INFORMAL SECTOR RECYCLERS: INCLUSION FOR MORE SUSTAINABLE WASTE MANAGEMENT

by

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A THESIS

Presented to the Department of International Studies
and the Robert D. Clark Honors College
in partial fulfillment of the requirements for the degree of
Bachelor of Arts

June 2014

An Abstract of the Thesis of

Frances Maloney Bursch for the degree of Bachelor of Arts
in the Department of International Studies to be taken June 2014

Title: Informal Sector Recyclers: Inclusion for More Sustainable Waste Management

Approved: [redacted]

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Though invisible to most, unsustainable waste production and management lie at the epicenter of the planets' two most pressing challenges today: climate change and the impending exhaustion of natural resources. An unlikely community in Santiago, Dominican Republic has assumed an important role in extracting recyclable material from the waste stream for recycling. Recyclers (also known as waste-pickers or scavengers) make their livings salvaging recyclable materials from the waste stream—usually from landfills—and selling it back into the market to be recycled. The work of recyclers around the world has positive environmental impacts, reducing methane emissions by minimizing the amount of material ending up in landfills, as well as reducing the necessity for the extraction of virgin materials. Locally, recyclers in Santiago do important work diverting about 3 percent of the total waste back into the market every day. Recyclers have the potential to even more effectively improve the sustainability and reduce health detriments of the waste management system through increased collaboration with the municipality. Research was conducted by way of 50 interviews in the neighborhoods closest to the landfill. Results demonstrate that though recyclers work in the industry for the income it provides them, they are aware of the positive environmental impacts they have. Data exposes the important information that extreme poverty and environmental awareness are not mutually exclusive. With increased understanding of the recyclers, formal inclusion and thus improvements in the quality of life of the recyclers and the efficiency and sustainability of the waste management system are more likely.

Acknowledgements

The completion of this project would not have been possible without the following people: first I would like to thank my parents, Tom and Catie Bursch for their unwavering support of my education over the last sixteen years as well as the gifts of work ethic and perseverance.

Second I would like to thank the fifty community members of Santa Lucía, La Piña, and San Antonio who participated in my research and welcomed me to sit and talk with them last March. The conversations I had with these individuals were the most impactful experience I had in the nine months I spent in the Dominican Republic and largely inspired the continuation of this project.

Next I would like to thank my thesis committee: Professor Derrick Hindery, Professor Ocean Howell and Elaine Acacio for taking time from their very busy schedules to assist me in this process.

Lastly, I could not have done this without friends and roommates who have endured countless thesis-oriented conversations this year and probably know more than they ever wanted to about recycling, waste management or the Dominican Republic.

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INTRODUCTION

> "Without a fundamental shift in the way goods and resources are consumed, the world faces the prospect of multiple, interlocking global crises for the environment, prosperity and security. Sustainable consumption is a prerequisite for a more prosperous, safe and equitable global future." – (Deloitte Toche Tohmatsu and World Economic Forum 2010, 7)

The direct consequence of the consumption of goods is the creation of waste. As the global population rapidly increases—especially in urban settings—production, consumption and thus disposal of commodities reach unsustainable levels jeopardizing human and the environmental health. As Jared Diamond establishes in his 2008 article, "What is your consumption factor?" the increase of the planet's population alone is not of utmost concern but it matters only insofar as people consume and produce. Diamond states that the average rate at which people consume resources, like oil and metals, and produce wastes, like plastics and greenhouse gases, is about 32 times higher in North America, Western Europe, Japan and Australia than it is in the developing world. Thus the impact of population growth varies vastly depending on where populations are growing. For the first time in 2010 the global urban population exceeded rural population and continues to grow at a rate of 1.85 percent annually (*The World Factbook 2014*). This is significant because urban populations consume, and thus produce waste, at higher rates than their rural counterparts (Gutberlet 2008, 23). Mitigation of impending resource crisis—both the exhaustion of consumable resources and the suffocation by over-production of waste—requires action from the most consumptive countries developing countries, and all of the political, ecological and financial systems that link them.

An unlikely population has taken unprecedented initiative to mitigate the detriments of solid waste and simultaneously eke out a livelihood. Recyclers,[1] an estimated 15 million people worldwide, depend on the collection and resale of recyclable material for their subsistence. For consumers who generate waste, this waste is unwanted and valueless, but for recyclers —about one percent of the urban population in developing countries— it provides materials to sell and sometimes building materials for their homes, clothes to wear and food to eat (Medina 2007, vii). Recyclers work around the world in landfills and in the streets. They are misunderstood, discriminated against and under-recognized for their contributions to the informal economy and the environment at large. The work of recyclers reduces the quantity of waste that needs to be collected, transported and disposed and extends the use and capacity of landfills by reducing the material that reaches final disposal there. The immense amount of recycling attributed to recyclers also benefits the environment by reducing pollution caused by solid waste and necessity for virgin resources as well as the water and energy needed to produce them. It improves the efficiency of society's use of natural resources, a crucial step toward sustainable development and the reduction of anthropogenic environmental impacts (Medina 2007, 16).

In addition to the economic and environmental benefits recyclers provide, they also provide for themselves when their governments and societies do not. Recycling is like many other parts of the informal sector in which people create a

[1] In this thesis I refer to the people who collect and resell recyclable material for money as "recyclers." In literature the most frequent terms are "scavenger," "rag-picker," and "waste picker." However, I choose "recycler" to honor recent efforts of the recyclers in the Dominican Republic to change the way they are perceived and treated. Dominican recyclers refer to themselves as *recicladores* (recyclers) not *buzos* (divers) the more common colloquial and derogatory name. There are many colloquial terms for recyclers depending on their location.

livelihood for themselves from the resources available to them. When supported, recycling can be a form of sustainable development, giving recyclers a lead out of poverty. It is a misconception that recyclers are *always* the poorest of the poor (Medina 2007, 251). Here it is important to define and problematize the term "poverty," as it is one of the most common demographics defining recyclers in literature. In an effort to illuminate the complexity and antecedents of the recycler population, I will dissect this term so often assigned to them.

In the 1995 book, *Encountering Development: The Making and Unmaking of the Third World*, Colombian development critic Arturo Escobar explains that poverty is defined in relation to the standards of wealth of the economically advantaged (34). Definitions of poverty are intangible and based in value judgments of the wealthy and often the geographically removed. Poverty and development are intrinsically linked. For Escobar, "development was little more than the west's convenient 'discovery' of poverty in the third world for the purposes of reasserting its moral and cultural superiority in supposedly post-colonial times" (Ried Henry 2012). Escobar, cited by Simon Ried-Henry in *The Guardian*, concludes that development efforts are often detrimental not only when they fail, but also when they are successful, "because they so strongly set the terms for how people in poor countries could live. Told how to behave, poor people were made subjects of development as much as they were subjects of their own government" (2012). Confining implications of development in conjunction with pressures forcing immigration and urbanization in the Dominican Republic establish the circumstances in which the recycler community in Santiago de los Caballeros, Dominican Republic exists.

Despite underlying and longstanding origins of the challenging circumstances of recycler communities, recyclers are not defeated; they seek means of improving their standards of living. A social movement encouraging recyclers to organize themselves into an independent and efficient service sector and to strengthen their educational formation began in 1999 in Brazil (Gutberlet 2008, 8). Since then, similar initiatives have spread throughout the world and there are now national cooperatives and international conferences for recyclers. Cooperatives can be empowering and increase health standards for member recyclers as well as increase effectiveness of environmental and health protection (Gutberlet 2008, 8). The organization process is arduous for recyclers, they have to work to change classist ideologies, occupational stereotypes and structures of local government and waste management systems.

I was first introduced to the realities of a recycler community through an internship with a community-based recycling center in Santiago de los Caballeros, Dominican Republic. The recycling center is in the small neighborhood Santa Lucía, which is home to many of the recyclers in Santiago, and lies only a few hundred feet from the municipal landfill, called the Rafey landfill. At the beginning of my internship I was skeptical about the effectiveness of a recycling center in such a marginalized community. My reasoning was: "if it is difficult to make recycling a priority for people in the US—who have all the environmental education and recycling infrastructure in the world—why should the residents of Santa Lucía be expected to care about recycling when many are struggling to put food on the table?" Over the course of the next four months working at the recycling center and, especially, conducting my research, I realized my initial reasoning could not have been more wrong.

Residents of the neighborhoods closest to the landfill are disproportionately committed to recycling. I attribute this to two causes: first, the economic gains that can be made in the reuse, repurposing and recycling industries in the area that have arisen from the availability of resources from the landfill. Second, the proximity to the landfill makes the consequences of unsustainable waste management practices apparent in the daily lives of residents. This thesis seeks to answer the question, how can the recycler community in Santiago contribute to a discourse for the most efficient, holistic and sustainable waste management system in Santiago? It aims to advocate for increased collaboration between recyclers and other actors in sustainable waste management for the optimum efficiency of commodity use and disposal. My goal is to contribute more information about this population to the academic discourse, representing recyclers as agents in improving sustainability of the waste management system. The recyclers in Santiago demonstrate that environmental awareness and underprivileged circumstances are not mutually exclusive.

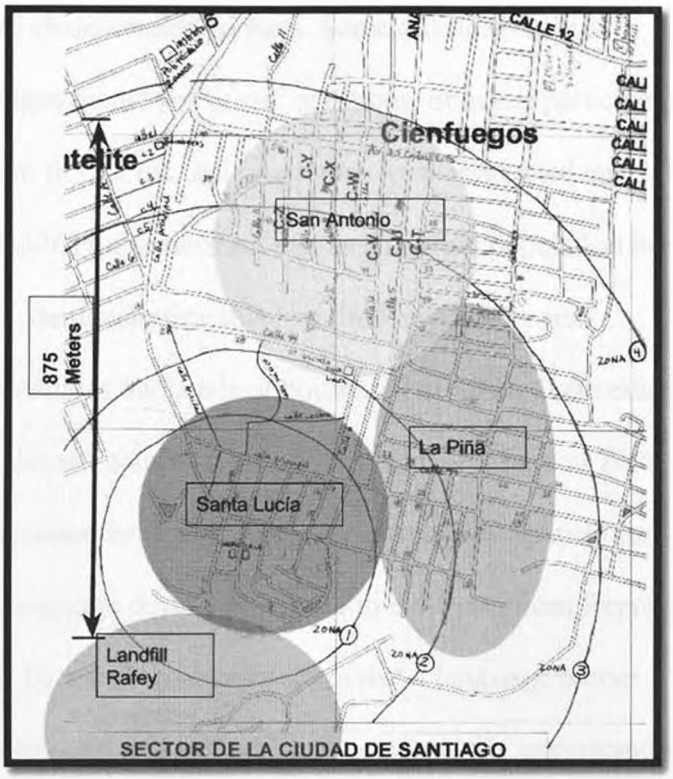
METHODOLOGY

This project is compiled of primary research based in the communities nearest the Rafey landfill in Santiago de los Caballeros, Dominican Republic and secondary research focused on themes of: recycler populations, waste distancing, waste management, global production and consumption patterns, as well as a close review of local newspaper accounts of the recyclers in the Rafey landfill.

The primary research was planned and conducted by myself while studying at the Pontificia Universidad Católica Madre y Maestra (PUCMM) through the student exchange program Council on International Education Exchange—Service Learning (CIEE-SL) in Santiago in 2013. Research was carried out in the form of interviews with fifty community members in Santa Lucía, La Piña and San Antonio, neighborhoods all lying within a half mile of the Rafey landfill (see image 1).

The three neighborhoods fall within one square kilometer of one another and to an outsider no distinction is apparent between them. Children from all three neighborhoods attend the same schools and though Santa Lucía is the closest to the Rafey landfill the others are only a matter of a few hundred feet further (see image 1).

Image 1. The three target communities and the landfill are superimposed over a street map of the area



There is socio-economic data available for Santa Lucía via the report, "Agenda de Desarollo del Barrio Santa Lucía 2010-2015" (Development Agenda for the Santa Lucía Neighborhood 2010-2015*)* by Alice Auradou that is not available for La Piña or San Antonio. This focus is due to the attention Santa Lucía has received from non-governmental organizations (NGOs) and local government because of *La Programa Integral de Mejoramiento del Barrio Santa Lucía* (Comprehensive Program for the Improvement of the Neighborhood Santa Lucía). Socioeconomic data has been collected by organizations involved in the program to measure the success of their efforts in improving standards of living. Due to the extreme proximity of the three neighborhoods and the similar percentages of recyclers in their populations (44 percent, 36 percent, and 38 percent in Santa Lucía, La Piña and San Antonio respectively) I cautiously assume other similarities in demographics. I do not claim that any of the data about Santa Lucía is applicable to the other neighborhoods in this thesis, though in my thinking I do presume that it is similar.

The interviews I conducted in Santiago each consisted of the same 25 questions of both open-ended and closed-ended formats. Some questions asked participants to elaborate while others were "yes or no" questions, or asked participants to choose the most accurate option from a list. All interviews were conducted and contested orally to best avoid possible misunderstanding, as the target population has statistically low levels of literacy: demonstrating this low literacy a 2008 socio economic report states that 76 percent of the heads of household in Santa Lucía either received no formal education or did not complete elementary school (Auradou 2008, 24). Another variable I tried to account for is that though I have studied Spanish for eight years and it was my target language during my tenure in the Dominican Republic, Spanish is not my first language. To avoid any inaccuracies that a language barrier could incur my interview questions were revised to be most colloquially understandable by both my professors at the university and co-workers in the specific neighborhoods where the interviews were given. I am confident in my Spanish fluency to the degree that I confirm all answers to interview questions were clearly understood and accurately recorded. The questions pertain to the participants' basic demographic information as well as their perceptions and practices of recycling, or in other words, essentially their relation to the industry as well as how they value recycling and their environment.

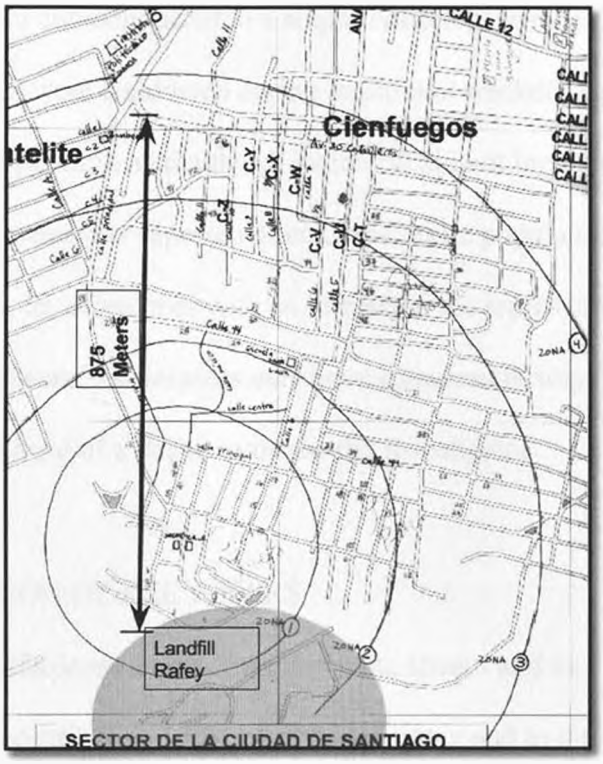
Questions from the interviews applicable to this research include the following:

- In your opinion, what does it mean to recycle?
- Recycling helps protect the environment: (agree, indifferent, don't agree)
- Do you personally see an importance in recycling (yes, indifferent, no)
    - If so why?

- Is the health and well-being of your community important to you? (yes, indifferent, no)
- Do you or have you ever recycled waste?
- Have you ever sold recyclable materials?
  - If not, why not?
  - If so, to whom/ what recycler did you sell it?
- What types of materials do you collect
  - (plastic bottles, gallon jugs, hard plastics, cardboard, paper, glass, metals, other)
- Where do you collect the materials you sell?
- (Landfill Rafey, the streets, from local establishments, your own home, the houses of neighbors and friends, other)
- How frequently do you collect recyclable materials?
  - (daily, weekly, bi-weekly, monthly, less than 6 times a year, annually, other)
- Why do you collect recyclable materials to sell?
- (financial reasons, to clean the streets, in effort to improve the environment, to maintain cleanliness, other)

The population of the investigation consisted of 50 adults living in Santa Lucía or the adjacent neighborhoods La Piña and San Antonio in the Southwest corner of the Cienfuegos district of Santiago, Dominican Republic. Within the established area, I tried to interview participants as evenly distributed geographically as possible (see image 2). Participants were selected at random and informally as I walked through the area between 2:00 and 4:00 pm on weekdays and looked for people outside of their homes who were willing to participate. The research was conducted between March 12th and April 3rd of 2013.

Image 2. This map shows the area in which interviews were conducted. The small red numbers represent exactly where the participant lives.



Different methods were used in the processing of the data based on the type of question being asked. Closed-ended questions were organized into tables in Microsoft Excel to facilitate their transformation into graphs. The responses to open ended questions were organized into categories based on similarities, then transformed into graphs and tables to facilitate analysis.

The main limitation of the primary research for the purpose of this thesis is that it was designed for a different research question (How does the community value the *Centro de Reciclaje la Esperanza* (Recycling Center the Hope)), within the context of their practices and perceptions of recycling?). The results of the initial study are relevant to this thesis and to minimize this main limitation I started with the raw data (the answers to the interview questions) in my analysis of the data for the purpose of this project.

In the actualization of my research, the following limitations must be recognized: 1) 10 of the 50 interviews were conducted by someone other than myself. Though I explained to the other individual how to conduct the interview it is possible that 10 of the interviews were presented and conducted in a slightly different manner from the rest; 2) because the interviews were conducted during traditional weekday working hours it is possible that the population available for interview did not include part of the working population and thus was not representative of the entire population; 3) it is possible that my mere presence, as a foreigner with an interest in the topics of the interview, skewed participants' answers. Participants may have answered in ways inconsistent with beliefs or actions because of a desire to please the investigator.

2. ECONOMIC CONTRIBUTION OF RECYCLERS

Through the extraction of recyclable materials from the waste stream and its resale back into the market, recyclers contribute positively to the economy and to the protection of the environment. The 2012 UN (United Nations) report by Hoornweg and Bhada-Tata, *What a Waste: A Global Review of Solid Waste Management,* claims that the post disposal recycling done by recyclers has a positive impact of an estimated $30 billion dollars per year (27). However, on the individual scale recyclers earn very little. Because recyclers are paid by the quantity of recyclables they collect, income varies by day, and by individual and certainly by location. An individual recycler in 2011 in Santiago, Dominican Republic made at most the equivalent of five US dollars a day (200 Dominican pesos) or an approximate annual income of $1828, well below the 2011 per capita Gross Domestic Product (GDP) of $ 9600 US dollars (Carbonell 2013;

The World Factbook 2013-14). Though meager, waste as a resource provides a livelihood to many. The World Bank estimates that solid waste management accounts for one to five percent of the all urban employment worldwide (Hoornweg and Bhada-Tata 2012, 1). Waste, as a resource, does not only benefit recyclers but also the global market, the materials recyclers salvage and gain value trickling up through the economy as they are recycled.

Recyclers are vulnerable to economic changes in other parts of the industry. The price of recyclable materials fluctuates radically and is dictated by the global market. This price instability poses challenges for recyclers and small businesses in the industry. Fluctuations are based on costs of crude material, demand for materials and transportation costs among other factors. Resources are limited; as oil and other nonrenewable natural resources become scarce, their prices go up. Price fluctuations, though dictated mostly by the opposite end of the commodity chain (extraction), impact the recycling industry since all materials containing the resource assume the cost. Higher prices for recyclable materials directly benefit recyclers, but are perhaps more important for sustainability. High prices also encourage conservation of the resource via more efficient use of the materials. (Medina 2007).

Recyclers save money for the municipalities in which they work by reducing the volume of waste in landfills, thus extending the lifetime of existing landfills and nullifying the necessity for the construction of as many new ones. Furthermore, recyclers minimize municipal expenditures on the facilities, personnel and equipment used for collection, transport, and disposal of solid waste (Medina 2007, ix). Recycling saves money as well as introduces money back into the economy. Though already

contributing economically, recyclers could be even more involved. If recyclers were taken into consideration with respect to the layout and processing methods within the landfill and further integrated in household waste pick-up, they could work more efficiently and thus contribute more substantially. As well as economic contributions, increased rates of recycling achieved by recyclers provide many ecological benefits.

ENVIRONMENTAL IMPORTANCE OF RECYCLERS

Though municipal solid waste (MSW) can be a considerable resource for recyclers, it is also a threat to the health of people and the environment. Recycling helps protect the environment and helps mitigate climate change most directly in two ways: first, by diminishing the need for landfills and second, by minimizing the quantity of virgin materials needed for production of new things (Forcyth 2005). Reducing the number and size of landfills is crucial to the reduction of greenhouse gas (GHG) emissions. In 2013 the US Environmental Protection Agency estimated post-consumer waste accounts for between 3 percent and 5 percent (1,460 $mtCO_2e$ (metric tons of carbon dioxide equivalent)) of total global GHG emissions (Hoornweg and Bhada-Tata 2012, 29). The main GHG landfills produce is methane, a GHG twenty times more potent than carbon dioxide (Gutberlet 2008, 7). Methane from landfills composes 18 percent of total global methane emissions (United States Environmental Protection Agency 2006). Methane, along with other GHGs, like water vapor and carbon dioxide absorb energy in the atmosphere as heat. Acting as a blanket, GHGs slow or prevent the loss of heat into space, thus making the earth warmer and contributing to climate change (United States Environmental Protection Agency 2014).

As detrimental as they are, GHG emissions from landfills can be readily reduced. For example within the European Union the rate of GHG emissions from waste has declined by more than half from 69 million tons of CO_2 per year in 1990 to 32 million tons of CO_2 per year in 2007. However, this is not the trend everywhere. The "Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2011," states that the percentage of waste landfilled may decline due to increased recycling and composting

practices, however, unlike in the EU the quantity of CH_4 produced by landfills has increased by about 60 percent since 1990 (409-410). Recycling reduces emissions produced by landfills by lessening the total material in landfills. The recycling process produces some emissions as well, however, they are offset by the reduction in fossil fuels that would be required to obtain raw materials in place of the recycled ones (Gutberlet 2008, 7). For example, recyclers in the Jardim Gramacho Landfill in Rio de Janeiro, Brazil remove 200 tons of recyclable materials per day, which is equivalent to the amount of garbage being produced by a city of 400,000 people. In Santiago recyclers remove over 27 tons daily, about 3 percent of the total waste in the landfill, which over time is a significant quantity (Peralta 2013; Fernández 2010). Waste minimization can also have significant up-stream GHG minimization benefits, meaning the production processes for most materials that become MSW produce emissions that can be lessened by a reduced need for raw materials (Hoornweg and Bhada-Tata 2012, 29).

The second way recycling directly protects the environment and mitigates climate change is through the reduced necessity for the extraction of virgin resources for production. Use of virgin rather than recycled material can be more costly for the environment for two reasons. First, production processes require more energy than recycling material, for example producing aluminum from recycled aluminum requires 95 percent less energy than producing it from virgin materials (Hoornweg and Bhada-Tata 2012, 27). Second, often the extraction process—whether it is mining, logging or oil drilling—is detrimental to the environment. While landfills at the final disposal end of the commodity chain are one cause of environmental degradation, the opposite end—

the extraction of virgin resources—is another. Production of paper is a good example: the world market for post-consumer paper and cardboard is estimated at around 175 million tons annually, meaning 4, 200,000,000 trees are left standing every year (UN Habitat 2010, 77; "Trees to Paper" 2008). The use of post-consumer paper in the production of more paper keeps more trees standing, which not only leaves more of the environment intact but also maintains high levels of carbon sequestration in forests, further mitigating effects of climate change (Gutberlet 2008, 7). The reduction of GHG emissions and the extraction of virgin resources are ways in which increased rates of recycling contribute to global environmental health.

Recycling also protects environmental health on a local scale. Incentivizing the collection of recyclable materials from the streets and other inadequate informal open dumping areas in empty lots and ditches helps prevent health risks to the immediate population. "Inadequate open dumping is a common problem in many developing countries often due to a lack of alternatives, lack of funds, and general absence of environmental awareness" (Gutberlet 2008, 30). Recyclers reduce some of the waste in these areas of open dumping, however, materials that have no recycling value remain and continue to create health risks. For example, in the Dominican Republic rates of dengue fever—a vector born disease transmitted by mosquitoes—can be reduced by eliminating standing water needed for mosquitoes to develop and hatch (World Health Organization 2014). MSW that is improperly disposed of can clog ditches, streams and culverts causing water to become stagnant. In this way recyclers reduce negative health implications of MSW for the general public in the areas they collect materials. Nevertheless, the recyclers themselves are a high health risk population because of their

proximity to waste both in their occupation and often their places of residence. The health risks and implications of recyclers will be further addressed in section nine: *Health Implications for Recyclers.*

In effort to reduce carbon emissions, conserve resources, and promote health, increased consumer participation in recycling would be much more efficient and effective than solely recyclers recovering what they can post disposal. "Although most of us generate waste on a daily basis, we are unaware of environmental health issues related to the consequences of disposal and management of our waste. People do not feel responsible for the environmental impact of discarded products or materials once those items are classified as garbage" (Gutberlet 2008, 27). Ideally, people would take initiative to recycle as effectively as possible the material they consume before they classify it as waste, as well as be more aware of the environmental impacts their consumption and disposal activities exacerbate. This thesis seeks to contribute to increasing consumer awareness. The disassociation between consumers and the implication of their waste is an important part of the phenomenon of waste distancing explored in the following section.

WASTE DISTANCING & COMMODITY CHAINS

Waste distancing and commodity chains[2] are inextricably linked to one another and help explain the extent of the world's unsustainable waste problem as well as complications in confronting it. Commodity chains connect the very conception of a product to the raw materials from which it is made, to all of the processes it undergoes on its way to consumption then final disposal. It links mass producers to retailers, consumers and recyclers, as well as every agent in between. In order to best reform the existing non-sustainable waste management system each node of the commodity chain needs to prioritize sustainability and change policy and practice according to their specific role in the commodity chain. Methods of sustainable reform include: producers creating less packaging or more eco-friendly packaging, consumers taking responsibility and making sustainable consumption decisions, proper public education about sustainable disposal like recycling, municipalities using appropriate technologies in their landfills, and the including and supporting recyclers in the collection and reintroduction of recyclable materials.

These proposed solutions are all reformist solutions that do not question the overall capitalist model, which Marxist and Ecosocialist scholars determine is fundamentally unsustainable. Ecosocialist James O'Connor argues that capitalism actually undermines the "conditions of production" critical for the sustenance of endless accumulation of capital. Conditions of production include soil, water, energy, and other

[2] The notion of the commodity chain traces the entire trajectory of a product from its conception and design, through production, retailing and final consumption. Commodity chains are defined as the network of labor and production processes whose end result is a finished commodity. Chains constitute sets of inter-organizational networks clustered around one commodity or product, linking households, enterprises and states (Conca 2002, 101).

natural resources as well as an adequate public education system, transportation infrastructures, and other services that are not produced directly by capital, but which is intrinsic to the effective accumulation of capital (O'Connor 1998, 149). According to these critiques of the capitalist model, there are no solutions to the problems capitalism inherently creates until the entire system is overturned. Though not central to this thesis, these critiques are important to acknowledge as they provide a side dialog to the central theme of unsustainable production, consumption and disposal inherent to capitalism.

As globalization and urbanization create more consumers and a higher demand for products, commodity chains grow longer, more complex, and more transnational (Conca 2002, 62). As they do, the social and spatial distance between production and consumption also grows (Conca 2002, 62). Thomas Princen author of, *Shading and Distance of Commerce* defines distance as: "The separation between primary resource extraction decisions and ultimate consumption decisions occurring along four dimensions—geography, culture, bargaining power, and agency" (Princen 1997). All commodities eventually lose value in the eyes of the consumer and are disposed of, thus the chain does not end with ultimate consumption but instead with final disposal or reintroduction to the chain through recycling. Though the term 'commodity chain' usually refers to the sum of processes between the conception and construction of a product to its consumption, for the purposes of this thesis I extend it to include the lifespan of a product until it reaches final disposal (if it will not be recycled) or until it is recycled and changes composition.

Princen's four dimensions of distance are present throughout the chain. As the distances grow, more information as well as accountability is lost between the different

actors in the chain. Geographical distance between producers, consumers, and their waste grows with globalization. Cultural distance refers to ways consumers lack information about the specific environmental or social impacts of their waste and their implications. Distance in bargaining power indicates inequality among decision makers and other agents with regard to the location of waste disposal. For example, the marginalized communities like those surrounding Santa Lucía generally have no power to prevent the municipality from building a landfill in such proximity to their neighborhoods while municipal leaders do. The final dimension of distance is agency, which refers to the role of middle agents between consumption and waste disposal decisions (Clapp 2002, 157). Key decision-makers (producers and consumers) are ill informed about the consequences of their decisions and disassociated from their role in the non-sustainable commodity chain because of a culmination of these four distances.

The suggestions Ken Conca made in the 2002 book *Confronting Consumption* are very much valid today in addressing these apathy-creating disassociations:

> Changes in the organization of production and the scope and complexity of international transactions are making traditional regulatory approaches to global environmental protection increasingly ineffective. Power in global production systems has shifted both upstream and downstream from the factory floor, where traditional environmental approaches have focused. If efforts to protect the planet and its peoples from environmental harm are to be effective, they will have to follow that shift in power. In particular, activism and advocacy will have to follow power downstream to the ideologies, symbols, relationships and practices that drive consumption (55).

While the consumer population is very powerful in its enormity, for holistic change all nodes—or stages in the chain—will have to contribute to the effort, from the boardrooms to the recyclers.

Due to expanding distances in the commodity chains those with the power to make production and waste management more sustainable are not being confronted with the entirety of the implications of their decisions. Conca summarizes Princen very well in reference to the non sustainability of the production process when he states:

> Diverse forms of distance [geography, culture, bargaining power and agency] can block feedback effects by inhibiting knowledge, information, and contextual understanding of the production process feeding one's consumption decisions. As a result, consumers lack the information and incentives to behave in a more sustainable fashion even if they are otherwise disposed to do so (63).

The lack of comprehension about the production process impacting consumptive decisions can be said about a lack of comprehension of producers in addition to consumers and other actors along the chain about the disposal process as well. For this reason the collaboration of the actors involved on all levels in all parts of the commodity chain is necessary in successfully addressing the unsustainable waste management problem. The GLOBE 2012 panelists at the conference on business and environment agreed that, "there's not enough discussion between product manufacturers, retailers and consumers to make zero waste a reality" (Annepu 2012). This means actors in each node must take action from their angle. This is where municipal collaboration and support of recyclers can greatly increase sustainable waste management as well as human development (Medina 2001, 100). This thesis focuses on one node—the post disposal role of recyclers—and how it can most effectively address the waste management problem. It aims to inform about the implications the landfill has on the community Santa Lucía and the actual and potential contributions of recyclers, in effort to reduce the breach of knowledge between recycler, municipal waste management, and other invested actors.

ORIGINS OF CONDITIONS FOR INFORMAL RECYCLING

In the Dominican Republic the informal sector and migration persist as results of industrialization and major forces in the creation of the social and economic conditions in which informal recycling exists. The industrialization process in the Dominican Republic has attracted the attention of many researchers and critics because of the paradox it embodies impressive economic growth is concurrent with a decrease in salaries and persisting poverty (Organización Internacional de Trabajo 2013, 1).

> "En los últimos 20 años, la República Dominicana ha experimentado un crecimiento económico alto y sostenido, con un incremento anual promedio del PIB per cápita del 4 por ciento frente al 1,8 por ciento para América Latina y América Central y el Caribe. Sin Embargo, este notable desempeño económica no se tradujo en una mejora igualmente significativa en los estándares de vida para todos" (Organización Internacional de Trabajo 2013, 1).
>
> (In the last 20 years the Dominican Republic has experienced large and sustained economic growth, with an average annual increase of 4 percent compared with 1.8 percent annual increase in Latin America, Central America and the Caribbean. Nevertheless, this notable economic achievement has not translated to equally significant improvements in the standards of living for everyone.)

This incongruence between social and strictly economic improvement supports critiques of Walt Whitman Rostow's modernization theory such as the more holistic theoretical paradigm, structuralism.

José Itzigsohn's 2000 book, *Developing Poverty the State, Labor Market Deregulation, and the Informal Economy in Costa Rica and the Dominican Republic* states that one of the most widely accepted approaches to the study of Latin American economics attributes the paradox to, "the existence of a large surplus labor force that cannot be absorbed in the formal sector" (5). Itzigsohn claims this structural surplus

originates from the particular form of industrialization in Latin America, characterized by the import of capital-intensive technologies in a context of rapid growth of urban population (5). The recycler population in Santiago is one of many subgroups of this surplus labor force outside of the formal sector. Recyclers, as well as over 56 percent of the Dominican population, are unable to gain access to formal wage employment and create work for themselves, composing the informal sector (Organización Internacional de Trabajo 2013, 8). Industrialization and the informal sector are intrinsically linked with migration, which in the Dominican Republic has 2 major facets, urbanization and immigration.

Informal Sector

The informal sector, in which recyclers operate, is sustained by urbanization and immigration in addition to high rates of formal unemployment. Though often invisible, it is a necessary companion to industrialization and expansion of the formal sector. In comparison with the relatively minor informal sector in more developed countries the informal sector in most developing nations it constitutes over half of the workforce (Yuki 2007, 77). The informal sector attracts immigrants and migrants because jobs are generally unskilled and it is more permeable than the formal sector in which jobs may be scarce (Yuki 2007, 77). In 2010 unemployment was 14 percent (Organización Internacional de Trabajo 2013, 15; 10). The 2010 Regional Evaluation on Urban Solid Waste Management in Latin American and the Caribbean correlates unemployment with the prevalence of recyclers (see graph 1).

Relationship Between Unemployment Rate and Number of Waste Pickers in LAC

FIGURE 10: RELATIONSHIP BETWEEN UNEMPLOYMENT RATE AND NUMBER OF WASTE PICKERS IN LAC



Source: Based on information from CEPAL: Panorama social de América Latina 2009, November 2009 and EVAL 2010 software.

Graph 1. (Espinoza et.al. 2010, 54)

As unemployment rates rise, more people seek work in the informal sector and thus an increase in recyclers is noted.

Pérez Sáinz, as cited by José Itzigsohn, coins the term *neoinformailty* to refer to the current informal sector situation. Pérez posits three main scenarios of neoinformailty, all of which the informal recycling industry is exemplary:

> 1) Economics of poverty, characterized by contexts of exclusion and activities of subsistence conducted with very limited resources; 2) subcontracting for the tradable sector, which amounts to a subordinated incorporation into the global economy; and 3) agglomeration of small dynamic business, which implies a dynamic incorporation into the global economy based on cooperation among small firms and solidarity based on local identities (6).

With respect to the first scenario of neoinformailty, recycling at the Rafey landfill is certainly characterized by exclusion and is conducted with truly no resources beyond municipal solid waste itself. Second, recyclers are vulnerably situated at the bottom of a transaction chain that ends in export of recyclable material and thus the global economy. The local recycling economy in Santa Lucía is exemplary of the third scenario as the many individual recyclers interact with and have relationships with the numerous levels of recyclable buyers and collectors and middlemen businesses on site. The position informal recycling occupies is the first rung in a ladder leading from informal to eventually formal sector via many middlemen in the industry.

Urbanization

Urbanization in the Dominican Republic became notable in the 1950s in the capitol Santo Domingo and shortly after in Santiago and La Romana (the countries second and third largest cities) in the 1960s and 1970s (Haggerty 1989). Initially, "the growth in industry and urban construction, coupled with Trujillo's expropriations of rural land, fueled rural-urban migration and the city's growth" (Haggerty 1989). While new industry jobs were pull factors attracting migrants, expropriations were pushing people from their rural homes. James Ferguson in his report, "Migration in the Caribbean: Haiti, the Dominican Republic and Beyond" claims that as the Dominican economy has broadened from its historic agricultural base—mainly its dependence on sugar—so too has demand for cheap labor in other sectors. Ferguson attributes this to both the fact that, "Dominican agricultural workers have abandoned their traditional roles, looking for work in the new manufacturing and service sectors, and Dominican migration, especially from the poorest rural areas, has reinforced this trend" (15). The

diversification of the economy both encouraged urbanization as well as urbanization fueled diversification of especially the informal economy.

Urbanization is an integral force in the creation of recycler communities for three main reasons: 1) urban populations consume more than rural populations, as more people urbanize more waste is produced; 2) urbanization feeds the informal sector in which the recycling industry exists, and 3) the slums created by rapid urbanization make waste collection difficult. Since 1950 The Dominican Republic has experienced almost a complete inversion in the proportion of rural to urban populations. In 1950 about 25 percent of the population lived in urban areas. In comparison with 2014, the urban population is approximately 70 percent (The World Factbook 2012). In her paper prepared for the International Congress of the Latin America Studies Association, Barbara Lynch states, "In Santiago, as in other smaller Latin American cities, demographic and economic expansion has generally outpaced investment in basic services and infrastructure and the development of municipal capacity or financial resources to manage growth" (Lynch 1998, 2). The large influx of generally low-income migrants from rural Dominican Republic and immigrants from Haiti move into marginalized and undeveloped communities in the city's periphery or, "where they are reasonably close to the city center, they are generally located on geologically unstable sites or under the plume of polluting facilities" (Lynch 1998, 3). Though this population lives a minimally impactful lifestyle, even low-income urban populations produce more waste than their rural counterparts (Gutberlet 2008, 4). Increased overall amounts of consumption and waste production in conjunction with areas that are difficult for

collection service to access as well as inhabited by people who are likely to be unable to pay for collection services.

Immigration

In Santiago, Dominican Republic the connection between recyclers and immigrants is especially complex. Rather than solely a national rural to urban migration of Dominicans feeding the recycler community, it is predominantly Haitian immigrants. A recent newspaper article in Santiago claims that of the 535 organized recyclers, 450 are Haitian and 85 are Dominican. There are also 300 undocumented Haitians that come daily to the landfill who do not belong to the association of organized recyclers (Batista 2012). Considering both the recyclers pertaining to the organized group and not, an estimated 89 percent are Haitian immigrants. The Dominican Republic and Haiti have a long and contentious history of Haitian immigration for labor purposes across the fairly permeable border dividing the island of Hispaniola. Although the Dominican Republic is notoriously prejudice against Haitian immigrants, the economy relies on the cheap labor immigrants provide, especially to fill particular niches in the economy.

Labor migration from Haiti to the Dominican Republic is long-standing and multifaceted. The convergence of political upheaval, ecological destruction, stagnant economy and natural disasters in Haiti sustain a large and consistent outflow of emigrants to the Dominican Republic. The compounding impacts of poverty, violence and climate change Christian Parenti describes as the "catastrophic convergence" in the book *Tropic of Chaos: Climate Change and the New Geography of Violence,* are the fundamental elements causing Haitians to immigrate to the Dominican Republic. Following the 29-year militaristic rule by the Duvalier family, ("Papa Doc" François

Duvalier from 1957-1971 succeeded upon his death by son "Baby Doc" Jean-Claude Duvalier 1971-1986) Haiti has experienced extreme political turmoil (Abbott 1988).

> Haiti experienced an "extended period of coups and ephemeral unelected governments, Haiti witnessed the overthrow of the democratically elected Jean-Bertrand Aristide in 1991, a brutal military regime, and then the return of Aristide in 1995. Re-elected in 2000, Aristide's government has been paralyzed by constitutional obstructions from opposition groups in Haiti and allegations of electoral malpractice" (Ferguson 2003, 9).

Political instability and stunted economic development are underlying factors of poverty, which Ferguson stares is the driving force behind both seasonal and permanent migration of Haitians to the Dominican Republic (8). Though a developing nation as well, the Dominican Republic has a GDP per capita purchasing power parity (PPP) of nearly eight times that of Haiti (Central Intelligence Agency 2013).

The situation in Haiti that has pushed an estimated 500,000 to 700,000[3] (Ferguson 2003;8) of its people over the border to the Dominican Republic is caused by self-perpetuating convergence of political and economic instability and environmental destruction and disaster. These conditions are self-perpetuating because a society is conditioned by the traumas of its past and damaged societies respond to new crisis and adversity in ways that are irrational or shortsighted (Parenti 2011, 7). Haiti's responses to the onslaught of natural disasters they have endured in the last decade are exemplary of this phenomenon and further perpetuates the migration of Haitians to the Dominican Republic. It is not only the instability in Haiti that drives immigration on Hispaniola, the

[3] The Haitian Embassy in the Dominican capital Santo Domingo proposed a similar figure in 2001, and some Dominican media reports have guessed at 1.5 million. There is no reliable census material, and estimates are generally ideologically motivated, especially from Dominican nationalists opposed to Haitian migration. Not only is it unclear how many Haitians are resident in the Dominican Republic, but also how many people of Haitian descent were born in the Dominican Republic.

Dominican Republic also benefits from the influx of cheap labor, thus informally encourages it.

As the Dominican economy has diversified since its historic dependence on sugar cane production, so has its demand for cheap labor. Much less is known about recent forms of migrant labor that was recognized about the peril of the migrant sugar cane workers. As Ferguson points out;

> "This is largely because such labour is often illicit and undocumented. Neither the workers who live outside the economic mainstream nor the employers who benefit from their illegal status are keen to draw attention to the thriving informal-sector economy that exists alongside and supports the formal economy" (4).

The high rate of informal and loosely regulated employment in the DR not only leaves room for cheap immigrant labor, the function of the Dominican economy relies on it. The recycler community in Santiago is a prime example of this relationship: Haitian immigrants (in addition to some Dominicans) are willing to work salvaging recyclable material from the landfill which is sold into the informal recycling market that generates revenue for Dominican enterprises higher up in the recycling chain. The industry would not be possible without the recycler community working in the landfill at the base of the system yet they are not given credit or rights in exchange for their important role in the economy and the preservation of the environment.

Informal recyclers are at the confluence of the intrinsic relationships between industrialization, the informal sector, urbanization, and immigration. The fundamental source of the recycling occupation, waste, would not be as prevalent were industrialization less predominant. Immigration and urbanization perpetuate the creation of waste by increasing the number of consumers participating in higher rates of

consumption and waste-production associated with urban lifestyle. These migration patterns also sustain the informal work force of recyclers who—excluded from formal employment—resourcefully subsist from waste as a resource. This logic is one example of the many ways the complex social, geographic, economic and theoretical manifestations intersect

WASTE MANAGEMENT IN SANTIAGO

In Santiago, recyclers' proximity to the landfill and to the repercussions of current waste management make them an important voice of recyclers are an important contribution to the discourse on waste management and general knowledge of the status of the landfill. The consequences of waste distancing are made apparent on a citywide scale with regard to environmental hazards in the landfill. Recyclers are the ones calling attention to the dangers and risks the landfill poses, not the municipal decision-makers who live distanced from the consequences of unsustainable waste management. For example, municipal decision makers could benefit from the functioning recycling systems and constantly updated knowledge of the realities within the landfill in order to make appropriate decisions, while recyclers could benefit from improved organization and safety regulations within the landfill. The inefficiencies in waste management policy caused by waste distancing can be overcome with improved collaboration. It is not advised that everyone come into more contact with waste, but that the voice of recyclers is heeded. If taken seriously, collaboration with recyclers can help overcome the inefficiencies created by the dimensions of distance.

The four dimensions of distance Princen describes—geography, culture, bargaining power and agency— are present in the waste distancing that occurs on a local level in Santiago. Geographical distance in this setting is distance from the landfill; residencies further from the landfill do not experience the same degree of air pollution and other health impacting consequences of the landfill. The amount of trash in the streets is also correlative to the wealth of the area. Cultural distance, is demonstrated by varying levels of household recycling and awareness of the recycling

industry. It is more prominent in the more marginalized districts of Santa Lucía, La Piña and San Antonio than in wealthier sectors of the city.[4] Distance in bargaining power in Santiago refers to the imbalance of power between entities such as the mayoral office or the Ministry of The Environment, and the Association of Recyclers. Lastly distance in agency refers to the middlemen, such as the waste collection companies and in some cases recyclers who collect in the streets. For these reasons, the recyclers, those who are not distanced from waste are currently the best advocates for the sustainable management of waste and protection of the environment.

The Rafey landfill is the final disposal destination for 1150 tons of MSW every day. 900 tons per day is created by the city of Santiago while 250 more tons are transported from nearby cities Licey, Tamboril, Moca, Canca la Reyna and others for disposal (Peralta 2013). Collection of the MSW is carried out by three contracted companies: Urbaluz, Urbaser, and Esena. Urbaluz collects between 285 and 330 tons of MSW a day, Urbaser collects 120-160 tons and Esena 60-85 tons per day (Peralta 2013). However, these quantities are not indicative of the entirety of what is being produced becuase a lot of waste is never collected or is improperly disposed of. The 2010 *Regional Evaluation on Urban Solid Waste Management in Latin America and the*

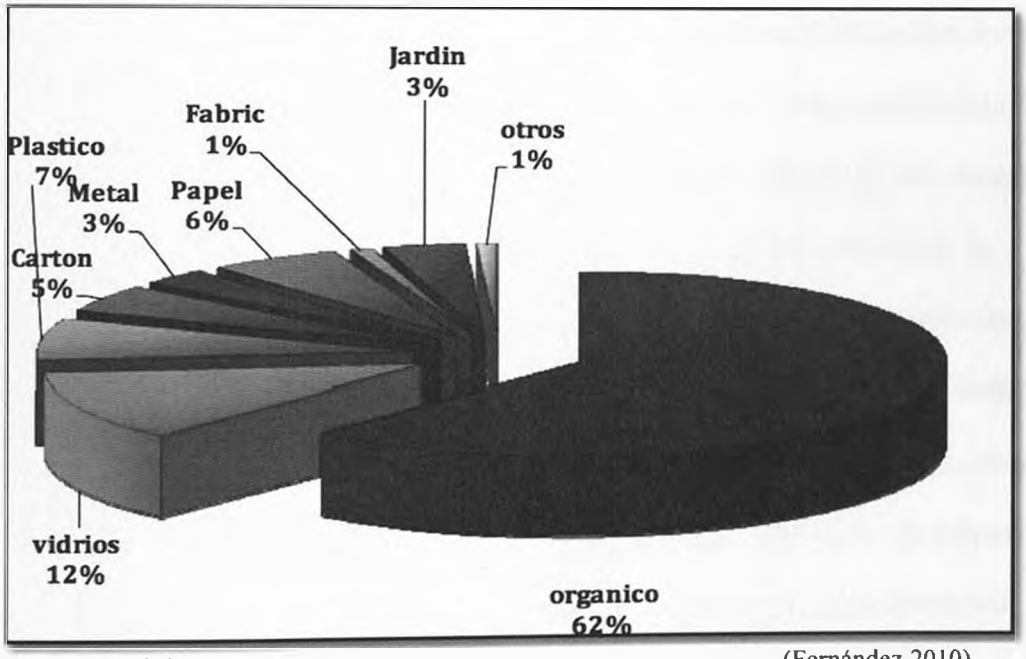
[4] Recycling in the home or public places is not yet culturally incentivized or facilitated in the Dominican Republic as it is in the United States. Some households separate their recyclable materials from their other waste to facilitate the work of recyclers or to sell themselves; for example many of the recyclers and their friends and neighbors will keep separate the small amount of material they produce. However, in wealthier districts where people are less acquainted with the recycling industry, as well as in public spaces such as even universities, recycling at the time of disposal is very uncommon. The demographics in Santiago reflect the economic disparity predominant in the Dominican Republic (A 2010 PAHO report states the DR has the Gini coefficient measurement of equity of 0.56) (Espinoza et. al. 2010, 58). Including both slums and very wealthy neighborhoods, from one side of the city to another the variance in the prevalence of waste in the street is noticeable; wealthier areas being cleaner than poorer areas. Generally, people are very concerned with the appearance and cleanliness immediately surrounding their homes but have very little regard for littering or disposing improperly of household waste in empty lots or ditches.

Caribbean claims that in the Dominican Republic in cities the size of Santiago, 100 percent of trash is collected, however, I know this to be untrue. Santiago has a major problem with littered waste in the streets as well as gullies, ditches and empty lots that become informal dumping sites. Uncollected waste is a result of three main factors: a culture that does not condemn littering (thus more waste is improperly disposed of), unreliable waste collection services, and a portion of the population that lives in areas that are inaccessible for collection vehicles (Ponce 2013; Espinoza et al. 2010, 53). Levels of poverty have an impact not only on the amount of solid waste generated but also on the collection of MSW for two reasons. First, high levels of urban poverty lead to the establishment of informal settlements and marginalized neighborhoods, which are difficult to access for trash collection. Second, the lowest-income population is often unable to pay for waste collection services (Espinoza et al. 2010, 53). Origins of urban poverty are further explored in section five: *Origins of Conditions for Informal Recycling: the Informal Sector, Urbanization and Migration.*

As well as what is littered in the streets, recyclers that work in the streets extracting recyclable material from dumpsters before it is formally collected, collect a small part of the waste produced. Thus, the quantities collected by contracted companies do not present the entirety of what is being disposed of. Though some collection happens in the streets in Santiago the vast majority of recyclable materials that are eventually gathered and resubmitted to the commodity stream by recyclers is collected in the landfill. Within the Rafey landfill there are 152 stalls of intermediary buyers that buy 10,000 kilos (11.02 tons) of cardboard, 15,000 kilos (16.53 tons) of plastic and a significant amount of metals from recyclers every day (Peralta 2013).

These intermediary buyers are small informal businesses that profit from further sorting, cleaning or simply accumulating large quantities of recyclables and then selling them to bigger recycling companies. The Recicladora del Cibao, the main recycling company in Santiago exports partially processed materials abroad to Korea, China, Chile and India (Díaz). The following graph shows the composition of all the material disposed of in the Rafey landfill.

Composition of the Rafey Landfill



Graph 2 (Fernández 2010)

307 tons of the 930 tons received daily (33 percent) of all the material deposited into Rafey Landfill is recyclable. The recyclers collect 30 tons per day, only 10 percent of the recyclable materials, 3.2 percent of the total material (Fernández 2010). The work recyclers do to reduce the necessity for virgin materials, to elongate the lifetime of the landfill and thus save the municipality money, and make a living for themselves based on an available resource is immense. However, it is not enough to rely

on the recyclers of the world for a solution to the unsustainable waste management problem plaguing our planet. The 2012 Hoornweg and Bhada-Tata report for the World Bank's Urban Development and Local Government unit of the Sustainable Development Network explains that, "recyclables recovered from mixed waste, for example, tend to be contaminated, reducing marketing possibilities. However, source separation and separate collection can add costs to the waste collection process" (14).

Separating recyclable materials at the point of disposal—for example in consumer homes—can be more costly for waste management services but it ensures that a greater proportion of material is extracted from the waste stream and it improves the quality and utility of the material (Hoornweg and Bhada-Tata 2012, 14). As graph 2 shows, only ten percent of recyclable material is currently being recycled. In comparison the EPA states that in the US, 34.5 percent of waste was either recycled or composted in 2012 (2014). For more efficient waste management and utilization of the remaining 90 percent of recyclables not collected by recyclers in Santiago, sorting and recycling initiatives are necessary along the entire commodity chain. Increased rates of recycling at the point of disposal, for example in the homes of consumers, will not put recyclers out of a job.

This call to action begs the question; why should everyone take action to increase recycling rates and other sustainability measures, why should they care? Though ideally all actors would be motivated to take such initiative out of global awareness and a sense of social and environmental responsibility alone, realistically a widespread change will probably not be seen until there is considerable economic incentive for such action. This is indeed the determining factor for recyclers. Each node

of the commodity chain consumes, generates waste and produces commodities uniquely and thus has the potential to contribute to a multifaceted effort to improve sustainability of production and consumption.

In 2010 Mayor José Enrique Sued in collaboration with the Xunta de Gallicia project (Spain) and Japanese International Cooperation Agency (JICA) invested 700 million pesos ($16,260,160 USD) in transforming the Rafey landfill from a smoldering open-air wasteland into a modern sanitary landfill. The name was changed from *vertedero* (garbage dump) Rafey to *ecoparque* (eco park) Rafey. Upon the inauguration of the renovated landfill, Mayor Sued announced, "*El vertedero a cielo abierto de Rafey ya ha dejado de ser una fuente de contaminación, la humareda será cosa del pasado*" (The open air landfill Rafey has ceased to be a source of contamination, the smoke will be a thing of the past) (Torres 2013). However, more than three years after the renovation there is little to show for the investment. The same 2013 newspaper article in *7 Días* by Torres claims, "*Un cambio de nombre no transforma una realidad. La humareda que invade la ciudad da la impresión de extenderse dibujando la inutilidad no solo de las palabras del funcionario, sino también de aquella cuantiosa inversión*" (A change in the name doesn't change the reality. The smoke that invades the city illustrates the futility of not only the mayor's words but also the large investment). On days with especially bad conditions the entire city is invaded by the smoke from the landfill, it is much more frequent in the neighborhoods of Santa Lucía, La Piña, and San Antonio impacting not only the health of recyclers but their entire communities.

Through the establishment of the Association of Recyclers and conferences, relations and collaboration with recyclers have improved. However, recent

events demonstrate the necessity for increased inclusion of recyclers in the decision-making processes regarding the landfill and environment. Fires in the landfill, the main cause of the contaminating smoke, smolder for months. The city put out the part nearest to where they are currently most actively working but it continues to burn in the more distant parts of the landfill (Torres 2013). The fires are extremely dangerous for recyclers, and for the entire population of Santiago via the smoke it creates, in addition to the pollution of the environment. Another sign that recyclers and the city are not collaborating to the fullest degree for the improved sustainability and efficiency of the waste management system, is the recent tax the local government imposed on recyclable material leaving the landfill. A tax of $250 Dominican pesos (almost $6 USD) is now charged per truckload of recyclable material leaving the landfill. The tax severely impacts the already meager incomes of recyclers (Torres 2013). The city should be incentivizing the work of recyclers for the benefits it provides rather than taxing it.

With regard to cleanliness of the streets and air quality in relation to the landfill, the recyclers appear to be some of the city's biggest advocates for the environment. In regard to the air quality issues Cesarina Tolentina, the vice president of the Association of Recyclers of EcoPark Rafey was quoted saying, "*Hacemos un llamado al ministro de Medio Ambiente para que se haga cargo de esta situación que está afectando la salud de toda la comunidad de Santiago*" (We call on the Ministry of the Environment to take charge of this situation that is affecting the health of the entire community of Santiago) (Torres 2013). Though the recyclers are concerned for the health of their own small communities, they also understand the implications for the larger population and the

effects on the environment. José Yeini Rosado secretary general of the Association of Recyclers stated, *"El que realmente se beneficia del trabajo que nosotros realizamos es el país y en planeta, claro nosotros vivimos de esto, pero el planeta es quien realmente se beneficia"* (The country and the planet are those that really benefit from our work, of course we live off of it, but the planet is really what benefits) (Mera 2012). Recyclers' understanding of widespread environmental purpose as well as individual economic purpose of their occupation.

SANTA LUCIA

The community of Santa Lucía is the focal population for this thesis. The neighborhood was previously—and colloquially still—called La Mosca for the prevalence of *la mosca* (the fly) due to the proximity of the landfill. Santa Lucía lies at the Northeastern periphery of the inland city of Santiago de los Caballeros, Dominican Republic. Santa Lucía is the neighborhood nearest the municipal landfill called *Eco Parque Rafey* within the larger city sector, Cienfuegos. The neighborhood was formed in 1991 following the relocation of a group of people from another part of Cienfuegos (Auradou 2010, 17). Its proximity to the landfill for easier access to waste as a resource, is one of three main reasons people move to Santa Lucía; the others being jobs in the nearby free trade zones (factories for the production of goods for export), and for available land (Auradou 2010, 19). Formal boundaries of Santa Lucía range from about a half-mile (0.8 kilometers) from the edge of the landfill to just 303 feet (92 meters) away with trails and residences sprawling even closer.

Location of the Landfill in Relation to the City of Santiago

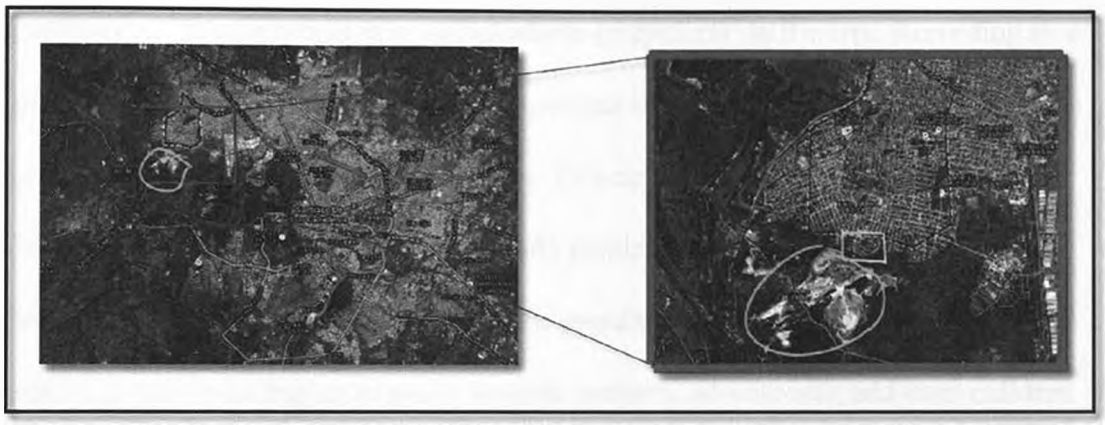
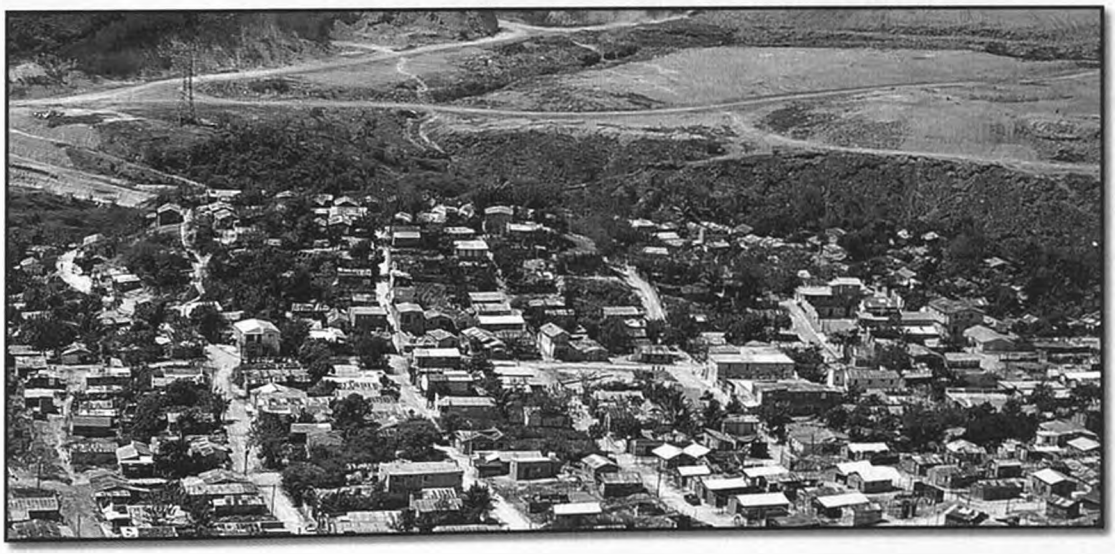


Image 3. The map on the right shows the city of Santiago indicating the area of magnification in red and the landfill (Vertedero Rafey) in the blue circle. The magnified image on the right shows Santa Lucia in a yellow rectangle and the landfill in a blue circle

Santa Lucia and the Rafey Lanfill



(Programa Integral de Mejoramiento Barrio Santa Lucía. 2010)

Image 4. This image of Santa Lucía and the Rafey landfill shows the proximity of residences to the edge of the landfill.

Due to its proximity to the landfill, Santa Lucía is home to the highest concentration of people working as *recicladores* (recyclers)[5] in the city. According to a socioeconomic diagnostic done in 2008, 13 percent of the heads-of-households in Santa Lucia work as recyclers (Auradou 2010, 35). This census derived this percentage from 204 heads-of-household representing the 2445 residents. It is possible to surmise that if the percentage had been taken from the entire population rather than one member per household, it would be higher as many woman partners, adolescents, and even children who were not considered heads-of-household work as recyclers. My own research shows that 26 percent of the population either has in the past or does currently sell recyclable materials, this may or may not comprise their main occupation but it is or has been a source of income. An article in the Dominican newspaper *El Diario Libre* claims that Santa Lucía is home to half of the people who work as recyclers in the Rafey landfill (Batista 2012).

At the time of the last census in 2008 Santa Lucia had a population of 2445 inhabitants distributed throughout the 489 dwellings. An estimation of the present population is 3266[6]. To help illustrate living conditions in Santa Lucía, La Piña and San Antonio; houses are closely spaced along both paved and dirt roads, some are painted in the classic bright pastel pink, yellow and teal colors that are common throughout the Dominican Republic while some are more apparently made of rudimentary found materials. The majority of the houses are wood with zinc roofs and cement floors with outdoor pit toilets (Auradou 2010, 30).

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[5] The Asociation of Recyclers of Eco Park Rafey are working to gain recognition as "recyclers" not "buzos" the colloquial and derogatory term for them, which literally means diver.

[6] This number is based on the population growth rate measured between 2005 and 2008 of 2.5% annual growth applied to the years 2008 to 2013. *If* the growth rate has stayed the same than his is accurate.

Though it is not explicitly stated in Auradou's 2010 report Development Agenda for the Neighborhood Santa Lucía, it can be inferred that Santa Lucía is home to many Haitian immigrants; more than half of the recyclers of the Rafey landfill (of which 89 percent are Haitian) live in Santa Lucía (Batista 2012). Although the first inhabitants arrived 22 years ago, 67.2 percent of households moved to Santa Lucía between 1 and 10 years ago (Auradou 2010, 34; 16). As part of the informal sector, recycling is an occupation that does not require identification papers, thus it is accessible to undocumented immigrants, of which the majority is Haitian in the Dominican Republic. Haitian immigration to the Dominican Republic is long standing and complex. Due to the fairly porous border between the two nations, convoluted documentation processes and minimal rights granted undocumented persons, illegality and marginalization are multi-generational challenges for many people.

Santa Lucía's inhabitants are some of urban Santiago's most marginalized, both geographically and socially. A compounding of issues creates their situation. First, Santa Lucía is located on the periphery of the city and in detrimental proximity to the landfill making its inhabitants disproportionately vulnerable to the toxic consequences of anthropogenic climate destruction to which their relatively low impact lifestyles contribute disproportionately little to. Waste production is directly linked to income as well as urbanization and economic development. As an urban yet economically underdeveloped community, people living in Santa Lucía produce more waste than their rural counterparts but less than wealthier parts of Santiago, and certainly than other parts of the world (Hoornweg and Bhada-Tata 2012, 2; Gutberlet 2008, 4).

Social stigma experienced by recyclers comes from Santa Lucia's status as one of Santiago's most marginalized communities as well as its association with recyclers and with Haitian immigrants, two of the more socially excluded populations. The social exclusion is perpetuated in part because of Santa Lucía's geographical location at the periphery of the city. I encountered many people from other parts of the city who had never in their entire lives living in Santiago, been to Santa Lucía or surrounding areas, thus did not understand the conditions.

One quarter of the heads-of-households in Santa Lucía have received no formal education and only 4 percent has completed high school or continued on to university (Auradou 2010, 24). My research demonstrated a somewhat higher overall level of education with only 6 percent having received no formal education, 34 percent completed elementary and 10% had completed at least some university level studies. When asked if he had ever been to school, Neno an sixty six year old man who is a recycler from Santa Lucía says he tried once but it didn't work out, he said, *"Hay que tener algún tipo de Fundación, si no tienes una base para poner el primer ladrillo, que ¿cómo vas a poner la segunda?"* (You need to have some kind of foundation, if you don't have a foundation to lay the first brick, than how are you going to lay the second?) (Carbonell 2013, 26:05). He indicates the perpetual cycle of poverty experienced multi-generationally in Santa Lucía and proximate neighborhoods. Recycling is a source of income, however, recyclers often remain in poverty due to the exploitation of middlemen and corrupt leaders (Medina 2007, 250). Organization via microenterprises, public-private sector partnerships, and cooperatives have proven successful methods of

reducing poverty among recyclers, in some countries recyclers earn several times minimum wage, allowing an escape from poverty (Medina 2007, 251).

In recent years Santa Lucía and especially the recycler population have received attention from a collaborative effort to improve living standards, called *El Programa Integral de Mejoramiento del Barrio Santa Lucía* (Comprehensive Program for the Improvement of the Neighborhood Santa Lucía). The program stemmed from the unification of Santiago de los Caballeros (Dominican Republic) and Santiago de Compostela (Spain) as sister cities. The two cities signed an agreement of collaboration with three fundamental objectives for improvements in the Dominican city. One of the three objectives is to achieve collaboration in matters of waste management (Programa Integral de Mejoramiento del Barrio Santa Lucía, 2010). The Spanish city signed a contract with the public autonomous business *La Sociedad Gallega del Medio Ambiente (SOGAMA)* (The Spanish Society for the Environment) also called the Xunta de Gallicia to, "*Llevar a cabo actividades destinadas a apoyar la protección y la mejora de la calidad del medio ambiente, por el tratamiento de los residuos sólidos municipales*" (carry out activities aimed at supporting the protection and improvement of the quality of the environment, by the treatment of municipal solid waste) (Programa Integral de Mejoramiento Barrio Santa Lucía 2010). The Xunta de Gallicia works with city government around issues of proper waste treatment in the landfill as well as with social issues for the people impacted by waste management either by occupation or proximity (Fundación Solidaridad 2013).

The social element to the work of the Xunta de Gallicia is the Comprehensive Program for the Improvement of the Neighborhoo d Santa Lucía, which works for the,

"el mejoramiento de las condiciones de trabajo de los/as recicladores y recicladoras, y en el desarrollo integral de los asentamientos humanos cercanos al relleno sanitario del vertedero de Rafey: las familias wue vivian en el Barrio Santa Lucía"
(improvement of the labor conditions of the recyclers, and for the comprehensive development of the settlements closest to the Rafey landfill: the families that live in the neighborhood Santa Lucía) (Programa Integral de Mejoramiento Barrio Santa Lucía 2010, a). The program was initiated in June of 2008 in collaboration with local nonprofit organizations as well as the City of Santiago. The program's specific foci are: water, basic sanitation and habitability, community health, professional education and productive development, and institutional strengthening of civil society organizations (Programa Integral de Mejoramiento Barrio Santa Lucía 2010, a).

RECYCLERS OF THE RAFEY LANDFILL



Image 5. Isabelle Carbonell. *Dumping Straight into Their Hands*

The creation of the *Asociación de Recicladores del Ecoparque Rafey* (Association of Recyclers of Eco Park Rafey) was born out of the collaboration of the technical training courses offered by the Comprehensive Program for the Improvement of the Neighborhood Santa Lucía, the local nonprofit organization Fundación Solidaridad and of course members of the recycler community (María 2010). The Association of Recyclers was initiated in May of 2009 and has gained clout since, bringing awareness to the occupation, collaborating with local government and participating in international conferences and collaboration with the *Red Latinoamericano de Recicladores* (Latin American Network of Recyclers (RedLacre)) (Fernández 2010). The president of the recycler association, Felipe Rosario Nolasco,

has a story similar to many of the recyclers he represents. Moving from rural areas to Santiago with grander plans but finding themselves otherwise without options turn to the landfill for their livelihood. Though only 25 years old now, Felipe Rosario came to Santiago as a young teenager to study and work, finding no alternative he began working as a recycler (Torres 2013). Felipe Rosario works long hours collecting recyclables during the day from which he earns $2500 Dominican pesos ($57 US dollars) a week, and studying political science at night (Torres 2013).

He and other members of the association are working hard to improve environmental and safety standards within the landfill as well as recognition and social acceptance of the work they do. At the first national conference of recyclers in October 2013 held to unite the sector of recyclers, self defined as *"recicladores de materias primas y defensores del medio ambiente"* (recyclers of premium materials and defenders of the environment), Felipe Rosario addressed his fellow recyclers, *"Para nadie es un secreto que la palabra buzo era lo peor que se puede imaginar, pero esta noche las personas que nos acompañan es porque reconocen la importancia y el valor del trabajo que realizamos"* (It is no secret that the word "buzo" [diver] is the worst imaginable word, but tonight the people that accompany us are here because they recognize the importance and value of the work that we do) (Torres 2013 a). A promising spectrum of actors capable of making the movement successful were present at the meeting; local government officials, Dominican Federation of Municipalities, the Ministry of the Environment as well as delegations of recyclers from the principal landfills in the Dominican Republic as well as representatives from recycler associations in Chile, Colombia and Nicaragua (Torres 2013 a).

Since the establishment of the association of recyclers and efforts made by the Xunta de Gallicia to improve sanitation and safety within the landfill, both recyclers and city personnel in charge of the complex perceive improvement (María 2010). The organization of recyclers into the Association of Recyclers of Eco Park Rafey has made communication between recyclers and the city easier. The city can now communicate with one spokesperson where as before, they had to reach out to many disparate groups (Lynch 1998). Though the association does facilitate collaboration, only about half (523) of the approximately 1000 recyclers working in the Rafey landfill are affiliated with the organization (Peralta 2013). So far a 2010 evaluation report of the Comprehensive Program for the Improvement of the Neighborhood Santa Lucía states, "It is important to recognize that there is still a minority of rebel recyclers who are not interested in organizing. There is also a high percentage of undocumented Haitians working as recyclers who are more difficult to organize" (Lynch 1998). Though it provides organizational challenges and can make communication and collaboration difficult, some recyclers do not wish to organize.

Not all recyclers are in favor of forming cooperatives. The independence from having a boss that recyclers enjoy is one of the reasons some people are drawn to the occupation (Carbonell, 2013). Here it is important to distinguish that forming a cooperative or organizing, doesn't mean recyclers are joining the formal sector, though it may make it easier to collaborate with the formal sector. Gutberlet and Binion in "The Effects of Handling Solid Waste on the Wellbeing of Informal and Organized Recyclers: a Review of the Literature" say that creating cooperatives is typically carried out under organic grassroots situations. They acknowledge that it is a difficult process.

The activity of informal recyclers has been noted as being individualistic, and therefore, creating cooperatives is not without its set of challenges (2012, 49). Some recyclers fear collaborating with others will inhibit their efficiency or income. Though this may be true in some situations, the opposite has generally been experienced because when organized recyclers have better bargaining power (Gutberlet 2008, 93).

The city, in conjunction with SOGAMA, has not made much progress towards improving the environmental safety in waste treatment processes. A newspaper article titled *"La conversión de Rafey en un "eco-parque fue solo un cambio de palabras"* (The conversion of Rafey to an "eco-park was only a change of words) describes the lack of improvements seen in waste treatment techniques and facilities since the initial investment. An evaluation of the collaborative program to address waste management in Santiago admits there is still room for improvement, "The organization of the association has had positive impacts on the lives of the recyclers as well as relations with the local government. However, it is understood that the results of this process will be even more tangible as the city fixes key aspects of the operation of the landfill, like safety" (María 2010, 5). Though some collaboration efforts have been made, it doesn't seem that the city is being held accountable for promises it made. As the association of recyclers gains clout and allies it may have more influence on the city, however, at this stage the association still needs to gain recognitions and respect.

HEALTH IMPLICATIONS FOR RECYCLERS

Woman Recyclers in the Rafey Landfill



Image 6. Isabelle Carbonell. *A Day's Worth of Finds*

The Rafey landfill is a health concern for the much of the populace of Santiago, most critically for those who live closest to it and work within it. The Rafey landfill is 642,733 m^2 in size and though its projected lifespan endures through 2027, recyclers report it is nearing capacity (Ayuntamiento Municipio de Santiago 2014). Due to poor landfill management the smoke from frequent fires that is commonplace in adjacent communities sometimes reaches other sectors of Santiago. Extended exposure to landfill smoke increases risk of asthma and chronic obstructive pulmonary disease (COPD) and infectious respiratory disease (Carpenter, Ma, and Lawrence 2008, 205). A

2008 socioeconomic and cultural diagnostic report of Santa Lucía draws strong connections between prevalent ailments such as respiratory and skin illnesses and activities in the landfill. It claims the most frequent illnesses are respiratory and skin conditions. The report states the following as most salient health concerns.

> El impacto del humo, los ruidos, la basura, las aguas sucias, que circulan por la cañada, otras enfermedades son: presión arterial, estomacales, la gripe, de transmisión sexual, entre otras… La carencia de equipo de protección de los buzos y los trabajadores de las metaleras los hace venerables a las enfermedades (Auradou 2010, 33-34).

> (The impact of the smoke, noise, garbage, and dirty water that circulates in the gully [between Santa Lucía and the landfill], other health issues are: arterial pressure, digestive, flu, sexually transmitted diseases among others… The lack of protective equipment of the recyclers and the workers in metal shops make them vulnerable to these ailments.)

Air Pollution from the Rafey Landfill



Image 7. Smoke from the Rafey Lanfill is carried Northeast over the city of Santiago. Santa Lucía is the circular neighborhood visible closest to the landfill. (Torres 2013)

Logically, the recyclers who spend a significant part of each day in the landfill are the most acutely vulnerable to its perils. My research did not locate any in depth studies of health conditions of recyclers in Santiago however the health of recycler communities in other countries living and working in very similar conditions has been. A 2004 study of recyclers in Delhi, India compares a population of recyclers with a control population matched for age sex and socioeconomic conditions; a comparison of health data of nonsmokers among the study population and controls revealed higher prevalence of respiratory symptoms (94 percent vs. 56 percent) and lung function decrement (52 percent vs. 34 percent) in recyclers (Ray et. al. 2004).. Recyclers demonstrate almost twice the rate of infirmity of non recyclers (Ray et. al. 2004). Binion and Gutberlet in "The Effects of Handling Solid Waste on the Wellbeing of Informal and Organized Recyclers: a Review of Literature," categorize numerable critical health impacts by the following: chemical hazards, infection, ergonomic and musculoskeletal damage, mechanical trauma and emotional well-being (2012).

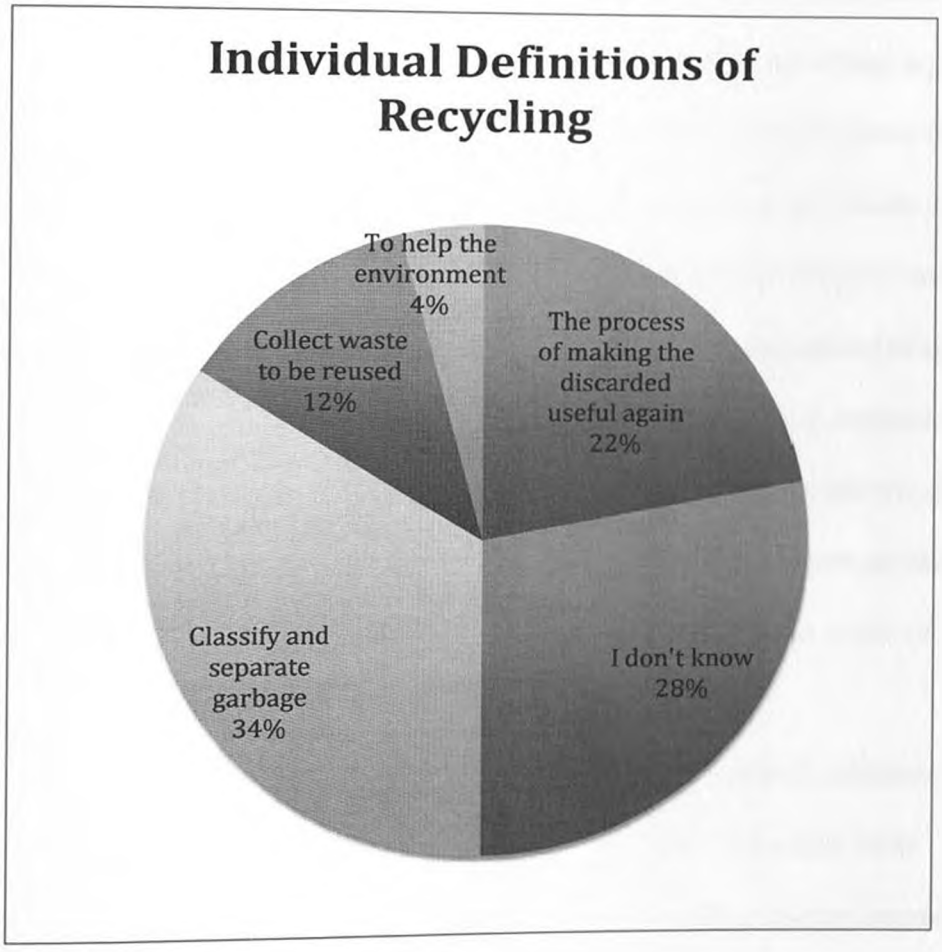
The cooperative is not necessarily a means or end product to alleviating all health issues but it can create place and space for recyclers. Binion and Gutberlet provide the example of the recycling cooperative *El Movimiento de Trabajadores Excluidos* (Movement of Excluded Workers) in Buenos Aires, Argentina. The cooperative has a social security network that provides health insurance to its recyclers via Argentina's workers union. Member recyclers of the union are also provided durable uniforms with reflective tape, free gloves and relevant vaccinations such as tetanus (Binion and Gutburlet 2004, 49).

Most cooperatives fit somewhere between this example and disorganized members of the informal sector. Though formalization by cooperation is not always the solution it can provide recyclers with access to otherwise unattainable services, such as health care.

RESEARCH RESULTS

The following data was collected via 50 interviews with community members in Santa Lucía, La Piña, and San Antonio.

Individual Definitions of Recycling



Graph 3.

To ensure that both researcher and respondent were on the same page, one of the first questions in the survey was; "*in your opinion, what does it mean to recycle?*" The most common definition given is; recycling is to classify and separate garbage. This is a

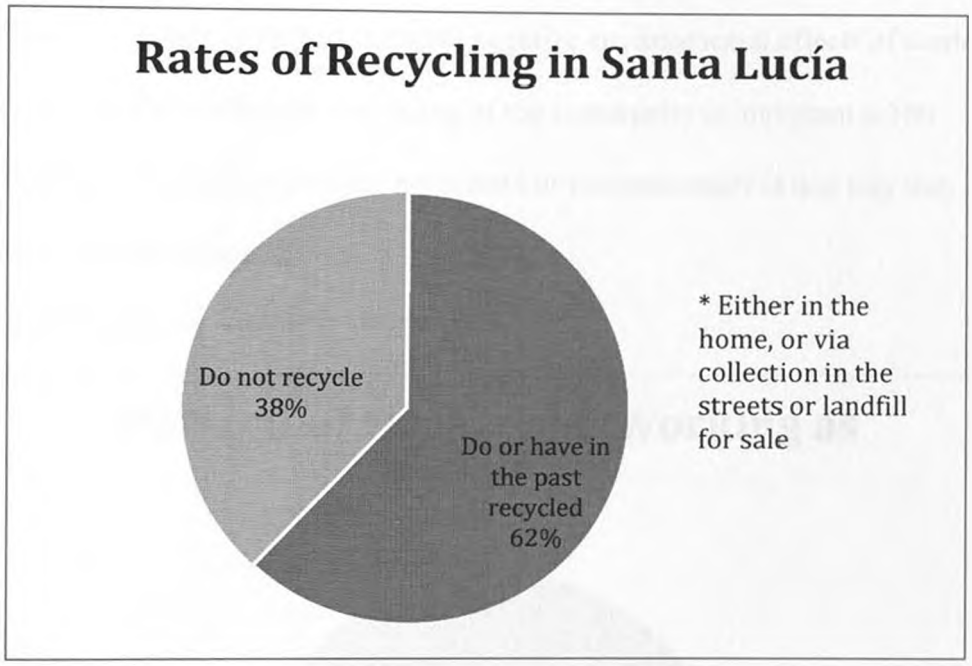
very logical definition for respondents as this is the part of the recycling process the recycler community is immediately involved in.

The second most common response to the question was "I do not know." In instances in which the respondent would respond this way, I would explain to the participant what recycling is as it was important for them to understand in order to respond to the rest of the questions of the survey. Often as I began explaining recycling they would recall what it was. Due to of the prevalence of the recycling industry in the one square kilometer that makes up the subject area I infer that these individuals are in fact familiar with recycling, however, they do not associate the word "recycle" with the activities they are familiar with, such as the gathering, separation, and selling of used materials, the process inferred by the word "recycling." One person even responded that they did not know what recycling was but then went on to say that they sold recyclable materials as their occupation. I attribute the high percentage of respondents not knowing to the definition of recycling to a discrepancy in terminology rather than a lack of knowledge about the actual process.

Though many people correlated "recycle" with the post-disposal activities of the recycling industry, through the research process I became more aware that while *reciclar* (recycle) has a connotation with emerging public recycling and environmental preservation campaigns, the words *bucear, recoger,* and *clasificar* (dive, collect, and classify) are more applicable to the post-disposal recycling industry in Santiago. The efforts of the Association of Recyclers of Eco-Park Rafey make explicit connections between the post disposal recycling industry and the protection of the environment, reconciling the discrepancies in understandings of the terms.

The third most common response is a more holistic explanation of the recycling process, which many (20 percent) participants understood.

Rates of Recycling in Santa Lucía

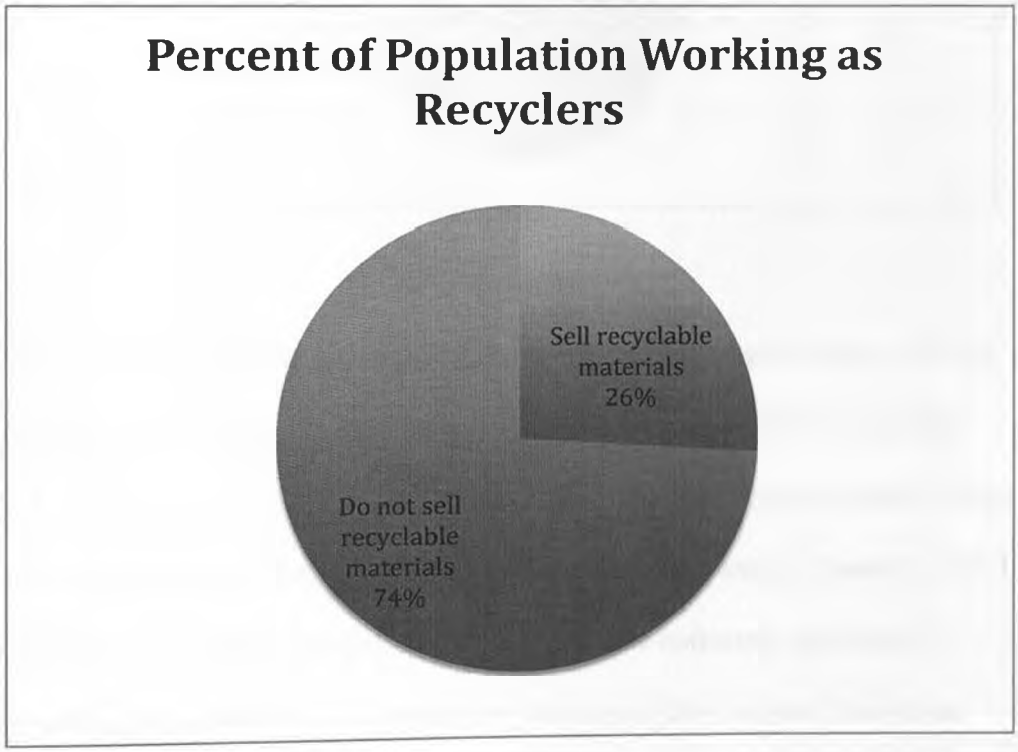


Graph 4

This graph refers to household recycling a well as recycling occupationally. Many people in Santa Lucía, La Piña, and San Antonio, do not work as recyclers but they separate their household waste for others to pick up and sell. 36 percent of the population recycles by keeping separate what they produce in the home but do not sell it. Based on informal observation this percentage is much higher in this sector of the city than it is in wealthier sectors further from the landfill. I attribute the correlation between high rates of recycling without financial reward to the proximity of the residences of the respondents to the landfill for two reasons. First, more than 1 in 4 people (see next graph 5) in their immediate community work as recyclers, the

individuals that do not, certainly have friends and neighbors who do thus, they give their recyclable material to them. Second, people in this community are among the most severely impacted by the environmental and human health impact of the landfill, as graph 10 shows, they recycle to help mitigate negative environmental effects of waste. My research shows the health and well-being of the community is important to100 percent of respondents, recycling in the household or occupationally is one way they can contribute to its promotion.

Percent of Population Working as Recyclers

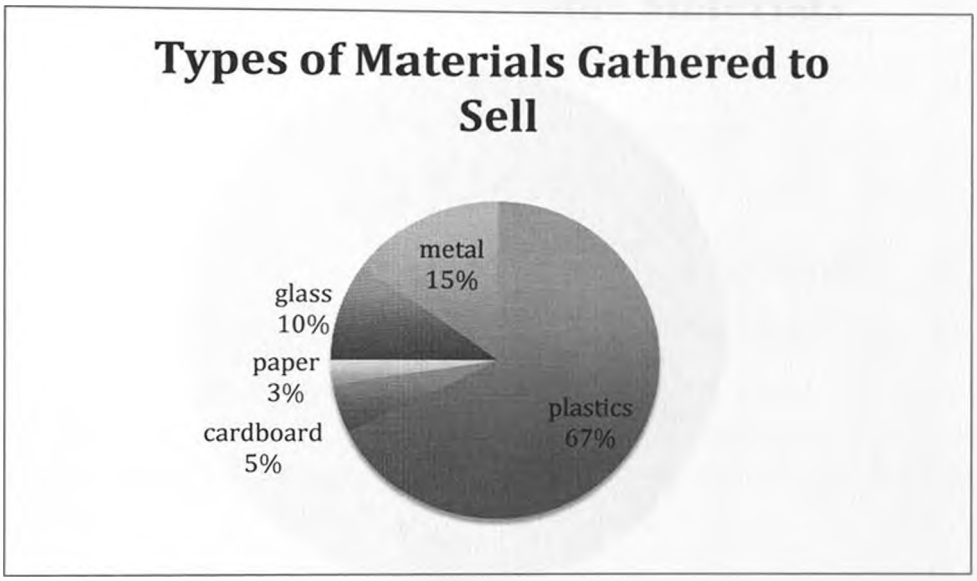


Graph 5

More than 1 in every 4 people in the area collects and sells recyclable materials or has at some point in the past. This is a very considerable and valuable part of the population. A quarter of the people in this population is well acquainted with the

realities of waste management and is not distanced from it at all. This data is very important as it demonstrates the prominence of recycling in the area.

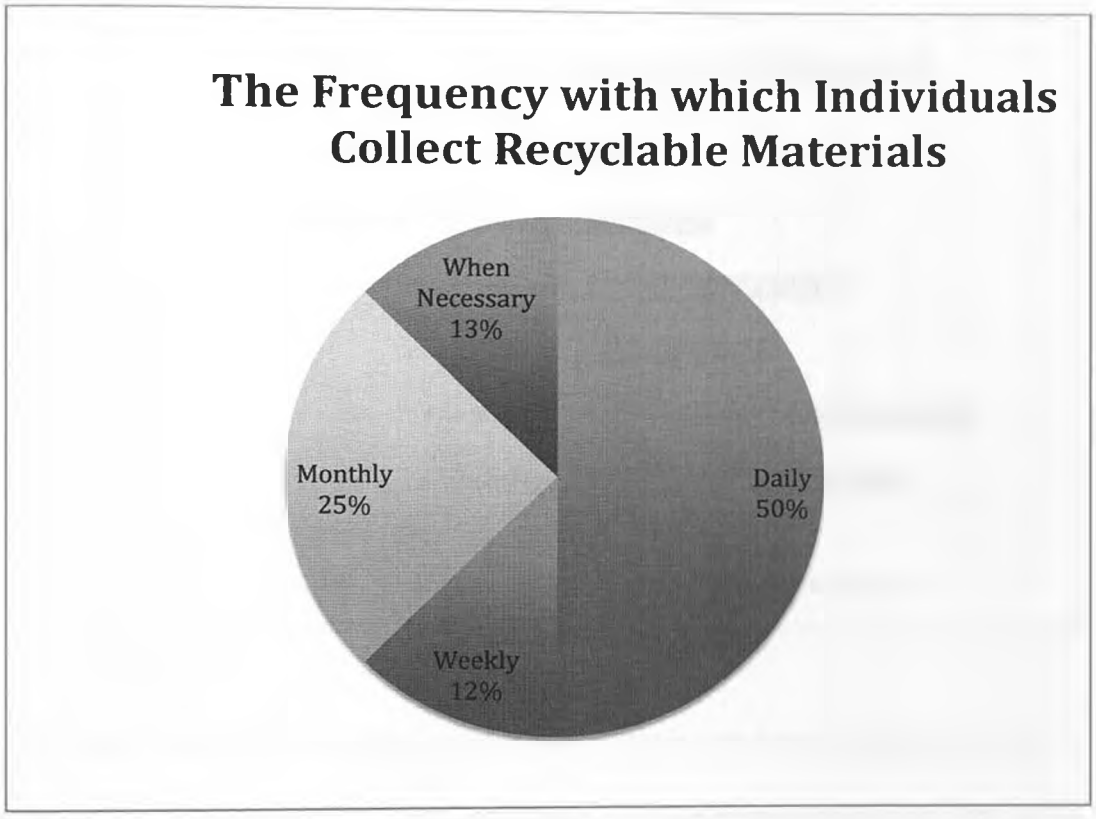
Types to Materials Gathered to Sell



Graph 6

Plastic is the most collected material, the most common types include: PET or PETE #1 plastic most often clear and common in drink bottles, HDPE #2, typically opaque and common in household cleaning products, and thicker types of plastic found in buckets and plastic chairs for example. Though composing a smaller quantity, metal is the most lucrative material. All forms of scrap metal are collected; appliances—especially washing machines—are desirable for the copper they contain. Individual recyclers generally focus on the collection of one material so as to be most efficient (Carbonell 2013).

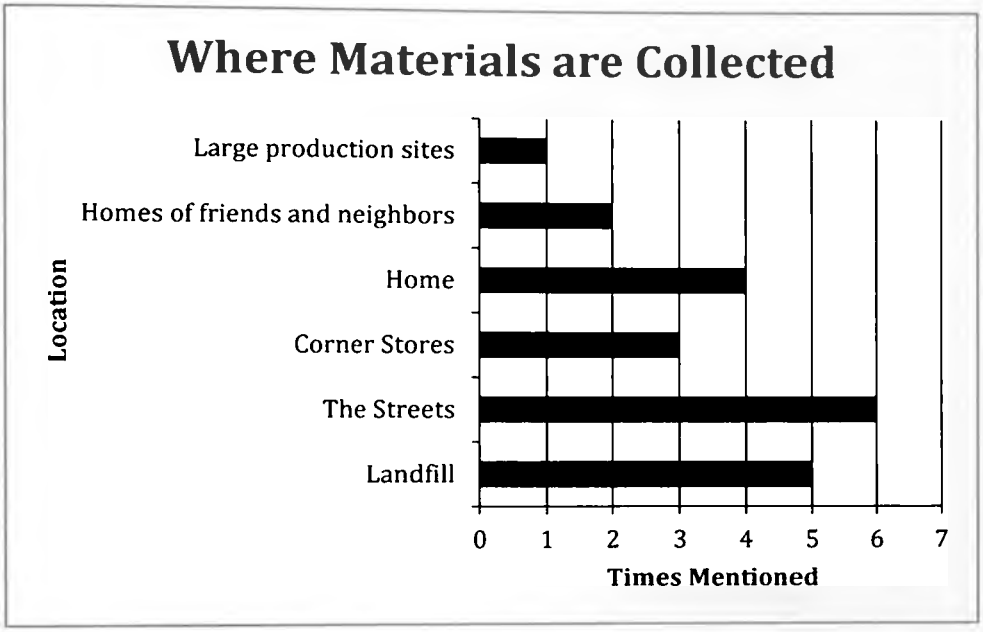
The Frequency with which Individuals Collect Recyclable Materials



Graph 7

Most recyclers work daily, some people who recover materials less frequently likely use recycling to supplement other forms of income.

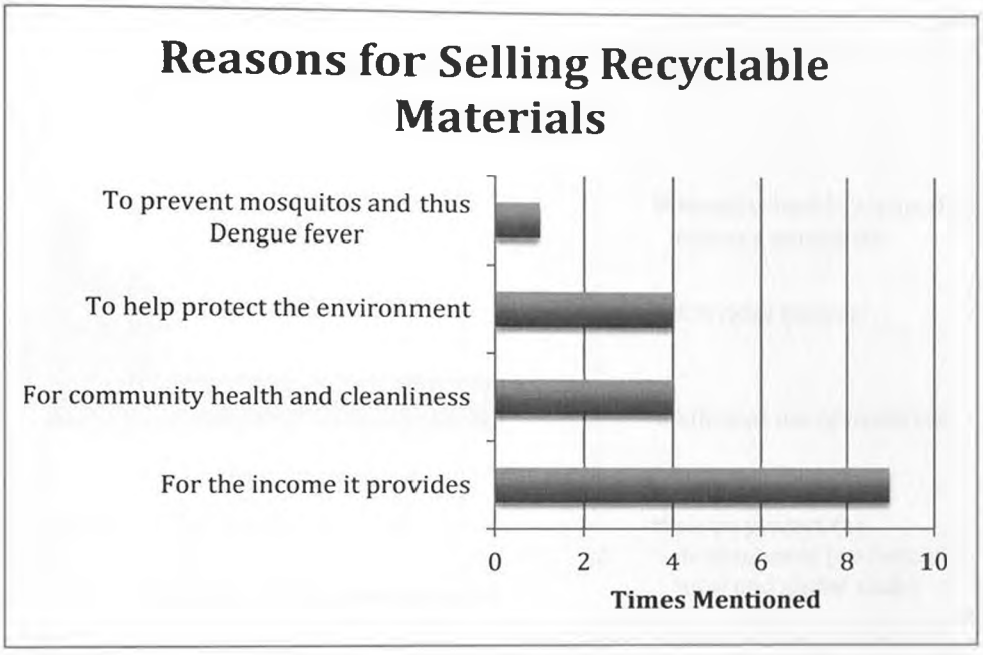
Where Materials are Collected



Graph 8

While many people collect materials from their own homes and others', the quantity for domestic sources is minimal and supplements larger quantities they attain either in the landfill or the streets (from dumpsters and informal dumping sites).

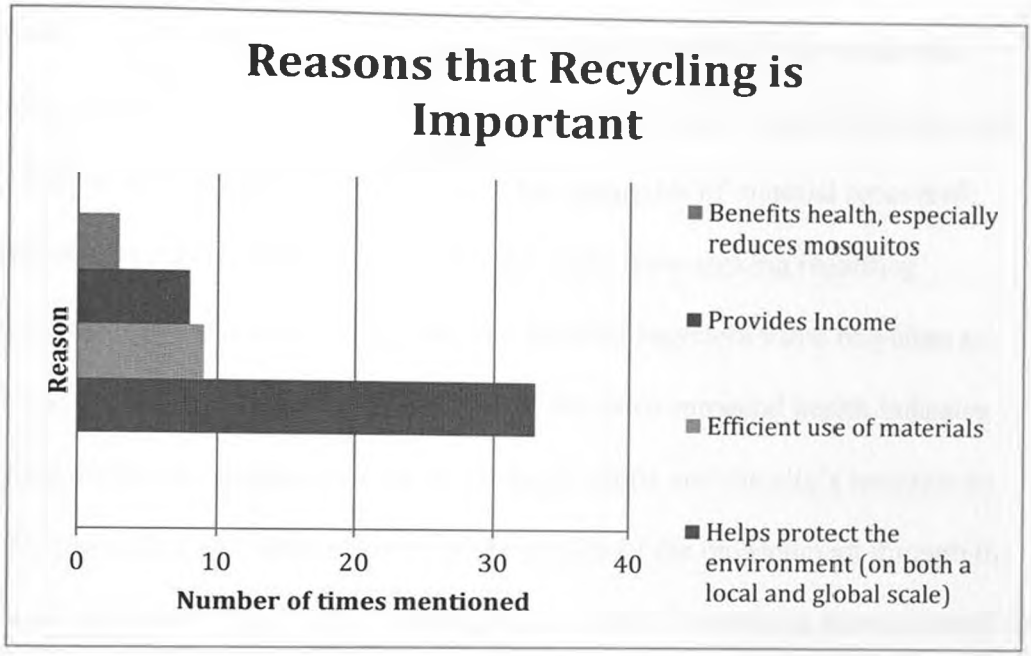
Reasons for Selling Recyclable Materials



Graph 9

It is undeniable that recyclers recycle for the money it provides them; informal recycling is based on economic incentive. This information came from responses to the question, "*why do you recycle?*" It is informative in consideration with the following question that asks more broadly, "*why is it important in general to recycle?*"

Reasons that Recycling is Important



Graph 10

This is the most important facet of my research because it demonstrates recyclers' awareness and consideration for the environment, which has been consistently overlooked in literature on recycler communities. It indicates that within the communities nearest to the landfill recycling is first and foremost valued for its contributions to environmental health. Recycling as a means of contributing to the health of the environment was mentioned more frequently than all other responses combined. It is also interesting to note that more people responded that recycling is important because it encourages the efficient use of materials than responded saying recycling is important for the income it provides. Though recyclers individually recycle for economic reasons (graph 9) they value their occupation for its protection of the environment and sustainable practices that it encourages.

Recyclers are not given credit for their awareness of their role in the bigger picture of environmental health and sustainable practices. In the academic discourse recyclers are often reduced to reflect only low rates of formal education and literacy coupled with statistics of low income and quantities of material recovered; hardly encouraging their inclusion in planning and decision-making regarding sustainable waste management initiatives. The fact that recyclers value recycling so highly for its contributions to community and global environmental health indicates recyclers are on the same page with environmental efforts and the city's intention to support the protection and improvement of the quality of the environment through the treatment of municipal solid waste. Recognizing recyclers' awareness should encourage their inclusion in decision-making processes and waste management systems.

Data Summary

Recyclers in the communities closest to the Rafey landfill prove that poverty and environmental awareness are not mutually exclusive. Santa Lucía, La Piña and San Antonio are communities where more than a quarter of the population work as recyclers, many of them incurring considerable health risks by going daily into the landfill to extract materials for resale in order to provide economically for themselves and their families. Though recyclers incur these risks in the landfill or social stigma while recycling in the streets as they extract mostly plastics as well as cardboard, glass and plastic, they do not exist in a vacuum of ignorance and poverty as they are often portrayed to, they understand the impacts of unsustainable waste management, in fact they live beneath its plume.

CONCLUSION

One small part of the planet-encompassing commodity chain, the recycler community of the Rafey landfill in Santiago is taking relatively big strides toward efficient resource utilization and sustainable waste management. Increasing production of waste as a result of industrialization and the trends of urbanization and immigration intrinsically linked to it, in conjunction with the large population of urban poor excluded from modern wage jobs in the formal sector compose the recipe for the recycler community. Prompted by economic necessity and using ingenuity and the available resource of municipal solid waste, recyclers form an important niche of the informal sector contributing to society economically as well as via protection of the environment.

Waste management is not just a corporate social responsibility or a non-priority service. Unsustainable waste management is a public health and environmental crisis, economic loss, operational inefficiency and political and public awareness failure. Though invisible to most, especially in the more developed world, unsustainable waste production and management lie at the epicenter of two of the planets most pressing challenges today: climate change and the impending exhaustion of natural resources. Unsustainable waste management results in the squandering of recyclable materials made of natural resources in landfills rather than their utilization via recycling, which embodies efficiency and conservation. Landfills are also a significant contributor to greenhouse gas emissions and thus to global warming. Though practically every individual on earth participates in some degree to the production of waste—residents of more developed countries to a higher degree—for most people once a commodity

looses value to them and become waste a critical disassociation occurs. People no longer feel responsible for the material they consume and produce once it is classified as waste. This disassociation is important because it explains the apathy most people have to issues of waste management.

The disassociation between most people and the consequences of their consumption and disposal decisions is referred to as "waste distancing" and occurs along four axes (geography, culture, bargaining power and agency). Waste distancing is one reason recycler communities should be important contributors to the discourse on waste management solutions; recyclers are not distanced from waste on any axis and thus understand fully the implications of unsustainable waste production. The recycler community in Santiago suffers persisting lung and skin infection among other health issues due to their proximity to waste and constant contact with polluted air. Unlike the majority of the population comfortably distanced from their waste, recyclers—encouraged by the daily challenges it imposes—recognize the impact they can have by altering disposal practices.

Though members of the communities closest to the Rafey landfill recycle for the much-needed income it provides, community members value recycling more for its contributions to environmental health. Seemingly minor, this information could have important influence on the future inclusion of recyclers in the waste management discourse. Recyclers are an invaluable resource for the reconsideration and reform of the waste problem for three primary reasons: 1) Unlike most decision makers involved in production or waste management, recyclers are a minority of the population not disassociated from and made apathetic to, their own contribution to the waste problem.

Recyclers are aware of the issues as well as are confronted with their implications and thus are encouraged to participate in change. 2) In addition to the rare perspective they bring as a non-distanced population, recyclers in Santiago value recycling highly for its contributions to environmental health and the sustainable use of materials. This is a little known and potentially powerful commonality between recyclers and more powerful actors such as environmental entities and more specifically to the Santiago situation, the local government. 3) Lastly, and most specific to Santiago, recyclers form an already functioning system of resource recovery. Were recyclers to have a more collaborative relationship with the local government, that manages the landfill and contracts private companies for waste-collection, both recyclers and the municipality would benefit.

Nevertheless, a better understanding of the recycler population is a first step toward improved collaboration. Most literature that exists inadequately represents recyclers in one of two ways: either it is quantitative and considers only the crude amounts of waste recyclers process, or second, several documentaries about recyclers make an emotional plea for recyclers and in order to do so usually emphasize hopelessness and negative condition of recyclers. Though the second form gives recyclers more voice it does not represent them as adequately intelligent or capable. Through this thesis I hope to have represented recyclers accurately as invaluable and cognizant agents in the efficient function of a sustainable waste management systems and as sources of a vital and unique perspective to be considered in future plans to address the planet's waste problem as it contributes to climate change and impending natural resource exhaustion.

RECOMMENDATIONS

I do not suggest the complete formalization of the informal recyclers. However, consideration of other successful Latin American recycler cooperatives and some of the current challenges in Santiago—for example regarding access to waste and taxation on extracted material—suggest an increased level of organization could prove mutually beneficial for recyclers and the municipality. It is difficult to conjecture on the exact measures that should be taken to ensure success in this collaboration without direct communication with the three most integral parties: the municipality of Santiago, the Association of Recyclers of the Rafey Landfill, and non-associated recyclers.

In effort to both learn from past experience as well as consider current dynamics I recommend continued partnership between the Association of Recyclers of the Rafey Landfill and the *Red Latinoamericano de Recicladores* (Latin American Network of Recyclers (RedLacre)). It is important that in conjunction with this partnership constant consideration for forces that make Santiago's waste management system unique is maintained.

The Global Alliance of Waste Pickers is a networking group between recycler organizations across the globe. It holds global meetings at which recyclers can share ideas and innovations, with the goal of raising visibility of recyclers' work and their difficult circumstances, and make the point that they must have rights and respect. This kind of organization on an international level is key to the cooperation of recyclers and to their consideration and inclusion by other important actor groups in the waste management system.

Through initiatives such as the Global Alliance of Waste Pickers, and the organization and participation of local associations like the Association of Recyclers of Eco Park Rafey, recyclers have the best chance of being heard and respected by governments, environmental ministries, producers and consumers.

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