersed and disorganized, to articulate their voice and exert collective power, especially in countries emerging from authoritarian rule (Goodfellow, 2014). However, opportunistic tendencies often erode and compromise the objectives of the collective organizing (Ezeibe et al., 2017).

In order to influence policies and promote the welfare of those involved, the informal economy in Africa has resorted to collective organizing. In this form of collective organization, people with common interests cooperate to render support and assistance such as financial contributions or labor power to members of the group (Oduol and Kabira, 1995) especially as such groups are known to constitute close-knit identity groups in African cities (Konings 2006; Oosterom et al., 2016). While collective organizing has been well documented in some aspects of the informal economy in Nigerian cities such as the motorcycle taxi economy (Ezeibe *et al,* 2017) and the shoe and garment economy (Meagher, 2010), very little is known about how waste workers organize themselves to contest urban governance policy.

Critiquing the perceived benefits of collective organizing, Meagher (2010) and Kinyanjui (2014) highlighted the negative roles of collective organizations in African informal economies. These authors argue that the strong social bonding that comes with collective organization increases corruption and crime. However, Kinyanjui (2012) has demonstrated that collective organization in the informal economy can also have beneficial impacts. For example, they assist individual members through self-help groups by providing opportunities for contributory thrift schemes (locally known as *isusu*), skills training, and security. The informal economy also strives to meet the challenges of organizing to engage the government and protect the interests of its members (Wakins, 2013). Nonetheless, the informal economy's structural features constitute obstacles to organized collective action for economic, social, or political ends (Bonner and Spooner, 2011). In the next section, we present some background information on the social conditions of the study cities as a prelude to a discussion of their waste economies.

Study context, data and methods

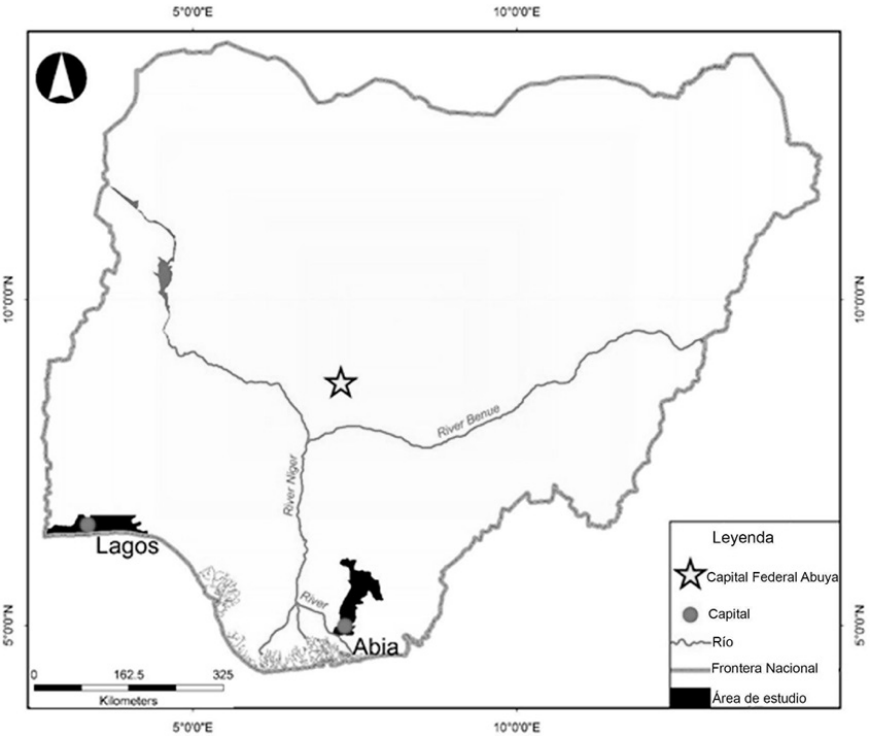
This study was anchored on the cities of Aba in the southeast and Lagos in the southwest regions of Nigeria. Aba is the commercial and industrial nerve center of Abia State, southeastern Nigeria. This city provides goods and services to adjacent urban areas and international markets. It includes the entire Aba North and Aba South Local Government Areas (LGAs) and parts of Osisioma and Ugwunagbo LGAs. The population of Aba has been growing steadily since the first census of the study area in 1931. As of 2006, the estimated population stood at 1,022,138.

On the other hand, Lagos megacity is the premier economic hub of the West African sub-region. With an estimated population of 21 million, Lagos is the world's fastest-growing megacity and a major gateway into the sub-region. The megacity of Lagos is also the most heterogeneous single settlement in Nigeria. As the largest center of commerce and industry in Nigeria, it is a melting pot in which every known ethnic nationality in the country is represented.

These two cities possess a large and burgeoning informal economy, to which a dynamic waste economy is firmly integrated. The cities were chosen because they reflect in many ways the social issues that affect the lives and activities of actors in the informal waste economy in Nigeria (Nzeadibe and Anyadike, 2012). While it is believed that the waste economy is very much a male-dominated activity in Nigerian cities, studies on the gendered nature of the occupation of waste picking and the position of female pickers in the informal waste economy of Nigeria have been generally inadequate (Nzeadibe and Adama, 2015).

With very little formal recycling taking place in Nigeria, open dumping of waste is still rife in Aba and Lagos. Consequently, current thinking in municipal solid waste management in both cities largely revolves around making huge investments in waste collection and disposal infrastructure. The existence of an informal transborder recycling economy involving waste dealers in the two Nigerian cities and countries in the West African sub-region has only recently been investigated (Mbah et al., 2019). Thus, visits to the major dumpsites in Lagos (Olusosun, Solous, and Abule-Egba) and Aba (Burrow pit) and the informal markets for the sale of recyclable materials in the two cities were pivotal to data collection in this study. Figure 2 is a map of Nigeria showing the study sites of Aba and Lagos.

Map 1. Nigeria showing the location of the study cities



Source: Nzeadibe and Adama (2015).

In recognition of the need to evolve an inclusive MSWM policy in which informal waste workers are recognized as stakeholders in urban space and social economy, this study carried out a wide-ranging multi-stakeholder engagement[1] over a period of 8 years (2006 to 2013)[2]. Qual-dominant mixed methods approach was utilized to describe the internal dynamics and pattern of participation in the waste economy of the focus cities. Qualitative methods employed were in-depth interviews (IDI), focus group discussions (FGDs), key-informant

[1] Adoption of a multi-stakeholder approach in this research is in line with the position recently canvassed by Alamgir et al. (2012) that the success of waste management strategies requires meaningful involvement of concerned stakeholders. Thus, a wide range of stakeholders representing many occupational sectors within MSWM were consulted in this research.

[2] The 8 years include the period of the author's doctoral research and professional engagement in solid waste management and public policy practice.

interviews (KII) as well as on-field observation. A survey of waste pickers was also conducted to collect some quantitative socioeconomic data. The choice of interviewees was predicated on their involvement in MSWM and the need to present the views of important stakeholders as well as people knowledgeable about Nigerian MSWM system (Nzeadibe, 2009; Ezeah and Roberts, 2014). Interviews were adopted as the main method of data collection to gain new perspectives and insights and more in-depth information from waste pickers and scrap dealers (Medina, 2007).

The interviews aimed to obtain a nuanced understanding of stakeholders' views on participation of waste pickers and scrap dealers in MSWM. Given that the stakeholders are not ubiquitously distributed, purposive sampling of interviewees presented the most suitable way to obtain data for the study (Fuseini and Kemp, 2015). Authors also draw from fieldwork experiences *with* waste pickers in Nigerian cities as participant observers.

The Aba case study

Although the informal waste economy is often seen as "an unorganized activity," and remarkably little is known about how people in informal waste economy organize themselves at work in Nigeria (Nzeadibe and Iwuoha, 2008; Adama, 2012), there seems to be some order or, more appropriately, socio-political organization among the waste dealers in Aba. However, most of the individual waste pickers operate solo, do not have viable cooperatives, and have limited negotiating power in their transactions with middlemen. Thus, waste pickers often find themselves in exploitative relationships with scrap dealers. In this context, Meagher (2010) distinguishes between informal governance processes, which relate to the regulatory role of social networks, informal institutions, and popular associations in urban areas, and formal governance processes, which involve formal political, economic, and social institutions. In this context, the organization of the powerful, tiered waste dealers' association, comprising individuals involved in the waste trade in Aba, may be regarded as informal urban governance. Whatever materials the waste pickers salvage must be sold for either direct reuse or recycling in order to complete the recycling loop.

The buying and selling of recyclables in Aba occur within highly organized systems. There are major markets for recyclables in Aba and in other Nigerian cities; there is also the internationalization of recycling networks between the city of Aba and cities in neighboring countries, including Malabo (Equatorial

Guinea) and Kumba and Doula in Cameroon. The materials recovered by the waste pickers must be sold for either direct reuse or recycling to complete the recycling loop. In Aba, the segments of the market for recyclables are organized in clusters around the Old Court Main Market. Hence, collective organizing is apparent in this market, which is made up of five (5) zonal unions, that is, market associations of traders that deal in the same type of goods or render the same kind of services, and as such, are united by common interest. The most important of these organized groups are those for glass bottles, plastics, and metal scraps. Each zone has a leader, while there is a President General of the entire market union who oversees the activities of the zonal unions. Members paid weekly subscriptions to maintain their membership and as a means to generate funds to further their collective aspirations and group interests. The waste dealers' sub-system operated as a closely knit cartel, in which they were familiar with one another and had identifiable locations in space from where they operated, unlike the pickers, who were itinerant. The dealers also have a very influential association with a powerful chairman and executive committee. The market union exercises considerable clout over the prices paid for materials they bought from waste pickers or sold to end users or industry.

The President General, in consultation with his executive committee, is the only one who can authorize interviews or research of any form in the market. The market union also seeks to influence urban governance policy and law enforcement agents such as the police, preventing undue harassment of their members. Mechanisms are also in place to punish offending members and for conflict resolution among members or between members and non-members. This system of organization of the market for recyclables would seem to suggest the development and stability of certain sub-sectors of the recyclables market in Aba. In all, the informal waste economy of Aba is estimated to indicate a potential of contributing USD 2.8 million to the urban economy on an annual basis (Nwosu et al., 2016). Table 1 shows the average daily incomes of waste pickers and scrap dealers in Aba.

Table 1: Distribution of pickers' and dealers' average daily income in Aba

Average daily income pickers (₦)*	**% of respondents**	**F (N=401)**	$\bar{x}$
No response	17.3	69	1643.47
1-2000		66.9	268
2001-4000		12.9	52
>4000		2.9	12
Average daily income of dealers (₦)	**% of respondents**	**F (N=195)**	$\bar{x}$
No response	33.8	66	2775.97
0-2000		27.5	54
2001-4000		31.8	62
4001-6000		4.6	9
>6001		2.0	4

*₦ means Nigerian naira (NGN). USD 1 is approximately equal to NGN 150.
Source: Nzeadibe and Anyadike (2012).

The Lagos case study

The informal waste economy in Lagos comprises the municipal waste economy and the e-waste economy. Although both segments of the informal waste economy are fueled by global structures and processes of change, the international trade in e-waste has remained the focus of environment and development discourse in West Africa (Oteng-Ababio, 2010; Ezeah and Fazerkely, 2017) while the informal transborder trade in municipal recyclables remains relatively unknown in the sub-region (Mbah et al., 2019). In Lagos, the e-waste economy is organized around seven clusters which represent main sources of waste electrical and electronic products (Nzeadibe and Adama, 2015). The clusters are Westminster Market, Alaba Market, Lawanson Market, Ikeja Computer Village, Ojota Scrap Market, Solous Dumpsite and Olusosun Dumpsite (Manhart *et al.* 2011).

Approximately 3,000 tons of waste are handled every day in Lagos, keeping about 5,000 people in regular employment. Economic and technological developments in Nigeria have continued to drive the increasing generation of e-waste in the country. According to the Global E-waste Monitor 2017 cited in the International Labor Organization (2019, 9), Nigeria generated 277,000 tons of e-waste in 2016, making it the third largest generator of e-waste in Africa behind Egypt and South Africa. The domestic generation of e-waste in Nigeria

is compounded by large volumes of e-waste coming in from abroad. Recent reports provide detailed but widely diverging statistics on illegal shipments of e-waste to Nigerian ports from countries in the European Union (EU), the United States, and China (International Labor Organization, 2019).

Estimates of the potential of the informal waste economy to create jobs indicate that up to 500,000 jobs may be created in the sector in Lagos State (Salau *et al.* 2017). In-depth interviews (IDIs) conducted at the Olusosun disposal site in December 2012 also revealed that over 1,000 waste pickers operate on the site, but only about 500 were registered with the waste pickers' association. Out of this figure, only 70 pickers, representing about 14% of the population, were women. The trading of waste is a major activity in the informal waste economy. It is a well-structured activity linking the major groups, from the waste pickers at the bottom to the manufacturers at the top of the hierarchy. The middlemen or small buyers and the agents or big buyers play the crucial role of supplying the factories with recyclables which they buy from waste pickers (Nzeadibe and Adama, 2015).

The informal waste economy of Lagos also comprises over 5,000 cart pushers and cart builders, waste pickers, resource merchants, and recyclers (Adebola, 2017). The role of informal waste workers in sustaining the green economy has assumed a regional dimension. Adebola reports that about 50% of materials recovered from the MSW stream serve as raw materials to the industries within Lagos and in Nigeria, while the remaining 50% is exported to some other African countries such as Ghana, Togo, Cameron, Mali, the Republic of Niger, and Sudan for both industrial and personal use. Nzeadibe et al. (2017) have similarly reported the existence of a dynamic recycling economy involving waste dealers in other Nigerian cities and countries in the sub-region. For example, trade in recyclable materials between cities in Cameroon and Equatorial Guinea, on the one hand, and Nigerian cities, on the other hand, were highlighted during interviews with scrap dealers in Aba, Nigeria, in 2011. A strong informal e-waste economy in the sub-region has also been noted (Oteng-Ababio, 2010, 2017) with Lagos playing a critical role as a regional hub (Manhart et al., 2011).

Although the informal waste economy may sometimes be driven by poverty and the need to earn incomes, there are, however, positive implications for the environment, albeit by default, since the main motivation for recycling is economic (Adama and Nzeadibe, 2017). Thus, Nzeadibe and Mbah (2015) argue that these informal waste management (IWM) activities form part of the new green economy, which is necessary for the creation of green jobs and sustainable urban development in Nigerian cities. Table 2 presents some data

on the contributions of waste pickers and scrap dealers to the urban economy and environment of Lagos.

Table 2. Minimum wage in Lagos compared with waste pickers' income (₦)

Waste pickers	Average daily income	Average monthly income	Minimum wage
Ojota landfill site	700	21, 000	7,500
Solus/Abule-Egba illegal dumps and other legal ones	550	16,500	7,500
IWBs/Cart pushers.	350	10, 500	7,500

Source: Nzeadibe and Iwuoha (2008).

Informal waste management, green economy, and inclusive development

Informal waste management (IWM) comprises all the unregistered and unregulated activities of waste pickers, scrap dealers, itinerant waste buyers (IWBs), informal collectors or cart pushers, middlemen, and micro and small enterprises (MSEs) involved in solid waste management (SWM) outside the state's regulatory sphere (Nzeadibe, 2013; Nwosu et al., 2016). Increasing public awareness and interest in environmental issues such as climate change, resource and waste management, as well as the realization that these issues are playing prominent roles in post-2015 development agenda (United Nations Environment Programme, 2015) catalyzed the quest for green and inclusive development. With the Sustainable Development Goals (SDGs) aiming to 'leave no one behind', Ezeibe et al. (2017) explain inclusion as the social, economic and political involvement of the most vulnerable people in society in the policy process, irrespective of age, sex, disability, race, ethnicity, origin, religion, or economic or other status. The informal waste economy in Africa has been linked to global environmental challenges such as the fight against climate change, the drive for increased resource recovery in situations of increasing scarcity of materials and natural resources, entrepreneurship, employment, and incomes (Adama and Nzeadibe, 2017). Arguably, the informal waste economy saves cities huge sums of money and landfill space, drives entrepreneurship, and generates employment and incomes, mitigates the problem of climate change, conserves

non-renewable resources, and creates a circular economy which is gradually replacing the 'linear economy' in many parts of the world (Michelini, 2017; International Labor Organization, 2019).

It is noteworthy that 'circular economy strategies seek to reduce the total resources extracted from the environment and reduce the wastes that human activities generate in pursuit of human well-being' (Foster, 2020). Accordingly, Velis (2015, 389) avers that the 'circular economy advocates the returning of used resources that would otherwise become wastes back into the economy'. It involves rethinking and redesigning the production process so that materials can fit into either a biological cycle (composting and anaerobic digestion) or a technical cycle (reuse, repair, remanufacture, or recycle). Underpinned by a transition to renewable energy sources, circular economy builds economic, natural, and social capital. This systemic shift can build long-term resilience, generate business and economic opportunities, and provide environmental and societal benefits. For example, the collaboration of multinational companies with informal sector associations in Latin America in the recovery of secondary materials and for product manufacturing is an important development in the transformation of initially informal systems into a circular economy (Velis, 2015, p. 391). Thus, informal waste management, this paper contends, can be a significant component of the 'circular economy' and its inclusion for the promotion of green jobs and sustainable urban development in African cities has been strongly advocated (Nzeadibe and Anyadike, 2012; ILO, 2013; Obeng-Odoom, 2014).

Similarly, the greening of the economy offers a dual promise to protect the environment and to provide decent work (Scully-Russ, 2018: 503). In this connection, Death (2015) distinguished between the green economy and the green state. While the green economy seeks to reconcile economic growth and capitalist development with ecological sustainability, the green state uses discourses of environmentalism to legitimize its development politics. Hence, the green principle in MSWM subjects the local environments, including the informal economy to market parameters.

Again, the inclusion of the urban poor and the most vulnerable groups is a core aspect of green MSWM. It extends the understanding of the relationship between the state, the economy, and socio-natures (Ezeibe, 2015). We argue that the SDGs are strong on inclusion, with eleven out of seventeen SDGs focusing on ecological inclusiveness while three focus on relational inclusiveness (Gupta and Vegelin, 2016). As noted by Gupta et al. (2014), the argument for justice and inclusive development in a neoliberal era is justified for moral,

legal, economic, social, security, and environmental reasons in an increasingly globalizing world.

In this regard, it is noteworthy that in evolving an inclusive MSWM policy in Nigeria, the support of international and local non-governmental organizations (NGOs) has been crucial in galvanizing efforts to organize informal waste workers in some Nigerian cities. One such effort is the Waste Collection Workers Welfare Initiative, which aims to cater to the welfare of waste pickers. According to the founder, the initiative aims to enable waste pickers to have a group voice in the liberalization of the sales of their products, as well as to provide a medium of meaningful engagement with the government. This initiative is currently being driven from the city of Lagos with plans to expand to other Nigerian cities.

With regard to the relationship between the informal waste economy and the academy, this study notes the modicum of research and advocacy engagement on the informal waste economy in Nigeria. A recent study systematically evaluated the development contributions of the informal waste economy in Nigeria (Nzeadibe, 2013). Entitled 'Informal waste management in Africa: Perspectives and lessons from Nigerian garbage geographies', this study reviewed developments in informal waste management in Africa, drawing from lessons learned over a decade of research and activism in Nigerian cities. The aim was to evaluate the scholarship impact of Nigerian informal garbage geographies and to accentuate emerging innovations in informal waste management research and activism in the country. This study is a pioneering effort at situating developments in the informal waste economy of Nigeria in international academic discourse using literature published by researchers within and outside Nigeria.

Similarly, the volume 'Dealing with waste' (Adama and Nzeadibe, 2017) provides unique perspectives and insights into the entrepreneurial skills and linkages of the actors in the informal waste economy in African cities. It highlights the construction of markets and the dynamics within them as the various actors strive to maximize their profits and opportunities. The book further pays attention to the social relations of power within and between the complex but structured networks that have evolved. The interest in the social relations of power is linked to the growing attention to the internal diversity of the informal economy. In this context, the book provides the opportunity to critically examine how the informal economy is differentiated and traversed by hierarchies, divisions, power relations, and inequalities structured along the lines of gender, age, income, ethnicity, and class among others. This book is remarkable because it is perhaps the first time such attention is devoted to informal

solid waste management in Africa in a single volume, with a preponderance of contributions from Nigerian scholars, based in Nigeria and complemented by a few from abroad. In all these academic engagements, collective organizing in the informal waste economy in Nigeria has received relatively little attention in academic literature, thus necessitating the present chapter.

Conclusion

This study has examined the collective organizing of waste pickers and scrap dealers in Nigerian cities. The waste pickers reclaim value from municipal waste in the absence of formal recycling programs in cities of Nigeria. In the post-2015 development era, it is argued that supporting value reclamation from informal MSWM could advance green and inclusive development. The informal workers in Nigeria are actors in the green economy in their own right who are making a significant contribution to the environment and development. One approach to achieving inclusion of groups, such as informal waste workers, traditionally excluded from mainstream urban governance, is collective organizing. The initiative at collective organizing of the waste pickers may be seen as ecological modernization and represents an approach to improving MSWM by waste pickers and scrap dealers and giving them a group voice in urban policy and governance in the face of their displacement from their sources of livelihood that is caused by modernization, which often fails to improve recycling of MSWM.

Reference

Adama, O. and Nzeadibe, T.C (eds) (2017). *Dealing with waste: Resource Recovery and Entrepreneurship in Informal Solid Waste Management in African cities*. Trenton, NJ: Africa World Press.

Adama, O. (2012). Urban livelihoods and social networks: Emerging relations in informal recycling in Kaduna, Nigeria. *Urban Forum* 23(4): 449 – 66. DOI: 10.1007/s12132-012-9159-8

Adebola, O.O.(2017). The Informal Private Sector in Integrated Solid Waste Management in Lagos. In Adama, O. and Nzeadibe, T.C (eds). *Dealing with waste: Resource Recovery and Entrepreneurship in Informal*

Solid Waste Management in African cities. Trenton, NJ: Africa World Press.

Adepitan, A.O.(2012). The Waste Collection Workers Welfare Initiative. Paper presented at the international Workshop *Survival in the margins of African Cities: Informal Solid Waste Management in Nigeria,* organized by the Urban Dynamics Research Cluster, Nordic Africa Institute, Uppsala, Sweden on 21 August 2012, at Rockview Hotels, Abuja Nigeria.

Bonner, C. and Spooner, D. (2011). Organising in the informal economy: A challenge for trade unions. *Internationale Politik und Gesellschaft*, *2*,87-105.

Death, C. (2015) Four discourses of the green economy in the global South. *Third World Quarterly*, 36:12, 2207-2224.

Ezeah, C. and Roberts, C.L. (2014). Waste governance agenda in Nigerian cities: a comparative analysis. *Habitat International*, 41, 121–128.

Ezeah, C. and Fazerkerly, J.A.(2017). Extended Producer Responsibility as a Tool for Managing E-Waste in Sub-Saharan Africa: Key Issues. In Adama, O. and Nzeadibe, T.C (eds). *Dealing with waste: Resource Recovery and Entrepreneurship in Informal Solid Waste Management in African cities*. Trenton, NJ: Africa World Press.

Ezeibe, C.C., Nzeadibe, T.C., Ali, A.N., Udeogu, C.U., Nwankwo, C.F and Ogbodo, C. (2017). Work on wheels: Collective organising of motorcycle taxis in Nigerian cities. International Development Planning Review 39 (3), 249-273. doi.org/10.3828/idpr.2017.10

Ezeibe, C.C. (2015), ABC of political economy: A beginner's guide to understanding the state and economy. Nsukka: University of Nigeria Nsukka Press.

Foster, G.(2020).Circular economy strategies for adaptive reuse of cultural heritage buildings to reduce environmental impacts. Resources, Conservation & Recycling 152, 104507. DOI:10.1016/j.resconrec.2019.104507

Fuseini, I. and Kemp, J.(2015). A review of spatial planning in Ghana's socio-economic development trajectory: A sustainable development perspective. *Land Use Policy* 47, 309–320.

Garson, G.D. (1978) *Group Theories of Politics*. California: Sage Publications, Inc.

Goodfellow, T. and Titeca, K. (2012). Presidential intervention and the changing politics of survival in Kampala's informal economy. Cities, 29, 264-270.

Goodfellow, T. (2014). Legal Manoeuvres and Violence: Law Making, Protest and Semi-Authoritarianism in Uganda. Development and change, volume 45, Issue 4, July 2014, 753-776.

Gorz, A. (1989) *Critique of Economic Reason. Translated by* Gillian Handyside and Chris Turner. New York: Verso.

Gupta, J.,Baud, I., Bekkers, R., Bernstein, S., Boas,I., Cornelissen, V., Iguchi, M., Kanie, N.,

Kim, R.E., Lima, M.B., Obani, P., Schoof, P., Stevens,C., and van Zoomeren, D.(2014). Sustainable Development Goals and Inclusive Development. POST2015/UNU-IAS Policy Brief #5. Tokyo: United Nations University Institute for the Advanced Study of Sustainability. Retrieved from http://collections.unu.edu/eserv/UNU:2567/Post2015_UNUIAS_PolicyBrief5.pdf (accessed 9 November 2015).

Gupta, J and Vegelin, C. (2016) Sustainable development goals and inclusive development. *International environmental agreements: Politics, law and economics* 16 (3), 433-448.

ILO (2013). Promoting green jobs through the inclusion of informal waste pickers in Chile. Retrieved on 09:08:13 from http://www.ilo.org/empent/units/green-jobs-programme/about-the-programme/WCMS_216961/lang--en/index.htm

International Labor Organization (2019). From Waste to Jobs: Decent work challenges and opportunities in the management of e-waste in Nigeria. Working Paper No. 322. Geneva: International Labour Office

Kinyanjui, M. N. (2012) Institutions of Hope: Ordinary people's market coordination and society organisation alternatives. Nairobi: Nsemia Publishers.

Kinyanjui, M.N. (2014). Women and the informal economy in urban Africa: From the margins to the centre. London: Zed Books.

Konings, P. (2006). Solving Transportation Problems in African Cities: Innovative Responses by the Youth in Douala, Cameroon. *Africa Today* 58.2: 58-95.

Lourenço-Lindell, I. (2010). Introduction: the changing politics of informality – collective organising, alliances and scales of engagement. In I. Lindell (Ed.) Africa's informal workers: collective agency, alliances and transnational organising in urban Africa (p.1-30). London/Uppsala: Zed Books and the Nordic Africa Institute.

Lourenço-Lindell, I (2001) Social Networks and Urban Vulnerability to Hunger. In A.

Tostensen, I. Tvedten and M Vaa (Eds.) *Associational Life in African Cities: Popular Responses to the Urban Crisis*. (pp *30-45*). Uppsala: Nordiska Afrikainstitutet.

Manhart, A., Osibanjo, O., Aderinto, A., and Prakash, S.(2011).Informal e-waste management in Lagos, Nigeria – socio-economic impacts and feasibility of international recycling co-operations. Final report of component 3 of the UNEP SBC E-waste Africa Project, Öko-Institute.V. Retrieved from http://www.oeko.de/oekodoc/1371/2011-008-en.pdf (accessed 10 September 2013).

Mbah, P.O., Ezeibe, CC., Ezirim, G.E., Onyishi, C.J. and Nzeadibe, T.C. (2019).Value reclamation from informal municipal solid waste management: Green neoliberalism and inclusive development in Lagos, Nigeria. *Local Environment: the International Journal of Justice and Sustainability* 24 (10), 949-967.

Mbah, P.O and Nzeadibe, T.C. (2017). Inclusive municipal solid waste management policy in

Nigeria: Engaging the informal economy in post-2015 development agenda. *Local Environment* 22(2), 203-224.

Meagher, K.(2010). Identity economics: Social networks and the informal economy in Nigeria. New York: James Currey.

Medina, M. (2007). The world's scavengers: Salvaging for sustainable consumption and production. Lanham: AltaMira Press.

Michelini, G., Moraes, R.N., Cunha, R.N., Costa, J.M.H and Ometto, A.R. (2017). From linear to circular economy: PSS conducting the transition. *Procedia CIRP* 64, 2-6.

Nzeadibe, T.C and Ochege, F.U.(2018).Urban Vulnerability of Waste Workers in Nigerian Cities: The Case of Aba, Nigeria (Chapter 16). In Brinkmann, R. and Garren, S. J.(eds) *Palgrave Handbook of Sustainability: Case Studies and Practical Solutions.* Springer International Publishing. ISBN: 3319713884

Nwosu, B U., Nzeadibe, T C., and Mbah P O. (2016) Waste and well-being: a political economy of informal waste management and public policy in urban West Africa. Review of African Political Economy, 43 (149), 478-488.

Nzeadibe T.C. (2009) Solid waste reforms and informal recycling in Enugu urban area,

Nigeria, *Habitat International,* 33 (1), 93-99.

Nzeadibe T.C and Iwuoha, H.C.(2008) Informal waste recycling in Lagos, Nigeria, Communications in Waste & Resource *Management,* 9(1), 24-30.

Nzeadibe T.C. and Ajaero C.K. (2010) Informal waste recycling and urban governance in Nigeria: Some experiences and policy implications. *In*: Meijer, J. and der Berg, A. (Eds.) *Handbook of Environmental Policy*. New York: Nova Publishers, pp. 245-264.

Nzeadibe T.C. and Ajaero C.K. (2011) Development impact of advocacy initiatives in solid waste management in Nigeria, *Environment, Development and Sustainability,*13(1), 163-177.

Nzeadibe, T.C. and Anyadike, R.N.C (2010). Solid waste governance innovations: an appraisal of recent developments in the informal sector niche in urban Nigeria. *Geography Compass*. 4 (9) 1284-1296.

Nzeadibe T.C. (2013). Informal waste management in Africa: Perspectives and lessons from

Nigerian garbage geographies. *Geography Compass*, 7(10), 729-744.

Nzeadibe, T.C. and Adama, O.(2013).Improved recycling performance: Policy options for

Nigerian cities. Policy Notes 2013/2. Uppsala, Sweden: The Nordic Africa Institute. Available at http://nai.diva-portal.org/smash/get/diva2:653251/FULLTEXT01.pdf

Nzeadibe, T.C. and Adama, O. (2015). Ingrained inequalities? Deconstructing gendered spaces in the informal waste economy of Nigerian cities. Urban Forum 26(2), 113-130. DOI: 10.1007/s12132-014-9246-0.

Nzeadibe, T.C and Mbah, P.O. (2015). Beyond urban vulnerability: interrogating the social sustainability of a livelihood in the informal economy of Nigerian cities. Review of African Political Economy, 42(144), 279-298.

Nzeadibe, T.C and Anyadike, R.N.C. (2012).Social participation in city governance and urban livelihoods: Constraints to the informal recycling economy in Aba, Nigeria. *City, Culture and Society* 3(4), 313-325.

Nzeadibe, T.C, Anyadike, R.N.C and Adama, O.(2017). Informal Recycling Market Linkages and Urban Governance in Nigeria. In Adama, O. and Nzeadibe, T.C (eds). *Dealing with waste: Resource Recovery and Entrepreneurship in Informal Solid Waste Management in African cities*. Trenton, NJ: Africa World Press.

Obeng-Odoom, F.(2014).Green neoliberalism: Recycling and sustainable urban development in Sekondi-Takoradi. *Habitat International,* 41,129-134.

Oduol, W. and Kabira, M. (1995) The mother of warriors and her daughters: the women's movement in Kenya. In A. Basu (ed.) *The Challenge of Local Feminisms: Women's movements in global perspective* (pp. 87-208). Boulder CO: Westview Press.

Oosterom, M.A., Kache, C., Mususa, D., and Pswarayi. (2016). The Violent Politics of Informal Work, and How Young People Navigate Them: A Conceptual Framework. Evidence Report No. 198, Brighton: Institute of Development Studies. Accessed on 31:01:17 from: https://opendocs.ids.ac.uk/opendocs/handle/123456789/11780

Oteng-Ababio, M.(2017). Dreaming of a "Zero Waste City": Insights into "Kaya Bola" and the Steel Industry in Accra, Ghana. In Adama, O. and Nzeadibe, T.C (eds). *Dealing with waste: Resource Recovery and Entrepreneurship in Informal Solid Waste Management in African cities*. Trenton, NJ: Africa World Press.

Oteng-Ababio, M.(2010). E-waste: an emerging challenge to solid waste management in Ghana. *International Development Planning Review*, 32 (2), 191-206. DOI:10.3828/idpr.2010.02

Scully-Russ, E.(2018). The dual promise of Green Jobs: Sustainability and economic equity in R Brinkmann and S J Garren (eds) *The Palgrave Handbook of Sustainability: Case Studies and Practical Solutions*. Cham: Palgrave Macmillan (503-521).

Strauss, D. F. (2008) Atomism and holism in the understanding of society and social systems. *Koers* 73(2), 187-205.

United Nations Environment Programme (2015). *Global Waste Management Outlook*. Retrieved from http://www.unep.org/ietc/Portals/136/Publications/Waste%20Management/GWMO%20report/GWMO%20full%20report.pdf (accessed 10 September 2015).

United Nations Department of Economic and Social Affairs (2015). Transforming our world: The 2030 Agenda for Sustainable Development. Sustainable Development Knowledge Platform. Accessed on 20th August 2015 from: https://sustainabledevelopment.un.org/content/documents/7891Transforming%20Our%20World.pdf

Velis, C. (2015). Circular economy and global secondary material supply chains. *Waste Management & Research* 33(5) 389-391.

Wakins, D. (2013). The formalization and unionization campaign in the Buenaventura port, Columbia. In S. Schurman and A. Eaton (Eds.). Trade unions organising workers "Informalized "From Above:" Case studies from Cambodia, Columbia, South Africa and Tunisia. (pp. 57-100). New York: Solidarity Centre.

The recovery of waste in Yaoundé (Cameroon)

Actors, chains, and flows of recovered materials

*Jules Ngambi**

Introduction

Waste, understood as a resource, abounds in the city of Yaoundé. It is estimated that more than 2,000 tons are produced per day: 70% is biodegradable and putrescible; the remaining 30% is made up of plastics, metals, waste electrical and electronic equipment, paper, cardboard, glass, and textiles). Despite the fact that as of 2012 the legal framework has evolved in terms of regulating the recovery of waste, its application is still limited. In practice, the trades associated with the waste industry are developing through the initiatives of private companies, civil society (associations, NGOs) and artisanal recycling workers. To these three categories of actors, self-employed workers (reclaimers, sellers and/or resellers, and merchants) can be added. The main channels that feed the recovery circuits with or without waste transformation, cover both the formal and informal sectors: recovery, repair, reuse, composting, recycling, and the extraction of methane gas from landfills. The flows and circulation of these waste resources, transformed or not, take mainly two directions in Yaoundé. First, they go both towards the medium-sized cities near the capital

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(Obala, Mbalmayo, Mbankomo, and Mfou) and towards the border between Cameroon, Gabon, and Equatorial Guinea (Kyo-Ossi) located about 310 km from Yaoundé. Second, the flows of recoverable materials go on the one hand, to Douala (economic capital) and, on the other, to supply exports to Asia and other African countries. The conflict-free coexistence of informal and formal actors at all stages of the recovery of recyclable materials from waste constitutes, in Yaoundé and in Cameroonian cities in general, a key strength for the maintenance, consolidation, and development of trades related to waste.

Sustainable waste management still constitutes an urban challenge for governments, particularly for local authorities (Dumonteil, 2016), mostly due to rampant and poorly controlled urbanization, as well as population growth fueled by rural exodus and immigration (Tshala Upite et al., 2015; Lazare at al., 2017). Some of the difficulties that have contributed to inefficient and poorly controlled waste management in the cities of developing countries include the increasing standard of living of populations, their eating habits, which increasingly resemble those of consumer societies, and the changing quality and quantity of waste production that needs to be treated. Thus, waste production in the city of Yaoundé continues to increase. In fact, it has been estimated at 2,000 tons per day in 2015 (Ngambi, 2015a) and 2,300 tons per day in 2017 (Sotamenou, 2017).

It should be noted that in Yaoundé (and in the cities of Cameroon in general), a linear urban waste management system is still used: more than 80% of waste is collected, transported, and buried in local dumps. Aware of the limits of this linear system, the Cameroonian state has committed itself to achieving the Sustainable Development Goals (SDG) and has defined a national waste management strategy since 2015. Cameroonian governmental entities, especially municipal authorities, are responsible for waste management and the continued search of innovative and adaptive solutions for collecting and treating waste within their territory. To implement the SDG, the local authorities suggest that waste is a resource, and it should not be regarded as a pollutant agent or a producer of environmental impacts or nuisances. In other words, initiatives such as the Yaoundé Sanitation Project (PADY 1 and 2), aim to transform "waste which produces environmental impact and nuisances, into resources" (Pierrat, 2017). The actors involved in the PADY and other projects such as Clean City (Cité Propre), which is promoted by the NGO ERA-Cameroon, show that the issue of waste in Yaoundé is no longer a sole concern of local authorities. The local waste management policies benefit from subsidies and the expertise of civil society actors, private companies, and international fund

suppliers. The aim of external actors' participation is to promote environmentally friendly economies.

Methodological approach to identify actors, typologies, and waste flows in Yaoundé

Field observation

As Wadoum Defouen (2005) highlights, the direct observation of the object of study and the environment in which the problem occurs is useful for extracting relevant information for the research. This approach has allowed the identification of the different types of workers and the daily observation of their activities despite the reticence of most organizations (of recovery and composting) and self-employed workers to engage with people unrelated to their activities. Nevertheless, several work meetings with different actors helped build a relationship of trust, which facilitated data collection. This stage of work also enabled to study different waste streams and circulation in Yaoundé and to propose a cartographic reconstruction of them.

Qualitative survey

A qualitative survey (using semi-structured interviews or surveys carried out through an interlocutor) was conducted with key actors, including executives from associations, collective interest groups (CIGs), NGOs, self-employed workers, and managers of private companies in charge of waste recovery. A total of 112 interviews were conducted. Each interviewee was the best-placed actor to provide us with detailed information about their activity based on their multiple experiences (Table 1). The interviewees helped to identify the different waste typologies, as well as their sales, or supply circuits. The data gathered during this stage helped to establish interactions among the different actors involved in waste recovery in Yaoundé.

Table 1. Types of interviewed recovery actors

Structure	Number of people
Associations (CIGs)	9 legal representatives
NGOs	6 legal representatives
Self-employed workers	33 waste pickers
Repairers	31
Resellers	19
Artisans	12 in charge of the production units
Companies	2 heads of departments

Source: J. Ngambi, 2018.

Diversity of actors involved in Yaoundé's waste recovery sector: integrating formal and informal actors

In the city of Yaoundé, waste recovery activities are carried out in two different but complementary sectors, namely the informal[1] and formal[2] sectors. The actors belonging to the informal sector (IS) include households, waste pickers, independent traders, resellers of unprocessed waste, artisans, collective interest groups (CIGs) and associations. The formal sector (FS) consists of administrative structures that are technically well organized and possess all the necessary qualifications and abilities to carry out various activities in the field of waste. These are public institutions, NGOs, and private companies (Table 2). In Yaoundé, qualified NGOs, such as ERA-Cameroon, Mvog-Ada Volunteer Club, and CIPRE (International Center for Promotion and Recycling) have

[1] The informal or unstructured sector includes economic activities that are not supervised by public institutions but are not clandestine. Its activities are not declared to tax authorities, and tracking them remains rather difficult as the promoters do not keep accounting records. Furthermore, the actors do not hold a license. Nevertheless, the services they provide to the municipalities and the population are still accepted by public authorities.

[2] In this case, companies handle accounting and have a solid administrative structure. Although they are not duly accredited, they work together with public institutions and international organizations. They can be accountable for their activities when they receive financial and material support from third parties. Moreover, workers benefit from social security, since they are registered in the National Social Security Fund (NSSF), and they have the right to social benefits such as pensions. The production units are located and registered in the Commercial Registry.

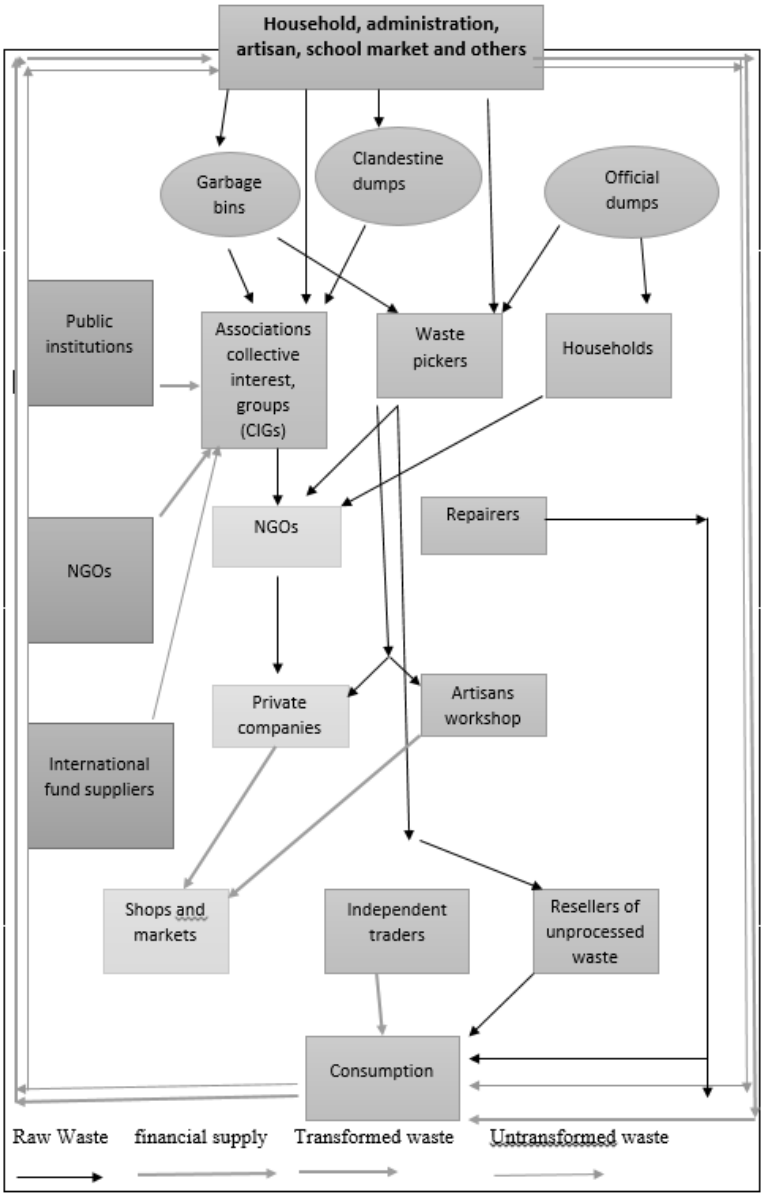
been involved not only in waste recovery but also in providing training on recovery techniques.

In Yaoundé, waste pickers have been the first actors to set up profitable activities through the exploitation of waste. They provide raw materials to all actors who participate in the recovery of waste, regardless of whether they belong to the formal or informal sector. They position themselves in Cameroon's urban ecosystem as key players in all the sectors involved in waste recovery.

Waste activities that generate income and have a positive environmental impact rely on the financial support of international agencies. The funds allocated to associations, NGOs, and CIGs are used for training in recovery techniques and for the implementation of productive projects. The peaceful coexistence of the formal and informal sectors in the process of recovery is an advantage for the maintenance and development of different professions related to waste management. In Yaoundé, the raw materials obtained from waste are abundant. In addition to this, the formal sector is almost absent in the collection of materials from "deposits" (garbage bins, clandestine dumps, and official dumps), which leaves the field open for the participation of informal waste pickers. Furthermore, 80% of recovered waste comes from informal waste pickers, while 15% comes directly from households and the remaining 5% from the private company Cameroon's Sanitary Hygiene Services (HYSACAM).[3]

[3] HYSACAM is the only private company authorized for the technical management of household waste in Yaoundé.

Figure 1. Actors and their interactions in the recovery of Yaoundé waste



Source: J. Ngambi, 2018.

The actors who work in the formal circuit are large economic operators with traditional sales venues (shops, hardware stores, colection points, among others). The informal circuit is larger than the formal one and is controlled by more modest actors. It includes independent traders who are supplied by waste pickers, repairers, informal recyclers, and factories. The end products of these activities are consumed by all users (businesses, households, companies, people in general, and so on.). The constant demand for the products coming from waste treatment and repair is related to their affordable price for all social classes.

In Yaoundé, there are different recovery circuits. However, regardless of the techniques or methods used for waste recovery, there is a mutually beneficial relationship among the different actors at all stages of the waste economy activities. This complementarity is manifested in different forms of reciprocity, and it has facilitated the coexistence of a diversity of waste workers in a non-conflicting environment. Nevertheless, each actor, as shown in Table 2, has at least one specific function in the process of waste recovery.

Table 2. Intervention of the different actors in waste recovery in Yaoundé

Actor category	**Actor**	**Role in waste activities and/or projects**
Informal actors	Households	Classification and sale of recycling waste.
	Waste pickers	Classification and sale of recycling waste.
	Repairers	Repairing of waste or one of its components; selling repaired objects at a low price.
	Buyers and resellers of unprocessed waste	Purchase and sale of waste for reuse.
	Independent traders of processed waste	Purchase, reintegration of secondary raw materials, and products made from recycled materials in the economic cycle.
	Associations and GICs	Recovery and processing of waste and sale of processed materials such as compost.
	Recyclers	Purchase and recycling of waste; manufacturing and sale of products derived from recycled materials.

Actor category	Actor		Role in waste activities and/or projects
Formal actors	Public institutions	Secretariats	Enactment of laws; planning of waste management programs and projects.
		Associations	Implementation and supervision of labor-intensive waste projects in the urban area.
		Municipalities	Implementation and control of waste projects at the local level (municipal); Continuous support to associations with small equipment (gloves, wheelbarrows, facemasks, etc.).
	Stores/markets		Purchase, reintegration of secondary raw materials, and products made from recycled materials in the economic cycle.
	International fund suppliers		Financial, material, and technical contributions to associations, NGOs, and the State.
	NGOs		Sensitization, training in waste management, waste purchase, classification, recycling, and reintegration of secondary raw materials in the economic cycle.
	Private companies		Purchase and recycling of waste; manufacturing and sale of products derived from recycled materials.

Source: J. Ngambi, 2018.

Factors that influence the emergence of waste recovery activities

Legal framework: an introduction to the formalization of waste management

The government of Cameroon strengthened the legal framework in 2012 by introducing new regulations governing waste recovery activities at a national level. These measures were timely, reinforcing the strategy of sustainable waste management and the environmental protection at an urban level. The new regulations have established technical, administrative, and organizational rules for waste management, leading to a new framework for the formal integration of all actors in every kind of waste activities and/or projects (Box 1).

Box 1. New waste management regulations in Cameroon

Prime Ministerial Decree No. 2012/2809/PM of 26 September 2012

The decree signed by the Prime Minister establishes for the first time the requirements for the classification, collection, storage, transportation, recovery, recycling, treatment, and final disposal of waste in Cameroon. The concept of waste recovery is formally defined, and it refers to any operation of recovery, reuse, recycling, and use of waste as a source of energy or any other action aimed at obtaining raw materials or reusable products from the recovery of waste. The goal is to reduce or eliminate its negative impact on the environment.

Ordinance No.001-MINEPDED of 15 October 2012

This regulation passed by the Ministry of Environment, Nature Protection and Sustainable Development (MINEPDED) outlines the requirements to obtain an environmental license for waste management. Article 1 of the ordinance defines the environmental license as a legal document that authorizes any natural person or legal entity to carry out activities of classification, collection, transportation, storage, recovery, recycling, treatment, and/or disposal of waste. This regulation promotes the formalization of waste recovery sectors which had been previously dominated by the informal sector.

Joint ordinance No.004-MINEPDED/MINCOMMERCE of October 2012

This regulation encourages the use of biodegradable packaging. It regulates the manufacturing, importation, and commercialization of non-biodegradable packaging. The objective is to limit the production of non-biodegradable plastics and to hold plastic packaging manufacturers and importers responsible for implementing an action plan for the management of waste, promoting reuse and recycling of plastics in all their forms.

Joint ordinance No.005/MINEPDED/MINCOMMERCE of 24 October 2012
This joint ordinance signed and published by the MINEPDED, and the Trade Ministry (MINCOMMERCE) establishes the specific requirements for the management of electrical and electronic equipment waste (WEEE or D3E) and their disposal without causing damage to the environment. The adoption of this joint decision has encouraged the creation of the WEEE recovery sector. Most of the electrical and electronic equipment which is bought in the cities of Cameroon is second-hand or third-hand. Previously, even when this equipment was recovered and reused, it often ended up contaminating the natural environment.

Private companies: formal actors in waste recovery

Undoubtedly, the enactment in 2012 of the legal texts that lay the foundations for waste recovery represents a significant achievement for the Cameroonian state. However, public authorities, specifically the local authorities, have a minor presence in the promotion of waste recovery initiatives. Waste recycling or transformation projects in Yaoundé, and in Cameroon in general, have always been conducted by private companies and NGOs that often benefit from the financial contributions and experience of international partners.[4]

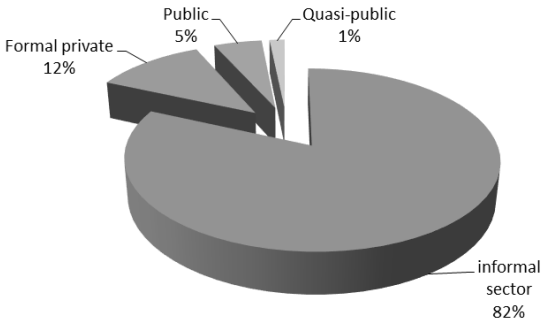
Informal actors: the key element of waste recovery

For years, the state has been the primary employment generator in Cameroon. Access to employment was possible through testing and direct recruitment. Getting a university degree was equivalent to getting a public or quasi-public administrative job. Nevertheless, this resource quickly became scarce as a result of the multiple financial crises in the country during the 1990s. The integration of young people into the formal labor market has become uncertain. In 2000, the unemployment rate was estimated at 25.6% in Douala and 21.5% in Yaoundé (Ngahan *et al.*, 2006). Therefore, in Cameroonian cities, most of the population is employed in the informal sector (in all its spheres): more than 80% of the workers, primarily young people between 15 and 35 years of age. Furthermore, during the 1990s, the Subregional Institute of Statistics and

[4] These projects are designed and implemented by well-organized structures with proven experience that are recognized by the state and international suppliers of funds. These companies continue to be benchmarks thanks to the satisfactory and constant results obtained in their different activities.

Applied Economy reported that the informal private sector employed almost 82% of young people in Yaoundé (ISSEA, 2008). It is important to emphasize that, 12 years later, this sector still employs more than 80% of young people.

Figure 2. Distribution of jobs by sector of activity



Source: J. Ngambi, 2018.

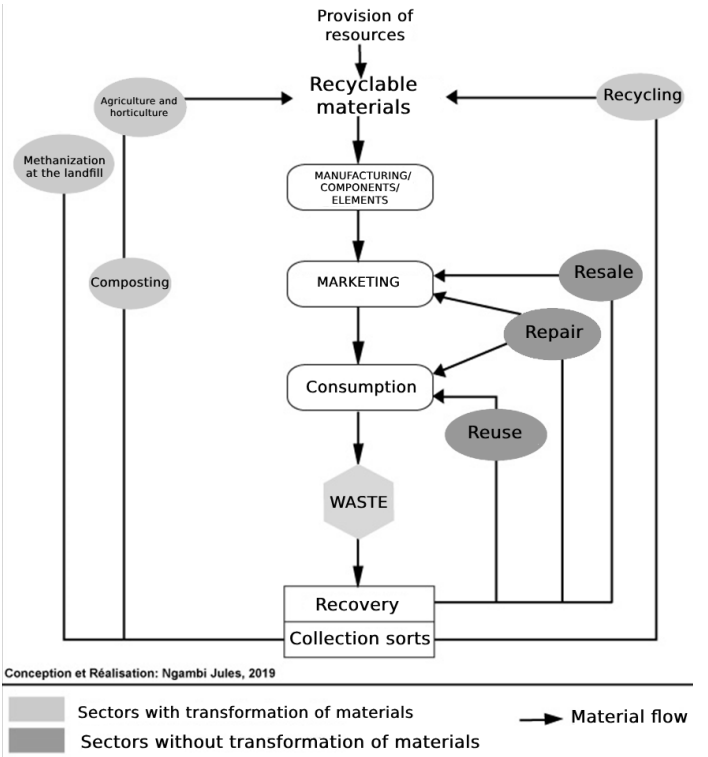
Waste management jobs employ 65% of young people between 15 and 30 years of age. Almost 95% of recovery activities and/or projects are performed by small businesses with less than 10 employees, associations, and self-employed workers. Waste recovery, which in Cameroonian cities has significantly increased since 1990, is considered "the employment of the poor" or, in the best-case scenario, "the small trades of ingenuity and creativity", as defined by Ayimpam (2015). Members of the informal sector involved in waste recovery are vulnerable people, living in poverty. This situation is very common for domestic and foreign migrants, poorly educated people, laid-off workers, elderly people, single women, orphaned children, public and private employees with low salaries, and university and college graduates (private and public) who have not found employment. All these workers have the same purpose: to earn a daily livelihood for their families in a challenging urban environment.

Sectors and modalities of waste recovery in Yaoundé

Sustainable waste management requires a categorization of the treatment methods, which contributes to the application of preventive policies to limit the waste of natural resources and to promote economic and social benefits. In the context

of Cameroon and other cities of Sub-Saharan Africa, this process involves the design and implementation of waste recovery activities with transformation (recycling, composting, and methane capture) and without transformation (recovery, reuse, and repair) (Ngambi, 2018a; Williams et al., 2012).

Figure 3. Waste recovery channels in Yaoundé



Source: J. Ngambi, 2019.

The informal sector in Yaoundé: essential support for the emergence of recovery activities

Informal waste recovery activities are unregulated economic activities that generate income through the purchase, sale/resale, or any other form of exchange of goods and services (Nayheli Tejumola, 2012). The main actors of this sector include associations (recovery and composting), households, NGOs, and CIGs.

Informal recovery: the cornerstone of waste recovery

Recovery is categorized as a small-scale urban informal activity or trade. As in other African cities such as Cotonou in Benin (Lawson *et al.*, 2008; Gbinlo, 2010), and Libreville in Gabon (Ada, 2006), informal recovery in Cameroon has become a cornerstone of the process of urban waste recovery. Beginning in the 1990s, it first emerged in Yaoundé and Douala (Kengne and Bopda, 2000). In Yaoundé, 90% of the recovery process is conducted informally (75% by independent waste pickers, 5% by households and 10% by the associations and CIGs). There is no legally recognized association of waste pickers, they work independently. There are approximately 10 associations and 5 NGOs in the recovery sector. At least three hundred (300) independent waste pickers supply 70% of the recoverable material to NGOs and 100% to private companies. This dependence occurs because the actors involved lack the necessary labor force to perform the recovery activity on a permanent basis. As mentioned above, people of all ages – children, young people, adults, and older adults, all of them with a precarious social status – are involved in the informal recovery. In the Nkol Foulou dump, where some of the interviews for this research were conducted, the workers are between 20 and 65 years old. In the municipalities of Yaoundé, the informal recovery activities are conducted for three purposes: livelihood, livestock rearing, and industrialization (Ngambi, 2015b).

- **Waste recovery for livelihood purposes**

Recovery for securing livelihood is conducted by individuals with unstable economic situations, such as unemployment and low incomes. The major recovered resource is plastic.

Figure 4. Plastic materials recovered from the open air in Yaoundé

Source: Jules Ngambi (personal colletion, 2015).

Waste is recovered from sewers, drains, or watercourses. The recovered material is carefully washed to increase its market value.). Waste pickers deliver their products in Douala using an adapted means of transportation (for example, a pickup truck). Nevertheless, waste pickers also collect ferrous and non-ferrous metals, glass, cardboard, and objects that can be easily sterilized or safely used (wood, clothes, kitchen utensils, and shoes). Recyclable materials are collected in garbage containers, sewers, trash bins, streets, and clandestine dumps. The daily income of an experienced worker may amount to between 1,000 and 2,000 CFA francs (about USD 2 and USD 4).

- **Recycling for animal rearing**

Some of the reasons that have contributed to small-scale urban livestock rearing involve insufficient income, cultural habits, and unemployment after leaving an agricultural school. Animal sheds are built using recovered material. A visit to a farmer who owned six pigs revealed that he fed them on grain used in the Mvan Brewery and leftovers found in rubbish bins. He explained that this practice was the cheapest and had tripled his profits since he stopped buying fodder in the market. Pigs are easy to rear because they are omnivorous. Those

who are involved in waste recovery for rearing purposes have substantial gains in the medium. The cost of a pig ranges from 8,000 to 15,000 CFA francs (between USD 15 and USD 28). The selling price of a pig is between 50,000 and 150,000 CFA francs (between USD 90 and USD 270).

Figure 5. Pigsty of a waste collector in the Elig Edzoa district

Source: Jules Ngambi (personal colletion, 2013).

- **Recovery for industrial purposes**

Recovery for industrial purposes is the standard way of informal recovery in Yaoundé and its surroundings. It brings together actors of all ages. Every worker has the same purpose: the waste trade. The benefits are not limited to improving the standard of living of the actors and their families. The classification of waste and recovered materials by waste pickers has an important ecological incentive (reduction of harmful waste in the urban environment). It also influences the costs of waste treatment (reduction of waste flows to the municipal dump) and facilitates the direct access to raw materials for formal and informal recycling actors. The main recovered materials in this sector are ferrous and non-ferrous metals. In the two main markets of Yaoundé and Douala, prices are not fixed

and continue to fluctuate according to the availability and demand of the resource. Table 3 gives an idea of the value of resources in the market.

Table 3. Indicative prices of recovered materials in Yaoundé and Douala

Materials	Prices in Yaoundé (CFA francs/kg)	Prices in Douala (CFA francs/kg)
Iron residue	75	140
Plastics	70	140
Glass and bottle shards	60	110
Unburned copper	2200	2400
Aluminum	350	400
Brass	600	1000
Bronze	600	1000
Lead	150	250
Zinc	150	250
Used batteries	200	250
Beef bones	50	75

Source: J. Ngambi, 2015.

Resale of recovered materials: a booming trade

Once a stigmatized trade, the resale of recovered materials has now has become a recognized occupation in Yaoundé. Starting this activity does not require any qualifications or significant start-up capital, as confirmed by the following interview extracts.

> "I don't have a diploma or any academic training… The resale of recovered objects is a job which I have been doing for 10 years. In fact, in the neighborhood, all the neighbors have started reselling, while, not so long ago, they laughed at us. Five years ago, there were 15 of us selling here at Elig Edzoa crossing, but today there are more than 60 resellers in the area". *(*Pauline, 40 years old*)*

> "I started with 3,000 CFA francs (USD 6) six months ago. My current capital is 40,000 CFA francs (USD 80)" (Julie, 26 years old).

Work is conducted on road shoulders and in areas outside of markets. Households and informal waste pickers supply the resale sector. Materials that can be recycled and reused are carefully washed before being offered for sale. The resale of discarded, abandoned, and recovered objects is an activity conducted

mainly by women (70%) and mainly includes plastic bottles, jam jars, beer bottles, and kitchen utensils.

Figure 6. Resale point at Elig Edzoa crossing

Source: Jules Ngambi (personal colletion, 2015).

Elig Edzoa is one of the main resale points for recovered materials and objects in Yaoundé. Resellers occupy both sides of the main street that leads to the Omnisport stadium. Consumers come from a variety of places. The lower right of the photo shows packing areas for the goods. Products that are ready to be used are transported and sold in the surrounding areas, such as Soa, Obala, Mbalmayo, Mbankomo, and faraway cities (Douala and Nkyo-Ossi).

Reuse: a common practice among Yaoundé residents

Daily practices, such as reusing printed paper in offices, turning plastic containers into garbage bins in households, and repairing clothes and shoes, are common among Yaoundé residents, with the aim of giving objects a second or

sometimes a third life. In everyday life, the most popular objects are mineral water bottles, jerry cans, plastic bags, and glass jars. These objects are used by traders and have become excellent containers for storing solid and liquid food, beverages, and medications in the households.

Figure 7. Food preservation

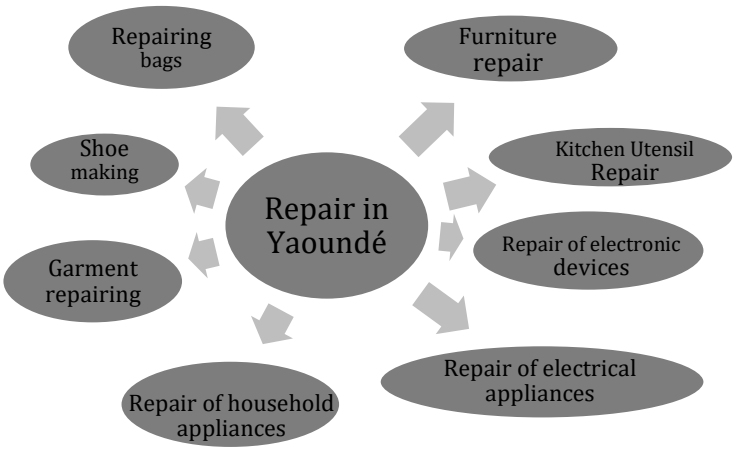
Source: Jules Ngambi (personal colletion, 2015).

Mineral water bottles are reused by traders as measuring units or packaging materials. These containers can also store products for a long time without them damaging spoiling.

Repair: a sector with diversified economic activities

Repair is a highly diversified activity and spans all areas of consumption. Regardless of their social origin, all Yaoundé residents seek repairs at least once a year. It should be highlighted that in Yaoundé, where the ingenuity thrives, everything is repaired.

Figure 4. Some repair activities in Yaoundé



Source: J. Ngambi, 2015.

The commercial and professional repair discussed here is performed by sedentary and itinerant repairers. Itinerant workers are involved in the shoe and sewing trades; they travel the streets and neighborhoods offering services at competitive prices compared to the professionals who have a storefront. In Yaoundé, only the Mokolo market has at least 300 sedentary cobblers and more than 200 sedentary clothing repairers. Workers involved in these activities offer a variety of services to clients with damaged or recovered objects, and they have a price list adapted to the needs of a homogeneous public. The cobbler's trade is an activity conducted by individuals of different nationalities (Cameroonian, Nigerian, Malian, and Chadian). Cobblers learn their trade on the job, since there is no school for this trade. This is not the case for garment repair, which includes a large number of workers trained in private professional training institutions and secondary schools (60-70%). The rest of the workers (30-40%) learned the trade in the informal sector.

The informal sector in the waste processing field

Composting: a declining sector

Yaoundé's waste deposits are mainly made up of biodegradable materials. The study conducted by Ngnikam *et al.* (2017) at the municipal dump entrance estimates this waste at 63.60%. Another study, involving households, markets, and administrations, reports an estimated 70% of biodegradable waste (Ngambi,

2018a). This large amount of putrescible substances makes composting the preferred and most appropriate method for organic waste recovery in African cities (Toundou *et al.*, 2014; Longanza *et al*, 2015). In Yaoundé, the first composting projects started in 1990. An experimental project was conducted by researchers at the Yaoundé National Polytechnic School. The associations and CIGs were responsible for implementing them. However, the results are not positive: of more than 15 projects launched in the 1990s, only three, implemented by associations, still exist today. The development of composting projects on a large scale in Yaoundé and other African cities faces the problem of long-term sustainability over time (Ngahane *et al.*, 2018). The number of activities, supported by external financing, declines after the pilot phase.

Artisanal recycling: "Macocotte", a successful experience

In Yaoundé, an example of artisanal waste recycling is the manufacturing of bags, paints, sculptures, and kitchen utensils. Among the informal recycling activities, which are identified and studied in our research, the manufacturing of cooking pots locally known as "Macocotte" is a noteworthy example. It is an innovative work that is a symbol of success in artisanal recycling in Yaoundé.

Figure 8. Artisanal production unit for "Macocotte" pots

Source: Jules Ngambi (personal colletion, 2015).

The manufacturing of "Macocotte" pots started in 1930 with the immigration of Malians as part of the bilateral program for the integration of immigrants

(promoting integration with natives and family reunification). The Dogon people, with a long history of metalworking (Cissé, 2009), introduced the manufacturing of pots in the cities of Douala and Yaoundé. Nowadays, several varieties of "Macocottes" and other kitchen utensils are produced, such as frying pans, plates, buckets, and ladles. Their prices range from CFA francs 2,500 CFA francs (USD 5) to more than 50,000 CFA francs (USD 100). These recycled products are sold in the local and national markets and throughout the Economic Community of Central African States (ECCAS).

The formal sectors involved in recovery: activity started by private actors

The International Center for Promotion and Recycling (CIPRE) is the only NGO involved in formal waste recovery in Yaoundé. Its initiative was formalized through the Cité-PROPRE project (Promotion of plastic waste recycling and recovery of containers). The aim is to reduce poverty and urban pollution by recycling plastic waste in poor neighborhoods. CIPRE has established ten waste recovery locations in the urban perimeter of Yaoundé. Recovered plastic materials include old shoes, bottles, chairs, plates, bowls, refrigerators, old bins, cupboards, tins, baskets, glasses, pipes and plumbing materials, and PVC packing bags.

Figure 9. Waste dumping in the Biyemé River in Biyem-Assi

Source: Jules Ngambi (personal colletion, 2016).

Manufacturing of plastic pavers: a flourishing sector

The recovery of plastic waste through the manufacturing of pavers in is the latest development in Yaoundé. The Foundation *Coeur d'Afrique*, set up by a former football star in Cameroon, has contributed to bringing this sector to light, which helped it obtain human, financial, and material resources to launch the project. The creation of production units requires low investment, and, in addition to this, raw materials are abundant in the city. This project especially contributes to poverty reduction, as it demands highly labor-intensive, which enables the employment of unskilled workers. The impact of these projects is indeed remarkable in the reduction of environmental pollution from plastic waste.

Scrap and plastic recycling: an almost absent sector in the city of Yaoundé

The formal recycling of ferrous and plastic waste is underdeveloped in the city of Yaoundé and its surroundings. Recycling actors have settled in Douala, the major industrial region of Cameroon, such as The Association for the Manufacturing of Building Materials (SOFAMAC). It is the only recycling industry concerned with the transformation of metals and plastics through diverse industrial processes (injection, blowing, and extrusion, among others). Recycled materials supply local markets with building materials at competitive rates.

Table 4. Products manufactured by SOFAMAC from waste

Materials	Transformation process	Products obtained
Plastics	Injection	- Household plastics: buckets, cups, bathtubs, jugs, chairs, basins, cutlery trays, garbage scoops, refrigerator food bowls; - Industrial plastics: helmets, flush-mounted junction boxes, floor drains and enclosures; - Gutter accessories: joints, gaskets, and brackets; - PVC shoes; - PVC piping accessories: 90° elbow, 45° elbow, pressure tee, PVC tee, and PVC pipe clamps
	Blowing	Watering cans, jerrycans, drums and bottles.

Materials	Transformation process	Products obtained
	Extrusion	-Sheathed pipes: polyethylene pipes for electric cables; Sheath for bucket handles Ø6.5, Ø7.5, Ø8.5 - Films: bread bags and pressure sheaths - 4 m plastic gutters
	Screen printing	- Tuyaux PVC Evacuation et tuyau PVC pression Ø32, Ø40, Ø50, Ø63, Ø100, Ø110, Ø125, Ø160, Ø200, Ø250 en 4m; - Seaux et flacons sérigraphiés à la marque des clients
Metal		- Paris wire: T.P. wires of 20, 25, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 140, 150; - Galvanized products: 58mm and 68mm sheet metal wire in standard and gold colors, galvanized wire from Ø0.80 to Ø3mm; - Single-twisted wire mesh in rolls of 1m x 25, 1.5m x 25, 2m x 25, 3m x 25, single-twisted wire mesh, etc. - Annealed wire: tie wire and drawn wire from Ø0.8 to Ø5.5mm
Aluminium		- Fastening accessories: Aluminum staple, Aluminum washer; - Folded products: Non-notched ridge sheet, notched ridge sheet, plain ridge sheet, and hemmed strip. - Smooth flat sheets, tray sheets, and corrugated sheets.

Waste recycling of electronic and electrical devices: an efficient support to WEEE management in Yaoundé

Although Cameroon adhered to the Basel Convention in 2001, which addresses the control of cross-border movements of dangerous waste, there is a proliferation of second-hand products that generate electronic and electrical waste. In Yaoundé, there is a store that sells second-hand electrical and electronic appliances. The evolution of the legal framework of 2012 promoted the construction of the Recycling and Reuse of Electronic and Electrical Devices(CRD3E) in Awea-Escalier (Yaoundé). The French NGO, *Guilde Européenne du Raid,* was the founder of this project. The French association, *Solidarité Technologique,*

was able to implement the D3E project in Yaoundé thanks to the cooperation between the Ministry of Foreign and European Affairs, the Cameroonian-French Cooperation for Development Program (PRODESO), and *Guilde Européenne de Raid.* The collected WEEE waste is disassembled in the workshops and those parts that still work are recovered and restored. Some equipment is repaired and sold to associations, schools and people who need computer equipment. WEEE which cannot be recycled is exported to France for proper treatment.

Methanization in the dump: an incomplete project

The methanization project at the Nkol Foulou dump has benefited from exceptional institutional and legal flexibility. When biogas capture started in 2011, there was no legal regulation governing this form of waste treatment in Cameroon. The Cameroonian state, which signed and ratified international treaties (the United Nations Framework Convention on Climate Change and the Kyoto Protocol), took advantage of this opportunity to implement its commitments. HYSACAM is in charge of the project, which was made possible thanks to the financial and technical contributions of its partners (ORBEO, SGBC, and VEOLIA). This project consists of three parts: biogas capture, conversion of biogas into energy, and an injection of the surplus into the public electrical grid and sale of carbon credits. Although the first module of the project has been operating since 29 Jun 2011, the electricity production phase is not yet operational. With regard to the sale of carbon credits, its evaluation remains private, making it difficult to assess the quantification of the benefits from this phase of the project.

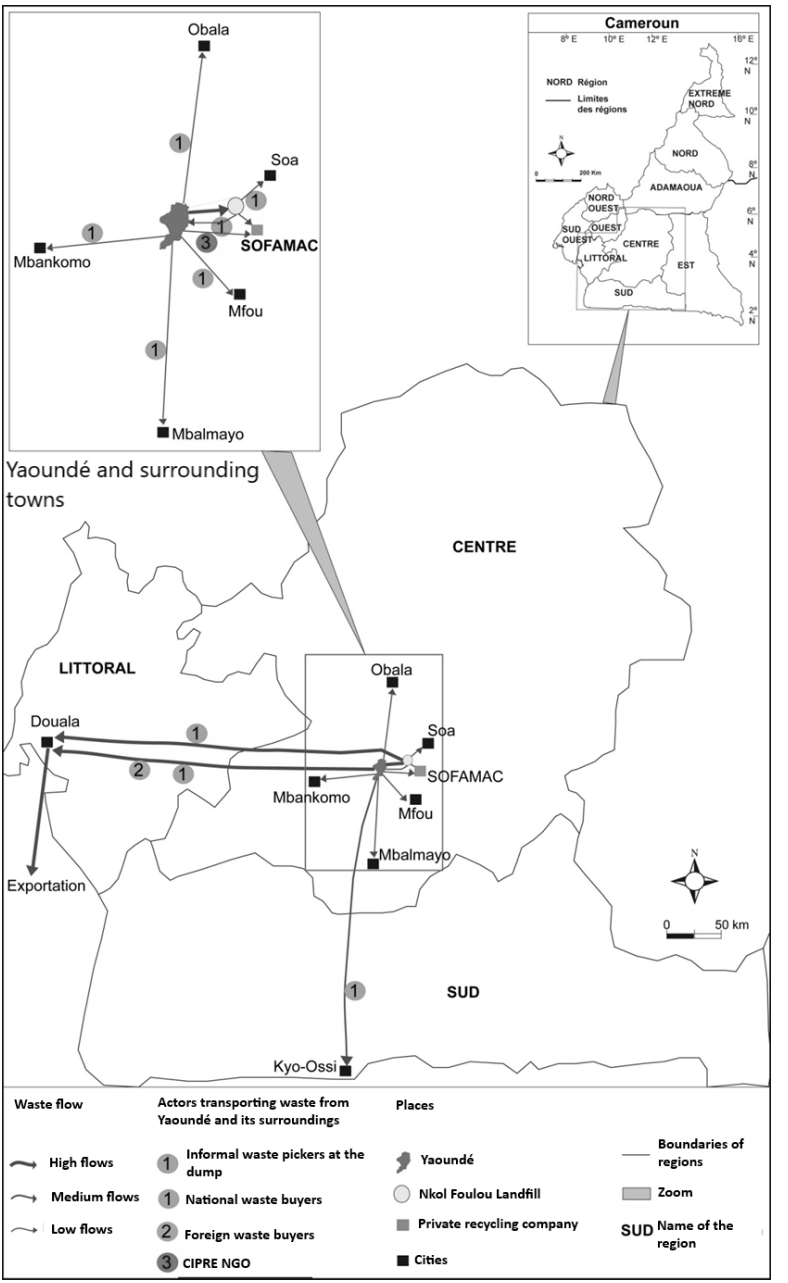
Waste flow in Yaoundé: traceability is difficult to determine

The linear waste management delegated to HYSACAM constitutes an important network of recoverable material flows leaving from Yaoundé. Waste is collected, transported, and treated in the Nkol Foulou dump, which is located 20 km from the urban center. So far, this place has been the main repository of these resources/waste. Waste flows are managed by formal and informal waste pickers in Yaoundé and its surroundings. Two kinds of waste flows circulate in Yaoundé. First, internal waste flows that circulate within the city between supply points (households, administrations, schools, illegal dumpsites, among others), sales points (shops, crossings, and street edges) and recycling and composting units.

The second category of waste flows is generated in the municipal dump, and deviates in three circuits. The first one is located in the dump where informal waste pickers work. Nowadays, there are almost 80 informal waste pickers at the Nkol Foulou dump, some of whom have increased their financial capital, so now they can buy goods from their peers. The second circuit directly supplies the consumers. After a final classification, the waste pickers working at the dump, pack, transport, and sell their products to artisans, formal and informal recycling units, buyers (local and exporters), and construction works. And finally, the third circuit, which is the most important, consists of the waste flows from Yaoundé. They go mainly in two directions after their processing . First, towards medium-sized cities which are located 20 to 50 km away from Yaoundé, such as Obala, Mfou, Mbalmayo, Mbankomo, and Soa. In the case of Kyo-ossi, the distance is 310 km from Yaoundé. The city of Kyo-Ossi was built on the border between Cameroon, Gabon, and Equatorial Guinea, where diverse economic activities are conducted thanks to the trade between these three countries. The delivered products are mainly plastic materials for reuse or reprocessing.

The second destination concerns the waste flow from the Nkol Foulou dump to the recycling units, and from Yaoundé to Douala and the rest of the world. The waste pickers at the municipal dump deliver almost 25% of their goods to SOFAMAC, which is located 4 km away, while 15% goes to artisanal recycling units of Yaoundé. The remaining goods are transported and sold to private companies in Douala. For the waste pickers working in Yaoundé, 10% of their products are bought by artisans, around 5% by SOFAMAC, and about 75% are sold to buyers who, in turn, may resell them on site or transport them to Douala. Thirty percent (30%) of the recovered and recycled materials introduced into the sales circuit come from national buyers (who receive 100% of their supplies from informal waste pickers) who have been equipped with transformation units. The remaining 70% comes from foreign buyers whose role is only partially visible. This informal practice is the principal reason why it is difficult or even impossible to quantify the material flows in Yaoundé. Depending on the material, the difference in price per kilogram between Yaoundé and Douala can range from 50 to 400 CFA francs/kg. Furthermore, Douala is the largest national market for recycling materials and the only transition area for the flows to the rest of the word.

Map 1. Flow of recyclable waste in Yaoundé and its surroundings



Conclusions

Waste in the city of Yaoundé constitutes a large repository with an economic potential that only needs to be properly recovered. Civil society (Associations, CIGs, Development Support Committees, and NGOs), artisanal production units, private companies, and individuals have boosted different waste recovery sectors and activities since the 1990s. In the field, it is possible to distinguish recovery sectors without transformation (recovery, repair, and reuse) and with transformation (composting, recycling, and methanization). Nevertheless, 80% of individual and collective recovery initiatives are conducted by the informal sector (Ngambi, 2018a). Notwithstanding the encouraging results, the informal activities and/or projects occasionally face challenges in developing at the municipal level and even at the regional level. This limitation is related to the trade practices that are performed on a small scale and in a dispersed manner, which makes it difficult not only to evaluate the waste flow and recycled materials in Yaoundé, but also to ensure the sustainability of most of the activities of the associations. In order to formalize the waste economy in Yaoundé and Cameroonian cities in general, the mobilization of public institutions is still very important. The legal framework created in 2012 is indeed an innovation to regulate the waste recovery sector; however, there is a lack of a proper strategy to support the project leaders. So far, the support of international fund suppliers has been circumstantial thus, several projects collapsed after their experimental phase or immediately after their first production. The improving the skills of the actors, most of whom are informal, can be oriented towards training in design, fundraising, and the administrative and technical aspects of engineering projects. The lack of these resources is still, in 90% of the cases, the main obstacle for the sustainability of waste recovery projects in Cameroonian cities. The municipalities are structured to oversee the environment and associations. This may be the formal framework for local activities and/or projects related to waste recovery.

References

Ada C. (2006). Réseaux sociaux et gestion des déchets au Gabon. NETCOM vol. 20, n°3, pp 183-194.

Ayimpan S. (2015). Economie de la débrouillardise à Kinshasa, Informalité, commerce et réseaux sociaux. Edition Karthala, Paris, 332 p.

Cucchiella F. et al. (2017). Sustainable waste management: Waste to energy plant as an alternative to landfill. Energy Conversion and Management, n°131, pp.18-31.

Dumonteil J. (2016) Gestion des déchets: un défi permanent pour les villes, ne nouveaux modèles à structurer. Global local forum, 8p.

Gbinlo R. E. (2010). Organisation et financement de la gestion des déchets ménagers dans les villes de l'Afrique Sub-saharienne: Cas de la ville de Cotonou au Bénin. Thèse de doctorat, Université d'Orléans, 237 p.

ISSEA (2008). Enquête sur la Dynamique d'insertion socioprofessionnelle des Jeunes de la ville de Yaoundé. Rapport, ISSEA,Yaoundé, 96 p.

Kengne F., Bopda A. (2000). Un demi-siècle de recherche urbaine au Cameroun. Réseau Inter-Africain d'Etudes Urbaines (RIEUCAM). Presses Universitaires de Yaoundé, 17 p.

Lawson et al. (2008). Valorisation des déchets au Bénin: atouts et limites. Projet d'appui à la Gestion des Déchets à la Décentralisation-PGED. ONG DCAM-BETHESDA, Bénin, 68 p.

Lazare A. et al. (2017). Etat des lieux du secteur informel des déchets en Afrique et dans les Caraïbes: pour une gestion inclusive et sociale. Enda Europe et Gevalor, 86 p.

Longanza B.L., et al., (2015). Valorisation agricole des déchets comme alternative à leur gestion dans les villes d'Afrique subsaharienne: caractérisation des déchets urbains à Lubumbashi et évaluation de leurs effets sur la croissance des cultures vivrières. Revue Internationale des Sciences et Technologie, vol. 11, n°2, pp. 76-84.

Ngahan J. T. et al. (2006). Le Cameroun face au défi de la pauvreté et de l'emploi des jeunes: Analyse critique et propositions. Jeunesse Horizon, Yaoundé, 17 p.

Ngahane E. L. et al. (2018). Axes stratégiques pour la pérennisation d'unités de compostage en Afrique: cas de Bouaké en Côte-d'Ivoire. Déchets Sciences et Techniques n°76, 9 p.

Ngambi J. R. (2015a). Déchets solides ménagers dans la ville de Yaoundé-Cameroun: De la gestion linéaire vers une économie circulaire. Thèse de doctorat, Université du Maine, 495 p.

Ngambi J. R. (2015b). Quelle place pour la récupération informelle dans la gestion municipale des déchets à Yaoundé? Travaux & Documents Eso, n° 38, pp 85-93.

Ngambi J. R. (2018a). Transition vers l'économie circulaire au Cameroun: Jeux d'acteurs de la gestion des déchets et opportunités d'un système en construction, Ed. Connaissances et Savoirs, 151 p.

Ngambi J. R. (2018b). Promotion de la valorisation des déchets au Cameroun: stratégies publiques aux effets limités, dans dir Jaglin S., Debout L. et Salenson I., Du rebut à la ressource: Valorisation des déchets dans les villes du Sud, pp73-83.

Ngnikam E. et al. (2017). Evolution des caractéristiques des déchets solides ménagers dans la ville de Yaoundé au Cameroun. Revue Scientifique et Technique Forêt et Environnement du Bassin du Congo, Vol. 8, pp 45-56.

Nayheli Tejumola A. R. (2012). Ni vus ni connus: La contribution des récupérateurs informels dans les pays en développement. Sherbrooke, Québec, Canada, 105 p.

Pierrat A. (2017). Donner à voir la valorisation des déchets urbains par la micro-géographie des "lieux de l'ordure". M@ppemonde, n°119, 5 p.

Sotamenou J. (2017). La gestion des déchets solides en Afrique cinquante ans après les indépendances: bilan et perspectives. Reve Afrique 21, n° 3, pp. 21-37.

Toundou O. et al. (2014). Effets de composts de déchets sur les propriétés chimiques du sol et la solubilité d'éléments minéraux sous deux régimes hydriques en conditions contrôlées au Togo. International Journal of Biological and Chemical Sciences, vol. 8, n°4, pp 1917-1926.

Tshala Upite J. et al. (2015). Vers une valorisation des déchets ménagers en agriculture (péri) urbaine à Kolwezi: caractérisation et influence de la saisonnalité. Journal of Applied Biosciences vol.112, pp. 11072-11079.

Wadoum Defouen P.G. (2005). Activités de récupération des déchets non biodégradables et lutte contre la pauvreté en milieu urbain. Mémoire, INJS, Yaoundé, 70 p.

Williams H. et al. (2012). Reasons for household food waste with special attention to packaging. Journal of Cleaner Production, vol. 24, pp 141-148.

From decline to valorization of gakpogblégblé* in Lomé, Togo

Socio-spatial circuit and impacts

*Cyprien Coffi Aholou*** *and Prosper Sékdja Samon****

Introduction

World waste production has doubled in the last decade and is expected to increase by 69% by 2025 (Hoornweg and Bhada Tata, 2012). Given that the planet is now predominantly urban (Marchal and Stébé, 2011), it is clear that cities are primarily responsible for this production. This is aligns with the idea of Girardet (1999), who argued that cities use 75% of the world's natural resources and reject waste in equal proportion. We are in a situation where cities are becoming more and more energy-intensive, legitimizing the idea of rethinking urbanity. This amounts to implementing environmentally and environmentally friendly measures to ensure a certain level of safety, which is becoming increasingly popular in cities. Among these measures, the reorientation, or rather the valorization of waste, stands out as one of the most plausible and realistic paths. Before the 2000s, waste management in cities in the Global South (especially

* Coming from the contraction of two words in Mina (mainly spoken language in the city of Lomé in Togo), *gakpo* which means "iron", and *gblégblé* which means "what is spoiled", *Gakpogblégblé* thus means "the iron which is spoiled, the iron that is no longer used for something", in short: ferrous waste.

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cities on the African continent) was limited to cleaning public areas, garbage collection, and then evacuation and disposal of removed material (Jaglin, 2018). However, faced with the rapid increase in population and the spread of urban areas, waste management had to expand beyond the primary roles that were assigned to it to propose reforms. Thus, from the 2000s, the concepts of recycling and recovery made their entry into the main stages of waste management in the city. It is no longer a question of just collecting and storing the waste, but of giving it some attention by valorizing it. For several decades now, this is the case for plastic, electronic, and ferrous waste that is collected in urban areas. The valorization of these types of waste has contributed to the creation and the consolidation of several types of employment, to the development of an economy which is certainly informal but very dynamic, while benefiting the planet by allowing for the reduction and elimination of this waste. The growing importance of waste valorization, particularly ferrous waste, in cities in general and particularly in the Global South is quite remarkable given the mobilization and development experienced by the sector in recent years. In Lomé, the interest in *gakpogblégblé* is the focus of the attention.

Undoubtedly, the valorization of *gakpogblégblé* is a "city practice" (Gervais-Lambony, 1994) that is well anchored in Lomé. The need to reflect on such a subject became apparent given the magnitude of the phenomenon and the mobilization that it generates among certain young people. As the Lomé urban landscape faces many challenges, several activities have developed in recent years that attempt to at least provide solutions. These include the creation of a plethora of cleansing structures in the city and the development of recycling activities for plastic products by non-governmental organizations (NGOs). In addition to this list, there is also the valorization of *gakpogblégblé*. Relatively recent, this activity only became important in the early 2000[1]. Though it had a tentative start, the activity has developed with lightning speed to the point of becoming a central and daily occupation for some young people, who engage in it full-time. With the help of two-armed carts, they scour the streets and alleys of Lomé chanting *gblégblé* in search of iron materials of all kinds, which their owners have discarded.

[1] The activity was present before the 2000s but did not mobilize as much attention. The actors of the sector unanimously recognize that its scale became remarkable only starting in the 2000s with the economic positioning of China at the world level, which was the first outlet of the ferrous scrap. This increased due to the situation of impoverishment, which the population was already feeling in urban spaces in Africa, especially in Lomé.

From trivial objects, these once-coveted materials rediscover their "dignities," thus legitimizing the idea of Barles (2005), who argued that "the city did not always generate waste but has long produced raw materials by recycling its excreta". Revealing the return of the "waste-resource" (Debout, 2015), this activity induces a change of perception of ferrous waste in Lomé, since it acts as a deposit and the city of Lomé becomes a potential "urban mine", presumably provoking a "rush for junk" (Cavé, 2015). Being increasingly present in the Lomé urban space, these collectors have largely participated in the speculation on ferrous scrap. An almost abrupt craze for this commodity then emerges, mobilizing a significant number of people. Faced with this situation, the question that arises is: what are the socio-spatial circuits and the impacts of upgrading *gakpogblégblé* in Lomé, Togo? In addition, where do the collected materials go, or, in the words of Guitard (2015), what is the fate of these resuscitated goods? Who are the actors of this valorization, and what are the consequences on the urban space?

While it is true that we are now witnessing the supremacy of urban centers brought about by the swelling of their population and their economic base, it is undeniable that this trend involves a certain number of problems; the most glaring are related to housing, safety, employment, and the environment. If the urban environment is constantly undermined, the reasons are to be found, among others, in the inadequate management of urban waste, especially in countries of the Global South. However, the accumulation of waste undoubtedly causes pollution; an estimated more than 2.01 billion tons of solid urban waste are produced per year worldwide, at least 33% of which is not managed in an environmentally sound manner (World Bank, 2018). Thus, recycling is a bulwark that reduces, on the one hand, the rate of air pollution, preserves the ecology, and, on the other hand, stimulates the economy. The recycling of scrap iron surely fits within this context. Worldwide, metal recycling is booming with major industrial players. In 2017, the recycled metals market was valued at over $90 billion and was projected to grow at an annual rate of 4.5% over the 2018-2024 period (Moncel, 2018).

According to Global Market Insights (2018), the recycling market has become an integral part of the materials industry, primarily for metal processors, who perceive all the benefits of recycling in economic, environmental, and societal terms. It is therefore natural that one wonders about the economic return that the practice of recycling scrap iron could have in the case of the city of Lomé. Apart from the economic component, what are the environmental and social impacts related to the activity on the territory of Lomé?

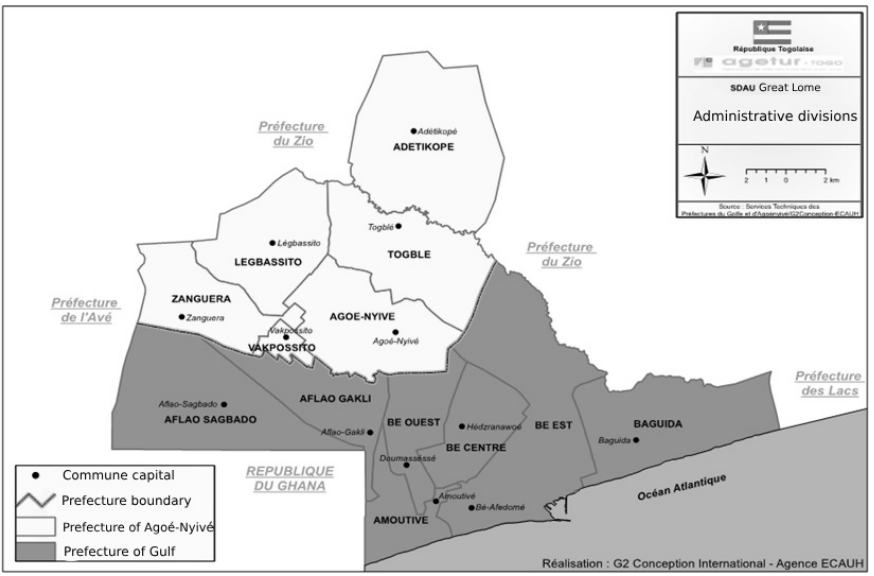
All these questions reiterate the importance of this study, inviting us to analyze the requalification of the remains of cities, in general, and those of Lomé as an alternative response to ever-growing urban waste. Through this contribution, we set ourselves the goal of highlighting the socio-spatial circuit of the valorization of *gakpogblégblé* in Lomé and then grasping the various impacts, pronounced or not, concealed or not, on the urban space. This research postulates that the pronounced craze for recycling ferrous waste in Lomé is motivated primarily by economic interest; the socio-environmental aspect is only a secondary outcome. To better grasp the complexities of this phenomenon, and given the highly informal nature of the recovery activity, especially in the case of Lomé, we chose to understand the phenomenon in terms of the theory of "coping," developed by J.M. Ela (1999), later applied by M. Ayimpam (2014), and more recently by Assogba (2017). This theory proposes to revisit the "real economy" of the countries of Africa where one witnesses the "triumph of the informal," which is based exclusively on activities of resourcefulness. For these authors, the world of resourcefulness is presented as a place where a survival imaginary unfolds. To this end, the "people below" develop strategies in a difficult situation of access to resources, and the street remains the place par excellence where they practice the "art of getting by" to exist or live. This theory will undoubtedly help to understand all the strategies put in place by scrap metal collectors in the streets of the city of Lomé and to understand the workings of the activity, allowing us to capture and report on economic, social, as well as environmental aspects. Following Assogba (2017), we will say that the fundamental interest of a sociological study is its significant contribution to the advancement of the knowledge of social reality and its contribution to the explanation and intelligibility of the social phenomenon studied. This theory allows us to understand the organization of this activity, which is concentrated much more in the streets of Lomé.

To carry out this study, we have used, apart from documentary analysis, observation, interviews, and geolocated photography. Through observation, we could first establish the importance of the phenomenon to be studied, its impact on the Lomé cityscape, and the development of related activities in connection with scrap iron. To support and prove our observations, we chose to capture them with a camera. The interest of this imagery lies in the fact that it allows us to account for the reality of the observed fact by freezing a moment, immersing the reader in the heart of the field. Geolocation data was added to the photographs with the aim of showing the presence of the phenomenon in study on the whole extent of the city of Lomé. In this, photography is an

extension of observation. A series of interviews with different targets was also coupled with the observation. Thanks to the saturation technique (Sardan, 1995), thirty-four interviews were carried out in total, including five with the managers of warehousing workshops, five interviews with the handling companies of the autonomous port of Lomé, twenty-one with waste pickers (at bare hands and carts), an interview with a delegate from the Lomé town hall, and two interviews with composting and waste recovery facilities that are present in Lomé. With the collectors, it was an "interview in motion". Since the recovery activity in Lomé takes place in the streets and where the waste pickers tow their carts, chanting *gblégblé* to hail the household-sellers, this type of interview consisted of following them during their actions while questioning. These different approaches made it possible to solidify our methodological arsenal to have valid and generalizable information.

The research was conducted in Lomé. Capital of Togo, Greater Lomé, as it is commonly known today, is located on the Gulf of Guinea in West Africa at the crossroads of two (2) corridors: on one side the east-west corridor, from Freetown to Lagos, and on the other, the second, north-south, from Lomé to Bamako, via Niamey and Ouagadougou (SDAU-GL, 2018). As the main urban entity of Togo, it concentrates most of the administrative, political, and economic functions of the country (trade and industry). With a population of 1,591,746 inhabitants, or 23.9% of the national population (Direction Générale de la Statistique et de la Compatibilité Nationale, 2010), its population was estimated at more than 2,000,000 inhabitants in 2018 over an area of 280 km², or 0.5% of the total surface area of Togo. Greater Lomé contributes 60% of the national GDP (Citafric Report, 2006). The map below shows the different municipalities that make up Greater Lomé and the two prefectures it contains.

Map 1. Great Lome Territory



Source: Agetur-Togo, 2019.

These different characteristics give Greater Lomé a unique position among West African cities. It is widely recognized as a trade hub, serving both coastal and hinterland countries (Mali, Niger, and Burkina Faso). This raises the question of whether this position has played a role in the emergence and prosperity of the valorization of ferrous waste. To answer these questions, this paper is structured in five parts: (I) the private and informal nature of the recovery activity; (II) the profile of the collectors and the nature of the materials collected; III) the establishment of the ferrous scrap circuit in the Lomé urban space; (IV) the implications and impacts of the activity; and (V) the future prospects of the ferrous waste recovery activity in Lomé.

The private and informal nature of the ferrous waste industry in Lomé: the interweaving of the informal and the formal economy

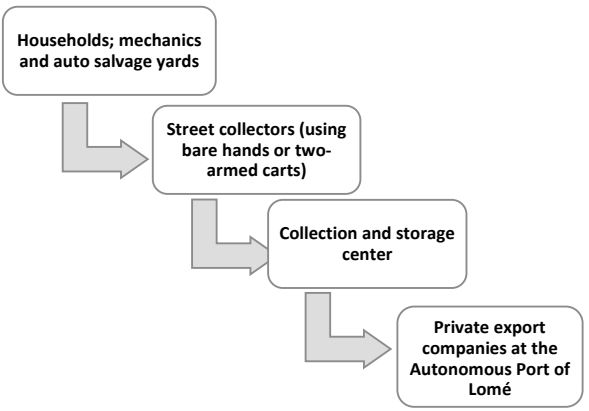
According to the International Labor Organization (2018), more than 61% of the world's working population earns their living in the informal economy. In Africa, the informal economy accounts for an average of 40% of the GDP of low-income countries and 35% of the GDP of middle-income countries, with more than 85% of jobs being informal. In Togo, the private sector is relatively undeveloped and dominated by micro and small enterprises operating mainly in the informal sector of the economy (Assimaidou, 2013). According to a report published in 2018 by the International Monetary Fund (IMF), the informal market accounts for between 20 and 30% of Togo's gross domestic product (GDP) and alone accounts for around 90% of private sector jobs. A survey conducted by the National Employment Agency (ANPE) with the support of GIZ found that 80% of all people surveyed operate in the informal sector in Togo. This shows that the Togolese economy is highly dependent on its informal sector. Several activities are therefore considered informal, outside of any control by public authorities. The recycling of ferrous waste is one of them.

Public institutions in Togo do not recover ferrous waste, at least not in Lomé. This is not without reason. The activity experienced a boom in the 2000s, driven by private initiatives. While the activity was already well established at the global level and especially in other countries of the West African sub-region[2], it was only at this time that it appeared on the Togolese landscape. Being lucrative, the recovery of ferrous waste began to professionalize, achieving the structure we see today. Togolese people, widely seen as reluctant to engage in activities considered degrading, such as the recovery of Gakpogblégblé, were almost entirely excluded from the recovery system, which found itself completely in the hands of foreigners (Indians, Nigerians, Nigeriens, Ghanaians, etc.). It was these groups who were the first to invest in the sector, and although it has reached industrial proportions today, it has always remained in the hands of private entities, legitimizing their primacy and perpetuating this tradition, so to speak.

[2] This could partly explain why the sector is only held by expatriates in Lomé, and they were the first ones to launch the activity.

The transition to formalization could not take place, since the various private actors quickly became aware of the turnover it could generate. The public authorities, far from entering into any conflict of interest, have instead encouraged this practice, since this arrangement relieved them of a step in the waste treatment chain within Lomé. An official from the Technical Services Division of the Lomé City Council says: "It is a very popular secondary resource that is almost no longer in the dumpsite. The town hall's policy regarding the reusable portion of household waste (cardboard, plastics, metal) is to encourage recovery at the source (households or places of production) for resale. It is a circuit purely managed by the private sector".[3] This means that no public structure intervenes anywhere along the recovery line in Lomé, giving free rein to private actors. The diagram below illustrates this fact.

Figure 1. Gakpogblégblé Recovery and Treatment Chain



Source: C. C. Aholou, P. S. Samon; Source, 2019.

The first notable observation is the absence of any public entity. There are three reasons for the essentially private nature of the Lomé iron scrap industry. First, this is linked to history; in 1997,[4] the waste management system was left in the hands of grassroots organizations and other actors who flourished in the absence

[3] Interview conducted on April 4, 2019 with an official from the Lomé Town Hall.

[4] This was the year the contract between the city of Lomé and the Togolese company for the removal of household waste and sanitation (SOTOEMA) was terminated due to the insolvency of the town hall, pushing it to sign subcontracting contracts with private operators.

of a well-orchestrated municipal management system (Garnier, 2016, p.80). Second, the public authorities were surprised by the scale of the phenomenon and could not organize themselves to regulate the sector appropriately, as is done in other countries where there are recycling structures run by public authorities. Third, the waste comes primarily from households. Once households understood that selling their ferrous waste could generate income—while simultaneously relieving public authorities of the management of this type of waste—they chose to sell to private storage facilities instead. It should be noted that a technical landfill (CET) was set up recently in January 2018 by the Municipality of Lomé to accommodate nearly 300,000 tons of waste per year. Designed according to European standards, it was supposed to be a turning point in waste management in Lomé (Garnier et al., 2018), a management system that is lackluster, to say the least, as evidenced by the illegal dumpsites observable everywhere in Lomé. Although a dual waste management system is established (pre-collection and door-to-door collection) to complement the efforts made by the responsible structures (town halls, public authorities, and private actors), waste in the city of Lomé is generally not well managed, and ferrous waste even less so. In the city of Lomé alone, waste production is estimated to be around 800 tonnes per day, amounting to a production of 292,000 tons of waste per year, but less than 45% of this waste goes through an efficient treatment, which explains the presence of illegal dumps in the urban environment of Lomé. Trying to overcome this problem, corrective measures have been taken, including the construction of a technical landfill center (CET) in Aképé (see map) capable of receiving and treating all types of waste. However, despite the center's recognized technical capacity to manage this specific type of waste, the ferrous waste component has remained in private hands. This situation, far from being controversial, demonstrates the extent to which the activity's development in Lomé is founded upon the private and informal sectors.

In any case, it can be attested that the recovery of ferrous waste in the city of Lomé is a private responsibility, with all the associated externalities. Its development has made it possible today to witness a plurality of actors who are active in the field. Occupying roles as diverse as they are numerous, these actors are the main agents of this sector in Lomé. What exactly are they collecting?

The nature of ferrous objects and the profile of collectors

"Not all ferrous objects should be recovered, and not all objects have the same value." This is what one collector told us. This suggests that the recovered objects have different natures and therefore receive different treatment. The typology we developed confirmed this.

The nature of recovered ferrous objects

At first, one is tempted to say that everything that is ferrous material is a future ferrous waste. But not all of it is subject to recovery, since not all of it has the same value. In Lomé, the actors involved in the field have a priority list. The comments made by a shopkeeper we interviewed are quite telling: "We do not pay the same attention to all the kinds of *gakpogblegble* that we collect here. This depends on the scarcity of the goods and the price offered. Also, we operate to meet the demands we receive." It is therefore clear that some ferrous products are more worthy of treatment than others, and this is not without reason. It should be noted that the ferrous scrap recovered in Lomé is not essentially composed of iron, but of any solid with a ferrous appearance. Thus, the collected materials include iron, aluminum, steel, copper, and household appliances, etc. Their importance depends on their market value. Measured in kilograms (Kg) using an electronic scale, a price is fixed by convention[5] and is subject most of the time to fluctuations in the price of metals. Nevertheless, it is a relatively standard price applied at all levels of collection. It has been noted that there is a certain compromise in the pricing of the different categories of waste. A manager of a centralization structure explained, "This comes from handling companies specializing in the export of ferrous waste. They are the ones who set purchase prices for us based on what's going on around the world, and we just adjust."

Many such objects are targeted by this sector. Once trivial objects or completely relegated to the bottom of the hierarchy of usefulness, they find themselves at the center of all attention, becoming increasingly rare and desired. This is how a completely rusted bicycle placed in the corner of a house becomes an object of attention and thus a source of income. As incongruous as it may seem, ferrous waste of any kind is now "immortal" since it is infinitely reusable

[5] It is considered a price set by convention because it is a generalized price applied at all levels. It only changes by following the market price.

(copper, for example). For the sake of synthesis, the table below lists the various ferrous scrap collected around the Lomé area and specifies the related prices.[6]

Table 1. Types of ferrous scrap put on sale and prices in XOF (CFA franc) in force on the Lomé space at the level of the different actors.

Types of Ferrous Scrap		Price Paid to Collector (per kg)	Price at Warehouse / Storage (per kg)	Price at Port of Lomé (per kg)
Iron	Concrete iron, iron wire, all iron materials, etc.	75 – 100	100	100 – 110
Aluminium	Beverage cans, kitchen utensils, faucets, etc.	400 – 500	500	600 – 650
Zinc		200	300	400 – 500
Bronze		1,000	1,200	1,500 – 1,600
Stainless steel		100	250	300 – 450
Copper	Spool of old appliances, copper wire from home renovations, etc.	1,900 – 2,000	2,000 – 2,500	2,300 – 2,500
Bike, motorcycle, home appliance, tv and computer board, fan, battery, plate, special alloys, cast iron, wheel rims, spare parts, etc.		Negotiable and very variable prices (generally between 100 and 25,000)		

Source: C. C. Aholou, P. S. Samon, 2019.

It is noted in this classification that the waste collected does not have the same market value. A clear price hierarchy exists. This is certainly due to the intrinsic value of the metals themselves and to the profit required to make the activity sustainable and prosperous. Thus, at each stage of the activity, actors at each level generate a profit margin, which also serves to pay their employees. When the quantity of scrap for sale is higher, the price per kilogram is slightly reduced, making the transaction more appealing and increasing the potential profit. This primarily benefits the operators of warehousing structures and delivery stores; otherwise, the activity would quickly lose momentum since it would yield very

[6] Prices here are in XOF (CFA). Convertibility to the US dollar or Euro is possible; 1 US dollar equals 588 CFA francs, and 1 euro equals 657.28 CFA francs.

little. From the analysis of this table, we notice that the most expensive ferrous scrap is copper. This is because it is one of the metals that is most resistant to corrosion, whether caused by water or certain chemicals. Additionally, it is an excellent thermal and electrical conductor that is non-magnetic, ideal for electrical and electronic construction. Copper is a malleable metal and very easy to work cold when unalloyed (or pure). All this contributes to its high price, even for recovered material. It is an infinitely recyclable metal.

The collection of these objects mobilizes numerous actors with different profiles who do not necessarily perform the same work. They have specific profiles but converge at a given point, brought together by ferrous waste. What are the different roles these actors hold?

The profile of actors in the ferrous scrap sector in Lomé

The rapid and unexpected prosperity experienced by the collection and recovery of ferrous waste in the Lomé region is due to the dynamism of the actors involved. With a well-defined organization and division of labor, "everyone knows what to do," as stated by one collector. From households to collectors with carts to exporting companies, every role seems to be filled. It is almost like assembly-line work, since the different levels and actors are linked in permanent interdependence. These include households, automobile and general mechanics garages, car dismantlers, collectors working by hand, collectors with carts, operators of ferrous materials centralization and storage structures, shopkeepers (or "departure stores"), and handling companies specialized in the export of ferrous waste.

The advantage of drawing up this kind of profiling comes from the need to recognize and categorize the actors of the sector to identify the importance of the phenomenon and to trace a possible circuit that helps to better understand and grasp the system and its impacts. What does this entail then?

- Households: They are particularly involved in this activity. It is a way for them to get rid of their ferrous waste that they no longer need and to earn a little money. It should be noted that it is more for the sake of getting rid of their waste that households get involved in this activity, since what they earn is not very substantial.[7] Following this logic, many households in

[7] The ferrous waste is sold by the kilogram, and a kilo costs 100 CFA, which is equivalent to 0.15 euro cents or 0.20 dollar cents, depending on the currency exchange rate.

Lomé therefore engage in this activity. They are often alerted by the cries of collectors with carts who roam the streets and deliver their scrap, which will have another destiny. (Furthermore, it is very difficult to estimate the daily quantity of ferrous scrap from households because the collection is not systematic. In any event, of the 250,000 tons of ferrous waste exported from Togo annually, just over 30% originates from households, collected by waste pickers with carts who traverse neighborhood streets daily).

- Automobile and general mechanics garages: The city of Lomé brings together a fairly large number of automobile and mechanical garages. Damaged cars that cannot be reused are brought to these garages to be disposed of. This leads to the dismantling of the engine, and the car's various components are subsequently sold directly to storage structures. Very often, these workshops are operated by Togolese.

Figure 2. engines and components of vehicles broken p and placed at the front of a mechanics workshop

Source: C. C. Aholou, P. S. Samon, 2019.

The car dismantlers: Some workshops are exclusively specialized in this field. Their job is to recover old cars, dismantle the engines and other parts, and then sell the chassis. This is shown in the following photograph.

Figure 3. Vehicle bodywork offered for sale

Source: C. C. Aholou, P. S. Samon, 2019.

These garages are also actively involved in feeding the recycling of ferrous waste. Tenants are Togolese in most cases. On the picture above, we can easily read the inscription "to break", which means that these car heads are intended for breakage and become ferrous waste.

- Collectors working by hand: In very small numbers, these collectors are mostly very young, generally from underprivileged backgrounds who, using plastic bags (bafana-bafana),[8] go from one garbage can to another with the hope of discovering any ferrous materials, picking them up, and ultimately selling them. They are occasional pickers, since they do not do this every day. They participate in their own way in feeding the *gakpogblegble* circuit.
- Collectors with carts: It should be mentioned at the beginning that most of these collectors are expatriates, most of them from Niger. This is explained by the extreme poverty in that country.[9] Furthermore, the relative success of the first collectors coming from this country contributes to their remarkable presence in the sector in Lomé. They are young men, dressed very simply, roughly speaking French and a few words of Mina,[10] who embark on an adventure towards Togolese territory, hoping for a better life than they had

[8] This is the name given to the type of bag used by these children. These are plastic bags, but very hard and resistant.

[9] Niger is the 4th poorest country in Africa with a GDP per capita estimated at $1,016.60 (Forbes ranking, 2019).

[10] Local language, widely spoken in the Togolese capital.

until then. They are recognizable by the two-armed cart they push, which serves to store their ferrous haul. The ever-increasing number of these waste pickers is the visible face of the momentum of the Lomé recycling activity. The two photographs below illustrate this fact well and show how the activity takes place. After collection, these goods are transported to centralization and storage structures where they are weighed per kilogram.

Figure 4. Collectors in full activity in the city of Lomé.

Source: C. C. Aholou, P. S. Samon, 2019.

Figure 5. Collectors in full activity in the city of Lomé.

Source: C. C. Aholou, P. S. Samon, 2019.

Tenants of centralization and warehousing structures: these structures are usually homes that tenants transform for a different purpose. They serve as relays for the departure stores. We can see one in the picture below, portraying the stored waste.

Figure 6. Pile of ferrous waste collected and stored in a structure

S Source: C. C. Aholou, P. S. Samon, 2019.

It is in these structures that waste pickers and other actors in the sector weigh their waste to be paid. It should be noted that these centralization structures are located in the neighborhoods of Lomé and are, so to speak, closer to the street collectors, which explains why they increasingly go there. Moreover, while there is no quota limit for selling scrap, the final aggregation stores accept only large quantities of scrap. These operators thus play a crucial role in the *gakpogblégblé* circuit in Lomé. It is from here that the materials are usually conveyed to delivery stores.

Delivery store operators: These types of stores receive their merchandise from centralization and warehousing structures, mechanical workshops, or dismantlers. This is the final level of domestic recovery since it is from these

stores that the goods are transported for export. These centers are effectively organizations with staff (those who oversee weighing, those who deal with scrap quality assessment, cashiers, and those who load containers). Of the five centers surveyed in Lomé, four are operated by expatriates (Nigerian, Nigerien, and Lebanese). They are not makeshift centers; they are well established and operate as businesses. They sometimes even import their goods from outside Togolese borders (Burkina Faso, Mali, Niger) to ensure they are never out of stock. These operators maintain the dynamics of the sector in Lomé.

Figure 7. A trailer during delivery

Source: C. C. Aholou, P. S. Samon, 2019.

Handling companies specializing in the export of ferrous waste

These types of companies are based in Togo's industrial free zone, located in the port area. They handle the export of collected materials. They operate in import/export and therefore handle a multitude of products. These companies have a large staff and handle all stages until the scrap iron is shipped. This is the final link in the domestic chain that deals with the sector. The destinations, according to our respondents, are China, Indonesia, India, Lebanon, the United Arab Emirates, and Ghana, and occasionally Europe (Germany). The photographs below show a truck, its container loaded with ferrous scrap, parked on a weighbridge to be weighed before heading to the port for transshipment to the above-mentioned buyer countries.

Figure 8. A trailer truck mounted on a weighbridge weighing ferrous scrap

Source: C. C. Aholou, P. S. Samon, 2019.

Figure 9. Trailer trucks in full transhipment at the autonomous port of Lomé

Source: C. C. Aholou, P. S. Samon, 2019.

Each of these players, at their respective level, is an important link for the promotion and sustainability of the industry. A shopkeeper said: "From the smallest recycler to the largest conveyor, if someone is missing, our work will be impossible. We all have the same importance, and we work in symbiosis." Through this profiling, we have been able to detect the role that everyone plays at their level. Occupying well-defined positions, they participate in their own way in the fluidity of the ferrous sector in the city of Lomé. With the actors, types of waste, and their market values known, one might wonder about the trajectory of the various transactions—in short, how the industry operates.

The circuit of Gakpogblégblé in Lomé

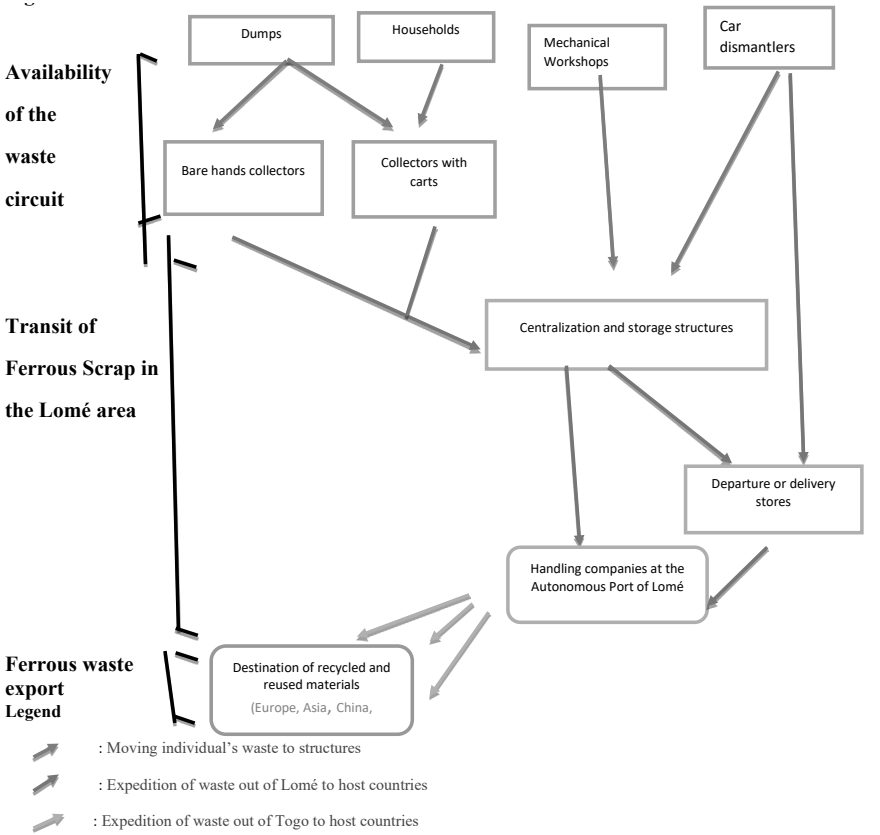
Given the above, it seems easier to establish the ferrous waste circuit in the city of Lomé since the actors (social entities) that drive the activity are known. But knowledge of the actors alone is not enough, since it is necessary to establish the different relationships that are formed and to evoke all that this implies. The sector operates 6 days a week (except Sunday)[11] and mobilizes a significant number of people. The diagram below shows the main configurations, from the bottom to the top of the chain.

This circuit shows that the ferrous waste industry in Lomé is well organized. Although the sector is private, this does not give free rein to arbitrariness in pricing or breaking the market cycle. Because the supply is guaranteed by four types of actors (collectors, households, dismantlers, and mechanical workshops), the system has not broken down for several years. This is explained by the enthusiasm for and especially by the gain generated by this recovery. The professionalization of the various actors in the field has contributed to its scale, which has so far justified its durability. It has also been noted that when preparing ferrous waste for transit, these companies demonstrate a relative maturity in the execution of tasks, both in their regularity of deliveries and in meeting the required quotas. When questioned, the cashier of a warehouse structure revealed the following: "We sometimes ship no less than 4 containers to the port in a month. The Gakpogblégblé industry is booming; we do not really understand the reason, but that's what we see. The demands are grow-

[11] Sunday is often reserved by the people of Lomé to either go to the Church, do sports or simply rest.

ing, and it's good for business." This could explain the very strong presence of cart collectors in the streets of the Lomé neighborhoods, since they are the ones who feed the industry, and the survival of the activity depends on their efforts. During our fieldwork, we decided to count them on one day in the whole city of Lomé. After seven hours, we counted 150, and this figure is far from exhaustive. Furthermore, our investigation establishes that on average, four containers are conveyed per month to the port for export by the companies in charge. This shows once again the dynamism of the sector. "As of today, there are as many as 20 companies that act as delivery shops in Lomé, employing a lot of people. In our case, there are 13 of us working in this company, and we are never idle; there is always something to do. And then our boss has several companies like this one that do the same job as us every day." This statement from an interviewed operator verifies our findings. The recovery of ferrous scrap yields many benefits. Apart from the economic side, which is immediately noticeable, several other externalities are linked to the activity, also contributing to its growth and its social positioning. If it is estimated that 250,000 tons of ferrous waste are sent out of Togo each year (Garnier, 2016, p.86), this means that each category of the industry is doing well. "Per month, I can get at least a profit of 20 thousand CFA francs, but this is very variable because recovery does not depend only on our goodwill. Sometimes we search without collecting anything, but sometimes it's a complete overflow," said a cart collector. Being very discreet on the subject, one can estimate the monthly profit for the centralization structures and the departure stores to be one million. Apart from this aspect, the activity has real impacts on the city of Lomé and its inhabitants that should not be neglected.

Figure 10: Ferrous waste circuit in Lomé



Source: C.C. Aholou, P. S. Samon; Source: Fieldwork, 2019.

Ferrous waste in Lomé: implications and impacts

Considering the analysis made above, we can say that today, ferrous waste is a booming sector in Lomé. Involving a certain number of actors and therefore a segment of the population of Lomé, it has a considerable impact on the city of Lomé and, by extension, the entire country. We have chosen here to identify these impacts in three areas: the social, economic, and environmental aspects.

Social

The unstoppable urbanization (Aholou, 2011) of cities in the Global South, which has been accompanied by a slow development of wage labor, has led to new paradigms in the quest for well-being. Thus, the urban popular classes will engage in activities that are less stigmatized but which have a high growth potential since they meet an essential need: the recovery of waste. Now representing 1 to 2% of the world's population (World Bank, 2012), waste pickers have become so important in our societies that they are essential in the stabilization of the health of countries. In Togo, the work of recovery gradually begins to have value in the eyes of people in the sense that it allows a person to live off the fruits of "their recovery"; their ever-increasing number speaks volumes.

The recovery has led to the birth of socio-professional classes with layers that are juxtaposed and are characterized by a certain mechanical solidarity. This solidarity is well observed in the standardization of waste prices and the establishment of collection centers in the different districts of the city of Lomé.[12] Additionally, the recovery of ferrous waste has facilitated the migration of foreign populations (Nigerian, Nigerien, Indian, etc.) who are largely the operators of these structures. The development of recovery has thus contributed to the social and economic integration of these immigrant populations. We can note that this "foreign" population is perfectly integrated since they mainly employ Togolese and most even speak Mina (the main language spoken in Lomé) and French. This prevents any cultural or even religious conflict between these foreigners and the natives, thus allowing them to develop their activities easily and peacefully. Lomé thus appears as a host city for populations from both within Togo and abroad. As a city of recovery, Lomé has become in recent years a city of integration.[13] By clearing the city of Lomé of this waste, these collectors participate directly in the cleaning of the city and its embellishment, although it is not the only qualifying criterion, offering, so to speak, a certain visibility to the city. All these aspects make the recovery of ferrous waste in Lomé a job of the present but also of the future, with certain social repercussions.

[12] It was noted that there were no more than two collection centers per district, avoiding any competition and any telescoping between them.

[13] Historically, Lomé is considered a city of African integration since it houses institutions of the West African sub-region (West African Development Bank (BOAD), Central Bank of West African States (BCEOA)). This activity confirms and reinforces, in a way, its position as the capital of integration.

Economic

In Togo, 0.52 kg of waste per person is produced per day, and this could reach 0.85 kg in 2025 (World Bank, 2012). This means that the production of scrap iron will also follow this upward curve with the associated economic opportunities. In 2015 alone, the Autonomous Port of Lomé (PAL) exported 629,500 tons of *gakpogblégblé* (Garnier, 2016) with all the economic benefits it brings to the country.[14] Furthermore, it should be noted that the port has been modernized in recent years, attracting many economic operators mainly due to relatively low taxes compared to the other ports of the sub-region (Tema, Takoradi, Accra, Cotonou) and the depths of its waters. This is also why we often see trucks from other countries (Benin in particular) bring containers through the port. Moreover, the economic benefits of the activity are measured by the multiplicity of not only collection structures and storage companies, but also collectors with carts. This observation is based on the fact that an activity only grows if it is prosperous. Given the importance of the activity, we can attest to its prosperity: "I live from the benefits of this activity here in Lomé, and I monthly send an amount to my parents who remained in Zinder," confessed a collector during a meeting. Another one says: "It is thanks to this activity that I could change the roof of my father's house. I also provide for the needs of my family because I have a wife and a son; they stayed in Niger." This activity contributes to the economic self-sufficiency of the actors in the sector and therefore ensures a certain social position within their community of origin.

The economic aspect of this activity also comes from its ability to make the circular economy in Lomé a reality. People, while getting rid of things that once served them, receive a fee in return. This activity contributes to fueling the economy at the grassroots level and along the entire recovery chain.

Environment

Waste is blamed for several evils because of its undeniable negative impact on the quality of urban environments, including air and soil pollution, groundwater contamination, the proliferation of disease vectors, and olfactory and

[14] A calculation allows us to realize all the economic fallout of the activity on Togo. If we postulate that these containers only transport iron and that one Kg is sold at 100 XOF, with these 626 500 tons we reach more than 62 billion XOF just for the year 2015. This is an analysis to integrate to the text.

visual nuisances (Durand, 2010). Although it has been recognized that several thousand tons of waste leave Togolese territory every year, one wonders what the situation would be if the waste had not been collected. The importance of this activity for the Lomé environment is crucial, as it eliminates ferrous waste from the waste disposal chain and puts it back into the recovery chain, while at the same time contributing to the creation of wealth. In short, this activity is an alternative, since the Lomé technical landfill site did not provide for the management of ferrous waste in its areas of expertise. The recovery is then offered as a boon for the Lomé environment. It must be said that countries of the Global South have long been regarded as the world's dump, where old cars and even waste deemed dangerous are transported. Despite the establishment in 1992 of the Basel Convention to control the circulation of hazardous waste and a "Ban Amendment" in 2011 prohibiting the export of hazardous waste from OECD countries to non-member countries, it remains very difficult to exercise effective control over such flows (Bensebaa et al. 2010). But since the recycling of ferrous scrap has taken on a global dimension, countries of the Global South have found something they could also ship. This relieves them of any treatment obligations, and their environment is thus rid of the waste. But the question that persists is whether this transaction is really to the advantage of these countries. There is no doubt that this activity largely contributes to cleaning up the environment of the city of Lomé and proposes, moreover, a 3R technique (recovery, recycling, and reuse) to the people of Lomé, except that for the moment, the recycling of metals has not yet taken place in Lomé.

In any case, the impacts of ferrous waste recovery go beyond the aspects that we have identified here. At least, these are the most perceptible whose reach is easily measured. In view of all this, what is the future outlook for ferrous waste in Lomé?

Leaving Lomé: what the outlook for ferrous waste?

The intertwining between small-scale informal activity (collectors) and the formal economy (storage structures and handling companies) has made the recovery activity a real source of economic dividends for Togo. It is urgent to ask what the future holds for ferrous waste, given its importance. Would the local economy not benefit more if there were facilities for recycling scrap iron in Lomé, especially for the most precious metals (aluminum, copper, and lead), instead of opting for their export? Especially when we know that employment

is now perceived as a rare commodity in Togo,[15] would this not constitute a serious option for employability for people in Lomé? We have been able to realize the unsavory conditions in which the work of the main suppliers (collectors with carts) of the industry is done; is it not time to rethink the pathways of this activity?

These different questions raise questions about the future of metal recovery in Lomé and, by extension, the future of its main players.

For the United Nations Environment Program (UNEP, 2011), "Informal collection and manual dismantling need not be transformed into a formalized process, as they often offer sustainability benefits compared to the introduction of new technologies." We were able to see that in our investigation. Reclaimers occupy a prominent place in this activity in Lomé and play a central role in its sustainability at the same time. The goal is not to propose changes in the structuring of the activity, but rather to find ways to allow local economies to take full advantage of the benefits from their waste. The introduction of new technologies will therefore have to contribute to making the sector more profitable since it will allow the establishment of on-site processing plants. It should be noted that Lomé has no recycling structure for these ferrous scraps, which means that this phase takes place outside of Lomé with all the associated externalities. The global market for recycling scrap iron is blooming. In France, for example, in 2017, the turnover of recycling companies was estimated at 9.05 billion euros (World Bank, 2012). This leads us to think about the total economic value that the sector could have accumulated if it were brought to term in Togo, from its collection as waste until its recycling as a (re)usable product, and especially since it is known that increasing the recycling rate allows the development of local economic activities. Preventing the "escape" of this resource appears to be a priority to better control the sector from end to end and make it more productive for the local economy.

However, the financial contribution that comes from the export of this commodity should not be neglected, when we know that thousands of containers leave the port destined for abroad each year (PAL, quoted by Garnier 2016). There is no doubt that the processing of scrap yields more to the economy than its export. To this end, work remains to be done to create industrial capacity (steel companies) in Togo to sustain the sector and make it more productive in terms of decent employability and provision of already processed secondary raw

[15] Only 1% of the Togolese population works in the civil service (interview with an official from the Lomé municipality).

materials. This justifies what Henry-Wittman (1996, p.173) means when she says that: "Recovery and recycling are economic activities that induce others such as transportation, storage, processing, etc." They contribute to reducing the dependence of countries by delivering substitute products for imported products; they can {better} contribute to the improvement of the trade balance of a country {if they are transformed}. Furthermore, another perspective for the activity would be to increase the cost per kilogram (kg) of waste in order to allow the collectors to live better from their collections and thus participate in the sustainability of the sector. This will participate in more than one way in creating motivation and commitment among this group. This is the idea advocated by Jack Louamy (2007), who believes that "collectors who earn better are often more eager to take part in curbside recycling." For him, once the sector is supervised and the price of recovered objects is revised upwards or stabilized among all intermediaries or resellers, waste pickers would be much more motivated, encouraged, and would have more enthusiasm for practicing selective collection. This measure, in view of the conditions in which the collectors work in the ferrous circuit in Lomé, is essential.

Conclusion

The ferrous waste recovery activity in Lomé is relatively recent. According to consistent sources, it can be dated to the beginning of the 2000s. But very quickly, it became structured, with actors who seemed to master the intricacies of the sector. The recovery thus became a full-fledged occupation that supports several people. The activity being lucrative, it quickly grew, and waste collector networks were formed to make these secondary raw materials constantly available to storage structures, which in turn supply handling companies that export the materials to the largest international consumer countries. Once discarded, this rubbish becomes the center of all attention and covetousness. The impacts of the activity on the city of Lomé are significant. They are social, economic, and environmental. This study has allowed us to trace the circuit of *gakpogblégblé* in Lomé, including the strategic position occupied by the actors involved, to grasp its operating logic. As an activity of resourcefulness, the recovery of *gakpogblégblé* is structured and formalized over the various stages marking its trajectory. Moreover, we ask ourselves this question, which persists and which, it seems to us, reopens the debate: does the scrap iron recovery

process not involve health risks to which the actors are exposed, given their permanent contact with the material?

Reference

Aholou, C.C. (2011). "Habiter l'inhabitable: espace périurbain de Lomé et ses problèmes environnementaux: quelles approches de solution ? ". Mosaïque: Université de Lomé.

Antea-Group, (2013). Diagnostic des pratiques de récupérations et de recyclage pour une formalisation dans la ville de Lomé (Togo).

Assimaidou, A. L. (2013). Le rôle du secteur privé dans la réduction de la pauvreté en Afrique subsaharienne: Les Cas du Togo et du Ghana. (Mémoire de Maîtrise). HEC Montréal: Canada.

Ayimpam, S. (2014). Economie de la débrouillardise à Kinshasa, Informalité, commerce et réseaux sociaux. París: Edition Karthala.

Banco Mundial (2018). "'Déchets: quel gâchis 2.0': un état des lieux actualisé des enjeux de la gestion des ordures ménagères". Disponible en: https://www.banquemondiale.org/fr/news/immersive-story/2018/09/20/what-a-waste-an-updated-look-into-the-future-of-solid-waste-management.

Barles, S. (2005).L'invention des déchets urbains, France, 1790-1970, Champ Vallon, Seyssel.

Bensebaa, F., Boudier, F. (2010). " Gestion des déchets dangereux et responsabilité sociale des firmes, Le commerce illégal de déchets électriques et électroniques " " Développement durable et territoires ", Varia, mis en ligne le 01 octobre 2010 http://developpementdurable.revues.org/4823.

Bhada-Tata, P., Hoornweg, D., Banque Mondiale. (2012). What a Waste: A Global Review of Solid Waste Management, UrbanDevelopmentSeriesKnowledgePapers, n° 15/98, Banque mondiale. Washington D.C.

Banque Mondiale. (2018). "Déchets : quel gâchis 2.0 " : un état des lieux actualisé des enjeux de la gestion des ordures ménagères.

Cavé, J. (2015). La ruée vers l'ordure. Conflits dans les mines urbaines de déchets. Presses universitaires de Rennes: Rennes.

Debout, L. (2015).«Conception et définition du déchet face aux enjeux d'égalité territorial: la gestion des déchets ménagers au Caire (Égypte) ", In : Cirelli C. et B. Florin (dir.), Sociétés urbaines et déchets : éclairages internationaux, (pp. 347-366). Tours: Presses universitaires François-Rabelais.

Ela, J-M. (1998). Innovations sociales et renaissance de l'Afrique noire. Les défis du "monde d'en bas. Montreal-París: L'Harmattan.

Garnier, J. (2016). "Valorisation des déchets à Lomé : La valorisation des déchets perçue comme un moyen de réduction des coûts du service public ", rapport de terrain n°6, Projet ORVA2D (Gevalor-Togo).

Garnier, J., Marciniak, R. & Delarue, J. (2018). "Démonstration du potentiel économique du compostage des déchets organiques à Lomé par l'analyse coûts-bénéfices" In SylvyJaglin, Lise Debout, Irène Salenson (Dir.), Du rebut à la ressource: valorisation des déchets dans les villes du Sud, Agence Française de développement, pp. 223-240.

Gervais-Lambony, P. (1994).De Lomé à Harare. Le fait citadin, Karthala-IFRA, Paris.

Guitard, É. (2014). "Le grand chef doit être comme le grand tas d'ordures". Gestion des déchets et relations de pouvoir dans les villes de Garoua et Maroua (Cameroun). (Thèse de Doctorat). Université ParisOuest Nanterre La Défense.

Henry-Wittmann, M. D. (1996). "le recyclage des déchets: approche économique d'une activité nouvelle". (pp. 165-191). Paris: Revue Française d'Economie.

Lazare, A., &Devignes, F. (2015). Etat des lieux du secteur informel des déchets en Afrique et dans les Caraïbes: pour une gestion inclusive et sociale. Plateforme ReSources, Enda Europe et Gevalor.

Louamy, J. (2007). " Pré-collecte d'ordures ménagères : une activité génératrice de revenus ", www.rezoivoire.net/news/article/1535

Marchal, H. &Stébé, J-M. (2018). Sociologie Urbaine, 6ème édition corrigée. Que sais-je?

Moncel, C. (2018). "Le recyclage des métaux entre dans l'âge d'or Global

Market Insights analyse le marché jusqu'en 2024". L'Ecocirculaire, la lettre professionnelle du recyclage et de l'économie circulaire. Disponible

en: https://lecho-circulaire.com/le-recyclage-des-metaux-entre-dans-lage-dor/.

OIT (2018). Emploi et questions sociales dans le monde. Tendances 2018. Ginebra: Bureau international du Travail.

Onu-Habitat (2010). Solid Waste Management in the World'sCities. Water and Sanitation in the World'sCities 2010. Earthscan, Londres et Washington D.C.A. Pierre, M.(2002).Les déchets ménagers, entre privé et public : approches sociologiques, Paris, L'Harmattan.

PNUMA (2018). "Future of waste management in Africa". United Nations Environment Program, Nairobi, Kenya.

Sardan, (de) J-P. O. (1995). La politique du terrain. Sur la production des données en anthropologie. Paris : Enquête, n°1.

Strategic documents

MUNICIPALITE DE LOME (Fév. 2014). Plan Stratégique de la Gestion des Déchets Solides Ménagers du Grand Lomé (PSGDSUGL).

Agence Nationale d'Assainissement et de Salubrité Publique (ANASAP), 2018, Rapport diagnostic en vue de l'élaboration du plan stratégique d'ANASAP pour la période 2018-2022 version finale du 30/01/2018.

Rapport Citafric, 2006.

Schéma Directeur d'Aménagement Urbain du Grand Lomé (SDAU-GL), 2018.

Public policies and waste recovery in Ouagadougou (Burkina Faso)

Actors and logics

*Issa Sory**

Introduction

Under the combined effects of natural population growth and migration, the capital of Burkina Faso, Ouagadougou, is a city experiencing rapid demographic growth. As a result, the population of the city increased twenty-five-fold in 45 years, from 60,000 in 1960-61 to 1,500,000 in 2006 (Ouattara & Somé, 2009). With an annual growth rate of 7%, the population of Ouagadougou doubles every ten years; it was close to 3,000,000 in 2019. This demographic dynamic has occurred without a real urban plan or out of step with the requirements of existing planning tools (Sory, 2013). The result is a rapid spatial expansion and an accelerated horizontal urbanization of the city. The area occupied by the city's residents was 5,300 ha in 1961, 6,860 ha in 1980, and 8,600 ha in 1983 (Jaglin, 1995). Currently, the area of the city is 52,000 ha, with an annual spatial expansion of about 6%.

Until 2012, Ouagadougou was organized into 30 districts within 5 boroughs. Each borough was administered by a borough mayor, with a central mayor heading the city since the first municipal elections in 1995, which resulted from the process of decentralization (see Picture 1). In 2012, Ouaga-

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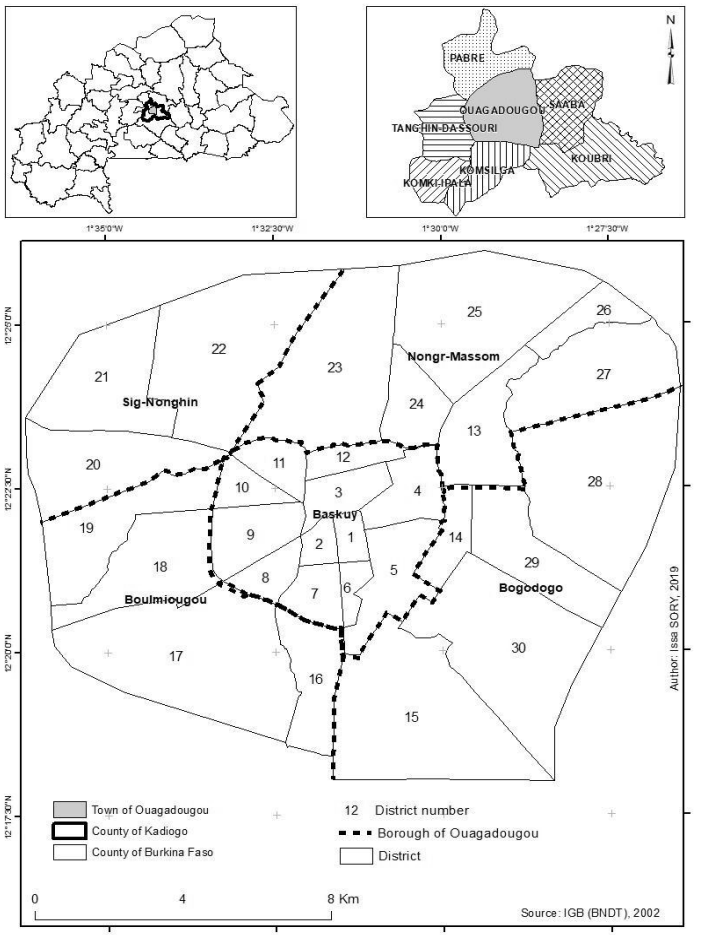
dougou underwent a new administrative redistricting, on the basis of which the last municipal elections were carried out. Currently, the city has 55 districts in 12 boroughs. The new areas and boroughs retain the same responsibilities as under the previous redistricting. Since the organization of waste collection actors was made on the basis of the previous boundaries, the analysis in this text is based on the latter.

Map 1. Location and administrative division of Ouagadougou



Source: Issa Sory 2019.

Population growth and urban sprawl have a negative impact on the organization of waste collection. Indeed, population growth is a determining factor in the amount of waste produced, which is 0.54 kg/person/day (Arcens, 1997). Urban sprawl complicates the provision of services in terms of collection infrastructure, coverage of the city by pre-collectors, and the transport of garbage.

In a context where public collection was abolished, the control of the waste chain by pre-collectors led state and municipal authorities, with the support of the World Bank, to develop a Master Plan for Waste Management (SDGD) in 2000. The reforms driven by this scheme affect collection infrastructure, the organization of actors, and the urban space. Although mentioned in the SDGD, waste recovery was overlooked in this reorganization of the sector. This dimension, which was practiced outside the formal scheme, was brought to light through a complementary project, the Ouagadougou Waste Reduction Strategy Project - Creating Jobs and Revenues through collection, sorting and valorization (PSRDO-CER). In this text, recovery includes the reuse, valorization, recycling, and reprocessing of waste.

This text is based on secondary data and mainly on qualitative primary data collected periodically since 2009. The interviews were transcribed verbatim, coded, and analyzed using the content analysis technique. In accordance with the principle of anonymity, respondents are designated by pseudonyms. Based on these data, the text first highlights the lack of recycling in the waste sector resulting from the implementation of the reforms instilled by the waste management master plan. Next, it describes the strategies of actors in pre-collection and the diversity of waste recovery sources revealed by the reality of the sector. Finally, the issues surrounding the inclusion of waste recovery in public policies are analyzed.

Burying waste as the cardinal principle of the various reforms

From Burkina Faso's independence in 1960 to the present day, the waste industry in Ouagadougou has undergone several reforms. Thus, it was publicly managed between 1958 and 1968, and then again between 1979 and 1986. The sector was privatized between 1968 and 1979. The revolutionary period (1983-1987) had an impact on the waste management system in Ouagadougou in particular and on the entire territory in general. In 1986, a public structure was created with the aim of holding a monopoly on waste management over the entire national territory: the National Office of Maintenance, Cleaning

and Beautification Services (ONASENE). Nationally-inspired reforms soon gave way to "universal" urban management models driven by international financial institutions.

The origins of the current reform of the waste sector

Alongside these internal reforms, since 1970, the World Bank has begun to take an interest in the city. The aim of this International Financial Institution was to create the conditions for the return on public investment in urban areas and to fight against poverty in the city in order to integrate these poor into the liberal economy. This meant "mobilizing private savings, and lowering equipment standards in order to adapt supply to demand" (Osmont, 1985, p. 64). In Mali, for example, the Bank has focused on urban projects, strengthening political and financial governance and "improving urban productivity" (Morin & Séguin, 1997).

This vision of the World Bank continued with the implementation of the Structural Adjustment Programs (SAPs) imposed on developing countries since the early 1980s. In the case of Burkina Faso, the World Bank has consistently expressed its opposition to public subsidies (Le Bris, 2000). While hopes were focused on decentralization—which was supposed to promote democracy and liberate local initiatives—the World Bank's intervention on the urban scene is akin to a theoretical and practical engineering project aimed at harmonizing local governance according to global principles. Urban Development Projects (PDUs) are instrumental in this modeling. They thus define the modes of management, the types of actors, and the relationships between these actors in the cities of the signatory countries.

The first PDU (1978-1982), mainly focused on the city of Ouagadougou, centered on the restructuring of part of the Cissin district. This involved opening access roads and establishing sanitation services in the neighborhood. The second PDU (1990-1994) concerned three cities: Ouagadougou, Bobo-Dioulasso, and Koudougou. This project was divided into five components: (i) improved municipal management, (ii) resource mobilization, (iii) implementation of an urban information system, (iv) strengthening of municipal technical services, and (v) rehabilitation of infrastructure. Finally, in 1991, one year after the second UDP came into effect, the World Bank identified the third PDU, also known as the Urban Living Conditions Improvement Project (PACVU). Implemented from 1993 to 2004, the PACVU aimed to strengthen the gains of the PDU already underway in the process of improving the management

capacities of local governments, equipping the two main cities of Burkina Faso (Ouagadougou and Bobo-Dioulasso) with basic infrastructure, and creating an institutional environment for better management of these infrastructures. During the negotiations on this project, the World Bank delegation argued that the PACVU was "primarily devoted to the preparation of the transfer of management, enforcement and control responsibilities for the environment and urban development (...) to the benefit of local communities" (Diou et al., 1994, p. 2).

Thus, the content of the PACVU was divided into two components: capacity building and the strengthening of primary infrastructure. Waste management plays a key role in the capacity building component. It was proposed that the "polluter pays" principle be effectively applied through the participation of "urban populations to cover the costs of improving living conditions, including investments in household waste collection, individual and collective sanitation, and stormwater drainage" (Diou et al., 1994, p. 13). The development and implementation of the Waste Management Master Plan (SDGD) met this objective.

The PACVU explicitly sets out neoliberal guidelines in line with the World Bank's urban services principles. As a reminder, the signing of the project between the World Bank and the authorities of Burkina Faso took place at the beginning of the implementation of the decentralization process. This political context of reforms of the organization of the Burkinabe state created favorable conditions for this signature. Considered a "political reform aimed at the transfer of powers from the central to the local level" (Ouédraogo, 2006, p. 9), decentralization, which has been underway in Burkina Faso since 1993, aims at the transfer of new and important powers to local authorities, including waste management. At the same time, political actions focused on undermining the foundations of their authority. In the field of waste management, financial and material resources were invested for the emergence of private actors in the sector.

Decentralization rendered the monopoly of ONASENE obsolete in the field of waste collection. This observation was made by the World Bank delegation during the PACVU negotiations. It pointed out that: "The monopoly on the removal of household waste was recognized for ONASENE by Kiti A5-0032FPMET of 3 August 1988 and amending A5-360FPMET 3 August 1989, while the recent legislation (Act 004/93/ADP dealing with municipal organization) also grants municipalities jurisdiction over cleanliness and hygiene. [Consequently,] the mission [this is the World Bank delegation] recommends

that the removal of the formal monopoly of ONASENE for the collection of household waste be a condition of negotiation" (Diou et al., 1994, p. 6).

This condition was accepted by the authorities of Burkina Faso, who had already begun in the late 1980s to promote the emergence of private actors in the waste sector. With the support of the National Fund for the Promotion of Employment (FONAPE), the French Mission for Cooperation, and Burkinabe economic operators (notably, Oumarou KANAZOE's company), the Faso Pre-Cooperative Express (ECOFA)[1] a group of 15 students at the end of their studies—was approved in 1990 by ONASENE (Bayili, 2001). This structure even had the premises of ONASENE as its headquarters. NGOs and/or financial partners have supported initiatives to create community associations for waste management in Ouagadougou. The Regional Centre for Potable Water and Sanitation (CREPA)[2] and the African Institute of Urban Management (IAGU) supported the Lagm-Yam association in the Wogodogo pilot project in district 10. This association benefited from a donation of carts, working capital, and training sessions with modules on managing financial resources and leading public awareness meetings. With the intervention of opinion leaders (religious leaders, customary leaders, etc.), other neighborhood associations have benefited from CREPA's support for the pre-collection of waste. From 1996 to 2001, CREPA was supported in these activities by the National Scientific Research Fund (FNRS) of the Swiss cooperation, in particular for the waste composting component. The NGO named Water, Agriculture, and Health in a Tropical Environment (EAST), funded by the French Development Fund, has supported associations in the boroughs of Nongr-Mâssom and Sig-Nonghin. As part of the third urban development project, the World Bank and UNICEF initiated the "Community Sanitation Participation Pilot Project" in Sector 7 in Ouagadougou. The aim of this project was to encourage urban dwellers to participate in the remediation of their living environment (Gougeon, 1998).

The proliferation of private pre-collection actors (from 1990 onward) is linked, among other things, to the failure of ONASENE and its liquidation in 1996. By 2000, the city of Ouagadougou had eleven community associations and fifteen pre-collection companies.

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[1] The Faso Pre-Cooperative Express (ECOFA) became the Faso Waste Collection, Recycling and Cleaning Company (ECONFA) in 1996.

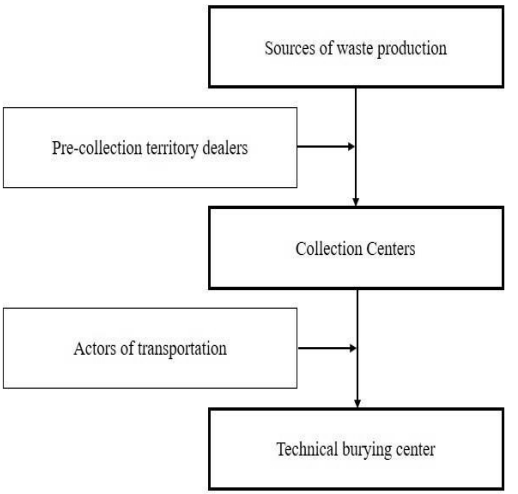
[2] CREPA is an NGO active in 17 countries in Central and West Africa (Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Congo, Ivory Coast, Gabon, Guinea Bissau, Guinea, Mali, Mauritania, Niger, Rwanda, Senegal, Chad, and Togo).

Omission of valorization

The multiplicity of pre-collection actors from 1990, based on a lack of a consultation framework and collection infrastructure, created role confusion, an unequal distribution of actors in the city's districts, and a lack of control over the urban territory. To reorganize the sector, state and municipal authorities, with the help of the World Bank, developed the Waste Management Master Plan (SDGD) as part of the Urban Living Conditions Improvement Project (PACVU) in 2000. The reorganization of the sector required the construction of thirty-five (35) collection centers, and a Technical Burial Center (CET) was built.

This restructuring of the sector is built around the concept of a "clean neighborhood", which implies that the urban territory is subdivided into pre-collection territories and allocated to economic interest groups and small and medium-sized enterprises through an invitation to tender. The invitation to tender took place in 2003, the results were announced in 2005, and the new actors began their five-year contracts in May 2007. The SDGD specifies that dealers in the pre-collection territories are guaranteed to be the only actors within their territory. In return, they are placed at the core of the sector's financing. They are thus responsible for collecting fees from their subscribers for the financing of the entire sector, namely collection and burial. Furthermore, the salubrity of the pre-collection territory is the responsibility of the territory dealers. According to the SDGD, the structuring of the chain should include three levels: pre-collection, transportation, and burial (see Figure 1).

Figure 1. Waste sector in accordance with Waste Management Master Plan



Source: Issa Sory, 2019.

Figure 1. indicates that waste producers are required to subscribe to dealers in the pre-collection territories. Then, the pre-collectors transport this waste to the collection centers. The transport of waste from these collection centers to the technical landfill is the responsibility of dealers at this stage of the chain. As for the landfill, its operations were granted to a company.

Thus, the initial organization of the sector failed to incorporate waste valorization. Although mentioned in the SDGD, the structuring of the sector did not provide for any actors or infrastructure for waste recovery. This part of the waste management system has emerged mainly as a result of complementary projects and initiatives.

Actor strategies and diversity of sorting sources

The empowerment of the various actors in their pre-collection territory has encountered challenges on the ground. In the sector, there are formal pre-collectors and informal pre-collectors. The formal actors are the dealers of the pre-collection territories and their subcontractors. Informal pre-collectors intervene in the sector outside the regulations of the formal scheme. The multiplicity of these informal actors makes their characterization complex. Mas &

Vogler (2006) identify several types of informal actors: "structured associations," "unstructured groupings," and "individual actors". This distinction is based, among other things, on the legal status of different pre-collection organizations, their size, and the number of their subscribers. Observing the practices of informal actors suggests that their strategies in the sector can be considered the most relevant variable for their classification. These strategies distinguish two types of informal actors: permanent informal and casual informal.

Among the permanent informal actors are associations—which could not apply for the call for tenders or which were formed after this call—and individual pre-collectors who also either intervened before the application of the Waste Management Master Plan (SDGD) or became interested in this activity after the call for tenders. The common feature of permanent informal pre-collectors is that pre-collection is one of their core activities; they have subscribers (customers), just like the formal actors. They use strategies based on reducing their fees to compete with the formal actors.

> "For instance, it happens that the formal collectors offer to pre-collect the waste for 1000 FCFA, and an informal collector can come to the door and say, 'Okay, the GIE [formal group] takes the waste for 1000 FCFA, but I will do it for 300 FCFA.' The head of the household, sitting at home, says okay, there is no problem, and the deal is concluded. [...] This bypasses the formal GIE in its own zone. That's the way the informal actors proceed". (Interview with Sankara, Department of Cleanliness, December 2009)

This practice, common among these informal actors, is not occasional; it is permanent. It is part of their strategy for finding customers and ensuring customer loyalty. Contracts with these customers are usually oral. Like the formal actors, they are paid monthly at 500 FCFA for one removal per week. The immediate consequence of this offensive strategy by the permanent informal actors is a decrease in the fees and the number of customers for the formal actors, as underlined by Tara and Toro:

> "We pre-collect at 500 FCFA. We tried to add 250 FCFA, but the informal collectors come and undercut that price at 450 or 500 FCFA. So we had to come back to 500 FCFA. Sometimes you win a client's yard at 1000 FCFA, and there are informal collectors that will come and collect for cheaper". (Interview with Tara, formal actor, February 2010)
>
> "The informal actors make the number of our subscribers drop. When informal collectors enter the garbage collection business, they first drop the price to 250.

> There is an informal association that started by sweeping the streets and then emptying the bins at 100 FCFA per week [400 FCFA/month]. The second one that started just began by picking up for free. Later, she raised the price to 250F, and today I don't know what she charges. Maybe 500F like us." (Interview with Toro, formal actor, February 2010)

The permanent informal actors are thriving and embedding themselves in the sector thanks to their flexibility and the lack of information and awareness among residents who, in such a context, prefer the lowest price. The ambitious fee estimates outlined in the SDGD—according to which the people of Ouagadougou were willing to pay a monthly fee of more than 1,000 FCFA—face the reality on the ground; formal actors are obliged to reduce their fees because of competition from permanent informal companies. In addition to these "identifiable" permanent informal actors, other types of informal workers sometimes engage in pre-collection.

As their name implies, casual pre-collectors intervene sporadically in the sector. Pre-collection is a secondary activity for them. They use several types of transportation for garbage collection. Sand sellers, for example, can, after delivering their goods to a customer, go from yard to yard to offer their services for other activities, including the pre-collection of waste. When they cannot sell their sand, pre-collection can allow them to "make their day," as Sansan says: "[...] they go to town to sell the sand. If they cannot sell their sand by 1 p.m., they look for a corner where they unload the sand, and they go from yard to yard to offer their services".[3]

In this case, pre-collection is a substitute activity that can compensate for or lessen the day's losses. The means of transport—a donkey-drawn cart—facilitates this temporary conversion. Those who do not have these adapted means of transportation use whatever means they have to carry out this activity; "There are even others who have water rickshaws to pick up, others pick up in bags on bikes, so there are all sorts of them.".[4]

Informal casual pre-collectors adopt more flexible strategies than permanent informal ones. Indeed, being ready to exercise "any type" of activity, they are paid per job done. This remuneration can be in cash or in kind (food, for example). The main difference with permanent informal actors is that casual informal collectors do not have regular clients; they are not paid by subscrip-

[3] Interview with Sansan, formal actor, February 2010.
[4] Interview with Tara, formal actor, February 2010

tion. As they move from yard to yard to offer their service, Toro thinks that pre-collection is a pretext for casual informal collectors to steal.

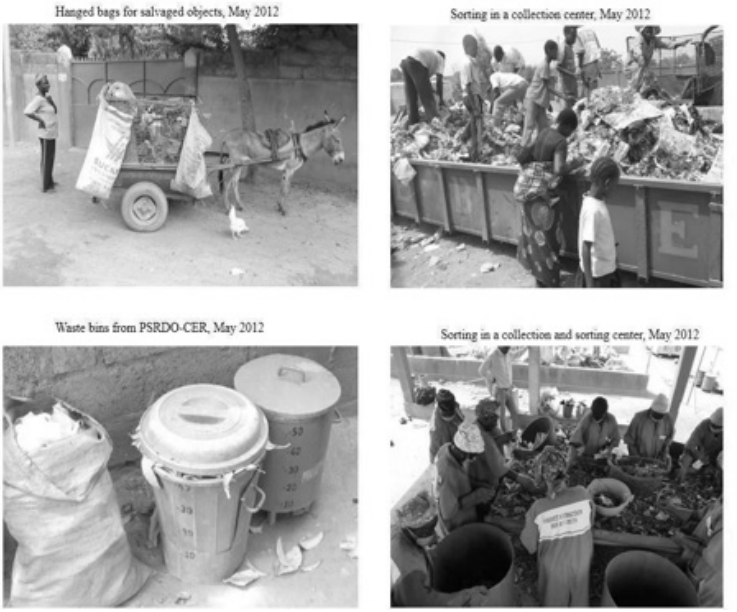
> As they move from yard to yard to offer their service, Toro thinks that pre-collection is a pretext for casual informal collectors to steal."They are usually young people who do not actually go out to pick up trash but to steal. I remember that in December [December 2009], an informal collector went to one of my clients. The maid was in the yard. He managed to get her to bring him some water to drink. When she went, he took the gentleman's personal computer [the owner of the yard]. Even some pots were stolen from the courtyards. A gentleman in our area had lost his engine block. [...] The children told their dad that the young people who collect garbage did it." (Interview with Toro, formal actor, February 2010).

Through Toro's comments, it appears that residents have difficulty distinguishing between the different types of actors (formal and informal). In fact, there is nothing to differentiate them, especially for city dwellers who do not know about the existence and functioning of the formal scheme (such as the subdivision of the city into pre-collection territories and the role of territory dealers). It is difficult even for the subscribers of formal actors to get a clear idea of who pre-collects their waste because of high turnover among workers.

While the presence of casual informal collectors has little influence on the number of clients for other types of actors (permanent and formal), it encourages residents of Ouagadougou not to subscribe. While only pre-collecting occasionally, casual informal workers still participate in and disorganize the sector.

In addition to the formal master plan being undermined by the persistence of informal pre-collectors, the emergence of the recovery stage (reuse, valorization, recycling, reprocessing, etc.) reshapes the entire sector (see Figure 2).

Figures 2. Sorting places in Ouagadougou



Source: Issa Sory, 2019.

Waste sorting takes place at production sources, in garbage cans, on landfills, at collection centers, and at technical burial centers. Several actors are involved in this recovery: children, the elderly (especially women), and pre-collectors (formal and informal). Pre-collectors sort waste as they collect it from their customers. Bags are hung on the actors' vehicles to hold recoverable materials encountered in households, businesses, or even in the street. At the end of the pre-collection stage, waste is sorted again at collection centers and illegal dumps. The same is true at the landfill. This means that different collectors are attracted to different objects. Some children often go door-to-door to search garbage cans.

The challenges of including waste recovery in the formal scheme

Valorization is not a recent phenomenon in Ouagadougou. It has always existed without being organized by public policies. From the liquidation of ONASENE until the pre-collection territories were granted as concessions to the actors of this stage of waste management, valorization was carried out by so-called informal actors.[5] The application of the waste management master plan induced changes in the status of pre-collectors without affecting the actors involved in sorting and recovery. Incorporating this dimension of collection, through the Ouagadougou Waste Reduction Strategy Project - Creation of Jobs and Income through collection, sorting and valorization actions (PSRDO-CER), transforms infrastructure and tends to place waste deposits under the control of formal pre-collectors.

The insertion process of the valorization stage

The city of Ouagadougou, with the help of its partners[6], benefited from a grant in 2010 for a project to reduce waste, the Ouagadougou Waste Reduction Strategy Project - Creation of Jobs and Income by collection, sorting and valorization actions (PSRDO-CER). The aim of the project, as its title suggests, is to contribute to the reduction of urban waste while participating in the fight against poverty through job creation. The project stemmed from the observation that the sector resulting from the Waste Management Master Plan (SDGD) cannot be efficient and effective without sorting waste. Considering the amount of waste buried every year, the Technical Landfill Center (CET) might be full before its expected lifespan ends. Similarly, the cost of transport weighs heavily on the budget of the municipality. Thus, by sorting at the source and at the collection centers, the project would contribute to reducing the mass of waste to be transported—thus lightening the collection budget—and extending the life of the final disposal center.

[5] At that time, no pre-collector qualified as a "formal actor" as defined by the waste management master plan.

[6] The partners assisting the municipality of Ouagadougou with the project's formulation and implementation included: the Urban Community of Lyon, the Regional Center for Drinking Water and Sanitation at Low Cost (CREPA), the Volunteer and International Cooperation Association (LVIA), and Strategic Development Initiatives (IDS). The project cost totaled €1,125,675, with 87% financed by the European Union and 13% by the Ouagadougou municipal government.

The PSRDO-CER was to begin in 2009 to last three years. Finally, it started to last only two years. It ended in June 2012. The project involved only two pre-collection territories:

- district 30 in the pre-collection territory of the SME / CGEMD. This district has been subcontracted between this SME and seven associations[7] (Zone 6);
- the pre-collection territory of the GIE / APE (districts 20, 21 and 22) (Zone 12).

In the experimental areas of the project, the collection centers ceased to be merely transit points for waste and integrated a sorting function. Women sorters—50 women for the 5 collection centers in zone 12; and 28 women for the district 30 centers—were recruited. While Toro claims that the new recruits in zone 12 came from the GIE/APE, those in district 30 "are under the responsibility of the town hall".[8]

Sample yards[9] (200 in number) were chosen in the two zones (140 yards in zones 12 and 60 in sector 30) to test sorting at source. In each test yard, three garbage cans have been deposited to separate the different types of waste:

- a bin where organic waste is deposited;
- a second bin to receive plastic and paper / cardboard (soft and hard plastic, paper and cardboard);
- a third trash is reserved for the rest of the waste, "the bulk".

In zone 12, each type of waste was collected on a specific day of the week: organic waste on Monday, "bulk" waste on Tuesday, and paper/cardboard on Wednesday. For Yelkouni, Pouget, Cisse, Weisman, & Morizot (2011), during pre-collection, the actors use "bags to collect plastics and cardboard" (p. 21). The pre-collectors of these two test areas have the right to recover the objects they want except those designated for the project. In collection centers, which have become collection and sorting centers, women sorters separate paper by

[7] The seven associations in District 30: Wend-Manégré, Challenges, Health Plus, Gnilmdé, Kozalus, Nongtaaba, and Sotougnongma.

[8] Interview with Ouédraogo, member of one of the seven associations in Sector 30, May 2011.

[9] In project documentation and various reports from municipal authorities, the term "household" is used to refer to a "yard". In Ouagadougou, subscriptions to the pre-waste collection service are organized by yard, not by individual household, as a yard may contain multiple households.

category (hard or soft) from cartons, sort waste from unsorted sources, and sieve the remainder to isolate the sand. After all this processing, the waste is put in garbage bins to be transported and buried in the CET.

In district 30, according to Ouedraogo (a member of one of the seven associations), the objects recovered on behalf of the project were to be sold to supply a bank account that would be opened for this purpose. These financial resources would be used for the maintenance of the collection and sorting centers, and undoubtedly for the payment of the women sorters/trainers[10] and the renewal of sorting equipment.

In the pre-collection territory of the GIE/APE, the sorters were supposed to have a monthly pay of 10,000 FCFA. The proceeds from the sale of the recovered items during the sorting process would serve as additional resources. Here, through the sale of project waste (organic waste, plastic, and paper/cardboard) and sand, the GIE was expected to be able to cover the new expenses generated by the project (salary of the sorters/facilitators, maintenance of collection and sorting centers, renewal of sorting equipment, etc).

The awareness-raising work of the recruited trainers, according to Toro (a formal actor), increased the number of subscribers. The project thus helped to fill one of the shortcomings of the SDGD: the lack of awareness among the people of Ouagadougou. This result shows the importance of public awareness in the application of projects requiring the participation or even the involvement of city dwellers. Furthermore, by allowing the recruitment of 78 women—50 women by the GIE/EPA (districts 20, 21, and 22) and 28 by the associations of district 30—the project contributed to job creation, even though the wages were low (30,000 FCFA/month).[11] Finally, by allowing sorting (including the isolation of sand) at the collection and sorting centers, the project "considerably" reduced the mass of waste to be transported to the CET. The advantage of reducing the waste to be buried, besides the reduction of transport costs, is the extension of the CET's lifespan.

Public policy and the transformation of the sector

The Ouagadougou Waste Reduction Strategy Project - Creation of Jobs and Revenues through collection, sorting and valorization actions (PSRDO-CER)

[10] They are currently supported by the project.

[11] Toro, a formal actor, notes that sorters will be paid 10,000 FCFA per month. They currently receive 30,000 FCFA per month with support from the municipal government.

has left its mark on the waste management sector in Ouagadougou. Waste recovery is now anchored in public urban sanitation policies. Transformations are underway in the development and naming of waste collection infrastructures.

Thus, in the Technical Landfill Center (CET), two units have been created for the valorization of solid waste. Members of two different associations work in each unit: the Association of Women for the Valorization of Plastic Waste (AFVDP) and the Wend-Benedo association for compost production. Composed solely of women, the members of these two associations were designated by municipal councilors. They work full time for a monthly salary of 30,000 FCFA. Their salary is paid by the Ouagadougou town hall, and the profits belong to the associations.

The Wend-Benedo association is supplied with organic waste—"green waste"—by the sanitation department. The manufactured compost is sold to market gardeners and farmers at a rate of 3,000 FCFA per 60 kg bag. As for the Women's Association for the Recovery of Plastic Waste, they buy plastic waste from dealers, pre-collectors, or individuals. On the site, during compaction, members of the AFVDP sort out plastics, which are then sold to the association for processing. These plastics are soaked, washed, and crushed to obtain granules. National companies (FASO-PLAST, GS PLAST, or SODIPLAST) then buy the pellets for the production of items such as school kits, pavers, and chairs.

With the establishment of the two waste recovery units, the CET is now called the Waste Treatment and Recovery Center (CTVD). As for the collection centers, they have been profoundly transformed by the PSRDO-CER. They are being rehabilitated to meet the standards of Collection and Sorting Centers (CCT). Newly built centers, or those under construction, no longer serve merely as an interface between pre-collection and collection; they now constitute sites for sorting and recovering materials.

Recovery sites and valorization channels have thus diversified. From garbage cans to the CTVD to landfills, collection and sorting centers, etc., objects (plastic bags, bottles, irons, foils, plastic packaging, etc. See Figures 3.) are recovered by city dwellers and informal and formal pre-collectors. While the structuring of the waste collection system makes it possible to distinguish between formal and informal actors, the valorization process involves all actors.

Figures 3. Sorted objects in Ouagadougou

Plastic packaging at Ouaga 2000 waste bin, June 2019

Glass bottles at Boins-Yaaré market, June 2019

Irons salvaged at Ouaga 2000 waste bin, August 2017

Plastic bags at Ouaga 2000 waste bin, August 2017

Source: Issa Sory, 2017 and 2019.

Once an object is turned into waste—meaning its owner has voluntarily decided to dispose of it outside their property, according to the legal definition—it becomes a commodity for the collector. The observation of this activity shows that in the bin, on dumps, in collection centers, or at the waste treatment and recovery center, the waste corresponds to the dual characteristics of a public good. It is a rivalrous and non-excludable good. Indeed, while all city dwellers can technically access this resource (making it non-excludable), the presence of one collector reduces the quantity available to others (making it rivalrous). This activity is even encouraged because it contributes to reducing the amount of waste to be buried.

Collected items are then sold by intermediaries to landfills, sorting centers, etc. Some intermediaries organize their home environments for the purchase of these objects. In this case, the collectors go there to sell, usually in the evenings: "Each evening, the women [pre-collectors] will line up to sell the bottles,

plastics, and others at Abdou's before coming to drop off the carts. That's why they come here usually after 8 p.m.[12]

Waste valorization, initially neglected in the reforms driven by the master plan for waste management, seems to have become one of the solid pillars of the current system because it constitutes the main source of income for some pre-collectors, formal or informal.

After the sale to intermediaries, these objects are finally sold to wholesalers who are established in certain markets like Toessin-Yaar, Karpala, and Bobo-Yaar, etc. Iron and aluminum are mainly exported to countries in the sub-region. In Ouagadougou, aluminum is mainly used for the artisanal production of pots, while plastic packaging and bottles are reused as containers for fruit juice, traditional medicine products, etc.

The transformations in favor of valorization remain very fragile, however, and reveal new challenges that are detrimental to the effective structuring of the waste chain. Indeed, the recovery of waste (manufacture of compost and granules) is currently stifled by a lack of markets. This marketing difficulty seems more pronounced for compost; farmers find it "too expensive",[13] while market gardeners and florists prefer free sludge from cleaned gutters over the compost from the Waste Treatment and Disposal Center (CTVD). Despite awareness sessions with some farmers, sending delegations to the provinces to publicize the center's compost, reducing the price of the bag (from 3,000 to 1,500 FCFA), and introducing 30 kg bags (sold at 750 FCFA), the marketing stage remains the main limitation of the organic waste recovery policy in Ouagadougou.

The same is true for plastic bags recovered by the various actors. The state, through the Ministry of the Environment, decided to eliminate these bags from the capital (Ouédraogo, 2015). It thus encouraged city dwellers, pre-collectors (formal and informal), and collectors to recover plastic bags of different colors. These bags were purchased by the Ministry of Environment for between 50 and 75 FCFA. With no plan for their use, the bags were stored at the CTVD. Currently, the bags collected by the different actors have no buyer.

> "We have picked up the bags and are waiting for the ministry. The ministry promised us that in 2018 they would pay our bags. In 2017, he did not pay and he said in 2018 and until then we are waiting. He promised us and we waited".[14]

[12] Tara, formal actor, February 2019.
[13] Interview with Kara, member of the Wend-Benedo association, February 2019.
[14] Interview with Nana, waste picker, April 2019.

Furthermore, by transforming the role of the collection center, the 2010 project induces changes that are inconsistent with the current behavior of pre-collectors. If the project were extended to the entire city, there would be, in each collection center, sorters paid from the proceeds of sorted waste and recovered objects. This means that each pre-collector would be obliged to send their waste to a collection and sorting center in the pre-collection area to which they are assigned. This requirement would further hamper this stage of the sector, given the current distribution of collection and sorting centers. The other aspect related to these centers concerns informal actors. The project, because of the political issues this category of actor would raise, could not eliminate informal actors from the test areas (Sory & Tallet, 2015). This means that they will remain in the sector even after the generalization of the project to the whole city. The existence of women sorters in collection and sorting centers—who could act as custodians of these centers—will surely deter informal pre-collectors from bringing their waste there. Informal workers will be inclined to deposit pre-collected waste at illegal dumpsites. Then, despite the project's few sample households and their follow-up by facilitators, pre-collectors point out that some people "refuse" to sort. What will be the effectiveness of sorting at the source when it comes to extending the project to all the districts of the city?

Finally, contrary to the assertions of the project's proponents indicating that "the associations/GIE managers of these centers did not receive any remuneration other than those generated by the sale of the sorted products and the increase in the number of subscribers to the collection" (Yelkouni et al., 2011, p.21),[15] the project had to provide a check for 274,053 FCFA to each of the associations of the GIE/APE in the first term of 2011 to meet the new expenses. Throughout its duration, the project supported the 78 women recruited. Indeed, the sorted waste (under the project) that would allow organizations to "self-finance" lacks market opportunities. Prospective buyers "drag their feet"[16] What will happen when this applies to all the city's waste?

[15] This passage was authored by Louis-Edouard Pouget (Head of Service, Department of Sanitation, Urban Community of Lyon) and Sidi Mahamadou Cissé (Director of Sanitation, City of Ouagadougou). The text was part of a strategic presentation of the project intended to secure support (particularly financial) for its extension.

[16] Interview with Toro, formal actor, February 2019.

Conclusion

The multiplication of private pre-collectors in the waste sector in Ouagadougou and the overlapping of pre-collection areas, as a result of competition between stakeholders at this stage of collection, were the main evidence of the application of the Master Plan for Waste Management (SDGD). The sector recommended by the scheme shows that waste pre-collected at production sources is deposited in collection centers. From these centers, the dealers at the collection stage transport them to the technical landfill site (CET). Valorization was omitted from the sector proposed by the scheme.

In the field, a discrepancy between the plan's prescriptions and the reality of the sector is observed. Indeed, the application of the scheme led to a differentiation among pre-collection actors: formal pre-collectors and informal pre-collectors. The former consist of the concessionaires of the pre-collection territories and their subcontractors, while the latter are those who operate outside the system established by the formal scheme. The competition between these two types of pre-collectors contributes to the reduction of fees and the proliferation of illegal dumps in Ouagadougou. Furthermore, a form of recovery is observed that operates outside the formal chain leading to the CET.

Based on existing valorization initiatives, a complementary project to the SDGD was initiated in 2010: Ouagadougou's Waste Reduction Strategy Project - creating jobs and incomes through collection, sorting, and recycling activities (PSRDO-CER). Two pilot areas were chosen for source sorting. The collection centers in these areas were transformed into collection and sorting centers. In these centers, women were recruited for sorting. The impact of the project affected the landfill site, which became a waste treatment and recovery center (CTVD) after two recovery units were created. Moreover, the old collection centers are being rehabilitated to meet the standards of collection and sorting centers, and those built after the project integrate the sorting aspect.

If the reforms driven by the project are in favor of valorization, they also reveal challenges related to the maintenance of this trend and the coherence of the global sector. First, the organic waste transformed into compost lacks markets. Second, the recovered plastic bags have had no buyer for over two years. Finally, the transformation of collection centers into collection and sorting centers reaffirms the control of pre-collection territories by the formal actors. Given the persistence of informal pre-collectors, the reforms initiated by the PSRDO-CER will pave the way for the proliferation of illegal dumpsites in the capital of Burkina Faso.

References

Arcens M-T., (1997). La participation de la communauté a la gestion des déchets solides, [http://www.globenet.org/preceup/pages/fr/chapitre/capitali/cas/burkina.htm, consulté le 13 juin 2019].

Bayili P. P., (2001). Gestion et valorisation des déchets solides dans les villes africaines: contribution à la définition d'un plan de gestion, in Wyss K., Gestion par leurs occupants d'environnements urbains défavorisés au sahel (pp. 72-85), CSRS, Suisse : Genève.

Diou C., Maurer R., Drozdz J., Horenfeld G., Richy F. & Champion A., (1994). Projet d'amélioration des conditions de vie urbaine, Aide-mémoire de la mission d'évaluation de l'Association internationale de développement (IDA), Banque Mondiale.

Gougeon C., (1998). Gestion des déchets municipaux : une solution alternative à Ouagadougou - Burkina Faso, [http://claire.gougeon.free.fr/frameset_dechets.html, consulté le 17 juillet 2012].

Jaglin S., (1995). Gestion urbaine partagée à Ouagadougou: pouvoirs et périphéries (1983-1991), Karthala-ORSTOM, France: Paris.

Le Bris E., (2000). Ouagadougou: de l'immobilisme à l'entropie, in Dureau F., Dupont V., Lelièvre E., Lévy J.P., & Lulle T. (coord.), Métropoles en mouvement: une comparaison internationale, (pp. 381-392), Anthropos et IRD, France : Paris.

Mas S., Vogler C., (2006). Les déchets solides dans la ville de Ouagadougou: Etat des lieux de la gestion Etat des lieux de la valorisation, rapport de stage, CREPA, Ouagadougou.

Morin R., & Séguin A-M., (1997). La Banque mondiale et les politiques urbaines: le cas de Bamako, Mali, Canadian Journal of Development Studies, 18:1, 23-47, DOI: 10.1080/02255189.1997.9669693

Osmont, A., (1995). La Banque mondiale et les villes. Du développement à l'ajustement, Karthala, France: Paris.

Ouédraogo H. M. G., (2006). Décentralisation et pouvoirs traditionnels: le paradoxe des légitimités locales, Mondes en développement, 133 (1), 9-29. https://www.cairn.info/revue-mondes-en-developpement-2006-1-page-9.htm

Ouédraogo R. U. E., (2015). Le péril plastique à Ouagadougou: pratique urbaine et préservation environnementale (Thèse de doctorat en Géographie), Université de Ouagadougou, Ouagadougou.

Sory I., & Tallet B, (2015). Un partenariat public-privé à l'épreuve des logiques d'acteurs : le schéma directeur de gestion des déchets solides à Ouagadougou, Géocarrefour, 90 (1) http://journals.openedition.org/geocarrefour/9734

Sory I., (2013). "Ouaga la belle!" Gestion des déchets solides à Ouagadougou: enjeux politiques, jeux d'acteurs et inégalités environnementales (Thèse de doctorat en Géographie), Université Paris 1 Panthéon-Sorbonne, Paris.

Yelkouni M., Pouget L-E., Cissé S. M., Weisman N. & Morizot G., (2011). La gestion des déchets : Un peu de technique, beaucoup d'économie… ", Liaison Energie-Francophonie, (90), 18-25, https://www.pseau.org/outils/ouvrages/ifdd_gestion_des_dechets_menagers_regards_croises_2011.pdf

Stigma and agency

Sstreet waste pickers in South Africa

*Teresa Perez**

Introduction

The global policy emphasis to help the world's most vulnerable people is intended to make a difference to the lives of marginalized social groups. In theory, waste pickers should be benefiting from discourses that position inclusion as a linchpin of sustainable development. Once vilified for an overreliance on economic measures of growth, the United Nations is "committed to developing broader measures of progress to complement gross domestic product" (United Nations, 2015). Sustainable Development Goals encompass social and environmental dynamics, which recognize the multiple functions of employment beyond economic benefits. The ILO has swathes of policies, training, instruments, initiatives, and forums, all of which set minimum employment standards to achieve decent work for all. In South Africa, constitutional commitments echo these worldwide priorities to grow the green economy. National plans to create green jobs and investment in cooperatives have the potential to help waste pickers make a livelihood from reclaiming household refuse. In an ideal world, informal waste minimization would be viewed as an important contribution to the circular economy towards achieving green growth. But this

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favorable policy climate has, as yet, had little impact on waste pickers working on the streets of Cape Town.

In contrast to the positive language of the green economy, terms associated with waste pickers tend to marginalize people and their work. Most obvious is the stigma of the work itself, when touching waste spoils the identity of workers who are labeled as dirty and desperate. Managing this stigma is an age-old problem and a common struggle that has been eased by waste pickers organizing and collectivizing (Samson, 2009). Stigma is therefore not unique to Southern Africa nor an insurmountable challenge – even in the absence of targeted policy initiatives. What this chapter illustrates is the multiple and overlapping sources of stigma that reinforce one another in subtle yet powerful ways. In analyzing how stigma positions waste pickers (identity) and waste picking (behavior), I offer an explanation as to why policy shifts have not led to changes in everyday interactions. The waste pickers in this study are not representative of all reclaimers in Cape Town, let alone all of South Africa or other global regions. But they do represent the intended beneficiaries of policies to help the furthest behind first (United Nations, 2016). Consequently, findings can show how stigma constrains the impact of policies that might otherwise help informal workers make a living from waste.

My argument is that despite a favorable policy context, waste pickers struggle to manage stigma in their interactions with members of the public. Constraints are partly due to the design of policies that hinge on job creation in the green economy, which assume that waste pickers are interpreted as workers and waste picking is seen as a way to minimize waste. This is often not the case due to global trends, historical constructions, and local conditions that contextualize the collective identity of Cape Town as a city that is keen to change its image. Theories of stigma and impression management, discourses of dirt and 'race,' and social mobility in unequal societies, are therefore useful for understanding waste pickers' audiences as well as their stigma management strategies. Using an ethnographic approach that involved me working alongside waste pickers, I was able to shadow a group to help me see the world from their perspective. I wore a device to record our conversations while we worked, which I analyzed using a combination of thematic and discourse analysis. I present conversations as vignettes, which I analyze to reveal the tacit knowledge used to construct waste pickers as suspicious. I conclude that waste pickers are stigmatized as an undesirable presence on the streets and waste picking is stigmatized as unmodern, which constrains the impact of policy efforts to support

informal livelihoods from waste. As a result, waste pickers have to continually negotiate and re-negotiate their access to waste.

Policy discourses

Before explaining stigma in interactions, I first set out policy discourses that have a bearing on attitudes towards waste pickers in general. This assumes that "Policies do not normally tell you what to do; they create circumstances in which the range of options available in deciding what to do are narrowed or changed" (Ball, 1993, p. 12). At present, policies have yet to broaden the range of options available to waste pickers, which limits their agency and has meant that reclaiming on the streets of Cape Town remains stigmatized. At a global scale, policies aiming "to reach those at risk of being left behind and the most vulnerable" (International Labor Organization, 2015, 2019) have set targets to achieve decent work for all (SDG goal #8). This fits with job creation targets announced in South Africa's national development plans, all of which aim to significantly reduce unemployment[1] (Statistics South Africa, 2019). Both international and national level policies have combined economic, social, and environmental aspects of work, generally housed within the concept of green growth, the green economy, and green jobs (Economic Development Department, 2011). In theory, waste pickers should be reaping the benefits of the unprecedented level of attention in policies that recognize their work.

In practice, these large-scale visions have not reached marginalized people and places. The City of Cape Town Municipality (CoCT) is mandated by the Waste Act (Republic of South Africa, 2008) and is under pressure to achieve 'zero waste' by 2022 (Pikitup, 2001). But the means by which this is achieved is not stipulated and depends on resources and priorities available locally. Although the Western Cape prides itself on being the best run province, inequality is as evident in Cape Town as it is in other cities. This has been described as "environmental apartheid" where spatial divisions remain highly racialized, with its roots in a regulation of resource distribution that was (and continues to be) deliberately inequitable (Stull et al., 2020). Yet waste pickers' access to resources and the value that they can extract from them, given their place at the bottom of the value chain, tends to be skimmed over. Instead, waste picking

[1] In the last quarter of 2018, unemployment was recorded to be 27.1% (Statistics South Africa, 2019), but this varies enormously and is much higher in rural areas (Stull, Bell, & Ncwadi, 2020).

is subsumed within the logic of generating wealth from the circular economy. This resonates with policies that position waste as a resource, where there is potential for value extraction to "unlock opportunities for Africa" (Oelofse, Nahman, & Godfrey, 2018).

An underlying assumption is that informal workers should transition into the formal economy, where employment opportunities increase with economic growth. This pairing unintentionally contributes to the stigma of informality and has been critiqued in calls for "independent and coherent policy to ensure achievement of full employment and decent work whether or not there is economic growth" (Frey & MacNaughton, 2016, p. 8). The focus on growth also means that the CoCT has one eye on its performance on the global stage, keen to attract foreign investment and tourism to cement its place as a world city (McDonald, 2008). Presenting the city as modern and efficient positions waste-to-energy and other technological solutions as more desirable than the manual sorting of waste, either at source or in material recovery facilities operated by former waste pickers. Pressure groups have fought against plans to burn rather than recycle waste. The South African Waste Pickers Association (SAWPA) was formed in 2009 in collaboration with groundWork (an environmental justice and development Non-Profit Organization) as part of their waste campaign (groundWork, 2014). The aim is for waste pickers to be recognized as workers and involve them in decision-making. SAWPA is acknowledged in the National Waste Management Strategy (Department of Environmental Affairs, 2019), circulated for public comment. The revised strategy confirms "waste pickers are often regarded with distrust by homeowners, and there is little positive collaboration between waste pickers, the private sector and local municipalities" (pp. 44-45). Instead, the strategy advocates for regulations that protect the interests of informal pickers. However, how this will be taken forward at a local level remains to be determined. At present, support for street waste pickers in Cape Town is conditional on them being able to provide a comprehensive waste minimization service that the local government can showcase.

To this end, growing the green economy in South Africa has been pursued through the provision of incentives for small-scale collectors and sorters to become waste entrepreneurs or form cooperatives. Financial assistance is available from government and industry bodies such as PETCO (Scholtz, 2015), but relies on being able to demonstrate the potential to operate at scale in the future. Many projects have struggled to remain sustainable and have not led to widespread incorporation of waste pickers into the formal economy (Godfrey, 2015; Linnay, 2013). Alternatively, waste pickers could seek employment at

waste management companies. The reasons why waste pickers do not pursue such work have been suggested by some authors as being related to the independence and autonomy of informal working arrangements (R. Schenck, Blaauw, & Viljoen, 2016). The implication is that waste pickers are somehow content with precarious and difficult working conditions. While this may be true to some extent, framing existing arrangements as satisfactory might also be a way for waste pickers to avoid being judged as irrational or stupid in interviews with academics. Waste pickers might imagine their interviewer assumes a formal job is better than waste picking and that overlooking 'better' opportunities is counter-intuitive.

However, extreme levels of inequality in South Africa often mean there is relatively little to gain from a permanent but low-paid formal job, compared to living from day-to-day in the informal sector. Wolff's (2016) study of highly unequal societies is an important reminder that short-termism makes sense, when the jump to the next rung up on the socio-economic ladder is out of reach. Yet policy discourses continue to entrench the expectation that waste pickers should aspire to become upwardly mobile and think long-term, even though the levels of inequality clearly prohibit this possibility for the vast majority of South Africans. Another explanation is that part of the appeal of informal livelihood strategies is that alternative wage work is exploitative. It's instructive that no sooner did the government introduce a universal minimum wage,[2] than questions were raised about ensuring mechanisms for employers to be demarcated as exceptions (Parliamentary Monitoring Group, 2019). Further, despite evidence pointing to the benefits of extending social security to informal workers (International Labor Organization, 2019), this has not been pursued as a stepping stone from informal to formal employment arrangements in South Africa. Overall, there appears to be little appetite to offer informal workers unconditional support – a sentiment that permeates waste pickers' everyday interactions.

Stigma in interactions

Stigma is embedded in dramaturgical theory that analyzes interactions as a performance, akin to the way that scenes are presented to an audience. Stigma has power when individuals are unable to shape the perception of the people

[2] This is ZAR 20 per hour (ARS 60.20, USD 1.40, GBP 1.20, EUR 1.25).

that they interact with, because they have attributes that are synonymous with stereotypes. Attributes can be physical markers that spoil a person's identity because of the negativity that audiences immediately attach to them. The meaning attached to attributes can change over time and between cultures. As with body modification, for example, what is socially acceptable in one place is deviant in another (Becker, 1963). Stigma management is any attempt to reduce the power that stereotypical interpretations of these attributes have. These are extensively discussed in (Goffman, 1963), such as "passing" as normal by concealing "stigma symbols" – one of a range of strategies used by stigmatized groups to fit in and avoid the constraints of negative labels.

Stigma management falls within a broader theory of impression management (Goffman, 1959), which sets out the extensive but often tacitly adhered to interaction rituals in everyday life. Knowledge of these rules of engagement is integral to being able to define a situation and sustain a desired impression of oneself (such as competent, trustworthy). The capacity to maintain or change the perception of audiences is therefore an important part of agency. By agency, I mean the choices that individuals make about how to act that take into account past, present, and future considerations (Emirbayer & Mische, 1998). These choices are shaped by historical and ongoing inequitable arrangements. For example, constructions of 'race' globally arrange people into hierarchies (Mills, 1997) that in South Africa continue to be used, for example, to categorize people as 'black,' 'colored' or 'white.' Visible markers (skin, hair, lips) of socio-economic position (class) intersect to give an overall impression of one's rightful place in society. Acquiring cultural capital can be a status symbol, to give a performance that distinguishes individuals from others, in order to gain and maintain entry into social and physical spaces (Bourdieu, 1984).

Stigma constrains individual and collective agency when negative stereotypes have discursive power. Following Foucault (1972), discourses are "a set of related statements, manifested multimodally through an interplay, for example of language and visual structures that produce and organize a particular order of reality and specific subject positions therein" (Lazar, 2005, p. 143). Names, sets of ideas, and assumptions can position people and things into a hierarchy, which gives specific meanings to interactions. Impression management is therefore a way to challenge the power of discourses. For example, unemployed people in New York have been able to present 'dumpster diving' as a protest against food waste (Barnard, 2011), which challenges the stigma of touching and eating organic waste. Unemployed people in South Africa, and in the global South more broadly, have presented themselves as informal

workers, which some have used to successfully form movements to challenge the stigma of touching and selling recyclable waste (Dias, 2012).

What both dumpster divers' and waste pickers' performances have in common is the struggle to avoid being seen as desperate and destitute. Their identity is spoiled by stereotypes of homeless people as mentally ill, substance abusers, violent, beggars, and people to be avoided (Desjarlais, 1997). The act of touching and moving waste has been theorized to re-frame rubbish as merely "matter out of place" (Douglas, 1966). The meaning of waste is therefore contextual, socially constructed, and rooted in a complex history that has culminated in a widespread "cleansing or refining impulse; a will to order" (Scanlon, 2005, p. 58). This study therefore explored how waste pickers were affected by social processes that order people and behaviors according to negative stereotypes. This theoretical framework was a way to focus on the power of stigma (Link & Phelan, 2001), to understand why policy discourses have not enabled waste pickers to improve their status by presenting themselves as waste minimization workers.

Currently, waste collection services in Cape Town vary from one area to another. In the suburbs that I worked in with waste pickers, household waste is collected once a week on a Thursday morning. Households are provided with one black bin that must be wheeled into the road, ready to be emptied into a truck by refuse collectors. There is no door-to-door collection for recyclable waste. Residents who want to recycle, need to separate and store recyclable waste at home and then take it to a 'drop off' site that the government provides, which are at various points around the city. These workers are either directly or indirectly employed by the city, via private companies that are tendered to provide waste services on behalf of the local government. Waste pickers are known to sort through bins on the day of collection before they are emptied. They have the same route each day that mirrors the one taken by the municipal truck, collecting from suburbs on an allocated day in a particular sequence. Waste pickers' work is viewed as voluntary, and waste pickers have no formal interaction with waste management arrangements or staff. Waste pickers who were caught making a mess in the process of taking out waste were chastised by refuse collectors, but otherwise I did not witness any animosity between the formal waste collectors and informal waste pickers.

Researching stigma

My research design was grounded in the need to understand the interactions of waste pickers from their perspective, without glamorizing or romanticizing a difficult and hazardous occupation. I therefore took an interpretivist approach whereby "knowledge is constructed not only of observable phenomena, but also by descriptions of peoples' intentions, beliefs, values and reasons, meaning making and self-understanding" (Henning, 2004). This epistemological position meant I chose to conduct participant observation, working alongside waste pickers, in order to be exposed to the less obvious and tacitly held assumptions of both performers and audiences. I therefore did not ask any questions directly about stigma or agency. Instead, I used these as theoretical concepts to analyze fieldnotes, composed of personal reflections, descriptions of interactions, and transcribed recordings of conversations that took place while we worked. The group with whom I worked was aware that I was recording, and I sought permission from my key informant to record at the beginning of each work day.[3]

I first met my key informant (Tamas[4]) on 12th December 2013 while waiting on a street corner, in an area that I used to live in, knowing that at some point waste pickers would pass by. He became my key informant due to his proficiency in English, and willingness to let me shadow him for 3-4 hours at a time. As part of working alongside him, I met many other people, some of whom joined Tamas every week and some that I met intermittently. Where Tamas used waste picking as his sole method of income with no intention of looking for an alternative, others used waste picking as a 'stop gap' to supplement their income in periods of unemployment. There were approximately 10 people that I came to know well, that were regular waste pickers. They were mostly males aged between 30-40, who would have been classified as 'coloured' or 'black' under apartheid, whose family homes are in the historically disadvantaged part of Cape Town. These areas are colloquially referred to as the 'Cape Flats,' a combination of townships and informal settlements, where high rates of crime and violence are exacerbated by gang rivalry. Negative stereotypes about black men in particular mean their movement from one suburb to another has to be thoughtfully navigated, sometimes in order to alleviate fear among richer 'white' people (Lindegaard, 2009).

[3] For a more detailed explanation of the ethics of selective consent, see Perez (2019).
[4] All names are pseudonyms.

In addition to waste pickers' race and gender, there were other parts of their appearance that connected them to negative stereotypes. Tamas and several of his colleagues had spent time in prison, during which they acquired distinct tattoos, some of which were on their face or difficult to conceal. Many of the group had missing teeth, either deliberately extracted as part of cultural practices or knocked out in fights. Most of the group were alcohol dependent and therefore tended to be underweight, which meant they did not look healthy and tends to be associated with drug abuse. Although they had access to family homes, which some intermittently returned to, Tamas slept on the streets in an affluent suburb. Waste pickers' physical appearance and habits therefore conformed to homeless and criminal stereotypes. However, they saw themselves as distinct from other homeless people in that they had permanently exited from prison gangs, were no longer affiliated to criminal gangs in the cape flats, substantially reduced their abuse of substances, and were largely self-sufficient. They were therefore critical of others in a similar position to themselves but who were disorganized, habitual drug abusers, and resorted to begging without trying to support themselves.

Tamas and I met most Thursday mornings throughout 2014 (33 weeks in all, totaling 82 hours of recording and amassing 1,000 pages of fieldnotes). I told him I wanted to learn about what he did, which at first he and the others were suspicious of. Tamas and the rest of the group found it difficult to understand why I insisted on doing the work, rather than just asking them about it and not getting my hands dirty. The implication was that in my shoes, they would not be sifting through the waste. Hence, it was through interactions and conversations such as these that the stigma of touching waste became apparent in subtle ways, which would have been more difficult to garner using other methods.

When I talked about my research to other students and academics, they were curious about what it was that waste pickers looked for and what they found. They had not approached the waste pickers that worked in their streets to ask them in person. I therefore became a 'go-between,' giving advice on how to make waste picking easier, such as keeping reusable items separate from other waste. As a former resident in the area, I was often shocked by the things that we found in the bin; clothes that could have been salvageable had they not been put in the bin along with organic waste; a burnt pan that had been thrown away rather than washed and re-used. I therefore managed the impression that waste pickers formed of me, taking care to distance myself from stereotypes of wasteful rich students. Similarly, waste pickers distanced themselves from other homeless people who did not work and people who used illegal substances. In

these ways, I paid attention to the intention behind what was communicated rather than only the content of conversations, using thematic and discourse analysis (Braun & Clarke, 2006; Johnstone, 2008).

This chapter is a subsection of a larger PhD investigation (Perez, 2016). Although I focus on constraint more than enablement here, I realize that both are at work simultaneously as part of the co-constitution of society (Giddens, 1984). Furthermore, I have selected extracts that show how discourses are entrenched by stigma. But this analytic focus should not downplay the everyday forms of resistance (Scott, 1985) to restrictions on waste pickers' freedom of movement in affluent and historically 'white' suburbs of Cape Town. The rationale behind this selection of data is to argue that, despite policy discourses that position waste pickers as waste minimization workers, the right to earn a living from salvaging reusable and recyclable items remains contested. For many residents, the informal manual sorting of household rubbish is not something that should be on display for all to see.

Stigma and agency

I use four examples, as moments that raise the issue of stigma in relation to waste pickers' agency. Each begins with a vignette that I have divided into two columns. The left column is my transcription from recorded conversations as it was spoken verbatim. The right column is a translation of sorts, where the meaning is likely to be unclear to people who were not present. The first two examples are taken from interactions that I witnessed which I judged to be instances where waste pickers needed to manage their stigmatized identity. The second two are extracts from conversations that I had with waste pickers when they reflected on the judgments that the general public tended to make about them. It's worth noting that these moments were not frequent. Overt, in-person confrontations with/objections to waste pickers were few and far between. But the theoretical lens of stigma and impression management means I am interpreting this lack of interaction as the work of stigma, as opposed to evidence of a widespread ambivalence and acceptance.

Shaming the neighbourhood

Waste pickers work early mornings, which meant for the most part residents were not at home. But landlords and caretakers were more likely to be on the street when waste pickers arrived to look through bins, prior to the formal refuse collection trucks. By and large, landlords and caretakers did not object to the presence of waste pickers but equally, interaction was minimal. As is customary, the group was greeted but no interest was taken beyond common courtesy. Instead of knowing individuals by name, Tamas commented that the public tended to recognize him by his dog – which was far more likely to attract concern than his own well-being. In the following extract, a landlady is compelled to interact with the group. Leandra (a landlady) is waiting for foreign students who are scheduled to come and view her property. Leandra presumes she has reached an understanding with waste pickers, that they must leave before the prospective tenants arrive. The following exchange ensues when she becomes anxious that the group does not look like they are leaving. One of the group that I came to know well, Jared, talks to me as we both look on within earshot but at a distance.

Extract 1: Fieldnotes, Week 3, January 23, 2014

1	Leandra: That's now, now	
2	Me: No it's not half past	It is not 9.30 a.m. yet
3	Jared: (…)[Afrikaans] o.k.	
4	Leandra: No you have to go now because they are going to be here at half past nine.	Waste pickers have to go now because prospective tenants are arriving at 9.30 a.m. She owns several properties in this road
5	Me: You want us to go now?	
6	[Jared turns to me]	
7	Jared: What is wrong with this lady?	
8	(…)[Inaudible] she says, you know she owns the road.	
9	Me: Some students are coming to look at the flat so she wants us to go	
10	Jared: Why? Why? It's good for them to see us	

11	Me: I agree. It's nothing that no one doesn't know anyway, it's not like 'ooh surprise, people are looking through the bins on bin day.' It happens in every area, it happens in every area.	
12	Jared: And it's only, it's only on Thursday	
13	Me: Ja (we walk to join the others)	
14	Jared: So ja, like now (…) [Inaudible] 10 o'clock.	
15	Leandra: If you come back at 12 o'clock and I'll give you something, but if you could just, if you could just, you know what it is...I'll give you something, come back at 12 o'clock... I'll have something for Robert to give to you	Robert is the caretaker
16	Jared: o.k.	
17	Leandra: Thank you very much	
18	Jared: Thank you my (…) [inaudible]	
19	Me: Thank you	
20	Leandra: You know these are American people, they want to see the road is, you know, they want to come and see, if they see all of you guys on the road then they get freaked out	
21	Jared: Ja ja ja	Yeah, yeah, yeah

Leandra claims it is 9.30 a.m. (line 1) which I dispute (line 2) and she ignores. She explains why waste pickers need to leave well in advance of the property viewing time (line 4). Out of earshot of Leandra, Jared suggests her behavior is at odds with what is considered normal (line 7) and informs me of the extent of her wealth (line 8). I explain why I think she wants the group to leave (line 9), which Jared dismisses as irrational logic (line 10). I agree that the sight of waste

pickers should not cause alarm (line 11) and Jared emphasizes their relatively low level of intrusion (line 12). We get closer to her and the rest of the group who she continues to appeal to. Jared points out when the group usually leaves (line 14), at which point Leandra offers an incentive (line 15). Jared verbally accepts this exchange (line 16), Leandra appears grateful (line 17), and we both thank her (lines 18-19). Rather than walk away, she explains the rationale behind her request. Waste pickers will scare off Americans (line 20). This is met with flippant agreement (line 21). The group continues to congregate but I do not see how the story ends because my key informant (Tamas) instructs us to leave. As we walk away, the others argue about the loss of income and inconvenience of returning to the suburbs later in the day.

Leandra's handling of the situation can primarily be understood as a stigma management strategy. Her performance is undermined by the presence of waste pickers when trying to present the area as a desirable place to live. Hence, her main concern is what American students will think. Rather than waiting to see if/how they react, she pre-empts that the area will be interpreted unfavorably. Waste pickers must therefore be hidden temporarily - welcome to return once she has finished her performance. This micro-level interaction emulates what happens on a larger scale when the city has to perform on the international stage. Similar to other cities that try to pass as modern and inclusive ahead of sporting mega events, discrediting symbols are removed (Majavu, 2009). This includes 'cleaning up the streets,' and removing 'crime and grime' by relocating people when their physical appearance is anticipated to be off-putting to foreigners (Eisenhauer, Adair, & Taylor, 2014).

The waste pickers with whom I worked had physical attributes (tattoos, scars, underweight, missing teeth) that connected to stereotypical images of crime and homelessness. In addition to judging waste pickers based on their body image, asking people who identify as 'coloured' to leave an area takes on a specific meaning in South Africa. Any denial of the right to be present in a historically white-only area, especially by a 'white' person, resembles apartheid era injustices. For example, people categorized as 'non-white' were forcibly removed from their homes and relocated to what are now 'townships' under the Group Areas Act (Union of South Africa, 1950). The discourse of the 'new' South Africa, while not as yet having led to economic change for the majority of previously disenfranchised groups, makes it less socially acceptable to restrict others' freedom of movement. Hence, citing American students as the problem deflects attention from her personal preferences and protects her from being accused of racism.

For waste pickers to be employed in green jobs, they need to be granted access to suburban streets in order to access household waste. The altercation above is indicative of an underlying sense of unease about the presence of people who do not fit with a modern city image. If people currently working informally are to transition into the formal economy, as envisioned by the ILO, residents need to be less anxious about what people look like. In other parts of the world uniforms and safety equipment have helped people to shed the stigma of homelessness (Mehta, 2015). But this does not help when residents object to having their waste manually separated at source, as the next example shows.

Order and private property

Some local government officials are reluctant to support street waste pickers in Cape Town because of complaints by residents about the mess they make while sifting through the bin. The group with whom I worked were meticulously tidy in order to maintain access to household waste. Anything that had been taken out of the bin but deemed of no use to waste pickers was placed back inside the bin, lid closed, handles facing away from properties, lined up on the kerb. Even items that waste pickers did not want but that might have been of use to someone else had to be put back in the bin (as opposed to left on top of the bin for others to take). This was at the request of caretakers, under the watchful eye of their landlord employers (such as Leandra) who in turn were accountable to tenants. The only exception to this rule was that paper could be put to one side because there was one waste picker (Steven) who collected only paper. He regularly joined Tamas each week but often lagged behind because he had to make more trips to and from where he stored paper, before loading it all onto a trolley to sell to a buy-back center.

The following extract is taken from an interaction that happened after I took a pile of magazines out of a bin and stacked them on the kerb. I was at the other end of the street but hurriedly returned when I heard a resident shouting about the magazines from her first-floor window.

Extract 2: Fieldnotes, Week 16, July 3, 2014

1	Ang: I watched you!	
2	Mike: (…)[inaudible]	
3	Ang: And you dirt, you are making dirt all around here	
4	Mike: (…)[inaudible]	
5	Me: Do you know what, the paper, that was me. I'm leaving it because someone else comes and does the paper.	
6	Ang: I don't want other people to come and take my paper. There is a reason I don't want it. You don't have access to my paper.	
7	Me: ok, sorry, what, why is it that you don't want us to take	
8	Ang: I don't, I have (…)[inaudible]	
9	Me: Just out of interest, you don't have to tell me	
10	Ang: I don't want you to take my paper	
11	Me: ok, it's just to recycle it	
12	Ang: (…)[inaudible] I do not want people taking my papers.	
13	Me: It's just to recycle	We take the paper to recycle it
14	Jared: It is to recycle	
15	Me: Is it because it's got your name on and stuff and you're worried about	
16	Ang: (…)[inaudible] and I don't want it recycled	
17	Me: ok. Ok so, I didn't, I didn't mean to cause you any bother. So you want me to put that back in the bin, you don't want that recycled.	
18	Ang: Those ones are not the ones I was (…)[inaudible] there's very specific ones that he took out of the packet, that I put it in a packet specifically because I didn't want it recycled	It refers to the specific paper that the waste picker took out of a bag
19	Me: oh	
20	Ang: But he's taken it out	
21	Me: oh, ok	
22	Ang: I know you don't understand, but you don't have to understand because it's my property.	
23	Me: ok	

Seemingly having kept an eye on us for a while, Ang concludes that we are making a mess, reiterating the type of complaint about waste pickers that appears in local news (Hassen, 2018). I explain myself in an attempt to reas-

sure her that the paper will be collected and not litter the street (line 5). But in this moment, her indignation is fueled by the act of accessing her paper. She alludes to her reaction having a reason (line 6) but, unlike Leandra, she does not volunteer this information. I probe (lines 7; 9) but she restates her objection (lines 8; 10) and I repeat that it will not be used for any purpose other than to be recycled (lines 11; 13). At a loss I start to try and guess the cause of her concern, suggesting that perhaps she is worried about identity theft (15). She repeats her mantra (line 16), I stop probing and clarify how she would like me to proceed (line 17). It transpires that we are talking about different stacks (line 18) and she singles out Mike to blame (line 20). She realizes I am confused but states that she does not have to explain herself to me because of her ownership rights (line 22), which I accept (line 23). She shuts her window and I turn to see that my fellow waste pickers are unperturbed: They have long since returned to sorting through the remaining bins.

The interaction can be explained using theories of the social construction of waste. Of these, waste pickers can be seen as disrupting the rightful place of waste (Douglas, 1966). This means regardless of how tidy street waste pickers are, they disrupt the "order of things" (Scanlon, 2005, p. 58). As a consequence, waste is emotive and thought provoking (Gregson, Metcalfe, & Crewe, 2007; Watson & Meah, 2012). Ang has carefully considered what she wants to happen to her paper and taken steps to make sure its contents are not known or seen. Stigma is about the act of touching waste, in connection with standards of cleanliness, and the act of seeing and moving things that are none of their business. Campaigns to make waste the business of informal reclaimers do so by putting a value on materials, such as paper, to unlock its economic potential that is otherwise lost when it is dumped or burnt (Oelofse et al., 2018). But this has little bearing on the anxiety expressed by Ang. Her right to send paper to landfill is enshrined in the construction of waste as private property and exacerbated by the privatization of waste services (Miraftab, 2005), despite being placed inside a bin in a public place. Local government's policy and provision means recycling is voluntary, which validates Ang's argument that waste pickers should respect her right to send paper wrapped in a plastic bag to landfill.

No mention is made of the incident until I raise it at the end of the workday and confess to finding her condescending tone aggravating. Tamas's advice is "fuck her…don't let her work on your nerves" (Fieldnotes, week 16, 3 July 2014). I was left with the impression that waste pickers had become somewhat aloof to being patronized. Tamas's advice is also indicative of the need to develop

a thick skin in order to manage the stigma of homelessness which is connected to being untrustworthy.

Smelly and untrustworthy

Establishing recycling cooperatives in the image of those in South America relies on members trusting one another, found to be a feature of waste pickers at landfill sites in other African countries (Kimbugwe & Ibitayo, 2014). For street waste pickers, building trusting relationships was difficult. Street waste pickers were frequently the victim of theft. One of the people with whom I worked, Ryan, routinely had his blankets stolen at night and suspected the culprit was a friend (Fieldnotes, week 21, 21 August 2014). The previous interactions involving Leandra and Ang point to a more generalized atmosphere of mistrust towards waste pickers. This was voiced by Jared who chose to waste pick intermittently when other casual work was in short supply. For him, waste picking was one of several livelihood strategies as reported in other studies (C. R. Schenck & Blaauw, 2011). He would therefore be neither interested nor meet the criteria to be able to start his own business. He expressed a preference for entering a standard employment relationship but was precluded because he was homeless and had a criminal record.

One morning we talked about why I had chosen to conduct the research by working alongside him and the rest of the group, as opposed to interviewing him. His response illustrates how waste pickers are stigmatized as untrustworthy:

Extract 3: Fieldnotes, Week 3, January 23, 2014

1	Jared: But I believe you're going to get a PhD. You know why?	One morning, the waste picker informant shared his thoughts about the students and the PhD candidate.
2	Me: No. Why?	
3	Jared: Because you do all the efforts to, to get there. See here, not one of those UCT students gonna trust us like you trust us now.	
4	Me: It's, some people, there's different ways of working,	
5	Jared: They (…)[inaudible] us	
6	Me: and this is, I don't think you can understand anything unless you actually	
7	Jared: Or maybe they think 'oh they're homeless, they're stinking' or they, you know, you get people like that, you understand what I'm saying	
8	Me: Yeah, I do, I understand	
9	Jared: (…) [inaudible]. Many of them. So that's the ones who never get to the PhD.	

Jared's impression of students was that they did not differentiate between homeless people and waste pickers. As a result, he felt that university students avoid waste pickers because their homeless appearance and body odor are signifiers of an unreliable character. From the perspective of waste pickers, homeless stereotypes positioned them as a disruption to the otherwise orderly suburban streets. Waste pickers worked hard to manage the stigma of homelessness in several ways. For example, the group with whom I worked conspicuously washed their hands and talked about the importance of personal hygiene. They saw themselves as superior to other homeless people who they viewed as disorganized and exploiters of the goodwill of others in order to fund their illegal drug habits. In contrast, Tamas and the waste pickers that I saw most weeks had a strict routine. They were up in the early hours of the morning regardless of the excesses of the previous evening. They followed the same route each week and

had well-established networks. This counters the '*bergie*' (homeless) stereotype that stigmatizes waste pickers as incapable of forming relationships (Ross, 2005).

The current policy emphasis is that green jobs can provide work for the unskilled and uneducated workforce. Job creation initiatives such as the extended public works program (EPWP) claim to train people so that when they leave the project, they will have a skill that they can use to obtain future employment in the sector. What this ignores is the knowledge and skills that street waste pickers have. For example, Tamas's extensive networks had been built up over years, which meant he had several potential buyers lined up for the things he reclaimed from the bin. Waste pickers had in-depth knowledge of the new and used price of items, which they updated by scanning newspaper adverts for the price of electronics. In contrast, formal waste minimization services are at the will of the recycling industry. Cooperatives must accept the per kilo value of recyclables. Price fluctuation has an adverse effect on income and the capacity of 'Waste-preneurship' projects to promote self-reliance (Hlahla, Goebel, & Hill, 2016).

Tamas boycotted the volatile recyclables market by choosing not to collect paper, plastic or glass. Instead, he foraged for more valuable items with a higher resale value such as electronics and clothes. This logic is not evident to the public and therefore it is easy to assume that waste pickers who choose not to participate in formal waste minimization projects are idle, dysfunctional or both. The power of stereotypes is borne out in other research in Cape Town where the strategies that people use to make ends meet are ignored because the stigma of poverty means people are viewed as "lazy" (Orderson, 2011) or "someone who just wants to drink" (van Heerden, 2015, p. 66). When I asked Tamas if he would consider joining SAWPA or collectivizing in some way, he asked me to outline what this would entail. I emphasized the ethos of cooperative ways of working such as pooling resources. Before I finished explaining, he claimed that this was what he was already doing and therefore had no interest in collectivizing. The conversation was indicative of Tamas's dislike for formalities or any threat to his autonomy. Unlike Jared, he did not want to enter into a standard employment relationship or union.

Although the waste pickers I met did not smell unpleasant as mentioned by Jared, I often caught the smell of alcohol on Tamas's breath. Tamas understood that when he became drunk he could be a 'nuisance' and this attracted complaints from the public which he thought was a legitimate response (Fieldnotes, week 20, 7 August 2014). What he found unfair was when members of the public cast aspersions about his level of intelligence; 'I do a lot of things, like

people don't know me. [They] just think I'm scratching in the dustbin, I'm drunk. No. I use my mind also' (Fieldnotes, Week 21, 21 August 2014). In connection with homeless stereotypes, Tamas felt he was stigmatized as stupid because of his excessive alcohol consumption. A common stigma management strategy was to present himself as educated. In his interactions with me, Tamas reminded me of his qualifications, level of education, and times where he had outsmarted professionals. The underestimation of his mental agility was one aspect of a broader theme that dominated fieldnotes related to waste pickers' level of cognition.

Alcoholism and cognitive capacity

Tamas explained the constraints of stigma in relation to the judgments that the public made about his cognitive capacity. The implications for policy impact were illustrated in a conversation between Tamas and I, about forms of stakeholder engagement designed to consider the extent of informal workers' participation in the green economy. The conversation began by me explaining that I would be absent in the coming weeks due to work commitments that clashed with my PhD fieldwork. Specifically, I had been tasked with organizing a workshop titled 'The solidarity economy and jobs: "Green jobs", decent jobs or any jobs?' I felt awkward because I had no intention of inviting any of the waste pickers, even though it was highly relevant to them. Instead, members of SAWPA were attending to represent the views and interests of waste pickers. Tamas was inquisitive but ultimately not interested in attending because of his previous experiences.

Extract 4. Fieldnotes, week 21, August 21, 2014

1	Tamas: Yes because I don't like this, you can go and sit and you have to be disciplined	I don't like workshops because you have to stay sitting down and be disciplined
2	Me: Ja	
3	Tamas: Share my whatever, opinion	
4	Me: Yeah	Yes
5	Tamas: Share [my views] and see whatever we got, mind work, that's mindwork I'm talking about	And share my opinion or whatever

6	Me: Ja	
7	Tamas: You see (…)[inaudible] 'that's a drunky, he nothing, he don't know nothing' everything like that, but he does know	Share my views and find out what people think. That takes thought, I'm talking about the thought process involved
8	Me: Who says that?	
9	Tamas: No they don't, it's like you see it	
10	Me: they don't say it	Yes
11	Tamas: They look you, by the face	They don't say anything but you can tell by how they look at you You can see it in their face
12	Me: ah	
13	Tamas: They look you by your face, and what clothes you got on, maybe you dirty, but they don't know what's going on in your mind.	They look at your face and clothes Maybe you look dirty but they don't know what you are thinking
14	Me: ok	

Tamas anticipates that the rules of interaction will be dictated to him and require a level of self-control (line 1). This may be unappealing, in relation to his time in prison and interactions with correctional services, which Michel Foucault (1979) also characterizes in terms used by Tamas (line 1). Tamas is made aware of his deviance by the reaction of others (Becker, 1963), indicated by their facial expressions (line 11) as a response to being labeled a drunk (line 7). The homeless stereotype positions him as out of place (Douglas, 1966) in forums that require mental agility. Rather than being judged by the insights that he offers (line 3 and 5), his opinions are assumed to be inferior (line 7) because he is alcohol dependent. Other people who are alcohol dependent can pass as 'normal' (Goffman, 1963) if their consumption is in private, at socially acceptable times of the day, and does not interfere with their ability to remain in formal employment. In contrast to this image of a functional alcoholic, Tamas's presentation of self is construed as dysfunctional. As part of the stereotype of homelessness, waste pickers are assumed to be alcohol dependent and therefore unpredictable or unruly.

There has been an emphasis on multi-stakeholder engagements to disseminate information in academic research, which in theory should involve a diverse range of perspectives. The most recent workshop I attended was titled 'How can South Africa's green economy projects work better for the poor?' (Huff & Scheba, 2017). The following extract is taken from the invitation letter:

> After a *formal* presentation (...) participants are invited to join an *informal* roundtable discussion on how research can help to develop tools for policy makers, industries and practitioners to make green economy initiatives work better for the poor in the country (Human Sciences Research Council, 2017 [my emphasis added in italics])

From an academic point of view, sitting around a table in a seminar room is an informal conversation to elicit insights into supporting the livelihood strategies of the lowest earners. But from Tamas's perspective, the space is disciplined, people will be watching him, and judging his credibility according to his clothing. Certainly, non-attendance by the people that such forums aim to help can be explained in ways that are unrelated to stigma. For example, practical constraints mean informal workers cannot take time off without loss of earnings. The problem is that the lack of engagement with stigmatized groups means that most of the information about why the growth of the green economy has been so slow in South Africa tends not to come directly from informal waste workers. Consequently, policy discussions and the spaces in which they take place unintentionally entrench hierarchical relationships. The only means available to street waste pickers to improve their position in the waste hierarchy is to abide by the rules set out by policy makers, which are geared towards transitioning to the formal economy.

Conclusion

Stigma is not the only constraint to policies aimed at reaching the furthest behind first. But stigma is significant because it stops people (residents) from making a connection between the people they see on the street sifting through bins and work that contributes to economic, social, and environmental targets. Until waste pickers are viewed as informal workers, they are unlikely to benefit from policy efforts. The power of stigma is also in part entrenched by an underpinning assumption of much global, national, and local-level policies, where formal remains more desirable than informal work. Even if employers were

willing to overcome their prejudices, the pay and conditions of work that waste pickers might be eligible to apply for would not result in a substantially better overall standard of living. While waste picking is a hazardous job, alternatives are few and equally precarious. However, from the perspective of affluent residents, waste pickers have little quality of life. To support them is to potentially fund substance abuse and criminal networks and to sacrifice the gains made to change the image of Cape Town as a global city. In short, waste pickers are made to feel like an unwelcome threat and a group that is incapable of rational thought, as indicated by what they look like and how they act. Stigma creates a distance between waste pickers and waste picking on the one hand, and social, economic, and environmental development on the other.

Hence, policies across scales that attempt to re-position waste pickers via discourses of greening the economy are unlikely to have a significant impact unless waste pickers are more valued in their everyday interactions with residents. The updated draft waste management strategy (Department of Environmental Affairs, 2019) acknowledges the role played by the informal sector and the need for closer collaboration between government, recycling industry associations, and SAWPA. This is a welcome improvement, but like previous policies, might not include street waste pickers who are not unionized and wish to maintain their informal working arrangements. The success of separation at source schemes, if they were to be introduced in Cape Town, would require high levels of public participation in order to increase the recovery of recyclables. Therefore, any recruitment of waste pickers into a kerbside collection service would need to involve residents' associations. This would help to ensure households view collectors as workers rather than, as at present, homeless people who are a potential threat to safety and security.

References

Ball, S. J. (1993). What is policy? Texts, trajectories and toolboxes. The Australian Journal of Education Studies, 13(2), 10-17.

Barnard, A. V. (2011). 'Waving the banana at capitalism': Political theater and social movement strategy among New York's 'freegan' dumpster divers. Ethnography, 12(4), 419-444.

Becker, H. (1963). Outsiders: studies in the sociology of deviance. New York: Free Press.

Bourdieu, P. (1984). Distinction: a social critique of the judgement of taste. London: Routlegde and Kegan Paul.

Braun, V., & Clarke, V. (2006). Using thematic analysis in Psychology. Qualitative research in Psychology, 3(2), 77-101. doi:10.1191/1478088706qp063oa

Department of Environmental Affairs. (2019). Consultation on the draft revised and updated national waste management strategy. Retrieved from https://www.gov.za/sites/default/files/gcis_document/201912/42879gon1561.pdf

Desjarlais, R. (1997). Shelter blues. Sanity and Selfhood among the Homeless, Philadelphia: University of Pennsylvania.

Dias, S. (2012). Waste and Development – Perspectives from the Ground. Field actions science report(6), 1-5.

Douglas, M. (1966). Purity and danger: An analysis of the concepts of pollution and taboo (ARK ed.). London: Routledge.

Economic Development Department. (2011). New growth path: Accord 4: Green economy accord. Retrieved from http://www.economic.gov.za/communications/publications/green-economy-accord

Eisenhauer, S., Adair, D., & Taylor, T. (2014). Neoliberalism and mega-event security legacies: The 2010 FIFA world cup, Cape town, South Africa. International Journal of Event Management Research, 8(1), 35-60.

Emirbayer, M., & Mische, A. (1998). What is agency? American Journal of Sociology, 103(1), 962-1023. doi:10.1086/231294

Foucault, M. (1972). The archaeology of knowledge and the discourse on langauge. In. Retrieved from https://monoskop.org/images/9/90/Foucault_Michel_Archaeology_of_Knowledge.pdf

Foucault, M. (1979). Discipline and punish: the birth of the prison. Harmondsworth: Penguin Books.

Frey, D. F., & MacNaughton, G. (2016). A human rights lens on full employment and decent work in the 2030 Sustainable Development Agenda. SAGE Open, 6(2), 1-13.

Giddens, A. (1984). The constitution of society: outline of the theory of structuration. UK: Polity Press.

Godfrey, L. (2015). Evaluation of co-operatives as a developmental vehicle to support job creation and SME development in the waste sector. 2017(November 19). https://www.iwmsa.co.za/downloads/Linda%20Godfrey%20Role%20of%20co-ops.pdf

Goffman, E. (1959). The presentation of self in everyday life. New York: Doubleday.

Goffman, E. (1963). Stigma: Notes on the management of spoiled identity. New Jersey: Prentice Hall.

Gregson, N., Metcalfe, A., & Crewe, L. (2007). Identity, mobility, and the throwaway society. Environment and Planning, 25(4), 682-700.

groundWork. (2014). The groundwork waste campaign. Retrieved from http://groundwork.org.za/waste.php

Hassen, T. (2018). 'Bin pickers make a mess'. Retrieved from https://www.southernsuburbstatler.co.za/news/bin-pickers-make-a-mess-13044476

Henning, E. (2004). Finding your way in qualitative research. Pretoria: Van Schaik Publishers.

Hlahla, S., Goebel, A., & Hill, T. (2016). Green Economy: A Strategy to Alleviate Urban Poverty and Safeguard the Environment? KwaZulu-Natal, South Africa. Paper presented at the Urban Forum.

Huff, A., & Scheba, A. (2017). How can South Africa's green economy projects work better for the poor?. Retrieved from http://www.hsrc.ac.za/uploads/pageContent/8216/EPD%20seminar.31%20May%202017.Andreas.pdf

Human Sciences Research Council. (2017). How can South Africa's green economy projects work better for the poor? Retrieved from http://www.hsrc.ac.za/en/events/seminars/sa-green-economy

International Labour Organisation. (2015). New ILO standard on the informal economy: A tool for workers. Retrieved from http://www.ilo.org/actrav/media-center/news/WCMS_379091/lang--en/index.htm

International Labour Organization. (2019). SDG Note: Social protection. Retrieved from http://www.ilo.ch/wcmsp5/groups/public/---dgreports/---integration/documents/genericdocument/wcms_561758.pdf

Johnstone, B. (2008). Discourse analysis (2nd ed.): Blackwell publishing.

Kimbugwe, E., & Ibitayo, O. O. (2014). Analysis of characteristics, activities, and exposure to vermin of human landfill scavengers in a developing nation. Environment Systems and Decisions, 34(2), 358-365.

Lazar, M. (2005). Performing state fatherhood: the remaking of hegemony. In M. Lazar (Ed.), Feminist critical discourse analysis: gender, power and ideology in discourse (pp. 139-163). New York: Palgrave macmillan.

Lindegaard, M. R. (2009). Navigating terrains of violence: how South African male youngsters negotiate social change. Social dynamics, 35(1), 19-35. doi:10.1080/02533950802666881

Link, B. G., & Phelan, J. C. (2001). Conceptualising stigma. Annual review of sociology, 27, 363-385.

Linnay, J. (2013). Opportunities and limitations of (social) entrepreneurial approaches: A case study of the recycling sector in Cape Town, South Africa. (Masters), Queen's University, Ontario, Canada. Retrieved from http://qspace.library.queensu.ca/bitstream/1974/8309/1/Linnay_Joanne_201309_MES.pdf

Majavu, A. (2009). Sweeping the streets. New Internationalist, (427), 28-28. https://newint.org/columns/currents/2009/11/01/street-people

McDonald, D. A. (2008). World city syndrome: Neoliberalism and inequality in Cape Town. New York: Routledge.

Mehta, A. (2015). Ignored by corporation for years, rag pickers in Pune finally get safety equipment. Retrieved from http://www.iamin.in/en/pune/news/ignored-corporation-years-rag-pickers-pune-finally-get-safety-equipment-64747

Mills, C. W. (1997). The racial contract: Cornell University Press.

Miraftab, F. (2005). Informalizing and privatizing social reproduction: The case of waste collection services in Cape Town, South Africa. In N. Kudva & B. Lourdes (Eds.), Rethinking Informalization: Poverty, Precarious Jobs and Social Protection (pp. 148-162). Cornell University Open Access Repository: Cornell University Open Access Repository.

Oelofse, S., Nahman, A., & Godfrey, L. (2018). Waste as a resource: Unlocking opportunities for Africa. In United Nations Environment Programme (Ed.), Africa Waste Management Outlook (pp. 99-118). Nairobi: United Nations Environment Programme. Retrieved from https://www.csir.co.za/sites/default/files/Documents/Africa%20WMO%20Report_final.pdf.

Orderson, C. (2011). 2010 annual Ruth First memorial lecture, universtoty of the Witwatersand: voices from the margin. African Studies, 70(1), 156-165. doi:10.1080/00020184.2011.559382

Parliamentary Monitoring Group. (2019). Proceedings of the national assembly, 13 March 2019. Retrieved from https://pmg.org.za/hansard/28260/

Perez, T. S. (2016). Stigma management in waste management: An investigation into the interactions of 'waste pickers' on the streets of Cape Town and the consequences for agency. (Doctor of Philosophy), University of Cape Town, South Africa.

Perez, T. S. (2019). In support of situated ethics: Ways of building trust with stigmatised 'waste pickers' in Cape Town. Qualitative research, 19(2), 148-163. https://journals.sagepub.com/doi/full/10.1177/1468794117746553

Pikitup. (2001). The Polokwane Declaration on waste management. Retrieved from http://www.pikitup.co.za/wp-content/uploads/2015/10/Polokwane-Declaration-on-Waste-Management-2001.pdf

Republic of South Africa. (2008). Waste Act. 32000. Retrieved from https://www.environment.gov.za/sites/default/files/legislations/nema_amendment_act59.pdf

Ross, F. C. (2005). Model communities and respectable residents? Home and housing in a low- income residential estate in the Western Cape, South Africa. Journal of Southern African Studies, 31(3), 631-648. doi:10.1080/03057070500203038

Samson, M. (2009). Refusing to be cast aside: Waste pickers organising around the world: Women in Informal Employment: Globalizing and Organizing (WIEGO).

Scanlon, J. (2005). On garbage. London: Reaktion books.

Schenck, C. R., & Blaauw, P. D. (2011). Living on what others throw away: an exploration of a socio-economic circumstances of people collecting and selling recyclable waste.

Schenck, R., Blaauw, D., & Viljoen, K. (2016). Enabling factors for the existence of waste pickers: A systematic review. Social work, 52(1), 35-53.

Scholtz, C. (2015). PETCO & Informal Sector. Retrieved from https://www.iwmsa.co.za/downloads/PETCO%20and%20the%20informal%20sector.pdf

Scott, J. C. (1985). Weapons of the weak: everyday forms of peasant resistance. New haven: Yale university press.

Statistics South Africa. (2019). Quarterly Labour Force Survey. Retrieved from http://www.statssa.gov.za/?p=11882

Stull, V., Bell, M. M., & Ncwadi, M. (2020). Environmental Apartheid: Eco-health and Rural Marginalization in South Africa. In L. King & D. M. Auriffeille (Eds.), Environmental sociology: from analysis to action (Fourth ed.). Lanham: Rowman & Littlefield.

Union of South Africa. (1950). Group Areas, Act No. 41 of 1950. Retrieved from https://blogs.loc.gov/law/files/2014/01/Group-Areas-Act-1950.pdf

United Nations. (2015). Transforming our World: The 2030 Agenda for Sustainable Development. Retrieved from https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

United Nations. (2016). The sustainable development goals report: Leaving no one behind. Retrieved from https://unstats.un.org/sdgs/report/2016/leaving-no-one-behind

van Heerden, A. (2015). Valuing waste and wasting value: Rethinking planning with informality by learning from skarrelers in Cape Town's Southern Suburbs. (Masters of City and Regional Planning), University of Cape Town, Cape Town. Retrieved from http://media.wix.com/ugd/315c14_8f26ef926cd34597a310ae4ca583ea46.pdf

Watson, M., & Meah, A. (2012). Food, waste and safety: negotiating conflicting social anxieties into the practices of domestic provisioning.

The Sociological Review, 60(S2), 102-120. doi:10.1111/1467-954X.12040

Wolff, J. (2016). Social equality, relative poverty and marginalised groups. In G. Hull (Ed.), The equal society: Essays on equality in theory and practice (pp. 21-41): UCT Press.

Cases in Europe

Senegalese scrap metal waste pickers from Barcelona (Spain)

Between urban survival and garbage-commodities

*Mauricio Chemas Rendón**

Introduction

Context

This study focuses on a group of Senegalese men who have become part of the integrated waste management system in the city of Barcelona. Despite their marginal position within this system, they manage to functionally integrate into it in a way that not only ensures their basic survival but also contributes to the creation of a network of informal relationships. Within this network, certain ways of creative adaptability, spatial appropriation, solidarity, and expertise in maximizing limited means and opportunities prevail, ultimately forming their own ecology of subsistence.

This study deals with a group of men who have undergone a solitary migration experience, which has led to a process of deterritorialization, both from their birthplace and within their new place of refuge, which never fully accepts them. As a result, they experience a kind of never-ending migration process.

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The decision to migrate is mainly based on economic reasons and the expectation of improving the living conditions of both themselves and their families of origin through work.

Therefore, the conditions of this migratory process, as well as the characteristics of the particular experience they go through in their place of refuge, imply a relationship between their obligations and expectations regarding their family groups and a work ethic associated with both economic needs and their understanding of work and its compensation. This situation places them in an intercontinental labor flow process that, undoubtedly, plays a role in the large chains of transnational exploitation, creating a marginalized and unprotected workforce (Graeber, 2006). This situation represents what Silvia Federici refers to as "a pure labor-power, with no guarantees, no protections, ready to be moved from place to place and job to job" (Federici, 2019).

Given the current circumstances, which differ significantly from the expectations that initially motivated their migration, the idea of failure takes root in the way they perceive their own experience. In the words of AM, one of the key figures in this community who also became the main informant for this study, "the entire dream is upside down, everything is upside down".

African chatarreros" working in Barcelona

This ethnographic research focuses on the situation of Senegalese *chatarreros*[1] in Barcelona, and it is limited to an examination of a small, poverty-stricken community, its members, and their daily activities. This community is known as the Sunu Village (see Figure 1), a term borrowed from an expression used by its inhabitants.

[1] A colloquial term used in Barcelona that refers to people who collect scrap metal on city streets, which is recovered and then used for recycling.

Figure 1. Men working in the Sunu Village

Source: Mauricio Chás Rendón, 2016.

Therefore, this analytical description applies to the aforementioned scope, and the interpretations herein arise from the interactions that were possible within that context.

The Sunu Village is a small house with an adjoining courtyard located in the Les Glories area of Barcelona, more precisely in the El Poblenou neighborhood. It serves as a shelter and workplace for approximately 25 Senegalese *chatarreros*. The Sunu Village is a property they have gradually squatted and adapted after many of them had been victims of widely publicized mass eviction proceedings.

This place has the specific physical characteristics of the boundaries of urban poverty. Their living conditions place these men at the limit of extreme urban poverty in terms of their individual physical capital (housing) and collective physical capital (infrastructure), as well as individual human capital (education) and basic social capital (household composition and overcrowding).

Despite circumstances typically associated with unemployment, the Sunu Village is also characterized as a place whose inhabitants never rest. Every member displays a level of commitment and dedication to work that seems to follow a strange work ethic that seems to have gone extinct. The ages of the African *chatarreros* range from 22 to 40, and the amount of time they have been living in Spain varies widely: some have been there for as long as 18 years, while others for only 4. They come from different regions within Senegal and

belong to diverse ethnic groups (such as Wolof, Futa, Diola, etc.). They did not know each other before arriving in Barcelona but rather grouped together due to a shared culture and the need for survival.

The historical contradiction between excessive work and the inadequate salary paid in exchange is expressed most drastically in this group. They live in such harsh conditions that they have no other option than to adopt a marginal labor activity for their survival. They are engaged in the exhausting work of recovering solid metal waste; they work as full-time *chatarreros*. They are involved in an extensive recovery chain of recyclable materials, which, paradoxically, is entirely formal when viewed as a whole. The *chatarreros* are, quite simply, the hidden, marginalized, yet conspicuously visible part of this chain.

Nevertheless, these men are more than *chatarreros*, and the Sunu Village is not just a storage space for waste. This place gives rise to a unique and distinct cultural group, created through what seems to be a blend of cultural traits and more situational, Western forms of organization. It is evident that a community is formed as an essential element for individual survival and as a place where unity and legitimacy are consolidated. Although it is a temporary and marginalized territory, it is also the only place where they experience a sense of inclusion and a sense of self-identity.

However, the lives of these Senegalese individuals are also entirely influenced by and connected to the city and the urban place where the Sunu Village is located. These men are involved in waste collection activities, which are their primary source of livelihood. This labor constitutes one of the most visible and possibly one of the most frequently performed activities in public spaces in Barcelona within the general scenario of informal work. At a specific time, this situation, along with other forms of irregularity (especially in terms of housing), brought them into direct confrontation with the municipal council. Despite the fact that "waste" recovery is the main activity they perform, it is not the only one. The survival of these men, and of the community as a whole, depends on the adaptive, creative, and "flexible" capacity of each individual in relation to the recovery process.

The men from the Sunu Village have worked as *chatarreros* in the city of Barcelona for around 5 to 12 years (some have been in Spain for several more years). They form a large group. Throughout this time, they have always organized into communities that squat abandoned houses or industrial units as their workplaces and, in some cases, as their places of residence. Many of them also share another occupied place in the city where they live with other members of their community, which they further use as their overnight accommodation.

During the municipal administration of Xavier Trias (Mayor of Barcelona from 2011 to 2015), the group of African *chatarreros* faced systematic persecution. At that time, they posed a problem not only due to the nature of their work in public spaces but especially because they had squatted several industrial units, which they turned into their workplaces and sociability centers. Additionally, they found themselves in the middle of real estate and housing issues, which were characterized by evictions pressured by private property owners and urban projects associated with the "commodity city" (Mansilla, Marcús, Boy, Janes, & Aricó, 2019). Consequently, in response to public policy actions and court rulings that granted eviction orders, the *chatarreros* organized collectively and began struggles for their visibility led by Mamadou Kheraba Drame, a prominent leader among them.

The *chatarreros* hoped to make their status as workers visible and, to some extent, highlight the significance of their labor's contribution to urban development. "We want to work, we want a better life, and we want to be allowed to work. If we can't be *chatarreros*, then we should be given another job, but nothing […]", MC commented, recalling that moment of mobilization.

The eviction process eventually occurred. From the heated debates, cooperation measures emerged. The City Council of Barcelona commissioned Labcoop (a non-profit cooperative whose purpose is to engage in promoting associative projects) to create an organizational framework that would enable the formalization of the *chatarreros*. However, the question remained: how many of them would be included? Finally, in 2015, two years after the significant eviction from the Puigcerdà industrial unit took place, the Alencoop cooperative was established. It aimed to provide formal employment and labor standards to 30 of the Senegalese *chatarreros* who had been evicted from the Poblenou industrial units. Even though they now enjoy the sought-after labor formality, they also face the several geographical, temporal, and technical limitations that the regularization implied, which continue to exist due to current bureaucratic processes. Following this, the city council withdrew and the requested assistance never materialized, so hundreds of *chatarreros* excluded from the regulation scattered around the city, returning to anonymity and institutional neglect. Surprisingly, for many of them, this situation represents a functionally positive condition compared to the disadvantages that visibility and negotiation with the government involve. This is because such visibility and negotiations are perceived as threats that could worsen their vulnerability rather than as feasible solutions (Bromley, 1979). However, it is important to highlight that both the supposedly inclusive measures (such as creating a cooperative) and the coercive

measures (such as evictions and persecutions) had a common outcome: the permanent, structural, and irreversible marginalization of the collective spirit.

In sum, their entire migratory experience, which is an endless journey, is characterized by both irregularity and constant vulnerability. They have no chance of thinking about personal plans for the future. Some of them dream of achieving certain goals, starting some kind of business, returning to fishing in Senegal, or simply improving their circumstances, but they fail to materialize these aspirations in their lives. Their current situation prevents them from making any plans, even in the short term, and hopes for a successful migratory process are nearly extinct. What Richard Sennett referred to as "the corrosion of character" is extremely and radically exemplified here: it is impossible to stabilize, plan, and guide their personal and collective life experiences (Sennett, 2001).

The streets: informal subsistence work and territory of exclusion

The initial phase of a *chatarrero*'s occupation happens on the streets. The urban space creates a stage of opportunities for the *chatarrero*, since it is the place where each *chatarrero* can start the recovery cycle. The city is the major source of waste and, consequently, a generator of recovery opportunities, with its excessively productive logistics and its intensive consumption. The public and urban space, through its infrastructure and management systems, handles this waste in a relatively organized way for formal recovery; however, at the same time, it exposes visible cracks where informal practice emerges.

It is there, on the streets, where the imagined city faces the *real* city (Delgado, 2002). Moreover, it is in the city where the limits between informal and formal practices merge into a single, large, integrated economic system. The daily routine of the *chatarreros* and their relationships within the urban space that they use and make their own involves a dynamic in which the space of the norm and the projected order is transgressed through practices that appropriate it beyond these limits and that, ultimately, constitute part of the experiences that shape it as a physical, social, and mental space (Lefebvre, 2013).

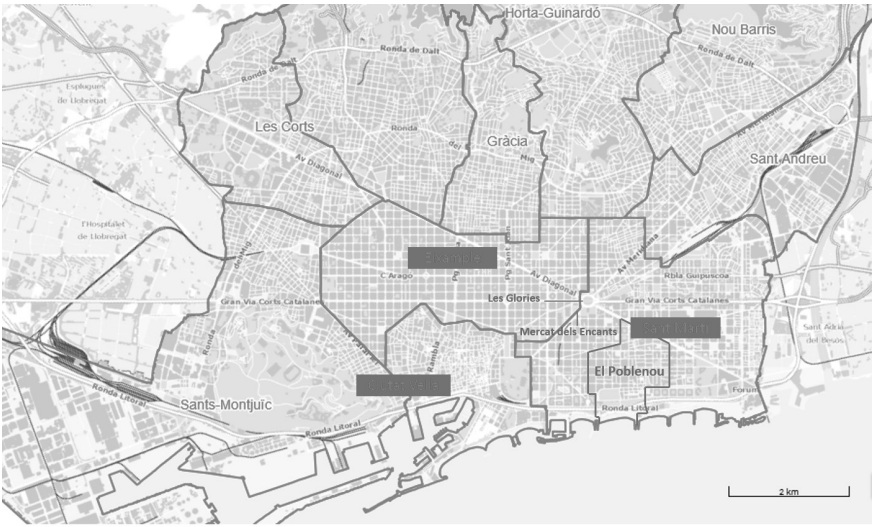
Moreover, the day-to-day implementation of this "informal subsistence work" (Pfau-Effinger, Flanquer, & Jensen, 2009) reveals how the official forms of waste recovery coexist with marginal dynamics, all of which overlap

within one large economic and productive chain. In this chain, there are no distinctions between an informal and a formal sector that are separated and disconnected; different forms of what Keith Hart called "income opportunities" emerge within the same unified, although hierarchically structured, economic system (Hart, 1973).

Therefore, the streets are the stage where the great structural dichotomies materialize; however, they do so as part of a specific sociospatial experience that also shows deep contradictions. "We have to be on the streets every day […] sometimes we are lucky and sometimes we are not, but we do have to be on the streets […]", says MC, thereby expressing an important aspect of the recovery process as a way of relating to the urban space, which is related to a kind of intrinsic dialectic: its inevitability coexisting with its unpredictability. The near-daily trip is as compulsory, certain, and restricted as it is undefined and essential.

Specifically, in geographical terms, the community of Senegalese *chatarreros* primarily resides and works in the Poblenou neighborhood. Most of the warehouses where they go to sell the collected material are also located right there. However, the daily trips are made very irregularly and spontaneously through almost all of the San Martí district (except small zones in the north and the east), a large part of the Ciutat Vella district (except for the coastal area), and an important area of the eastern and central part of the Eixample district.

Map 1. Barcelona: Main work areas of Senegalese *chatarreros*



Occupation I: Recovery of items

The occupation of the Senegalese *chatarreros* involves three distinct steps. The first step is the recovery of the items, which takes place either at an intermediate waste disposal site or at the source of waste generation. The ability to anticipate is a key factor in the *chatarrero*'s occupation, as in many occasions the waste is recovered right at the place of generation and even at the same time it is generated.

To put it in terms that may be too schematic, but are necessary for understanding, the collection process occurs in three different ways depending on the source of waste and the methods of waste disposal:

Containers

In very broad terms, the waste management system in Barcelona works, regarding the aforementioned district, based on the logistics of "selective collection"[2]

[2] In compliance with "*Llei 6/1993, del 15 de juliol, reguladora dels residus*", an urban waste management system was created. This system is mainly based on selective collection (specific

of household and commercial waste. This logistics involves an infrastructural system of differentiated containers: blue for paper and cardboard, green for glass, yellow for household packaging, grey for general waste, and brown for organic waste. Specialized containers are also provided for construction waste and other sources, such as hospital waste. The system is completed with Punts Verds, Deixalleries, and other waste management facilities that aid in the sorted disposal of waste and items that cannot be discarded in containers. Waste managers (private corporations) are in charge of waste collection at disposal sites and the management process thereafter.

The waste container infrastructure enables the *chatarreros* to go to specific collection points. Hence, they can take advantage of the official general organization and achieve some regularity and optimization.

Containers (almost exclusively the grey ones) are rapidly but cleverly scrutinized. The *chatarrero*'s work is mainly individual (even lonely) and demands movement that is not only constant but also very dynamic and hurried. This extreme individualization and strategic movement that the occupation involves have fostered the development of a highly skilled understanding of urban space, of a "tactic", in the sense understood by Michel De Certeau as an adaptive and recursive form of using space in conditions of reduced availability of means and resources which, nevertheless, constitutes an activity that has a kind of "spatializing" effect (De Certeau, 1996) and which endows them with a certain fluidity that fits in with the rhythm and activities of the city, and with a physical expertise in the manipulation of the objects of their interest, from infrastructures to the waste itself.

Containers are the source of recovery that represents a more complex degree of potential illegality. Regardless of what is recovered from them, the process by which something is taken from them may constitute a form of theft. The *chatarreros* anticipate the formal collection with surprising ability: they perform their own collection without prior authorization, they take the items for their own benefit, and they are not integrated into any formal taxation chain.

containers for each type of material) and on the creation of waste managers (private individuals who, with the appropriate authorization, can carry out various recovery and management activities). Subsequently, a key principle of citizen joint responsibility (which states the regulated participation of citizens) has been incorporated into this model.

Construction, refurbishment, and demolition sites

Another main source of recovery for the Senegalese *chatarreros* is construction, refurbishment, or demolition sites. In such sites, the recovery might occur from specialized containers or directly from the very source of waste. In either case, this modality implies, most of the time, some kind of negotiation or agreement with the people in charge of the sites. On a few other occasions, recovery is done without the consent of those in charge and in a clandestine manner.

The construction site itself is more complicated to follow; although it provides large quantities of material, it is generally monitored and its waste is also generated and disposed of in less accessible ways, in micro-spaces in progress that are veritable restricted areas.

On remodeling and demolition sites, the *chatarreros* perform the recovery according to the work schedules. Such recovery takes place during breaks and intervals, in areas that are gradually emptied, and once daily activities have been completed. Despite being an almost immediate recovery modality, the time-space follows a hierarchical order. The *chatarreros* establish evident subordination relationships to win the sympathy of the workers and managers on the sites.

Nevertheless, recovering items from this kind of site is a significant achievement in the economy of immediacy in which the *chatarreros* live, since it constitutes a significant discovery and an extraordinary opportunity compared to the typical conditions of their day-to-day activity and since it usually leads to an above-average daily profit.

Spontaneous but scheduled collection

The two aforementioned forms of recovery hold a certain priority among the *chatarreros*' daily activities. However, there are several other variations of recovery which, although each of them is not very recurrent, regularly complement the primary activities.

The *chatarreros* have a form of low-scale visibility; that is, given the objective conditions of their existence and their occupation, their presence and their work are clearly noticeable in the immediate environment. This situation, which is quite different from structural visibility, does not involve any institutional recognition whatsoever. However, this low-scale visibility enables the residents of the neighborhood, including small shops, bars, and nearby restaurants, to find in the *chatarreros* an ideal way to dispose of certain types of waste. Hence, the *chatarreros* represent a close (at the neighborhood level), reliable, and simple

option for the eventual need to dispose of waste, which gives rise to a sort of "neighborhood recovery".

Within these residual dynamics of the marginal practice of informal collection, the *chatarreros* are also involved in other activities, such as property clearance and the exchange of non-metal items for metal, and they participate in trade networks related to the dynamics of the Encants market in Barcelona and in the sale of electrical appliances, especially televisions and second-hand bicycles.

These alterations imply the creation of different pathways or, rather, diversions, according to the distinction made by Appadurai (1991) highlighting the normative status of the former and the novelty and unforeseen irregularity of the latter. These particular diversions are, moreover, very different from those that scrap follows in the everyday course of *the Sunu Village*, from the forms of recovery to the channels of trade.

On the other hand, countless things are recovered for the Sunu Village itself. The trip is a process that is always focused on making a profit. The search is mainly economic, but the *chatarreros* pay special attention to anything that can serve a particular purpose within the house, their community, and their own personal space. In this way, it is key to highlight that the importance of the waste recovery practice is not given exclusively by market dynamics, but is consolidated by the inherent value of items, due to the fact that for the *chatarreros*, urban waste serves as work materials, consumer goods, and commodities. Thus, the activity may be considered both productive and reproductive.

In summary, it could be said then that the practice of informal urban waste recovery combines certain characteristics and skills with certain contextual conditions in such a way that particular relationships and interactions take shape: anticipation appears to be a key factor in this situation and, sometimes, negotiation skills are necessary to ensure the acquisition of the material to be recovered. On the other hand, a form of civic irresponsibility, namely inadequate waste disposal, greatly benefits the *chatarreros*, who also rely on neighborly solidarity to expand their work opportunities. Finally, the acquisition of certain abilities such as quick decision-making, a kind of opportunism, variability, and adaptability are crucial in shaping a specific practice that is furthermore refined through an expert and sensitive use and appropriation of space.

The trip: contradictory process and territory of exclusion

The journey or trip refers to that urban transit in search of survival; that kind of labor nomadism that implies geographically and temporally extensive mobility, which deliberately occurs in public spaces. It is specifically the round trip through the city, the streets, searching for recovery opportunities and other survival mechanisms.

The collection pathways and their duration vary widely, and the process is deeply characterized by a certain intuitive spontaneity that makes it very irregular. The *chatarreros* move around using a shopping cart (see Figure 2) and taking advantage of the topography and certain conditions of the city's urban infrastructure (chamfered block corners, cycle lanes, access ramps, etc.). The amount, the size, and the weight of what is collected varies greatly day by day. The trip represents a highly refined, expert, and sensitive knowledge of the recovered items, the few tools they use, and the city's infrastructure; however, this skill does not give the *chatarreros* a competitive advantage, as their daily income, which depends exclusively on the weight of the material they manage to collect, can be less than 8 euros and rarely exceeds 30 euros, after a working day that never lasts less than 8 hours and often exceeds 13 hours.

Figure 2. Senegalese chatarrero in Plaza Catalunya, Barcelona -

Source: Mauricio Chemás Rendón, 2018.

The most striking aspect is probably related to its own internal contradictions; a kind of intriguing dialectic governs the daily trip. As a process, the trip is as inescapable and recurrent as it is unpredictable and unsafe. Likewise, the more the *chatarreros*' trip as a work practice is incorporated into the formal chain, the more marginal it becomes, since the form of its incorporation determines its irregularity. Furthermore, because of its physical and socio-spatial objectivity, it is a process of extreme appropriation which, at the same time, is absolutely deterritorialized due to the absence of social recognition and the lack of positive territorial significance. While their occupation creates a certain form of self-identification, the trip exposes them to a public scrutiny that incorporates them into processes of systematic discrimination and segregation.

At no time in their lives did they have the freedom to choose this labor. They all seem to be forced to perform this activity, not only for the obvious structural conditions that push them to the margins of informal work, but also for a kind of self-acknowledgement of their own marginal condition. Paradoxically, and especially during the trip, the *chatarreros* define themselves as such, which reinforces the impossibility of their integration into society and the marginal condition of their existence. However, simultaneously, they highlight their differences, their "otherness" within an aggressive and unfamiliar context.

On the other hand, it is striking that their necessary dedication and their inexorable involvement result in an increase or reinforcement of the informal nature of their work in general and even the illegality of some of their procedures. This is a non-negotiable situation. These men must focus on their work without any further consideration. The *chatarrero's* success is directly proportional to the irregularity of the act giving rise to it. The more the *chatarreros* are involved in informal waste recovery, the more they are integrated, without recognition, into the large formal recovery processes, which, despite their contribution, reinforces their marginal position within the overall process.

The very daily performance of this occupation, instead of providing recognition for the *chatarreros*, and paradoxically by making them visible, tends to place them on the marginal end of a formal recovery chain that presents itself as complete and self-sufficient.

However, even beyond the normative implications of their work and citizenship status, there is the empirical fact of their daily, necessary presence, which all residents of the Sunu Village must strive for without exception. In order to survive, every *chatarrero* has to be willing to participate in a battle in and for urban space; this is what the trip represents, a constant struggle in motion that uses, consumes, and produces urban space.

AM's statement explains at least a couple of things: "You cannot pretend that you're just watching or studying, no one cares about that […] You and I, we are learning from each other, but if you want to learn, you have to get your own trolley and make a route". This suggests that the way to understand his craft is from the inside, by doing it yourself, and that such work requires an instrumental and functional appropriation of space. Their work depends, paradoxically, on the ability to appropriate space and its resources, and on the ability not to depend on any of them.

This double condition generates an equally dichotomous relationship with the space. The *chatarreros'* daily trip crystallizes a functional and symbolic appropriation of space that is key to their success. Their activity implies that they make the space they travel through their own; that they move with absolute expertise through its major flows and narrow crevices—the few spatio-temporal scenarios beyond the reach of the norm—and, equally important, that they appropriate the instrumental means available in that space, understand them, and use them effectively, and even know how to take possession of them. Nevertheless, the nature of their activity and some of its more structural conditions also force them to develop a form of total detachment from the space that supports their livelihood. The "spatial rootedness" (Del Acebo, 1993) here experiences a back and forth between identification and functional connection on the one hand, and deterritorialization and the impossibility of genuine attachment on the other.

Finally, the ideological and hegemonic public space is a stage where these men, in the course of their daily work trip, objectively experience the most violent forms of segregation and marginalization. The urban survivor's trip creates a territory that is both externally imposed and internally reinforced.

The struggles for appropriation I - On the streets and public spaces

In many ways, collection practices may be deemed a real battle against time, against authority, against the city itself and the objects that define it, and even against the very items that have to be recovered.

From a different yet complementary perspective, Senegalese *chatarreros* must also engage in and face a fight against normality and morality, against stigmatization, against unfair labeling and criminalization, and against the lack of visibility and illegitimacy that marginalizes them. Consequently, the trip is not only a daily process of work, but also the stage where the daily struggle for

survival is waged against the entire urban system and during every minute of their work, in each operation they perform.

The daily life of these men on the streets as *chatarreros* constitutes the field of their struggles for their appropriation of space, which is a temporary and intangible appropriation, but an essential one. While "public space" and "spatial belonging" are not the terms that *chatarreros* use to describe their daily experiences on the streets, it is clear that they are acutely aware of the fact that their survival depends on their expert appropriation of urban space and their declared intention to take ownership of certain items. The term public means available for use, and the streets are specifically a resource, a vehicle, a substrate, an instrumental space that they need and deserve.

The Sunu Village: the land of poverty and social cohesion

The Sunu Village and the daily life of these men change every day, but these changes do not occur slowly or at a steady pace, nor do they follow a particular direction or pattern. Even though there are certain constants within this community that enable the rest of society to recognize the *chatarreros'* identity and the general and schematic activities they perform, the changes may be substantial, and the events that foster such changes tend to be often dramatic.

The Sunu Village, as it was found in September 2015, was located in two different properties, each with its own specific address number: the house and an empty adjoining lot that serves as a courtyard. They initially squatted the lot, approximately during the spring of 2015, where they quickly built a small wooden shack; about four days later, they squatted the house. The first *chatarreros* to arrive opened the house, demarcated the lot, and set up the scrap yard and a restaurant. Among this group were MC, US, BY, AM, and Mamadou Kheraba himself, a well-known leader of the *chatarreros'* community and the Senegalese community in Barcelona.

This is the place that ensures their economic survival; this is where elementary work is centralized and where its many variations are generated. All the daily activities related to collection are organized there. That is the place where the trip starts and where they all return to continue with the collection process that they started on the streets. The following step is the cleanup, which consists of separating and sorting the material. As they all converge there, the work is shared, to some extent, and the work of some facilitates the work of others.

Although everyone participates in the cleanup and many offer help to each other at different times, each *chatarrero* determines what to do with the items they have collected on their own. However, they all contribute to maintaining a shared subsistence microeconomy. In addition to what each of them cleans for their own benefit, other items and materials are sold there, or they simply create different diversions for them. They also use this place to buy refreshments, food, liquor, and marijuana.

However, this is not only the main place where they carry out their instrumental survival activities, but also where they identify themselves as part of a cohesive community. This is the only place they have where they truly preserve their culture, in the sense that they live by its rules, interact with one another according to its basic principles, and maintain some of their daily traditions.

MC opened with his own hands several of the warehouses in which they had lived and worked before, until the last of the major evictions on Carrer de Puigcerdà in Poblenou, which took place in 2013. The Sunu Village is the most recent and apparently the last squatted place by the collective (by this specific group) to live and work there. MC himself states that he has no intention of opening and squatting another lot to settle such a large community.

And finally, time was up for the Sunu Village as well. In June 2016, a police operation was carried out for their eviction. First, the yard was entered, and all shanties were torn down—some 20 or 25 rooms built primarily from wood and plastic that served as private bedrooms, common areas, kitchens, and storage rooms. Then, all *chatarreros* were removed from the house, and its entrances were blocked, with the belongings of some of them still inside. A few hours after the end of the operation and the departure of the municipal police, AM returned to the yard and re-erected a shanty, which led the others to squat in the lot once again. By August, 10 new shanties had been built, and the yard was once again serving as a labor and meeting area. Since the house was inaccessible, most socialization would take place on the street, specifically on the opposite sidewalk.

They would have to bear with more police interference in the future, but they have managed to maintain this place as a form of fight for their collective territory, which is also of vital importance to their function. In any case, institutional harassment, their precarious economic situation and the marginal position of their main line of work, and the reluctance to return to mass squatting in a large lot lead to a visible disintegration of their community and the progressive decay of the place they occupy and define. To make matters even worse, they are reluctant to become visible institutionally or to seek help from any kind

of political organization. They have no intention whatsoever to report their condition or the harassment of which they are victims, as past events have made it clear to them how futile such efforts are and the harm that they can cause.

Occupation II: Recovery of materials

However, besides structural conditions, the center of this marginalized space not only holds abstract poverty, but also shows specific forms of everyday survival. This is what makes the Sunu Village a non-institutionalized labor and sociability center. On most days, most *chatarreros* from the Sunu Village spend the night in places other than where they normally sleep. On several occasions, they sleep in the Sunu Village itself. This situation shows the substantial distinction between this place and the previously occupied units, where most of them lived and worked full-time, as told by MC. Although it is not the intention of this paper to exaggerate, this situation could serve as further evidence for the progressive disintegration of the community, which results from the incessant harassment arising from stigmatization and criminalization.

The Sunu Village is the remnant of an implied resistance that invariably needs a central hub to organize group labor, to provide the means to make it possible, to promote countless mechanisms to survive, and to act as a meeting point for peers to socialize within a strange and hostile environment.

Besides serving as a meeting point with no formal arrangement, the Sunu Village is also the place where their daily trip begins, where the subsequent cleanup job is carried out, where collected waste is sorted and classified, where some sell, others store, and others still begin their final trip towards the final trade.

Once the daily trip (or several of them) is finished, the *chatarreros* use and share the place as their own, where they can perform the operations that follow the collection of waste on the street within an environment that is familiar to them, and perhaps even their own. These operations are the cleanup or, to be fair to their occupation, the recovery of materials. In some cases, this is an indispensable process for the subsequent trade. It represents, in all cases, the utility margin for the *chatarreros*. In their opinion, collection is not lucrative; the sale of materials as they were collected is not worth the effort or time invested—the cleanup is unavoidable. Recovery may take as long and may be as tiring as the trip itself. It all depends on what materials have been picked up. It essentially consists of the process by which all collected metallic waste is sorted and classified. It sounds simple, but expertise often makes the difference.

Cleanup in the Sunu Village may be carried out for different individual purposes, though different forms of collective work may converge during the process. AM and MC are the foundations for the sustainable functioning of the place. They have invested in a set of scales and, partially as a business but also as a cooperation mechanism, they use it to buy materials brought by their peers or any other sporadic *chatarrero*. This is how they, the leaders who keep the place running, make a living from valuable materials either collected by themselves or bought as surplus. Everyone does their cleanup there, but no one is forced to sell in the Sunu Village. Each *chatarrero* sets aside a portion of their collection to sell to AM, while keeping the more valuable materials for personal trading.

Most of the material brought to the Sunu Village by each *chatarrero* is stored and sorted for individual purposes. All trips are individual. Therefore, work in the yard, even though eminently performed as a group, is also individual.

It could be said that everyone does their cleanup at the Sunu Village because they consider it their genuine meeting point and center of agency; it is an environment that provides the indispensable means for their occupation and where they can work as a group. These operations and the cleanup process in general are always carried out in the same way; it is as inescapable as it is invariable (unlike the trip), but its final purpose will depend on the specific conditions of each *chatarrero*: (1) selling to AM on the spot, who stores all bought scrap in a large general storage area; (2) storing in private storage areas; and (3) sorting and classifying for a final trip on the same day as collection, with the purpose of individual trading.

The Sunu Village is like a return to home workshops; it is a place where sociability among peers is consolidated and where cleanup, storage, and sorting take place. When recovering the material, the *chatarrero* begins the cycle anew and returns unusable items to a new cycle of work and of use. Once cleaned, the material is ready to be reinstated in new "regimes of value" as a commodity (Appadurai, 1991).

The struggle for appropriation II —Work and the community

However, a battle is also being fought within the Sunu Village itself. In this case, it is an internal struggle for the appropriation of the social environment, deriving from work, expertise, and hierarchical levels. Though rather subtle, these hierarchical levels become apparent regularly, since to a certain degree they are required to be made objective to become enforceable. On the one hand,

it is essential to highlight the importance of the role played by the positions and places occupied individually in the physical interior space. As if following an implied choreography that engraves in them certain basic social coercions (Goffman, 1993), the individuals place themselves in different points that grant them varying degrees of visibility and privileges related to space availability and the very actions performed within it.

On the other hand, the relevance of some objects owned individually proves the existence of a symbolic or objective hierarchy. Specifically, regarding work in the Sunu Village, the scales and the notebook keeping record of all weighed and bought items denote a privileged hierarchical position. Such is the case for AM, MC, and a few individuals close to them that boast about their ownership and control over these objects, clearly stating who holds greater control over what happens within the Sunu Village.

However, besides this hierarchical order objectively projected onto the physical conditions of spatial organization by way of a "reified social space" and the objects involved, the formation of an arena of struggle within the Sunu Village is more related to the appropriation of a social space, rather than a physical one (Bourdieu, 1999). Despite the existence of a form of grouping and collective labor, some forms of internal struggle also appear and become objective, not so much for control over certain physical areas, but over hierarchy levels that constitute the social microspace therein.

These are the inevitable struggles for the appropriation of social space. Once the main social space encompassing these men in the physical space is objectively projected, a fight breaks out over the appropriation of any residual space that remains and that must be shaped by them. After every trip and during every cleanup day, the *chatarreros* fight over a privileged position in the Sunu Village's socio-spatial organization. It is a form of struggle that is agreed upon and absolutely transparent, for the purpose of forming and projecting ideal working, subsistence, and organization methods.

Through these dynamics, the men collectively develop very particular ideas regarding work and their community, supported in essence by the idea that only decisive and dedicated work will provide them with the means to survive, and the indispensable fact that such labor, individual as it may seem functionally, must be consented to and carried out as a group. The Sunu Village is the place where they have been atomized and individualized, and after a time it has been the only stage where they have achieved a social cohesion that is essential to their way of life.

Trading: functional reinstitution and reincorporation into the market

Another matter must be addressed after cleanup. It is a process apparently as simple as it is vital: trading. Trading is the final operation in the scrap cycle, or at least of the parts where Senegalese *chatarreros* are involved. While the main chain of events for metal recovery is clearly much more complex, this is where the cycle ends and begins once again for these men. It is the definitive moment and final instance towards the main goal of their entire occupation: trading the material for money.

Occupation III: The trade

Once cleaned and sorted, the material is now ready to become what each chatarrero considers ideal for an economically favorable trade.

Once the men reach the yard and begin the cleanup, they also begin a sorting process functionally aimed at trading, selling the material, and earning monetary payment, which may vary visibly depending on what they managed to collect. Some recovered items that are still somewhat functional are resold through certain infrequent pathways. Many of these items are also incorporated into a form of internal market. As stated previously, a good amount of them simply become part of the instruments employed daily in the Sunu Village.

Clean material itself may follow two pathways towards trade: it can be sold then and there and stored as scrap proper (mixed generic material), or sorted and ordered for its direct sale by each *chatarrero* in nearby formal storage facilities that buy sorted material. The distinction depends on the material. Brass, aluminum, and iron are often sold there; whereas copper, steel, and other more valuable variations are kept for individual trading within these formal collection centers.

What is sold there is then stored until a significant amount is reached and transported to larger peripheral storage facilities that buy mixed material at a much lower price. Specifically, when a significant amount of material is available, AM calls a contact who owns a black truck. Everyone helps with loading it (another short but intensive shift of group labor), and the truck leaves for a large industrial unit located in Sant Adrià del Besòs, where a large industrial unit purchases and stores scrap for its recovery at an industrial scale, and where all this mixed material is sold by weight. The truck enters a set of scales to be weighed and passes through an internal zone where it is unloaded and all ma-

terial is lumped together indiscriminately (another moment, though final, of hard and rapid work). The truck is then weighed again, this time while leaving. The difference in weight will determine the monetary value earned in the trade.

Meanwhile, the *chatarreros* bring sorted material to formal storage facilities individually, where it is weighed one by one, placed where indicated, and taken to the cash register for liquidation. It is an absolutely clear process, rather quiet in terms of interaction, and clearly considered formal by the buyer.

In short, collected and sorted objects and materials follow multiple pathways to the market in this final process of recovery. Trading is the key moment where value is created and where the material acquires a monetary equivalent, which constitutes the main goal of every *chatarrero*. This is the reason why all recovered objects follow a specific pathway that will maximize their value as much as possible.

Trading involves returning to the streets for a final trip that is substantially different from the initial collection trip. It is a form of flow in search of a journey through space that is even more rapid than the first: extremely decisive and without hesitation, direct and precise, always in search of the shortest, simplest pathway from the cleaning yard to the scrap storage facility. The appropriation of space continues in an expert and refined manner, though now there is formally a different expertise at play that broadens the spectrum of urban rediscovery.

What normally happens in the storage facilities of waste management businesses is beyond the scope of this text, but it is still important to note that it is a formal, official entity that buys irregularly collected material. This creates a deeply contradictory scenario that becomes even more complex when the evidence of subordination and relegation of the *chatarreros* and their labor is taken into account: it is an extreme and radical abstraction. Their labor is completely devoid of worth, as their monetary pay depends exclusively on collected material and its market value per weight—a variable number defined by a stock market they do not even know exists. This, therefore, generates a relationship that fetishizes labor so radically and elementally that it completely erases all traces of any actual effort exerted.

Commodities, pathways, and diversions

The trading process reveals the broader context surrounding the process of waste recovery and its underlying logic. On the one hand, it reveals the particular recovery process carried out by the Senegalese *chatarreros*, which constitutes the initial moments within the great chain of material recovery. In addition,

it reveals the remainder of this great chain, which approaches them with feigned sincerity, but knows with absolute certainty the dynamics involving the trade. The system brings to light a great economic-productive flow that, when combined, is completely formal and slots the *chatarreros* on its marginal end, a sort of regulated periphery that is kept on the outskirts of a great labor and economic network within the process.

The *chatarreros* are both marginalized and included. They clearly belong to a production chain, and they are anchored to a monetary economic system, or rather its residual area, where pay for their labor can never be anything but precarious.

On the other hand, this process for recovering metallic objects and materials presents an underlying logic to reincorporate things into functionality and market value, which may evidence the borders between the formal and informal aspects in the process, as well as when and how those borders are crossed. This great labor-economic-productive chain equally includes its most marginalized version, which leads to altering its condition entirely.

The process of recovery implies a functional operation that modifies the physical conditions of things, but besides that, it also involves a reincorporation of things into the market, which alters the regime of value and the status of exchangeability. Collection returns items to new cycles of use and consumption. The *chatarrero* brings what was previously deemed useless into a new stage of function, where new ways to use and consume the item are made possible. Meanwhile, the trade gives place to a form of structural reincorporation of items to market spheres, now as legitimate commodities: the item is reinstituted, given significance, and once again inserted into a legitimate regime of value. In summary, things go through an informal diversion during their initial collection and follow a formal pathway when traded (Appadurai, 1991).

However, this process is possible thanks to trading networks. The creation of new contact networks or the inclusion of already established trade networks is essential for every *chatarrero*. Once these networks are made clear, the material flows from an informal activity, submerged in other duly formalized instances within the same great economic-productive chain; from its informal collection on the streets, passing through the cleanup in the squatted yard, to the small storage facility or the large industrial unit that formalizes the process and institutionally legitimizes the item and its value. It is in this way, thanks to these networks, that irregularly acquired material and informal work are "washed" by an operation that inserts materials obtained through irregular recovery activities into official recycling circuits: the network formalizes the informal,

thereby legitimizing its own marginal end, using objects with restoration as its goal and objects as the means to achieve it.

Conclusion

Wasting capacity

It is well known that for commodities to be considered as such, they must fundamentally be considered exchangeable. They must be able to be represented in money, which is the universal equivalent. This partially explains why, at least at first, a good amount of reproductive social practices (such as caregiving) resisted such abstraction.

However, there is another factor that all goods must possess to be considered as such and to keep the production and value chain alive through commodity exchange: they must be capable of becoming waste. It is simply indispensable: all commodities must be able to become waste at a certain point in time. This does not have to involve the physical attributes for their use, but specifically their requirements to generate market value by their circulation in monetary exchanges, and all "social benefit" pressures related to their symbolic value, especially regarding sign-commodities (Baudrillard, 1999).

This wasting capacity, much like labor and goods themselves, is marked by an inherent fetishism that veils what lies behind. This social practice of commodity disposal then appears as a form of simulation of de-economization that hides the marketable condition and the very value of waste. In fact, "one of the key problems in managing solid urban waste is how to successfully hide from social groups the quality of commodity acquired by the waste" (Sarlingo, 2008) [Own translation].

Waste recovery within cities is very different. It is a process that at least involves the recovery of the function of things, several forms of re-signification, and a final re-fetishization that resets the market exchange dynamics almost instantly as a result of its new material and symbolic conditions.

The case of informal and marginal practices, just as with Barcelona's Senegalese chatarreros, is very particular, as their practice not only moves objects from the disposal cycle to the recovery one—that is to say, they are moved from one "regime of value" to another (Appadurai, 1991)—but also such re-fetishization, the return of waste to a commodity, implies a form of "washing"

where things and the work involved itself flow from diversion to pathway, from informality to formality.

Such flow is key to generate value from an informal waste recovery system since, "in the 'official' system, value derives from the fungibility (Reno, 2009) of garbage, and its realization is guaranteed by the creation of a stock […] In contrast, value in a 'non-official' circuit derives from the (re-)merchantilizing of matter, by renewing its market value after its disposal. The realization of value depends on flow, and not stock […]" (Carenzo, 2011) [own translation].

In any case, what has been made clear in more abstract terms is that the relationships established with waste belong to the same logic and the same flows as consumption. Much like the case of so-called consumer goods, humanity's methods of disposal and its relationship with waste regarding information systems are mechanisms of cultural ascription and social classification (Douglas & Isherwood, 1990); likewise, these relationships also work as mechanisms of hierarchization and social disqualification (Paugam, 2007).

Zygmunt Bauman was right when he highlighted that the current economy tends towards the production of "human waste" (Bauman, 2005), people who are now "of no use, not even to be exploited" (Jappe, 2009) [Own translation].

With regard to the real and specific experience of Barcelona's Senegalese chatarreros, this condition is objectively shown in an elemental and radical manner: in their never-ending migration process and their deterritorialization, in the middle of a form of deculturation with no assimilation and full of several forms of social exclusion, these men have resorted to adopting the condition of their working materials and, due to neglect from the State, they have been structurally transformed into waste matter—people who socially "are placeless […] their status is indefinable" (Douglas, 2007), and perhaps unknowingly becoming waste themselves in the process.

References

Abduca, R. (2011). "Acariciando lo áspero". El itinerario cartonero como construcción de un territorio. En F. Suárez, & P. (. Schamber, Recicloscopio II. Miradas sobre recuperadores, políticas públicas y subjetividades en América Latina (págs. 183-221). Buenos Aires: Ciccus.

Appadurai, A. (. (1991). La vida social de las cosas. Perspectiva cultural de las mercancías. México: Grijalbo.

Baudrillard, J. (1999). Crítica de la economía política del signo. Madrid: Siglo XXI.

Bauman, Z. (2005). Vidas desperdiciadas: La modernidad y sus parias. Barcelona: Paidós.

Bourdieu, P. (1999). La miseria del mundo. Madrid: Akal.

Bromley, R. (1979). Organization, Regulation and Exploitation in the So-Called 'Urban Informal Sector': The Street Traders of Cali, Colombia. En R. Bromley, The urban informal sector: critical perspectives on employment and housing policies. London: Pergamon.

Carenzo, S. (2011). Desfetichizar para producir valor, refetichizar para producir el colectivo: cultura material en una cooperativa de cartoneros del gran Buenos Aires. Horizontes Antropológicos, 15-42.

De Certeau, M. (1996). La invención de lo cotidiano I. Artes de hacer. México: Universidad Iberoamericana.

Del Acebo, E. (1993). Sociología de la ciudad occidental. Un análisis histórcio del arraigo. Buenos Aires: Claridad.

Delgado, M. (2002). Disoluciones urbanas: procesos identitarios y espacio público. Medellín: Universidad de Antioquia.

Douglas, M. (2007). Pureza y peligro: un análisis de los conceptos de contaminación y tabú. Buenos Aires: Nueva Visión.

Douglas, M., & Isherwood, B. (1990). El mundo de los bienes: hacia una antropología del consumo. México D.F.: Grijalbo.

Federici, S. (2019). Re-enchanting the World: Feminism and the Politics of the Commons. Oakland: PM Press.

Goffman, E. (1993). La presentación de la persona en la vida cotidiana. Buenos Aires: Amorrortu.

Graeber, D. (2006). Turning modes of production inside out. Or why capitalism is a transformation of slavery. Critique of Anthropology, 61-85.

Guber, R. (2013). El salvaje metropolitano. Reconstrucción del conocimiento social en el trabajo de campo. Buenos Aires: Paidos.

Hart, K. (1973). Informal income opportunities and urban employment in Ghana. The Journal of Modern African Studies, Vol. 11, No. 1, 61-89.

Harvey, D. (2008). La condicion de la posmodernidad: investigación sobre los origenes del cambio cultural. Buenos Aires: Amorrortu.

Jappe, A. (2009). Introducción a la edición castellana. En A. Jappe, R. Kurz, & C. P. Ortlieb, El absurdo mercado de los hombres sin cualidades. Ensayos sobre el fetichismo de la mercancía (págs. 7-26). Logroño: Pepitas de Calabaza.

Jappe, A., Kurz, R., & Ortlieb, C. (2009). El absurdo mercado de los hombres sin cualidades. Ensayos sobre el fetichismo de la mercancía. España: Pepitas de Calabaza.

Lefebvre, H. (2013). La producción del espacio. Madrid: Capitán Swing.

Mansilla, J., Marcús, J., Boy, M., Janes, S., & Aricó, G. (2019). Del planeamiento urbanístico a la actividad turística. Sobre la ciudad como mercancía. En J. Mansilla, J. Marcús, M. Boy, S. Janes, & G. (. Aricó, La ciudad mercancía. Turistificación, renovación urbana y políticas de control del espacio público (págs. 9-21). Buenos Aires: TeseoPress.

Neuwirth, R. (2011). Stealth of nations. The global rise of the informal economy. New York: Random House.

Paugam, S. (2007). Las formas elementales de la pobreza. Madrid: Alianza.

Pfau-Effinger, B., Flanquer, L., & Jensen, P. (2009). Formal and informal work: The hidden work regime in Europe. New York: Routledge.

Sarlingo, M. (2008). Los residuos como objetos. IX Congreso Argentino de Antropología Social. Misiones: Acta Académica.

Sennett, R. (2001). La corrosión del caracter. Las consecuencias personales del ttrabajo en el nuevo capitalismo. Barcelona: Anagrama.

Venceslao, M., & Delgado, M. (2017). Somatizaciones del internamieto en un centro de justicia juvenil. La participación de los dominados en su propia dominación. AIBR Revista de Antropología Iberoamericana, 193-214.

Wacquant, L. (2001). Parias urbanos. Marginalidad en la ciudad a comienzos del milenio. Buenos Aires: Manantial.

From “nuisance” to “social acceptability”?

15 years of biffins’ struggles for second-hand markets in Paris area

Jeanne Guien and Elise Havard dit Duclos***

Introduction

In Paris and its near suburbs, waste pickers have been gathering for a long time to sell second-hand merchandise, especially at the edge of flea markets. For almost fifteen years, the activity of these waste pickers and sellers (sometimes called “*biffins*") has become a public issue. As most city halls repeatedly sent the police to scare them away, they started mobilizing to resist repressive measures and defend their activities. Through associations, public speaking, demonstrations, and the organization of their own markets, these sellers and their citizen supporters have raised public awareness about waste picking and informal markets.

The paradigm of social and sustainable urbanity, which has achieved consensus in contemporary northern metropolises, has offered an opportunity to publicly valorize the activity through its ecological character. In this context, the public issues linked to waste picking are reframed, circulating among various networks from activists to media outlets, public authorities, and economic partners. Forced to symbolically recognize the waste pickers' role in the reduc-

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tion of waste, local authorities seem to encourage their organizations to make the activity "acceptable".

This article offers an overview of these various struggles and discusses the issue from a political perspective: how did the strategies set up by sellers and their allies reshape the public image of the waste pickers, legitimizing some of them while excluding others? While the emergence of the "*biffin*" figure has contributed to giving credit to waste picking, this pursuit of "social acceptability" has also further reestablished its margins, leading to renewed forms of exclusion.

Based on six years of commitment, benevolent work, and research on this activity, this paper will study the legitimization strategies of the waste picker organizations and the limits they have confronted. This implies, first, studying the discourses constructed to represent and explain the activity; then, their materialization in new forms of spatial organization during markets; and finally, the representation of waste pickers in political and media arenas.

Waste pickers organizations in Paris and its near suburbs: a brief overview of fifteen years of struggles

For almost fifteen years, some waste pickers and sellers have been struggling to work and resist political repression in Paris and its immediate suburbs, where most of the flea markets are located and where they have been selling for a very long time. All around the Montreuil, Clignancourt, and Vanves flea markets, they benefited from the foot traffic, selling without paying a license that they could not access and/or afford. In these streets, they still sell objects they collect during the week in dumpsters or through diverse forms of exchange, ranging from personal gifts to commercial relationships within the flea market itself (Sciardet, 2003). At the Clignancourt flea market, sellers would gather under a bridge at Porte Montmartre, selling their goods on the floor, on cardboard, or on sheets, every week from Saturday to Monday.

This informal but tolerated situation started to evolve in 2005 (Milliot, 2010), as the number of sellers began to grow. Neighbors complained about their occupation of space and about the traffic problems their presence could cause. The city hall sent increasingly more law enforcement to evacuate waste pickers. Harassed by the police, they would frequently run away and leave all their merchandise behind, creating litter that no waste collection service would pick up (see Image 1). Sometimes, the police would confiscate merchandise

and penalize sellers with fines they could not afford. Some of the neighbors blamed waste pickers for stealing and selling stolen goods or dangerous products. However, others blamed the police for violently chasing away these poor, sometimes old or disabled individuals; they then blamed the city hall for failing to offer an alternative through social services.

Figure 1. Police at an informal *biffins* market

Source; Elise Havard dit Duclos.

In order to deal with these conflicts, some of the sellers, united with local inhabitants and committed citizens, created an association in 2006 called ” Sauve-qui-peut ” (SQP), which means “let’s run away”, to refer to police officers chasing away waste pickers. It has dedicated itself to improving the working conditions in Porte Montmartre. From 2006 to 2009, members of the association contacted political leaders, wrote petitions, organized demonstrations, and sent letters to the mayor (who was clearly opposed to the organization of waste selling), in order to prevent repressive measures and ask for designated areas where selling would be legal. Supported by the local Green party and some

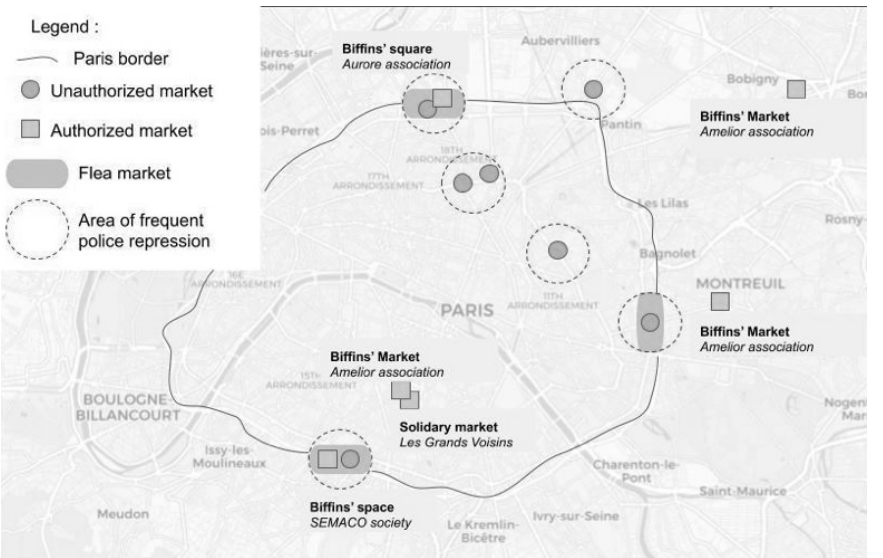
activists, members of the association tried to imagine how the activity could be organized, publicly recognized, and approved. In their letters to the mayor, flyers, or media appearances, they emphasized the social benefits of waste picking and selling: in its capacity to offer employment to the poorest members of society, this activity was also part of the recycling and reuse processes that environmentalists were advocating for. For many people, especially the isolated migrants and numerous elderly people with low pensions who continued to do that work at an advanced age, it was also an important place of sociability, where they could find community and solidarity (Bazin et Rullac, 2011: 44).

After three years of struggle, the SQP movement led to the opening of the first organized waste pickers' market at Porte Montmartre, called the "Biffins' Square" (*carré des biffins*). However, as it was offering only 100 places to a larger number of sellers, as these places were only accessible under certain administrative and economic conditions, and as it was ruled by social workers from an organization (Aurore) that had not taken part in SQP struggles or any second-hand informal activities, the market was contested as insufficient and illegitimate from its opening.

This led to the appearance of other organizations supporting waste pickers' markets in Porte Montmartre and other districts, such as Belleville (75020), Montreuil, and Bagnolet (93). Some people, still enduring repressive measures in unauthorized markets and unable to access the "Biffins' Square", gathered with activists to demand more markets. From summer 2012 until today, the Amelior association has fought to open new markets and to legally organize the activity. The association, mainly led by an activist, organized demonstrations, took part in yard sales, and ran markets in squats. They then managed to open an official authorized market in Montreuil in 2013, called the "Biffins' Market" (*marché des biffins*), which soon became monthly. Since 2016, they have opened another market in a former hospital that hosts associative and cultural activities (Grands Voisins). This market is now located on a public thoroughfare, Denfert Rochereau avenue (75014). Amelior's members also run a squatted second-hand shop in Montreuil and still frequently engage in a lot of political lobbying. Furthermore, they plan to open a new place in Bobigny (93), where they run a market and a reuse center. Rues Marchandes, a group of independent researchers and social workers supporting waste pickers and aiming at creating knowledge about waste picking and selling (Rues Marchandes, 2016; Bazin et al., 2018), has also organized small monthly markets in a squat in Aubervilliers (93), from the end of 2018 until the evacuation of the squat by the police. The group is now trying to convince the city hall to give *biffins* some stalls in a food

market in Aubervilliers. Meanwhile, unauthorized markets were still happening very frequently in Montreuil, Barbès, Aubervilliers, or Clignancourt (see map); many waste pickers kept on selling their merchandise in yard sales or on the Internet; sometimes one could also see couples of *biffins* displaying their goods in very touristic areas, such as Beaubourg, Montmartre, or Père Lachaise cemetery. The COVID-19 epidemic hit the *biffin* community very hard, since the "Biffin's Square", "Grands Voisins", and the "Biffins' Market" had to close during various lockdowns. During the first one, there was no place to sell, and there was a fear that waste-picking might convey illness. Amelior organized food support, while many Roma people were returning to Romania. Most people had to find other ways to make money and keep up (Guien, 2020).

Map 1. *Biffins* markets in Paris



Source: Elise Havard dit Duclos.

Research on the topic has burgeoned, sometimes becoming embedded in political conflicts. The SQP movement has been the fieldwork of Virginie Milliot (2010) and Mélanie Duclos (2020). Among the different answers SQP received from public authorities was the funding of a qualitative study by the regional council, which subsequently attempted to prevent its publication (Bazin et

Rullac, 2011). As waste pickers' struggles continued to be studied in articles and doctoral research (Balan, 2016), former social workers from the "Biffins' Square" published a testimony on their experience there (Chouatra et Grimaldi, 2014). Rues Marchandes began in 2015, led by one author of the regional study. One of its members, Radhia Slimani, made a world tour to meet and document waste pickers' struggles around the world, producing videos, photos, and exhibitions[1]; her project has been supported by WIEGO and GlobalRec, two international organizations supporting waste pickers' struggles around the world. The authors of this article were previously volunteer workers for Amelior, taking part in the market activity, internal organization, and communication (Doumic et Zelez, 2015). They have published academic and non-academic work on the topic (Guien et Ramirez, 2017; Bazin et al., 2018; Havard dit Duclos, 2018). They are still members of Rues Marchandes, trying to organize small markets and to produce knowledge and recognition about waste picking and selling. This article may be read as a part of that process of participatory action research, as commitment preceded and framed the scientific inquiries. It is grounded on interviews, workshops, and sociological studies, but also on reflexive observations, memories, and personal exchanges.

Giving voice to waste pickers: naming, telling and arguing

Naming themselves was also an issue. The word "*biffin*", which was used at the Clignancourt Flea Market before the SQP struggle (Sciardet, 2003), was not common knowledge. Sellers themselves did not necessarily use it, as it is quite an ancient term, referring to Paris history: during the 19th century, ragmen (chiffonniers) collected Parisians' rubbish to sell materials to industry. They were important economic (Barles, 2005), literary (Compagnon, 2017), and social figures. "*Biffins*" were those that collected and sold in flea markets. To refer to that history, an activist supporting the SQP movement decided to use that name, with the idea that historical references could strengthen the waste pickers' local legitimacy (Milliot, 2010: 60). "The word '*biffins*' was highlighting a tradition, values of craftsmanship, and would help to place this activity in the context of contemporary recycling issues" (id., 2017) (own translation).

This "strategic category" (ibid.) (own translation) was used by other organizations later (*Collectif de soutien aux biffins, Amelior, and Rues Marchandes*). It was

[1] https://www.thegolddiggersproject.com/english#!

accompanied by many testimonies and biographical narratives. In interviews, talks, reports, or movies, *biffins* explained how they collect and sell trash, why it became their main activity, and how they endure police repression, sometimes offering substantial biographical or sociological details. The significant participation of women, migrants, and the elderly in this activity was highlighted through portrait-making in the media[2]. Putting stress on the social link created and sustained by the organization of markets was also very important: when markets are made legal, people get a place to meet, they can secure an income, and they belong to a community they can rely on. To give a name, a face, and a personal story to the sellers appeared as an important way to legitimize their activity. So did some studies about their sociological background: these data[3] were supposed to help associations and institutions to qualify their action as social work by identifying them as potential beneficiaries, as people in need.

These communication strategies helped activists to create a social identity, give unity to individual practices, and avoid being associated with various forms of legal or illegal economic practices—stealing, concealing, drug dealing, or begging. It contributed to the criticism of the negative connotations linked to waste and poverty: as waste recyclers, the "*biffins*" introduced themselves as workers having professional skills, such as collecting, sorting, pricing, repairing, and sometimes, creating (Guien et Ramirez, 2017). They challenged the dominant way of thinking that was blaming the activity and its actors for market-related nuisances, considering the social situation of the workers, their constant repression by the police, and the impossibility of organizing properly as the main causes of these nuisances. The word "*biffin*" has proven effective in dealing with some local authorities and became institutionalized to a certain extent: the local city hall named the market the "Biffins' Square", while media outlets, neighbors, and reluctant councilors would still call it the "thieves' market", "street market", "wild market", or "misery market" (*marché des voleurs, marché à la sauvette, marché sauvage, marché de la misère*).

[2] For instance, a journalist from Le Monde interviewed two "women of a certain age" selling around Montreuil Flea Market, insisting on their friendship and intimate relationships with the neighborhood (Loisel, 2012).

[3] For instance, Elise Havard dit Duclos' study for Amelior (2018) showed that the waste pickers attending Amelior's market in Montreuil were male as much as female; one quarter of them was more than sixty years old; only 42% benefited from a proper housing; 50% had no other income than waste selling; 35% had a regular administrative situation (french nationality or resident permit).

The Amelior association took this approach further, trying to enhance the technical aspects of the activity by having members of the team wear yellow vests on market days, thus using the social codes of urban street workers (Florin and Garret, 2019). Its members also tried to quantify the "tons" of waste prevented by the market and the amounts of money created by selling—sometimes with rough approximations (Doumic and Zelez, 2015), sometimes through a quantitative study (AEFEL, 2018) funded by SYCTOM, a major public actor in waste management, including incineration. In this study, one can read that 213 tons of merchandise are displayed during Amelior markets, of which 57.4 tons on average are sold, and 12.7 tons end up collected or recycled at the end of the market. The partnership with SYCTOM, aiming at producing data on "the Biffins' Market ecological performance" (our translation), is supposed to highlight the *biffins'* professional legitimacy as efficient waste workers and thus to allow comparison with other forms of waste management, such as reuse centers (ressourceries). Ecological issues are reframed in that way: in order to convince city halls to support their activity, as they are supporting reuse centers, yard sales, and charity shops, Amelior insists on the part played by "*biffins*" in the "circular economy" (Soulié, 2019).

Various discourses on self-relying organization and professionalism contributed to distinguishing their social action from the model of the "Biffins' Square", where social workers aim at the integration of waste pickers into the traditional labor market so that they quit waste picking. This goal appears largely unattainable for a segment of the population that is structurally excluded from formal labor (due to their age, health, or lack of identity papers), or that does not want to be part of it (as many of them share an ideal of individual autonomy and value independent work) (Milliot, 2010: 28-9).

These communication strategies nevertheless proved powerful, as many media outlets and public speakers shared these ideas. SQP garnered support from the local Green party, from elected representatives, and from many civilian activists. "*Biffins* are ecological recyclers" ran as a headline of an article in an ecological magazine about Amelior's market (Martin, 2014); they are "members of sustainable Paris", a "struggle against poverty", wrote another (Acteurs du Paris Durable, 2015). However, some prejudices die hard: in a recent article about the Denfert-Rochereau market, the very well-known newspaper Le Parisien rejoiced at the fact that these "*biffins*" would not "be confused with street vendors" anymore (Soulié, 2019) (our translation). This distinction had already been made by one social worker at the "Biffins' Square", opposing "our *biffins*" to the "street vendors" to legitimize police repression (Milliot, 2010: 82)

(our translation). In 2019, in La Courneuve (93), video cameras were installed to place street vendors under police observation; in Saint-Denis (93), the city hall installed posters reading “Street vending: caution! Danger!”, in which they accused “street vendors” of stealing, selling dangerous food, toys, or cigarettes, and spreading diseases (our translation) (see picture 3). A social movement led by food street vendors in 2017 (called Chouettes brochettes) received no other answer from the city hall.

Figure 2. Market stall in Amelior

Source: Elise Havard dit Duclos.

Using the word “*biffins*” may have proven efficient to legitimize some collective social movements, but might have had some negative effects on the informal vendors community, that now seems to fall into two different parts: good ones and bad ones. Showing their associative membership card helped some waste pickers to avoid getting in trouble with the police while collecting trash (Grimaldi and Chouatra, 2014; Havard dit Duclos, 2018). Still, some specific words are used by the authorities and media outlets to exclude some

groups of people from the "*biffins*" community. For instance, the police qualify Roma families as "international networks" or even "mafias", in order to justify violence towards them.

A discussion can also be raised about the social reality of this "strategic category". Many sellers did not call themselves "*biffin*" before becoming part of an association and still resist this label. Studies on Amelior's market show that they do not use a specific word to describe their activity, referring to "selling", "participating in markets", "making ends meet", or "collecting trash" (Havard dit Duclos, 2018). Clients also rarely use the word "*biffins*" when asked to describe the market; most of them use the words "yard sale" or "flea market". The only people that actually use this category are regulars that showed interest in the associations' positions, or that have been attending waste pickers' markets for years. When Rues Marchandes organized a small market in a squat in Aubervilliers (93), the organizers were faced with the meaninglessness of the phrase "Biffins' Market" in the local context: as the passersby did not understand these words that had been printed on flyers and posters, it was necessary to change the market's name several times, eventually choosing "solidarity yard sale". The emergence of the "*biffin*" figure has thus shown public efficiency, circulating from activists to associations, in the media, and appropriated by public authorities. Yet it still appears as an activist category whose reality in the field is limited and whose use can have unequal repercussions.

Transforming a public image through the appropriation of public space

In 2018, during a meeting with Amelior, a Paris city councilor tackled the waste picking issue through the notion of its "acceptability". For her, dealing with that issue implied sufficiently transforming the activity so that it would be acceptable, that is to say, not associated with the negative images of informal markets. This shows how much the issue is solely perceived as a social nuisance. The question of these informal markets is addressed to please, or at least to not harm, inhabitants. This section will study the spatial strategies of waste picker associations through which they challenge the criticisms that their informal markets raise. By "spatial strategies", the nature of the spaces appropriated to organize formal markets is highlighted, but also the setups of those markets, in relation to the aesthetic and political image of the activity.

An important issue for market organizers was to define areas in which the activity could possibly be organized. With informal markets still being set up every week in popular central locations, one of the questions was how these formalized places would relate to this existing informal waste picking geography. The experience of the “Biffins’ Square” underlines the difficulties of operating in an area well-known for flea markets. While the goal of the organization was to bring some stability to this area, it actually seems that the limited capacity of the “Biffins’ Square” (one hundred stalls) and its inability to transform the organizational scheme considering the growing demand of waste pickers, participated in recreating the vicious spiral of informal settlement, repression, and conflicts of use. The area kept attracting waste pickers that would not fit in the “Biffins’ Square” but would benefit from the resulting commercial situation with no authorization. The situation thus reproduced old conflicts with authorities and inhabitants, progressively addressed with fences and a police presence, while artists were paid to create some embellishments. Formalizing this limited market with regulated access in this particular area has participated in recreating a gap between authorized waste pickers and excluded ones, marginalizing them even more. The rapid urban transformations that those areas are facing make it even more complicated to address this local informal geography. Paris’ margins, long appropriated by waste picker activities, are now the focus of large economic land valuation and gentrification processes (Collet, 2012) which directly limit the possibility of establishing a market formally or even informally. For instance, Porte de Montreuil is now facing a huge renovation project,[4] space occupation. It Considering these issues, Amelior’s spatial strategy seems to differently address the informal waste picking geography embodies all the social promises of today’s sustainable city and yet does not manage to allow the opportunity for a formal market used by the waste pickers that sell there every weekend.

Considering these issues, Amelior’s spatial strategy seems to address the informal waste picking geography differently. The marketplace they obtained in 2013 from Montreuil’s city hall is an accessible public space in a historically lower-income neighborhood, where it economically and socially made sense

[4] This project belongs to the international call C40 Reinventing Cities with 60 000m2 to transform. It highlights the public goals of this new urban paradigm, that is to say an “ environmental excellence ” with “ innovation in the field of economy ” such as ” innovation platforms, incubators, fab lab, circular economy premises ” https://www.c40reinventingcities.org/en/sites/porte-de-montreuil-1303.html

to organize a second-hand market. As it is far enough from the Montreuil flea market, it would not be related to this historic center of informal activity (at least, not directly).[5] It is able to attract local waste pickers that know the area very well and already form a community, without suffering from overcrowding. While recognizing the historical territories of second-hand activities, the association considers that the strong community of sellers and buyers can be recomposed around new spatial opportunities. This strategy has proven true in Montreuil: regular clients of Porte de Montreuil or Porte de Montmartre now describe Amelior markets as an "institution", "a date that you can't miss if you buy second-hand". With this perspective, in presentations before city councilors, Amelior's president proposed a project of three weekly experimental markets of 200 stalls in different neighborhoods of Paris (see Picture 2). His strategy in relation to waste picking is thus to create arrangements with local authorities to transform a public space considered neutral into a formal market.

In this legitimizing strategy, the market is described as a place of sociability and local animation (de La Pradelle, 1996). In order to convince local authorities, "Biffins' Markets" are compared to other valued occupations of public spaces, such as food markets and yard sales. For instance, in Montreuil, Amelior's market is part of an initiative to mount participative projects in the public space that is in line with the efforts made by the city hall over the past few years to enhance the city's street life. This material and symbolic valorization of public spaces is in keeping with the ideology of a new urban landscape resulting from the social transformation of the city and the arrival of new inhabitants partly attracted by the image of a local life inspired by the myth of the village square (Collet, 2012). This scenario offered Amelior the possibility to twist this narrative in order to create a place for waste pickers in this emerging paradigm.

This leads to the second tension that drives the formal geography of waste picking, that is to say, the relation to public authorities regarding public space accessibility. Years of struggles and only two long-term experiences of formalization in public space led waste pickers and activists towards other spatial strategies. To address this situation, some of the activist groups aim to foster integration in different spaces that are accessible, free, but not directly under the power of public authorities. Third-places have then appeared as a spatial op-

[5] Some people do perceive a relationship between those two places. For instance, in a documentary about Amelior's activity in Montreuil, we can see one inhabitant express his fear that the marketplace where the "biffin market" is set up would become "an extension of the Montreuil flea market" (Doumic and Zelez, 2015).

portunity for Amelior and Rues Marchandes, which both ran markets in places with hybrid status, in between private and public governance. This being said, two types of hybrid spaces that have been appropriated can be distinguished: squats or institutional cultural occupations made possible by temporary contracts (such as Les Grands Voisins, an ex-hospital in the south of Paris). This spatial strategy highlights the failure of public authorities to consider and explore possible answers to the public problem of informal markets by taking into account the existing use of the streets as a marketplace. Those places have created new issues for associations. Establishing an alternative economy in a place whose social and economic accessibility are not guaranteed or identified by possible clients is not easy. For instance, when Rues Marchandes organized a market in a squat in a lower-income suburb, difficulties were experienced in attracting local people that could have been interested by the alternative means of consumption offered but that were not identifying the venue as a potential resource. On the contrary, at Les Grands Voisins, the Amelior market became well-known, but it attracted mostly people looking for antiques and art-craft, or just for leisure time.

Each formal market is organized in a territory that has a different material and symbolic relationship to waste picking and all of the conflicts of use and the stigmas hence associated with informal markets. The spaces appropriated by the markets stage different collective commercial forms that reinforce the construction of alternative narratives on the activity.

Amelior's markets allow for the consideration that these events have political as well as material dimensions. Events in public space such as markets and demonstrations are moments of appearance in which it is possible to introduce the activity differently. For instance, one can notice that the markets always have a special table with flyers about the value of waste picking and the association. Members also hang a banner on which is written "market of solidary reuse" (*marché solidaire du réemploi*) (our translation) and try to establish communication with clients. It is interesting to notice that it also goes the other way: in demonstrations organized by the association,[6] activists also set up unauthorized markets. Symbols such as yellow vests or membership cards help the organization but also create an impression of collective and professional legitimacy that is effective on the waste pickers and also on the clients. Space is thus appropriated as a commercial area, but also as a political

[6] For instance, every year the association organizes a demonstration on the international day of waste pickers, celebrated on March 1st.

arena where a public problem is challenged. These events appear as places of open investigation that make it possible to "acquire a collective point of view" and "develop scenarios of action to influence the course of events in a newly imagined way" (Tonnelat, 2011) (our translation). It can be easily noticed how, by using the market as a place for a specific experience, the association tries to promote their point of view and model of organization. Inviting technicians or local councilors of different cities to the marketplace underlines this will to give credit to the narrative through an embodied experience. The publicity of space is reinforced, not only by the social and economic accessibility of the market, but also through the exposition of a public problem that is directly tackled and reconfigured through the event (see picture 2).

The reshaping of the public image is not only political; it is also an aesthetic work. The redesign of the public space of Porte de Montmartre illustrates this quite well. Facing the difficulty of actually stabilizing the situation, the local city hall, in partnership with Aurore and the inhabitants, has funded a project to redesign and decorate the market space, which is located under a highway bridge, with wooden panels and mirrors. The "mirrors passage" (our translation) combines the two objectives of the transformation of the market: spatially delimiting it through wood panels and creating a "decorative and aesthetic"[7] set to transform its image. This installation works with the narratives and aesthetic codes of contemporary public space production[8] while considering the Biffins' Square as an object of tension, overcrowding and degradation. Alternative urbanism appears as one of the aesthetic means to finding a strategy of acceptability. It is the groundwork of the redefinition of a spatial and symbolic identity of a neighborhood that was considered marginal until its valorization with the recent private investments in the area, such as a luxury hostel nearby, and the latent gentrification of Paris' northern neighborhoods.

The market organized at Les Grands Voisins has also developed strategies in order to integrate the waste pickers into the aesthetic of this third-place. It is a hybrid event between a waste picker market, a yard sale, and an artisanal market. By mixing different practices, the organizers integrate waste picking into the cycle of urban alternative practices of recycling; they describe the market as an "inclusive" place with "a spirit of diversity" in which you can "find good

[7] http://encoreheureux.org/projets/passage-miroir/, consulted on 28/06/2019

[8] Chosen through a participative budget, it is an artistic intervention that uses sustainable material. The project is described as participatory since the inhabitants have the opportunity to decorate wallpaper with the artists.

deals on second-hand and vintage items”. However, the different practices and resources of sellers have an effect on the appearance of the stalls. While waste pickers often set up their stalls on the ground, most other sellers have tables, racks, and chairs. While some waste pickers sell piles of one-euro clothes, creative young artists sell fashionable vintage clothes at 20 euros each. These aesthetic and economic ruptures contribute to the form of the market and maintain the idea of socio-economic inclusiveness around the common objective that is second-hand merchandise. Nevertheless, they codify a potentially exclusive market scenography. Some waste pickers have the resources (storage, valuable items, knowledge to identify them, time to wait for them to be sold at a good price...) to adapt to this aesthetic presentation. They consider it an enhancement of their activity and enjoy the event. Marie-Jeanne, a waste picker, explains well that adhering to the aesthetics of the market cannot be reduced to the material register: if she spends a good time here, it is also because she appreciates the sociability of this event. The convivial character seems to take precedence over the economic motivation, which pleases some, such as Marie-Jeanne, who has the cultural and communication resources to participate in this social time, but excludes others, such as Miko, an allophone, for whom interaction with potential customers is often reduced to a commercial exchange which he found insufficient for a day of work.

The Les Grands Voisins Market therefore seems to be producing a specific commercial model, where conviviality is the main way to attract potential clients. The layout of the market highlights this idea of a playful stroll in an event punctuated by various stalls but also by terraces, bars, installations for children, and sometimes concerts. The multiplication of entertainment offerings creates a festive space that breaks with the normative use of public space. Les Grands Voisins, by articulating the immateriality of atmospheres and the materiality of spaces (Pradel, 2007), characterizes the waste pickers’ market within a paradigm of events in public space whose festive nature seems to supplant its commercial dimension. The second-hand business then appears as leisure consumption and not as an alternative economic space. The aesthetics of vintage merchandise, the history that is told by the object, its seller, and its place of acquisition are the main motivations for customers to buy (Lallement, 2010). The narrative of salvaged goods appears here as staged in the production of an idea around alternative commerce that does not satisfy the needs of those for whom the second-hand economy is the only resource.

The progressive importance of intermediary actors in the construction of the *"biffin"* figure

The actors of waste picking organizing, as people that embody and broadcast the narratives described, can be seen as the last layer of this legitimation process.

When SQP was created, one of the main challenges was to speak out as a group, as most waste pickers suffer from marginalization and had not been trained in political techniques. Self-representation and organization of the waste pickers was one of the main objectives they held. Not surprisingly, SQP's president, Mohammed Zouari, used to be in a trade union. In keeping with this activity, Amelior, originally founded by an activist and a waste picker, has been trying to build a horizontal structure that would allow waste pickers to appear in the public sphere as political voices and therefore give visibility to their understanding of the situation, from an individual experience to a structural analysis and a collective struggle. Rues Marchandes also intends to serve as an intermediary between waste pickers and society through publishing collections of waste pickers' speeches, resulting from collective discussions in workshops or during markets. For the moment, the collective, composed of researchers and social workers, has produced texts that mostly create a link between waste picking and the academic community. The efforts made by the two groups to enforce a participative logic, rather than a representative one (Doidy, 2007), face a reality of individual precariousness that often limits the commitment of those concerned. Rues Marchandes has experienced the complexity of structuring a long-lasting group for reflexive workshops when it is not related to the organization of an actual market. On the other hand, for Amelior, having a local that can host meetings and organize community life is a strategic asset. This is all the more true when it hosts economic activities, such as a permanent second-hand shop or the collective recycling of materials, that attracts waste pickers and offers them a supplementary income.

The part played by Amelior's members on their market has been evolving since 2013. Facing the day-to-day organization, the association has improved its methods and tools. Most of the waste pickers involved in the structure have gained many skills linked to the diverse practices developed by the collective: collecting and recycling materials, checking-in and greeting sellers on the marketplace, managing and facilitating collective events, driving trucks, cleaning the area before leaving, etc. Without entering with precision into the mechanisms of individual development, these collective dynamics can be analyzed as a process of professionalization of the activity. On the one hand, the

collective skills and the work-autonomy developed in the association highlight the potential of this form of organization to actually legitimize and produce a professional culture. On the other hand, this professionalization of Amelior and its members as market managers can be perceived as exclusive for novice waste pickers. The complexification of the activity tends to professionalize the main core of the association while creating a new generation of intermediaries.

This process is even more effective when dealing with public authorities. It entails taking part in official meetings with local councilors, establishing institutional partnerships, and talking to the media, thus requiring specific skills of self-presentation (Goffman, 1973) that are not equally shared among various members, such as speaking French, having knowledge of tacit rules of interaction, and understanding the legal and administrative context. The issue appeared clearly with the recent subsidy received by the association from SYCTOM. It implied a financial arrangement of advance and refund that was understood, for a long time, only by two activists of the group. Considering the permanent urgency linked to the unstable nature of the few positive achievements made by the association, there is a risk of reproducing a bureaucratic and political intermediation that ranks the roles in the struggle, reproducing levels of domination found in society.

This process of intermediation that characterizes most of the struggles encountered by individuals in precarious situations, including the undocumented and those lacking proper housing (Doidy, 2007), is strengthened by politicians’ strategies, for whom it is easier to identify one stakeholder who acts as a field intermediary with a marginalized group. The example of Amelior in this case speaks for itself. Considering the inability of supportive municipal councilors to face the situation and actively find a solution, Amelior appears as a possible operational relay that can maintain a production of field knowledge and an open inquiry into the public problem. In a way, the association seems to be perceived as a means to reach a sector of the population described as unaffiliated and unreachable. Amelior’s president has thus become a public figure, a key player in market-related public issues, making it difficult to establish other contacts. This demand for entitled representatives from the city hall is normative and can potentially act as a factor of racial and social exclusion. During a public meeting in Montreuil city hall in 2014, a councilor told one of the authors how surprised she was when she discovered that a waste picker’s representative could be “this guy, that looks good and speaks well” (our translation).

The production of an intermediary figure appears as a sign of the withdrawal of public action from social intervention while relying more and more

on the nonprofit sector. The waste picking situation directly highlights this process, especially when considering that the only direct relation Paris city hall maintains with the waste pickers is through its municipal police. The different experiments of formalization are all led by associations, some of them like Aurore largely funded, others like Amelior not receiving any public subsidy. This non-accountability of public authorities in relation to this conflictual situation could appear as a failure of the *biffins'* struggles if it could not be explained by the overall trend of an extremely repressive local context that, through urban planning or local and national policies, focuses on excluding marginalized bodies and practices from public space while relying on local associations to address public needs.

Conscious of the fraught relationship between waste picking and the "zero waste movement" or "circular economy", the situation one can observe in Parisian activist movements leads to the same conclusion. While most actors of the zero waste movement publicly recognize the part played by waste pickers in waste reuse, empowering them directly is still a problem for the city hall. For instance, during a meeting with a councilor of the Paris City Hall,[9] one of the suggestions was that the Zero Waste association could ask for and receive a subsidy for an experimental market managed by Amelior. Other than the associative clientelism that this situation demonstrates, it also questions the image of this association that, as a representative of waste pickers, still has to call on more accepted non-profit organizations in order to have a public and economic valorization of their work. Waste picking has to be made politically acceptable, and that means keeping waste pickers themselves away from decisional spaces.

The alliance of those stakeholders, motivated by the same political objectives and ecological values, seems expected. However, political tensions exist between the different associations. As individuals and as a collective, Amelior and its members have to confront the precariousness of their activity, which they describe as social work and frequently oppose to an upper-class, abstract ecology. Although those questions are not evinced from Zero Waste's speeches, their day-to-day actions[10] do not seem to be constrained by social issues. Posture towards public authorities and lobbying is also a case of dissent between organizations. Whereas Zero Waste's strategy seems to be entering into decision-making spaces

[9] It should be added that this councilor was in charge of the "social and solidarity economy".

[10] Their work mainly concerns raising awareness, introducing zero-waste practices, organizing events, selling "zero waste goods", lobbying, and consulting for institutions. https://zerowasteparis.fr/lassociation/organisation-de-zero-waste-paris/ (consulted 28/06/2019).

and gaining the support of local authorities, Amelior's president usually uses meetings to confront them, criticizing their breaches of proper practice and institutional contradictions. Most of the time, this posture is criticized or even rejected by local councilors, arguing that it is too "political" or "activist" for the discussion and therefore justifying more action by intermediary figures.

Conclusion

Despite the fact that waste pickers are still, for the most part, selling informally, fifteen years of struggles in the Parisian area have led to the emergence of formal places for second-hand activity and contributed to the visibility and social recognition of the part played by "*biffins*" in the circular economy. It has shed light on modern waste and on the experience of a segment of the population whose social condition does not fit into the idealized narratives of northern metropolises.

Through various strategies of communication and spatial or political organization, these associations have managed to deconstruct the prejudices and perspectives that led to police repression and social stigma. The construction of the "*biffin*" figure, with its professional, ecological, and political values; the setting-up of marketplaces as areas of economic opportunities and sociability; and the emergence of a political collective have managed to reframe the public issue. Organizations have shown that waste picking should not be considered a nuisance, but rather an opportunity if organized properly and with the full consideration of the perspectives and practices of waste pickers. However, this overview should not conceal the complexity of the process: the discourses and legitimizing strategies described have circulated from waste pickers to activists, then to media outlets and public authorities. They were sometimes appropriated, sometimes rejected by stakeholders; they led to convergences and divergences between the different models. For instance, the existing ideal of institutionalized social intervention aiming at integrating sellers into the mainstream labor market, which is supported by the organizers of the "Biffins' Square", can clearly be opposed to the self-organized professionalism of Amelior.

However, their work is confronted by the same challenges that this article has attempted to address. To access public space and social legitimacy, waste picker organizations have had to negotiate with very normative expectations: the pursuit of social acceptability imposed by city halls tends to recreate the social, aesthetic, and political borders from which waste pickers suffered in

the first place. Through the dialectic of "nuisance" and "acceptability" (words used by the media and/or public authorities), one can observe how economic alternatives and political initiatives have evolved when facing institutional pressure. To be "acceptable", they have to speak the institutional language, fit into gentrified "new cities", and sell vintage goods that respond to the demands of a leisure-based culture and a myth of meaningful consumption. For the moment, Les Grands Voisins has become the main reference for public authorities when they have to address the claims of waste pickers' organizations, whereas places like Montreuil's market have stood the test of time. Meanwhile, cities like La Courneuve and Saint-Denis run campaigns against "street vendors", and each week police are sent to Montreuil, Ménilmontant, or Clignancourt. It is no surprise, thus, that many waste pickers resist the organization of their activity in any way, despite the risks they take in engaging in informal labor.

References

Acteurs du Paris Durable, "Le marché des biffins", uploaded on the 10/12/15. URL (consulted on 06/16/19): https://acteursduparisdurable.fr/actus/consommer-autrement/le-marche-des-biffins

AEFEL, 2018, Étude de la performance de prévention et de gestion des déchets du Marché social et solidaire de la Croix de Chavaux, étude Amelior-Syctom.

Hélène Balan, 2016, Redéfinir la place de l'informel à Paris: la controverse sur les biffins et les "marchés de la misère", PhD thesis directed by Raymonde Sechet - Rennes 2.

Hugues Bazin and Stéphane Rullac, 2011, Étude qualitative portant sur les conditions de vie des biffins en Île-de-France, Association Aurore/ Unité Société de la Direction du Développement Social, de la Santé et de la Démocratie régionale de la Région Île de France.

Hugues Bazin, Maëlle Capello and Jeanne Guien, 2018, "Recherche-action avec les récupérateurs-vendeurs de rue", Cahiers de l'action, n° 51-52, pp. 47-53.

Pascale Chouatra and Yvan Grimaldi, 2014. "De seconde main". Vendeurs de rue et travailleurs sociaux face à face dans la crise, Paris, L´Harmattan.

Collectif de Recherche-Action Rues Marchandes, 2016, Guide des biffins, online : http://rechercheaction.fr/ruesmarchandes/

Anais Collet, 2012, “Montreuil, “le 21e arrondissement de Paris” ? La gentrification ou la fabrication d'un quartier ancien de centre-ville”, Actes de la recherche en sciences sociales, n°195, pp. 12-37.

Antoine Compagnon, 2017, Les Chiffonniers de Paris, Paris, Gallimard, coll. “Bibliothèque illustrée des histoires”.

Eric Doidy, “Le logement décent et l’épreuve de la réquisition. A propos de la “précarité” des mobilisations de précaires”, in Boumaza, Magali and Hamman, Philippe (dir.), Sociologie des mouvements de précaires: espaces mobilisés et répertoires d'action, L’Harmattan, Paris, p. 270.

Mélanie Duclos, Les braconniers des poubelles. A la rencontre des biffins de Paris, éd. Syllepse, Paris 2020.

Bénédicte Florin and Pascal Garret, “Faire la ferraille en banlieue parisienne: glaner, bricoler et transgresser”, Echogeo, n°47, uploaded on the 04/21/2019. URL (consulted on 07/03/2019): http://journals.openedition.org/echogeo/16942

Erving Goffman, 1973, La mise en scène de la vie quotidienne 1: La présentation de soi, Paris, Les Editions de Minuit, coll. Le sens commun

Jeanne Guien and Violeta Ramirez, 2017, “Travailler à consommer”, Terrains&travaux n°31, pp. 45-62.

Jeanne Guien, “Affronter le COVID19 quand on vit de la récupération des déchets”, article publié sur Le Blog Médiapart le 24 mars 2020. https://blogs.mediapart.fr/jeanne-guien/blog/240320/affronter-le-covid19-quand-vit-de-la-recuperation-des-dechets

Elise Havard dit Duclos, 2018, Étude qualitative du marché des biffin.es de la Croix de Chavaux – Montreuil, étude Amelior-Syctom.

Emmanuelle Lallement, 2010, La ville marchande, enquête à Barbès, Paris, Téraèdre, coll. “Un proche si lointain”.

Michèle de La Pradelle, 1996, Les vendredis de Carpentras. Faire son marché, en Provence ou ailleurs, Paris, éd. Fayard, coll. “Sciences humaines”.

Manon Loisel, “Gisèle et Joëlle, leur “kiff”, c’est la biffe”, article published on LeMonde.fr on the 11/17/12. URL (consuled on 06/14/19) :

http://crise.blog.lemonde.fr/2012/11/17/giselle-et-joelle-leur-kiff-cest-la-biffe/

Bénédicte Martin, “Les biffins de Paris sont des recycleurs écolos”, article published by Reporterre on the 04/14/14. URL (consulted on the 06/16/19) : https://reporterre.net/Les-biffins-de-Paris-sont-des-recycleurs-ecolos

Virginie Milliot, 2010, “La ville informelle ou le travail des marges”, in. Virginie Milliot et Yann-Philippe Tastevin, 2010, Les archipels de la Goutte d’Or. Analyse anthropologique d’une métropolisation par le bas”, rapport final du programme de recherche “ Culture et territoires en Île-de-France ”, pp. 7-89.

Virginie Milliot, 2017, “ Biffin ”, L’abécédaire de la deuxième vie des objets, online : https://dvo.hypotheses.org/category/abcdaireabcdario

Benjamin Pradel, 2007, “Mettre en scène et mettre en intrigue: un urbanisme festif des espaces publics”, Geocarrefour, n°82, p. 123-130.

Hervé Sciardet, 2003, Les marchands de l’aube, éd. Economica, coll. Etudes sociologiques.

Elodie Soulié, “Paris : les biffins retrouvent droit de cité ”, article published in Le Parisien on the 04/14/19. URL (consulted on 06/16/19) : http://www.leparisien.fr/paris-75/paris-les-biffins-retrouvent-droit-de-cite-14-04-2019-8052984.php

Stéphane Tonnelat, “ Making sustainability public: the bayou observation deck in the Lower 9th Ward of New Orleans ”, Metropolitics, 20 June 2011. URL (consulted on 06/28/19): https://www.metropolitiques.eu/Making-sustainability-public-the.html

Cases in Asia

Recyclable waste management in Turkey

Waste pickers in Istanbul at the intersection of formal and informal waste recycling

*Irem Nihan Balci**

Introduction

Informal waste recycling contributes to the treatment of urban solid waste and provides an income for vulnerable groups in developing countries (Medina, 2000; Cirelli et Florin, 2015). Today, the waste picker is situated at the intersection of economic, social, and political issues. First, recycling becomes an economic and environmental issue because it offers a prevention strategy for minimizing the cost of raw materials and for limiting the scarcity of resources (Van Beukering et al., 2014; Downs and Medina, 2000). Second, from a social perspective, in low- and medium-income countries, informal waste recycling grows in a context of urban poverty and is often practiced by ethnic minorities and migrants (Bertolini, 1996). Third, depending on the country, the attitude of public authorities toward waste pickers oscillates between repression and cooperation (Medina, 2000). In this respect, Turkey is one of the countries that does not include kağıt toplayıcıları (paper collectors)[1] in its waste management

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[1] The first statistics about the number of waste pickers in Turkey is based on Cevat Yaman's (2011) estimation. He claims that there are approximately 100,000 waste pickers in Istanbul and 200,000 in Turkey. The Waste Pickers' Association estimates that there are 500,000 waste pickers in Turkey, half of whom live in Istanbul.

policies, even though they collect from 30% to 70% of the country's recyclable materials (Yaman, 2011; Florin, 2016).

Most academic studies in Turkey about the living and working conditions of waste pickers have discussed how waste picking has become a means of survival alongside the deterioration of the formal labor market in the context of urban and rural poverty (Özgen, 2001; Saltan et Yardımcı, 2007; Dinler, 2016). Since 1980, Turkey has confronted informalization, unemployment, and a decrease in workers' rights and salaries as a result of the neoliberal restructuring of the labor market (Özdemir and Yücesan-Özdemir, 2004; Bugra and Keyder, 2003). Particularly after the 1990s, the growing informal sector has increasingly become a means of subsistence for the most recently arrived migrants in Istanbul, who have witnessed fewer employment opportunities compared to earlier migrants (Keyder, 2005; Işık and Pınarcıoglu, 2001).

As these studies state, the factors that drive waste pickers to the informal waste sector are essentially economic. When the formal labor market is inaccessible, it is easy to enter informal waste picking. They sell the materials directly to warehouses and are paid in cash, so there is neither an employer-employee relationship nor a recruitment procedure. However, beyond economic constraints, the reasons for collecting and the manner of working vary according to the social trajectory of groups and the personal trajectories of individuals. The diversity of reasons for collecting to generate an income stems from the fact that, in Turkey and particularly in Istanbul, waste picking is carried out mostly by ethnic groups such as the Roma, Kurds, Afghans, and Syrians, as well as internal migrants from central Anatolia. Depending on the motivation for their migration, their way of appropriating the city, and their individual and communal experiences, different groups are positioned differently in the waste recycling sector.

A waste picker could be a person from a group excluded from the formal labor market and education system, such as the Roma (Akkan, Deniz et Ertan, 2011; Uzpeder et al., 2008); a person who experienced forced migration because of political conflicts, such as the Kurds (Dinler, 2016; Yilmaz, 2008); a migrant who leaves their country because of political and economic instability in a context of war, for example Afghans and Syrians; a person who migrated to the metropolitan city in search of employment, such as migrants from central Anatolia; and, though it rarely occurs, a college student who wants to save some money or an employee who needs a supplementary income. Waste picking is carried out mainly by men, and the Roma are the only group within which women pick waste in the streets.

In Turkey, informal waste recycling is a complex sector that is structured by waste management regulations and micro-interactions between different actors. While new legislation on solid and packaging waste management generates some conflict, the variety of ethnic groups can reinforce both competition and solidarity ties. This paper discusses the position of waste pickers in the waste recycling sector by analyzing the interaction between the different actors in the recycling chain. More precisely, it seeks to highlight the relationship between different groups of waste pickers and other actors, such as warehouse owners and municipal police, in the broader context of waste management.

This article is based on ethnographic fieldwork carried out mostly with Roma waste pickers in Istanbul during December 2017, December 2018, and May-September 2019 within the scope of a Master's thesis and PhD research. To better understand their living and working conditions and their daily interactions with other actors, both in-depth semi-structured interviews with waste pickers and observations during their collection process and daily life were conducted. During visits to small-scale informal warehouses, Kurdish and Afghan waste pickers and some waste pickers from central Anatolian cities were also interviewed in order to comprehend their relationship with warehouse owners and the municipal police.

Solid and recyclable waste management regulations

The solid waste management system in Turkey has undergone several modifications from the 1990s to the present day, promoting the sorting and valorization of recyclable materials. However, the main actors, the waste pickers, who constitute an essential workforce for the functioning of the formal recycling sector, have been excluded from decision-making processes and deprived of improvements in their working conditions.

The first detailed reform concerning solid waste, the Regulation of Solid Waste Management, was implemented in 1991 by the Ministry of Environment and Forestry. Even though the regulations provided an improvement for the collection, storage, transfer, and disposal of solid waste, household and recyclable waste were far from being managed according to these standards; all were transported to open dumps without any sorting (Turan et al., 2009). At that time, dumping in uncontrolled sites and at sea was a common method of waste disposal, and Hekimbaşı in Istanbul was one of 2,000 open dumps in the country (Kocasoy and Curi, 1995). In 1993, a methane explosion in

the Hekimbaşı dumpsite caused the death of 39 people and forced authorities to take effective measures for waste management. In the following decade, while uncontrolled dumps were replaced by sanitary landfills and transfer stations, solid waste regulations were revised, prioritizing measures concerning recyclable waste.

In 2004, the Regulation of Packaging and Packaging Waste Control was implemented according to European Union criteria. It was then revised in 2007 and in 2011 before finally being applied in 2016. As a common point, these three regulations promote the principle of reducing waste, reusing, and recycling resources and products (3R) in order to establish sustainable waste management (Regulation of Packaging and Packaging Waste Control, 2004; 2007; 2011). They point out that the firms that generate packaging waste have the responsibility to collect it from the source and to recycle their waste by making an agreement with licensed recycling companies. In addition, municipalities are responsible for collecting the packaging waste in their territory and recycling it or assigning the process to licensed companies. However, the list of prohibitions has been successively extended. The 2004 regulation, which gives a detailed description of packaging waste and important concepts concerning waste recycling, banned the transport of packaging/recyclable waste to sanitary landfills. According to the fifth article of the 2007 regulation, an official license is necessary for the collection, sorting, and storage of packaging/recyclable waste, and any third parties who do not fulfill the official license requirement are not allowed to collect or store waste. In addition to the ban on informal collection, the 2011 regulation emphasizes that licensed companies can no longer buy waste collected by waste pickers. Even though informal waste picking was officially forbidden under the 2007 regulation, the prohibition was enforced in 2016, and in case of violations of the law, a fine of up to 140,000 TL (US$ 23,500) for companies can be issued.

At first glance, in order to establish modern and sustainable waste management, the regulation seems to define the process of collection, sorting, storage, and recycling of packaging waste and the actors in charge. However, an inspection of the particulars reveals that the objective is to regulate the recycling sector by enforcing public-private partnerships and ordering informal waste recycling actors out of the field.

Pyramidal recycling sector organization

The waste recycling sector in Turkey can be represented by a pyramid in which profit increases gradually toward the top. The waste pickers are at the bottom, followed by small, unlicensed informal warehouses, then larger licensed or unlicensed warehouses; finally, all is dominated by licensed recycling factories.

Once waste is thrown in the bins, the waste picker is the key person who makes the recycling process happen. They collect recyclable materials from household and workplace waste, such as paper, cardboard, plastics, and scrap metals (copper, aluminum, iron, etc.).[2] Even if they have relative freedom in choosing working hours, waste picking requires a greater commitment of time than the ordinary working day. They generally work from eight to eleven hours per day at least six days a week, preferably in affluent neighborhoods which provide access to a good quality and quantity of recyclable waste. A healthy body that is capable of coping with such labor-intensive work, and a hand truck with a large sack as a tool, are their most important capital while they collect from 100 kg to 200 kg of materials per day.

In addition to the difficulty of intensive work, they are continuously exposed to occupational accidents, hazardous chemicals, and biological agents which can potentially generate short- and long-term effects such as cuts on the hands, respiratory problems, musculoskeletal damage, and infectious diseases including hepatitis (Gutberlet and Uddin, 2017; Schenck et al., 2019). Even though these working conditions are unfavorable for all waste pickers, a clear distinction can be observed in terms of how different ethnic groups experience their severity. Roma waste pickers, in particular, are more vulnerable than others since they represent one of the most disadvantaged communities in Turkey, with limited access to housing, healthcare services, and nutrition, which aggravate their health problems (Akkan, Deniz et Ertan, 2011; Uzpeder et al., 2008; European Commission, 2012). Moreover, the majority of Roma waste pickers are reluctant to take any preventive measure for work safety, such as wearing gloves, because they find that gloves make their hands sweat and make tearing plastic bags difficult. Unlike other groups, they have longer exposure time to

[2] Every recyclable material that comes from household waste is bought and recycled by the local industry. However, among them, only glass is not collected by waste pickers because it is the municipality or licensed companies that collect it in a closed recycling bin and transfer it directly to the recycling facility.

hazards because they start working at a young age, as child labor represents an important source of income for the everyday survival of Roma people.

After collecting recyclable materials, they generally sell them to intermediary small-scale warehouses and are paid daily by the kilo. The price of materials is determined by the international market, which is usually unstable (Grace et al., 1978). A waste picker might earn from 30 TL (US$ 5) to 80 TL (US$ 13) per day, and this amount remains below the minimum wage. The income depends on the day, the weather conditions, the hours spent, and the experience of the waste picker.

During the collection, a waste picker generally either gathers one type of material or puts plastics and paper/cardboard together in a big sack and scrap metal in a smaller plastic bag. Following the weigh-in, the regular workers of the warehouse overturn the big sack to sort the mixed material brought by the waste picker and to regroup similar items. The weight of the empty sack is deducted directly (5 kg/5 TL/~US$ 1), and then, if the paper/cardboard is wet, a wastage of between 10% and 50% is applied according to the humidity conditions.

It is also possible to sell the materials to the largest warehouses, but most of the time this requires a truck because of their distance from central collecting areas. Although direct sale to a recycling factory is more remunerative, such factories are even farther than the larger warehouses, and they prefer to buy vast quantities of material from licensed large-scale warehouses.

The main difference between small- and large-scale warehouses stems not only from the space they have for storage but also from the technical equipment capacity of the facility: while the larger one has a pressing machine for paper and cardboard or a machine for the conversion of plastic into granules, the industrial weighing scale is the principal equipment of the small one. In contrast to the large warehouses that are generally formal and licensed, the majority of the small warehouses are informal and unlicensed. The "informality" of a warehouse refers, on the one hand, to the absence of an official license and business registration certificate, and on the other hand, to the status of labor and conditions of work (Castells and Portes, 1989). The informal warehouses have neither an official license nor a business registration certificate, and workers (the waste pickers) are not declared and do not have access to legal and social security. In the last step of recycling, large-scale warehouses sell materials, such as scrap metal and paper-cardboard, to recycling factories. The remaining plastics can be converted into granules by both factories and unlicensed warehouses.

Dependence of formal waste recycling to the informal sector

Informality can be characterized as a set of income-generating activities "unregulated by the state in contexts where similar activities are so regulated" (Portes and Schauffler, 1993, p. 48; Castells and Portes, 1989). Although this definition is generally accepted by different approaches, the relationship between the capitalistic economy and informality has been interpreted differently. The first perspective is based on the idea that informalization, which is a result of underdevelopment and a lack of state regulations, decreases with the development of the industrial and capitalistic economy. However, according to the second approach, introduced by Peruvian economist Hernando De Soto, informal activities emerge when the state extensively regulates the economy. In his book The Other Path (1989), he describes informality in opposition to formality, arguing that the former is completely isolated from the latter. Contrary to De Soto's perspective, the third one, the structuralist approach, stresses that the existence of a systemic connection between the formal and informal sectors does not allow for rigid classification because workers may alternate between the two sectors, even within the same working day (Portes and Schauffler, 1993). They argue that informality is "an integral feature of advanced capitalism rather than a marginal appendix to it" (Castells and Portes, 1989, p. 12). In other words, informality is not only compatible with, but also encouraged by, capitalistic economies, and the state is complicit in the emergence and growth of informal activities (Portes and Sassen-Koob, 1987; Castells and Portes, 1989; Sassen, 1994). In the same vein, Bašak Kuş points out that "the growth of the informal economy is inherently linked to the state's regulatory intervention" in the Turkish economy (2014, p. 288).

The waste recycling sector is one in which it is possible to clearly trace how formal and informal sectors are deeply connected and how both the state and the private sector tolerate and even stimulate informal activity as long as it increases their profits (Harris-White, 2017). As in some other countries like Colombia (Birkbeck, 1978) and Uruguay (Fortuna and Prates, 1989), informal waste recycling in Turkey is highly connected to the modern capitalist economy and large industry, rather than being a marginal activity.

When the recyclable waste regulations were implemented, the principal concern of the public authorities was to comply with European Union standards as a requirement of Turkey's accession process by establishing sustainable waste management. Additionally, they aimed to create a broader and more profitable space for formal licensed companies in the collection and sorting process,

which is dominated by unlicensed warehouses and waste pickers—i.e., by the informal sector. Compared to the companies' workers, waste pickers have the advantage both in terms of numbers and flexible work hours for collecting materials before their arrival. Companies that had already made an expensive investment in order to obtain an official license ended up with incremental costs since they failed to aggregate sufficient material. In fact, the aim of formalization was based on the idea of privatization rather than on incorporating waste pickers into the system.

On the one hand, the regulations defined in detail the important concepts of recycling and the responsibilities of public and private actors and promoted the 3R principle in order to create sustainable and "more formal" waste management. On the other hand, they ignore not only the contribution of the informal sector to urban sanitation but also the fact that waste picking is a means of survival for a large number of people. Another significant point is that waste recycling in Turkey is not as organized as in European countries, so the same reforms cannot all be applied at once without providing the necessary infrastructure and considering social and economic aspects.

When the regulations were put into practice and waste picking was forbidden in 2016, the results troubled both formal and informal waste recycling sectors. First and foremost, in a country where waste pickers collect more than half of the total recyclable materials, such a prohibition damages the formal recycling sector.[3] Licensed enterprises lack the infrastructure and the necessary workforce for collecting as consistently as waste pickers.

However, the prohibition was even more problematic for waste pickers, as they are the most vulnerable actors in the hierarchy of waste recycling in terms of income and social security. During the first weeks of the ban, some

[3] Although the given number of waste pickers and their contribution to the waste recycling sector cannot be accurate, it is possible to calculate approximately the percentage of their collection within the total recycled waste. According to TurkStat (Turkish Statistical Institute) waste statistics of 2018, in Turkey, 46 million tonnes of waste were recycled in recycling facilities. While 12 million tonnes of recyclable waste are transported by the manufacturing industry, 4 million tonnes are delivered by municipal collection. The rest, 30 million tonnes, is transported both by waste pickers and licensed private companies. Although there is no data regarding the share collected by the latter, if we presume that 500,000 waste pickers collect between 100 kg and 150 kg of recyclable materials per day by working six days per week, we can deduce that they collect approximately 15 million to 24 million tonnes in a year, which corresponds to between 50% and 80% of the country's recyclable waste. This estimation goes along a similar vein to that of previous studies: while Yaman (2011) argues that a minimum of 25% of recyclable solid waste is gathered by waste pickers, Florin (2016) estimates that they collect from 30% to 70%.

warehouses paid almost half the usual price for the collected materials under the pretext of the illegality of the activity. Moreover, the municipal police confiscated the hand trucks and the collected materials of waste pickers. Licensed large-scale warehouses stopped buying materials that came from unlicensed ones. The pressure created fear among waste pickers and prevented them from working. After a few months of anxiety and repression, the prohibition took the form of tolerated illegality. On the one hand, the municipal police could not make waste pickers stop working because forbidding their only means of survival was equivalent to depriving them of their subsistence. Conversely, the waste recycling factories realized that if the waste pickers remained sidelined, they would never obtain the same quantity of materials, so the formal recycling sector would, in turn, be damaged.

In fact, the formal recycling sector is quite dependent on the existence of the informal recycling sector. The formal recycling sector functions thanks to the labor of waste pickers, yet they are paid the least. It is almost impossible for licensed companies to employ as many people for a lower labor cost than waste pickers. Authorities have had to take measures under the pressure of European Union norms, but as the municipalities and the companies cannot establish a collecting and sorting system as efficient or cost-effective as that of the waste pickers in a short time, maintaining the current dependent relationship between the formal and informal sectors was more profitable, especially when the formal sector obtains the surplus created by the waste pickers' cheap labor.

Relationship with two other recycling actors: warehouse owners and the municipality

The small-scale informal warehouse owner and the municipal police are two important actors within the recycling sector with whom the waste picker is constantly in contact. This complex network of relations varies depending on time and space and is experienced differently by different groups of waste pickers. While the interaction between waste pickers and warehouse owners alternates between protection and (inter)dependency, the relationship of waste pickers to the municipal police tends to be more conflictual.

It is possible to distinguish two types of small-scale informal warehouses: those that waste pickers visit in order to sell collected materials and those where waste pickers live. While Roma waste pickers mostly sell materials to the first

type, the second is preferred by seasonal workers, such as some Kurdish waste pickers and migrants from central Anatolia, and by Syrian and Afghan migrants. The two different kinds of warehouses generate distinct work organizations and relations.

First and foremost, even if a warehouse provides a possibility for seasonal waste pickers to get used to the city and make a living, the living conditions are not favorable. The following conditions are observed in warehouses where waste pickers stay: Waste pickers do not pay any rent or any charges (sometimes, except for the internet bill). They sleep in the same space as others, where they store the waste or very close to it. Since they do not have a separate kitchen, they cook practical and easy food with a small propane tank. As they are in contact with waste all day, basic sanitation is quite important for personal hygiene. However, although they have a toilet in the warehouse, there is no shower. They take showers either in their friends' apartments or in a public bath (hammam). There is no washing machine, and since laundromats are not common, waste pickers throw their work clothes away when they find new ones in a waste container. Even if the warehouses are lacking the basic equipment for living in decent conditions, most waste pickers consider having shelter an opportunity.

Generally, waste pickers are paid daily. In the warehouses where the waste pickers stay, they may receive a weekly or monthly payment. In almost every warehouse, owners advance money to waste pickers in case of emergency and/or offer a small amount for daily needs. In the following days, the amount of advanced money is deducted from the waste picker's payment. In the warehouses where seasonal waste pickers work, the system is mostly based on debt. Especially during the summer, villagers and high school and university students come to Istanbul from eastern and central Anatolia to work in a warehouse either to save some money or to pay their debt to a warehouse owner who has advanced them money during the winter. This unregistered verbal agreement of debt requires mutual trust and an acquaintance. Usually, trust is ensured by hometown and kinship ties. Villagers and students come to work in a warehouse where they know the owner or other waste pickers who have already worked there.

While the system of debt makes waste pickers more dependent on the warehouse, advancing a small amount of money does not require a great commitment. This dependency may become problematic, especially when the waste picker wants to work with another warehouse. In principle, waste pickers are free to choose the warehouse for selling materials and to change it in case of a problem with the owner or if another warehouse offers a higher price. However, in practice, changing one's warehouse is more difficult for those who stay in

it. As much as possible, waste pickers avoid disagreements with a warehouse owner, whom they see as a paternalistic figure since he provides shelter and a job, and they do not consider it morally right to sell the materials to another warehouse. The waste pickers who do not stay in a warehouse, on the other hand, have the freedom to choose the warehouse that offers a higher price and the relative possibility of negotiating the price.

Even if there is a paternalistic link between them, the waste picker and the warehouse owner do not have a typical employer-employee relationship compared to other jobs. Waste pickers work independently from a boss during the day, and they are free to choose their working hours and workplaces. Furthermore, if they choose not to collect for a couple of days, nobody is going to force them. Even in the warehouses where waste pickers stay, the owner is a paternalistic provider more than a boss who gives them orders. However, quality control exists only at the moment of weighing wet paper/cardboard in the warehouse, but this check aims to verify the quality of the product, rather than controlling the waste pickers' competence and work discipline.

On the other hand, their freedom to choose hours and workplaces is relatively restricted not by a boss, but by the waste collection service and limited space. They must be synchronized with the municipal collection service to pick up the materials before their arrival. They must visit close neighborhoods that they can walk to with a hand truck and where there are not many other waste pickers, which means less competition. Even though urban space is not strictly divided and hierarchically shared according to ethnicity, the relationship between some communities may be conflictual. Waste pickers generally prefer to work in the closest affluent neighborhood to where they live and, except for some neighborhoods such as Ortaköy and the center of Beşiktaş which are controlled by waste pickers from Adana (a city located in southern Turkey), they may collect in other neighborhoods. However, in practice, there are reasons why they do not easily change their collection itinerary and go to other neighborhoods: first, they get used to collecting in a particular neighborhood and know at what time waste is thrown away. Second, there are unwritten rules based on respect for the other's livelihood which makes them reluctant to threaten others' subsistence. Tolerance for others comes from sharing the same difficult conditions. Third, this tolerance can easily be replaced by tension if one waste picker community begins to over-collect in a neighborhood in which another group typically collects. Afghan and Syrian waste pickers in particular experienced defensiveness regarding territory when they began waste picking.

These two groups are still accused by other communities of being "foreigners" taking away the livelihood of "citizens".

Rather than simple domination, the relationship between waste pickers and warehouse owners is a form of interdependency that sometimes works to the benefit of waste pickers and sometimes does not. On the one hand, waste pickers need a place to stay (mostly the seasonal workers) and to sell the materials because they cannot always sell them to large-scale warehouses. On the other hand, warehouse owners need suppliers of materials. In fact, waste pickers are the key actors in both the formal and informal recycling sectors. If they do not supply the materials, the others, particularly the small-scale informal warehouses, would lose money because they cannot buy materials from licensed collection companies like large-scale ones. Moreover, the more waste pickers work with a warehouse, the more profits increase. In order to employ as many waste pickers as possible and not to lose them, the owner has to conduct fair business. For instance, when the market prices of materials fall significantly, a warehouse owner tries not to change the price. Even if he loses money, he does not want to risk losing his workforce. Since the small-scale informal warehouse owners are generally former waste pickers who open a warehouse when they acquire sufficient economic and social capital over time, they are familiar with the difficulties of waste picking. Furthermore, they are aware of the fact that if they patronize waste pickers, they will not be welcomed.

Nevertheless, there is no guarantee that this interdependent relationship will not become abusive. There is no official regulation over this informal relationship, which is regulated by hometown and kinship affinities. The unwritten rules and verbal contracts, which can vary from one warehouse to another, make waste pickers more vulnerable, as two incidents show clearly: during the first weeks of the ban on waste picking, some warehouse owners took advantage of the prohibition by paying waste pickers half-price. Second, when Afghan and Syrian migrants began waste picking, some warehouses tried to exploit them by paying less, but it did not take long before the Afghans and Syrians refused this injustice.

The relationship of the municipal police with both waste pickers and small-scale warehouses is more problematic during certain periods and in certain locations. Particularly during the ban, municipal police confiscated the hand trucks and collected materials of waste pickers. At present, municipal police are more tolerant until inhabitants complain. When waste pickers grow in number in a neighborhood, inhabitants can call the municipal police to complain, even if inhabitants and waste pickers usually get along well. Since the topography of

Istanbul, with its many hills, does not always allow for the use of a hand truck, waste pickers may leave their truck at a corner and collect with a smaller plastic bag. Large sacks accumulated on corners can disturb inhabitants because of the smell, especially during the summer. Moreover, in affluent and central neighborhoods, municipal police are more attentive to the number of waste pickers.

Apart from the factors of time and space, the severity of the measures varies according to different communities of waste pickers, too. In summer 2019, the police came to a warehouse to take undocumented Afghan waste pickers into custody for deportation from Turkey. Although Roma waste pickers are not welcomed in some of the affluent neighborhoods by municipal police who accuse them of being beggars, in neighborhoods where Roma NGOs have relative power among the local authorities, municipal police return the confiscated hand trucks. However, confiscation may take an abusive form by asking for bribe money from the waste pickers. During an interview, a Kurdish waste picker declared that some years ago, after the municipal police had confiscated their hand trucks, they tried to sell them back to the waste pickers at half the price.

Small-scale warehouse owners have had some problems with municipal police, too. During the ban, some of them received hefty fines. Some warehouses suffer from regular fines because they lack properly clean conditions. Apparently, cleaning control is used for levying fines more than for improving the conditions in warehouses. Additionally, municipal police oblige some small-scale warehouse owners to sell their materials to recycling facilities that have an agreement with the municipality for below market price.

Conclusion

This paper has discussed how the waste recycling sector is structured both by waste management regulations and by the micro-interactions between different actors of the formal and informal waste recycling sectors. Regulations, which were implemented in order to establish sustainable waste management according to European Union norms, could not go beyond a formalization attempt that prioritizes privatization rather than incorporating waste pickers into the system. Since the formal licensed companies lack the infrastructure and the necessary workforce for collecting the same quantity of materials as waste pickers, the prohibition of informal waste picking was devastating: waste pickers were separated from their means of survival, and the formal recycling sector was cut off from the surplus created by the waste pickers' cheap labor.

After a while, the ban became tolerable because in a country where the formal and informal sectors are strictly dependent, eliminating the informal one was neither achievable nor profitable.

While the regulations shape the general context, micro-interactions between different actors structure the inner dynamics of waste recycling. The complexity of the sector stems from the existence of different ethnic groups of waste pickers and their relations with the other actors, such as warehouse owners and the municipal police. This complex network of relations between waste pickers and other actors may be conflictual during a specific period and in a specific location. However, these relations are experienced differently by different groups of waste pickers.

References

Akkan Başak Ekim, Deniz Mehmet Baki and Ertan Mehmet, Sosyal dışlanmanın Roman halleri, Istanbul, Punto Baskı Çözümleri, 2011.

Bertolini Gérard, Déchet mode d'emploi, Paris, Economica, 1996.

Birkbeck Chris, "Self-employed proletarians in an informal factory: the case of Cali's garbage dump", World Development, vol. 6, no 9/10, 1978, pp. 1173-1185.

Bugra Ayşe and Keyder Çağlar, New Poverty and the Changing Welfare Regime of Turkey, Ankara, UNDP, 2003.

Castells Manuel and Portes Alejandro, "World underneath: the origins, dynamics and effects of the informal economy", in Alejandro Portes, Manuel Castells and Lauren A. Benton, (Eds), The Informal Economy: Studies in Advanced and Less Developed Countries, Baltimore, The Johns Hopkins University Press, 1989, pp. 11-41.

Cirelli Claudia and Florin Bénédicte, "Introduction. Vivre des déchets" in Claudia Cirelli and Bénédicte Florin (Eds.), Sociétés urbaines et déchets. Éclairages internationaux, Tours, PUFR, 2015, pp.13-56.

De Soto Hernando, The Other Path, New York, Harper and Row, 1989.

Dinler Demet, "New forms of wage labor and struggle in the informal sector: the case of waste pickers in Turkey", Third World Quarterly, vol. 37, no 10, 2016, pp. 1834-1854.

Downs Mary and Medina Martin, "A Short History of Scavenging", Comparative Civilizations Review, vol. 42, no 42, 2000, pp. 23-45.

European Commission, Commission Staff Working Document, Turkey 2012 progress report, 2012.

Florin Bénédicte, "De l'indignité à l'indignation: petites luttes, résistances quotidiennes et tentatives de mobilisation des récupérateurs de déchets à Istanbul", Cultures & Conflits, n°101, 2016, pp. 99-119.

Fortuna Juan Carlos and Prates Suzana, "Informal sector versus informalized labor relations in Uruguay", in Alejandro Portes, Manuel Castells and Lauren A. Benton, (Eds.), The Informal Economy: Studies in Advanced and Less Developed Countries, Baltimore, The Johns Hopkins University Press, 1989, pp. 78-94.

Grace Richard, Turner Kerry R. and Walter Ingo, "Secondary materials and international trade", Journal of environmental economics and management, vol. 5, no 2, 1978, pp. 172-186.

Gutberlet Jutta and Uddin Sayed Mohammad Nazim, "Household waste and health risks affecting waste pickers and the environment in low-and middle-income countries", International journal of occupational and environmental health, vol. 23, no 4, 2017, pp. 299-310.

Harriss-White Barbara, "Formality and informality in an Indian urban waste economy", International Journal of Sociology and Social Policy, vol. 37, no 7/8, 2017, pp. 417-434.

Işık Oguz and Pınarcıoglu Melih, Nöbetlese yoksulluk: Sultanbeyli örnegi, Istanbul, Iletisim, 2001.

Keyder Çaglar, "Globalisation and social exclusion in Istanbul", International Journal of Urban and Regional Research, vol. 29, no 1, 2005, pp. 124-134.

Kocasoy Günay and Curi Kriton, "The Ümraniye-Hekimbasi open dump accident, Waste management & Research, 13, 1995, pp. 305-314.

Kus Basak, "The informal road to markets: Neoliberal reforms, private entrepreneurship and the informal economy in Turkey", International Journal of Social Economics, vol. 41, no 4, 2014, pp. 278-293.

Medina Martin, "Scavenger cooperatives in Asia and Latin America", Resources, conservation and recycling, vol. 31, no 1, 2000, pp. 51-69.

Özdemir Ali Murat and Yücesan-Özdemir Gamze, "Living in endemic insecurity: An analysis of Turkey's labor market in the 2000s", SEER: Journal for Labour and Social Affairs in Eastern Europe Review, vol. 7, no 2, 2004, pp. 33-41.

Özgen Neşe, "Kentte yeni yoksulluk ve çöp insanları", Toplum ve Bilim n° 89, 2001, p. 88-101.

Portes Alejandro and Sassen-Koob Saskia, "Making it underground: comparative materials on the informal sector in western market economies", American Journal of Sociology, vol. 93, n° 1, 1987, pp. 30-61.

Portes Alejandro and Schauffler Richard, "Competing perspectives on the Latin American informal sector", Population and development review, vol. 19, no° 1,1993, pp. 33-60.

Regulation of Packaging and Packaging Waste Control, Turkish Official Gazette, 30 July 2004, no 25538.

Regulation of Packaging and Packaging Waste Control, Turkish Official Gazette, 24 June 2007, no 26562.

Regulation of Packaging and Packaging Waste Control, Turkish Official Gazette, 24 August 2011, no 28035.

Saltan Ali and Yardımcı Sibel, "Geri dönüşümün görünmeyen yüzü: sokak toplayıcılarının iş ve yaşam koşulları üzerine bir değerlendirme", Toplum ve Bilim, n° 108, 2007, p .206-238.

Sassen Saskia, "The informal economy: between new developments and old regulations", Yale Law Journal, vol. 103, 1994, pp. 2289-2304.

Schenck J. Catherina, Blaauw Phillip F., Viljoen Jacoba MM and Swart Elizabeth C, "Exploring the potential health risks faced by waste pickers on landfills in South Africa: A socio-ecological perspective", International journal of environmental research and public health, vol. 16, no 11, 2019.

Turan Gamze, Çoruh Semra, Akdemir Andaç and Ergun Osman, "Municipal solid waste management strategies in Turkey", Waste Management, vol. 29, n°1, 2009, pp. 465-469.

Uzpeder Ebru, Danova-Roussinova Savelina, Özçelik Sevgi, Gökçen Sinan (dir), We Are Here! Discriminatory Exclusion and Struggle for Rights of Roma in Turkey, Istanbul, Mart Matbaacılık, 2008.

Van Beukering Pieter, Kuik Onno and Oosterhuis Frans, "The economics of recycling", in Ernst Worrell and Markus Reuter (Eds.), Handbook of recycling: state-of-the-art for practitioners, analysts, and scientists, Oxford, Elsevier, 2014, pp. 479-489.

Yaman Cevat, "Evaluation of the current condition of packaging wastes throughout Istanbul", Scientific Research and Essays, vol. 6, no 16, 2011, pp. 378-3388.

Yilmaz Bediz, Migration, Exclusion et Taudification dans le Centre-ville Istanbuliote: Etude de Cas de Tarlabaşı, PhD diss., Université Paris VIII- Saint Denis/Institut Français d'Urbanisme, Paris, 2006.

Contesting urban metabolism

Struggles over waste-to-energy in Delhi, India

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Introduction

Recent scholarship on the materiality of cities has been criticized by urban scholars for being overly descriptive and failing to account for political economy. This paper argues that in order to understand cities in the Global South whose

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metabolisms are fiercely contested, it is necessary to incorporate materialist and critical perspectives. For instance, waste pickers in the Global South are being sidelined by new waste management policies (privatization, incineration, and restrictions on urban space).[1] The Barcelona Research Group on Informal Recyclers, in collaboration with the Global Alliance of Waste Pickers, has mapped more than 50 of such conflicts to see who loses and who benefits from policy shifts.[2] This paper focuses on the conflict that has erupted in Delhi, India, as authorities have progressively privatized the city's solid waste management system in response to an increase in the volume and metabolic density of waste, as well as a change in its composition. Authorities have embraced waste-to-energy incinerators, and workers in the informal waste sector fear that these changes threaten their access to waste, while middle-class residents oppose waste-to-energy incinerators because of their deleterious impact on ambient air quality. The emergence of an unlikely alliance between these groups is narrated, whose politics opposes the production of a waste-based commodity frontier within the city, as well as the imposition of exposure to waste on an everyday basis. The conclusion is that the materiality and political economy of cities are co-constituted, and contestations over the configuration of urban metabolisms span these spheres as people struggle to realize their own situated urban political ecologies.

> Residents of south Delhi's Okhla area were delighted to see what they thought was the season's first snowfall. But they were enraged after realising that it was toxic ash from a large waste-to-energy plant. *(Rediff News* December 27, 2012)

The above quote is from an online news article about a waste-to-energy incinerator in Delhi, India. It highlights the importance of materiality—in this case, toxic ash—in the lives of the people residing in the neighborhood adjacent to the incinerator. Indeed, the euphoria elicited when residents thought they were witnessing the season's first snowfall quickly gave way to visceral rage as the neighborhood was engulfed in hazardous particulate matter. The story of Delhi's first waste-to-energy plant could be narrated as a case of neoliberalism par excellence—a series of non-transparent deals led to the transfer of land and the right to build the incinerator from a parastatal institution to a large

[1] For an overview of the threaths faced by waste pickers around the Global South, see: https://theconversation.com/how-waste-pickers-in-the-global-south-are-being-sidelined-by-new-policies-132521

[2] Find the map here, with a description of each conflict: https://ejatlas.org/featured/wastepickers

corporation owned by a sitting Member of Parliament. However, this narrative would omit the emotional and physical toll that the incinerator has taken on nearby residents, who launched a protracted campaign to have the plant closed. This movement is focused on materiality, as the constant exposure to particulate matter has become a defining feature of the everyday lives of nearby residents and has produced a collective anxiety. In addition to middle-class residents, waste-to-energy technology has faced opposition from workers in the informal waste management sector and NGOs that lobby on their behalf. Waste pickers collect, segregate, and sell waste to recyclers, and to them, the incinerator represents a bitter economic injustice because it threatens to dispossess them of a resource, i.e., waste (Wilson et al., 2006). An incipient alliance has emerged between middle-class residents and waste pickers in opposition to the incinerator, and it exists despite their being motivated by "conflicting rationalities" (Watson, 2003). For the former, this struggle is material in essence as they seek to reduce their exposure to waste on the grounds that it poses a health risk, while the latter are engaged in a political-economic contestation whose aim is to defend a source of livelihood.

This research speaks to ongoing scholarly debates surrounding the need to expand the scope of urban political ecology on the one hand (Heynen, 2014), while situating it within local contexts on the other (Lawhon et al., 2014). To this end, this paper draws on industrial ecology and ecological economics (see Newell and Cousins, 2014), in which materiality lacks agency but must be accounted for and can be quantified; in this particular case, the focus is on the composition, volume, and density of Delhi's waste. This approach demonstrates that neither political economy nor materiality can be considered context, as they are "always already" co-constituted. It is distinguishable from classical urban political ecology's (UPE) use of the metabolism metaphor as a heuristic device employed to better understand and critique capitalism, as well as from "second wave UPE", wherein post-humanist approaches focus on the distribution of agency across complex assemblages composed of human and non-human actants (see Heynen, 2014).

The politics surrounding metabolic flows give rise to antagonisms and alliances that are not necessarily re-enactments of 20th-century struggles; instead of epic contestations between capital and organized labor, or demands for recognition and rights that characterize so-called "new" social movements, metabolic conflicts erupt and alliances are formed and fragment as people struggle to define their "place" in, and relation to, dynamic situated urban political ecologies. Metabolic contestations in cities in the Global South—and waste conflicts in

particular—involve struggles over value and livelihood as well as health and wellbeing. While it is clear that political opportunities are fostered or foreclosed according to the resources that serve as metabolic inputs and the ways in which they are processed (e.g., coal vs. oil) (Mitchell, 2011), this paper shows that the same is true of outputs (e.g., interring waste in landfills vs. incineration).

This paper is divided into four sections. The next section introduces a conceptualization of urban metabolism, which is influenced by industrial ecology and ecological economics. In the third section, Delhi's Solid Waste Management (SWM) system is described, explaining how it has been transformed in recent years and showing how this has provoked opposition that coalesced into an unlikely alliance. The fourth section concludes by exploring the implications of such unlikely alliances for environmental politics in general.

Materiality and the making of urban metabolisms

The conceptualization of cities as metabolisms has a long history (Geddes, 1885; Mumford, 1938; Wolman, 1965; Martinez-Alier, 1987; Decker et al., 2000; Giampietro et al., 2012; see Newell and Cousins, 2014 for an overview), and over the course of the past decades, there has been a "virtual explosion" (Fischer-Kowalski, 1998: 62) of research on urban metabolisms. Ecological economists and industrial ecologists have been at the forefront of this revival, and to these scholars, urban metabolisms are "exchange processes whereby cities transform raw materials, energy, and water into the built environment, human biomass, and waste" (Castan Broto et al., 2012: 851). The aim of many of these researchers is to quantify material inputs and outputs and capture the biophysical processes that result as resources are assembled and transformed, and waste is produced (Kennedy et al., 2007; Daniels and Moore, 2001; Fischer-Kowalski et al., 2011). This approach has been influential in policy surrounding environmental sustainability, which is increasingly geared toward the quantification of material flows and biophysical processes (While et al., 2010). For example, the United Nations Environmental Program's recently published report entitled City-Level Decoupling: Urban Resource Flows and the Governance of Infrastructure Transitions (2013: 2) "makes the case for examining cities from a material flow perspective, presenting the city as a living organism with a dynamic and continuous flow of inputs and outputs as its 'metabolism', while also placing the city within the broader system of flows that make it possible for it to function".

Urban metabolisms can remain stable over long periods of time, but they are inherently subject to change according to resource availability, technological innovation, and political contingency. Joan Martinez-Alier (2002) has demonstrated that the chance of social and political conflict is heightened when metabolic flows are suddenly increased, interrupted, or redirected. While most scholarship focused on the quantification of material flows within a given metabolic system has largely failed to explicitly show how power relations condition the (re-)configuration of metabolisms (for exceptions see Martinez-Alier et al., 2010; Anguelovski and Martinez-Alier, 2014), urban political ecologists have put these contestations front and center. For these scholars, urban infrastructure is a manifestation of power relations within and between cities, as it facilitates the throughput of metabolic flows, their transformation, and unequal distribution (Kaika and Swyngedouw, 2000; Kaika, 2006; Keil and Graham, 1998; Swyngedouw and Heynen, 2003; Swyngedouw, 1996). Accordingly, UPE demonstrates that metabolic processes cannot be understood in isolation from governance regimes that determine the social relations of production, division of labor, and distribution of resources (Swyngedouw and Heynen, 2003; Heynen et al., 2006). In much of this scholarship, there is an a priori assumption that metabolic flows are determined by political-economic processes, so in contrast to quantitative analyses of urban metabolisms, UPE tends to employ the metabolism metaphor as a heuristic device through which capitalism can be understood and critiqued. For example, Matthew Gandy (2002: 8) criticizes earlier scholarship on metabolism whose "metabolic conceptions of urban form tend to neglect the flow of capital…[which] represents the most powerful circulatory dynamic in the production of modern cities".

Urban political ecology is witnessing a number of robust debates, and Heynen (2014) traces the emergence of "second wave UPE", which draws on post-humanism to critically analyze the role of things. Much of this scholarship employs the Deleuzo-Guattarian concept of "assemblage" to describe the rhizomatic coming together of humans and non-humans, and/or it examines the ways in which actants mediate durable actor-networks (see Farias and Bender, 2010; McFarlane, 2011a; 2011b; Harris, 2013; Bennett, 2010; Holifield, 2009; Lancione, 2013; Meehan, 2014; Shaw and Meehan, 2013; Ranganathan, 2015). Much of this scholarship is not geared toward understanding or critiquing capitalism, but rather it seeks to develop a deeper understanding of everyday life and cities (see Heynen, 2014; Derickson, 2014). In this vein, Lawhon et al. (2014) argue that UPE risks universalizing particular Northern ecologies because of its unwavering focus on the power of capital. They sug-

gest that scholarship on African urbanism can inform the development of a situated urban political ecology (SUPE), by beginning with local context, identities, and everyday practice, and then using non-Northern epistemologies to explain actually existing ecologies. Rather than generating a critique of capitalism whose remedy is systemic change, they argue that this situated UPE can lead to "radical incrementalism" (Pieterse, 2008). This approach has already proven fruitful by situating actually existing metabolic flows, the production of landscape, and urban space in the context of local contingencies, ecologies, and politics (Lawhon, 2013b; Ernstson, 2012; Silver, 2014). Importantly, for these authors, African urbanism is not meant to replace Marxian-inspired UPE as an alternative universal epistemological framework, but by situating UPE, they hope to expand the "range of urban experiences to inform theory on how urban environments are shaped, politicized and contested" (Lawhon et al., 2014: 489).

The authors are sympathetic to the argument that UPE should be broadened theoretically and situated empirically, and argue that this can be achieved by developing a deeper understanding of the contested nature of urban metabolisms. Colin McFarlane (2013: 500) argues that peering at a city through a "metabolic lens" offers the potential to multiply "the potential sites of intervention, from water pipes, drains and power stations to laws, policies and officials, widening the objects of analysis and the epistemology of social change". However, this potential remains largely unfulfilled in much UPE scholarship because of the way in which capital is portrayed as the primary determinant of urban metabolisms. By embracing an understanding of metabolism influenced by industrial ecology and ecological economics, which focuses on actual material flows, this paper seeks to develop a situated understanding of waste in Delhi, at the core of which is a complex relationship between its materiality (e.g., volume, composition, density, and its biophysical transformations) and political economy (e.g., ownership, access, and value struggles). In this urban metabolism, non-human entities lack agency but must be accounted for in a literal sense because a change in their character or quantity, or the way in which they are acted upon, can profoundly impact political-economic processes. This paper does not simply seek to "empower" materiality as a determinant of political economy; rather, it demonstrates that materiality and political economy are dialectically related and co-constitute urban metabolisms. While a change in one or the other may disrupt a stable metabolic configuration in particular instances, there is no moment when either serves as context or structure. Ultimately, the coevolution

of materiality and political economy transforms urban metabolisms, and as a result, political opportunities are fostered and foreclosed.

Delhi's urban metabolism

Waste management in metropolises of the Global South is a multi-billion dollar industry that is increasingly attracting the attention of large-scale institutional investors (Bank of America Merrill Lynch, 2013). This is due to the fact that the volume of generated waste, its metabolic density, and proportion of recyclable materials (and thus calorific value) has increased in many cities (Martinez-Alier et al., 2014). As a result, there are new opportunities for capital accumulation through incineration (World Bank, 1999). In most cases, municipal officials are left with little choice but to process and dispose of waste within cities, given the increasing metabolic density of waste, the difficulties in establishing new landfills within cities, and the high costs of transporting waste to landfills in outlying areas (D'Alisa et al., 2012).[3] Incineration appears to be an attractive option because it 'eliminates' waste while it also produces energy.

Indian cities exhibit these trends, and they are also being transformed through complex economic, political, social, and ecological processes that are contested in a range of spaces and ways by numerous actors (Shatkin, 2014). Powerful local actors typically embrace and work towards grandiose visions of urban transformation, the pursuit of which significantly impacts cities and their residents, as slums are demolished and cityscapes are remade (Benjamin, 2008; Dupont, 2010; Ghertner, 2011; Goldman, 2011; Schindler, 2014a). Nevertheless, visions of "world-class" cities remain perpetually postponed because they are contested by a bewildering array of actors who employ a range of techniques in a range of places, varying from courts and corporate boardrooms (see: Bhan, 2009; Searle, 2014) to the everyday politics that unfolds on the street (see Chatterjee, 2011; Doshi, 2013; Datta, 2013; Schindler, 2014b).

Recent scholarship demonstrates that urban ecologies in India are embedded in these broader processes of transformation and contestation, and serve as a field in which the middle class and the poor are engaged in political and material struggle. Negi (2010) has narrated an "environmental turn" in Indian politics in

[3] D'Alisa et al. (2012) define metabolic density of waste as the product of the pace of waste disposed per capita and area (kg/d)/km^2). This indicator is calculated with the Multi-Scale Integrated Analysis of Societal and Ecosystem Metabolism (MuSIASEM).

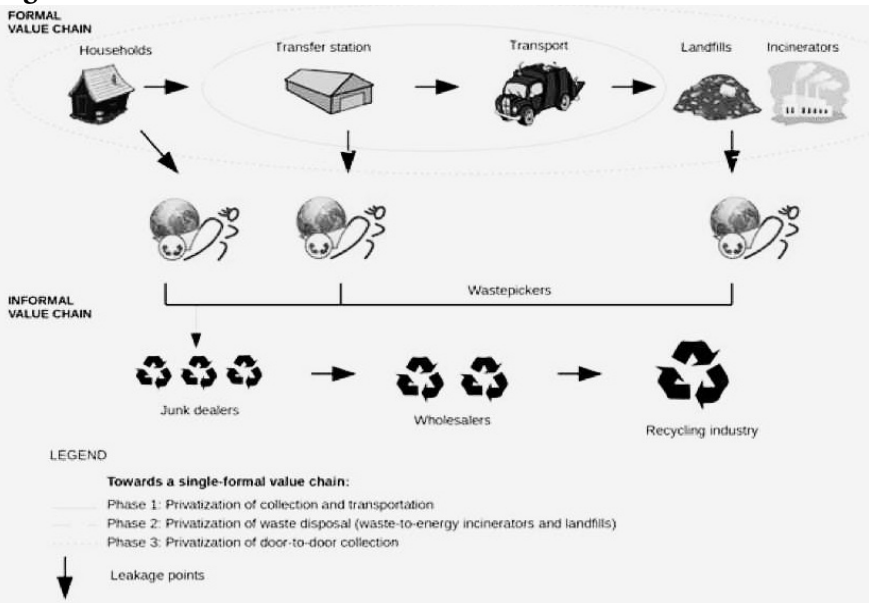
which courts have ruled in favor of public interest litigation (PIL) initiated by middle-class residents, which forces municipal authorities to demolish slums and close so-called "hazardous industries" in the name of environmentalism. While Mawdsley (2004: 81) cautions against essentializing a single environmentalism of the middle class, she notes that "the middle classes exert a disproportionate influence in shaping the terms of public debate on environmental issues". Meanwhile, the poor have resisted displacement and metabolic reconfiguration that threaten their livelihoods. A recent edited volume by Rademacher and Sivaramakrishnan (2013: 30) presents "the emergence of a set of conflicts that involve not merely the material conditions of urban life—security, green spaces, municipal services, unimpeded mobility through the city—but also the very people, mostly slum dwellers, who might undermine these conditions".

The political positions taken by these groups are not immutable, and the transformation of urban India's dynamic metabolism can foster unlikely alliances between them. This paper draws on a combined 16 months of experience collaborating with organizations working in Delhi's waste management sector—one an NGO and the other a waste workers' trade union—in 2011-2012. During this time, interactions occurred with key stakeholders involved in everyday struggles over waste management, and these experiences were augmented with semi-structured interviews during follow-up visits in 2013 and 2014.

Solid waste management in Delhi

The metabolization of waste in Delhi—i.e., the production, throughput, and processing of waste—is best understood as a single production network comprised of two interlinked value chains, one formal and the other informal. The generators of waste—e.g., households and firms—are legally obliged to deposit their waste at a transfer station, where it becomes the property of the municipal government. These transfer stations are typically approximately 15 square meters in size and are located throughout the city in both residential and commercial areas. From the transfer station onward, the collection, removal, and disposal of waste is the responsibility of municipal authorities.

Figure 1. Waste metabolisms in Delhi



Source: Federico Demaria and Seth Schindler, 2019.

The formal waste management system has historically been overburdened and is complemented by a large informal value chain that channels waste into the formal and informal recycling sectors. The relationship between the formal and informal value chains is mediated by approximately 150,000-200,000 waste pickers (Chaturvedi and Gidwani, 2011: 131) who collect recyclable waste at various leakage points along the formal value chain. They segregate it and then sell it to small-scale junk dealers, who, in turn, sell it to wholesalers (see Gill, 2010; Agarwal et al., 2005; Hayami et al., 2006; Gidwani and Reddy, 2011). These wholesalers ultimately sell recyclable waste in bulk to formal and informal recycling firms. The success of this system has been mixed; as of 2005, approximately 15% of Delhi's waste was recycled (Agarwal et al., 2005) while approximately 20-30% remained uncollected and was illegally dumped or burned in the open (Talyan, 2008). What is indisputable, however, is that the informal waste sector provided last-resort livelihoods to thousands of people (Gill, 2010). Most waste pickers collect approximately 50 kg of recyclable material per day, mostly plastic and paper (60% and 30% of their income, respectively), but also metals, hair, and organic materials, and they earn roughly 8,000 Rupees per month (about $120) (AIKMM, 2015).

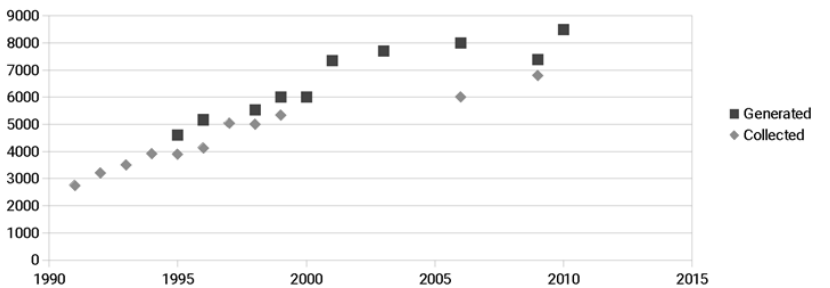
Solid waste management in Delhi is undergoing a prolonged and thorough reconfiguration as successive phases of privatization of the formal waste management system have strengthened connections within the formal value chain at the expense of linkages with the informal value chain. These institutional reforms have been accompanied by the introduction of new techniques of waste processing that rework the material flows of waste and determine who is exposed to environmental hazards. These political-economic and technological changes are driven by the dramatic material increase in the volume and density of waste, and a change in its composition. The roots of these material changes date back to the mid-1980s when only 8.3% of Delhi's waste was recyclable. By 2002, the proportion of recyclable waste had increased to 17.2% (See Table 1), and this compositional shift is even more striking when one considers that there was an unprecedented trebling of the amount of waste generated from 1990-2010 (See Graph 1).

Table 1. Physical composition (as wt. %) of municipal solid waste in Delhi

Year	Organic	Recyclable	Inert	Total
1982	57,7	8,3	34	100
1995	38,3	12,9	48,8	100
2002	36,6	17,2	46,2	100

Source: Talyan 2008.

Graph 1. Generation and collection of municipal solid waste in Delhi (1991-2011)



Source: Central Pollution Control Board CPCB Delhi 2006; Municipal Corporation of Delhi MCD 2012.

Delhi's landfills struggled to absorb the material increase in waste, and municipal authorities were urgently tasked with locating new sites for sanitary landfills in order to avoid a public health crisis. Middle-class residents filed numerous lawsuits that demanded authorities develop more effective SWM systems, the result of which was the creation of a number of expert committees at multiple levels of government (Gidwani, 2013). Numerous policy options could have responded to the increased volume of waste in Delhi. One option would have been to promote the segregation of waste at the point of generation, improve collection rates, and invest in sanitary landfills. This could have been complemented by institutionalizing the linkages between the formal and informal value chains with the objective of fostering recycling (see Schindler et al., 2012; WIEGO, 2013). Instead, authorities embraced techno-managerial solutions that entailed transforming the production network of waste management into a single formal value chain under the control of private-sector enterprises.

The privatization of waste management in Delhi has unfolded in three phases (Fig. 1), the first of which began in 2005 when municipal authorities started to contract private firms for the collection and transport of waste from transfer stations to landfills (Chaturvedi and Gidwani, 2011). Authorities opted for a second phase of privatization in which waste-to-energy plants—i.e., the incineration of waste rather than its burial—became the cornerstone of Delhi's waste management system. Currently, two waste-to-energy plants are operational in Okhla and Ghazipur (south and east Delhi, respectively), and a third is under construction in the north of the city in Narela Bawana.

The third phase of privatization has just begun and is geared toward developing a single value chain under the control of private-sector enterprises; this policy is driven by material necessity because waste-to-energy plants can only produce energy from high-calorific waste. In Delhi, the calorific value of formally collected waste at disposal sites (i.e., after recyclable waste is removed by waste pickers) is approximately 1000 Kcal/Kg (NEERI, 2005), while combustion incinerators require waste with a minimum calorific value of 1500 Kcal/Kg. Thus, Delhi's incinerators require the elimination of leakage points through which high-calorific recyclable waste is transferred to the informal value chain by waste pickers. In order to obtain waste with a high enough calorific value, privatization vertically integrates SWM—from collection to disposal—under the direction of a small number of large-scale enterprises. One example is a 2009 contract between the Municipal Corporation of Delhi and a subsidiary of Ramky (Delhi MSW Solutions Limited), one of India's largest waste management firms, which grants the firm exclusive rights to collect and

process waste in four zones in Delhi (Civil Lines, Rohini, Vasant Kunj, and Dwarka Pappankalan).

The progressive privatization of SWM in Delhi was a response to—and made possible by—the increase in volume and metabolic density of waste, as well as a change in its composition. Privatization is not only an institutional change but also a comprehensive reconfiguration of the city's metabolism, as the throughput of waste is redirected and new methods to process waste are introduced. This has been contested by Delhi's middle class and waste pickers, albeit for very different reasons.

Conflict I – wastepickers

Waste pickers began to organize politically in the 1990s. They originally sought recognition from the state, and their demands centered on access to services such as healthcare and schools. Beginning in the mid-2000s, struggles increasingly revolved around access to waste because the reconfiguration of Delhi's waste metabolism progressively eliminated leakage points from the formal value chain. The first struggles over access to waste erupted at transfer stations because after their privatization, firms often forcibly removed waste pickers or forced them to pay a fee to continue their operations (see Chaturvedi and Gidwani, 2011). One waste picker explained (personal communication, 2014):

> At first when the company came, they said that we should carry on working. But then, one by one, they started to go to the garbage bins [to collect waste]. They stated they had written permission from the municipal authority and they took control of them. Those who did not vacate them were beaten up and thrown out; the others were told that they could stay if they paid a certain sum of money.

The urgency of struggles over access to waste intensified with the announcement that waste-to-energy would become the cornerstone of SWM in Delhi. The following two comments are representative of how wastepickers typically understood the conflict as a struggle for their livelihood (personal communication 2014):

> Since we don't have any other work we are forced to do this filthy work. We are forced to pick up this waste. Still the government is trying to force us out. They want to produce electricity by burning our livelihood.
>
> The work of the waste-to-energy plant is to burn things. They know that [inert and organic] waste never burns. They are trying to burn things [recyclable mate-

> rial] from which we earn our living. Therefore, we are opposing the waste plants.

Finally, in some areas of Delhi where the door-to-door collection of waste has been privatized, waste pickers have lost access to the last remaining leakage point. A female waste picker whose livelihood came from door-to-door collection explained (personal communication, 2014):

> Since 2012 the company has started to send a four-wheeled small truck to collect waste at the doorstep. Since then my revenue has already gone down by about 30 or 40 per cent and it's decreasing everyday. Then, sometimes the company employee offers us the waste they collected for a payment of 100 Rupees or more per truck, but I can't afford it. Where should I go to get support?

A number of trade unions have been formed to demand access to waste, such as All India Kabadi Mazdoor Mahasangh (AIKMM), Safai Sena, Delhi Kabadi Mazdoor Sangh, and Green Flag. They have primarily (1) lobbied municipal authorities to grant waste pickers access to waste in publicly owned facilities and (2) organized networks of waste pickers in order to secure flows of waste. For example, Safai Sena (meaning 'Army of Cleaners') is "a registered group of waste pickers, doorstep waste collectors, itinerant and other small buyers, small junk dealers, and other types of recyclers" that was formed in 2009 (see http://www.safaisena.net/index.htm). It successfully outbid competitors for the exclusive rights to collect and remove waste from Delhi's three train stations in 2011. This waste then enters Safai Sena's network and is channeled into the recycling industry. Similarly, AIKMM, formed in 2005, claims to have approximately 17,000 members in the Delhi metropolitan area (see: http://aikmm.org/). Its director Shashi Bhushan explained (personal communication, 2013):

> We work with a trade union perspective. We organize waste pickers to get them their livelihood and fundamental rights as citizens. If one of us faces a problem [e.g., is harassed by the police], we call fifty or more members and rush to his support. In this way we have managed to stop the demand for bribes by private companies at the transfer stations in the center of Delhi. Nobody wants to hear our voice... no policymakers reply to our letters of complaint. So we organize demonstrations with hundreds of our members in front of the public authorities' offices and sit there until they receive us. It is the only chance for us to meet and talk to them about our demands, starting from the right to waste.

Both of these unions organize rallies and demonstrations, and their demands have targeted local officials and private firms. For example, AIKMM organized

a demonstration outside of the Delhi headquarters of the United Nations in 2011 to protest the inclusion of the Okhla and Ghazipur waste-to-energy plants in the Clean Development Mechanism's carbon credits scheme. The effectiveness of grassroots unions is limited, however, because they have scarce resources, and many waste pickers earn a subsistence livelihood and cannot afford to spend much time attending political rallies. Furthermore, there is no legal basis for them to make a lawful claim regarding access to waste since its management is the responsibility of municipal authorities.

Trade unions are complemented by a host of social and environmental justice organizations that advocate on behalf of waste pickers, such as Toxic Watch Alliance, Hazards Center, Toxics Link, Chintan, Nidan, and the Global Alliance for Incinerator Alternatives (GAIA). Many of these organizations collaborated with grassroots unions to host the Global Strategic Workshop for Waste Pickers in 2012 in Pune, in which waste pickers and activists from around the world gathered and identified privatization and waste-to-energy as the two main threats to waste pickers globally. While all of these unions and organizations consistently demand that waste pickers should have access to waste, tensions emerge regarding how they relate to private-sector firms. For example, Safai Sena's website explains that a private firm was granted exclusive rights to collect waste in a Delhi suburb, and "Safai Sena worked with them to ensure that the existing wastepickers were able to upgrade their work through becoming the doorstep collectors under the new system".[4] In other words, this union demanded that the firm hire its members as wage laborers. Alternatively, AIKMM has steadfastly opposed bargaining with private-sector firms for fear that this could legitimize privatization. Its website demands that privatization be halted altogether, and most recently its demands have focused on door-to-door collection: "Informal sector waste collectors should be given exclusive rights for door-to-door collection at the housing cluster and neighborhood levels. The private sector companies should be kept out of door-to-door waste collection".[5]

All of the NGOs that advocate on behalf of waste pickers link their demands to both environmental sustainability and social justice, but tensions have emerged over which issue to prioritize. Some of the organizations frame their opposition to waste-to-energy plants as an environmental struggle, while for others it is first and foremost an issue of social justice, and their demands are focused on livelihood issues. For example, an organization called Chintan

[4] For more information, please visit http://www.safaisena.net/our-activities.htm

[5] For more information, please visit http://aikmm.org/demands-2/.

released a report that framed waste-to-energy as a livelihood issue that should "not be accepted blindly without regard to the socio-economic context" [emphasis added] (Chaturvedi et al., 2012: 17). Alternatively, an NGO called Toxic Watch Alliance (http://www.toxicswatch.org/) has focused on waste-to-energy's environmental impacts, and its director Gopal Krishna (2013) explained that "this plant will emit large quantities of hazardous emissions (such as dioxins) due to burning of MSW [Municipal Solid Waste], and will profoundly affect the health of the people living in the surrounding areas and the environment for all time".

In summary, issues surrounding access to waste have become increasingly politicized, and a number of trade unions and NGOs have emerged to contest the reconfiguration of Delhi's waste metabolism. Since waste pickers operate informally, they cannot make lawful claims to waste, and this may explain why some organizations committed to social justice frame their opposition to waste-to-energy plants in environmental terms.

Conflict II – middle class residents

Informal dumping grounds proliferated in large Indian cities in the 1980s as government subsidies for commercial fertilizers reduced demand among farmers for organic waste, which they had previously used as fertilizer (Almitra Patel, personal communication, 2014). Economic growth in the 1980s and 1990s resulted in the widespread use of cheap plastic, and a concomitant boom in construction increased the volume of inert waste. This prompted the emergence of a middle-class mobilization demanding more effective SWM with the slogan "clean up and flourish or pile up and perish" (ibid.).[6] Legal proceedings were initiated against municipalities for their failure to handle solid waste and to enforce anti-dumping laws. The petitioners ultimately prevailed, and the Supreme Court appointed a committee that drafted India's first Municipal Solid Waste (MSW) Rules in September 2000 (PIL No.W.P. (C) 888 of 1996 Almitra H. Patel vs. Union of India and Others). The lead petitioner in the case, Almitra Patel, explained that "this regulation advocates that 'wet' food wastes and 'dry' recyclable wastes should not be mixed at the source (household or commercial level), so that the organic waste can be composted, while the dry waste can be

[6] The term 'middle class' is used broadly here to refer to Delhi residents who are formally employed in white-collar work. This includes people employed in hi-tech sectors but also accountants, journalists, teachers, and small business owners.

left to the informal sector's ragpickers and kabadiwalas for recycling" (personal communication, 2014). The avenues available to India's middle class to make lawful claims against poorly performing municipal governments have proliferated, as the MSW Rules have given municipal governments more responsibility. Almitra Patel claims that the MSW Rules are "a powerful weapon that any Indian citizen can use to demand improved performance and accountability" (http://www.almitrapatel.com/).

Most middle-class residents in Delhi either supported or failed to notice the initial wave of privatization of the city's SWM system. Complaints among middle-class residents only surfaced in instances where private firms failed to improve waste collection, but there was no opposition to privatization per se. Thus, for most middle-class Delhi residents, waste becomes a political issue when the failure of municipal authorities to meet legal obligations regarding its handling and management threatens to contaminate their surroundings. This explains why the reconfiguration of Delhi's waste metabolism engendered resistance among middle-class residents of neighborhoods located near the proposed waste-to-energy plants, who were fearful that the plants would contribute to the rapid deterioration of air quality.

The first waste-to-energy plant in Delhi was built in a populated area called Okhla, and it is India's largest. The second plant is somewhat smaller and is located in an area called Ghazipur, which is somewhat peripheral but nevertheless densely populated. The proponents of the Okhla waste-to-energy plant conducted an environmental impact assessment in 2006, and unsurprisingly, they concluded that the plant would not have serious adverse environmental impacts. The assessment explained that although there would be continuous emissions of particulate matter and ash, the plant will only have a "minor negative impact" on ambient air quality (pg. 87).

Local residents claim that they were not informed about the project in its early stages, and they formed the Okhla Anti-Incinerator Committee in 2009 to oppose the waste-to-energy plant. They sought to mobilize support through social media, and they organized public actions such as street plays.[7] Consistent with earlier middle-class mobilizations regarding environmental issues, the opposition demanded accountability from public officials and insisted that the plant posed an environmental hazard. One of the leaders of the movement explained as follows:

[7] For more information, please visit the following Facebook page: https://www.facebook.com/pages/Okhla-Anti-Incinerator-Committee/203624043005125d

> "The municipal authorities are not interested in solving the waste crisis at all, all that rhetoric on technology and development is nonsense. They have a hidden agenda, the waste crisis is just used as an excuse. These are acres of prime real estate land. They [Jindal Ecopolis] got it for a few Rupees and will sell it for several crores of Rupees in the future (personal communication, 2014)".

These allegations of corruption are consistent with an ongoing anti-corruption movement in Delhi, yet even if proven true, this is unlikely to halt the operations of the waste-to-energy plant. Furthermore, demands to have the plant relocated were futile because city officials could simply assert their authority to determine land-use on publicly held land. Thus, rather than lobby to have the plant relocated, the Okhla Anti-Incinerator Committee was forced to contest the waste-to-energy plant on the grounds that it was inherently unsafe. During interviews, repeated attempts to focus the discussion on the political economy of opaque land deals were rebuffed. Indeed, the political economy of corruption was treated as a matter of course, but what motivated residents to take to the streets and demonstrate was the feeling that particulate matter produced by the plant is all-pervasive and inescapable. Thus, these residents are first and foremost focused on materiality; particulate matter has invaded their bedrooms and implanted itself in their clothes, blankets, and even bodies. As one of their leaders explained: "This is a question of the health of our children and elders and we cannot compromise. Most of us have been living in this area for decades and cannot relocate" (personal communication, 2013).

Residents met with the acting Minister of Environment and Forests, Jairam Ramesh, and he promised to launch an inquiry into the approval of the plant given its proximity to residential areas. The stakes were raised in the meantime when the plant began operating and promptly covered the surrounding neighborhoods in a blanket of ash. The Deccan Herald (Sethi, 2012) reported that the area "is slowly turning into a toxic gas chamber". Residents had already launched a number of legal challenges to the plant, and a member of the Okhla Anti-Incinerator Committee explained that "we are now planning to file a case for human rights violation at the National Human Rights Commission. We feel our fundamental rights have been violated, in particular the right to life and the right to a clean environment". The PIL that the residents filed in 2009 made its way to the Delhi High Court in 2013. The presiding justices opted to refer it to India's recently created National Green Tribunal, which was created in 2010 "for effective and expeditious disposal of cases relating to environmental protection" (http://www.greentribunal.gov.in/index.php). The case is currently pending.

Unlikely alliances and the institutionalization of waste politics

An incipient—and at times uneasy—alliance has been forged between waste pickers and middle-class residents in their opposition to Delhi's waste-to-energy plants. The Okhla Anti-Incineration Committee has highlighted the threat to waste pickers' livelihoods posed by the Okhla waste-to-energy plant through social media, and a more collaborative relationship has developed in the contestation over the Ghazipur waste-to-energy plant. In March 2012, a demonstration was spearheaded by resident welfare associations from neighborhoods located near the Ghazipur plant in collaboration with AIKMM. In a letter to inform Delhi police of their intention to stage a demonstration, AIKMM General Secretary Shashi Bhushan explained that "local residents are concerned about the potential injurious consequences to the health of their families due to the plant's toxic emissions (i.e., carcinogenic dioxins and furans). Instead, wastepickers are concerned about the loss of their livelihood, as they fear that recyclable materials will be burnt in the incinerator".

The resident welfare association and AIKMM subsequently formed the Ghazipur Anti-Incinerator Committee, and issued a press release (2012) with four demands:

1. 1. Stop all on-going work on the Ghazipur incinerator immediately;
2. 2. Dismiss all waste-to-energy incinerator project proposals;
3. 3. Adopt participatory and decentralized waste management policies that do not disproportionally force any single community to live with the city's waste;
4. 4. Recognize and support the informal waste recycling sector by adopting policies that include the waste pickers.

The Okhla Anti-Incinerator Committee took notice and happily announced that "Ghazipur has picked up the baton!". There was evidence that the thinking of Okhla residents had evolved from being narrowly focused on closing the Okhla plant to more broadly focused environmental justice issues. One very active member of the Okhla Anti-Incinerator Committee explained this shift (personal communication, 2013):

> "Earlier some people used to say 'shift it, shift it' [to another location] but I said no. From both the cases [Okhla and Ghazipur waste-to-energy plants] these tech-

> nologies are not good. Either some good technologies are needed or we should use some other way [to safely process waste]…They should find some other ways to dispose of garbage".

Another active member of the Okhla Anti-Incineration Committee is a professional journalist who has publicly defended the interests of waste pickers :

> "For rag pickers, rubbish is a resource and a survival strategy. Even under unhealthy conditions, their work earns them enough to support their families. And in the absence of a municipal recycling system and segregation of waste at source, such as people's homes, they play a key part in the city's waste management". (Makri & Devraj, 2015)

While Okhla residents demonstrate a willingness to explore alternative metabolic configurations which can serve as the basis for augmenting waste pickers' access to waste, in general the two groups have remained at arm's length. In contrast, waste pickers and Ghazipur residents have cooperated closely by holding joint demonstrations and issuing joint statements. The primary explanation for these differences is the socio-economic status of residents in Okhla and Ghazipur, respectively. Many of the former are affluent professionals capable of engaging in formal politics and litigation. Prior to the completion of the incinerator, they were able to secure a much-publicized visit from the erstwhile Minister of Environment Jairam Ramesh, in which he promised to review the procedure whereby environmental clearance was issued to the plant (The Hindu, 2011). They were also able to gain an audience with Delhi's erstwhile Chief Minister Sheila Dikshit, and in addition to engaging public officials and leveraging media coverage, Okhla residents can afford to wage a lengthy legal battle.

Ghazipur residents tend to be from a lower socio-economic status (e.g., low-level officials, small entrepreneurs, and low-level office workers) whose demands do not command the attention of public officials or the media. Thus, they are forced to take to the streets and agitate, and AIKMM has proven a valuable ally because of its ability to mobilize waste pickers. The relationship between AIKMM and Ghazipur residents has been symbiotic. The Ghazipur residents required assistance from AIKMM to register their joint demonstration with police because they lacked knowledge regarding street politics. Negotiations with police surrounding the registration of the demonstrations was handled by AIKMM, and initially, it appeared as if permission would not be granted. In response, AIKMM members considered escalating the situation by blocking roads, but Ghazipur residents refused to participate in direct action that was

not sanctioned by authorities. Permission to hold a demonstration was finally obtained, and the presence of Ghazipur residents lent it legitimacy in the eyes of authorities, whose patience with waste pickers is thin because they are unable to make lawful claims to waste. Thus, there are clear reasons why waste pickers and residents aligned; the question that remains surrounds the durability of this alliance and whether it represents a newfound willingness among both groups to combine demands regarding the environment and livelihoods. They envision different situated ecologies, so the limits to their cooperation will likely become apparent after the issue of waste-to-energy plants is settled by India's judiciary. For waste pickers, the struggle against the reconfiguration of Delhi's SWM system is over their means of subsistence. Just as many farmers and small-scale producers of non-agricultural products in rural areas depend on ecosystems for their livelihoods (what Gadgil and Guha, 1995, call "ecosystem people"), waste pickers' livelihoods are dependent on a metabolic configuration characterized by a high volume of accessible recyclable material. This urban metabolism emerged after India's economic reforms in the early 1990s, which, combined with a certain degree of political decentralization, empowered urban middle classes who increasingly demand government officials enforce environmental laws and reduce pollution (i.e., so-called '*bourgeois* environmentalism', Baviskar, 2003). While their immediate motivation is to reduce their exposure to environmental hazards, they also embrace the creation of urban nature, access to which is restricted and serves as a status symbol and evidence of membership in the middle class. Thus, while waste pickers' main objective is to configure Delhi's metabolism in such a way that they maintain access to waste, middle-class residents envision a metabolism that produces a situated political ecology that insulates them from waste and enables a desired lifestyle.

These diverse objectives have recently been incorporated into Delhi's formal politics. There was a longstanding consensus among India's rival nationwide parties, the Indian National Congress and the Bharatiya Janata Party, surrounding the privatization of waste management and incineration. After a prolonged movement, the Aam Aadmi Party (AAP), an upstart party headed by a social reformer, came to power in citywide elections in 2013.[8] Okhla residents were assured by Delhi's erstwhile Environment Minister Saurabh Bhardwaj that the AAP government would address their demands, and recently The Times of India reported that Chief Minister Arvind Kejriwal committed to closing the plant

[8] Delhi's AAP Chief Minister resigned in order to contest national elections, and the party formed a majority government after a landslide victory in citywide elections in 2015.

(Nandi, 2015). The Deputy Chief Minister subsequently inspected both Okhla and Ghazipur facilities, indicating that the joint efforts of waste pickers and residents in Ghazipur ultimately garnered an official response (TNN, 2015).

The AAP released a Manifesto on Sanitation and Waste Management, wherein the "*Mohalla Sabha*[9] [neighborhood assemblies] would be given complete authority and funds for local waste management". If implemented, this would provide a formal platform for waste pickers and residents to devise localized solutions to waste management. While it is unclear if AAP has the authority to close the Ghazipur and Okhla plants, *mohalla sabhas* could conceivably ensure that waste pickers retain access to high-calorific recyclable material, thereby channeling waste away from waste-to-energy plants. The politics of waste took a further turn in June 2015, when municipal waste workers went on strike for 12 days.[10] As waste piled up in Delhi's streets, political parties sought to lay the blame with their rivals. Thus, the politics of waste have taken center stage in Delhi, and although change will likely be incremental, it is significant that the party in power advocates institutionalizing a decentralized waste management system that includes waste pickers and residents.

Conclusion

This article has examined the contestation of Delhi's urban metabolism. Like many Indian cities, Delhi faced a looming public health crisis in the 1990s due to the rapid increase of waste that had been expanding for decades. This metabolic configuration required a response from authorities, enabled waste pickers to earn livelihoods, and inhibited middle-class residents from practicing the lifestyles to which they aspire. Conflicts erupted, however, when municipal authorities opted to embrace waste-to-energy technology. Waste pickers contest the reworking of Delhi's metabolism because it threatens access to the waste upon which their livelihoods depend, and middle-class residents oppose waste-to-energy because of its perceived deleterious impact on air quality and the concomitant health risks. While environmental politics in urban India has

[9] Each ward is divided into 10 *mohallas*, and all residents of a *mohalla* are members of the *mohalla sabha*. Each *mohalla sabha* meets bi-monthly. The councilor and all local municipal officials are present, and people decide how the municipal funds should be used in that mohalla. Source: http://www.lokrajandolan.org/images/mohalla_sabhas_a_how_to_guide.pdf

[10] http://www.ndtv.com/cheat-sheet/money-for-mongolia-not-for-mongolpuri-aaps-dig-at-pm-narendra-over-delhi-garbage-crisis-771037

hitherto been understood as the preserve of a bourgeoisie intent on imposing revanchist order and disciplining the poor, this case demonstrates that environmental politics can foster unlikely alliances among these groups.

In order to capture the complexity of the politics surrounding waste in Delhi, it is necessary to balance critical urban theory with attention to materiality. These approaches can be complementary, so instead of an a priori allegiance to one of these theoretical traditions, they should be combined according to local circumstances. Arguably, the concept of an urban metabolism—as conceived by ecological economists and industrial ecologists—allows for the incorporation of an awareness of materiality with critical approaches concerned with power relations and political economy. Urban metabolisms are inherently produced through material and political-economic processes—there is no 'original' or 'real' moment in which either materiality or political economy serves as context or structure. While one or the other may drive change in a particular time or place, they are both "always already" co-constituted. A sudden change in one or the other can generate feedback that affects the overall metabolism. In the case presented here, material flows of waste are subject to conflicting logics and rationalities (see Watson, 2003), yet what ultimately develops is a metabolic configuration that consolidates the throughput of waste in a single formal value chain that ends at a waste-to-energy plant and negatively impacts air quality. This has produced a situated political ecology in which the actual places where waste is collected and processed (e.g., doorsteps, transfer stations, and landfills) have become a "commodity frontier". Commodity frontiers have historically been located in hinterlands where the resources upon which cities depend are extracted (Moore, 2000; Martinez-Alier et al., 2010), and the emergence of a commodity frontier within Delhi indicates that the conflicts surrounding waste can be expected to increasingly resemble resource conflicts. In the sense that waste represents investment opportunities, its "extraction" produces environmental hazards that jeopardize the health of local residents and inhibit the production of desirable situated political ecologies. In this context, groups whose rationalities may indeed be in conflict can occasionally find common cause in their efforts to affect the situated ecology on this commodity frontier. The city is only livable for those who can integrate themselves within these systems in ways that allow them to earn livelihoods and also socially reproduce. As has been demonstrated, there are innumerable ways in which people can connect with an urban metabolism, for a range of goals and on highly uneven terms. Given the number of actors seeking access and influence, many of whom pursue divergent goals, urban metabolisms are shaping up to be the primary

focal point of sociality and contestation in metropolises of the Global South. The open question remains: Who—if anyone—will promote more sustainable situated political ecologies and why? The answer to this question remains elusive, but the understanding of how social, political, and economic struggles produce actually existing urban space will be limited if the relationship between political economy and materiality is not accounted for.

References

Agarwal A, Singhmar A, Kulshrestha M and Mittal AK (2005) Municipal solid waste recycling and associated markets in Delhi, India. Resources, Conservation and Recycling 44(1):73-90.

Anguelovski I and Martinez-Alier J (2014) The 'Environmentalism of the Poor' revisited: Territory and place in disconnected glocal struggles. Ecological Economics 102:167-176.

Bank of America Merill Lynch (2013) No Time to Waste: Global Waste Primer.

http://www.longfinance.net/images/reports/pdf/baml_waste_2013.pdf (Last accessed 13 June 2014).

Baviskar A (2003) Between violence and desire: space, power, and identity in the making of metropolitan Delhi. International Social Science Journal 55(175):89-98.

Benjamin S (2008) Occupancy urbanism: Radicalizing politics and economy beyond policy and programs. International Journal of Urban and Regional Research 32(3): 719-729.

Bennett J (2010) Vibrant Matter: A Political Ecology of Things. Durham, NC: Duke University Press.

Bhan G (2009) "This is no longer the city I once knew": Evictions, the urban poor and the right to the city in millennial Delhi. Environment and Urbanization 21(1): 127-142.

Castan Broto V, Allen A, Rapoport E (2012) Interdisciplinary Perspectives on Urban Metabolism. Journal of Industrial Ecology 16(6):851-861.

Chatterjee P (2011) Lineages of Political Society: Studies in Postcolonial Democracy. Ranikhet: Permanent Black.

Chaturvedi B and V Gidwani (2011) The Right to Waste: Informal Sector Recyclers and Struggles for Social Justice in Post-Reform Urban India. In W Ahmed, A Kundu and R Peet (eds) India's New Economic Policy: A Critical Analysis (125-153). London: Routledge.

Chaturvedi B, Khan I and Sen P (2012) Give back our waste: What the Okhla waste-to-Energy plant has done to local wastepickers. Delhi: Chintan http://www.chintan-india.org/documents/research_and_reports/chintan-report-give-back-our-waste.pdf (last accessed 5 May 2014)

CPCB, Central Pollution Control Board (2006) Assessment of status of municipal solid waste management in metro cities and state capitals. Delhi: CPCB Series, CUPS/65

D'Alisa G, Di Nola M F, Giampietro M (2012) A multi-scale analysis of urban waste metabolism: density of waste disposed in Campania. Journal of Cleaner Production 35:59-70.

Daniels PL and Moore S (2002) Approaches for Quantifying the Metabolism of Physical Economies: Part I: Methodological Overview. Journal of Industrial Ecology 5(4):69-93.

Datta A (2013) Illegal City: Space, Law and Gender in a Delhi Squatter Settlement. Farnham: Ashgate

Decker EH, Elliott S, Smith FA, Blake DR and Rowland FS (2000) Energy and material flow through the urban ecosystem. Annual Review of Energy and the Environment 25:685-740.

AIKMM (2015) "Rights for waste workers as service providers: A comprehensive valuation of Delhi's informal recycling sector". Delhi: All India Kabadi Mazdoor Mahansangh.

Derickson KD (2014) Urban geography I: Locating urban theory in the 'urban age'. Progress in Human Geography doi: 10.1177/0309132514560961

Doshi S (2013) The politics of the evicted: Redevelopment, subjectivity, and difference in Mumbai's slum frontier. Antipode 45(4):844-865.

Dupont VDN (2010) The dream of Delhi as a global city. International Journal of Urban and Regional Research 35(3):533-554.

Ernstson H (2012) Re-translating nature in post-apartheid Cape Town: The material semiotics of people and plants at Bottom Road. In: In Richard Heeks (Ed.), Actor-Network Theory for Development: Working Paper

Series (pp. Working Paper 4). Manchester: Institute for Development Policy and Management, SED, University of Manchester.

Farias I and Bender T (eds) (2010) Urban Assemblages: How Actor-Network Theory Changes Urban Studies. New York: Routledge.

Fischer-Kowalski M (1998) Society's metabolism: the intellectual history of Material Flow Analysis. Part 1. 1860–1970. Industrial Ecology 2(1):61-78.

Fischer-Kowalski M, Krausmann F, Giljum S, Lutter S, Mayer A, Bringezu S, Moriguchi Y, Schütz H, Schandl H, Weisz H (2011) Methodology and Indicators of Economy-wide Material Flow Accounting. Journal of Industrial Ecology 15(6):855-876.

Gadgil M and Guha R (1995) Ecology and Equity. London and New York: Routledge.

Gandy M (2002) Concrete and Clay: Reworking Nature in New York City. Cambridge: MIT Press.

Geddes P (1885) An Analysis of the Principles of Economics. London: Williams and Northgate.

Ghazipur Anti-Incinerator Committee (2012) Residents and wastepickers protest against waste-to-energy incinerator in Ghazipur. Press release 24th March.

Ghertner A (2011) Gentrifying the state, gentrifying participation: Elite governance programs in Delhi. International Journal of Urban and Regional Research 35(3):504-532.

Giampietro M, Mayumi K, Sorma AH (2012) The Metabolic Pattern of Society. New York: Routledge.

Gidwani V and Reddy RN (2011) The afterlives of "waste": Notes from India for a minor history of capitalist surplus. Antipode 43(5):1625-1658.

Gidwani V (2013) Value Struggles: Waste Work and Urban Ecology in Delhi. In A Rademacher and KC Sivaramakrishnan (eds) Ecologies of Urbanism in India: Metropolitan Civility and Sustainability (pp 169-200). Hong Kong: Hong Kong University Press.

Gill K (2010) Of Poverty and Plastic. New Delhi: Oxford University Press

Goldman M (2011) Speculative urbanism and the making of the next world city. International Journal of Urban and Regional Research 35(3):555-581.

Harris A (2013) Assembling global Mumbai through transport infrastructure. City 17(3):343-360.

Hayami Y., Dikshit AK and Mishra SN (2006) Waste pickers and collectors in Delhi: Poverty and environment in an urban informal sector. Journal of Development Studies 41(1):42-69.

Heynen NC (2014) Urban political ecology I: The urban century. Progress in Human Geography 38(4):598-604.

Heynen NC, Kaika M and Swyngedouw E (eds) (2006) In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism. London: Routledge.

Holifield R (2009) Actor-Network Theory as a Critical Approach to Environmental Justice: A Case against Synthesis with Urban Political Ecology. Antipode 41(4):637–658.

Kaika M (2006) Dams as Symbols of Modernization: The Urbanization of Nature Between Geographical Imagination and Materiality. Annals of the Association of American Geographers 96(2): 276-301.

Kaika M and Swyngedouw E (2000) Fetishizing the Modern City: The Phantasmagoria of Urban Technological Networks. International Journal of Urban and Regional Research 24(1):120-138.

Keil R and Graham J (1998) Reasserting nature: constructing urban environments after Fordism. In B Braun and N Castree (ed) Remaking Reality—Nature at the Millenium. London: Routledge

Kennedy C, Cuddihy J and Engel-Yan J (2007) The changing metabolism of cities. Journal of Industrial Ecology 11(2):43–59.

Krishna G (2013) Chinese incinerator is poisoning food chain of residents & birds of Delhi's Okhla. http://www.toxicswatch.org/2013/11/chinese-incinerator-is-poisoning-food.html (last accessed 21 November 2014)

Lancione M (2013) Homeless people and the city of abstract machines: Assemblage thinking and the performative approach to homelessness. Area 45(3):358-364.

Lawhon M (2013b) Flows, Friction and the Sociomaterial Metabolization of Alcohol. Antipode 45(3):681-701.

Lawhon M, Ernstson H and Silver J (2014) Provincializing urban political ecology: Towards a situated UPE through African urbanism. Antipode 46(2):497-516.

Makri A and Devraj R (2015) Delhi's waste site story. http://www.scidev.net/global/cities/multimedia/delhi-waste-site-photo-essay.html (last accessed 5 July 2015)

Martinez-Alier J (1987) Ecological Economics. Energy, Environment and Society. Oxford: Blackwell.

Martinez-Alier J (2002) The Environmentalism of the Poor: A Study of Ecological Conflicts and Valuation. Cheltenham: Edward Elgar.

Martinez-Alier J, Kallis G, Veuthey S, Walter M, Temper L (2010) Social metabolism, ecological distribution conflicts, and valuation languages. Ecological Economics 70(2):153-158.

Martinez-Alier J, Temper L, Demaria F (2014) Social Metabolism and Environmental Conflicts in India. Indialogs 1:51-83.

Mawdsley E (2004) India's middle classes and the environment. Development and Change 35(1):79-103.

Meehan KM (2014) Tool-power: Water infrastructure as wellsprings of state power. Geoforum 57:215-224.

MCD, Municipal Corporation of Delhi (2012) Report on Delhi's MSW Management. Delhi: Department of Environment Management Services.

McFarlane C (2011a) On context: Assemblage, political economy, and structure. City 15(3-4):375-388.

McFarlane C (2011b) Assemblage and critical urbanism. City 15(2):204-224.

McFarlane C (2013) Metabolic inequalities in Mumbai. Beyond telescopic urbanism. City 17(4):498-503.

Mitchell DT (2011) Carbon Democracy: Political Power in the Age of Oil. New York: Verso

Moore JW (2000) Sugar and the expansion of the early modern world-economy: commodity frontiers, ecological transformation, and industrialization. Review: A Journal of the Fernand Braudel Center 23:409-433

Mumford W (1938) The Culture of Cities. New York: Harvest

Nandi J (2015) Delhi CM Kejriwal promises to shut Okhla waste plant. Times of India, 27 February http://timesofindia.indiatimes.com/city/delhi/Delhi-CM-Kejriwal-promises-to-shut-Okhla-waste-plant/articleshow/46389323.cms (Last accessed on 6 July 2015)

NEERI (2005) Assessment of Status of Municipal Solid Waste Management in Metro Cities, State Capitals, Class I Cities and Class II Towns. Delhi: CPCB

Negi R (2010) Neoliberalism, Environmentalism and Urban Politics in Delhi. In W Ahmed, A Kundu and R Peet (eds) New Economic Policy in India: A Critical Analysis (pp 179-198). London: Routledge

Newell JP and Cousins JJ (2014) The boundaries of urban metabolism: Towards a political–industrial ecology. Progress in Human Geography doi: 10.1177/0309132514558442

Rademacher A and Sivaramakrishnan KC (eds) (2013) Ecologies of Urbanism in India: Metropolitan Civility and Sustainability. Hong Kong: Hong Kong University Press

Pieterse E (2013) City Futures: Confronting the Crisis of Urban Development. London: Zed Books

Ranganathan M (2015) Storm Drains as Assemblages: The Political Ecology of Flood Risk in Post-Colonial Bangalore. Antipode DOI: 10.1111/anti.12149

Rediff News (2012) Toxic ash engulfs south Delhi's Okhla neighbourhood. http://www.rediff.com/news/report/photo-toxic-ash-engulfs-south-delhis-okhla-neighbourhood/20121227.htm (last accessed 21 November 2014)

Schindler S, Demaria F and Pandit SB (2012) Delhi's waste conflict. Economic and Political Weekly 47(42):18-21

Schindler S (2014a) The making of 'world-class' Delhi: Relations between street hawkers and the new middle class. Antipode 46(2):557-573

Schindler S (2014b) A New Delhi everyday: Multiplicities of governance regimes in a transforming metropolis. Urban Geography 35(3):402-419

Searle LG (2014) Conflict and commensuration: Contested market making in India's private real Estate development sector. International Journal of Urban and Regional Research 38(1):60-78

Sethi A (2012) Incinerator gases choking Okhla. Deccan Herald, 12 July. http://www.deccanherald.com/content/263944/incinerator-gases-choking-okhla.html (last accessed 12 January 2014)

Shatkin G (ed) (2014) Contesting the Indian City: Global Visions and the Politics of the Local. Malden: John Wiley & Sons

Shaw G R and Meehan K (2013) Force-full: power, politics and object-oriented philosophy. Area 45(2):216-222

Silver J (2014) Incremental infrastructures: material improvisation and social collaboration across post-colonial Accra. Urban Geography 35(6):788-804

Swyngedouw E (1996) The city as hybrid: on nature, society and cyborg urbanization. Capitalism, Nature, Socialism 7(2):65–80

Swyngedouw E and Heynen NC (2003) Urban political ecology, justice and the politics of scale. Antipode 35(5):898-918

Talyan V, Dahiya RP and Sreekrishnan TR (2008) State of municipal solid waste management in Delhi, the capital of India. Waste Management 28(7):1276–87

The Hindu (2011) Jindal's Okhla waste-to-energy plant broke law, says Jairam. 1 April http://www.thehindu.com/todays-paper/tp-national/tp-newdelhi/jindals-okhla-wastetoenergy-plant-broke-law-says-jairam/article1589906.ece (last accessed 5 July 2015)

The Hindu (2012) Protest against waste-to-energy incinerator. 25 March http://www.thehindu.com/todays-paper/tp-national/tp-newdelhi/protest-against-wastetoenergy-incinerator/article3221985.ece (last accessed 21 November 2014)

TNN (2015) Sisodia gets feel of Okhla plant's smoke and ash. 23 May http://timesofindia.indiatimes.com/city/delhi/Sisodia-gets-feel-of-Okhla-plants-smoke-and-ash/articleshow/47392336.cms (last accessed 21 November 2014)

UNEP (2013) City-Level Decoupling: Urban Resource Flows and the Governance of Infrastructure Transitions http://www.unep.org/resourcepanel/Publications/City-Level decoupling/tabid/106135/Default.aspx (last accessed 2 November 2013)

Watson V (2003) Conflicting rationalities: Implications for planning theory and ethics. Planning Theory & Practice 4(4):395-407

While A, Jonas AEG, Gibbs D (2010) From sustainable development to carbon control: eco-state restructuring and the politics of urban and regional development. Transactions of the Institute of British Geographers 35(1):76–93

Wiego (2013) Waste Pickers: The Right to Be Recognized as Workers. http://www.wiego.org/sites/wiego.org/.../WIEGO-Waste-Pickers-Position-Paper.pdf (last accessed 17 February 2014)

Wilson DC, Velis C and Cheeseman C (2006) Role of informal sector recycling in waste management in developing countries. Habitat International 30(4):797-808

Wolman A (1965) The metabolism of cities. Scientific American 213(3):179-190

World Bank (1999) Municipal Solid Waste Incineration. World Bank Technical Guidance Report. Washington, D.C: The World Bank. http://www.worldbank.org/urban/solid_wm/erm/CWG%20folder/Waste%20Incineration.pdf (last accessed 19 November 2014)

"Surabaya Green & Clean": genesis of a community-based, semi-decentralized waste management model

Jérémie Cavé and Warma Dewanthi***

Introduction

With a population recorded in 2015 at 2,975,358 inhabitants, Surabaya is Indonesia's second-most populous city after Jakarta. The capital of East Java, Surabaya is a large coastal city oriented towards trade and industry. Surabaya is today a very horizontal city, covering 375 km². The seaside (north and east) is sparsely urbanized. The coast, covered with marshes and mangroves (on 300 ha), is largely unbuildable. The density of housing is nevertheless high: 8,300 inhabitants/km² on average. Beyond its municipal perimeter, Surabaya, together with Gresik and Sidoarjo, forms a conurbation of almost 6.5 million inhabitants.

The urban structure of Surabaya is characterized by large avenues and boulevards where car traffic is dense, even very crowded at peak times. These main roads, not very welcoming for pedestrians, delimit residential areas that are streaked with narrow alleys where vehicles are much less present: the kampungs. The kampungs are the traditional living quarters of Javanese cities. These are dense and compact blocks, forming a mosaic of small individual houses built with durable materials. Very often, Javanese people live and work in these neighborhoods. In most cases, the streets are paved and traffic is reduced: cars

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can park, two-wheelers can circulate, and frequent speed bumps impose very limited speeds.

Covering only 7% of the area of the municipality, the kampungs house approximately 60% of the population of Surabaya. Mostly inhabited by lower-middle-class homes, the kampungs are neither affluent residential areas nor slums. Traditionally placed under the management of a chief, they constitute spatial and social units of organization. While kampungs generally have a derogatory connotation (evoking a mode of rural life unsuited to the modernity of cities) and tend to be eradicated, the authorities of Surabaya distinguished themselves through a political will to include them in urban planning and to stop despising them in favor of modern real estate projects.

Based on this vernacular urban structure, the case of Surabaya serves as an excellent example of the social, community-based, multi-scale, and multi-technology ecological innovations that cities in the Global South could seek to develop. After a waste crisis in the early 2000s, a huge community mobilization led to a solid waste management system that is inspiring other cities from all over the world.

The most interesting innovation comes in the form of community waste banks for recyclables, which are widespread at the kampung scale (cf. Chapter 2). The neighborhood is not simply the technically defined perimeter for waste collection, but also the level at which some aspects of the service are managed and decided. In the case of Surabaya, neighborhood organizations decide on the local policy to be implemented. The kampungs, however, take responsibility for the cleanliness of their area, for collecting and sorting the waste, maintaining green spaces, and managing the community composting platform, etc. While this policy produces very different results across the kampungs, it promotes the deep involvement of residents (especially women's associations), in circumstances where the municipal public service lacks the capacity to directly offer these facilities on a massive scale.

The data presented here stems mainly from a field survey conducted under the ORVA2D research project,[1] in cooperation with the Environmental Engineering Department of the Institut Teknologi Sepuluh Nopember (ITS). Accessing data proved to be complicated for several reasons: the absence of technical and financial monitoring of service activities managed by the municipality, the

[1] Research Program "*Organisation de la Valorisation des Déchets dans les pays en Développement*" (ORVA2D), AFD, 2015-2017: http://eso-lemans.cnrs.fr/fr/recherche/programmes-en-cours/projet-afd.html

performance of services by companies reluctant to show their accounts, and the lack of transparency in public accounts. Despite these difficulties, primary data was collected through surveys in several *kampungs*, and, additionally, reliable secondary data were obtained from the Cleansing and Environmental Protection Agencies of the City of Surabaya (Durand et al., 2019).

The "Surabaya Green & Clean" program

2001: a waste crisis that served as a collective awareness

In 2001, the city experienced a major crisis. Keputih, the only disposal site in the city, was closed by the court following a complaint from nearby residents. However, the future landfill was not yet ready; therefore, there was no longer an outlet for the city's waste. For more than three weeks, household waste piled up in every neighborhood. The start of the rainy season accentuated the crisis. In no time, the city and its waterways were strewn with enormous "floods of waste", as the local press put it.

The new Benowo landfill was hurriedly opened three weeks later and gradually brought up to standard. However, that event was crucial in raising collective awareness regarding the waste issue. It had a strong impact on public opinion and laid the ground for a highly proactive and participatory waste management policy.

An initiative fostered by a corporate social responsibility program

The Surabaya Green & Clean project began through a collaboration between the Unilever Foundation, a local NGO (Pusdakota), and UNESA University. This ambitious program was triggered by the crisis sparked by the sudden closure of the Keputih disposal site in 2001, the long-term field experiments run by NGOs in liaison with the residents, and Unilever's determination to implement a CSR policy. As a major producer of palm oil, the company needed to improve its image, which is why it invested in this project. It provided annual grant-based support for a large annual city-wide contest organized to reward the cleanest neighborhoods.

The stated objective, based on a first eco-friendly kampung launched in the early 2000s, is to reduce waste at the source through neighborhood organizations by mobilizing recycling and composting activities. In partnership with the

City of Surabaya, Unilever identified community "leaders" within each *Rukun Warga* (RW, neighborhood units) and *Rukun Tetangga* (RT, community units) on whom they could rely to raise awareness among the population, and funded their training. The program was also promoted by 420 voluntary "facilitators" (with expenses paid and officially recognized) together with 28,000 community "leaders" trained in waste sorting and composting.

The overall amount of Unilever's CSR (corporate social responsibility) program is confidential, but it is known that the foundation contributed some IDR 400 million (about €27,000) in 2014 and IDR 300 million (about €20,000) in 2016 to the Surabaya Green & Clean program (Cavé & Nugroho, 2016).

Jointly organized by a corporate foundation, local NGOs, women's associations, and the media, the operation was subsequently taken over by the municipality to be mainstreamed as public policy. In 2016, the program was taken over by the Surabaya municipality, and 60% of neighborhoods participated in it, with 118 prizes awarded each year (Cavé & Nugroho, 2016). As a result, and while it was earlier described as "a dirty city full of pretensions and greed" (Hollander 2008, p.15), Surabaya now has the reputation of a clean city, both literally and figuratively (in terms of corruption).

Ibu Risma, a mayor committed to environmental issues

The transformation of Surabaya, from a dirty and dry city into a clean and green city, is today commonly attributed to its current mayor: Tri Rismaharini, nicknamed "Ibu Risma". A graduate in Architecture with a specialty in urban planning from ITS, Ibu Risma worked for twenty years in municipal services. From 2005 to 2008, she headed the Cleanliness and Landscaping Department (DKP), in charge of green spaces and cleanliness.

She was elected Mayor in 2010 with 38% of the vote on a campaign slogan: "make Surabaya a smart, humane & ecological city". In a few years, and despite a relatively limited municipal budget of IDR 2,971 billion in 2015 (EUR 198 million)—i.e., less than IDR 1 million/inhabitant (approx. €67/inhabitant)—her administration notably:

- developed the city's port activities (200% increase in traffic);
- imposed free education and health services for the poorest households (around 35% of the municipal budget is spent on education);

- permanently closed 'Dolly', the largest prostitution district in Asia. Brothels have been transformed into daycare centers and abandoned petrol stations into children's play areas;
- repurposed urban wasteland by developing 11 municipal parks, so that Surabaya now has more than 20% green space;
- provided rainwater absorption spaces (e.g., cemeteries) to reduce the city's chronic flooding;
- protected mangrove areas and supported urban agriculture;
- developed a participatory mode of government, which includes communities in decision-making and the implementation of public policies.

In 2011, the city won the national Adipura competition, which rewards cities that make the most environmental effort. In 2012, Surabaya received the ASEAN Environmentally Sustainable City Award. This award recognized the development of green spaces, as well as the marked improvement in the cleanliness of the city. The city was clean, parks were built, trees were planted along the avenues, and collection points were created in each district to store the waste collected from homes.

In 2013, Ibu Risma was named one of the ten most influential women in the country by Forbes Indonesia. The magazine notably recognized her for having blocked a government toll road project through the city in favor of a future tram system. In 2014, Ibu Risma was nominated for the World Mayor Prize, awarded by the World Mayors Foundation.

In 2015, the city, which had won the national Adipura competition five times in a row since 2011, received the Adipura Kencana, the highest environmental award in Indonesia. Not surprisingly, in November 2015, Ibu Risma was largely re-elected as mayor of the city, with 86% of the vote.

Surabaya's waste management system today

The City of Surabaya became one of the cities in Indonesia with the largest volume of solid waste. The volume of solid waste production in Surabaya in 2018 was 9,594 m^3/day. The amount of solid waste handled in the landfill was 5,237 m^3/day, or 55%. The remaining waste is mostly handled at the source, through household composting, decentralized composting centers, waste banks, and informal recovery. However, around 25% of municipal solid waste still lacks proper management and is thrown into the drainage system or

burned in the open air. The city also has a significant issue related to its landfill because the land area of Benowo Landfill is not well equipped to handle the entire solid waste of Surabaya, the potential for pollution could be large, and solid waste is the second leading cause of greenhouse gas emissions in Surabaya (after transportation).

Primary waste collection at kampung level

Surabaya has made the policy choice to entrust all collection to a municipal enterprise, meaning that it is performed directly by the municipal service with a fleet of 285 trucks. The purchase of compactor-trucks is planned in order to reduce the number of collection rounds. To make this solution viable, the city went through a period of modernizing all its municipal management and consolidating its budgets. Today, the collection rate is close to 90%.

In Surabaya, primary collection is highly organized, albeit not officially authorized. It is deployed by neighborhood organizations (Rukun Warga or RW) and carried out by the neighborhood's poorer residents or by waste collectors. They collect the waste using handcarts and take it to one of the city's transfer points (TPS – Temporary Shelter Facilities). These primary collectors, or tenaga penambil as they are called, are paid by the RWs, and their level of remuneration varies from one neighborhood to another. The RW administration levies a corresponding user charge on the households. As a result, the Surabaya municipality has no data on the organization of primary collection. What enables this primary collection system to function is actually the strong local sociability that has its historical roots in the operation of several public services. The Surabaya municipality then takes responsibility for transporting the waste from the TPSs to the city's new sanitary landfill.

In Surabaya, there are 173 official transfer points (TPSs). These are no longer places where waste is simply deposited, but real sorting centers at the disposal of the neighborhood's primary collectors. With a surface area of 100 to 300 m², they can house the waste of around 10,000 people. Neighborhood associations (rukun warga) enjoy strong incentives to sort waste (both financially and in terms of social recognition). Recyclables may account for up to 36% of household waste.

In light of this example, the neighborhood appears to be a favorable scale for sorting and reducing the streams of waste to be transported to the centralized sanitary landfill. What's more, collecting the service charge from residents

for primary collection proves relatively easy. As the service is decentralized, this also means that vulnerable citizens can be given work.

Decentralized composting plants

After the "flood of waste" caused by the premature closure of the polluting municipal disposal site at Keputih in 2001, the Surabaya municipality launched an organic waste recovery policy based on the creation of decentralized composting platforms and the promotion of household composting.

In 2016, 23 municipal decentralized composting units were operating across the city with an average capacity of 2 tonnes/day for each platform, equivalent to 19,000 tonnes/year for all platforms combined (around 2% of the waste generated by the city) (Cavé & Nugroho, 2016). The treated waste comes from the city's green spaces, the municipal plant nursery, and markets. As the waste streams are homogeneous, the compost is of good quality and used for urban green spaces or given to schools and communities.

Green waste composting costs €16.35 per tonne (Cavé & Nugroho, 2016). If the cost of sorting is factored in, the cost of treating the organic fraction of mixed household waste would rise to €36 per tonne of raw waste. Composting represents 3% of municipal expenditure in Surabaya, while the volumes of composted waste are 5%. This operation appears to be particularly well-run in Surabaya, where it costs little compared to the quantities composted. This is mainly due to the large number of solutions that Surabaya proposes for composting waste at several scales.

Neighborhood composting: community-led management of domestic bio-waste

Alongside the municipal composting platforms, the Surabaya municipality has distributed a vast number of community compost bins for organic household waste. Between 2005 and 2010, considerable community efforts were made to promote this practice: nearly 20,000 household composting bins were distributed, mainly thanks to the involvement of women's community associations.

The combination of the two approaches in the City of Surabaya (decentralized composting of green waste and household composting at the community scale) shows the municipality's real commitment to reducing the amount of waste sent to landfill. Several factors appear to be positive: the composition of the waste (a large number of green spaces and a significant share of organics

in household waste) and Surabaya's urban sprawl. By increasing the number of small, decentralized composting units (500 m²), the city makes good use of vacant urban land and helps to reduce waste transport costs. The main limitation of this approach is the inability of the households involved in community composting to sell the compost. One of the composting units managed by a Japanese cooperation project is trying to sell its compost, but it is seen as too expensive by farmers located over 100 kilometers away.

Sanitary landfilling

From a financial point of view, what stands out is the significant financial burden of landfilling in Surabaya. Surabaya's sanitary landfill operates with impermeable cells, leachate collection and treatment, and the capture of biogas for conversion into electricity, at a cost of €8.4 per ton. This is due to the high cost of a sanitary landfill that complies with environmental standards—which makes the case for diverting waste flows towards recovery and recycling channels through composting practices and waste banks.

In Surabaya, a gasification project for landfill waste was under consideration in 2018, with a planned capacity of 100 tons/day to generate 8 MW/day of electricity. The choice of this process seems risky as it requires homogenized waste, which in turn demands heavy and costly preparation. This unit, which would be a first in Indonesia, is still under construction. It should be noted, however, that MSW gasification projects are currently very rare worldwide and only suited to very specific contexts.

Surabaya's waste banks: community waste sorting

In Surabaya, Indonesia, public policy turns a blind eye to the informal sector (unregulated activities) and encourages an official community-led waste management approach. This is the rationale behind the creation of waste banks designed to promote neighborhood recycling.

The initiative was driven by a national program, Adipura, set up to reward cities that had environmentally virtuous waste management practices. Adipura is a program launched by the Ministry of Environment in the mid-1990s, which rewards cities that make the most efforts in urban environment management. The evaluation criteria include three main areas: brown issues (waste management, water, and air pollution); green issues (green spaces and urban planning); and white issues (democratic participation). The contest is held every year, and

the participating cities are assessed by third parties (universities and NGOs). To win the award, cities now have to be equipped with a sanitary landfill and have set up waste banks (Ministry of Environment Regulation No. 6/2014).

Waste banks: creating ties between residents and recyclers

In 2016, there were 400 waste banks across the city, defined locally as a "social engineering tool to involve citizens in waste sorting" (Cavé & Nugroho, 2016, p.48). Solid waste from houses is brought to the waste bank by the community itself. Waste deposited at the banks has been pre-sorted and carried by households (generally housewives). The waste banks are managed at the community level by a women's association. Each waste bank pays out its profits to residents as it sees fit, but most only make one payment a year. Some waste banks manage to remunerate their managers, thereby transforming a voluntary community activity into a real job.

In Surabaya, it is an organized neighborhood community that finances or directly implements this service. Each neighborhood waste bank sets its own user tariffs. The users are not paid immediately: the revenue from their waste is kept in a savings account and only paid out to them once a year on the occasion of a religious holiday (and during the cleanliness contest organized city-wide). The idea behind the waste banks is that: "dry waste has value. This value is not huge. But if you save it and let it build up over a certain time, it becomes a worthwhile amount" (Ibu Maya, Unilever, 02/05).

Each waste bank then negotiates the rates for its materials with buyers; prices vary considerably depending on time and place. A waste bank sorts between 15 and 50 different types of waste materials to sell on directly to large buyers. Yet, these recyclable-waste banks, supported by the public authorities, are unable to function without recourse to informal dealers (who also get recyclable materials from waste pickers and large producers such as offices). Waste banks thus represent only a first step in the process of formalizing this sector.

To structure the chain, the municipality has encouraged the creation of a "parent" waste bank (Bina Mandiri waste bank) that buys waste from other waste banks. Managed by six "volunteers", this "parent" waste bank actually only purchases waste materials from about 200 waste banks (50% of the total). The others continue to sell to informal semi-wholesalers, who offer a better price, faster payment, and are often geographically closer. In reality, the "parent" bank finds it difficult to channel all of the recyclables captured by the community waste banks to its own site. The community banks are often tempted to sell their

materials to informal local dealers, who offer better purchase terms, including prices, frequency, payment terms, and the variety of materials accepted (Cavé & Nugroho, 2016).

One of the limits to multi-stakeholder integration lies in managing the entire recovery and recycling chain. This does not mean public management of the whole chain, but rather knowledge and coordination among stakeholders. Surabaya has tried to set up a "parent" waste bank to centralize all recycled waste streams, but this has met with relative failure as the networks of buyers and waste dealers continue to operate. As a result, a robust network of informal waste pickers persists when it comes to recovering the bulk of recyclable waste.

An innovative financing method for still limited tonnages

The city estimates the annual turnover of each waste bank at between €20 and €330 from the resale of recyclable waste, equivalent to a yearly income of around €3 or €4 for each participating household. While some waste banks pay out their receipts directly to the residents, others use them to finance other local public services. For instance, the receipts can be deducted from water or electricity bills (also managed at the community level). This can reduce bills by 20–25%. Other waste banks pay out in the form of discount coupons usable in local shops, thus helping to boost the local economy. In all cases, such schemes are implemented with the approval of local authorities (RW or RT); this is outside the purview of municipal authorities.

There are no centralized data on the flows transiting through waste banks. In Surabaya, estimates suggest the figure of 3.3 tons a day was captured in 2014, equivalent to 0.22% of the tonnage sent to landfill by the city, or 0.62% of all recyclable waste generated (Cavé & Nugroho, 2016, p.54). The volumes captured by these community structures thus remain limited compared to those of the informal waste pickers, who continue to capture the highest-value waste materials. Furthermore, although waste banks work very well in the kampungs—i.e., the traditional neighborhoods home to a small middle class—they are much less successful in recently built residential blocks and districts. The entire downstream portion of the chain remains outside the public authorities' jurisdiction, despite their attempt to set up a "parent" waste bank.

Conclusion

The SGC: a resounding success, yet largely overestimated

From the start, the Surabaya Green & Clean program was a great success: the physiognomy of the neighborhoods changed, public cleanliness improved, and the inhabitants of the kampungs were valued. In the mid-2000s, an exceptional popular mobilization took place around the issue of waste: no less than 28,000 citizens volunteered to serve as voluntary liaisons, relaying public policy to residents. Today, 60% of the districts participate.

As of 2008, one report stated that "the amount of waste transported to Benowo landfill […] has reduced by more than 10% from around 1,500 T/d in 2005 to 1,300 T/d in 2007". As of 2009, the observation is amplified: in the space of 4 years, between 2004 and 2008, the production of waste had dropped by 23% (Maeda 2009, p.2). In 2012, the effect was further amplified: the volume of waste to be buried had decreased by 36% in 7 years (Ginanjar 2012, p.13). The authors associate this exceptional reduction with the development of composting and Waste Banks, in particular. Since 2013, this assertion has been repeated in the academic literature (Tauran, Ma'ruf & Suyatno, 2015, p. 55; Wijayanti & Suryani, 2015, p. 176). In 2016, the municipality itself affirmed that its public upstream recovery policy allows a reduction in the waste to be collected by 350 T/d for 1,477 T/d of waste buried in Benowo.

Based on the analysis conducted for this paper, these balance sheets seem considerably overestimated. According to the figures from this study, in 2016, the 23 composting units processed 52 T/d, while the 400 Waste Banks recovered 3.3 T/d, a total diversion of 55 T/d. However, it is categorically unlikely that domestic composting (which is difficult to measure and is losing momentum) can treat 295 T/d of household waste.

An Asian model fostered through a CSR program

Nonetheless, many delegations came to take inspiration from the Surabaya waste management "model". The waste bank device and the composting part in particular were promoted in other metropolitan areas in the country (Medan, Semarang, Macassar, Jakarta) and in Asia (Philippines, Thailand, Nepal, Malaysia). As has been shown, in Surabaya, the neighborhood scale was always pivotal: it is the long-standing sociability that enabled the innovations in sorting and composting to be deployed.

As this example shows, companies, like NGOs, thus play an important role in launching new initiatives. CSR allows financial resources to be released outside the conventional modes of financing urban services. The key question regarding these financing methods is that of their longevity. If it is not feasible to base a municipal waste management policy on such short-lived partnerships, their participation could nonetheless serve as a springboard to launch innovative operations. Any scaling-up requires a longer-lasting financial mechanism and more direct involvement from public stakeholders. This is why, in Surabaya, the municipality subsequently took over from the Unilever Foundation. The next step will thus be to make the actual waste generators pay, particularly when the waste is produced by companies, yet very often managed by the public service.

Towards an incentive-based fee?

In Surabaya, 86% of waste management expenditure is covered by public authorities: 6% of municipal resources come from the central government, 34% from the provincial government, and 46% from the municipality's own resources. Waste management expenditure, however, represents only 7% of the municipal budget. When assessing the financial soundness of the service with respect to the share of expenditure covered by the taxes or fees paid by households, household participation is less than 15% in Surabaya.

In Surabaya, it is not through joint billing, but rather good waste management practices that help to finance other services. The sale of waste collected by a community waste bank provides a nest egg that residents can use to pay their other bills, such as water or electricity. Territorial solidarity has thus emerged within the neighborhood.

For closer integration of community waste recovery into Surabaya's MSW management service, it would nonetheless be more logical to allow citizens to pay part of the waste removal fee (*retribusi*) in the same way. This measure would help citizens to become fully aware of the synergies between waste recovery on the one hand, and the reduction of the cost (and price) of the MSW collection and disposal service on the other. In other words, it would introduce a type of incentive-based fee (an incentive to generate less waste). This seems quite possible, as even the poorest households manage to earn a monthly income of IDR 8,000 from the sale of sorted dry waste, whereas the *retribusi* amount fluctuates between IDR 500 and 19,000 per month.

References

Cavé & Nugroho (2016) Surabaya: La valorisation communautaire des déchets dans le cadre d'un service semi-décentralisé, projet de recherche OR-VA2D, Rapport de terrain nº5, Mai, 80p.

Central Bureau of Statistics Surabaya. 2017. Surabaya City In Figures 2017. Surabaya: BPS Kota Surabaya.

Durand, M., J. Cavé, J. Delarue, A. Le Bozec, I. Salenson (2019) Détourner les déchets: Innovations socio-techniques dans les villes du Sud, Technical Reports n°54, AFD, June, 184 p.

Indonesian Central Bureau of Statistics. Statistik Lingkungan Hidup Indonesia 2016. Jakarta. (2016)

Sanitary and Green Open Space Agency. Informasi Kinerja Pengelolaan Lingkungan Hidup Daerah Tahun 2016. Surabaya: Dinas Lingkungan Hidup Kota Surabaya. (2016)

Ridley-Duff, R.J., and Bull, M. Understanding Social Enterprise: Theory and Practice, Sage Publication, London. (2011)

Minister of the Environment. Peraturan Menteri Negara Lingkungan Hidup RI No.13 Tahun 2012 tentang Pedoman Pengelolaan Reduce, Reuse dan Recycle Melalui Bank Sampah. Jaringan Dokumentasi dan Informasi Hukum Menteri Lingkungan Hidup. (2012)

Muntazah, S. Pengelolaan Program Bank Sampah sebagai Upaya Pemberdayaan Masyarakat di Bank Sampah Bintang Mangrove Kelurahan Gunung Anyar Tambak Kecamatan Gunung Anyar Surabaya. (2015)

Brunner, P. H., Ernst, Walter, R. Alternative Methods for The Analysis of Municipal Solid Waste. Waste Management & Research 4, 147-160. (1986)

Shafie, F. A., Omar, D., & Karuppannan, S., & Shariffuddin, N. Urban-scale Material Flow Analysis for Cities in Greater Kuala Lumpur, Malaysia. Procedia – Social and Behavioral Sciences, 234, 424 – 433. (2016)

National Standardization Agency. SNI 19-3964-1994: the Method of Taking and Measuring Sample of Generation and Composition of Municipal Waste. (1994)

National Standardization Agency. SNI 19-3983-1995: Specification of Waste Generation for Small Town and Medium City. (1995)

Safridah, N. L. Studi Pengumpulan Sampah Rumah Tangga di Kecamatan Wonokromo, Surabaya Selatan. (2015)

Warmadewanthi and Kurniawati, S. The Potential of Household Solid Waste Reduction in Sukomanunggal District, Surabaya. IOP Conf. Series: Earth and Environmental Science 106 (2018) 012068. (2018)

Trihadiningrum, Y., S. Wignjosoebroto, N.D. Simatupang, S. Tirawaty, and O. Damayanti. Reduction capacity of plastic component in municipal solid waste of Surabaya City, Indonesia. Proc. International Seminar on Environmental Technology and Management Conference 2006. Bandung, September 7-8. (2006)

Tchobanoglous, G., Theisen, H., dan Vigil, S. A. Integrated Solid Waste Management: Engineering Principles and Issues. New York: Mc Graw Hill International Editions. (1993)

Cases in South America

The inclusion system for urban waste pickers in solid waste management in the Autonomous City of Buenos Aires (2008–2020)

Pablo Schamber and Francisco Suárez***

Introduction

Beyond its heterogeneous forms and practices, the activity carried out by waste pickers of recyclable materials on the streets of urban areas all over the world is performed individually and as "self-employment". In other words, it is a task that exclusively depends on the itinerant efforts of the individuals who perform this task without an employer or boss. *Cartoneros*[1] earn a piecework income; i.e., their income depends on the payment they get for the collected materials that can later be traded. Their activity is not covered by any collective bargaining agreement, they are not paid a daily wage or a salary, they do not receive the statutory 13th annual salary or paid holidays, and they are not enrolled in the social security system. They earn their income by carrying out an activity that

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[1] *Cartonero* is a colloquial term used in Argentina that refers to people who collect cardboard and other paper derivatives on the streets of cities, which are then used for recycling.

is not regulated by the government. Moreover, in some districts, this activity may be explicitly prohibited and punished by law.

However, the situation of cartoneros in the Autonomous City of Buenos Aires is different from the conditions described above and has exceptional characteristics. Beginning in 2008, a new relationship was established between cartoneros' organizations and the Government of the Autonomous City of Buenos Aires, the federal district of Argentina, which hosts approximately 3 million inhabitants and covers an area of 200 km². This relationship has resulted in the creation of 12 cooperative organizations that officially include approximately 5,000 Urban Waste Pickers (UWPs). These workers are in charge of the segregated collection of dry or inorganic waste (both from households and from large generators and clean points), as well as its processing using modern recycling facilities known as "Green Centers".[2] Furthermore, they also trade recyclable materials independently with third parties. Table 1 shows the evolution of the amount of UWPs per cooperative during the period 2015-2020.

Under the agreements that have been executed, the cooperatives receive a payment from the government to cover the costs of the activities performed, while their members also receive a monthly stipend in individual bank accounts (called an "incentive"), which is around USD 200, for performing the tasks in which they are engaged (attendance bonus).

How has the transition occurred in this city between such different ways of doing the job? What does the system entail (in a more precise and detailed way)? Is it a consolidated modality, or is it at risk of regressing? These are the main questions this paper seeks to answer, and to a large extent, they guide its contents.

The methodology for this study included interviews with key actors, including cooperative leaders and technicians, as well as officials from the Government of the Autonomous City of Buenos Aires serving across different administrations. In addition, different research studies on the problem and newspaper articles have been consulted. In this sense, the production of local academic information on different aspects related to *cartoneros* in Argentina, and particularly in the Autonomous City of Buenos Aires, has been quite

[2] Green Centers are facilities equipped to receive bags loaded with recyclable materials. They usually have hoppers, conveyor belts, and balers for bundling these materials. Each of the 12 cooperatives taking part in the system is assigned a Green Center.

fruitful over the last decade[3] and can be easily accessed by those intending to delve into this brief overview. This work will only discuss certain regulations and the basic characteristics of bidding documents and contracts that regulate the provision of waste collection services in the city, in order to contextualize the main features of the present situation for those readers who are not familiar with the background of the current local scenario. It is important to highlight certain aspects in order to understand how the inclusion of cartoneros—which at the beginning was a gradual work-related reconversion from street waste collection to the operation and management of Green Centers supplied with recyclable waste by collection companies (Schamber, 2010)—later included the exclusive responsibility for the segregated collection and treatment of dry waste throughout the city (Schamber, 2012; Tagliafico, García, and Schamber, 2016).

How the process developed: facts to contextualize the present situation

Regarding the origins of collection for reusing or recycling waste in Buenos Aires, it is possible to find evidence even in colonial times (Paiva and Perelman, 2005; Prignano, 1998; Schamber, 2008; Suárez, 1998). Over the last 150 years, this activity has fluctuated, on the one hand, according to the processes of economic recession and the impoverishment of society, which encouraged more people to make better use of waste and commercialize it to obtain income. On the other hand, it has fluctuated based on the ups and downs of import substitution policies that led local industry to incorporate more recyclable materials as supplies in production processes (Bercovich and Chidiak, 1997; Borello, 1997; Lacabana, 2019). Both processes converged in the first years of the new millennium (Suárez, 2016).

[3] This work is not aimed at listing all the works that have been carried out so far, but in order to have at least a notion of their large volume, it is worth mentioning the following works among the most recent postgraduate dissertations, in alphabetical order (some of which have been published as books): Alvarez, 2011; Busso, 2004; Debora Gorban, 2005 and 2014; Dimarco, 2010; Gurrieri Castillo, 2020; Maldovan Bonelli, 2014; Molina, 2017; Paiva, 2008; Perelman, 2010; Portugheis, 2020; Schamber, 2008; Shammah, 2009; Sorroche, 2016; Suarez, 2003 and 2016; Villanova, 2015; among those research works carried out within the framework of what Álvarez (2011) identified as "anthropological" approaches and perspectives, to distinguish them from those more closely linked to the field of sanitary engineering itself.

However, it should not be assumed that the present situation is directly linked to that background. Gorbán (2014) explains how structural conditions and the willingness of individuals enable the recovery of genealogy and the updating of practical memory, making it possible to identify both continuities and ruptures between *cirujas* and *raneros* [both terms refer to junkmen who survive on what they scavenge from garbage bags; however, *raneros* were also involved in criminal affairs] who lived in Barrio de las Ranas in Parque Patricios at the beginning of the 20th century, and contemporary UWPs. The individuals involved in these tasks, both in the past and today, behave in the same way: they collect waste to commercialize it. However, the present situation arises from a new social and moral configuration, embodied in other entities, which even give a different meaning to the same task. In contrast with the past, today there are several social sectors that see this as an environmentally heroic task (Schamber and Bordagaray, 2016).

Over the last years of the century, the cartoneros reappeared in the landscape of the streets of the Autonomous City of Buenos Aires. Undoubtedly, the high unemployment figures reached in the Buenos Aires Metropolitan Area are a relevant factor that serves to explain this emergence. However, it should also be noted that, at that time, there were practically no public policies aimed at waste recovery, despite the existing recycling facilities at an industrial level. After the end of what was known as the "Convertibility Plan", Argentina saw a dramatic and inescapable fall in imports of raw materials because of the devaluation of the national currency (Svampa, 2005).

Thus, the transition to the end of the century has not only witnessed a considerable increase in the number of people involved in the activity and the alteration of the socio-demographic features of its historical composition ("structural poor" in the past, "recently unemployed" now), or the appearance of new legal forms of association (cooperatives), but these changes have also involved aspects of another nature, such as their perception by public opinion, their impact on the media, the interaction with environmental NGOs and other civil society organizations (Greenpeace and Avina) and, mainly, meaningful exchanges with the local government (Dimarco, 2010).

Some key points of this process are described below.[4]

[4] For further details on this and other background information on this process, see the excellent graphic summary by Nora Salvi et al., Hitos sociales e institucionales de las políticas de reciclado en Ciudad de Buenos Aires [Social and Institutional Milestones of Recycling Policies in the Au-

At the regulatory level: Act No. 992/02 and Act No. 1884/05

Act No. 992 (published in the Official Bulletin of the Government of the Autonomous City of Buenos Aires on March 29, 2003) repeals Section 6 of Ordinance 33581/77, which forbade the sorting, removal, collection, purchase, sale, transportation, storage, or handling of all kinds of household waste found on the streets to be picked up by the collection service. It also establishes that "The Executive Branch incorporates waste collectors of recyclable materials into the segregated collection service within the existing urban hygiene service" (Section 2, emphasis added). Furthermore, this piece of legislation sets forth that the City has to promote recycling and stop the indiscriminate final dumping of waste. This Act was regulated by Executive Order No. 622 dated May 23, 2003, which created the Urban Waste Pickers' Program (UWPsP), which had already been in effect for several months. Among other tasks, the UWPsP addressed the implementation of the Registry of Waste Pickers (RWPs). Under Section 16 of Exhibit I of the abovementioned Executive Order, registered waste collectors are authorized to carry out their work throughout the entire area of the Autonomous City of Buenos Aires.

The first approach between the Government of the Autonomous City of Buenos Aires and waste pickers was the "Roundtable Dialogue", which began at the end of 2002, where groups of cartoneros gathered with members of the emerging neighborhood assemblies (Koehs, 2007). During the meetings, different issues were discussed, such as operational issues of the RWPs, conflicts over the ways to enter the city, and complaints regarding the persecution of cartoneros, as well as strategic issues such as Act No. 992 and the installation of Green Centers (Waste Sorting Plants). Simultaneously, the Government of the Autonomous City of Buenos Aires held meetings with cooperatives in order to develop specific assistance and collaboration projects and negotiations regarding the future concession of Green Centers[5] in the future. A significant change was

tonomous City of Buenos Aires], available at http://www.tiki-toki.com/timeline/entry/663544/Hitos-Sociales-e-Institucionales-de-las-Polticas-de-Reciclado-en-Ciudad-de-Buenos-Aires/

[5] On 1 May 2006, the first Green Center was officially inaugurated in the southern area of the Autonomous City of Buenos Aires. Its management was assigned to the Ecological Cooperative of Recyclers of Bajo Flores (CERBAF) [*Cooperativa Ecológica de Recicladores del Bajo Flores*], and the supply of recyclable materials would come from the segregated collection service in large generators. In fact, it was not even the first one, since Coperativa El Ceibo already operated a warehouse for the classification and collection of recyclable waste in the Retiro area, where it had been receiving the product of the selective collection of two of the companies operating in

the transition from hiring pay-per-ton services for waste collection to a clean area system; the new modality did not compete with the UWPs. In these first years of public policies applied to waste pickers, the training courses provided by the Government of the Autonomous City of Buenos Aires were crucial; there were several workshops on health promotion and prevention, productive organization, and identification of recyclable materials, among others.

In the context of the closure of the Villa Domínico sanitary landfill (2004), the main waste disposal center in the Metropolitan Area of Buenos Aires, the environmental NGO Greenpeace promoted a series of meetings and debates on the "Zero Waste" Bill. In these spaces, Greenpeace joined forces with waste pickers' organizations. Indeed, the groups of waste pickers and environmentalists promoted the passage of Act No. 1854 on "Zero Waste". Due to their shared position, they were identified as "recyclers", as opposed to the "buriers" group, which included the collection companies, representatives of the Ecological Coordination Metropolitan Area State Society (*CEAMSE*) [*Coordinación Ecológica Área Metropolitana Sociedad del Estado*], and other actors linked to sanitary engineering services.

Finally, in November 2005, Act No. 1854, known as the "Integrated Management of Urban Solid Waste Act" or "Zero Waste Act", was passed. Said Act basically establishes: (a) a strategy for the progressive reduction of waste volumes to be buried (by establishing a prohibition on landfilling recyclable waste by the year 2020); (b) the prohibition of incinerating waste until the 75% waste reduction target is reached; (c) segregated collection by keeping dry waste and wet waste separate, giving UWPs "priority and inclusion in the process of collection and transportation of dry urban solid waste as well as in the activities of the sorting centers, under the provisions contained in Act No. 992" (Section 43).

Likewise, Section 44 states that the Government of the Autonomous City of Buenos Aires will establish "lines of credit and subsidies for the cooperatives of UWPs enrolled in the Permanent Registry of Cooperatives and Small

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the city (CLIBA and AESA) since 2004. Since this Green Center was assigned to El Ceibo by a national public agency, the National Agency for the Administration of State Assets, (ONABE) [*Organismo Nacional Administrador de Bienes del Estado*] and not by the Government of the Autonomous City of Buenos Aires, it was not recognized as such until December 2007, a few days before the change of administration of the city government, when it was officially inaugurated. A month earlier, in mid-November 2007, another Green Center located in Villa Soldati, also in the southern area of the city, became operational. This center was built by the company NÍTTIDA and is jointly managed by the cooperatives Del Oeste and Reciclando Sueños.

and Medium Enterprises (REPyME) [*Registro Permanente de Cooperativas y de Pequeñas y Medianas Empresa*s]". The organizations that participated in the debates prior to the enactment of this Act would later make up the Permanent Advisory Council for its follow-up and, in that context, would have an increasing influence on the orientation of public policies in the area.

Another important piece of legislation is Act No. 4859/13, which establishes that large waste generators in the Autonomous City of Buenos Aires must be registered in the Special Generators Registry, which controls the mechanisms to divert dry waste to the Green Centers managed by cooperatives of waste pickers. In this way, four- and five-star hotels, buildings with more than 40 functional units, banks, shopping malls and other stores, industries, and private commercial premises that generate more than 500 liters of waste per day make up a source of recyclable waste received by Green Centers.

At an executive level: bidding documents for wet waste and ontracts for dry waste

A few days after Mauricio Macri took office for the first time in the Government of the Autonomous City of Buenos Aires (2007-2011), the National Secretariat of Transportation suspended the service provided by the "*cartonero* trains."[6] As a result of this action, many *cartoneros*, who could not return to their homes in the Buenos Aires suburbs,[7] decided to spend the night on the public streets of the Autonomous City of Buenos Aires, which caused complaints from groups of neighbors who did not want them to camp near their

[6] Each of these trains was known as the White Train or the *cartoneros'* Train. They began to operate in 2001. They were used by waste pickers to move with their carts from their places of residence in the Buenos Aires suburbs to the Autonomous City of Buenos Aires, where more recyclable waste of better quality could be found less scattered in the area. They were complete, special, and exclusive train formations for *cartoneros*, which gradually increased the frequency of services on the railway branches (García, 2007; Fraser, 2015; Schamber 2007, and 2008).

[7] According to 2005 UWPsP data, more than three-quarters of the registered cartoneros (76.6%) lived in the suburbs close to the Autonomous City of Buenos Aires. Due to the relatively higher socio-economic level and the higher population density there, larger amounts of good-quality materials can be found in a smaller geographical area. The great mass of cartoneros enters the city with their carts to collect materials in the evening and returns to the suburbs with the loaded materials after midnight. During the following days, they sort them out to then sell them in warehouses located near their neighborhoods.

homes.[8] The widespread repudiation triggered by the violent eviction attempts carried out by the new government opened communication channels between officials and representatives of cartoneros. As a consequence, they agreed that the Government of the Autonomous City of Buenos Aires would finance the transportation of carts in trucks, while the *cartoneros* agreed not to work with under-aged children, for which the Government offered the creation of child-care centers. It should be noted that, at that time, the new authorities of the Directorate of Recycling sought to terminate the contracts with almost half of the area's employees, who managed to resist layoffs and establish strong alliances with a segment of waste pickers (Cooperativa Las Madreselvas, Recuperadores del Oeste, and Cartonera Sur).

The new modality in logistics implied that the carts (Carenzo and Schamber, 2021) would be delivered empty in the evening by waste pickers in certain locations in the province of Buenos Aires, to be transported to the Autonomous City of Buenos Aires by trucks. Then, waste pickers would take regular trains like any other passenger to fetch their respective carts at previously defined places in the Autonomous City of Buenos Aires, which began to be identified as stops. There they would start their daily route collecting materials, a task that usually took no less than 4 hours. At the end of the day, the loaded carts would be once again delivered to the stop, where trucks would transport them again, this time loaded, to the starting point in the province. Waste pickers would return to their destination in the province by taking regular trains, fetch their carts, and take them to their respective homes. The next day, waste pickers themselves or a member of their family would unload the materials and proceed to classify and store them in certain areas of the house, and thus, the empty cart would be ready to start a new working day in the afternoon. Sales would take place on Saturdays, and freight costs had to be paid to take the materials to the warehouse (Gorbàn, 2014).

At that time, and as one of the innovations established in the Bidding Document No. 06/03 then in force, segregated collection, which was carried out exclusively in large generators, was done by the collection companies, which took the material to the Green Centers. However, a report by the Technical

[8] Several newspaper articles from those days reflect the conflicts between cartoneros, local residents, and authorities; see http://www.pagina12.com.ar/diario/ultimas/20-89731-2007-08-15.html (accessed on February 22, 2021), http://www.lanacion.com.ar/nota.asp?nota_id=989831 (downloaded on February 22, 2021), and http://www.clarin.com/diario/2008/02/23/laciudad/h-06015.htm (accessed on February 22, 2021).

Advisory Commission under Act No. 1854 challenged the high price charged by these companies for this segregated collection service. Those arguments had already been presented in another government report (Pardo R. et al., 2006), which described the volumes of segregated collection carried out by the companies as "negligible and insignificant". Indeed, this study concluded that with this segregated collection, 6 tons per day of very poor-quality material were obtained, while in the circuit in which the waste pickers participated, about 585 tons per day of optimal material were collected for further commercialization. As a consequence, the Government of the Autonomous City of Buenos Aires terminated the contracts for the segregated collection service with the companies. The budget for the provision of the collection service in large generators that was managed by the Directorate of Cleaning (DGLIM) [*Dirección General de Limpieza*] was transferred to the Directorate of Recycling (DGREC) [*Dirección General de Reciclado*] and was assigned to the waste pickers' organizations (Villanova, 2014). In addition to replacing collection companies with one of the most numerous cooperatives (El Amanecer de los Cartoneros) for the segregated collection from large generators, the Government of the Autonomous City of Buenos Aires granted the first 600 incentives to the waste pickers of that cooperative for the performance of home segregated waste collection tasks.

Despite the agreements with the cartoneros' organizations, the Government of the Autonomous City of Buenos Aires introduced a Bill (1791-J-2008) before the Legislature of the Autonomous City of Buenos Aires in order to authorize the Executive Branch to grant a concession for the Public Service of Urban Hygiene in view of the expiration of the waste collection contract in force at that time. Such an initiative was harshly criticized by the participants of the public hearings (environmental organizations, waste pickers' representatives, and opposition politicians), and, consequently, it did not succeed. In July 2008, the Government of the Autonomous City of Buenos Aires signed an agreement with the *cartoneros'* organizations, where, among other things, it committed to:

- grant the exclusive concession of wet waste, as an Urban Hygiene Service provider, with collection companies, and develop an integral management policy with the direct participation of UWPs, who are recognized as the main protagonists of recycling efforts in the city (as established in Act No. 992/03, mentioned above),
- discuss a legal framework that grants cooperatives and independent UWPs the management of dry solid urban waste (SUW),

- guarantee transportation services for the waste pickers that used the suspended railway lines,
- provide buses and pay transportation costs to the waste pickers grouped in the Movement of Excluded Workers (MTE) [*Movimiento de Trabajadores Excluidos*], and
- provide the necessary logistics for transportation from large generators to green centers with the participation of *cartoneros* and finish other planned green centers.

In April 2010, the Ministry of Environment and Public Space presented File No. 350165/2010, a new version of the bidding documents[9] for the Public Bidding regarding the Hiring of Public Services of Urban Hygiene (Wet Department) and a Public Bidding regarding Collection Services of Urban Solid Waste (Dry Department). These documents establish two very different types of hiring. The first is developed within the framework of the laws governing public procurement and reaches almost 20% of the City's annual budget. The second document includes the concession of a service for which no expense is paid and that is governed by a series of conditions subject to a broad margin of negotiation and agreements between the government and the UWPs cooperatives.

The main topics of the final version of the "Wet Waste" bidding document deal with:

- the generalization of the container collection method,
- the expansion of service frequency (once a day, seven days a week), and
- the creation of a Compost Plant and a Demolition Waste Plant in each area.

With regard to the "Dry Waste" bidding document, it is highlighted that:

- the door-to-door waste collection service and transportation to a Green Center (or similar establishment to be designated) will be exclusively at the expense of UWPs cooperatives, which must include individual waste pickers who are providing the service on their own in their area of influence;

[9] Bidding documents are contractual instruments that regulate the contracting of services. Those related to a city's waste management are the main instruments that express the city's public policies in this field.

- the Government of the Autonomous City of Buenos Aires allows the commercialization of the waste collected in consideration of the services provided under concession;
- the Ministry of Environment and Public Space undertakes to gradually implement different programs (an Integral Logistics Program, a Child Labor Eradication Program, a Social Inclusion Program, a Monthly Incentive Program, and a Green Centers Management Program) through which it will seek to guarantee the adequate provision of the service and the achievement of the principle of social inclusion;
- the contractual term is 4 years; and
- the scope of the bidding includes 12 areas, since the areas where the UWPs cooperatives already provide the service are not subject to bidding. Therefore, the bidding map excludes the central and northern strip of the city where the organizations that already have an agreement with the Government of the Autonomous City of Buenos Aires operate.

After several months of interviews, meetings, and workshops with key stakeholders (service provider companies, UWPs cooperatives, unions, chambers, and civil society organizations), a Public Hearing was held on September 29, 2010, where, unlike the Public Hearing held in 2008, the remarks were mainly aimed at supporting the new Bidding documents. Most of the participants only referred to the bidding for dry waste. The two most criticized issues were the absence of a budget for the provision of this service and the lack of criteria for providing the service to large generators, which are not equally distributed in all areas of the city.

What does the current dry waste management system consist of?

Incentives

During 2014, through "Social Management Contracts for the Provision of the Public Service of Dry Urban Solid Waste Collection" signed between the Directorate of Recycling (under the Ministry of Environment and Public Space) and 12 UWPs cooperatives, the Government of the Autonomous City of Buenos Aires assigned them exclusive areas of the city for the collection of this type of waste, infrastructure for its treatment (Green Centers), and logistical support for the transportation of materials and people. In addition,

a significant number of UWPs were incorporated into the incentive scheme. Meanwhile, the organizations committed to complying effectively with the contractual terms and to gradually including independent waste pickers (self-employed waste pickers who do not belong to any cooperative) who work in the assigned areas. There are currently around 5,000 waste pickers from the 12 cooperatives who receive monthly incentive payments from the Government of the Autonomous City of Buenos Aires in individual accounts held with Banco de la Ciudad. This number includes waste pickers who carry out street collection activities and more than 800 operators of green centers and drivers employed in logistics tasks. Table 1 below shows the number of waste pickers per cooperative for the period 2015-2021.

Table 1. Number of UWPs per cooperative, 2015-2021

	Number of male and female environmental waste pickers					
Cooperative	2015	2016	2017	2018	2019	2020
Aleli	222	222	222	225	225	225
Baires	161	161	161	163	163	163
Recolectores del Oeste	65	66	66	66	70	70
El Alamo	33	59	74	74	74	74
El Ceibo	93	91	91	91	98	98
El Trebol	36	36	36	36	31	31
Las Madreselvas	445	464	464	464	460	460
Amanecer de los Cartoneros	3,174	3,268	3,268	3,268	3,174	3,174
Recuperadores Urbanos del Oeste	616	663	663	663	663	663
Primavera	58	58	58	58	60	60
Cartonera del Sur	43	47	50	50	38	38
Trabajo y Dignidad	42	42	42	42	36	36
Total	4,988	5,177	5,195	5,200	5,092	5,092

Source: Ministry of Public Space and Urban Hygiene of the Government of the Autonomous City of Buenos Aires.

Stages and productivity bonus

Each cooperative has its own organizational characteristics and modalities when it comes to the tasks performed. Since 2014, larger cooperatives have been gradually implementing, in accordance with the Government of the

Autonomous City of Buenos Aires, a selective waste collection service known as "stages", which includes important modifications to the system in effect since 2008, when trains were replaced by trucks for the transportation of carts. Every stage includes a series of tasks to be performed simultaneously: the installation of a new type of container exclusively for recyclable material (such containers are colloquially known as campanas (bells) due to their trapezoidal, bell-like shape); and the creation of the role of Environmental Waste Picker (EWP), which differs from the UWP principally, but not exclusively, in that EWPs receive a monthly incentive that is twice as high as the incentive UWPs receive. Waste pickers still go to stops, usually on their own, either by train or by bus hired by the Government of the Autonomous City of Buenos Aires. There, Directorate of Recycling employees, designated as Group Leaders, take attendance. The amount of incentive they receive, either full or partial, depends on that attendance record. A cooperative delegate provides one or two bags of more than a cubic meter to every waste picker; such bags had been previously delivered and unloaded from the relevant Green Center by other cooperative members. Moreover, the delegate delivers tags where the UWP's name and the number they receive on the attendance list are written.

Once attendance is recorded and bags and tags are delivered, EWPs begin their route. Every EWP is in charge of 2 or 3 previously assigned waste containers which are not far from each other (approximately 100 meters). On the way from one container to another, while hauling the loaded bag, EWPs also pick up recyclable material disposed of by customers (shops and buildings). In fact, the materials of larger quantity and better quality which EWPs store in those bags come from such customers. Nevertheless, waste pickers must check the assigned containers as part of their duties and deposit any remaining non-recyclable waste in the standard (black) containers.

In less than two hours after the beginning of this process, the loaded bags are closed and sealed. A truck carrying between 4 and 5 operators takes them to the Green Center. The EWPs return by walking to the stop where they await the departure of the transport hired by the Government of the Autonomous City of Buenos Aires, which will take them back to their own neighborhoods located in the municipalities of the suburbs where they live. At the Green Center, other cooperative members register the weight of the bags and, by checking the tag, can identify the EWP in charge of them. Then, tasks related to the classification and preparation of the material for sale take place. Materials may be baled, bagged, or put into metal containers, colloquially known as *tachos*

(waste bins), a term used in the construction industry for the containers used for storing rubble or roll-off dumpsters).

It should be noted how the implementation of the stages system led to, among other modifications, the end of itinerant collection and the assignment of a specific route between containers in certain areas, assigned under the contract with the cooperative to which the EWPs belong. Moreover, the modifications established that, in order to receive the total incentive, EWPs had to perform their tasks 5 days a week (unlike UWPs who had to perform their tasks only 3 days a week). It is also worth mentioning that UWPs no longer use and transport carts, as they have been replaced by bags. In addition to logistical matters, the new modality included a radical transformation in relation to the traditional performance of the task: individuals in charge of collecting materials are no longer involved in the classification and sale of recyclable materials. In this new division of labor, other members of the same cooperative are now in charge of the treatment and trade of recyclable material. Therefore, waste pickers that have become EWPs receive an increase in their incentives and also collect the income related to the trade of collected materials in a different manner: they used to be paid in cash the amount pertaining to the sale of materials individually collected; now, such an amount is called a productivity bonus. Indeed, cooperatives deposit every two weeks, in the same bank account where EWPs receive the incentive, an amount that varies according to the weight of individually collected bags. Nonetheless, this amount is no longer related to the specific market value of different materials or the relationship individual buyers may have with waste pickers. However, it should be highlighted that the manner in which the productivity bonus is estimated may differ among cooperatives that participate in the stages system and has even undergone variations in each of these cooperatives.

Since June 2017, and in accordance with new agreements made with the Government of the Autonomous City of Buenos Aires, a different rate has been established for waste pickers who individually collect more than 600 kilograms per month. That is, there are two different rates by which the kilograms of materials individually collected are multiplied, depending on whether the amount collected reaches 600 kilograms or not. Thus, the Government of the Autonomous City of Buenos Aires encourages the collection of all types of recyclable materials, not only those that have a higher market value.

Relying on interviews held with several EWPs who participate in the stages system, the improvement in quality of life, as a result of the work system changes, was highly appreciated. Nevertheless, the interviewees also reported

some inconveniences or disadvantages. Below, a table reflects the advantages and disadvantages of the work system changes.

Table 2. Advantages and disadvantages of the new container system and EWPs

New system of containers and EWPs	
Advantages	**Disadvantages**
Fewer working hours	No possibility of collecting large objects for themselves or to be traded (household appliances, furniture, mattresses, among others)
Less physical exertion	Lack of information regarding the system used to calculate productivity bonus
More space and comfort at home as well as more tidiness and hygiene as a result of not taking materials home	Bags deterioration
No involvement of EWPs in the sale of materials, which includes the transportation of materials and negotiation with buyers	Lack of awareness of market value and suspicions of value deduction

Source: Pablo Schamber, Francisco Suárez, 2019.

Management of Green Centers

Although Green Centers have the same duties, they do not all have similar infrastructure and dimensions or the same equipment and technology. In certain cases, Green Centers are facilities specifically designed and built to operate as waste classification plants, while in other cases they are warehouses or storerooms that cooperatives already had and which were adapted after the agreements made with the Government of the Autonomous City of Buenos Aires.

In addition to the materials waste pickers of cooperatives collect door-to-door or from containers, according to the system described above, Green Centers also process materials that were directly obtained from large generators as well as materials obtained from Clean Points, here denominated Green Points.[10]

[10] In the Autonomous City of Buenos Aires, more than 100 Green Points have been installed. Green points are containers where different recyclable waste materials are disposed of by local

Below, Table 3 includes information about the quantity of dry waste admitted into the group of Green Centers during the period 2014-2020.

Table 3. Annual tons of dry waste admitted into Green Centers of the Autonomous City of Buenos Aires

Period	Tons per year
2014	70,999
2015	45,223
2016	96,000
2017	100,800
2018	102,699
2019	91,242
2020	20,904
2021	74,671

Source: Ministry of Public Space and Urban Hygiene, Government of the Autonomous City of Buenos Aires

In accordance with the most recent study on waste quality in the Autonomous City of Buenos Aires conducted by the Faculty of Engineering at the Universidad de Buenos Aires and the Ecological Coordination Metropolitan Area State Society (2016), the recyclable portion of materials—i.e., paper and paperboard, plastic, glass, and ferrous and non-ferrous metal—amounts to 32.59%. Nonetheless, that study also reports that due to (a) the probable presence of contaminants in the waste stream, (b) the fact that not all recyclable waste materials have market value, and (c) the limited number of inhabitants who participate in the system of home waste sorting, the highest expected percentage of recoverable material drops to 11.5%. Taking into account the fact that the Autonomous City of Buenos Aires disposes of a million tons of waste at the facilities of the Ecological Coordination Metropolitan Area State Society, then in 2019 the group of Green Centers recovered either 28% of the total waste stream or 79% of the recyclable portion, depending on the perspective.

residents. https://www.buenosaires.gob.ar/ciudadverde/separacion/donde-llevar-los-reciclables/puntos-verdes

Controversy between waste-to-energy (incineration) and recovery/recycling

While the stages system was being implemented, different government agencies promoted debates in favor of incineration or "waste-to-energy" methods of waste treatment. Energy generation from waste is contrary to waste minimization and recycling policies, due to the fact that dry and flammable elements decrease the costs of that practice. Such methodology goes against recycling and the policies described in this work, even though this opposition is not explicitly disclosed by their promoters. Incineration, in whatever form it may take, is inconsistent with the most ambitious recycling goals, is subject to criticism regarding health care, and, despite requiring fewer people in the workforce, is more expensive.

In the Autonomous City of Buenos Aires, as an excuse for supporting this alternative, government authorities have shown the poor results obtained in connection with the goals established in the "Zero Waste Act," regarding the gradual reduction of waste sent to confinement in sanitary landfills, as though such results were not their own responsibility. For instance, the subsecretary of Urban Hygiene of The Autonomous City of Buenos Aires revealed in an interview that "the goals established in the Act were impossible to achieve, because said Act was based on the data obtained in 2004, a year in which the City generated less waste" (Listek, 2008). In line with this statement, since 2013, in the Autonomous City of Buenos Aires, 12 *cartoneros'* cooperatives have been in charge of recyclable waste processing and the levels they have obtained are also insufficient.

This posture is completely inconsistent with recent international environmental agreements (Communication of the European Commission to the European Parliament, COM, 2017, 34 final). In accordance with these agreements, the hierarchy that prioritizes the minimization of waste generation, its prevention, and recycling is ratified. The recommended option for biodegradable waste is energy recovery by means of anaerobic digestion. Only after that will incineration be an alternative, provided that high levels of energy recovery are being dealt with.

The search for acceptance of this new methodology was promoted through the Social and Economic Council of the Autonomous City of Buenos Aires. Since then, officials and lawmakers have been traveling to Europe to observe waste incineration plants (Polack, 2018). The result of this peregrination can be seen in the modification of the "Zero Waste Act" and the amendments introduced by Act No. 5966/2018 allowing waste incineration. Before these

modifications, there were intense debates that took place in national universities, chambers of commerce, and the media. The debates exposed, among other issues, a lack of public attention to the recycling system with social inclusion, the competition between recycling and waste-to-energy, the absence of or lack of improvements in composting policies, the persistence of the logic of transporting waste to the outskirts of the Autonomous City of Buenos Aires, thus extending historical territorial and environmental injustices, as well as criticisms about the capacity to control new, high-risk technology and uncertainty about damage, high costs, and few energy and environmental benefits.

Alliances between actors were reinforced or rebuilt. Thus, two argumentative postures were adopted. On the one hand, there were individuals in favor of promoting waste material recycling, who included waste picker associations, scholars related to social and environmental sciences, environmental NGOs, and chambers of commerce related to plastic, paper, and paperboard recycling. On the other hand, there were promoters of waste-to-energy incineration, that is, city governments, companies that provided environmental services, and professional entities related to engineering (Suárez and Shamber, 2019). In June 2018, allied groups in favor of recycling—including the Federation of Waste Pickers, Cart Carriers and Recyclers (FACCYR), [*Federación de Cartoneros, Carreros y Recicladores*]; the Observatory of Law to the City, ODC [*Observatorio del Derecho a la Ciudad*]; the Environment and Natural Resources Foundation, FARN [*Fundación Ambiente y Recursos Naturales*]; Greenpeace; and Avina—filed a joint action for protection of constitutional rights (a summary proceeding in Argentina called *amparo*) to request the unconstitutionality of Act No. 5966/2018, given the fact that the "second reading" step required for public hearings had been omitted.[11] Moreover, the above groups carried out diverse actions and protests against waste incineration. In October 2019, the Judicial Branch of the Autonomous City of Buenos Aires, after admitting the joint action for protection of constitutional rights, approved said request for legal protection submitted by waste pickers and environmental organizations and decided that Act No. 5966 was null and unconstitutional.

[11] Second reading is a procedure established under the Constitution of the Autonomous City of Buenos Aires. Section 89 sets forth that acts which affect the Urban, Environmental, and Building Planning Codes must be approved twice: initially, a first reading should take place, and then there should be a second reading where a mandatory public hearing should be called for them to be discussed once again and then passed, rejected, or modified.

Conclusion

Is there a consolidation of UWPs in dry waste management within the Autonomous City of Buenos Aires?

In the Autonomous City of Buenos Aires, a system of inclusion and formalization of UWPs regarding dry waste management is being implemented. This system cannot be compared to similar initiatives in other cities in the world, given its characteristics and magnitude. In the Autonomous City of Buenos Aires, 12 *cartoneros*' cooperatives include nearly 5,000 UWPs, and they are exclusively in charge of the segregated collection of dry or inorganic waste throughout the entire territory, including from households, large generators, and green points, as well as its processing through the management of 16 classification plants (Green Centers). Such organizations receive a payment to cover costs related to the tasks they perform and are absolutely autonomous in negotiating for recyclable materials with interested buyers, whereas their members receive a monthly remuneration (incentives) from the Government of the Autonomous City of Buenos Aires for performing their work (attendance bonus), which is historically around USD 200. They may also receive a productivity bonus that is directly related to the amount of individually collected materials.

This current situation is far from being a result of a strategy deliberately planned by the city government then in office. Different events kept changing the role of actors and interests as well as the aims of public policies: "Zero Waste" Act No. 992, public hearings for the presentation of the bidding documents for the waste collection service, and the "Zero Waste Act" amendment, among others. As a result of resistance and demands from *cartoneros* and their environmental and university allies since the mid-2000s, the recycling system with social inclusion has acquired the characteristics it has today, which were strengthened as of 2008 and, mainly, since 2014.

Nevertheless, the goals pursued by the political leaders who have governed the city since 2008 have proven to be contrary to those they finally adopted. The comments made during an interview by the Head of Government of the Autonomous City of Buenos Aires a few years ago (when he was a candidate in the middle of his political campaign) were clear enough: "*Cartoneros* have a criminal attitude because they steal trash […] informal waste pickers cannot be on the streets. We will take them out from the streets (...) they are committing an offense, because stealing trash is no different from robbing a man of his possessions around the corner" (Rey, 2002). This suggests that the political

decisions made are a result of opting for debate and negotiation alternatives with *cartoneros*' organizations for the purpose of avoiding social conflicts and keeping order over their activity in the territory (Gurrieri Castillo, 2020). Moreover, they are also a result of responding to claims, thus avoiding conflicts of interest with companies that provide wet waste collection services, against which waste pickers had the main clashes back then.

The system that now exists in the Autonomous City of Buenos Aires has been described by recent authors as a "public service of co-determination" (Gurrieri Castillo, 2020) or either a "problematic collaboration" (Gutiérrez, 2020) between the Government of the Autonomous City of Buenos Aires and cooperatives. Indeed, unlike other public service providers in the city, and unlike companies that are in charge of collecting wet waste, the role of the Government of the Autonomous City of Buenos Aires is more related to tuition and assistance rather than supervision and control. In fact, as noted above, the payment that cooperatives receive is not related to the provision of a service, but to the recognition of operative and maintenance costs. Moreover, incentives are exclusively connected to attendance and are not linked to the quality of waste pickers' performance.

Is this situation the last step in the ladder of inclusion/formalization of UWPs into the management of waste that the Government of the Autonomous City of Buenos Aires could grant or, conversely, is it the stepping stone to achieve new rights in the future? Will the relationship between cooperatives and the Autonomous City of Buenos Aires become less assisting and tutelary and more similar to the relationship the government has with other service-providing companies? Will cooperatives be vertically integrated by incorporating transformation and recycling processes? What role will cooperatives have with respect to the management of other waste materials, such as electrical and electronic waste and organic waste? These and other questions are posed especially in the new and uncertain scenario unveiled by the COVID-19 epidemic.

Executive Order No. 297, issued by the Argentine federal government on March 19, 2020, established the Mandatory Preventive Social Isolation; Section 6 provides for the exclusion of certain activities considered essential. Item 16 includes the "collection, transportation and treatment of urban solid, hazardous, and pathogenic waste". Even though the definition above clearly covers the practices that the 12 cooperatives perform, their activities were interrupted and suspended for most of 2020, a fact that can be seen in the tons of waste collected in that year (see Table 3). That was not the case for companies in charge of collecting wet waste. If both cases cover activities involved in the

collection, transportation, and treatment of urban solid waste, what criteria could justify the fact that the latter is considered essential but the former is not? Notwithstanding the achievements accomplished, the suspension of the most favorable practices for environmental care exposes a hierarchical and status difference shown in the type of contracts made between companies responsible for indiscriminate collection and treatment equivalent to waste being buried in sanitary landfills, on the one hand, and cooperatives in charge of segregated waste collection and treatment, related to social inclusion, on the other.

In a context of conflicts, negotiations, and agreements, groups of UWPs and the Government of the Autonomous City of Buenos Aires have co-existed for almost two decades between social inclusion and recognition on the one hand, and exclusion and limited participation to prevent conflicts on the other. Controversies and struggles of power have created a particular management system of waste recovery and recycling that, though it has unprecedented levels of inclusion compared to other cities around the world, is still characterized by a formality-informality hybrid system.

References

Alvarez, Raúl N. (2011) La basura es lo más rico que hay. Relaciones políticas en el terreno de la basura. El caso de los quemeros y los emprendimientos sociales en el relleno Norte III del CEAMSE. Buenos Aires. Dunken.

Bercovich, Néstor y Chidiak Marina. (1997) "Desarrollo y crisis de la producción de celulosa y papel en Argentina". En Bercovich N. y Katz J., Reestructuración industrial y apertura económica. La industria de celulosa y papel en Argentina, Brasil y Chile en los años 90. CEPAL/ IDRC - Buenos Aires. Alianza Editorial.

Borello José (1997) La industria Argentina de celulosa y papel: Reestructuración, reciclado, calidad y localización (Informe de Investigación N.o 13). Buenos Aires. Ediciones del CEUR.

Busso, Mariana (2004) Los trabajadores informales y sus formas de organización colectiva. Un estudio en ferias de la ciudad de La Plata [Tesis de Maestría en Ciencias Sociales del Trabajo, Universidad de Buenos Aires]. http://www.ceil-conicet.gov.ar/wp-content/uploads/2013/02/2004busso.pdf acceso 24/05/2017

Carenzo S. y Schamber P.: Reciclaje inclusivo y modelos de transferencia tecnológica en Argentina. Análisis socio-técnico de iniciativas de reemplazo de carros cartoneros, en Revista Iberoamericana de Ciencia Tecnología y Sociedad 2021, Volúmen 16 N° 47 ISSN 1850-0013 (119-151).

Gorban, Débora (2005). Formas de organización y espacio. Reflexiones alrededor del caso de los trabajadores cartoneros de José León Suárez. Universidad de Buenos Aires, Tesis de Maestría Facultad de Ciencias Sociales.

_____(2014) Las tramas del cartón. Trabajo y familia en los sectores populares del Gran Buenos Aires. Buenos Aires: Editorial Gorla.

Dimarco, Sabina (2010) Entre el trabajo y la basura: Socio-historia de la clasificación informal de residuos en la Ciudad de Buenos Aires (1870-2005) [Tesis para optar por el título de Doctora en Ciencias Sociales]. Universidad de Buenos Aires.

Facultad de Ingeniería de la Universidad de Buenos Aires-CEAMSE, septiembre de 2016: Estudio de Calidad de los RSU de la Ciudad Autónoma de Buenos Aires, disponible en http://www.ceamse.gov.ar/wp-content/uploads/2017/10/I.Final-ECRSU-CABA-FIUBA-2015-NOV-16.pdf

Gurrieri Castillo, J. L. (2020) Del reclamo por el derecho a trabajar al Servicio Público Cogestionado Sobre el proceso de formalización de los cartoneros en la Ciudad de Buenos Aires (2002-2016) [Tesis de Maestría Políticas Sociales y Urbanas]. Universidad Nacional de Tres de Febrero.

Gutiérrez, Ricardo (2020) "A Troubled Collaboration: Cartoneros and the PRO Administrations in Buenos Aires". Latin American Politics and Society, 62, 120. https://doi.org/10.1017/lap.2019.47. Acceso 10/12/2020

Lacabana, Miguel (2019) Economía y ambiente: El subsector celulosa-papel en Argentina. Universidad Nacional de Quilmes. https://ridaa.unq.edu.ar/bitstream/handle/20.500.11807/2342/economia_y_ambiente.pdf?sequence=1&isAllowed=y Acceso 10/12/2020

Listek, Vanesa (2018) "Incineración de residuos: el juego del Gran Bonete" Visión sustentable 23/8/2018 (https://www.visionsustentable.com/2018/08/23/incineracion-de-residuos-el-juego-del-gran-bonete) Acceso 20/02/2021

Maldovan Bonelli, Johanna (2014) Del Trabajo Autónomo a la Autonomía de las Organizaciones. La Construcción de Asociatividad en las

Cooperativas de Recuperadores Urbanos de la Ciudad de Buenos Aires, 2007-2012 [Tesis Doctoral Facultad de Ciencias Sociales]. Universidad de Buenos Aires.

Molina, Nadia (2017) Los intermediarios de materiales reciclables: Dimensiones de su rol en el subsistema del reciclaje en Quilmes. [Tesis de Maestría en Ambiente y Desarrollo Sustentable, Universidad Nacional de Quilmes]. https://ridaa.unq.edu.ar/bitstream/handle/20.500.11807/835/TM_2017_molina_015.pdf?sequence=1&isAllowed=y

Paiva, Verónica (2008) Cartoneros y cooperativas de recuperadores. Una mirada sobre la recolección informal. Buenos Aires. Prometeo Libros.

Paiva, Verónica & Perelman, Mariano (2005) "Aproximación histórica a la recolección formal e informal de la Ciudad de Buenos Aires: La "quema" de Parque Patricios (1860-1917) y la del Bajo Flores (1920-1977)". Theomai, 21, 134-149. http://revista-theomai.unq.edu.ar/numero%2021/ArtPaiva.pdf

Pardo, Rubén, Cariboni, Félix, Risso, Antonella y Pugliese, Mariela (2006) Informe sobre el circuito del reciclado en la Ciudad Autónoma de Buenos Aires, Área de Investigación de la Dirección General de Política de Reciclado Urbano, Subsecretaría de Higiene Urbana, Ministerio de Medio Ambiente, Gobierno de la Ciudad de Buenos Aires.

Perelman, Mariano (2010) El cirujeo en la ciudad de Buenos Aires. Etnografía de la supervivencia [Tesis doctoral Facultad de Filosofía y Letras]. Universidad de Buenos Aires.

Polack María Elena (2018) "Basura: La Ceamse analiza modelos de incineración para la ciudad" Diario La Nación 3/03/2018 (https://www.lanacion.com.ar/sociedad/basura-la-ceamse-analiza-modelos-de-incineracion-para-la-ciudad-nid2113828/) acceso 23/02/2021

Portugheis, Alexander (2020) Las institucionalidades emergentes de tres cooperativas de reciclado del Cono Sur (2010, 2015): Coop. Coocassis de Brasil, Coop. NuevaMente y Coop. Nuestro Ambiente Limpio de Argentina [Tesis de Maestría en Políticas Ambientales y Territoriales]. Universidad de Buenos Aires.

Prignano Angel (1998) Crónica de la basura porteña. Del fogón indígena al cinturón ecológico. Junta de Estudios Históricos de San José de Flores.

Schamber, Pablo (2008) De los desechos a las mercancías: Una etnografía de los cartoneros. Buenos Aires. SB.

_____ (2012) "De la represión al reconocimiento. Derrotero de la política pública hacia los cartoneros en la CABA (2002-2011)". Revista Perspectivas de Políticas Públicas, 2(3), 148-176. https://doi.org/10.18294/rppp.2012.615

Shammah, Chintia (2009) El circuito informal de los residuos. Los basurales a cielo abierto. Buenos Aires. Espacio editorial.

Sorroche, Santiago (2016) Gubernamentalidad global y vernaculización en la gestión de residuos. Análisis etnográfico desde la experiencia de cooperativas de cartoneros en el Gran Buenos Aires [Tesis doctoral Facultad de Filosofía y Letras, Universidad de Buenos Aires]. http://repositorio.filo.uba.ar/handle/filodigital/6019

Suárez, Francisco M. (1998). Que las recojan y arrojen fuera de la ciudad: Historia de la gestión de los residuos sólidos (las basuras) en Buenos Aires. Instituto de Conurbano, Universidad Nacional de General Sarmiento.

_____ (2003) Actores sociales de la gestión de los residuos sólidos de los municipios de Malvinas Argentinas y José C. Paz [Tesis de Maestría en Políticas Ambientales y Territoriales]. Universidad de Buenos Aires.

_____ (2016) La Reina del Plata. Buenos Aires: Sociedad y residuos. Universidad Nacional de General Sarmiento.

Suárez Francisco, F., & Schamber, P. (2019). "Los residuos en su encrucijada: Alcances y desafíos en la gestión de los residuos en la Región Metropolitana de Buenos Aires". En Di Pangracio A., Nordenstahl S. y Tramutola M. J. (Ed.), Informe Ambiental Buenos Aires. FARN 2019.

Svampa, M. (2005). La Sociedad Excluyente. La Argentina bajo el signo del neoliberalismo. Buenos Aires. Taurus

Rey, Alejandra (2002) "Reportaje a Mauricio Macri. ´A los recolectores informales de basura los vamos a sacar de la calle" Diario La Nación, 27/08/02 https://www.lanacion.com.ar/sociedad/a-los-recolectores-informales-de-basura-los-vamos-a-sacar-de-la-calle-nid425929/, acceso 22/02/21

Tagliafico, J. P., García, A., & Schamber, P. (2016) "La transformación de las funciones de la asociatividad en una cooperativa de cartoneros: De la representación al trabajo productivo". Revista Perspectivas de Políticas

Públicas, 5(10), 165-190. https://doi.org/10.18294/rppp.2016.1021 Acceso 20-02-2021

Villanova, Nicolás (2014) "Los cartoneros y la estatización de su condición como población sobrante para el capital por intermedio de las cooperativas. Ciudad de Buenos Aires, 2001-2012". Trabajo y sociedad: Indagaciones sobre el empleo, la cultura y las prácticas políticas en sociedades segmentadas, 23, 67-91. https://dialnet.unirioja.es/servlet/articulo?codigo=5120114. Acceso 15-12-2020

_____ (2015) Cirujas, cartoneros y empresarios. La población sobrante como base de la industria papelera (Buenos Aires, 1989-2012). Buenos Aires. CEICS-Ediciones RyR.

Perspectives for the socio-productive inclusion of waste pickers in the Brazilian recycling scenario

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Introduction

Waste management is a critical public service, and if waste is not collected and dumped or burned, serious environmental consequences are created, affecting the health of communities and the environment. However, waste is more than a sanitary or health problem to be addressed with technological solutions. Waste management requires an integrated approach that focuses on the social, cultural, technological, and economic facets of waste (Velis, Wilson, Rocca, Smith, Mavropoulos & Cheeseman, 2012; Gutberlet, 2015a). The Brazilian legislation for waste management is a unique example of integrated and inclusive selective waste collection and separation of reusable and recyclable materials, and it represents a profound social innovation by involving waste picker organizations in policy design and implementation.

Worldwide, waste pickers are at the forefront of retrieving recyclable materials for reuse and further industrial processing (Wilson, Velis & Cheeseman, 2006; Chaturvedi, Arora & Saluja, 2015; Gutberlet, 2016; Linzner & Lange, 2013; Samson, 2009; Scheinberg, Spies, Simpson & Mol, 2011). In some countries, waste pickers have organized into cooperatives, associations,

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unions, federations, or networks. Waste picker movements and networks enact new practices that link waste pickers and their actions into a broader political movement, bringing political debates around inclusive waste management to a larger audience. Organized waste pickers are important political actors in governance, participating in selective waste collection programs and in the social and solidarity economy. The establishment of partnerships between waste pickers and the government (co-production) creates the opportunity for more participatory and environmental governance, holding the promise of more innovative and solution-oriented waste management, but also of increased cooperation among different social actors that may have previously been outside the policy process, such as the waste pickers' social movement and grassroots organizations (Navarrete-Hernandez & Navarrete-Hernandez, 2018, Gutberlet, 2015b).

Alternative ways of waste management include co-production, which is understood as partnership arrangements in public service provision and is mostly known within water management (Bovaird, 2007; Joshi & Moore, 2004; Ostrom, 1996). Co-production is defined as "the process through which inputs used to produce a good or service are contributed by individuals who are not 'in' the same organization" (Ostrom, 1996, p. 1073). Joshi and Moore describe institutionalized co-production as the "provision of public services (broadly defined, to include regulation) through regular, long-term relationships between state agencies and organized groups of citizens, where both make substantial resource contributions" (2004, p. 40). Many authors have recognized the importance of non-governmental actors and organizations in mobilizing public opinion and in creating new solutions (Lemos & Agrawal, 2006). In Brazil, waste pickers have been organized for more than 20 years, and they have become persistent city co-producers of selective waste collection services (Zapata-Campos & Zapata, 2012), sometimes building lasting partnerships despite many hurdles.

Representatives from the Brazilian waste picker movement (Movimento Nacional de Catadores de Materiais Recicláveis MNCR) have participated in the elaboration of the National Solid Waste Policy (Brazil, 2010)[1]. This legislation, among other factors, gives priority to waste picker associations and cooperatives as agents to carry out paid selective waste collection and separation. Since 2002, waste pickers have been recognized as professionals, and their

[1] Federal Act No. 12,3050/2010 – institutes and Federal Decree No. 7,404/2010 - regulates the policy.

activity is included in the Brazilian Code of Occupations by the Ministry of Labor, providing increased recognition to the sector. This innovation encourages companies to formally hire these professionals and municipalities to contract waste picker cooperatives (Besen & Dias, 2011). By means of the Federal Policy on Public Sanitation Services (Law 11,445), launched in 2007, the law allows governments to contract the services of waste picker cooperatives without the need to go through a bidding process. Furthermore, Federal Decree 5,940/2006 makes it mandatory for federal offices to implement waste separation at the source, directing all recyclables to waste picker associations and cooperatives. The federal government has encouraged extended producer responsibility (EPR) systems for several materials (including oils and lubricants, electronics, batteries, fluorescent lamps, tires, medicines, pesticide product packaging, and packaging in general). Except for medicines and tires, waste picker organizations have become key actors in the recovery of these materials. These advances achieved through progressive and inclusive policies have increased the recognition of waste pickers and the empowerment of their leadership, which makes Brazil an interesting case from which to study and learn.

The key objective of this paper is to introduce and discuss the national waste management law of Brazil as a unique piece of legislation supporting inclusive waste management, critically evaluating its challenges and outcomes in its implementation, particularly given the political context since 2018. The authors have been working with waste picker organizations for nearly 20 years, one as a practitioner and the other as an academic. This paper is informed by a participatory (Brandão, 1987; Fals-Borda, 1987; Thiollent, 2011), action-oriented (Israel, Eng, Schulz & Parker, 2005; Israel, Coombe, Cheezum, Schulz, McGranaghan, Lichtenstein & Burris, 2010; Minkler & Wallerstein, 2008), and community-based (Koster, Baccar & Lemelin, 2012) research orientation. The relationships built with waste pickers over many years are highly valued, and the process of knowledge creation is understood as being co-produced with them as research participants.

The hypothesis of this paper is that based on the national law, significant numbers of new jobs can be created by expanding co-production arrangements between local governments and waste picker organizations, concomitantly also tackling current waste mismanagement and environmental health issues. Several studies have explored this topic in many different geographic contexts (Dias & Alves, 2008; Gutberlet, 2016; Scheinberg & Savain, 2015). This analysis is embedded in theories of co-production (Ostrom, 1996), the social and solidarity economy (Moulaert & Nussbaumer, 2005; Morais, Dash & Bacic, 2017),

and the circular economy (Geissdoerfer, Savaget, Bocken & Hultink, 2017; Ghisellini, Cialani & Ulgiati, 2016; Gutberlet, Carenzo, Kain & Azevedo, 2017; Navarrete-Hernandez & Navarrete-Hernandez, 2018) as a theoretical framework for building more sustainable communities and environments. This article is based on observations and applied everyday experiences as a researcher and practitioner in the field, continuously involved in the debates and empirical analysis related to the topic. The analysis was developed from a methodological research framework, integrating a participatory action research lens with theories related to the circular economy, social inclusion, solidarity economy, and waste governance (policy and management)—aimed at minimizing generation and maximizing the recovery of waste. This analysis systematizes and critically analyzes reflections on the Brazilian waste management legislation and its implementation, or lack thereof.

The next section will introduce in detail the context of the Brazilian waste management legislation and highlight its potential and current challenges. It will discuss some cases where progress has been made by promoting inclusive waste management and will also demonstrate how some of the advances have ultimately deteriorated into less progressive situations. Finally, it will highlight some of the best practices for co-production in urban waste management services and underline the benefits these services bring to local communities and environmental health, particularly in those cities where waste picker cooperatives have established contracts with local governments and with businesses to operate selective waste collection in their neighborhoods and/or with large industrial waste generators.

Waste management policies in the Brazilian context

In 1998, the federal government launched the national program "Garbage and Citizenship" (*Lixo e Cidadania*), setting an official precedent for social and environmental considerations in waste management and opening an opportunity for more inclusive policies. This program was the first to allow insights into the issue of waste and the situation of waste pickers, who worked mostly on dumps or in the streets. Subsequently, the Law of Public Consortia, created in 2005, established organized guidelines for the associated management of public services, a strategy that is particularly interesting for Brazil, which has a large number of municipalities (a total of 5,570) with fewer than 50,000 inhabitants. Another piece of legislation that has helped promote the integration of

waste pickers is the National Basic Sanitation Law (number 11.445), created in 2007, which recognizes waste picker cooperatives formed by low-income workers as key actors in the collection and separation of waste. Article 57 of this law allows municipalities to contract waste picker organizations without a competitive bidding process.

The National Solid Waste Policy (PNRS) has integrated these relevant norms and policies as well as others formulated around the Environment (1981) and Climate Change (2009). However, on the local level in particular, economic and political interests still prevail over social inclusion and environmental sustainability. The implementation of this policy requires local political will to work with waste picker organizations. Permanent articulation, resistance, and collaboration of waste pickers with a wide range of public and private actors related to solid waste management are required to achieve greater sustainability in waste management (Campos, 2014; Gutberlet, 2016). Given the current lack of support by the federal government and the absence of political will in many municipalities, these actors continue to contest and challenge local governments in their waste management policies and programs.

During its drafting phase, the PNRS law was widely debated with the active participation of civil society organizations, including waste pickers, and was finally approved and regulated by Federal Decree No. 7,404/2010, published just 4 months after the law was passed. The PNRS provides a legal framework and clear guidelines for greater sustainability in solid waste management. The law brought several important aspects into the debate and action, such as the order of priority in waste management and the responsibility of the private sector (manufacturer, importer, distributor, and merchant) for the product life cycle, through reverse logistics programs.

The order of priority defined in the Brazilian law is in line with the main guidelines and strategies of the theory of the circular economy (Ellen MacArthur Foundation, 2013) and also with what is laid out in the European Directives for Waste Management (European Commission, 2014), beginning with the most important actions today: non-generation and reduction of waste generation. This implies technological improvements, product design, and new production and consumption patterns. Once waste has been generated, the Brazilian standard establishes steps for the proper management of waste, stimulating and encouraging its maximum recovery through reuse, recycling of materials, and final treatment (which includes thermal treatment). It is worth noting that thermal treatment for energy recovery is the penultimate stage to be considered under Brazilian legislation. The last stage refers to the final disposal of the re-

maining waste at landfills. If this order of priority is applied, and considering the scenario and characteristics of the large quantities of waste generated in most households and commercial establishments, less than 10% of this total amount should be considered final waste and sent to landfills.

It is worthwhile to emphasize that the efforts brought by the law to prioritize the non-generation and the reduction of waste intersect and overlap with the guidelines to rethink production and consumption (in terms of product design, materials used, and product functionality) and to refuse products that are not compatible with these guidelines. These guidelines are also related to increased product durability, reduced packaging, and maximization of the recyclability of product components and packaging. Therefore, the Brazilian National Solid Waste Policy brings to the forefront forms and strategies for the discussion and implementation of new patterns of production and consumption. To this end, the national law has also established responsibilities for the various sectors of society, whether related to the private or public sector, as well as to consumers. These responsibilities must be adopted and fulfilled within each sector, under the supervision of the competent bodies related to environmental and health issues—the main aspects that are adversely affected if waste management is not satisfactory. Similar to the Brazilian law, the French National Assembly has worked on a new legislation for producer responsibility, demanding that producers inform consumers about the repairability of products, banning the destruction of unsold products, and promoting a strategy to avoid or recover plastics (single-use plastics, microplastics), thus combating waste and supporting the circular economy (France, 2020).

Until the recent election in 2018, the National Waste Pickers Movement (MNCR) was instrumental in organizing waste pickers from across Brazil, in attracting funding to improve the working conditions and capacity building of waste pickers, and in making significant contributions to public policy through their participation in councils, forums, and other public spaces to discuss and deliberate on solid waste issues (Dias & Ogando, 2015; Fracalanza & Besen, 2016; Gutberlet, 2016).

The PNRS is an important national instrument for environmental governance, defining shared responsibilities for the life cycle of products. This means that manufacturers, importers, distributors, and traders across the supply chain, as well as consumers and municipal solid waste management departments, are collectively responsible for handling waste, which includes the collection and environmentally appropriate final destination of post-consumer waste (Brazil, 2010). The original idea of the national legislation was to establish sector-wide

agreements to achieve certain recycling targets (Campos, 2014). The MNCR has also been involved in defining the nationwide sector agreement on packaging, signed between the government, the private sector, and other stakeholders (Brazil, 2015).

The PNRS requires, for example, the private sector to take responsibility for structuring, investing in, operating, and maintaining systems that guarantee the product life cycle before and after consumption. In addition, this segment must strive to meet the established order of priority, restructuring production processes, and adopting new design and technology solutions that meet these requirements and guidelines. Furthermore, to achieve a national standard established by law, the public sector is required to commit to planning and structuring public collection systems and to provide an environmentally appropriate final destination for waste, including household waste. Finally, the law also requires consumers to dispose of their waste correctly and to provide a destination in the systems as indicated and operated by the public and private sectors mentioned earlier.

For all these systems to work, it is necessary to guarantee the quality of the materials embedded in solid waste. This means respecting their specificities and preparing the materials to go through so-called 'technological routes', specific for each type of waste, considering the raw material that it comprises, and following a path for effective recovery (including all plastics, papers, cardboards, metals, glass, composite packaging, etc.). With increased material complexity, particularly related to different plastics and composite materials made up of nearly unlimited different polymer compositions, it has become very difficult for cities and waste picker organizations to fully recycle all materials that enter their spaces.

Unorganized waste pickers are the main collectors of recyclable materials, while organized waste pickers are the main resource recoverers for the circular economy (Besen, Jacobi & Freitas, 2017). They are the ones who can guarantee the quality of this process in their classification centers, with their knowledge and skills in separating and sorting materials. Organized waste pickers are also better equipped to target the emerging difficulties in resource recovery by accessing training and experimenting with alternative solutions for new materials. It is important to mention that the national solid waste legislation recognizes these workers as fundamental actors in the co-production of waste management and the achievement of these objectives, to guarantee the overall effectiveness of the policy. The next section will discuss the current situation of the policy's implementation, bringing to the forefront the importance of the

work of waste pickers to the achievement of the objectives laid out through the waste hierarchy.

Discussion: results related to the implementation of the National Solid Waste Policy

Almost ten years after the approval of the PNRS, little progress has been made in the implementation of the guidelines and the use of the instruments created for the application of the legislation. A first critique focuses on the lack of concrete initiatives made to achieve and prioritize waste management actions by setting goals and indicators to measure specific accomplishments. The first two planned actions, based on the order of priority—non-generation of waste and reduction of waste generation—have not advanced significantly. In the Brazilian scenario, there are still no better and more durable goods and products with less packaging. Ultimately, the business-as-usual scenario still prevails. No significant changes have happened so far related to primary consumption products, e.g., in personal hygiene, cleaning, beverages, and the food industry. Little progress has been made related to actions aimed at reuse, repurposing, and recycling, considering their high priority and the large quantity of waste generated. Waste recovery rates are still very low in Brazil, as will be seen later. Thus, both preventive actions, which seek to avoid the generation of waste, and those aimed at its recovery (repair, repurpose, reuse, and recycle), have not evolved significantly.

Private sector responsibilities and impacts

Advances are minimal regarding the fulfillment of the responsibilities to which the private sector had committed, and the success rate is very much below what is considered necessary. A clear example of the lack of progress is the flawed implementation of the reverse logistics system for the packaging industry. Despite signing a sectoral agreement with the federal environmental agency at the end of 2015, very little can be attributed as an actual result of the existence and operation of the waste hierarchy system. The strategy includes the implementation and operation of the reverse logistics system for packaging with the participation of waste picker cooperatives in major Brazilian urban

centers, including the twelve largest metropolitan areas with a total population of almost 72 million.

The reality, however, is portrayed in the streets, rivers, lakes, and on empty lands, where increasing amounts of waste are improperly discarded, as shown in Figure 2. Due to their everyday experience of being exposed to waste while often living in neighborhoods with no regular waste collection, these workers bring a differentiated perspective on waste, experiencing the drama of littered waste causing water logging (Akter, Hussain, Trankler & Parkpian, 2016), affecting their communities with flooding and consequent disease (Cointreau, 2006).

Figure 1. Packaging waste congesting waterways in the city of Recife (PE)

Source: Henrique A. Oliveira, 2017.

In relation to the public sector, the implementation of selective waste collection programs remains very limited, small in number relative to the total population in the Brazilian municipalities. In most cases, where selective collection is in place, there is very little public participation from the population. According to official data, only 1,256 Brazilian cities have an implemented selective collection system—which represents just over 20% of the 5,570 municipalities (ABRELPE, 2017). From this universe, only 130 have some mechanism or legal instrument confirming a formal relationship (contract, partnership, cooperation) with waste picker cooperatives. In the city of São Paulo, the largest metropolis in the country with more than 13 million inhabitants, the

public selective collection system for recyclables manages to collect and recover only between 2 and 3% of the total quantity of waste generated every day (ABRELPE, 2017).

While this is the present scenario, describing the formal scope of both public policies and private sector actions, the contribution of the waste picker sector to waste management needs to be further explained. The result that best reflects the importance of the work of waste pickers is expressed in the volume of material that reaches recycling industries through waste picker organizations and intermediaries who sell the materials which have been collected by autonomous, informal waste pickers. Brazil achieves significant recycling rates for certain materials. For aluminum packaging, recovery rates are above 95% of the products put on the market and consumed within the country (CEMPRE, 2019). There are many other materials that are widely collected by waste pickers, enabling high rates of resource recovery; these materials include certain plastics (particularly PET (Polyethylene Terephthalate), HDPE (High-Density Polyethylene), LDPE (Low-Density Polyethylene), paper, and cardboard. However, for soft plastic packaging, the rates are much lower (26%) (ABIPLAST, 2019).

Contribution of waste pickers to waste management

According to studies carried out by the Brazilian government —the results of which are recognized by both the corporate sector and third-sector organizations— waste pickers account for about 90% of the materials that arrive at recycling plants (IPEA, 2013). This could be considered and recognized as an excellent result within the scope of actions towards social inclusion and socioeconomic development. However, the situation is quite different. The level of informality in this economic chain remains extremely high. Over 80% of the establishments that make up the basis of this economic chain are informal, known as scrap dealers (intermediaries) and informal waste pickers (autonomous, unorganized, the majority of whom are men). Beyond this lack of formality, the resulting structures and operations of this economic chain are extremely negative, degrading, unjust, and perpetuate exclusion. According to a study by IPEA (2013), only 10% of these workers are organized in cooperatives or associations. Currently, this percentage is lower, due to the economic crisis that has affected Brazil since 2015, which has increased the number of unemployed people, many of whom have started to work individually in the collection of recyclables on the streets and in commercial establishments. There

is a clear increase in the number of workers pulling self-made carts on the streets in large cities. A small proportion of street waste pickers are women.

However, among organized waste pickers, women are predominant. According to data from the National Movement of Recyclable Material Collectors (MNCR), the majority of the workers in these sorting centers (cooperatives and associations) are female. The cooperative space attracts more women than men. It is an environment that affirms collective female identities and where women can develop personal self-esteem and find opportunities for personal growth through leadership development. A regional study identified 56 percent of organized waste pickers as women (INSEA Instituto Nenuca de Desenvolvimento Sustentável, 2007) and asserted that the number of women employed as waste pickers in associations and cooperatives was increasing, from 18% in 1993 to 55% in 1998 (Dias, 2002). Many of the cooperative leaders today are women, and the proportion of organized female waste pickers remains at 55%. There is a clear predominance of women and women's leadership in cooperatives and associations, as is commonly observed during visits to organizations or in meetings with waste picker networks.

It should be noted that most waste picker cooperatives and associations in Brazil are considered formal organizations, legal entities that pay taxes, have permanent labor costs, and make social security contributions. These organizations have to go through strict bureaucratic formalities, involving the payment of fees, filling in forms, and going through inspections, etc., in order to remain a recognized organization able to participate in the commercialization of recyclables. Yet, today the waste picker category is still not valued for the service they provide and the results and benefits they generate in terms of resource recovery. Most organizations are still unable to establish service contracts with those responsible for waste management—whether from the public or the private sector. Furthermore, it is not a given that an existing contract with the city administration will continue to be honored in the future. These agreements need to be constantly defended and re-conquered by the waste pickers (Gutberlet, 2019). As has already been pointed out, only 130 municipalities have established some form of legal instrument to formalize the relationship between the city and waste picker organizations. This represents roughly 2.5% of the total number of Brazilian municipalities.

The private sector, in turn, limits its participation to providing specific and restricted support, promoting capacity building (technical and management skills), and acquiring equipment and vehicles for the waste picker organizations. There is virtually no service contract established between waste picker

organizations and private sector companies responsible for the implementation, operation, and maintenance of reverse logistics systems (e.g., among manufacturers, importers, distributors, and traders) (Besen, Jacobi & Freitas, 2017). The remuneration for the work of waste pickers comes primarily from the sale of the materials sorted and separated by the cooperatives. This situation is unfair and perpetuates poverty. Waste pickers are subject to global fluctuations in material prices, following yearly and seasonal cycles, depending on the material type. An obvious example of market variation is demonstrated by the introduction of Chinese buyers into the Brazilian post-consumer plastics market in 2008 and 2009. In 2008, due to the global economic crisis and its repercussions, China sought alternative markets to buy plastic packaging. It was an aggressive move, economically speaking, as they bought large volumes of plastic at low prices because the Brazilian market saw an opportunity to get rid of unused stocks from the domestic industry. The post-consumer plastic market still faces difficulties in absorbing the amount of plastic waste, either due to collection difficulties, the location of these industries, or due to material complexity. Due to the needs of the local plastic industries, several Chinese commercial organizations have invested globally, including in South America and in Brazil, to identify the production of plastic products and packaging, drastically interfering in the price of the material and reducing the gains of the cooperatives—which were left without plastic material for a long period. Without material to collect and separate, there is no work for the cooperative, and without work, there is no income for the members. Therefore, one of the main flags and claims of the waste picker category is for hiring by cities and industries and fair remuneration of waste picker cooperatives for the services they provide.

The scenario is very different for private companies that provide waste collection, treatment, and final disposal services. All of these businesses have service contracts with the entities responsible for the proper management of waste, whether in the public or private sector. Almost 100% of Brazilian municipalities have contracts with companies for the services of waste collection and final disposal. A stark difference exists in the treatment of services provided by private enterprises compared to those provided by waste picker organizations. In the case of waste picker organizations, although they are responsible for recovering 90% of the recyclable material that reaches recycling industries, they are seldom contracted or paid for the services they provide to the community and the city.

According to official data (Brazil, 2018), about 36% of all Brazilian municipalities (1,236 municipalities, out of a total of 5,570) have some form of selective waste collection activities. The vast majority only contribute to or collaborate with waste picker organizations by allocating areas or equipment for sorting waste, but this support does not necessarily constitute a formal relationship or even guarantee remuneration for the services provided. In 2017, there were 1,153 waste picker organizations in the country, distributed in 813 municipalities, with over 28,900 associated waste pickers. Yet, effectively generating new jobs in waste picker organizations proves extremely difficult, and the opportunities are limited, despite the large potential for these workers to benefit local communities.

Multiple additional services provided by waste pickers

Waste pickers can act not only in the collection and sorting of waste ("the traditional activities associated with waste pickers"), but they can also perform other, equally important activities. Waste pickers have the ability and expertise to provide consulting services, guide and stimulate the population to separate waste correctly, actively participate in selective waste collection, and contribute to educational and informational processes regarding new consumption patterns. Waste picker organizations can contribute significantly to increasing the current rates of resource recovery by formalizing the relationship between the public and private sectors and by facilitating their hiring to provide various services. These services include the following activities, which will also be discussed further in the next section:

1. Environmental Education and Social Communication (Figure 3).
2. Collection of recyclable materials (Figure 3).
3. Sorting and separation of diverse categories of materials.
4. Processing for recycling (Figure 5).

Figure 2. Waste pickers from Cooperpires engaging with local residents during door to door collection of recyclables.

Source: Jutta Gutberlet, 2019.

In relation to the services of environmental education and social communication, waste picker organizations can develop diverse activities aimed at raising the level of awareness of the population in general. This can increase adherence to and the quality of the selective waste collection system operated by the public or private sector (depending on the type of waste/post-consumer products). Waste pickers are professionals capable of raising awareness, stimulating, and guiding the population to participate effectively in waste collection systems, addressing waste issues in schools, community centers, companies, shopping centers, and parks, during events, etc. They can clarify questions about the best procedures to ensure.

Figure 3. Sorting and separation of diverse recyclables materials at cooperatives

Source: Jutta Gutberlet, 2019.

With respect to the collection activities, these professionals differentiate themselves from waste collectors hired by companies that provide the same service by their care for and knowledge of recyclable materials, since they are the ones who further deal with the materials. They perceive during collection whether the materials are mixed or even contaminated with other types of substances. If they identify any abnormalities, they can identify the household where this is occurring and can inform their environmental education team to visit the household and provide guidance on how to correctly dispose of the materials. When it comes to the sorting activities, these workers have extensive knowledge about the diversity of materials that make up recyclable waste, which allows them to promote a careful separation of the materials during collection.

The superior separation skills of waste pickers allow for high-quality material classification, which is demanded by the recycling industry and whose criteria are related to the quality, quantity, and regularity of material delivery

to the industrial recycling process. Finally, after sorting, there are additional steps of advanced material treatment that promote developments in material processing, such as crushing, pelletizing, or even volume reduction. These activities are considered preliminary stages of the industrial process and can increase the final prices of the materials, supplying the recycling industry and filling an industrial niche.

Figure 4. Processing hard plastics for the production of pellets, polymer division from waste picker network *Rede Cata Vida*, Sorrocaba

Source: Jutta Gutberlet, 2019.

The work performed by waste picker organizations has positive impacts in many other socioeconomic areas, as summarized in Figure 6. Cooperatives and associations provide low-barrier jobs for individuals with emotional and mental illnesses, with substance abuse issues, or for ex-prisoners. These are forms of social inclusion. In addition to the social aspect, these professionals also generate environmental benefits, with positive results reflected in the reduction of natural resource extraction and the reduction of greenhouse gas (GHG) emissions (King & Gutberlet, 2013; Gutberlet & Donoso, 2015c). Studies link the work of waste pickers to one of the instruments of the National Environmental Policy: Payment for Environmental Services (IPEA, 2010). The case of the service provided by waste pickers relates to one of the variations of this instrument: Payment for Urban Environmental Services (PSAU). In a nutshell, PSAU can compensate waste picker organizations for the positive results they achieve in extending the life of landfills, reducing urban cleaning costs (e.g., cleaning up litter), reducing the rates of flooding and diseases related to irregular waste disposal (such as Dengue, Zika, and Chikungunya), and reducing water and

energy costs in the recycling process due to clean sorting, among many other benefits that can be measured, demonstrating the positive results of the actions of waste pickers. In summary, there are five services provided by waste picker organizations that remain unrecognized and unremunerated.

Figure 5. Range of diverse activities performed by organized waste pickers

Environmental Education	Communication with Households Information dissemination at schools Information on best practices in recycling for businesses
Collection and transportation	Door to door collection at households Collection from voluntary recycling stations Collection from large generators
Material separation and treatment	Detailed material classification and baling Adding value to specific materials (e.g. producting pellets,
Urban Environmental Services	Prolonging the life of landfills Cleaning up the environment Improving environmental and community health GHG emmission reduction
Social inclusion	Generating work Low barrier jobs Creating opportunities for human and professional development

Source: Jutta Gutberlet, 2019.

The participation of waste picker organizations and their work in selective waste collection, separation, and value-adding, as well as the performance of other related services, has the enormous potential to reverse the current scenario of waste mismanagement in Brazil, especially regarding material recovery and the diversion of these materials into the circular economy. In the case of the city of São Paulo, for example, their widespread participation could generate thousands of new jobs. If cities enforced selective household waste collection with organized waste pickers and thus established partnerships with waste picker cooperatives, a significant number of direct, easy-entry jobs could be

created, tackling the currently high unemployment rate. The latest figures for the Metropolitan Region of São Paulo, in 2019, showed an increase in unemployment from 10.8% in early 2016 to 14.3% in early 2019. Furthermore, the underutilization rate for the workforce increased from 15.7% to 21.2% over the same period (SEADE, 2019). This is yet another social facet of waste management that can be tackled with co-production.

A possible scenario and outcomes of inclusive waste management in the city of São Paulo

The municipality of São Paulo (currently 12.18 million inhabitants, area of 1,521 km²) has approximately 3,700 public units (including hospitals, schools, post offices, administrative offices, etc.). The following scenario is based on Decree No. 5,940 (October 25, 2006) of the national solid waste law, which requires public institutions to separate and donate the recyclable fraction of their solid waste to recycling associations and cooperatives. This idea is also reflected in the Integrated Solid Waste Management Plan of the city (PGIRS, 2014). If each municipal unit had just two workers responsible for the organization and preparation of the materials for collection and separation, this could create more than 7,000 direct jobs. In addition, the city has 32 regions, which include 96 districts, according to the PGIRS plan. In each of these districts, one or more waste picker organizations could be involved in selective waste collection and recycling services, depending on the socioeconomic profile of the population and the presence of consolidated shopping centers and commercial areas. Based on a simplified estimate, each waste picker organization could have activities divided into three work shifts, with about 40 workers on the two daily shifts and 20 on the night shift, which would be used to process the materials. This means that a total of 100 direct waste picker jobs could be involved in sorting and processing in each of the 96 sorting units (1 per district). These sorting activities would total approximately 10,000 jobs, directly linked to material recovery actions. Considering all the other additional activities—collection and environmental education—these numbers could reach more than 30,000 jobs in total, for the city of São Paulo alone and only for the recyclable material from public units (as requested by Decree No. 5,940). Under these circumstances, good waste management could thus in part address the problem of unemployment and underemployment and indirectly target several of the Sustainable

Development Goals (Gutberlet, 2019). With the expansion of door-to-door selective household waste collection and collection at offices and commercial establishments, the numbers would be significantly higher.

Nevertheless, as demonstrated earlier, currently neither the public sector nor the private sector has adopted initiatives to include waste picker organizations in waste management, as proposed by the national law, thereby failing to achieve the expected positive results (Fracalanza & Besen, 2016). A study published by the Institute of Applied Economic Research (IPEA), an organization linked to the Ministry of Economy, pointed out that in 2010, when the National Solid Waste Policy was launched, the country was losing about R$ 8 billion per year (approximately US$ 2.1 billion per year based on the current currency exchange) by failing to formally include waste pickers in resource recovery. This study, titled Payment for Urban Environmental Services for Solid Waste Management, analyzes the economic and environmental benefits from recycling and proposes socioeconomic instruments such as payment for productivity, compensatory and credit mechanisms, with a view to increasing the income of waste pickers and increasing the organization and formalization of cooperatives (IPEA, 2010). According to IPEA, the average monthly income of waste pickers in Brazil was R$ 571 (US$ 133, based on the current exchange rate). Fluctuations depend on the region within Brazil as well as the level of organization of the waste pickers. In large cities, organized waste pickers, on average, can make more than R$1,000/month (US$ 233) (Rutkowski & Rutkowski, 2015). The IPEA (2010) study points to strategies to formulate public policies that can guarantee adequate remuneration for waste pickers, the reduction of impacts on the environment, and positive economic results for the recycling industry and waste picker cooperatives. Since 2003, the federal government has pursued strategies and actions to structure public policies in support of waste pickers. For this purpose, the Inter-ministerial Committee on Social Inclusion of Waste Pickers (CIISC) was created, linked directly to the General Secretariat of the Presidency of the Republic as a way to integrate the actions of various ministries.

Specific programs and projects under the Solidarity Economy in Brazil have also been structured to support the organizations of waste pickers, such as CATAFORTE (2009, 2010, 2014) and the Pró-Catador program (Decree No. 7,405), created in December 2010. Both programs aimed at strengthening organizations and training workers (such as the PRONATEC-Catador program, created to allow for professional capacity building). At the time, the federal government itself was obliged to work in partnership with the waste

pickers and their organizations, creating the Solidarity Selective Waste Collection Program, which encompasses selective waste collection in public units and related entities (public banks, military, administrative offices, etc.). Since 2016, however, these federal government initiatives have been phased out, as were the support measures by states and municipalities to improve waste management. As a consequence, the amount of waste landfilled has increased significantly and, more recently, specifically due to the country's economic crisis, illegal waste dumping has again become a key concern.

The federal government has since made new efforts towards improving waste management, seeking to establish planning mechanisms that could guide actions for the effective implementation of the National Solid Waste Policy. To this end, the government has established a process to revise the National Plan for Solid Waste (PLANARES), the preliminary version of which was prepared in 2011, but was never completely approved and thus remained inactive. Studies for the review of PLANARES began in 2017, with the expectation of finalizing the proposal by mid-2018 for public presentation and discussion. Again, however, the process was not terminated. The differentiation of solid waste into dry and wet portions and the handling of the wet portion (through composting in particular) was one of the major changes introduced into the discussion on updating the PNRS, while continuing to support the inclusion of waste pickers (Palmeira Zago & Vasconcelos Barros, 2019).

While the review of the National Plan had advanced in the first two steps—the elaboration of a Work Plan and a Solid Waste Overview for Brazil (the Diagnosis)—several steps still remain incomplete, including the elaboration of Scenarios and Projections, Action Strategies, and Goals and Deadlines. With the political change in the federal administration following the Presidential elections in 2018, the revision of PLANARES was interrupted, with no prospects of being resumed in the near future. Given this current scenario, the major challenges for an effective implementation of the PNRS, which would allow for the socio-productive inclusion of waste pickers, are related to the following aspects:

1. **Compliance with the responsibilities established in the national law, with the effective implementation of reverse logistics and selective waste collection systems, in partnership with waste picker cooperatives**. The fulfillment of the responsibilities described at the beginning of this article can be achieved if the private and public sectors establish and formalize their relationship with waste picker organizations, remunerating them for the

services they provide. Under these conditions, waste picker organizations would be able to guarantee and increase job creation, reduce informality within the recycling chain, and open new opportunities for the inclusion of self-employed street workers.

2. **Support towards the organization and strengthening of waste pickers**. The support for collective organizations of waste pickers can take place in a variety of ways, the main one being the formalization of labor relations and service provision, reducing their vulnerability to variations and fluctuations in the recycling market, as well as to the seasonality of this market. Other types of support (including funding for capacity building and training, as well as improved management, technical, and operational conditions in the cooperatives) should continue permanently.
3. **Providing training and capacity building, specifically for entrepreneurship and cooperative action**. This type of action has already occurred between 2004 and 2016, mainly as an initiative of the federal government, which established several programs aimed at meeting the demands and needs of this group of workers, such as the Pró-Catador, PRONATEC-Catador, and CATAFORTE programs. Hence, these programs need to be continued, expanding the participation, integration, and articulation of waste pickers with private sector initiatives (such as, for example, the project called "Open your hand for the future", created by *ABIHPEC* - the Brazilian Association of Personal Hygiene, Perfumery and Cosmetics Industry).
4. **Facilitating qualified communication and information dissemination among the population, increasing their contribution and participation in reverse logistics and recycling programs**. Qualified information is fundamental to the success of initiatives that seek the involvement and participation of the population. It is important to have coordinated and integrated educational and awareness-building communication processes in place, focused on the dissemination of new patterns of production, consumption, and circularity. Waste picker cooperatives and associations are important actors in this process and can perform these interventions at the community and industry level.
5. **Organizing information on separate waste collection at the local, regional, and state level, with the effective participation of waste picker organizations, generating specific information and orientation actions for the population, consumers, and large generators**. The reality of Brazilian municipalities displays a large diversity of different situations, with

extensive urban agglomerations (mainly around state capitals) formed by a small number of large municipalities, and, at the other extreme, a large number of municipalities with a small population. To ensure widespread and persistent positive results in waste management, articulation between federal entities is fundamental, promoting institutional arrangements that allow for integration at local and regional levels, with joint efforts.

6. **Scaling up systems**. This involves structuring regional systems for the collection and accumulation of recyclable materials, stimulating solutions that can achieve economies of scale, and attracting and encouraging the implementation of industrial parks and recycling as well as repair units in each region of the country. The planned organization of systems aimed at resource recovery and correct disposal of solid waste is one of the main necessities in Brazil today. There are some outstanding initiatives that should be mentioned here. For example, the State of Ceará, in the Northeast of Brazil, has developed coordinated actions throughout the state territory, fostering organization and articulation among municipalities for joint action, structured by regions and groups of municipalities, and supporting cooperation and networking in waste management. The state government organizes the waste stream, acting within its competence and supporting municipalities with fewer institutional capacities by providing managerial, technical, and operational support.

Conclusion

Brazil has come a long way since the national program "Garbage and Citizenship" (*Lixo e Cidadania*) was launched by the federal government in 1998. Social and environmental considerations of waste have been formally recognized, reflected in the formulation of inclusive policies for solid waste management at the federal and municipal level. While the National Solid Waste Policy (PNRS) has integrated these perspectives into legislation, in practice, at the local level, however, economic and political interests often still prevail over social inclusion and environmental sustainability. Articulation and continuous negotiation by the waste pickers are necessary, involving a wide range of institutions and social actors (NGOs, social movements, and universities) related to solid waste management, in order to achieve greater sustainability in waste management, backed by policy. Given the current lack of support by the federal government and the absence of political will in many municipalities, regions, and states,

waste pickers continue to contest and challenge local governments in their waste management programs.

Despite the many difficulties and constraints attached to co-production in waste management, there are obvious gains for city administrations, communities, the waste pickers, and the environment. Innovative experiences and co-produced arrangements demonstrate these opportunities and multiple social, economic, and environmental benefits for the cities and their populations. Waste pickers, who are usually the most socially and economically excluded, have the opportunity to work in a collective setting, which is self-managed and guided by principles of cooperation, solidarity, equity, and reciprocity. Cooperative members engage in education and training activities that also benefit their personal and professional development. The cooperative is an inclusive space, providing low-barrier jobs, particularly attractive to women. With their work, waste pickers help to diminish the leakage of waste into the environment and the oceans as well as the waste of resources, which also reduces the need for further natural resource extraction. All these aspects ultimately benefit communities and build resilience, so needed in the current era of climate crisis.

The most successful cases of co-production with waste picker cooperatives are those where formal partnerships are established and where local governments have signed a contract with organized groups of waste pickers, remunerating them for their service. Public policies formalizing these arrangements are crucial to guaranteeing a successful and lasting program. Legislation has the potential to safeguard co-management arrangements beyond party politics; however, continuous political engagement and support from local communities are also required to maintain the governments' commitment and payment for waste picker services. Social innovations can emerge from membership-based waste picker organizations, involving technological and governance innovations from skillful and successful cooperatives in Brazil, from which lessons can be learned.

References

ABIPLAST (Associação Brasileira da Indústria do Plástico) (2019) Índice de reciclagem está em torno de 26% do total de embalagens produzidas no Brasil. http://www.abiplast.org.br/sala-de-imprensa/indice-de-reciclagem-esta-em-torno-de-26-do-total-de-embalagens-produzidas-no-brasil/

ABRELPE (2017) (entidade representativa das empresas prestadoras de serviço de coleta e limpeza urbana) Panorama dos Resíduos Sólidos no Brasil 2017 http://abrelpe.org.br/pdfs/panorama/panorama_abrelpe_2017.pdf

Akter, N.; Hussain, Z.; Trankler, J. & Parkpian, P. (2002) Hospital waste management and it's probable health effect: a lesson from Bangladesh, Indian Journal of Environmental Health, 44(2), 124-137.

Besen, G. R. & Dias, S. M. (2011) Gestão Pública Sustentável de Resíduos Sólidos – uso de bases de dados oficiais e de indicadores de sustentabilidade. Revista Pegada, Special Issue, July 2011.

Besen, R. G.; Jacobi, P. & Freitas, L. (Org.) (2017) Política nacional de resíduos sólidos: implementação e monitoramento de resíduos urbanos, IEE USP: OPNRS. http://www.iee.usp.br/sites/default/files/Pol%C3%ADtica%20Nacional%20de%20Res%C3%ADduos%20S%C3%B3lidos%20.pdf

Bovaird, T. (2007) Beyond Engagement and Participation: User and Community Coproduction of Public Service. Public Administration Review, 67(5), 846-860.

Brandão, C. R. (org.) (1987) Repensando a pesquisa participante. São Paulo: Brasiliense.

Brazil (2018) Diagnostico do manejo de Residuos Solidos Urbanos – 2016. Ministerio das Cidades. SNIS (Sistema Nacional de Informacoes sobre Saneamento). Brasilia

Brazil (2015) Programa de modernização do setor de saneamento: Diagnóstico da gestão e manejo de resíduos sólidos urbanos – 2013. Ministério das Cidades. SNIS – Sistema Nacional de Informações sobre Saneamento. Brasília: MCIDADES/SNSA.

Brazil (2010) Presidência da República, Casa Civil, Subchefia para Assuntos Jurídicos Lei Nº 12.305, de 2 de Agosto de 2010. http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/l12305.htm

Campos, H. K. T. (2014) Recycling in Brazil: Challenges and prospects. Resources, Conservation and Recycling, 85, 130– 138.

CEMPRE (Compromisso Empresarial para a Reciclagem) (2019) CEMPRE Review 2019. http://cempre.org.br/upload/CEMPRE-Review2019.pdf

Chaturvedi, A., Arora, R., & Saluja, M. S. (2015) Private Sector and Waste Management in Delhi : A Political Economy Perspective. 46(3), 7-16.

Cointreau, S. (2006) Occupational and environmental health issues of solid waste management: special emphasis on developing countries. World Health Organisation (WHO). http://www.worldbank.org/urban/uswm/healtheffects.pdf

Dias, S. M. & Alves, F. C. G. (2008) Integration of the Informal Recycling Sector in Solid Waste Management in Brazil, GIZ, Eschborn: GIZ, 93 pages.

Dias, S. M. (2002) Construindo a cidadania: avanços e limites do Projeto de Coleta Seletiva em parceria com a ASMARE. Dissertação (Mestrado em Geografia) - Instituto de Geociências, Universidade Federal de Minas Gerais, Belo Horizonte.

Dias, S. M. & Ogando, A. C. (2015) Engendering Waste Pickers Cooperatives in Brazil. ILO Research Conference on Cooperatives and the World of Work, Antalya, Turkey, 9–10 November 2015. Accessed: http://www.wiego.org/sites/default/files/publications/files/Dias-Engendering-Wastepicker-Cooperatives-Brazil.pdf

Ellen MacArthur Foundation (2013) Towards the Circular Economy: An Economic and Business Rationale for an Accelerated Transition; Ellen MacArthur Foundation: Cowes, UK, https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf

European Commission (2014) Towards a Circular Economy: A Zero Waste Programme for Europe; European Commission: Brussels, Belgium.

Fals-Borda, O. (1987) The Application of Participatory Action-Research in Latin America. International Sociology, 2(4), 329–347.

France (2020) Assemblée Nationale, Constitution du 4 Octobre 1958 Quinzième Législature, Session ordinaire de 2019-2020, 21 Janvier 2020 Projet de Loi relatif à la lutte contre le gaspillage et à l'économie circulaire. http://www.assemblee-nationale.fr/15/ta/tap0385.pdf

Fracalanza, A. P. & Besen, G. R. (2016) Challenges for the Sustainable Management of Municipal Solid Waste in Brazil. Journal disP – The Planning Review, 52(2), 49-56.

Geissdoerfer, M.; Savaget, P.; Bocken. N. M. P. & Hultink, E. J. (2017) The Circular Economy: A new sustainability paradigm? Journal of Cleaner Production, 143, 757–768.

Ghisellini, P.; Cialani, C. & Ulgiati, S. (2016) A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems. Journal of Cleaner Production, 114, 11–32.

Gutberlet, J. (2019) Waste picker social economy organizations addressing the Sustainable Development Goals. Draft paper prepared in response to the UNTFSSE Call for Papers 2018 Implementing the Sustainable Development Goals: What Role for Social and Solidarity Economy?

Gutberlet, J. (2016) Urban Recycling Cooperatives: Building Resilient Communities. London, New York: Routledge Taylor & Francis Group. 183 pp.

Gutberlet, J. (2015a) Cooperative urban mining in Brazil: Collective practices in selective household waste collection and recycling. Waste Management. 45, 22-31. http://dx.doi.org/10.1016/j.wasman.2015.06.023

Gutberlet, J. (2015b) More inclusive and cleaner cities with waste management co-production: Insights from participatory epistemologies and methods. Habitat International. 46, 234-243. http://dx.doi.org/10.1016/j.habitatint.2014.10.004

Gutberlet, J. & Donoso, M. (2015c) Zero waste: climate mitigation and poverty reduction with cooperative recycling. In: Hirsch, T., Lottje, C. & Netzer, N. (Eds.) Exploring Sustainable Low Carbon Development Pathways. Pioneers of Change. 21 good practices for sustainable low carbon development in developing countries. Electronic ed.: Berlin: Friedrich-Ebert-Stiftung. ISBN 978-3-95861-285-3, pp. 25-37. https://library.fes.de/pdf-files/iez/11664.pdf

Gutberlet, J.; Carenzo, S.; Kain, J-H. & Mantovani Martiniano de Azevedo, A. (2017). Waste Picker Organizations and Their Contribution to the Circular Economy: Two Case Studies from a Global South Perspective. Resources, 6(4), 52; https://doi.org/10.3390/resources6040052

INSEA (Instituto Nenuca de Desenvolvimento Sustentável) (2007) Perfill sócio-econômico dos catadores da rede CATAUNIDOS – 2007. Belo Horizonte: INSEA/UFMG/FELC, p. 31 Relatório.

IPEA (Instituto de Pesquisas Econômicas Aplicadas) (2013) Situação social das catadoras e dos catadores de material reciclável e reutilizável – Brasil. Brasília: IPEA.

IPEA (Instituto de Pesquisas Econômicas Aplicadas) (2010). Pesquisa sobre Pagamento por Serviços Ambientais Urbanos para Gestão de Resíduos Sóidos. Relatório de Pesquisa. Diretoria de Estudos e Politicos Regionais, Urbanas e Ambientais (Dirur). Brasilia.

Israel, B.A., Eng, E., Schulz, A. J. & Parker, E.A. (2005) Methods in Community-Based Participatory Research for Health. San Francisco, CA: Jossey-Bass; 2005

Israel, B. A., Coombe, C. M., Cheezum, R. R., Schulz, A. J., McGranaghan, R. J., Lichtenstein, R. & Burris, A. (2010) Community-Based Participatory Research: A Capacity-Building Approach for Policy Advocacy Aimed at Eliminating Health Disparities. Am J Public Health, 100(11), 2094-102.

Joshi, A. & Moore, N. (2004) Institutionalised Co-Production: Unorthodox Public Service Delivery in Challenging Environments, The Journal of Development Studies, 40(4), 31–49.

King, M. & Gutberlet, J. (2013) Contribution of cooperative sector recycling to greenhouse gas emissions reduction: a case study of Ribeirão Pires, Brazil. Waste Management, 33 (12), 2771-2780. http://dx.doi.org/10.1016/j.wasman.2013.07.031.

Koster, R., Baccar, K., & Lemelin, R. H. (2012) Moving from research ON, to research WITH and FOR Indigenous communities: A critical reflection on community-based participatory research. The Canadian Geographer, 56(2), 195-210. https://doi.org/10.1111/j.1541-0064.2012.00428.

Linzner, R. & Lange, U. (2013) Role and size of the informal sectos in waste management- a review. Proceedings of the Institution of Civil Engineers - Waste and Resource Management, 166(2), 69-83 https://doi.org/10.1680/warm.12.00012

Lemos, M C. & Agrawal, A. (2009) Environmental governance and Political Science. In Delmas, Magali A. & Young, Oran R. Governance for the Environment. New perspectives. Cambridge: Cambridge University Press, 69-97.

Linzner, R. & Lange, U. (2013) Role and size of the informal sectors in waste management- a review. Proceedings of the Institution of Civil Engineers - Waste and Resource Management, 166 (2): 69-83 https://doi.org/10.1680/warm.12.00012

Minkler, M., & Wallerstein, N. (Eds.). (2008) Community-based participatory research for health: From process to outcomes. San Francisco, CA: Jossey-Bass.

Morais, L.; Dash, A. & Bacic, M. (2017) Social and solidarity economics in India and Brazil, In: Social Enterprise Journal. 13(1), 95-112. Available online at: https://www.emerald.com/insight/content/doi/10.1108/SEJ-07-2016-0035/full/html

Moulaert, F. & Nussbaumer, J. (2005) Defining the social economy and its governance at the neighbourhood level: A Methodological reflection. Urban Studies, 42(11), 2071-2088.

Navarrete-Hernandez, P. & Navarrete-Hernandez, N. (2018) Unleashing Waste-Pickers' Potential: Supporting Recycling Cooperatives in Santiago de Chile. World Development, 101, 293–310. https://doi.org/10.1016/j.worlddev.2017.08.016

Ostrom, E. (1996) Crossing the Great Divide: Coproduction, Synergy, and Development, World Development, 24(6), pp. 1073-1087.

Palmeira Zago, C. V. & Vasconcelos Barros, R. T. (2019) Gestão dos resíduos sólidos orgânicos urbanos no Brasil: do ordenamento jurídico à realidade Management of solid organic waste in Brazil: from legal ordinance to reality. 219–228. https://doi.org/10.1590/S1413-41522019181376

PGIRS Plano de Gestão Integrada de Resíduos Sólidos da Cidade de São Paulo (2014). https://www.prefeitura.sp.gov.br/cidade/secretarias/upload/servicos/arquivos/PGIRS-2014.pdf

Rutkowski, J. E., & Rutkowski, E. W. (2015). Expanding worldwide urban solid waste recycling: The Brazilian social technology in waste pickers inclusion. https://doi.org/10.1177/0734242X15607424

Samson, M. (2009) Refusing to be Cast Aside: Waste pickers organizing around the world. Cambridge: WIEGO, 2009.

Scheinberg, A. & Savain, R. (2015). Valuing Informal Integration: Inclusive Recycling in North Africa and the Middle East, GIZ and SWEEP-Net, Eschborn, 164 pages.

Scheinberg, A.; Spies, S.; Simpson, M.H. & Mol, P. J. (2011) Assessing urban recycling in low- and middle-income countries: Building on modernized mixtures. Habitat International, 35, 188-198.

SEADE (2019) Informativos do Mercado de Trabalho Paulista. http://www.seade.gov.br/mercado-trabalho/2019/06/trabalho-e-rendimento-municipio-de-sao-paulo/

Thiollent, M. (2011) Action Research and Participatory Research: An Overview. International Journal of Action Research, 7(2), 160–174.

Velis, C. A., Wilson, D. C., Rocca, O., Smith, S. R., Mavropoulos, A., & Cheeseman, C. R. (2012) An analytical framework and tool ('InteRa') for integrating the informal recycling sector in waste and resource management systems in developing countries. Waste Management & Research, 30(9 Suppl), 43–66. https://doi.org/10.1177/0734242X12454934

Wilson, D.; Velis, C. & Cheeseman, C. (2006) Role of informal sector recycling in waste management in developing countries. Habitat International 30, 797-808.

Zapata Campos, M. J. & Zapata, P. (2013) Switching Managua on! Connecting informal settlements to the formal city through household waste collection, Environment and Urbanization, 25(1), 1–18.

Mapping of the recycling chain of Criciúma (SC), Brazil

Actors, links and relationships*

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Introduction

At the beginning of the 21st century in Brazil, several helpful policies were implemented regarding the collection of recyclable materials during the solid waste management process. This process reached a milestone with the development of the National Solid Waste Policy in 2010. However, in recent years, unemployment and job insecurity have increased given the political and economic crisis scenario, along with projects involving structural changes in the labor market. In this context, the work of informal waste pickers, driven by the ongoing economic crisis and historical unemployment, represents the incorporation of new social agents into the activity of solid recyclable waste collection. This work is also considered a possible job alternative, given that these work opportunities can be available at any time.

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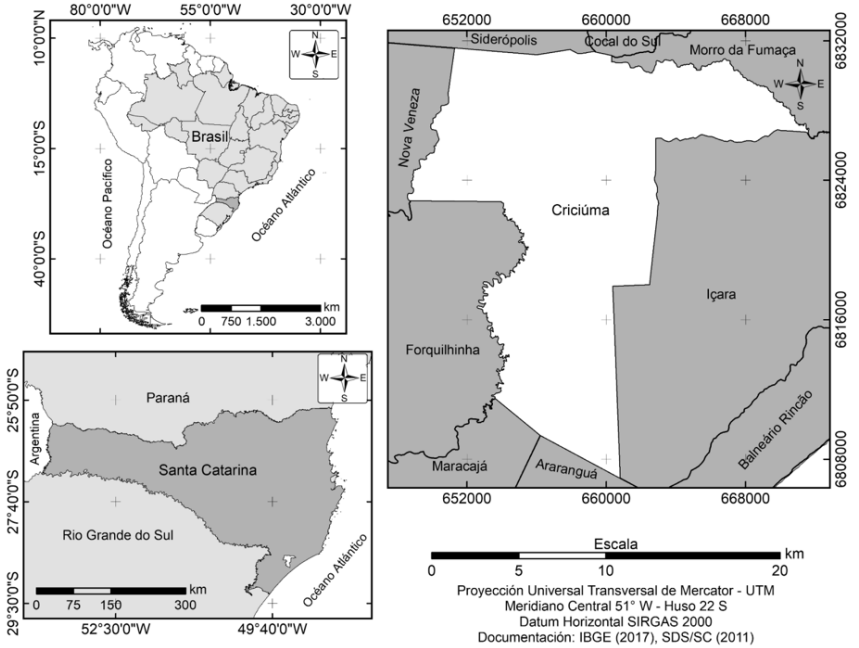
Knowing the recycling chain is essential to understand the difficulties that waste pickers of recyclable materials face. This chain involves complex relationships among different social agents in several stages, from collecting various types of recyclable waste to its final processing. This work is the result of an interdisciplinary research project, which aims to map the recycling chain in the municipality of Criciúma, located in the south of the state of Santa Catarina, Brazil (Figure 1). Here, selective collection is carried out by a company hired by the municipality, and the collected material is sent to a single association of waste pickers. This organization faces several problems: deficiencies in administrative management, lack of physical infrastructure, a high degree of labor turnover among its members, and sales contracts with several recyclable materials buyers. These difficulties have an impact on working conditions and on the low income of workers. The average income of recyclable materials collectors in Brazil corresponds to the minimum wage (approximately R$975.00, or USD 251.56, according to IBGE, 2018).[1]

Apart from the collectors working in the association, it is common to see independent waste pickers on the streets of Criciúma collecting different types of waste. There are no official data about these informal workers, who are not taken into account by the municipal management. It is widely known that many of them also do this activity occasionally or sporadically to obtain an extra income which supplements the pay they get from another job (Dagnino and Johansen, 2017).

[1] IBGE is the Portuguese acronym for *Instituto Brasileiro de Geografia e Estatistica*.

Map 1. Location of the municipality of Criciúma, Santa Catarina, Brazil



Source: Authors, 2017.

Throughout a field research study that included observations and interviews, it was possible to map the recycling chains in Criciúma. This made it possible to identify the social actors, their connections, and their spatial location in the city. The resulting cartography made it possible to classify the social actors according to the type of material they work with, the functions performed, and the hierarchical relationships established between them. In this work, it is highlighted that the recycling of materials is carried out through processes that generate invisibility and informality for certain social actors. It is also highlighted that the recycling chain is maintained by the normalization of precarious work by waste pickers.

The recycling process and its actors

According to Act 12305/2010, the solid waste management system is defined as the "series of actions to find solutions for solid waste disposal, in order to consider political, economic, environmental, cultural and social aspects, with social control and under the premise of sustainable development" (Brazil, 2010, chapter II, section 3, SUBSECTION XI). The National Solid Waste Policy defines the selective collection process as "a collection of solid waste previously segregated in relation to its structure or composition" (Brazil, 2010, chapter II, section 3, paragraph V). According to Jacobi (2006), such activity is designed as the fundamental action of the system. This means that, in order to transform post-consumer material (such as that produced in homes) into raw materials for processing industries (recycling), it is necessary to separate and segregate these materials where they were produced and selectively collect them, so they can be later commercialized as supplies, creating what is called the recycling chain (Rutkowski, Varella y Campos, 2014).

As mentioned above, recycling is defined as a "transformation process of solid waste which involves altering its physical, physicochemical or biological characteristics, with the intention of transforming it into supplies or new products, and taking into consideration the rules and conditions established by the National Environment System (SISNAMA for its acronym in Portuguese)" (chapter II, section 3, paragraph XIV). This "industrial procedure for the reuse of raw material in the production of new products (whether similar or not)" (Eigenheer, Ferreira and Adler, 2005) does not differ in Brazil from what is happening throughout Latin America. According to Fundación Avina (2012):

> "All across Latin America, waste pickers are the protagonists and main figures in the recycling process. However, most of them lack an organizational structure, formal recognition, and legal rights, although this situation has started to change in their favor thanks to their determination and the power of their union".

Indeed, waste pickers of recyclable materials carry out this activity informally in most cases, and they do not receive any support from the public institutions that are responsible for solid waste management, while the main beneficiaries of the recycling chain are industries and their middlemen (Conceição, 2005). The base of the recycling chain is made up of waste pickers, defined as workers who collect and select recyclable material by the Brazilian Occupational Classification System. These workers are responsible for the preparation, conditioning, and sale of the material, contributing in this way to the environment and promot-

ing the recycling process (Brazil/MTE, 2002).[4] The recycling chain consists of the exchange relationships existing between the participants engaged in the reuse and recycling process, from the waste pickers located at the beginning of the chain to the final processors in the recycling industry.

Methodological routes of mapping

The present study began with an exploratory research stage concerning the recycling chain and the role played by each actor. This stage attempted to clarify the problem through a bibliographical study (Gil, 2008) that consulted scientific articles about the participating actors in the recycling chain, which made it possible to form a hypothesis about how the relationships between the actors worked. Local inquiries were made during the first stage of the research study in order to identify the locations of companies and micro-companies within the recycling chain by following a systematic route in the outskirts of Criciúma.

After this first approach, a description of the characteristics of the interrelationships—from the collection of materials to companies processing recyclable materials—was provided. The combination of previous studies that provided a theoretical guide, in addition to the first approach in this field, made it possible to plan the investigation and design the instruments for data gathering. The mapping of the post-consumer chain was carried out by collecting primary data and conducting local visits to middlemen specialized in one or more materials. Several visits were made to prospective areas where companies work mainly with paper, plastic, and/or metal. Glass, although returnable and 100% recyclable, is not recovered for its reuse in the productive chains of the region because there are no companies working with this material.

During each visit, a form including open- and closed-ended questions was used. Question items were included in order to identify a company, its infrastructure, the number of employees, types of materials the company works with, and the companies with which they do business. Finally, questions about the main difficulties companies are currently facing were also raised. In addition to the form, photographs of materials and infrastructure were registered with the permission of the owners.

Once the data were collected, each actor in the chain was analyzed in relation to the role played in the different steps of the process using the classification suggested by Rutkowski, Varella y Campos (2014), and a classification of commercial organizations was added according to the methodology developed

by Aquino, Castilho y Pires (2009) and by Conceição et. al. (2016). If one case was different from the alternatives mentioned by these authors, it was analyzed separately, and then a new type of classification was created.

Using the information gathered, a map was created using Google Maps, which can be described as free research and visualization software developed by the US company Google. This software provides satellite images and maps from all over the globe. Google Maps and Google Earth have the same objective and the same display variables for geographical space. However, the principal difference is that Google Maps does not show images in a three-dimensional way (Moreira, 2012). General information, addresses, telephone numbers, and several photographs of the companies in the recycling chain were included.

A hierarchical structure of the actors is presented below, and finally, a classification according to the materials they work with, considering the data collected, the map created using Google Maps, and the mapping of all the actors identified in the recycling chain.

Links and actors of the recycling chain

The decision to map through Google Maps was also made based on the simplicity of sharing the results of the research study.[2]

The symbols in the map are identified as follows:

1. The blue dots show middlemen companies of the recycling chain that work with paper, cardboard, and long-life containers (Tetra Pak®)
2. The circles with the letter P show middlemen companies engaged in the plastic recycling chain
3. The yellow circles show companies that work with metal
4. Waste picker associations and cooperatives are shown with symbols of pins with a green background.

There are also other symbols for companies that process the products and end the recycling chain by (re)introducing new materials. These companies are identified with the recycling symbol and the colors indicated for each material according to the CONAMA resolution No. 275/2001 (Brazil, 2001). Dumps

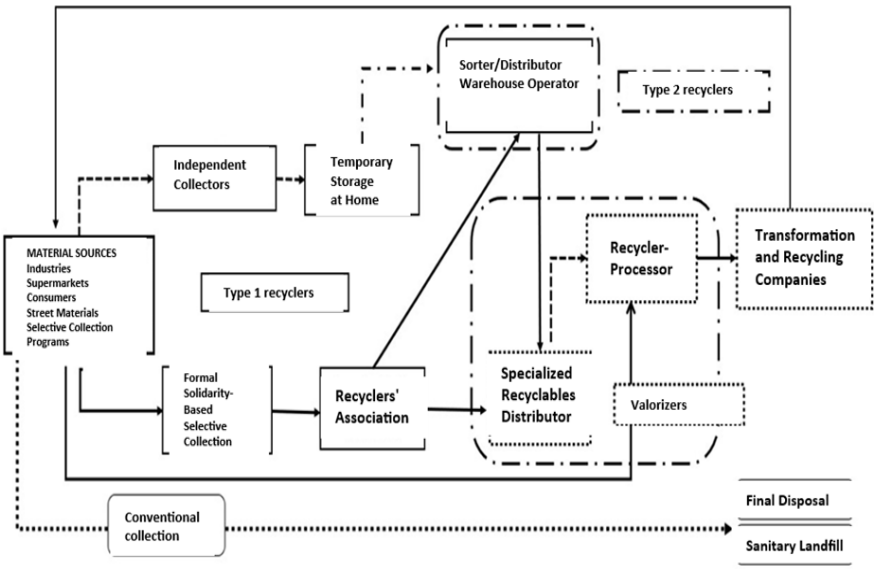
[2] The map can be accessed at: https://drive.google.com/open?id=1ibG-WfBSLpPMJL8Zxgzgvn4ZSCI&usp=sharing

were also identified. The database of maps created using Google Maps has nine different types of materials distinguishable by their symbol and chosen color.

The actors in the recycling chain perform different functions; however, these are interconnected. A total of 23 enterprises were visited. These were classified according to their level inside the recycling chain and the type of material they primarily work with (Table 1).

Conventional CollectionThe flowchart (Figure 1) shows the interaction between these actors and the logistics of recyclable materials from the moment these are discarded, either after use or as industrial waste, through the different levels of the recycling chain, up to the final steps of recycling or disposal. The flowchart illustrates how recyclable materials move within the Criciúma territory, considering their classification, processing, commercialization, and transformation in order to return to the consumption cycle.

Figure 1. Actors and links of the recycling chain located in Criciúma, SC.



Source: M. R. Guadagnin; V. Kraieski de Assunção; S. Baesso Cadorin; L. Nunes; D. De Conto, 2017.

Table 1. Actors of the recycling chain and the materials they manipulate

Types of actors	Terminology	Description of the actions	Types of materials			
			Metal	Paper	Plastic	Multi-materials
Independent collectors	**Type 1 Recyclers** Collector classifier	Collectors, also known as waste pickers, are workers who collect recyclable materials in the streets and in garbage cans, classifying and selling these reusable and recyclable materials.	0	0	0	1
Organized garbage collectors	**Type 2 recyclers** Collector-classifier	Waste picker associations and/or cooperative corporations. They are in charge of classifying and dividing the materials in two steps: previous selection and detailed classification. In the first phase, the material is divided into five categories: metal, plastic, paper, glass and waste materials. Then, the material is packed up in raffia polypropylene bags with a storage capacity of up to 300 kilos. In the second phase, the recyclable material is classified into different categories: metal (ferrous scrap, aluminium, copper), plastic (fittings, bubble wrap, HDPE, PP, PVC, white PET, green PET), paper (white paper - type I, II, III and IV, corrugated cardboard, magazines, newspapers, different types of paper, color paper) and cups (white and colorful).	0	0	0	2
Middleman Level 1	**Type 2 recyclers** Waste picker-classifier/ distributor	Commercial organizations that usually buy and sell recyclable materials such as paper, cardboard, plastic and glass and also ferrous and non-ferrous materials along with other reusable materials. Here the materials bought are already classified. In this case, the identification of the materials is used for the removal of contaminating substances and the classification is related to the quality standards of recycling industries. Several commercial strategies can be seen: materials that do not have market value are not processed; however, if the prices are low, a few of these materials are stored for a short period of time. Waste pickers are economic actors who are dedicated to collect, classify, store, prepare and sell recyclable waste for its reusing, recycling and other forms of waste recovery.	1	0	1	3
Middlemen Level 2		**Commercial organizations that revalue recyclable materials** Recycler-distributor	0	1	2	5
Middlemen Level 3		**Commercial organizations that revalue recyclable materials** Recycler-processor	1	1	2	1
Waste picker	**People who transform recyclable material** Recycler (person) in charge of transforming recyclable material	Recycling industry: organization that processes recyclable material. These organizations participate in the industrial process of waste management whose objective is to recover and process waste.	0	0	1	0
Other category	-	A company in charge of outsourcing the tasks required for a middleman, making the middleman responsible for sorting a certain type of material.	0	0	1	0

Source: the authors, using terminology defined by Aquino, Castilhos and Pires (2009). Conceição et al. (2016), Rutkowski, Varella y Campos (2014).

Criciúma consumers initiate the recycling process by discarding recyclable waste, which serves as raw material. This waste is largely collected by a subcontracted company in charge of regular and selective collection. The waste collected by this company is delivered to a classification and sorting unit, to the organized waste pickers in charge of commercializing it with middlemen collectors and organizations that resell recycled materials in the city, and, on several occasions, directly to waste processors.

Independent waste pickers are an important link within the recycling chain. They work in parks, streets, and avenues, where they collect materials on foot, by bicycle, or with animal-drawn carts, cars, or small trucks. During their routes, they first separate materials into recyclable and non-recyclable. Then, a second sorting is done in their homes: they thoroughly classify the recyclable materials, differentiating between five and thirty-two different typologies (such as different types of metal, plastic, paper, and glass). Finally, they sell the material to middlemen.

After sorting the materials, independent waste pickers commercialize them with small middlemen companies, which are local distributors. These distributors, in turn, commercialize the materials with large middlemen companies and local and regional organizations that sell recyclable materials. Middlemen store the materials until they achieve a sufficient scale to sell in the southern region of Santa Catarina and in other regions of the state where paper and cardboard recycling companies are located. On occasion, the recyclable materials are transported to manufacturing companies in other states, as in the recycling chain for multilayer and aluminum containers.

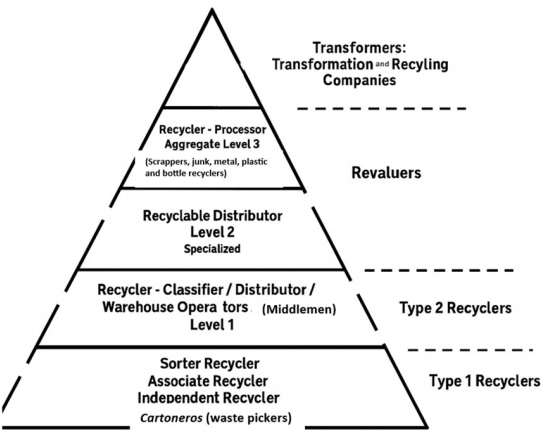
Based on the information gathered on middlemen, those included in level 1 have more problems related to infrastructure, supervision, and a lack of municipal incentives and financial resources, as they buy directly from independent waste pickers most of the time, and the material they receive is mostly unsorted waste. The middlemen included in level 2 have better working conditions than those in level 1. However, many difficulties still exist in relation to supervision, incentives, and rejected unsorted waste mixed with the purchased material. Waste processors have a vast buying market and a small number of competitors in the region. Thus, they have few, if any, difficulties compared with middlemen and other companies working in the recycling chain.

As shown in Figure 3, there is a hierarchy within the recycling chain. The criteria applied for classifying the actors at different levels were: size, available infrastructure, equipment used, and materials collected, received, and commercialized, in addition to the relationships of (inter)dependence between the

links of the recycling chain. In this pyramid, the higher the level, the higher the income, as market prices are defined by middlemen and higher-level industries. This is due to their better infrastructure, as reflected in their larger storage facilities that can hold materials for longer time periods without affecting quality. This advantage enables these companies to decide the best time for selling.

The first level includes independent waste pickers and/or associations and cooperative groups considered as collectors of recyclable material. The second level consists of type 2 recovery, which is subdivided into two further levels: level 1 middlemen and small distributors, and people engaged in the classification of recyclable material. These will, in turn, pass such materials to level 3, where waste re-users are found, with responsibility for distribution processes (middlemen level 2) and recyclable material processing (middlemen level 3). The entities that process recyclable materials into raw materials for industry by transforming waste into consumer goods are at the final link of the chain.

Figure 3. Hierarchy of the recycling chain in Criciúma, SC and the region



Source: Authors, using terminology defined by Aquino, Castilhos and Pires (2009), Conceição et at. (2016), Rutkowski Varella and Campos (2014).

At the end of the research study, it was confirmed that most of the companies visited (52%) work with multiple materials, which means that they buy and commercialize more than one type of recyclable material (usually paper, plastic,

and metal). This characteristic is also found in other companies in the Criciúma municipality and in the region. Diversification seeks to reduce financial insecurity, which can result from depending on the commercialization of only one type of material. It also helps to ensure orders for materials in the absence of regular customers for a single material.

Regarding the differences identified in field research, the middlemen who work with metallic materials (aluminum) are in the group that is least affected by the country's economic crisis, as the selling price of aluminum is determined based on the fluctuation of the dollar exchange rate.

Deficiency in the recycling chain

The national solid waste policy in Brazil is established in chapter 8 of Act No. 12305/2010. This act encourages the creation and development of cooperatives and other types of associations of waste pickers. However, the small number of existing organizations in the South of the State of Santa Catarina do not work as effectively as organizations with cooperative management should. Deficiencies in the implementation of selective collection of solid waste with segregation at the source, the lack of continuity in environmental education programs, and the lack of properly equipped infrastructure for sorting are all factors that show how public policies are intermittent in matters of inclusive management of solid waste.

In Criciúma, there is only one workers' association for recyclable materials. This association reports problems regarding administrative management and a lack of information and training for its members. There is also a high worker turnover, which results in a lack of work continuity and low quality of waste sorting, as reported by middlemen from all levels. Another reason for the low quality of waste is the lack of environmental programs to raise awareness of the importance of recyclable waste segregation and how and when it should be done.

Most of the companies visited, from waste pickers' organizations to level 2 middlemen, do not comply with environmental and labor laws, and do not comply with the requirements of the Town Council's environmental agency. Failure to pay taxes or to obtain the required environmental license are strategies to reduce operating costs. Therefore, there are risks of environmental impact and evidence of job insecurity on account of hiring workers and associates under inadequate working conditions. Lack of access to social security benefits and public health services are also reported.

The differences identified between the levels of the recycling chain are due to a couple of reasons. Entrepreneurs with a higher level of education and/or experience tend to be in the highest levels of the chain (waste re-users and processors) because of their greater negotiation skills and ability to secure a strong position within the recyclable solid waste markets. Furthermore, they usually have better infrastructure (sheds, equipment, and transportation vehicles), they are stricter when controlling the quality of the material received from suppliers (waste pickers), and they work with large volumes of waste.

Companies at a lower level, mainly waste collectors and small-scale contractors, usually have their infrastructure in poor condition, which adversely affects the quality of storage over longer periods. These companies receive street waste materials (from independent waste pickers), materials from selective collection (organized waste pickers), or they buy these materials from other collectors (level 1 middlemen). The poor quality of materials is related to the high percentage of impurity, humidity, and refuse.

Plastic is highly commercialized in the city of Criciúma as it does not lose quality when exposed to the outdoor environment, which makes it easier to reincorporate into the recycling chain. Paper, on the other hand, is affected by several chemical, physical, and biological agents, whether natural or anthropogenic, which damage its quality, resulting in the loss of value and making its commercialization impossible. Metal, in turn, also offers a wide market. Working with non-ferrous metal requires larger storage facilities and stricter safety measures given its high market value, which may result in loss or theft, even within waste picker organizations.

Conclusion

Many actors who engage in multiple relationships are involved in the recycling process. Such relationships begin with the disposal of a highly recyclable material. The mapping of this chain of recyclable materials in Criciúma, SC, Brasil, has shown that the material is moved to the peripheral area of the municipality. In this way, the map reveals a complex network of social agents and their relationships, which are mostly unknown to the public and even to public managers.

The national solid waste policy requires Brazilian municipalities to develop regional plans for integral waste management. Apart from the steps and objectives of waste management, an accurate diagnosis of the waste management situation is needed. This research study contributes to understanding a chain

of this type that has developed based on informality and job insecurity and which is not taken into account by public management.

The lack of infrastructure in workspaces and areas which characterizes the outskirts of most Brazilian cities (where the poorest population lives) is, in fact, the space for the social actors working at the bottom of the recycling chain. The facilities of the only association of waste collectors in the municipality of Criciúma are precarious compared to the conditions and organizational structures that, according to Eigenheer, Ferreira, and Adler (2005), were used at the end of the 19th century in cities like New York, Munich, or Budapest. The working conditions, the quality of the material received, and the low efficiency in the collection and sorting of waste, added to the population's poor commitment regarding solid waste management, have caused waste pickers to reconvert their former work—carried out in ordinary dumps in the state of Santa Catarina until the mid-2000s—into what are known as "indoor dumps" in the locations made available to associations and cooperatives (more than 3,000 facilities like these have been reported in Brazil).

The mapping of the recycling chain shows the importance of the autonomous waste pickers' work on the streets of Criciúma. Although penalized by municipal laws, they tend to grow in number with the rising unemployment figures in the country, while competing with cooperatives for the collection of recyclable materials. Inequality is also reported regarding the compliance with human and labor rights and the unfair distribution of the gains produced in the business. Just a few actors in the chain (mainly large companies) earn the largest profits at the expense of the most vulnerable and informal actors. The working conditions in the first links of this chain show a violation of the right to fair and equitable treatment for workers.

The visibility given to the collection and sorting of waste sparks debate on this issue and fosters attempts to grant better working conditions to workers at the bottom of the chain, reducing loss and adding value to the commercialized waste materials. However, better education and training for workers engaged throughout the process are required to reduce the rejection of waste material. Additionally, higher investment in environmental education for the community to effectively participate in selective collection should be encouraged.

The present study of the recycling chain shows the hierarchy and the unequal relationships between the actors involved in the process. This helps to maximize capital-benefit factors from a business perspective. The work in this sector is essential to obtain a better distribution in the recycling chain and to increase awareness in the community of the importance of recycling in general.

To overcome inequality, it is necessary to implement an information system (data set) about recycling in Criciúma and the region, integrating the different information providers (foundations and environmental, municipal, and state institutions, as well as universities) and investing in the proper infrastructure for the sorting and classification of waste. This must be done in a joint effort with companies created by waste pickers, associations, and cooperatives engaged in the solidarity economy and productive social inclusion approaches, based on the efficient implementation of selective collection as stated by the national solid waste policy and the promotion of permanent campaigns for awareness and social change.

References

Aquino, I. F., Castilho Junior, A. B. y Pires, T. S. L. (2009). A organização em rede dos catadores de materiais recicláveis na cadeia produtiva reversa de pós-consumo da região da grande Florianópolis: uma alternativa de agregação de valor. Gestão & Produção, 16(1), 15-24. doi: 10.1590/s0104-530x2009000100003.

Brasil, (2002), Catador de Material Reciclável: Trabalhadores da coleta e seleção de material reciclável. Ministério do Trabalho e Emprego. Classificação Brasileira de Ocupações Cbo. Recuperado de http://www.mtecbo.gov.br/cbosite/pages/pesquisas/BuscaPorTituloResultado.jsf

Brasil, (2001), Resolução nº 275, de 25 de abril de 2001, do Conselho Nacional do Meio Ambiente - CONAMA. "Estabelece o código de cores para os diferentes tipos de resíduos, a ser adotado na identificação de coletores e transportadores, bem como nas campanhas informativas para a coleta seletiva". Diário Oficial da União. Brasília DF, Brasil: DOU. Recuperado de http://www.mma.gov.br/port/conama/legiabre.cfm?codlegi=273

Brasil, (2010), Lei nº 12305, de 02 de agosto de 2010. Institui a Política Nacional de Resíduos Sólidos; altera a Lei no 9.605, de 12 de fevereiro de 1998; e dá outras providências. Diário Oficial da União. Brasília DF, Brasil: DOU. Recuperado de http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/l12305.htm

Brasil, (2002), Descrição 5192: Catador de Material Reciclável: Trabalhadores da coleta e seleção de material reciclável. Ministério do Trabalho e Emprego. Classificação Brasileira de Ocupações Cbo. Recuperado de http://www.ocupacoes.com.br/cbo-mte/519205-catador-de-material-reciclave

Conceição, M. M., (2005), Os empresários do lixo: um paradoxo da modernidade: análise interdisciplinar das cooperativas de reciclagem de lixo, Campinas SP, Brasil: Átomo.

Conceição, R. D. P. et al., (2016), A cadeia de reciclagem de pet pós-consumo e as definições de suas etapas: um estudo de caso no Rio de Janeiro. Revista Brasileira de Ciências Ambientais (online), (39), 80-96. doi: 10.5327/z2176-9478201613514.

Dagnino, R. S.; Johansen, I. C., Os Catadores no Brasil: características demográficas e socioeconômicas dos coletores de material reciclável, classificadores de resíduos e varredores a partir do censo demográfico de 2010. In: IPEA - Instituto de Pesquisa Econômica Aplicada. Mercado de trabalho: conjuntura e análise. Brasília: Ministério do Trabalho. p. 115 – 125. 2017 Recuperado de http://repositorio.ipea.gov.br/bitstream/11058/7796/1/bmt_62_completo.pdf

Eigenheer, E. M.; Ferreira, J. A.; Adler, R. R., (2005), Reciclagem: mito e realidade, Rio de Janeiro RJ, Brasil: In-fólio.

Fundação Avina, (2012). Reciclagem Sustentável. Relatório Anual 2011. Ciudad del Saber, Clayton Panamá, República de Panamá. Recuperado de http://www.informeavina2011.org/portugues/reciclaje.shtml

Gil, A. C., (2008), Como elaborar projetos de pesquisa, São Paulo SP, Brasil: Atlas.

IBGE – Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílio 2018. Rio de Janeiro: IBGE, 2018.

Jacobi, P. R., (2006), Gestão compartilhada dos resíduos sólidos no Brasil: inovação com inclusão social, São Paulo SP, Brasil: Annablume.

Moreira, M. A. (2012). Mapas conceituais e aprendizagem significativa. Instituto de Física – UFRGS, 1-14. Recuperado de https://www.if.ufrgs.br/~moreira/mapasport.pdf.

Ribeiro, T. F. y Lima, S. C. (2000). Coleta Seletiva de Lixo Domiciliar - Estudo de Casos. Caminhos De Geografia - Revista On Line Programa de

Pós-Graduação em Geografia, 1(2), 50-69. Recuperado de http://www.seer.ufu.br/index.php/caminhosdegeografia/article/viewFile/15253/8554

Rutkowski, J. E., Varella, C. V. S. & Campos, L. S. (2014). A reciclagem de resíduos sólidos urbanos no Brasil: desafios e oportunidades para Ampliação. En, Seminário Nacional De Resíduos Sólidos. Brasília, Brasil. Abes: Câmara Temática de Resíduos Sólidos da Abes. Recuperado de http://www.abes-df.org.br/upload/estudo/2014_10_01/v-011.pdf

Formalization of waste pickers in Bogotá

Between optimization and change in the waste management system

Luisa Fernanda Tovar and Roger Camilo Alfonso Leal[*]

Introduction

It has been three years since the signing of National Decree 596 of 2016, which establishes a formalization process for waste pickers as providers of the complementary public service of waste management (MVCT, Decree 596). The results in terms of Integral Solid Waste Management (ISWM) efficiency, measured according to the amount of waste recycled, are not satisfactory. Official information (Figure 1) shows that, despite the increase in tons recycled, the quantities of waste discarded in the Doña Juana Landfill also continue to grow. According to the literature, one of the main benefits of recycling is the reduction of tons buried in landfills (Gutberlet, 2013; Wilson, Velis, and Cheeseman, 2006). However, something seems to be failing.

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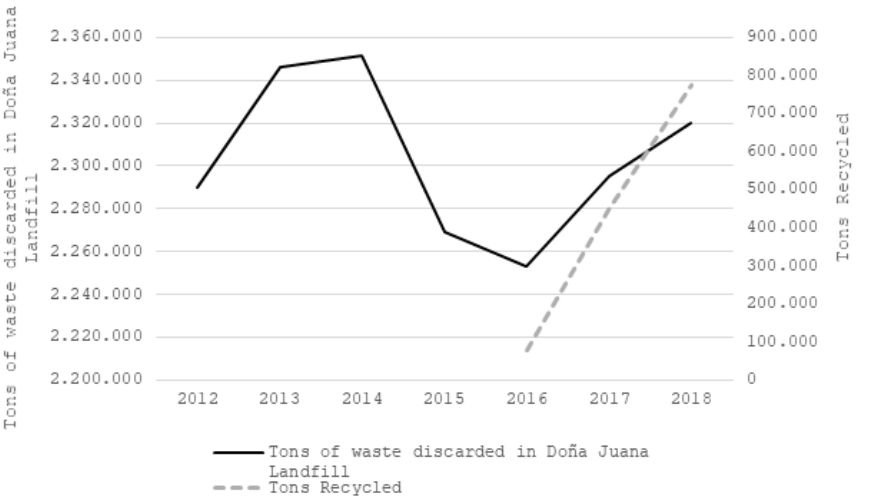
Figure 1. Tons of waste disposed in the Doña Juana Landfill and tons recycled in Bogotá (2012-2018)



Source: Data from the Environmental Observatory of Bogota and Unique Information Service (SUI) of Public Services Superintendence. Prepared by the authors.

Faced with this situation, there is concern about whether the waste management system of Bogotá is being changed to maximize waste utilization, or whether an optimization of the traditional landfill-based system is occurring.

The continuity of public policy is a complicated element to guarantee due to changes in government. In the case of Bogotá, the last two governments have held opposing views on waste management. Historically, a linear, landfill-based model prevailed until it was challenged by the Zero Waste policy promoted by the administration of Mayor Gustavo Petro (2012-2015). In this program, waste pickers, backed by an organized social movement, gained significant recognition thanks to processes of political and legal influence.

In 2016, a setback in ISWM was observed with the change of government. The adoption of policies that aimed to stabilize the linear collection system affected the process of inclusion for waste pickers. Furthermore, the organization's role as a fundamental actor in transforming the recycling system (Parra, 2007) was ignored. At the national level, however, the formalization of waste picker organizations has continued (MVCT, Decree 596).

A public waste management policy can optimize the existing system by improving cost efficiency, or it can advocate for a change in the system that

radically transforms its processes, seeking to alter and enhance its potential sustainability (Bugge, Fevolden, and Klitkou, 2019). Depending on the objective of public policy—be it optimizing or changing the existing system—the participation of the waste picker population will be affected.

Being conscious that recycling is the best economic, social, and environmental option in terms of ISWM (IDEXUD, 2016; Yang et al., 2014), and that changing the system is a complex process in which technological aspects, regulations, public services, and user practices must intervene (Bugge et al., 2019), this article seeks to analyze the main failures that hinder a change in the ISWM system for Bogotá.

To achieve this objective, a normative analysis of public policy was carried out for the period of 2012-2018. In addition, this study examines the information recorded by official institutions about the recycled and buried quantities of waste, as well as the participation of waste picker organizations in terms of tons recycled. This analysis was complemented with semi-structured interviews with officials and academics, and a focus group was conducted with members of waste picker organizations in the process of formalization. Furthermore, the reflections presented here result from discussions with the team of the Colombian Observatory for Integrated Solid Waste Management (*OCGIRS*).[1]

The article first presents the theoretical elements of the discussion between an optimization process and a system change in terms of ISWM, with types of flaws that serve as categories of analysis (Klein Woolthuis, Lankhuizen, and Gilsing, 2005; Weber and Rohracher, 2012). The second section explains the geographical, social, and historical context of the case study and the regulations that govern the cleaning service, particularly for recycled waste. The period between 2012-2018 in Bogotá is taken as a study reference. The third section presents the results of cross-referencing quantitative and qualitative information in relation to the types of failures. Finally, the paper concludes with some reflections on public policy to promote the change in ISWM that the city and its inhabitants require.

Theoretical discussion

The approach to waste management has undergone a substantial change, moving from a perspective of final disposal or burial to a logic of use and circular

[1] Official website: https://www.observatorioresiduoscolombia.org

management of waste (Crang, Hughes, Gregson, Norris, and Ahamed, 2013; Gutberlet, 2013; Vergara and Tchobanoglous, 2012). Under this new logic, municipal administrations can optimize existing systems or commit to a substantial change in waste management.

Optimization vs change in the Waste Management System

xOptimization of waste management systems involves changes that improve the sustainability or cost-efficiency of the current system, while **systematic change** refers to transformations that radically affect the waste system and fundamentally alter and improve its potential sustainability (Bugge et al., 2019). One of the main objectives in systematic change is to innovate beyond the traditional and linear forms of waste management, allocating the necessary infrastructure and investments to climb the "waste management pyramid" (Hyman, Turner, and Carpenter, 2013, p. 18).

Analyzing waste management involves studying infrastructure systems, technological needs, regulations, articulation with public services, and the practices and interactions between different actors. Thus, the process of changing the system requires a comprehensive approach to the interconnected social, technical, economic, environmental, and cultural factors. This last point complicates the possibility of large-scale change to achieve sustainable cities.

In this sense, it is important to elucidate the discussion between transition and transformation as concepts related to changing the waste management system. The two concepts offer perspectives on how to describe, interpret, and support desirable and radical, but not linear, social changes. Therefore, they are not considered mutually exclusive. In fact, transformation can be thought of as a possible transition path.

Thereby, transition (going across) is generally used to designate social, technological, institutional, and economic changes from one waste management scheme to another, with their respective interactions and feedback. Meanwhile, transformation (change in shape) refers more precisely to fundamental changes in the structural, functional, relational, and cognitive aspects of the socio-technical-ecological systems of waste management, which lead to new paths of interaction and results (Hölscher, Wittmayer, and Loorbach, 2018). The efforts to achieve a change in systems are deeply political and contested by the various actors that are affected in different ways (Patterson et al., 2017).

This article examines the public policies implemented around a change in waste management. It focuses on the recognition and integration of waste pick-

ers for the provision of the public cleaning service and its tariff remuneration. This paper analyzes whether the policies implemented promoted a management of waste tending toward sustainability, or, on the contrary, if the objective was aimed at optimizing the traditional final disposal scheme.

The inclusion of waste pickers in the ISWM

Public policies around waste management must ensure coherence with the contexts of their implementation. Indeed, the strategies implemented in the countries of the Global North cannot be transferred to the contexts of the Global South. The socio-technical conditions of the latter differ from those of the former, as a large part of the population in the Global South lives from recycling.

In the processes of changing waste management systems, it has been shown that one of the best strategies to increase recycling levels is to integrate waste pickers.[2] Through this activity, they improve their livelihoods, working conditions, and recycling efficiency. Conversely, excluding them can be highly counterproductive, since the potential of their practices and experience would be lost (Wilson, Velis, and Cheeseman, 2006). Despite the absence of official information on the participation of recyclers in management systems, different studies have shown not only the importance of this population in increasing the quantities of recycled materials, but also the need to achieve their effective integration and interaction (Linzner and Lange, 2013; Sandhu, Burton, and Dedekorkut-Howes, 2017; Sapuric, Shkrijelj, and Josifovski, 2018; Simatele, Dlamini, and Kubanza, 2017).

The benefits of integrating the recycling population are not only environmental and economic but also social and cultural. On the one hand, it seeks to improve the living and working conditions of vulnerable populations; on the other hand, waste pickers are key actors in community awareness processes about the importance of waste separation at the source and the environmental impact of this practice (Rateau and Tovar, 2019).

In India and Kenya—countries with waste pickers in working conditions similar to those in Colombia—there is evidence of the absence of regulatory frameworks that promote a hierarchy in waste management. This is exacerbated

[2] A vulnerable urban population that collects and transports recyclable material and has historically carried out this work informally, with rudimentary tools and in precarious technical and operational conditions.

by governments because they do not recognize small and informal businesses, or even waste pickers, as potential partners. This is a shame, since cooperation could lead to increasing levels of resource recycling, as well as higher levels of employment (Post and Baud, 2003).

Types of flaws that prevent change in the GIRS system

Considering that a change in the waste management system leans toward optimization by including the waste picker population, a framework of analysis is established to categorize and understand the complexity involved in such a change. Authors such as Klein Woolthuis et al. (2005) propose the definition of four types of failures that hinder system optimization: capacity failures, infrastructure failures, network failures, and institutional failures. However, taking into account that the interest of this article focuses on the analysis of the factors that hinder a change in the system, this paper will opt for the proposal put forward by Weber and Rohracher (2012).

These authors propose four types of policy failures that can promote or hinder change in the waste management system:

- *Directional failures:* refer to the absence of a shared vision and the difficulty of establishing the necessary efforts and collective priorities to face societal challenges.
- *Failure to articulate needs*: are related to a deficit in the diagnosis and analysis of the needs and potential of the different actors involved in the system, which can generate inefficient programs or policies.
- *Policy coordination failures:* cover the problems of synchronization in administrations and institutions to articulate their operations with different sectors and levels to face social challenges. The absence of such coordination can be evidenced in the international, national, regional, and municipal spheres (vertical coordination failure), or between different sectors (horizontal coordination failure). Likewise, the impact on the temporal opportunity for involvement and the sequence of different political interventions should be considered.

Bearing in mind the long-term nature of transformations, together with uncertainty, continuous monitoring is required regarding the progress of change objectives and the development of adaptation strategies. Oberlander and Weaver (2015) suggest that feedback can be positive when policy objectives are clear

and attainable, and allow public bodies to avoid highly visible failures and maintain a reputation for competence. On the contrary, negative reactions can arise if administrative bodies are blamed for highly visible failures, potentially damaging their reputation, internal morale, and external support.

Next, the geographical, social, and historical context of the case study is presented, before subsequently addressing the results of the analysis.

Changes in the GIRS and the inclusion of the waste picker population between 2012 and 2018

In 2012, after several rulings of the Constitutional Court in favor of the right of the waste picker population to be a formal part of the cleaning service (Parra, 2019), the administration known as "Bogotá Humana" (2012-2016) began to implement the inclusion of waste pickers in the public sanitation service. A year earlier, at the request of the waste pickers, the same Constitutional Court had nullified the bidding process for the exclusive service areas (ASES) for the collection of non-usable waste because it found evidence of non-compliance with the Court's previous exhortations. Through Auto 275 of 2011, this same corporation ordered the Mayor's Office of Bogotá and the Commission for the Regulation of Drinking Water and Basic Sanitation (CRA) to define a route that would actually and effectively include waste picker organizations in the public sanitation service.

Thus, by 2012, the new District Administration found a favorable environment to modify what had, until then, been the collection, transport, and final disposal of waste from the capital. For a decade, Bogotá was divided into 6 exclusive ASES service areas. Each of these areas was controlled by a private company that collected and transported garbage to the Doña Juana Landfill for burial. Recyclable material was collected by independent waste pickers and organizations that performed this work informally and in precarious conditions, without any remuneration from the State. Thus, in 2012 the "Zero Waste" program was born as one of the flagship policies of the new administration[3] that aimed to drastically modify the public sanitation service.

[3] Bogota.gov.co, June 23, 2013, *Petro destaca a 'Basuras Cero' como modelo de aseo mundial* [Petro highlights the "Zero Waste" Program as a model for international sanitation]: https://bogota.gov.co/mi-ciudad/gestion-publica/petro-destaca-basuras-cero-como-modelo-de-aseo-mundial.

The Zero Waste program and the new public sanitation scheme

In its Development Plan, "*Bogotá Humana*" (Humane Bogotá) included the "Zero Waste" program, which it defined as follows:

> It aims to minimize the impact of debris and solid waste, including special and hazardous waste, generated by the city on the environment and the health of citizens. It implies a cultural, educational, and public policy change on waste management, which involves the State, citizens, and the productive sector. It includes actions to stimulate the production of reusable or biodegradable consumer goods, the construction of a culture of waste separation at the source, separate collection, industrial recycling processes, and final use and minimization of landfill disposal. Actions are directed towards fulfilling, in the medium and long term, the goal of reducing garbage production, constantly increasing the amount of waste utilized, and eliminating the social segregation, environmental discrimination, and predation of the environment caused by the current structure of the sanitation service. (Mayor's Office of Bogotá, 2012, p. 236)

For the Capital District, it was essential to create a culture of waste separation that would improve efficiency in the collection of usable waste. In the Development Plan, COP [Colombian pesos] 35,000 million (USD 11 million) were allocated to sensitize citizens to comprehensive waste management and source separation, added to COP 7,000 million (USD 3.2 million) to reach agreements with large generators with the aim of significantly improving the volume of recovered material harvested in the city (UAESP, 2015). Ambitious goals were set, such as the reduction of 30% of the waste disposed in the Doña Juana Landfill (RSDJ); the formalization of 50% of recycling activity through the creation of 60 waste picker companies legally constituted on the basis of solidarity economy organizations (as the Constitutional Court had urged in Order 275 of 2011); and awareness-raising on source separation for 100% of the users of the sanitation service (Mayor's Office of Bogotá, 2012). To address the new policy oriented towards the recovery of usable waste, the UAESP was institutionally modified, creating the Sub-Directorate of Valorization with 100% of its officials dedicated to meeting the goals set in the Development Plan.

However, the situation that would radically change Bogotá's sanitation service would be the implementation of a new scheme. By December 2012, the contracts between the capital district and the private companies that operated the six ASES expired. The District Administration did not miss the opportunity and substantially modified the garbage collection service, creating the public sanitation company Aguas de Bogotá, which had the responsibility of collecting

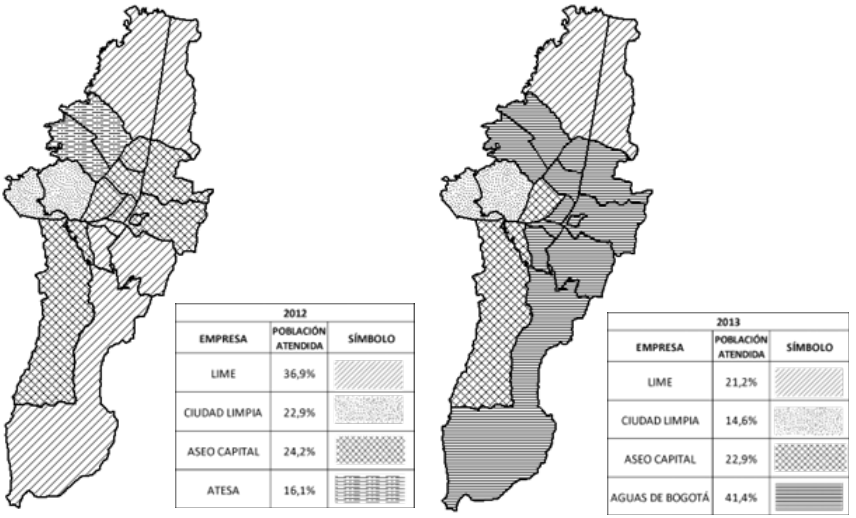
non-usable waste in 52% of the city's territory. It also assigned control over rate calculation,[4] collection, and billing of the service to the Aqueduct and Sewerage Company of Bogotá (EAAB)—a public company—limiting the participation of private companies to 48% of the city as subcontractors.

In the new public scheme, "Bogotá Humana" forbade companies that collected and transported waste to the landfill from collecting usable waste when it was presented separately at the source. Likewise, the administration assigned "Aguas de Bogotá" the task of training the waste picker population and its organizations in the provision of the service and made one of the biggest demands of the recycling movement a reality: tariff remuneration, which consists of paying waste pickers for recovered recyclable material. Since January 2013, the District Administration, under the direction of the Special Administrative Unit of Public Services (UAESP), would pay waste pickers a cleaning fee. Through a weighing mechanism, the waste pickers of Bogotá would weigh the material recovered in public warehouses and in some private warehouses authorized by the UAESP, according to the census and registration made by the same entity. This entity would be responsible for verifying the weighing of the material, calculating the tariff remuneration that would correspond to each waste picker in the city, and ordering the payment to the EAAB from the cleaning fee paid by customers in the city. The payment to waste pickers for the recovered material would not be made through organizations, but individually to each worker because, at that time, there were no waste picker organizations authorized by the Superintendence of Public Domiciliary Services (SSPD) to receive tariff compensation.

Since December 19, 2012, the city's cleaning service transitioned from a completely private scheme to one in which the Mayor's Office of Bogotá, through the UAESP, monitored the fulfillment of contracts. These contracts specified that private companies, in conjunction with the public company "Aguas de Bogotá", were to provide collection and transportation services for non-usable waste in ten of the twenty localities of the city and control rate calculation and billing. Moreover, recovery was included as a new activity in the public sanitation service. This would be left to the waste pickers and their organizations and monitored, controlled, and regulated by the UAESP. The following figure shows the change in the allocation of locations by cleaning companies and the proportion of the population served between 2012 and 2013:

[4] Waste pickers received COP 87,000 (approximately USD 46) every two months per ton recovered and weighed in authorized weighing centers.

Map 1. Changes in the allocation of companies providing public sanitation services throughout Bogota's localities (2012 - 2013)



Source: Own elaboration based on population data of the District Planning Secretariat and information of the UAESP.

This scheme would be known as a "transitional scheme" because Act 142/1994 requires that exclusive service areas must be awarded through a bidding process to allow for their operation. However, the District Administration, covered by the Constitutional Court judgments which ordered that waste pickers be included in the public sanitation service, directly assigned three ASES to "Aguas de Bogotá" and the rest to private companies. The adjudication of the areas was made with the justification that it was necessary to have a public cleaning company provide the service in order to comply with the Court's orders to formally include trade waste pickers. Thus, the bidding of the ASES would be postponed indefinitely until the Constitutional Court and the District Administration considered that the waste pickers were in a position where it was possible to participate in a bidding process.

The "transitional scheme" entered into force, not without resistance from the sectors that had traditionally dominated the sanitation service. During the first days of the scheme, Bogotá experienced a complex situation in terms of basic sanitation due to the accumulation of garbage that affected much of the city. According to versions delivered by the press, the critical points of garbage were produced through premeditated action by private sanitation companies

that stopped collecting hundreds of tons of waste days before the new scheme began operating, with the objective of generating an environmental crisis that would make the collection of waste by the public company "Aguas de Bogotá" unsustainable (El Espectador, 2013; RCN, 2014). This situation would lead to legal confrontation between the Capital District and control entities, such as the Office of the Attorney General and the District Contraloría—due to the environmental impact of the days after the "transitional scheme" became operational—and with the Superintendence of Industry and Commerce (SIC), which considered that free competition had been violated by the direct hiring of a public company without going through a bidding process.

By 2015, the "Bogotá Humana" administration had managed to include and remunerate 12,878 trade waste pickers, "formalize" 59 waste picker organizations such as the Enabled Waste Picker Organizations (ORHAS) to offer recovery services in the city of Bogotá, and provide eight public warehouses for waste pickers to carry out their operations. Likewise, Gustavo Petro's administration succeeded in completely replacing animal-powered vehicles—used to transport usable materials—with mechanically-powered vehicles. Through a census, the carreteros were asked to hand over their horses in exchange for the Capital District granting them a sum of resources that they could allocate to acquire a motor vehicle, develop a business plan, or use for the purchase or improvement of housing.[5] he public company "Aguas de Bogotá" managed to survive the "garbage crisis" and consolidate itself as an efficient cleaning company, reducing the cost of service by 20% thanks to the regulation and rate control exercised by the EAAB (City Hall Mayor of Bogotá, 2015). In terms of citizen culture, from a universe of two million users, 194,600 residents were sensitized.

With respect to the waste disposed in the RSDJ, the figures are telling. By 2012, 2,290,144 tons of waste were buried in the RSDJ. In 2013, the first year of the "transitional scheme" under public control, 2,345,920 tons were placed in the landfill; that is, 55,776 more than in 2012. In 2014, the amount of waste increased to 2,351,131 tons—an increase of just 5,211 tons compared to 2013—and by 2015, the tons buried in the RSDJ were reduced to 2,269,533, a decrease of 81,598 tons compared to 2014 (See Figure 1).

[5] Executive Order No. 40/2013, by which the Animal Traction Vehicle Replacement Program is created in Bogotá, among other provisions. Mayor's Office of Bogotá: *https://www.alcaldiabogota.gov.co/sisjur/normas/Norma1.jsp?i=51523&dt=S.*

On December 18, 2015, less than two weeks before the end of the "Bogotá Humana" District Administration, the Integrated Solid Waste Management Plan (PGIRS) was issued through District Decree 548 of 2015, with a strong orientation towards the recovery of waste. Additionally, the Decree advocates for the division of the city by sectors for the provision of the recovery service, limiting free competition. It also provides a short-, medium-, and long-term public policy roadmap to convert waste picker organizations into public sanitation service companies with vehicles, fully equipped warehouses, machinery, and administrative support, to make the collection, transportation, and final disposal of usable waste efficient, with a high investment of public resources under strict state control and regulation (UAESP, 2015).

Scheme change and service reprivatization

In 2016, the "*Bogotá Mejor para Todos*" [Bogotá Better for Everyone] District Administration was formed, considering it necessary to leave the "transitory scheme" of public control. In this sense, the new administration began by completely repealing the PGIRS of the previous administration, eliminating the "Zero Waste" program, and keeping the waste picker organizations in free competition. Likewise, it started the bidding process to award five exclusive service areas, in which private companies finally regained control of 100% of service provision, billing, tariff administration, and rate calculation. By February 2018, the new scheme under private control entered into operation, and the public company "Aguas de Bogotá" ceased its existence as a sanitation company. As a result of legal pressure and social mobilization (Contagio Radio, 2017; Pacifista, 2017; Radio Santa Fe, 2017), the organizations reached some agreements with the District Administration, and a technical recovery annex was included in which the rights that the waste picker population had won up to that point were to be included (UAESP, 2019).

This situation resulted in the accumulation of garbage in some areas of the city, presenting a health emergency due to the poor provision of the service by the new private operators, according to press records (CANAL 1, 2018; Caracol, 2018; OCGIRS, 2018b, 2018a; Pulzo, 2018). There were also significant inconveniences for waste pickers due to changes in schedules, frequencies, and a lack of coordination between the collection of usable and non-usable waste (OCGIRS, 2018a).

In April 2016, the Ministry of Housing, City and Territory issued Executive Order No. 596/2016, which regulates at the national level the scheme for

the activity of recovery and the transitory regime for the formalization of waste picker organizations and their remuneration. This decree changed the rules of the game for waste picker organizations, forcing them to comply with a series of administrative and operational requirements if they wanted to be legalized as companies of the public cleaning service and access the tariff income within five years. Likewise, the decree transfers the supervision, surveillance, and control of recovery services to the SSPD, causing the UAESP, and specifically the Subdepartment of Valorization, to lose the functions of addressing, facilitating, and controlling waste picker organizations.

The bidding process includes the collection of non-usable and usable waste under a containerization system, which, in accordance with the contracts through which the five ASES were awarded, will be carried out progressively. This process has not been free of differences and tensions with the waste picker population, which has denounced on multiple occasions the difficulties presented by the collection of usable waste in containers that do not allow for the work to be carried out properly and, therefore, result in a reduction of usable material recovered by the waste picker population (Desde Abajo, 2018; El Espectador, 2019).

For 2017, the waste disposed in the RSDJ increased by 42,387 tons with respect to 2016. In 2018, and after 10 months of the private cleaning scheme being in play, the waste disposed in the landfill increased by 24,613 tons compared to 2017, standing at 2,320,072 tons (Bogotá Cómo Vamos, 2017; UAESP, 2018).

The increase in waste arriving at the landfill is aggravated by the decision taken by the CRA, through Resolution CRA No. 843/018, to increase the cost of the final disposal rate. This provision again inflates the cost of the service for users and evidences that the "*Bogotá Mejor para Todos*" administration is committed to an "optimization" of the linear paradigm in waste management, despite the *Contraloría General de la República* (2019) denouncing this increase as improper and illegal.

On the other hand, the decision not to divide the recovery service by sectors and, therefore, to maintain free competition in the collection, transportation, and final disposal of usable waste has meant that recycling in Bogotá is complex to report, collect, and pay for. Above all, it presents difficulties in carrying out effective supervision that allows for certainty that what the service providers report is effectively what they collect and dispose of in the Stations of Classification and Use (*ECA*). The SSPD does not have the necessary personnel to conduct field supervision of the RCTs and to verify that what is reported to the

entity is really what is collected, transported, and disposed of. The monitoring system is carried out through an application in which waste picker organizations register the tons of waste that they sell to industry. As a support tool, sales invoices for recyclable material are used. However, this means of verification has proved insufficient and vulnerable.

There are serious indications of multiple irregularities in the reports that some waste picker organizations make of the tons they recover and return to industry. The reported values are quite high and do not correspond to the operational reality of the waste pickers or to the installed capacity of the warehouses where the recyclable materials are classified and stored. This situation casts a shadow of doubt on the significant "growth" that the recycling of waste has had in Bogotá, precisely since National Decree 596 of 2016 was implemented. As of this moment, there has been no reduction in either the number of tons "effectively utilized" or the number of warehouses and organizations authorized to provide the service. Neither has the value paid by users for recovery in their sanitation bill decreased. As the "Bogotá Mejor para Todos" District Administration (2016-2019) decided to maintain the free competition scheme for the collection of usable waste, any company can register with the SSPD as a waste picker organization and start providing the service, reporting its recovered tons, and charging the fee, without the existence of supervision, surveillance, and control mechanisms that can effectively verify in the field that the registered information corresponds to reality (Alfonso, 2018, pp. 37–47).

The sector division scheme in which a single waste picking organization was assigned to provide the service in a specific area, without having to compete with other organizations for users and their waste, in accordance with District Ordinance 548/2015,[6] made it possible to discern the potential of waste in that area, as well as the number of users to whom the service would be provided. This would have prevented the proliferation of dozens of companies that call themselves recyclers and would have allowed for more efficient service provision, effective field supervision, cost reduction, and less vulnerability to irregularities. However, the new District Administration, in October 2016, decided to repeal Ordinance No. 548 issued by the previous administration and issue District Ordinance No. 495/2016,[7] which would eliminate the old PGIRS that was aimed at the total optimization of city waste.

[6] https://www.alcaldiabogota.gov.co/sisjur/normas/Norma1.jsp?i=64204&dt=S

[7] https://www.alcaldiabogota.gov.co/sisjur/normas/Norma1.jsp?dt=S&i=67394

Major obstacles to changing the ISWM

As evidenced in the previous section, Bogotá has experienced a back and forth between nationalization and privatization of its waste management, along with a recent process of inclusion for the waste picker population. However, in 2016, the change in administration represented a radical turn that significantly reversed the public policy of ISWM, with its emphasis on recovery and social inclusion of the waste picker population. Next, the four types of failures that have hindered change in the ISWM in the capital of Colombia will be analyzed, which, at present, not only put at risk the working and subsistence conditions of waste pickers but also threaten to deteriorate the environmental conditions of the city.

Contradictory visions about the ISWM

Directionality flaws (Weber and Rohracher, 2012) are one type of flaw that radically affects change in the ISWM. In the case of Bogotá, this aspect is clearly observable when comparing both the Development Plans and the Integrated Solid Waste Management Plans (PGIRS). According to Decree MVCT 1077 of 2015, the PGIRS is the planning instrument that determines the objectives, goals, programs, projects, activities, and resources for the management of solid waste. This program runs during a certain period (usually twelve years), in accordance with the policy established by the municipal or regional administration (Ministry of Housing, City and Territory, 2015). Through the PGIRS of each administration, it is possible to identify the vision of the government in office and the priorities that it establishes in line with its future projection of the ISWM.

The Development Plan of Bogotá Humana, within the framework of the proposal *A Territory that Faces Climate Change and is Organized Around Water*, included the Zero Waste Program, which established the maximization of recovery, along with the inclusion of the waste picker population, and the minimization of waste disposed in the city (Mayor's Office of Bogotá, 2012). Accordingly, the formulation of the *PGIRS* 2016-2027 *Bogotá is Oriented Towards the Total Use of Waste* was the result of roundtables among the different actors, including waste picker organizations, which for several months met with the administration to discuss ISWM public policy.

With the arrival of the new administration of Enrique Peñalosa and his Development Plan "*Bogotá Mejor para Todos*", the advances of the Zero Waste

Program went unacknowledged, and the waste picker population was excluded from the construction of public policy. In the focus *Environmental Sustainability Based on Energy Efficiency*, the Comprehensive Project for the provision of the public sanitation service (Art. 86) by the UAESP was stipulated, which was to design and implement a project for the integral management of solid waste, based on responsible production and consumption. Other points of implementation were the promotion of separation at the source through cultural change by applying fines; the implementation of alternative technologies for recovery, and the promotion of the correct final disposal of waste, as well as the inclusion of waste pickers in the provision scheme.

The aforementioned inclusion was handled in the following terms: i) a refined, updated, and permanent registry of the waste picker population; ii) training for technical strengthening and support of waste picker organizations; iii) psychosocial assistance; iv) mechanisms that guarantee access to social security; and v) replacement of human-powered vehicles according to studies that guarantee efficiency in the collection of usable materials. However, according to the Diagnosis of the Cleaning Model in Bogotá, carried out by the District *Veeduría* (Inspection), the update of the PGIRS carried out by the administration of Enrique Peñalosa eliminated the programs, projects, and investments that the waste pickers required for their formalization process and effective inclusion in the sanitation service (District Veeduría, 2018).

Moreover, with the awarding of the sanitation bidding, the investment in and optimization of the provision of sanitation services were prioritized, especially final disposal, at the expense of the waste picker population. This sector was subordinated to competing against itself, while the Collection, Sweeping, and Cleaning (*RBL*) operators are guaranteed their areas of operation. Recovery was relegated to the background and is not considered an essential component in the sanitation model.

In fact, the lack of directionality in the ISWM policy regarding recovery is notable, given the "*Bogotá Mejor para Todos*" administration's concern to extend the useful life of the landfill, which as of now is estimated to last until 2022. According to statements by Mayor Enrique Peñalosa, the district has the resources to add 37 years of operation.[8] This proposal is completely contradictory to a public policy that manages waste with a focus on recovery.

[8] https://www.elespectador.com/noticias/bogota/distrito-ya-tiene-estudios-para-ampliar-37-anos-la-vida-util-de-dona-juana-articulo-836538

According to the opinion of the waste picker population, the political will of Mayor Gustavo Petro and his officials to transform the sanitation service and carry out a recovery scheme that included them was evident. However, the perception of the new administration is discouraging: "in this administration, we see the opposite. There is no willingness to move this forward, and if there is, they don't even know what they are doing" (personal interview with a waste picker, April 2019).

Articulation of needs and their flaws

During the *Bogotá Humana* administration (2012-2015), various flaws were presented that account for shortcomings in the diagnosis of the needs and potential of the actors who participated in the "Zero Waste" program. These led to the failure to materialize public policy goals in terms of the transformation of the system proposed by the District Administration.

It was acknowledged that animal-drawn vehicles played a relevant role in the collection and transport of usable waste, although they presented a case of animal abuse. The District replaced animal-drawn vehicles with mechanically-powered vehicles, but did not modify at all the situation of thousands of waste pickers who do their work with human-powered vehicles, who are exposed to all types of occupational hazards and who render the recovery service inefficient.

The wealth from recycling remained with intermediaries, specifically with the warehouse owners who bought the materials and sold them in bulk to industry, having great power and coercion over the waste picker population. This diagnosis served as a basis for proposing the administrative strengthening of waste picker organizations and public investment in warehouses with the aim of freeing the waste picker population from the exploitation of the "warehousers". The district invested in the lease of public warehouses and made waste pickers responsible for their operation, but did not provide capital so that organizations could start buying recyclable material from their associates. In addition, it delivered the warehouses without the machinery and equipment necessary for their optimal operation. This meant that public warehouses were operated by organizations on paper, but in practice, they were empty spaces in which some waste pickers accumulated their recyclable material, without any service being provided to the bulk of their members, who mostly continued selling their materials to other warehouses.

It was a misdiagnosis to consider that waste picker organizations were organizations that put the solidarity economy and democracy into practice

and that, therefore, all human and financial resources invested in them would benefit the bulk of their members. However, the dynamics within the organizations are much more complex, and little by little, the enormous distance between the boards of directors and their members was evidenced, as well as irregularities in the management of the organizations' own resources and the external resources that management procured. This situation meant that the benefit of public investment policies in some organizations remained only with the board of directors and did not reach the bases—that is, the associated waste pickers. Therefore, the situation of vulnerability of the waste picker population would not change in the short term. The statement of one leader illuminates the situation:

> Individual payment did have many flaws but allowed the waste picker to be paid in a way that would meet their needs. With the payment to the organizations, what has been demonstrated is that the payment no longer reaches the recyclers, but only the leader of the organization, who sees it as a private company and keeps all the resources. That is what is happening. So, it does affect us. It is not that this is bad (payment through organizations), because it really should have been implemented from the beginning, but the organizational and collective levels should be strengthened for this to work. But there really were no such collective and organizational systems that would provide a formalization for waste pickers...The leaders who were taught to enrich themselves separated their personal fate from the rest of the guild. And although the guild is doing badly, the leaders were doing very well. So that culture of individualism, of winning and winning, of getting rich at the expense of the work of others, is terrible in the leaders' system. (personal interview with a waste picker, April 2019)

Policy coordination

Although Colombia started a process decades ago to mitigate the environmental effects related to solid waste management with the *Evaluation of the National Environmental Policy Towards Sustainable Human Development* (Republic of Colombia, National Planning Department, 1997) and the *Policy for the Integral Management of Waste* (Ministry of the Environment, 1998), the consolidation of an ISWM that makes recovery possible and guarantees its benefits to society is still incipient. There are several regulations that have been issued since then, such as laws that establish the technical requirements for the collection, incineration, and disposal of municipal waste in landfills (Resolution No. 1096/2000), policies to promote and define schemes of use and recycling organized in cities

or regions (National Planning Department, 2008, 2016), as well as the regulation of the recovery activity of the public sanitation service (*MVCT* Decree No. 1077/2015) and the transitory regime for the formalization of trade waste pickers nationwide (Executive Order No. 596/2016).

The regulations governing public services under the prevalence of economic criteria such as free competition, efficiency, financial sustainability, elimination of public monopolies, and incentives for private participation subsidized by public investments (Act No. 142/1994), the interests of large operators of the sanitation service and industry, as well as changes in government, have hindered the strengthening of the public policy of recovery and social inclusion. This situation translates into an increase in the burial of waste, together with an inflation in financial, environmental, and social costs.

The ISWM in a city like Bogotá, with more than 8 million inhabitants who produce 19.94% of the total tons buried throughout the country (Superintendence of Public Domiciliary Services, 2016), with multiple institutions and regulations, with a sanitation scheme with different complementary activities such as recovery, with fees and income that must be reconciled, with property rights in conflict over waste, and with productive processes, goods, and services interacting, requires a high level of policy coordination.

This coordination may fail vertically (between international, national, regional, and municipal levels) and/or horizontally (different sectors) (Weber and Rohracher, 2012). Considering these two types of policy coordination failures, what has happened in the case of Bogotá can be analyzed.

In terms of vertical coordination, global concern due to climate change and the urgency of controlling the production of plastics and promoting waste use policies such as a circular economy (European Commission, 2014; Velis, 2015) is eminent. At the national level in Colombia, the highest authority in charge of planning and advising the Government in relation to the economic and social development of the country is the National Council of Economic and Social Policy (*CONPES*). One of its functions is the study and approval of documents on the development of general policies. In relation to the ISWM, the most important *CONPES* regulation has been No. 3530/2008, which establishes the "Guidelines and Strategies to Strengthen the Public Sanitation Service in the Framework of the Integral Management of Solid Waste" (National Planning Department, 2008), and 3874/2016, which defines the "National Policy for Solid Waste Management" (National Planning Department, 2016).

Despite the fact that *CONPES* Regulation No. 3874/2016 defines strategies aimed at i) preventing waste generation; ii) minimizing waste flowing to

final disposal sites; iii)promoting reuse, optimization and treatment of solid waste, and iv) preventing the generation of greenhouse gases, as well as fostering change to a circular economy model. The recent report about waste in Bogota indicates that the current PGIRS preserves the logic of a linear economy by prioritizing basic sanitation, which favors the burial of waste over its efficient management (District Veeduría, 2018).

Another aspect that is important to consider is Colombia's intention on entering the OECD. To respond to the requirements stipulated in the acceptance process, countries must comply with a series of public policy recommendations in different areas and thus reach the standards required by the organization (OECD, 2014). Compared to the other countries belonging to the OECD, Colombia is ranked in the five countries that optimize their waste the least. Given this situation, CONPES 3918 of 2018 stipulated the "*Strategies for the implementation of Sustainable Development Goals (SDGs) in Colombia*." This states that by 2030, the national solid waste recycling rate would be 17.9% (National Planning Department, 2018). Despite regulatory efforts, discrepancies in implementing GIRS policies with social inclusion jeopardize the possibility of meeting the proposed goals.

Vertical coordination can also be found on Decree 596/2016, which, having been promulgated by the Ministry of Housing and Environment, has a national scope. The different exclusion processes that waste pickers are confronted with— such as competition for material, sanitation biddings, as well as containment—are contrary to not only the legislation that establishes transience in their formalization, but also breaches the precendents of the Constitutional Court and puts this population at risk. As one recycler states:

> What we looked at on the previous *PGIRS* is that it engages with Executive Order No. 596, they are concordant, they go the same way. What we see in this *PGIRS*, today, is that it contradicts such EO ... That is why organizations will never be able to formalize. What we do see is that we have to go back to the previous *PGIRS* contextualizing the reality, what is being lived today (personal interview with waste picker, April 2019).

In terms of horizontal coordination failures, it is evident how the change in ISWM public policy caused by the arrival of the new administration had implications in different sectors. On one hand, with the implementation of the new sanitation model and the beginning of the bidding process, confusion was generated among users, new RBL operators, and waste pickers. RBL operators placed the "*Recycle the White Bag*" ad on their trucks as a campaign

to raise awareness in the community about waste separation. However, the same operators collected both black bags (garbage and waste) and white bags (usable material). Users had to adapt to the change in collection frequencies, and it was not clear to whom they should deliver the recycled material. Faced with this situation, the waste pickers protested and demanded that the district force RBL operators to change the phrase advertised on their trucks to "*Recycle the White Bag for trade waste pickers*".

On the other hand, the authorization by the Commission for Drinking Water and Basic Sanitation (CRA) to increase the rates of the sanitation service in Bogotá, justified by the operational deficit and the crisis presented by the Doña Juana Landfill, is inconsistent with a policy of recovery. It is important to remember that the RBL operator is paid according to the amount of material deposited in the landfill, while the waste pickers are paid for the material sold. The worrisome aspect is that, with the increase in rates, an incentive is generated to dispose of more tons in the landfill. If the public policy of ISWM were aimed at recovery, the rate increase that the CRA should approve would be to dignify and strengthen the work of waste pickers, whose existence is increasingly threatened due to lack of funding, free competition, and the absence of a clear public policy of real inclusion in the city's sanitation scheme. Not to mention that users continue to finance an inefficient sanitation service for society.

Reflections and flaws in systemic change

The failures of feedback on the process and the weaknesses in the ability to monitor and evaluate progress in implemented systemic changes (Weber and Rohracher, 2012) during the "*Bogotá Humana*" administration—understood as reflexivity—affected the effectiveness of the policies implemented during the period 2012-2015.

The District Administration undertook the construction of a public policy of inclusion of recyclers in the sanitation service without there being any institutional reference at the national or district level on which to work, because it was the first time that a Colombian city formally included the waste picker population in the sanitation service and decided to remunerate this group for its work. This involved processes of "trial and error" that, whilst generating learning, could not be put into practice at the end of the administration due to lack of time. Because it was the first time a policy of these characteristics was implemented, decision-making officials did not have an institutional memory that would allow for a solid reference in terms of evaluation and monitoring

of these policies. This situation resulted in the issuance of regulations on waste picker organizations in order to strengthen their organizational capacity, but it was not possible to monitor the effectiveness of these regulations due to the number of existing associations, the limited number of field officials, and ignorance of the internal functioning of the organizations.

The institutional memory for the case of the UAESP, and in general for the Mayor's Office of Bogotá, is critical due to the job instability of thousands of public officials who, while functioning as "public servants" to citizens, are contractually linked to the district under a service provision modality and for periods not exceeding one year. This situation gravely affects the continuity of programs and projects and forces entities to undertake training processes permanently due to high staff turnover. This significantly affects institutional memory and the effectiveness of policy execution. Additionally, each administration brings new officials, new ideological orientations, and new policies. Regarding the "Bogotá Mejor para Todos" administration, a waste picker leader points out that:

> The current administration does not even know what it is doing and does not care. They really look after the interests of entrepreneurs... they have never wanted this system to progress, they want all the service to be theirs, and they continue to profit. They have been making money for more than 20 years, they would say, why can't I keep making money? Why do I have to share with these people? So, they are not interested in articulating (personal interview with waste picker, April 2019).

Conclusion

In Colombia, as in the rest of the world, the depletion of the linear model for waste management has been established. Factors such as the shortage of spaces for disposal and the overflow of the physical capacity of existing spaces, coupled with serious problems in terms of public, human, and environmental health, require that the political decisions implemented be more forceful and that a process of change and transformation towards an integral and sustainable management of solid waste is actually initiated.

The interest of this article was based on the need to reflect on the process experienced by public policy around the ISWM with social inclusion in the case of Bogotá. The purpose of this reflection seeks to broaden the discussion on the main aspects that must be re-evaluated, improved, changed, and trans-

formed, so that they can be converted into intervention policies to implement and consolidate a model of sanitation where recovery prevails.

The comparison of the two periods of government evidenced a setback in advances in terms of usable material, citizen awareness, and the conditions of inclusion for the waste picker population. Despite the fact that the "Bogotá Humana" administration had not been able to consolidate the changes implemented due to political, technical, and time-related reasons, for waste pickers and the general public, there was a clear commitment from the previous mayor's office to establish a sanitation scheme with a focus on recovery.

The observed "involution" also arises from erroneous diagnoses that continue to be made when it comes to the ISWM. A government committed to recycling and recovery must understand waste management with social inclusion not as a technical problem, but as a political process with its respective interactions. It is not possible to continue strengthening a disposal model that has already been delegitimized around the world.

After understanding the radical difference between disposal models and comprehensive waste management, governments must commit and move towards more sustainable public policy configurations. This requires significant structural changes in existing systems (Edmondson, Kern, and Rogge, 2018). Achieving these changes necessitates analyzing deficiencies and failures to establish an integral vision of how the process has been developed. The framework of failures was used not with the assumption that an ideal world exists, but in recognition that history and empirical evidence reveal the paths that should not be taken. Bogotá should not waste the opportunity to become a pioneer city in the effective inclusion of its waste picker population, which is fundamental to increasing its recycling levels.

Issues such as free competition; reporting, payment, surveillance, and control of "effectively utilized" tons; unequal competition for waste; burial of garbage as a business with high profit rates; the responsibility of industry in the production of effectively usable materials; and the tariff formula with which the providers of the sanitation service are remunerated, among other aspects, are issues that should continue to be analyzed in the light of an approach that emphasizes the integral management of solid waste and social inclusion. It is necessary to overcome the optimizing vision of the sanitation service, in which the primary objective is to capture the income generated by this sector. On the contrary, the economic and political recognition owed to urban waste pickers, who for generations have provided an environmental service to the cities of the Global South, should be the policy that guides the change towards the

provision of a public recovery service, with a quality, coverage, and efficiency for the user that guarantees sustainable and more equitable cities.

References

Alcaldía Mayor de Bogotá. (2012). Plan de Desarrollo Bogotá Humana 2012-2016. Bogotá, Colombia.

Alcaldía Mayor de Bogotá. (2012). Plan de Desarrollo Bogotá Humana 2012-2016. Bogotá, Colombia.

Alcaldía Mayor de Bogotá. (2015). Balance de resultados del plan de desarrollo distrital 2012 - 2016 "Bogotá Humana" a 31 de diciembre de 2015. Bogotá.

Alfonso, R. C. (2018). Libre competencia y reciclaje en Bogotá: informalidad y explotación en el servicio público de aprovechamiento de residuos sólidos. Universidad Distrital Francisco José de Caldas. Retrieved from http://repository.udistrital.edu.co/handle/11349/13931

Bogotá cómo Vamos. (2017). Informe de Calidad de vida. Bogotá 2017. Bogotá. Retrieved from https://assets.documentcloud.org/documents/5425905/Informe-De-Calidad-de-Vida-2017-FINAL.pdf

Bugge, M. M., Fevolden, A. M., y Klitkou, A. (2019). Governance for system optimization and system change: The case of urban waste. Research Policy, 48(4), 1076–1090. https://doi.org/10.1016/j.respol.2018.10.013

CANAL 1. (2018). Persisten problemas de basuras del nuevo esquema de aseo en Bogotá. Retrieved March 18, 1BC, https://canal1.com.co/noticias/bogota/persisten-problemas-de-basuras-del-nuevo-esquema-de-aseo-en-bogota

Caracol. (2018). Nuevo esquema de aseo en Bogotá: Procuraduría ordena suspender directora de Uaesp por problemas de basura. Retrieved from https://caracol.com.co/emisora/2018/02/22/bogota/1519318254_639845.html

Contagio Radio. (2017). Recicladores demandan licitación del servicio aseo de Bogotá. Retrieved from www.contagioradio.com/recicladores-demandan-licitacion-del-servicio-aseo-de-bogota

Contraloría General de la República. (2019). Comunicado de Prensa No. 012. Bogotá. Retrieved May 5, 2019, from www.contraloria.gov.co/contraloria?p_p_id=101&p_p_lifecycle=0&p_p_state=maximized&p_p_mode=view&_101_struts_action=%2Fasset_publisher%2Fview_content&_101_returnToFullPageURL=https%3A%2F%2Fwww.contraloria.gov.co%3A443%2Fcontraloria%3Fp_auth%3DbkTgn

Crang, M., Hughes, A., Gregson, N., Norris, L., y Ahamed, F. (2013). Rethinking governance and value in commodity chains through global recycling networks. Transactions of the Institute of British Geographers, 38(1), 12–24. https://doi.org/10.1111/j.1475-5661.2012.00515.x

Departamento Nacional de Planeación. (2008). Documento Conpes 3530. Ministerio de Ambiente Vivienda y Desarrollo Territorial, 1–45.

Departamento Nacional de Planeación. (2016). Política nacional para la gestión de residuos sólidos. Documento CONPES 3874.

Departamento Nacional de Planeación. (2018). CONPES 3918 - Estrategias para la implementación de los Objetivos de Desarrollo Sostenible (ODS) en Colombia. Bogotá.

Desde Abajo. (2018). Bogotá contenerizada. Retrieved October 24, 2019, from www.desdeabajo.info/ediciones/item/35388-bogota-contenerizada.html

Edmondson, D. L., Kern, F., y Rogge, K. S. (2018, March). The co-evolution of policy mixes and socio-technical systems: Towards a conceptual framework of policy mix feedback in sustainability transitions. Research Policy. https://doi.org/10.1016/j.respol.2018.03.010

El Espectador. (2013). El caos de las basuras fue premeditado. Retrieved December 10, 2019, from www.elespectador.com/noticias/temadeldia/el-caos-de-basuras-fue-premeditado-articulo-463430

El Espectador. (2019). Las condiciones que exigen los recicladores de Bogotá. Retrieved March 19, 2019, from www.elespectador.com/noticias/bogota/las-condiciones-que-exigen-los-recicladores-de-bogota-articulo-848528

European Commission. (2014). Towards a circular economy: A zero waste programme for Europe. Brussels. Retrieved from http://ec.europa.

eu/environment/circular-economy/pdf/circular-economy-communication.pdf

Gutberlet, J. (2013). Briefing: Social facets of solid waste: insights from the global south. Proceedings of the Institution of Civil Engineers - Waste and Resource Management, 166(3), 110–113. https://doi.org/10.1680/warm.13.00011

Hölscher, K., Wittmayer, J. M., y Loorbach, D. (2018). Transition versus transformation: What's the difference? Environmental Innovation and Societal Transitions, 27, 1–3. https://doi.org/10.1016/j.eist.2017.10.007

Hyman, M., Turner, B., y Carpintero, A. (2013). Guidelines for National Waste Management Strategies: Moving from Challenges to Opportunities. The Inter-Organisation Programme for the Sound Management of Chemicals (IOMC).

IDEXUD. (2016). Informe estudio de costos y beneficios del modelo de aprovechamiento con inclusión social como política pública para la gestión de residuos sólidos en Bogotá. Bogotá.

Klein Woolthuis, R., Lankhuizen, M., y Gilsing, V. (2005). A system failure framework for innovation policy design. Technovation, 25(6), 609–619. https://doi.org/10.1016/j.technovation.2003.11.002

Linzner, R., y Lange, U. (2013). Role and size of informal sector in waste management – a review. Proceedings of the Institution of Civil Engineers - Waste and Resource Management, 166(WR2), 69–83. https://doi.org/10.1680/warm.12.00012

Ministerio de Vivienda Ciudad y Territorio. (2015). Decreto 1077 de 2015. Decreto. Bogotá D.C.: República de Colombia. http://www.minvivienda.gov.co/NormativaInstitucional/1077%20-%202015.pdf

Ministerio del Medio Ambiente, . (1998). Política para la gestión integral de residuos. Bogotá.

Oberlander, J., y Weaver, R. K. (2015). Unraveling from within? The affordable care act and self-undermining policy feedbacks. Forum (Germany), 13(1), 37–62. https://doi.org/10.1515/for-2015-0010

OCDE, O. para la C. y el D. E. (2014). OCDE Environmental Performance Reviews: Colombia 2014. OCDE Environmental Performance Reviews. https://doi.org/10.1787/9789264208292-en

OCGIRS. (2018a). ¿Cómo va el aprovechamiento en el nuevo esquema de aseo de Bogotá? Retrieved April 3, 2019, from www.observatorioresiduoscolombia.org/inicio/index.php?option=com_content&view=article&id=46

OCGIRS. (2018b). A propósito de la recolección de las basuras en el nuevo esquema de aseo en Bogotá. Retrieved April 12, 2019, from www.observatorioresiduoscolombia.org/inicio/index.php?option=com_content&view=article&id=47

Pacifista. (2017). Recicladores bogotanos nos contaron por qué protestaron contra Peñalosa. Retrieved from https://pacifista.tv/notas/recicladores-bogotanos-nos-contaron-por-que-protestaron-contra-penalosa/

Parra, F. (2007). Reciclaje popular y políticas públicas sobre manejo de residuos en Bogotá. P. Schamber y F. Suarez. Recicloscopio: miradas sobre recuperadores urbanos de residuos de América Latina, Buenos Aires. Universidad Nacional de General Sarmiento.

Parra, F. (2019). Capítulo 8: La formalización de los recicladores en Colombia como prestadores del servicio de aseo en el componente de aprovechamiento: logros retos y amenazas. En: Estándar Ambiental y Derechos Ambientales en posacuerdos de Paz: Algunos Estudios de Caso / Gregorio Meza Editor; Grupo de Investigación en Derechos Ambientales y Colectivos GIDCA. -Bogotá: Universidad Nacional de Colombia. Facultad de Derechos, Ciencias Políticas y Sociales. Instituto Unidad de Investigaciones Jurídico Sociales Gerardo Molina (UNIJUS).

Patterson, J., Schulz, K., Vervoort, J., van der Hel, S., Widerberg, O., Adler, C., … Barau, A. (2017). Exploring the governance and politics of transformations towards sustainability. Environmental Innovation and Societal Transitions, 24, 1–16. https://doi.org/10.1016/j.eist.2016.09.001

Post, J., y Baud, I. (2003). Between Markets and Partnerships: Urban Solid Waste Management and Contributions to Sustainable Development? Global Built Environment Review, 3(1), 46–65. Retrieved from http://dare.uva.nl/document/11661

Pulzo. (2018). Un mes con nuevo esquema de aseo en Bogotá y persisten problemas de basuras. Retrieved March 13, 1BC, from https://www.pulzo.com/nacion/quejas-por-escombros-basuras-bogota-con-nuevo-esquema-aseo-PP454080

Radio Santa Fe. (2017). UAESP delega a concesionarios protección de recicladores. Retrieved from www.radiosantafe.com/2017/12/14/uaesp-delega-a-concesionarios-proteccion-de-recicladores/

Rateau, M., y Tovar, L. F. (2019). Formalization of wastepickers in Bogota and Lima: Recognize, regulate, and then integrate? EchoGéo [En Ligne], 47, 1–11. https://doi.org/10.4000/echogeo.16614

Radio Cadena Nacional. (2014). Había un complot para sabotear a Petro. Emilio Tapia. Retrieved from https://noticias.canalrcn.com/nacional-bogota/emilio-tapia-habia-un-complot-sabotear-petro

República de Colombia. Departamento Nacional de Planeación. (1997). Conpes 2910 de 1997. EVALUACION DE LA POLITICA NACIONAL AMBIENTAL HACIA EL DESARROLLO HUMANO SOSTENIBLE. Bogotá D.C.

Sandhu, K., Burton, P., y Dedekorkut-Howes, A. (2017). Between hype and veracity; privatization of municipal solid waste management and its impacts on the informal waste sector. Waste Management, 59, 545–556. https://doi.org/10.1016/j.wasman.2016.10.012

Sapuric, Z., Shkrijelj, S., y Josifovski, B. (2018). Informal sector inclusion in the sustainable waste management system as an opportunity for employment and social inclusion of vulnerable groups (Finance Think-Economic Research and Policy Institute). Policy study 12.

Simatele, D. M., Dlamini, S., y Kubanza, N. S. (2017). From informality to formality: Perspectives on the challenges of integrating solid waste management into the urban development and planning policy in Johannesburg, South Africa. Habitat International, 63, 122–130. https://doi.org/10.1016/j.habitatint.2017.03.018

Superintendencia de Servicios Públicos Domiciliarios. (2016). Informe nacional disposición final de residuos sólidos, 67. https://doi.org/ISSN: 2422-2941

UAESP. (2015). Plan de Gestión Integral de Residuos Sólidos 2016-2027. Alcaldía Mayor de Bogotá.

UAESP. (2018). Plan de Desarrollo Bogotá Mejor para Todos 2016-2020. Productos, Metas y Resultados. Bogotá. Retrieved from http://www.uaesp.gov.co/sites/default/files/planeacion/228 UAESP Informe de Logros diciembre de 2018 .pdf

UAESP. (2019). Documento técnico para la actividad de aprovechamiento en el marco del servicio público de aseo. Bogotá D.C., Colombia. Bogotá. Retrieved from http://www.uaesp.gov.co/sites/default/files/documentos/DTO Aprovechamiento Anexo 2 Versión publicación para comentarios 02-04-2019.pdf

Veeduría Distrital. (2018). Diagnóstico del Modelo de Aseo en Bogotá: El nuevo PGIRS.

Velis, C. A. (2015). Circular economy and global secondary material supply chains. Waste Management and Research, 33(5), 389–391. https://doi.org/10.1177/0734242X15587641

Vergara, S. E., y Tchobanoglous, G. (2012). Municipal Solid Waste and the Environment: A Global Perspective. Annual Review of Environment and Resources, 37(1), 277–309. https://doi.org/10.1146/annurev-environ-050511-122532

Weber, K. M., y Rohracher, H. (2012). Legitimizing research, technology and innovation policies for transformative change: Combining insights from innovation systems and multi-level perspective in a comprehensive "failures" framework. Research Policy, 41(6), 1037–1047. https://doi.org/10.1016/j.respol.2011.10.015

Wilson, D. C., Velis, C. A., y Cheeseman, C. (2006). Role of informal sector recycling in waste management in developing countries. Habitat International, 30(4), 797–808. https://doi.org/10.1016/j.habitatint.2005.09.005

Yang, Z., Zhang, Y., Li, S., Liu, H., Zheng, H., Zhang, J., … Liu, G. (2014). Characterizing urban metabolic systems with an ecological hierarchy method, Beijing, China. Landscape and Urban Planning, 121, 19–33. https://doi.org/10.1016/j.landurbplan.2013.09.004

Intersectionality and recycling in Cuenca (Ecuador)

Living conditions, work and exclusion

*Marco Ambrosi de la Cadena, Santiago Cajamarca Cajamarca, William Bueno Sagbaicela, Santiago Jimbo Días**

Introduction

The objective of this chapter is to examine and discuss the realities of waste picking in the city of Cuenca, Ecuador, taking into account the dimensions of subordination and the living conditions of women and men waste pickers, mainly those related to the feminization of work, precariousness, impoverishment, family labor, age status, and organizational and gender roles. To this end, surveys were conducted with 242 waste pickers, and focus groups were held with seven waste picker associations in Cuenca: *Corporación ARUC* [Association of Urban Waste Pickers from Cuenca], *Asociación Cristo Rey*, *San Alfonso-Centro Histórico, AREV* [Association of Waste Pickers from El Valle], *Asociación "Solidaría del Sur Feria Libre"*, *Asociación El Chorro*, and *Asociación Pichacay*.

This paper has three sections: the first section discusses the categories and concepts needed to address the intersectional approach used to analyze the living conditions of women and men waste pickers (WPs); the second section introduces data about the work and living realities of WPs in the city of Cuenca; and finally, the third section proposes guidelines in relation to the concept of

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waste picking, with the aim of including them in a new Solid Waste Management System for the City of Cuenca.

Conceptual toolkit

This paper employs a theoretical-empirical analysis that involves an intersectional approach centered around the work conditions, dimensions of subordination, and living conditions of associated women and men waste pickers working in primary waste picking in the City of Cuenca in Ecuador. This approach allows for a comprehensive discussion of a complex issue that particularly affects women, who are the focus of this research. This section defines the elements that make up what this paper has called the "conceptual toolkit"; in other words, the categories that enable the development of both the theoretical and the empirical analysis.

In line with the aims of this research, WPs are defined as those individuals in charge of manually collecting inorganic recyclable materials using non-motorized vehicles (according to the definition established by Cuenca's Municipal Waste & Sanitation Company (EMAC-EP) [*Empresa Pública Municipal de Aseo de Cuenca*] in 2011). Furthermore, in accordance with Ecuadorian legislation, an association is defined as a group of natural persons who perform similar or complementary economic or productive activities, and who voluntarily organize to produce, market, and consume lawful and socially necessary goods and services in a self-managed manner with joint liability (as set forth by the National Assembly of Ecuador in 2018).

An intersectional approach has been undertaken as a tool for understanding the interrelationship between multiple socio-economic-political dimensions such as power relations, gender, sexual orientation, ethnicity, social class, disability, age, educational background, nationality, and place of residence (AWID, 2004; Crenshaw, 1991), among other aspects that directly affect the living, working, and exclusion conditions—as in this particular case—of the people involved in waste picking. Therefore, from an intersectional approach, the numerous systems of oppression (male chauvinism, sexism, racism, xenophobia, among others) are conceived as interrelated, building an intertwined oppression system riddled with multiple forms of discrimination.

The purpose of this paper is to develop an intersectional analysis of the information obtained from women and men WPs to formulate multidimensional guidelines for a new Solid Waste Management System for the City of

Cuenca (Ecuador). This approach allows for emphasizing the fact that women WPs have different working and living conditions than men WPs due to the following factors: gender, sex, age, educational background, family dependents, the care economy, access to social services, and the volume of waste classified. According to several studies about waste picking and gender in Latin America (Dias, Matos, & Ogando, 2013; Dias & Ogando, 2015; González Martínez, 2018; IRR, 2013; Riofrío & Cabrera, 2012), numerous dimensions of subordination and conditions of disadvantage can be identified in relation to women waste pickers:

- Limited leadership positions and lack of decision making within the waste picking associations despite them being predominantly composed of women.
- Limited access to higher-value recyclable solid waste due to personal, family, technical, or time limitations.
- A gendered division of roles and activities, both in the public sphere (waste management) and the private sphere (care economy), that establishes unequal working hours and income levels.
- Both male and female waste pickers are exposed to various health and safety risks during their working day. However, women waste pickers are exposed to greater danger related to factors such as domestic violence, insecurity, and instability.

These unfavorable circumstances for women waste pickers are a consequence of asymmetrical power relationships in all social, political, productive, and economic spheres in a historically patriarchal society. Another challenge encountered in the study of women WPs is the normalization, naturalization, and invisibility of these conditions, as they face the (re)production of hierarchical relationships at home, in their communities, and at the workplace (Dias et al., 2013), in addition to experiences of vulnerability, need, and helplessness.

As stated by Dias and Ogando (2015), waste picking is a marginalized and invisible activity, related not only to the economic exclusion that characterizes our society but also to oppressive structures related to gender, race, and sexual orientation. This is particularly relevant considering that women WPs typically work in cities with public spaces designed by and for men, in which the production, reproduction, and consumer economy are prioritized. Thus, in accordance with the information gathered to be included in the following section, for women WPs, the streets are both their spaces of work (which gives

them autonomy) and of vulnerability, due to the fact that, while collecting solid waste, they are exposed to stigmatization, discrimination, violence, insecurity, unfair competition, and health risks.

The undervaluation of women's labor is also present in waste picking. This type of work is often considered to be physically demanding, which makes it seem more suitable for men. According to a research study conducted by Riofrío and Cabrera (2012, p. 29) in Lima, Montevideo, São Paulo, and Cochabamba, the image of the male waste picker with a vehicle cannot be overcome if the relationships and tasks performed by men and women are not differentiated, especially considering the potential violations of women's rights. Additionally, the tasks that society imposes on women within the domestic and family spheres are not recognized or quantified, resulting in long, unpaid working hours due to the gendered division of labor and responsibilities.

In response to the issues mentioned above, women WPs in the city of Cuenca have mostly chosen to include family members in waste picking and promote the creation of associations with the aim of increasing their income and improving their living and working conditions, as discussed below.

Living, working and exclusion conditions

In this section, the data obtained about the living and working conditions of men and women waste pickers (WPs) of the city of Cuenca are reviewed from an intersectional approach, reflecting their situation of subordination and discrimination, particularly in women. The information presented is the result of surveys conducted with 242 WPs, who were invited to participate through the official registry of waste pickers of EMAC-EP in work meetings at the "El Toril" Operating Plant. In addition, focus groups with representatives from each of the waste picker associations were organized at the University of Cuenca.

Based on EMAC-EP data, the population of WPs in the city of Cuenca as of July 2018 was 248 legally authorized individuals[1] (Cajamarca Cajamarca, Bueno Sagbaicela, & Jimbo Días, 2019). Nevertheless, there is an unspecified

[1] According to the Amendment to the Waste Picking Regulation, Section 3, waste pickers should be of legal age, be registered with the EMAC-EP, deliver at least 200 kilograms of waste to an EMAC-EP authorized waste picking center, collect waste manually, pass a 16-hour training course offered by the EMAC-EP, and be a member of—preferably—a waste picker association which has specific areas, frequencies, and timetables for waste picking work defined by the EMAC-EP.

number of informal waste pickers who fail to comply with municipal requirements. Disputes among registered and informal WPs over the collection of solid waste are not uncommon.

This intersectional analysis prioritizes women due to the feminization of waste picking in Cuenca, given that of the 242 waste pickers surveyed, 187 are women (77%) and 55 are men (23%). The situation concerning the organization of associations of women and men WPs is a transversal reality for determining the diverse conditions of waste picking in Cuenca. These association processes are not new in the city. For example, the ARUC Corporation was created in 1983. Currently, there are seven waste picker associations. However, 54.55% of the surveyed individuals are not members of any of these associations, and only 10.70% of the WPs registered with the EMAC-EP are members of Cristo Rey, the largest association (Table 1). This lack of association among waste pickers directly impacts their working conditions, as will be discussed below.

Table 1. Percentage of associated WPs

Association	**Percentage**
None	54.55%
Cristo Rey	10.70%
Feria Libre	9.09%
Centro Histórico	7.49%
ARUC	6.42%
El Chorro	5.35%
AREV	3.21%
Pichacay	3.21%
Total	**100%**

Another significant characteristic of waste picking in Cuenca is the age of the WPs, with an average age of 50 years for women and 53 years for men. Notably, 11.23% of women WPs and 20.00% of men WPs are older adults (> 65 years old), which means the elderly constitute a significant presence in this activity in Cuenca. With regard to the surveyed WPs, 42.50% believe that age is a limiting factor in their line of work, and 48.75% believe that waste picking is limited by gender (Table 2).

Table 2. Waste picking limitations by gender and age

Limited work	By gender	By age
Sometimes	6.25%	10.00%
No	51.25%	47.50%
Yes	42.50%	42.50%
Total	100%	100%

As previously mentioned, one of the main difficulties for women WPs is the gendered division of labor, both in the public and private spheres. This division is apparent both in their working hours and in their dedication to household and family activities. The survey results showed that 95% of WPs report being parents, with an average of four children. Furthermore, 25% of WPs (a total of 59) have family dependents whose caregiving tasks fall primarily on women, as can be inferred from their dual dedication to waste picking and domestic work. This situation of family care is further aggravated for waste pickers who are single, divorced, or widowed mothers, a group that accounts for 15% of the total population studied.

Table 3. Family dependents of women and men WPs.

Dependent situation	Dependents of Women		Dependents of Men	
	Number	*Percentage*	*Number*	*Percentage*
Disability	10	21.74%	4	30.77%
Other	19	41.30%	7	53.85%
Old age	17	36.96%	2	15.38%
Total	**46**	**100%**	**13**	**100%**

In addition to being an activity performed primarily by women, waste picking is characterized by being a family-based occupation (Table 4). In a few cases, there are at least three family generations involved in waste picking. On a regular basis, women and men WPs are introduced to their job through an offer from family or filial connections with the aim of obtaining economic resources. Alternatively, the trade is inherited from generation to generation, especially among women lacking other job opportunities.

Table 4. Family members of WPs involved in waste picking

Range of family members involved in waste picking	Percentage	Average number
1 to 5 family members	99.47%	2
5 to 10 family members	0.53%	6
Total	100%	2

Moreover, it should be highlighted that family members of WPs not only "inherit" the trade of waste picking but also the vulnerability and discrimination associated with it, as shown in the interviews and focus groups. María Alejandra Villa, a waste picker from the City of Cuenca, gave the following testimony, which was used in a campaign to raise public awareness about waste picking, in collaboration with the Universidad de Cuenca and the EMAC-EP:

> I don't like the discrimination against us (…) some people think we are bums or thieves. It's tough. For example, once, my son was bullied at school. They used to tell him that he slept on the garbage and ate and dressed from garbage. So, one day, he told them that, in fact, he ate and dressed from the garbage, and did everything with the garbage because he sells garbage and earns money thanks to the garbage… (Granda, 2019).

Waste picking is a family occupation, and it is a long-term one, given that it provides a regular source of income for women. The analysis of the number of years devoted to waste picking (Table 5) shows that WPs choose this activity as a life-long option to make a living, despite its challenges. The number of years devoted to this line of work can increase in accordance with the number of family members involved in the same activity, as working together or in association with family members who provide support to each other through all the stages of the solid waste picking process is indeed a motivation.

Table 5. Years devoted to waste picking.

Range of years devoted to waste picking	Percentage
1 to 3 years	7.49%
4 to 10 years	45.99%
More than 10 years	45.45%
Less than 1 year	1.07%
Total	**100%**

Although family incentives play an important role in waste picking, the main reasons for people from the city of Cuenca to stay involved in this productive activity are of an economic and labor-related nature (Table 6):

Table 6. WPs' perceptions of the advantages of waste picking

Advantages	**Percentage**
Economic income	60.50%
Environmental protection	18.00%
Flexible working hours and self-employment	14.00%
Job opportunity	9.00%
Leisure activities	8.50%
Public recognition	3.00%
Total	**100%**

It should be mentioned that 18% of the surveyed WPs consider environmental protection an advantage of waste picking, which may be the result of work empowerment promoted by permanent training from the EMAC-EP and a few Non-Profit Organizations. Moreover, it is noteworthy that only 9% of WPs perceive waste picking as a job opportunity, which reveals that most WPs engaged in this activity out of necessity or urgency.

Despite the fact that the motivations of women and men waste pickers may be mainly economic, waste picking itself in many cases does not generate enough income to meet household financial needs. Therefore, around 40% of men and women WPs engage in additional productive or business activities to cover their basic needs, for which they earn, on average, USD 77.28 per month. The following are some extra activities mentioned in the survey: informal trade, agriculture and livestock breeding, clothes or food retailing, domestic services, childcare, and even additional income from the Human Development Grant (*Bono de Desarrollo Humano*, in Spanish) or a retirement pension.

According to data from the National Institute of Statistics and Census (INEC) [*Instituto Nacional de Estadísticas y Censo*], 44% of Cuenca's WPs are below the poverty line, which, by December 2018, was set at a monthly income under USD 84.79 (INEC, 2018), while 13.64% of Cuenca's waste pickers are under the extreme poverty line, with a monthly income below USD 47.78. Therefore, it may be affirmed that waste picking is an impoverished line of work that does not generate enough income to cover the basic needs of the workers involved, given that the average monthly income of a waste picker is USD 125.41. The information obtained about women WPs suggests that

approximately 80% of them earn a monthly income under USD 120, while 90% of them earn less than USD 300 per month (Table 7). Hence, women waste pickers do not reach Ecuador's Unified Basic Salary (SBU) [*Salario Básico Unificado*], which, in 2019, was set at USD 394 plus benefits established by law.

Table 7. Average income for women WPs in the city of Cuenca

Income range (USD) for women waste pickers	**Percentage**	**Average income**
< 100	44.39%	56.18
100-150	35.29%	116.29
150-200	12.83%	188.54
200-250	1.07%	250.00
250-300	4.28%	292.50
> 300	2.14%	398.75
Total	**100%**	**113.89**

Cuenca's WPs are affected by wage inequality, given that, although 36% of women waste pickers and 56% of men waste pickers collect solid waste every day (Table 8), none of them reach the SBU. In Ecuador, the SBU is calculated based on an 8-hour workday, 5 days a week. However, while in Cuenca, 25.67% of women waste pickers and 34.55% of men waste pickers work full time (Table 9), barely 2% of them earn a salary equal to the SBU or above. This issue is aggravated for women WPs who, on average, earn USD 50 less than their male counterparts per month (Table 10). In other words, there is a pay gap of approximately 31%, even though women represent 77% of Cuenca's WPs.

Table 8. Work frequency for WPs

Days devoted to waste picking (days/week)	**Women**		**Men**	
	Percentage	*Average days per week*	*Percentage*	*Average days per week*
Once a fortnight	2.67%	0.50	1.82%	0.50
Once a month	0.53%	0.25	0.00%	-
At least once a week	60.43%	2.96	41.82%	3.43
Everyday	36.36%	7.00	56.36%	7.00
Total	**100%**	**4.35**	**100%**	**5.39**

Table 9. Hours devoted to waste picking per day

Range of hours devoted to waste picking (hours/day)	Women		Men	
	Percentage	*Average hours per day*	*Percentage*	*Average hours per day*
Over 8 hours	2.67%	10.50	12.73%	10.29
Full-time (8 hours)	25.67%	8.00	34.55%	8.00
4 to 8 hours	19.79%	5.81	10.91%	6.00
Part-time (4 hours)	36.90%	4.00	25.45%	4.00
Less than 4 hours	14.97%	2.80	16.36%	2.33
Total	**100%**	**5.38**	**100%**	**6.13**

Table 10. Average income by gender

Gender	Average Monthly Income (USD)
Women	113.89
Men	164.56
Overall average	**125.41**

According to Riofrío and Cabrera (2012), many women perceive waste picking as an opportunity—despite the risks and disadvantages of this activity—for several reasons: it enables them to access the public sphere beyond their domestic sphere, it is a regular source of income, it does not require intensive training or work experience, and it allows for flexible working hours for women WPs, who can manage their schedules according to their needs and priorities (primarily in relation to their household and family activities). This last factor is evidenced among the women WPs of the city of Cuenca who, on average, work 5.38 hours per day, while men WPs devote an average of 6.13 hours per day to this activity (Table 9).

In accordance with the consulted literature (Riofrío & Cabrera, 2012), this last fact concerning men WPs' daily commitment to waste picking may be misleading since, when women waste pickers were asked about their activities in their free time, their answer was that they performed household chores, took care of family members, and sorted the collected waste. From the testimonies obtained in the focus groups with women WPs from Cuenca, working hours are identified exclusively with waste collection and not with other related activities such as storage, sorting, or compacting, which take place during night hours or on non-collection days. Likewise, most surveyed women WPs (30%) mentioned

"sharing time with family" as their main leisure activity (Table 11), which also involves unpaid household work, which also involves unpaid household work.

Table 11. Women WPs' leisure activities

Leisure Activity	Percentage
Resting	25.17%
Sharing time with family	33.89%
Watching television	15.77%
Visiting someone	7.05%
Listening to music	11.07%
Playing sports	3.69%
Going out with friends	1.34%
Other	2.01%
Total	**100%**

Based on the information gathered, this paper could affirm that the existing pay gap is the result of women waste pickers working shorter hours and less frequently than men waste pickers. However, this assertion would deny and render invisible the living conditions of women waste pickers as daughters, mothers, wives, heads of household, or persons in charge of the care economy. These conditions limit, both in time and income, their waste picking work in the city of Cuenca.

Additionally, from an intersectional approach, this inequality in waste picking is not evidenced only through salary gaps or disparities in domestic and work responsibilities. The inequality in this activity is also influenced by gender (Dias et al., 2013). The monthly difference in the weight of waste collected in kilograms between men and women is 32.89% (Table 12), considering that men WPs collect a larger amount of waste with a higher commercial value (Table 13).

Table 12. Average weight of waste collected by gender

Gender	Average weight of material collected (kg/month/waste picker)
Women	473.07
Men	704.87
Overall average	**527.16**

Table 13. Monthly average weight by material and gender

Material	Men		Women	
	Average weight collected (kg/month)	*% of weight*	*Average weight collected (kg/month)*	*% of weight*
Cardboard	261.29	37.07%	141.02	29.81%
Duplex	38.40	5.45%	25.83	5.46%
Newspaper	13.40	1.90%	10.20	2.16%
Mixed paper	25.09	3.56%	26.58	5.62%
White paper	68.77	9.76%	51.96	10.98%
Soft plastic	48.37	6.86%	38.50	8.14%
Blow-molded plastic	47.81	6.78%	32.35	6.84%
PET	42.26	6.00%	39.41	8.33%
Scrap metal	62.94	8.93%	40.18	8.49%
Tetra Pak	2.29	0.32%	4.45	0.94%
Glass	70.37	9.98%	48.75	10.31%
Aluminum	9.73	1.38%	6.32	1.34%
Copper	5.42	0.77%	3.36	0.71%
Bronze	3.79	0.54%	1.58	0.33%
WEEE	3.00	0.43%	0.79	0.17%
Other	1.94	0.28%	1.77	0.37%
Total	**704.87**	**100%**	**473.07**	**100%**

On the other hand, the analysis of the information obtained allows for the affirmation that waste picking is a feminized, domestic, impoverished, and precarious activity. In the city of Cuenca, women and men WPs are not formally employed, either with the EMAC-EP or with any private entity or association; in other words, they do not have job stability, labor contracts, fixed incomes, legal benefits, or social security. As established by Ecuadorian legislation, all workers should be affiliated with one of the available social security systems (Ecuadorian Institute of Social Security (IESS) [*Instituto Ecuatoriano de Seguridad Social*] or the Rural Social Security [*Seguro Social Campesino*]); however, WPs are rarely affiliated with any of those systems. Only 8% of WPs are affiliated with a system (Table 14), given that covering the monthly social security fee would entail a significant income reduction. Some of the main consequences of this situation are that women and men WPs are forced to seek private healthcare, attend the overcrowded public healthcare system, or simply do not get treatment for their health conditions, however severe they may be, given that 48% of them suffer from frequent diseases such as muscle pain, diabetes, flu, arthritis, arthrosis,

trouble breathing, high blood pressure, and infections, mostly related to their waste picking activities.

Table 14. Percentage of affiliation to a social security system

Insurance registration	Percentage
IESS-General insurance	3.72%
IESS-*Seguro Social Campesino*	4.55%
No insurance	91.74%
Total	**100%**

Another aspect of the precariousness of waste picking is the level of education of the waste pickers. While 19% of them received no education, barely 5.88% completed their secondary education and 0.53% received higher education (Table 15). It is clear that these conditions hinder the waste pickers' social mobility and income level, which affects multiple aspects of their lives, such as their housing situation, given that 60% of waste pickers are not homeowners but instead rent, borrow dwellings, or exchange services for housing (Table 16). Additionally, over 41% of WPs live in rural areas, which is a contributing factor to social exclusion and limits their access to public services, which are usually concentrated in the city.

Table 15. Education level of WPs

Education level	Percentage
No education	19.25%
Complete primary education	32.62%
Incomplete primary education	32.62%
Complete secondary education	5.88%
Incomplete secondary education	9.09%
Higher education	0.53%
Total	**100%**

Table 16. Housing situation of WPs

Housing situation	Percentage
Rented	46.88%
Other	12.50%
Exchanged for services	0.63%
Owned not fully paid	1.25%
Owned and fully paid	26.25%
Owned: donated/gifted	12.50%
Total	**100%**

Another aspect that makes it possible to ascertain that waste picking is a precarious activity is the ownership and use of personal protective equipment in order to prevent and reduce exposure to hazardous waste and occupational risks. Only 50% of the surveyed waste pickers claim to use personal protective equipment; 42% of them wear masks and 71.50% use gloves (Table 17). Moreover, WPs consider this lack of safety in the workplace to be one of the disadvantages of their job. Based on the information gathered, it can be inferred that this situation is the result of three factors: a) although the EMAC-EP provides waste pickers with supplies, there is no regulation that mandates the provision of protective equipment to duly registered WPs; b) neither the associations nor the WPs have the necessary resources or training; and c) in some cases, they are reluctant to acquire or use the necessary equipment.

Table 17. WPs' use of occupational safety equipment

Occupational safety equipment	Number of WPs	Use percentage
Gloves	143	71.50%
Safety clothing	100	50.00%
Face mask	84	42.00%
Head protection	46	23.00%
Shoes	6	3.00%
Safety belt	2	1.00%

Overall, the factors reviewed concerning the impoverishment and precariousness of waste picking work promote exclusion and discrimination against women and men WPs that are evidenced in different ways: scant recognition of the social and environmental importance of their activity, limited citizen cooperation, insufficient institutional support, or even aggression towards women involved in waste picking. In figures, 40.63% of WPs affirm that their activity is not

recognized and 22.50% that it is recognized on occasion; 81.88% of WPs assert that citizens rarely or never cooperate with their waste picking activity (Table 18). Moreover, a significant 45% of waste pickers claim that there is no public or private institutional support for them. Lastly, a concerning issue is the percentage of women waste pickers (62.51%) that report having experienced some type of violence while working in the city of Cuenca (Table 19).

Table 18. Recognition of the waste picking activity and citizen cooperation according to the WPs

Awareness	Recognition of the activity	Citizen cooperation
Sometimes	22.50%	32.50%
No	40.63%	49.38%
Yes	36.88%	18.13%
Total	**100%**	**100%**

Table 19. Types of violence towards women WPs

Types of violence towards women waste pickers	Percentage
Physical	11.88%
Physical and verbal	13.75%
Verbal	36.88%
Neither	37.50%
Total	**100%**

It is essential to resume the discussion here about the limited associativity observed in waste picking. The information gathered from the focus groups shows that the lack of coordination and association has a negative impact on the organization of routes, territories, work schedules, collection of materials, processing capability, marketing, and the defense of common interests, usually caused by conflicts both between different associations and between registered and informal waste pickers. Another challenge is the WPs' reduced individual bargaining power, which leads them to accept the prices fixed by middlemen (which are frequently lower than market prices), generating extraordinary profits for the latter.

Although there are low levels of association among WPs in the city of Cuenca, most women and men WPs are aware of the importance and need to organize themselves in order to gain training, safety, higher incomes, materials,

fellowship, or security (Table 20). However, among the reasons for not joining associations, the surveyed WPs primarily mentioned economic constraints in covering association fees, loss of working time, disputes among members, conflicts with management, and a preference for freelance work (Table 21).

It should also be highlighted that the associations, in terms of organization, are characterized by their depoliticization as a direct consequence of the precariousness and impoverishment of their work, which hinders them from taking part in political education processes and having technical training on their own initiative. Conversely, associations have specific agendas with short-term objectives and welfare demands. There are no action platforms, such as environmental and political actors, to encourage their social participation by demanding better working conditions and/or legislative, regulatory, and institutional amendments that would benefit WPs.

Table 20. Reasons for WPs to get registered

Relevant reasons for joining associations	**Percentage**
Support	13.81%
Training	12.00%
Safety	10.71%
Better income	8.90%
More work/more material	9.29%
Job stability	9.81%
Improving working conditions	10.06%
Fellowship	11.35%
Overall benefits	9.55%
None	4.52%
Total	**100%**

Table 21. WPs' reasons for not joining associations

Reasons for not joining associations	Percentage
Negative public perception regarding associations: conflicts of interests, poor payment distribution, previous negative experiences.	10.37%
Lack of time to meet schedules and attend meetings.	7.41%
Preference to work alone, lack of interest: joining an association is not a priority.	19.26%
Lack of information about existing associations.	9.63%
Lack of opportunity and support to join an association (paperwork and spending time for searching).	22.22%
Need to pay association fees.	5.93%
Health problems or personal decision.	2.96%
Others are currently in the process of joining associations.	1.48%
No answer or response (prefers not to answer).	20.74%
Total	**100%**

Only two associations have their own collection center (Table 22), although 66.50% of the surveyed WPs claimed to have their own personal storage space for the collection of material. In order to have this space, they allocate a part of their own homes to store collected materials or rent vacant lots and small rooms, which generates extra expenses, reducing their income. Many WPs are forced to adjust the frequency of their sales of collected materials on a daily, weekly, biweekly, or monthly basis (Table 23), depending on storage availability.

Table 22. Associations with their own collection center

Association	Own collection center
AREV	No
ARUC	Yes
Pichacay	No
Centro Histórico	No
Feria Libre	No
Cristo Rey	No
El Chorro	Yes

Table 23. Frequency of sale of the recycled material

Frequency of sale of the recycled material	Percentage
Bimonthly	4.00%
Daily	9.00%
Monthly	40.67%
Fortnightly	18.33%
Weekly	20.33%
Biannually	0.67%
Quarterly	7.00%
Total	**100%**

Returning to the issue of associativity, it also becomes a problem for women due to organizational limitations, such as participation in leadership positions and decision-making. Of the surveyed women, only 24% hold a leadership position in their association, while the remaining women WPs are just members of these associations. From an intersectional approach, this situation could be attributed to the reproduction of patriarchy, male chauvinism, and discrimination in the associations that reaffirm the sexual division of labor, gender roles, and women's relegation to the private sphere. Furthermore, in the focus groups conducted with associations led by men, the needs and demands reported by women waste pickers were made invisible and neglected by their leaders who, on many occasions, have other priorities.

To conclude this section of the intersectional analysis of the living and working conditions of WPs in the city of Cuenca, it is relevant to address the perceptions of men and women WPs in Cuenca about their line of work in order to formulate recommendations to improve solid waste management and, especially, the quality of life and working conditions of urban waste pickers. Generally speaking, the main concerns are related to occupational safety, the shortage of materials, the discrimination to which waste pickers are subjected, and the lack of citizen cooperation in sorting solid waste in their own homes (Table 24).

Table 24. Disadvantages of waste picking according to the WPs

Disadvantages	Percentage
Safety concerns when handling materials (cuts, infections, diseases, foul odors).	19.50%
Scarcity of materials and excess of competition.	17.00%
Inappropriate classification of materials.	15.50%
Lack of support and recognition of the activity, and discrimination (violence).	14.00%
Low income.	9.00%

Conclusions and recommendations

In this final section, this research study proposes several intersectional and multidimensional alternatives as conclusions and recommendations to overcome exclusion and improve the living and working conditions of waste pickers by applying a Solid Waste Management System at collection centers that takes into account their social and economic needs and demands.

First, after the analysis of the information gathered, it can be concluded that, overall, the waste picker in the city of Cuenca meets the following criteria: is a woman who has not joined an association, is 50 years old, has completed primary education, has four children on average, has two family members involved in waste picking, performs the activity driven by economic reasons, has an average monthly income of USD 113.89, collects around 473.07 kg of waste per month, lives in rented housing, is not formally employed, is not affiliated with social security, and has ongoing health problems. These realities categorically differ from the stereotype of a middle-aged male waste picker with a motorized vehicle.

Based on this data, this research study proposes that WPs should be recognized as a vulnerable group by the Municipality of the City of Cuenca due to their socioeconomic conditions, which place them—especially women—in a situation of risk and instability. Recognizing them as such would result in the need for a new definition of "waste picker" in the ordinance regulating waste picking, which, at present, is limited to the capacity to manage waste and the vehicle used by WPs. An intersectional and multidimensional perspective would allow the EMAC-EP and the Municipality of the City of Cuenca to prioritize, at an institutional level, the improvement of the living and working

conditions of the waste pickers, which could be ensured by giving them access to the network of services of the Municipality of the City of Cuenca.

At an institutional level, the city of Cuenca has secretariats and state-owned companies with the capacity and the resources to meet the deficiencies, needs, and demands of waste picking:

- Land Use Planning Secretariat *[Secretaría de Planeamiento Territorial*], which coordinates: the EMAC-EP and Cuenca 's Municipal Company of Urban Planning and Housing (EMUVI-EP) [*Empresa Pública Municipal de Urbanización y Vivienda*].
- Human Development Secretariat [*Secretaría de Desarrollo Humano*], which coordinates: Cuenca's Municipal Economic Development Company (EDEC-EP) [*Empresa Pública Municipal de Desarrollo Económico*], the Social and Economic Welfare Administration, Municipal Social Assistance Programs [*Acción Social Municipal*], the Women and Children Hospital and the FARMASOL chain of Municipal Pharmacies.

Within this broad institutional organization, the Municipality of the City of Cuenca could establish, through the issuance of a municipal ordinance, that women and men waste pickers who are duly registered with the EMAC-EP be allowed to access all the services offered, and could also provide that the institutions mentioned above be obliged to attend to the WPs' needs and monitor their living and working conditions. The aim of the ordinance would be for the EMAC-EP to make a commitment, at an institutional level, to improving the quality of life of women and men WPs, rather than problematizing the issue concerning the development of employment contracts or placing the responsibility on waste pickers.

Moreover, it is proposed that the EMAC-EP, working jointly with other entities, could leverage the high percentage of satisfaction women WPs have with their job—78.76% of them are satisfied or very satisfied—to develop not only technical and work training but also training on gender empowerment, politics, and institutional strengthening, as a strategy to increase their participation in associations, as well as to redefine their medium- and long-term objectives and advocacy platforms. The case of the "El Chorro" association is proof of the effectiveness of this proposal. This association, due to its proximity to the sanitary landfill, has received constant support and training from the EMAC-EP, resulting in a high level of organization and awareness about the importance of the work of waste pickers as agents of environmental protection.

Despite the existing local regulations (GAD Municipal de Cuenca, 2010) that require citizens to classify waste at home, women and men WPs frequently complain about the lack of citizen cooperation and the discrimination against them. Hence, it is crucial to increase and strengthen awareness-raising campaigns to address the importance of waste picking and the visibility and appreciation of women and men WPs. Namely, one strategy might be for residents of each section to identify the WPs that collect waste in their area, not only to hand over sorted waste but also to establish a trusting relationship and put an end to discrimination.

In addition, with regard to the regulatory framework, an amendment to the Ordinance that regulates the solid waste management system in the municipality of Cuenca is essential, given that the current Ordinance dates back to 2003, was subject to minor modifications in 2010, and does not comply with prevailing Ecuadorian legislation, namely, the Organic Environmental Code and the Organic Code for Territorial Organization, Autonomy and Decentralization. However, in addition to being a rule that requires updating and consistency with prevailing legislation, this ordinance should help to change the perception that women and men waste pickers are merely collectors and highlight the fact that they are environmental agents that greatly benefit the city, yet have a great number of unfulfilled needs.

Lastly, both the municipal administration and the citizens of Cuenca should acknowledge the fact that the solid waste management system is not and should not be a problem but an opportunity to develop inclusive businesses that would benefit vulnerable groups and the environment. Waste picking in Cuenca should be recognized as a latent opportunity in terms of profit margins along the waste picking value chain, that is, from the generation of potentially recyclable solid waste to its final disposal.

The response to the economic demands of the waste pickers, as essential agents in this value chain, is the creation of an inclusive waste picking business model, with a defined business strategy that would grant greater bargaining power to the waste pickers in Cuenca, increasing their income and, gradually, their quality of life.

References

Asamblea Nacional del Ecuador. Ley Orgánica de Economía Popular y Solidaria. (2018).

Association for Women's Rights in Development AWID. (2004). Intersectionality: A tool for gender and economic justice. Women´s rights and economic change, (9).

Cajamarca Cajamarca, S., Bueno Sagbaicela, W., & Jimbo Días, S. (2019). De cero a dinero: La basura como fuente principal para un negocio inclusivo de reciclaje en Cuenca (Ecuador). Retos Revista de Ciencias de la Administración y Economía, 9(17), 71-87. https://doi.org/https://doi.org/10.17163/ret.n15.2018.05

Crenshaw, K. (1991). Mapping the margins: Intersectionality, identity politics, and violence against women of color. Stanford Law Review, 43(6), 1241-1299. https://doi.org/10.2307/1229039

Dias, S., Matos, M., & Ogando, A. C. (2013). Mujeres recicladoras: construyendo una agenda de género en las organizaciones de recicladores. En F. López Castellano (Ed.), Medio ambiente y desarrollo. Miradas feministas desde ambos hemisferios (pp. 221-240). Granada: Editorial Universidad de Granada.

Dias, S., & Ogando, A. C. (2015). Género y reciclaje: de la teoría a la acción. Belo Horizonte: WIEGO.

Empresa Pública Municipal de Aseo de Cuenca EMAC-EP. Reforma al Reglamento que establece los requisitos para obtener la autorización para realizar labores de reciclaje de residuos sólidos inorgánicos en el cantón Cuenca. , (2011).

GAD Municipal de Cuenca. Ordenanza que regula la gestión integral de los desechos y residuos sólidos en el cantón Cuenca. , (2010).

González Martínez, L. (2018). El enfoque de género aplicado a la gestión de residuos sólidos en Perú. Lima: Programa de las Naciones Unidas para el Desarrollo (PNUD).

Granda, J. (2019). Negocio inclusivo: El valor del reciclaje. Recuperado de https://www.youtube.com/watch?v=etllTWbJtsM

Iniciativa regional para el reciclaje inclusivo (IRR). (2013). Género y reciclaje: Herramientas para el diseño e implementación de proyectos. Washington D.C.: Banco Interamericano de Desarrollo.

Instituto Nacional de Estadísticas y Censos INEC. (2018, Diciembre). Encuesta Nacional de empleo, desempleo y subempleo (ENEMDU). Presentado en Quito. Recuperado de http://www.ecuadorencifras.gob.ec/documentos/web-inec/POBREZA/2018/Diciembre-2018/201812_Pobreza.pdf

Riofrío, G., & Cabrera, T. (2012). Trabajadoras por la ciudad: aporte de las mujeres a la gestión ambiental de los residuos sólidos en América Latina. Lima: DESCO.

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