

THROUGH GARBAGE

CHANGING MINDS AND HEARTS



Albina Ruíz Ríos, César Zela, Manuel Pajuelo,
Paloma Roldán Ruíz, José Carlos Rodríguez



**FROM WASTE,
CHANGING MINDS AND HEARTS**

Ciudad Saludable

Authors: Albina Ruíz, César Zela, Manuel Pajuelo, Paloma Roldán y José Carlos Rodríguez

Prologue: Luis Díaz

Coordination: Galo Flores

Editing into English: Monica Taurel

Coordination of the English edition: Jorge Rochabrunt

Photographs: Ciudad Saludable, Galo Flores

Ciudad Saludable

Av. Ernesto Diez Canseco 442, Of. 1001, Miraflores, Lima 18

Phones: 4466323 / 4466358

www.ciudadsaludable.org

First Edition

Quantity: 1,000 ejemplares

Copyright © 2009

ISBN: 9789972993695

Catalogued in the National Library of Peru Number: N° XXXXXXXXX

Layout and Publication:

Gama Gráfica S.R.L. Telf.: 4702143

gamagrafica@gmail.com

Jr. Riso 560 - Lince

Lima, December 2009



9789972993695

Índice

Prologue	05
Introduction	07
Chapter 1	
Waste in Peru, Progress and Challenges	09
1.1 Progress in the Municipal Enforcement of the General Law of Solid Waste Management	11
1.1.1 Waste Minimization	12
1.1.2 Comprehensive Solid Waste Management Plans - PIGARS	14
1.1.3 Community Participation	16
1.1.4 Registration of EC-RS's and EPS-RS's	18
1.1.5 Municipal Waste Management Laws	23
1.1.6 Municipal Capacity	26
1.1.7 Treatment and Final Disposal	31
1.1.8 Rates and Fees	37
1.1.9 Growth of Cities within the Country	49
1.1.10 An Estimate of Solid Waste Generation	57
1.2 Reflecting on the Context that Hampers or Facilitates Progress	60
1.2.1 Political Will	60
1.2.2 CONAM – Ministry of the Environment	62
1.2.3 Elements of Municipal Management	66
1.2.4 Investment in Infrastructure for Disposal and Treatment	72
1.2.4.1 In Large Cities	72
1.2.4.2 In the Majority of Cities and Districts within the Country	75
1.2.5 In Collection and Street Cleaning	77

Chapter II

Invisible Actors:

“Recyclers”, the Public Value of their Investment 79

- 2.1 Recyclers in Peru 83
 - 2.1.1 History and Testimonials 83
 - 2.1.2 The Work They Do 88
 - 2.1.3 Socio-Economic Characteristics of Recyclers 89
- 2.2 Where is the Work of Recyclers Headed 92
 - 2.2.1 The Recycling System 92
 - 2.2.2 The National Public Sector 101
 - 2.2.3 Municipalities and Formalization of Recyclers 106
 - 2.2.4 Towards an Entrepreneurial Organization 108
 - 2.2.5 Selective Collection in Homes and Businesses 109
 - 2.2.6 Tools to Promote the Work of the Recyclers 115

Chapter III

Environmental Education and Solid Waste Management 121

- 3.1 Our Educational Model 123
- 3.2 Formal Education 126
- 3.3 Community Education 129

Chapter IV

Experiences with Waste and Social Inclusion of Recyclers 131

- 4.1 National Association of Colombian Recyclers - ANR 133
- 4.2 National Movement of Peruvian Recyclers (MNRP) 136
- 4.3 Villa El Salvador: The Green Voucher Program 140
- 4.4 National Association of Colombian REcyclers-ANR 141
- 4.5 The National Movement of Peruvian Recyclers (MNRP) 145

Chapter V

Other Alternatives for the Reuse of Waste 151

- 5.1 Anaerobic Digestion 154
- 5.2 Our Program 155

Chapter VI

Principal Challenges 159

- 6.1 For the Improvement of Solid Waste Management 161
- 6.2 For the Social and Economic Inclusion of Recycler 163

Prologue

Around the globe the urgency of environmental protection is progressively being brought to the forefront. Community leaders and residents alike are increasingly becoming aware of this grave fact. People are demanding unpolluted air, water and soil conscious of the fact that this will greatly improve the quality of their lives.

In the midst of this situation municipal solid waste management has attracted a great deal of attention and in view of its incredibly complex nature it has become a great challenge for a vast number of public and private entities.

Solid waste management draws from the knowledge and experience of several fields such as: education, sociology, finance and engineering, to mention a few. Solutions to solid waste management problems in developing countries differ from those in developed countries. During the search for appropriate solutions I've had the pleasure of working side by side with members of *Ciudad Saludable* years before the organization itself was incorporated. Since working with USAID to create small collection and recycling businesses in the suburban communities of Lima up to when I organized the international course "Design, Operation, and Closure of Sanitary Landfills: Modern Approaches" with DIGESA (The National Directorate of Environmental Health) and CONAM (The National Council on the Environment) with my colleagues at the International Waste Working Group (IWWG), I have witnessed the passion and dedication of my colleagues at *Ciudad Saludable* in trying to solve solid waste problems. Not everyone who is involved in solid waste management shares such a passion and dedication. People who have attended my workshops

may have heard me say: solid waste management is a “dirty” business. The *Ciudad Saludable* team knows no limits and adheres to rules and requirements that do not offer material compensation but rather are driven by the pleasure of knowing that they have helped to improve the quality of life of thousands of citizens.

A couple weeks ago a reporter from a developing country asked me, “Based on your experience, could you recommend three actions that could improve solid waste management?” I answered, “Yes, education, education, and more education.” *From Waste, Changing Minds and Hearts*, is part of that education effort and I am convinced that it will help improve solid waste management in Peru.

Dr. Luis F. Díaz

President, CalRecovery, Inc., USA

Coordinator of International Activities IWWG (Italy)

Introduction

Ciudad Saludable was created in November 2002 and ever since has been devoted to environmental management particularly solid waste management, the economic and social inclusion of waste recyclers, and more recently, the research and development of clean technologies.

Our first goal focused on implementing pilot projects in the desert, highlands and jungle (the three geographic regions of Peru) in order to put into action the process outlined by the General Law of Solid Waste, a challenge in a country where leaders are all too often involved in endless discussions concerning proposals that never get off the ground, confuse the media, and stave off the public from services which the government should provide.

Now that the founders of *Ciudad Saludable* have accrued 20 years of experience in solid waste management and after six years of experience in the field as an organization we are proud to claim very promising results. We have humbly received international and national awards on behalf of each and every recycler, community leader, teacher and student, municipal authority and worker, businessman, and international aid organization that contribute their creativity, energy and dedication to enhance the conditions of every day living of the dwellers in their communities.

We realize that these awards oblige us to improve our interventions by being accountable and transparent. The many challenges we

face ahead prompt us to cope with them as best possible and manage moments of happiness, sadness, achievements and frustrations fully convinced that tomorrow will be better than yesterday.

Our dynamic, front line organization aims at linking activities of communities, districts and regions by advocating public policy at different levels of government; fundraising for pilot projects and developing investment programs at the request of governments and private businesses to secure a broad coverage of benefits. We constantly upgrade our strategies and develop initiatives to sharpen the skills of key stakeholders who envisage a better future.

Our strategic partners encourage us to do our best, for example Ashoka. Sometimes people ask how much money do our partners provide us with to do the job and we answer that they give us much more than money can buy. They give us a seal of quality, as social entrepreneurs who are a part of a family of hundreds of other passionate people like us who are convinced that the world can change and that each and every one of us can truly make a difference. Another partner of ours is AVINA, an organization that fosters leadership as a tool for social change. The Schwab Foundation has also helped to place us in the spotlight of the World Economic Forum and, in 2006, the Skoll Foundation challenged us to expand beyond the borders of Peru since our model is valid and can be duplicated in other developing countries. Unfortunately, bad solid waste management is a common problem in many countries.

In these past three years we have attracted new international and national partners. It is impossible to mention them all since they are numerous; however we wish to express our deep gratitude to them.

Chapter I:

Waste in Peru,
Progress and Challenges

1.1 Progress in the Municipal Enforcement of the General Law of Solid Waste Management

The General Law of Solid Waste¹ was enacted on July 21, 2000 and is a landmark achievement since it specifies the responsibilities of public institutions and defines key principles such as minimization concerning the subject. This initiative, spearheaded by DIGESA, received support by CONAM, the SPDA (Peruvian Society of Environmental Law) as well as other institutions and experts. This undoubtedly huge task has been accomplished through the help of Eugenio Bellido (Q.E.P.D.), Director of DIGESA's Basic Sanitation Office.

Before this law, solid waste management was governed by the following health sector laws (D.S. N° 6-STN 9/11/64 on waste disposal in sanitary landfills; D.S. N° 013-77-SA 29/11/77: on the recycling of inorganic products; D.S. 033-81-SA, and DS 037-83-SA 28/09/73 on urban sanitation. Other Ministries also issued additional regulations aside from municipal ordinances. These laws overlapped the responsibilities of a number of public agencies. They were fragmented, had no common frame of reference and were outdated since they lacked a preventative, comprehensive and well-articulated approach and furthermore neglected fostering an active role by the private sector.

Eight years have elapsed since the General Law of Solid Waste has been enacted and we would like to share our thoughts on the problems and progress so far regarding its enforcement based on our experience working with civil servants and municipal authorities as anonymous leaders who devote their time and efforts to build healthier cities.

¹ An important predecessor of the law was the Sectoral Solid Waste Analysis published by DIGESA in 1998 with the support of CEPIS.

1.1.1 Waste Minimization

One basic principle at the international level included in the General Law of Solid Waste is minimization which aims at reducing the amount and hazard of waste. Information relating to educating and training the public on the subject is mentioned. "Healthy bags" or cloth bags as well as biodegradable bags have been promoted by supermarkets to carry bread (evidence of their good intentions which really is their obligation). We are still in the beginning stages of a long process.

The questions raised are: Why has something as easy as using a cloth bag to buy bread, which used to be the norm, not been continued, widely adopted or become popular again? How can we all become socially and environmentally responsible consumers? This not only has to do with the amount but also the type of waste we produce.

On the highway from Piura to Sechura the landscape is barren with the exception of carob trees festooned with dozens of multi-colored plastic bags which can be seen for miles along route. Likewise, millions of residents of Lima who travel down highways on sunny summer days can spot hundreds of plastic bags floating on the shore and beaches. Unfortunately, these unsightly landscapes are no exception since they are common throughout the three regions of Peru.

Questions are always raised about why so much money is spent on keeping our streets clean and the answer is because people are careless and litter. Streets are full of garbage, an ugly sight, and nobody cares about its impact on public health or the cost of waste collection. Such neglect is evidence of the public's widespread disdain and irresponsibility towards a clean and tidy environment.

Waste knows no bounds, litter is thrown out of posh BMW's or Mercedes Benz's in residential San Isidro as well as from motorcycle taxis or mini-busses in more popular districts such as Huaycán or San Juan de Lurigancho. The difference is that while the District of San Isidro has the means to contract a public waste management service (waste on Av. Pezet is rapidly disposed of), garbage dumped on 15 de Julio Avenue in Huaycán can stay there for days on end, even weeks.

How much has the state invested at the national, regional or local level to change the attitude of residents and business leaders to act responsibly? The answer is, a pittance! However, some good initiatives, such as radio spots broadcasted by the regional government of San Martín are encouraging residents from refraining to litter public spaces. Provincial and district municipalities post messages on public signs and walls located in central areas of the city to keep the city litter free.

D.L. 1065-2008 that refers to Law 27314 mandates the shared responsibility of integrated solid waste management from start to finish, for instance waste from businesses that produce, import and sell mass consumer goods producing huge quantities of potentially hazardous waste. Some large businesses of the mining sector are also the culprits in addition to companies that sell computer equipment and supplies.

However there are also certain isolated initiatives that recover or recycle the waste of packages and work in conjunction with schools. However these are not examples of integrated waste recycling proposals.

The question yet to be answered is, "Which state entity will be in charge of promoting and providing incentives for good business practices?" Waste initiatives are only part of the social marketing

strategies of some companies. In many cases they altogether avoid this problem and are unwilling to include waste management in their overhead. It is of the essence to make waste management more visible, so that the public at large may understand the implications, and to evaluate how the regulatory actions of the State and the ethical behavior of companies can contribute to creating an environment of good civic behaviour.

1.1.2 Comprehensive Solid Waste Management Plans - PIGARS

The General Law of Solid Waste entrusts CONAM with promoting the creation of PIGARS. CONAM has undertaken a number of actions such as the publication of the Guide to Create PIGARS and has provided training courses for a broad number of municipal authorities all over Peru. NGOs, such as Ipes, Ecocidad, Alternativa, OACA (today Grupo GEA) and Ciudad Saludable, have also helped municipalities to devise their own development plans.

Despite these efforts provincial municipalities are still not convinced about their responsibility in complying with Law 27314 which specifies that provincial municipalities of Peru have “one year to create, approve and publish their waste management plan”. Seven years later, barely 50 provincial municipalities out of a total of 195 in Peru have complied and created a PIGAR. This represents barely 25% of the total provincial municipalities.

The question is, why have the other 145 municipalities not met their obligation yet? Which public agency should be monitoring this activity? What is the penalty for non-compliance by municipal authorities? Why are these municipal authorities giving the public such a bad example of citizenship? As concerns the plans submitted to CONAM, Up to what point are the needs of local inhabitants really taken into account? Should there be baseline

studies that substantiate such proposals “have they been approved by the community and are the corresponding budgets based on the PIGARS framework?”

Despite the fact that the PIGARS do not directly solve the problem of improper waste management in urban settings, they nonetheless are the first step in understanding the situation and therefore are the basis upon which to establish objectives, goals, actions in order to estimate the resources needed to bring about a significant change. While some municipalities have approved a PIGARS, quite a few have not earmarked funds in their annual budgets to improve their solid waste management.

If this is what is happening at the level of provincial municipalities, it is easy to imagine what is going on at the level of district municipalities, since the law mandates that district municipalities must set up their district solid waste management plans based on the guidelines of provincial PIGARS. Fewer district municipalities have management plans than provincial municipalities.

An intense campaign should be launched to prompt all provincial municipalities of Peru to create their PIGARS which would in turn encourage district municipalities to create their own waste management plans. Obviously this is feasible if authorities agree that waste management is a top priority issue and have skilled workers to do the job or have reached agreements with other institutions and professionals to join in this crusade. The Ministry of Environment could dispatch a team of professionals to provide technical assistance and help revise the PIGARS that have been created.

1.1.3 Community Participation

Title VI of the General Law of Solid Waste refers to community participation. However, the ideas proposed in this chapter have yet to be fully developed. The advisory mechanisms to effectively guide the participation of individuals or civil society organizations have not been created. In practice, civic participation solely depends on the political will of authorities and civil servants in office.

In order to properly promote civic participation the social situation needs to be examined such as the degradation of social organizations, the predominance of individualism and the apathy of the public with regard to environmental problems. On the other hand, municipalities have interpreted civic participation as the support of local residents in clean-up campaigns or recycling programs, but public opinion is hardly taken into account for the approval of such plans, programs and projects. These activities include monitoring and evaluating the implementation of solid waste management initiatives.

Few civil society organizations have solid waste management experience. The most dynamic organizations in communities, such as mothers' clubs, school breakfast committees or community soup kitchens are very active and meet on a regular basis. Solid waste management should be included in their institutional agendas and specific actions should be developed with their help.

With respect to this subject, the Zonal Committees of Comas² are an interesting example. Each neighborhood association in the district has an environmental delegate. *Ciudad Saludable* trained

² The district of Comas is located in Northern Lima only 30 minutes from downtown Lima.

the environment delegates in 14 areas of the district and gave them the tools to support the Neighborhood Environmental Watch Committees. Years later these committees are still active mainly because of the leadership and activism of local leaders and municipal authorities.

In order to ensure that these organizations embrace and commit to this subject their leaders must be trained as neighborhood promoters to encourage a change of behavior. These promoters could start by practicing new habits in their neighborhoods such as cleaning their front yards, classifying and separating garbage by type in their homes, making timely payments for public waste disposal services, etc.

Recently, municipal waste collection programs are providing new spaces for civic participation thanks to the daily practice of waste separation at the source. Some cities and districts in the following regions have already started to do so: Piura (Piura, Catacaos), Ancash (Carhuaz, Huaraz, Huarmey), San Martín (Moyobamba), Chíncha (San José), Arequipa (Caylloma), Coronel Portillo (Pucallpa), Callao (Callao, La Perla) and in Lima (Villa El Salvador, Comas, San Juan de Miraflores, Villa María del Triunfo, Cerro El Pino – La Victoria, amongst others).

More funds must be allocated for education and local governments must provide transparent information about payments for public garbage collection services to promote citizen participation in favor of waste collection. The public needs to know how much is spent on public services? How much is the service fee? How many people pay the fee? Furthermore, residents who comply with payments on a timely basis and practice garbage classification and separation at home should be given special incentives.

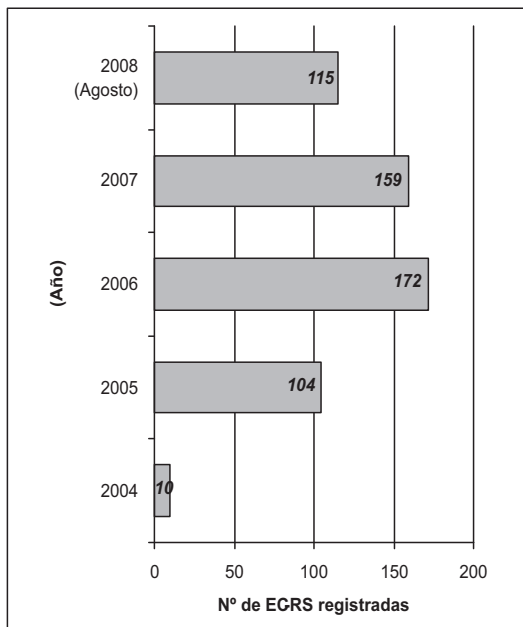
Tax exonerations should be reviewed since they exclusively benefit “bad” neighbors who do not pay on time and are indifferent to municipal management efforts. Therefore, civil servants must be more creative and innovative in the area of tax administration. For instance they could change the municipal ordinances by creating incentives for good environmental practices and good neighbors.

Local governments should set up Municipal Environmental Commissions (CAM) composed of community organizations, the private sector and technical solid waste groups in order to make joint decisions, to implement and monitor the PIGARS and the district solid waste management plans.

1.1.4 Registration of EC-RS's and EPS-RS's

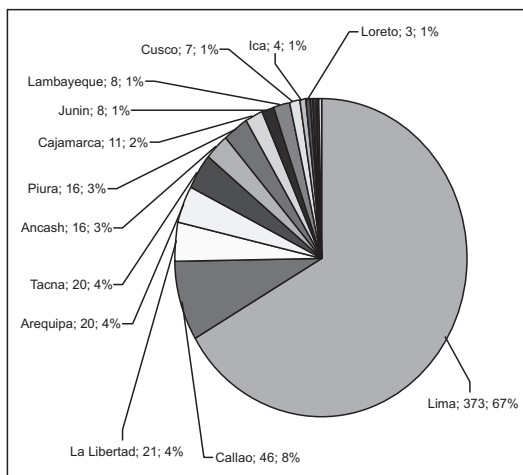
The General Law of Solid Waste created a sellers registry (EC_RS) and solid waste service providers (EPS_RS) and delegated this function to the National Directorate of Environmental Health (DIGESA). Once this registry was created, from 2004 until August 2008, DIGESA has registered 560 EC-RS's and 250 EPS-RS's. The chart presented below describes the evolution of this registry and the regional distribution of the participants.

Solid Waste Vendors Registry (2004 - August 2008)



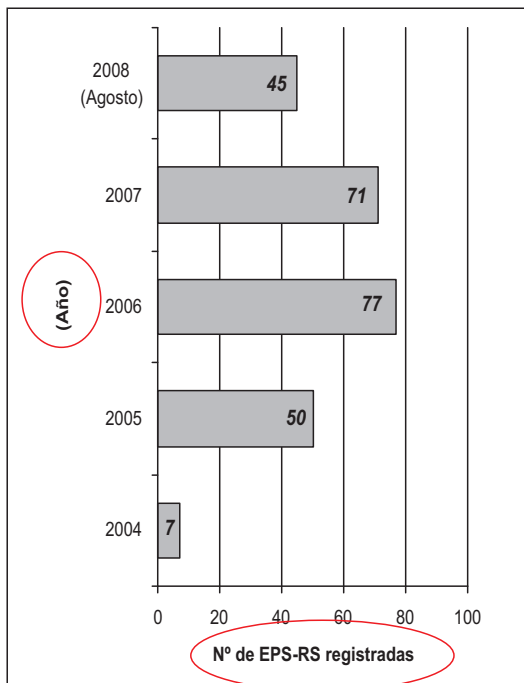
Source:
National
Directorate of
Environmental
Health
(DIGESA) –
Sept 08.

Regional Distribution of Solid waste Vendors



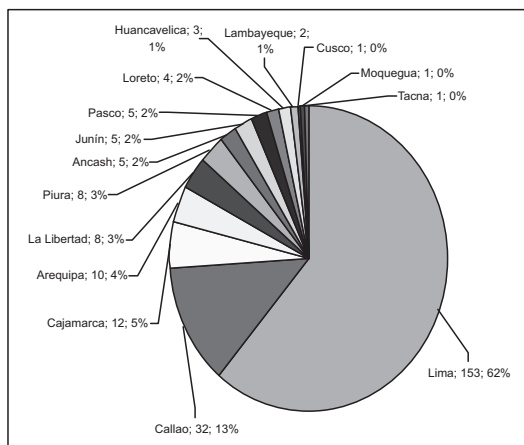
Source:
Environment
al Health
Department
(DIGESA) –
Sept 08.

Registry of Solid Waste Service Providers (august 2004 - 2008)



Source: Environmental Health Department (DIGESA) – Sept. 08.

Regional Distribution of Solid Waste Service Providers



Source: National Directorate of Environmental Health (DIGESA) – Sept. 08.

Article 42 of the law specifies that if one third of the population is dissatisfied with the services provided by an EPS that this is considered as grounds to terminate the contract. However, communities and municipal authorities are hardly aware of this fact.

A competent party should monitor, investigate and inspect these businesses to make sure that they are properly registered and to guarantee that they are operating adequately. Civil society has made itself heard particularly in one case, such as the SPDA³ that filed suit against the operation of an EPS managed dump in Iquitos, and another EPS's that collected outdated medicine and sold it thereafter in the "Hueco" (a large market in Lima). Regrettably the examples abound and investigative action is extremely weak and limited in scope.

Technical assistance is direly needed to help these businesses comply with the law. Informal storage spaces are used to sell solid waste and create unfair competition to waste separation programs at the source and selective collection implemented in many districts in Peru, such as in Villa El Salvador, Villa María del Triunfo and San Juan de Miraflores. These areas have thriving informal solid waste operations and some residents who had initially participated enthusiastically in waste separation now prefer selling their waste directly to these informal businesses. This has affected the income of the formal recyclers, who along with municipalities have invested time and money in training residents.

In view of these circumstances we have repeatedly mentioned that the State through DIGESA or another entity must organize a team of professionals in charge of assessing these storage spaces and to eventually formalize them as an EC-RS. Just as the State retains

³ Peruvian Society of Environmental Law (SPDA).

attorneys as public attorneys for defendants who are unable to pay for their own legal council, the state could also invest in stimulating and formalizing the solid waste sector, creating more job opportunities and improving environmental protection.

Another legal controversial issue concerns the fact that a sanitary engineer must sign the EPS-RS technical specifications in order to register before DIGESA. Each engineer can only sign off on three businesses. However, there are not enough sanitary engineers in Peru for this purpose and the demand is even higher in the field of water and sanitation that pays higher wages. Besides, a sanitary engineer is no guarantee of expertise on this topic. Upon reviewing the curriculum of this specialty area at the State University of Engineering or *Universidad Nacional de Ingeniería* – UNI and at the State University of Santiago Antúnez de Mayolo – UNASAM they barely have one elective course on solid waste.

The law often favors special interests and does provide for a solution to the problem. Fortunately, Legislative Decree 1065 solves this problem and qualifies the General Law of Solid Waste 27314. In effect, Article 27 of this Legislative Decree specifies that in order to provide solid waste services the EPS-RS “must have a sanitary engineer or another professional engineer with a major or experience in solid waste management...”

One interesting proposal involves providing technical assistance to the Recyclers' Associations, which are increasing in number each day, in order to enable them to register as an EC-RS, have appropriate storage spaces, operate in a sanitary manner, and sell waste that they directly collect to recycling or exporting businesses as a means of livelihood and therefore improve their standard of living.

1.1.5 Municipal Legal Framework for Solid Waste Management

Article 80 on Sanitation, Health and Hygiene of Law 27972 on the Organic Law of Municipalities determines the responsibilities of municipalities with regard to solid waste management. Waste services are one of the few areas directly related to residents. When a city is dirty and full of litter and garbage residents often remark that the mayor is not doing a good job. Even residents are clearly aware of the fact that the municipality is in charge of this service.

Law N° 27314 General Law of Solid Waste and its enabling clauses under D.S. N° 057-2004-PCM, and Legislative Decree N° 1065 that qualifies Law 27314, June 28, 2008, states that municipalities are responsible for the management of household and commercial solid waste and other types of waste generated within their jurisdiction.

July 24, 2005 was the deadline specified in the D.S.054-2004 for provincial municipalities to plan and approve a municipal solid waste management in accordance with Law 27314 and its respective regulations. Unfortunately, in spite of all the efforts made by CONAM to establish the “Guidelines to Create Ordinances for Solid Waste Management”, there are much less provincial municipalities with this legal apparatus in place than those with a PIGARS.

Yet again we witness the lack of investment to control and monitor the enforcement of laws passed in Peru in addition to the scant attention paid by municipal authorities and civil servants to these instruments or to solid waste management. Peru still has some municipalities that do not manage solid waste within their

jurisdictions and as a result dwellers dispose of garbage as they please thus creating public health problems where they live.

Law 29263 that amends several articles of the Criminal Code and of the General Environment Law approved on September 28, 2008 and that entered into force as of January 1, 2009 have promoted more awareness about this problem.

Two articles are directly related to the topic of this publication and should be made known to the public in order to demand enforcement:

Article 306°.- Non-compliance of solid waste management laws. Anyone who without authorization or approval from the competent authority establishes an informal solid waste dump site that may have a harmful affect on the quality of the environment, human health or ecological processes will be sentenced to no more than two years imprisonment. If a person, violates the law, regulations, or established provisions and uses solid waste to feed animals destined for human consumption, the penalty will be no less than three years and no more than six years of imprisonment.

Article 307°.- Illegal trafficking of hazardous waste. Anyone who illegally enters national territory, uses, employs, places, transports or dumps toxic or hazardous waste in the environment without the appropriate authorization resulting from a process of production, extraction, transformation, utilization or consumption, will be sentenced to no less than four years and no more than six years of imprisonment.



By enforcing the legal framework practices harmful to people's health and the environment will become a thing of the past.



The Ministry of the Environment faces a difficult task to be shared by all citizens who should cooperate and be watchful with regard to the enforcement of the law and they should abide by the law in order to avoid being sanctioned and should also reward good authorities, civil servants, businessmen and community members who strive to make our cities and communities clean, safe and healthy.

1.1.6 Municipal Capacity

A number of international aid organizations and multilateral organizations admit that the private sector is more efficient than the public sector. A series of studies and reports were commissioned and they have recommended the privatization of solid waste management services, basically waste collection, transport, transfer, treatment and final disposal.

As a result many municipalities have contracted private companies of which a few have actually improved these services however others have been inefficient. For example, some municipalities transport their waste to landfills far from their jurisdiction under the pretext of cheaper disposal costs without taking into account the cost of equipment, fuel and labor costs in their calculations.

The recommendation to privatize public waste services have usually not considered critical aspects such as: the allocation of fees and method of payment, the human resources which the municipalities already have, the separation or segregation of waste at the source, selective collection, education and environmental awareness. These aspects are often lacking when privatization is left in the hands of the municipalities. Nor have they considered what should be done in most cities of Peru with less than 20,000 inhabitants⁴.

⁴Section 1.3 of this chapter covers this aspect thoroughly.

If we ignore comprehensive plans, we will create unsustainable systems that oblige municipalities to use their own resources or transfer funds (Municipal Compensation Fund – FONCOMUN, payments from mining companies, etc.) to cover the costs of these services often creating tension within the community.

Studies have revealed that if operating conditions are not similar, no comparison can be made. If aside from privatizing the collection, transport, transfer and final disposal of waste, collecting fees from residents and environmental education services were also privatized the outcome would evidently be entirely different.

Municipalities usually put the least capable public official or an individual who has been accused of corruption in charge of dump sites which they nickname “Siberia⁵”. Municipalities ignore the fact that waste management requires trained public officials to adequately manage human and material resources and to develop a good relationship with the community (the “clients”).

Fortunately, today municipalities are more aware about how important this is and efforts are being made they to recruit professionals or individuals with experience in solid waste management. However, the old habit of political favors is still prevalent and often people without any knowledge or experience in this matter are given managerial posts and the cities pay for the consequences of these “commitments”.

Few authorities have really taken on solid waste management resolutely and responsibly to efficiently solve the problem. Proposals are needed to operate services and maintain equipment⁶ and to design and construct infrastructure for waste treatment and

⁵ Description used humorously.

⁶ News program obtain vehicles: dump trucks, compactors that are broken down before completing their expected lifespan thus generating a vicious circle.

disposal, identifying appropriate technological options adequate for each situation.

This lack of commitment is evident when municipalities accept the “support” of NGOs and international aid organizations and transfer the responsibility of environmental education to them as if these outside institutions were responsible for changing the behavior of the municipalities' local residents. Municipal budgets and resources earmarked for this purpose are clear evidence of this practice.

During a visit to a municipality on the northern coast of Peru the town councilman in charge of the Environmental Commission enthusiastically explained to us that hospital and commercial waste was collected by the same municipal compactor used to collect household waste. This involves several infringements to the law: the collection of hazardous hospital waste is the responsibility of the health sector, not the municipality, since a compactor improperly used contaminates the city with leachate from hospital waste.

Ciudad Saludable and other institutions receive requests from authorities and public officials to optimize public sanitation services. In no case have such requests addressed the need of specifying the appropriate type of waste collection and transport vehicle for municipal procurement.

It is obvious that under such circumstances corrupt public officials can easily get a kick back from equipment vendors who sell vehicles that quickly break down and involve steep operational costs for low density areas.



Once municipal authorities and officials clearly understand the issue they will ensure an appropriate management of sanitary landfills and dumps and critical points in urban settings will be eradicated.



In most cases these broken down municipal vehicles are left un-repaired due to limited after sales services of the sales companies aside from the fact that their spare parts are expensive and must be ordered months in advance. As a result, automobile repair workshops⁷ are full of abandoned vehicles that have been “picked apart” or “cannibalized” due to no control or supervision.

In 2004 CONAM diagnosed the training needs for solid waste management. As a result universities and institutions helped to implement training services, for example the Universidad Nacional de Ingeniería and its Solid Waste Sanitary Engineering program and certification program “Tools and Challenges for Waste Management” developed jointly by the Pontificia Universidad Católica del Perú and Ciudad Saludable⁸.

Another reason why there is a lack of training is because of the frequent rotation of public servants from one department to another, but also within the same department. Despite the low level of training for public servants in Peru, those who do receive training often change posts or are quickly transferred to other areas. Hence training is not considered to be crucial and therefore is not given appropriate attention and is usually subjected to political considerations.

In spite of everything, at present more public officials have the knowledge and ethics to fulfill their responsibilities. We must dispel the myth that the mere fact of being a public official is synonymous of being incompetent or corrupt. The role of the municipal public official should be re-appraised and they should reach the point of publicly saying “I am proud to be a public official”. However, for this

⁷ These municipal areas are dedicated to the maintenance of municipal vehicles and equipment.

⁸ Currently the fourth edition of the certification program is underway and has more than 110 graduates to date.

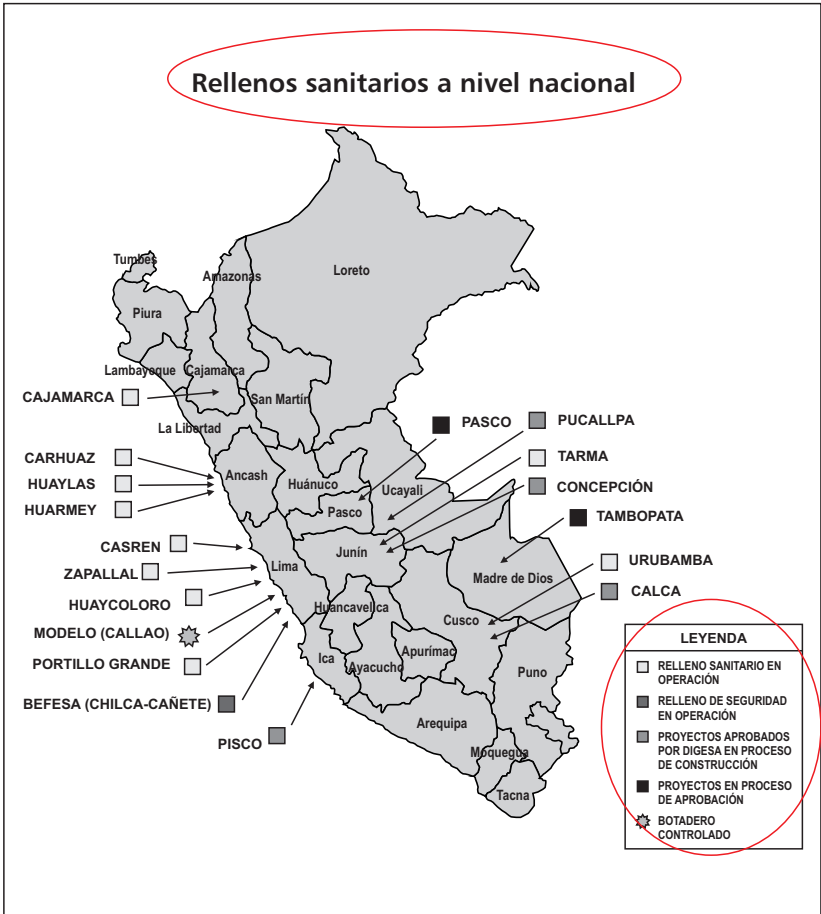
to become a reality their good work needs to be praised and their competency and dedication made evident.

Solid waste management systems depends upon different schedules as compared to other departments. They depend upon operational shifts. If responsibilities are undertaken in a comprehensive manner according to their PIGARS indications, this creates different work rhythms and schedules. The authorities must understand this. However, it is of the essence that proper waste management depends upon the collaboration of several municipal areas.

1.1.7 Treatment and Final Disposal

According to DIGESA (2008) 20,065 tons of waste are produced daily, assuming a per capita production of 0.711 kg/person/day and 70,62% is collected. According to a report published by CONAM (2007) only 19,7% is disposed of properly, and there are only 10 operative sanitary landfills throughout the country, however this number is lower than that of DIGESA.

Metropolitan Lima, has the best infrastructure for final disposal in privately managed sanitary landfills.



These figures reveal how critical the treatment, transfer and final disposal of solid waste is. The question is: Where does the garbage, hazardous waste from hospitals and industry that is not dumped in sanitary landfills go? Some companies responsibly transport their waste to Lima despite the risks involved. However, there is an



By enforcing current laws dump sites will be eradicated and people will no longer have to scavenge trash under degrading conditions.



insufficient infrastructure for the proper final disposal of household solid waste and much less so for hazardous waste.

Travels through Peru have allowed us to confirm that when solid waste is disposed of in rivers, lakes, shorelines, agricultural areas or is sent to unsupervised pig farms nobody makes a fuss, not a word is spoken by authorities or the public. However, if a municipality decides to properly dispose of its waste and build a sanitary landfill it suddenly faces a number of hurdles such as certifications and permits issued by the National Institute of Culture (INC), the National Institute of Natural Resources (INRENA), the Institute of Civil Defense (INDECI) and the inherent delays for the review and approval of Environmental Impact Assessments (EIA) to get clearance on the project.

For example, the INC takes too much time to issue a Clearance Certificate of an Area Free From Archeological Remains (CIRA). In many regions of Peru the local INC offices even ignore the procedure to issue such certificates. In places where this procedure is known, the first step is to pay an amount equal to the a special tax unit called *Unidad Impositiva Tributaria – UIT*, which this year topped 3,500 nuevos soles. In the case that the area designated for the sanitary landfill is larger than 6 hectares, the municipality must hire its own team of archeologists and pay between 19,000 and 26,000 nuevos soles to complete the evaluation and then the INC will determine whether or not to grant a CIRA.

On one occasion when a positive technical evaluation was sought from the Office of the Environment in the Ministry of Housing, Construction and Sanitation for a sanitary landfill in the city of Pucallpa the Ministry returned it indicating that it was not its responsibility. However, Article 69 of D.S. 057-2004 (Regulation of the General Law of Solid Waste 27314) specifies that a positive technical evaluation is required from both DIGESA as well as the

Bureau of the Environment in the Ministry of Housing, Construction and Sanitation.

DIGESA also delays approval of EIAs since observations are not made in the first revision but rather when the assessment is sent back to receive the first observations. The second time around observations are sent based on those indicated in the initial communication and so on and so forth. Additionally, the same requirements are used for manual, semi-mechanized and mechanized sanitary landfills. The current modifications to D.S. 057-2004, Regulation of the General Law of Solid Waste are considering different requirements for manual sanitary landfills (up to 20 tons/day) and for mini sanitary landfills (for cities with fewer than 5,000 inhabitants).

Since certificates and permits are prerequisites to implement a sanitary landfill, the aforementioned problems must be taken into account and these procedures must be streamlined in order to help municipalities to spot a place to properly dispose of waste and to mitigate harmful environmental and health effects.

A drastic change is needed. In more than one case an EIA approval took 8 months because the requirements called for conducting noise and air tests in certified labs (these labs are only in Lima) which elevated the costs of the permits and studies. Meanwhile, with every passing day waste continued to be thrown into rivers, lakes and the ocean⁹, and open dumps continued to accumulate. Such events are totally neglected by the public except during municipal elections campaigns.

⁹ This waste feeds the “island of trash” floating on the Pacific Ocean which is estimated to be 1.5 times larger than Spain.

Law 29263 was recently passed amending several articles of the Criminal Code and Article 306 General Law of the Environment regarding non-compliance with the rules governing solid waste management, “Anyone who without authorization or approval from the competent authority, establishes an informal solid waste dump that may detrimentally affect environmental quality, human health or the integrity of ecological processes, will be punished with a sentence of no more than 4 years imprisonment”. This law has several articles that refer to sanctions with regard to improper solid waste management. Additionally, it requires authorities to revise their practices and pay significant attention to the work carried out in this field.

Peru faces a critical issue in locating proper areas for solid waste infrastructure. The seventh complementary provision of Law 27314, passed in 2000, set a one year deadline for provincial municipalities to evaluate and identify geographic areas in their territory that may be utilized to install treatment plants, transfer stations or final disposal in coordination with the Ministry of Health and other qualified authorities. In spite of this legislation, this activity was never carried out¹⁰.

Including this type of infrastructure in the territorial plans of urban areas (infrastructure areas for the transfer, treatment and final disposal of solid waste) is important. Additionally, strategies must be developed in order to promote public and private investment to build this type of infrastructure, such as investments in the closure and environmental remediation of existing dumpsites, which is of utmost importance.

¹⁰ Later, in 2004, the D.S. 057 re-states in Art. 71 that provincial municipalities should establish, publish and update the zoning where the installation of solid waste infrastructure is permitted. This has not been completed.

Procedures must be established to simplify the administrative protocol that currently governs the construction of solid waste infrastructure.

The existing legislation evidently favors and encourages informality and punishes municipal authorities who decide to invest in improvements since the law actually hampers the construction of formal solid waste infrastructure. The law rewards those who dump trash in rivers thereby aggravating environmental pollution and public health.

1.1.8 Fees and Charges

One common trait shared by municipalities throughout Peru is their difficulty to fully fund public waste services because a significant number of their residents do not pay for garbage collection services and sanitary landfills. These neighbors are known as “delinquents” and the proportion of them as compared to all neighbors is known as the “delinquency index” or default index.

After conducting a series of interviews with municipal officials from the finance departments it has been revealed that the default indices in the main urban districts of Peru varies from 50% to 90%. Urban districts with efficient collection services have default indices between 10% a 20% but these are a small minority.

Today Peru has 1,834¹¹ municipalities, of which it is estimated that at least 83% report an income of less than 1,000 soles per month available for waste services a figure which is insufficient even for small localities.

¹¹ From the INEI National Registry of Municipalities 2008 RENAMU. Provincial municipalities number 195 and district municipalities number 1,639.

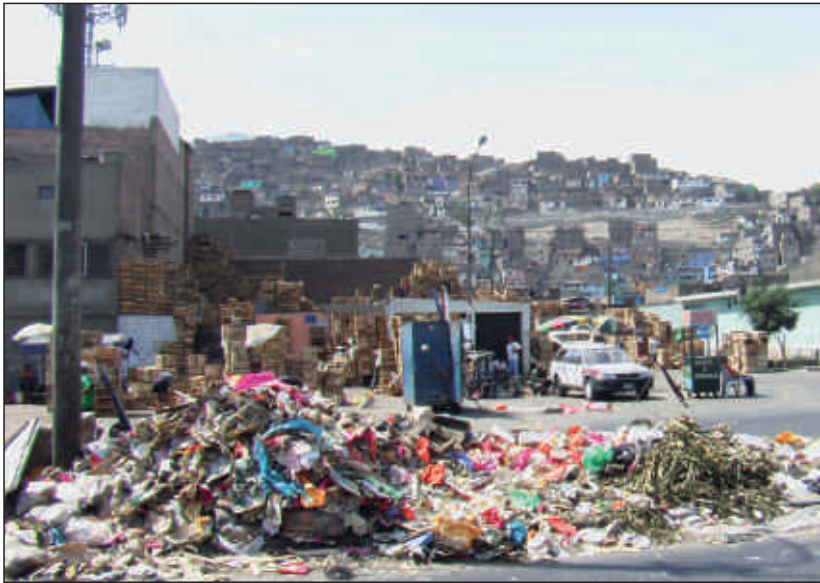
Table 1: 2006 Waste Service Income

Level of annual public clearing collection income	Number of Municipalities	Percentage
From S/. 12 000 to 50 million soles	304	16.6%
From S/. 1 to 11 999 soles	281	15.4%
Zero soles monthly	1 244	68.0%
Total	1 829	100%

Source: INEI website, RENAMU 2006

What reasons can explain this dramatic situation? Although the registry is not complete, the 2006 RENAMU annual survey carried out by the INEI provides us with some good clues:

- 77% of municipalities claimed to periodically collect solid waste (1,378 vs.1,793), the other 23% claimed to not provide collection services;
- 68% of municipalities claimed zero income for public waste services (1,244 vs. 1,829);
- **At least 45% of municipalities that claimed to provide service did not collect any payment for this service;**
- 37% of municipalities that claimed to provide waste services, claimed to provide these services on a daily basis (507 vs. 1,377);
- 31% of municipalities that claimed to provide waste services, claimed to provide these services every other day (429 vs. 1,377);



Insufficient resources often lead to deficient public cleaning services and to informal services which actually aggravate the problem.



- 32% of municipalities that claimed to provide waste services, claimed to provide these services on a weekly basis (441 vs. 1,377);
- 43% of municipalities that claimed to provide waste services, claimed to provide this service for more than 75% of the district capital;
- 7% of municipalities that claimed to provide waste services, claimed to provide these services for more than 75% of their territory outside of the capital;
- The 1,377 municipalities claimed that 20% of their solid waste is disposed of in sanitary landfills and 2% is recycled, seeking to comply with current environmental legislation;
- The 1,377 municipalities claimed that 60% of their solid waste is disposed of in open dumps, 14% is burned, 2% is thrown in water sources and 2% is disposed of in other ways.

The situation in most municipalities in Peru is a matter of great concern. On one hand they are incapable of complying with and enforcing the law, but on the other hand they openly challenge it. According to Mr. Paz and Mr. Solís from the provincial municipality of Pasco, during a workshop held in June 2008, out of 565 municipalities that effectively charged for waste services in 2006, only 9% (51) complied with the provisions outlined by the Constitutional Tribunal with respect to the method of calculating these municipal taxes. That is to say, that 514 of those municipalities openly disobeyed those provisions. In this case is it perfectly valid to ask ourselves if it is consistent for a local government to require its neighbors to respect municipal tax ordinances when they themselves are incapable of fulfilling their own obligations.

In municipalities, be they provincial or district, generally there are two main methods of levying taxes:

- Within their administrative framework there is a specific department known as the Department of Tax Administration or the Department of Revenue Collection, which manages municipal revenue collection in two ways: (a) through municipal personnel; and, (b) hiring an external party, either public or private, to provide collection services, supervised by this department.
- Building an external, autonomous and specialized entity similar to that of the Metropolitan Metropolitan of Lima (MML) has become a model of good performance. This called the Tax Administration Service – SAT, based on SUNAT but on a local scale. This entity completely supplants the necessity of a department within the municipality and its operational and budgetary autonomy allows it to achieve more efficiency and a higher specialization of its work. In general its creation suggests the search for greater efficiency in fundraising and revenue collection processes and avoidance of political issues.

Peru has three types of taxes:

- taxes;
- contributions;
- Other taxes (a) municipal taxes, (b) duties (c) permits and licenses.

Municipal taxes exact payment from taxpayers for public services.

In the past waste collection service payments were exacted through monthly electricity bills, an era that most municipalities throughout the country miss since in those days the level of default on payments to an electricity company was barely between 4% and 5% because if residents did not pay, their electricity was immediately cut off.

Default rates such as those would be desirable for most municipalities today since they presently spend considerable amounts to maintain expensive fleets of compactor trucks and enormous waste management infrastructure that are not financially sustainable. Waste collection payments attached to electricity bills in the city of Lima covered 95% of public service costs and municipalities were able to guarantee high-quality waste services with 100% coverage. Today this is very difficult to achieve.

In Lima, the capital, previously one large electrical distribution state-owned company, Electrolima, controlled the market. In other cities throughout Peru most of the electricity supplied was controlled by regional state-owned companies and municipalities. This characteristic facilitated the collection of municipal taxes since as state owned companies they guaranteed fair rates and provided non-profit services.

This situation –let’s call it ideal- continued until the government passed Law N° 25632 in April 1992, when the tax system was organized in Peru and taxpayer entities were no longer allowed to distribute receipts to collect payment for services not directly provided for or in representation of a third party and worse, this law forbid canceling services (power supply) for outstanding payments related to other services not directly provided for (waste services). As a result, it was at this juncture when waste services collapsed nationwide and the situation has not changed since.



(Carhuaz - Ancash)

Good investments provide quality services that benefit the environment and the health of people in general. Moreover, once public services are privatized more jobs will be created.



A small cleaning company in Pucallpa

From this moment on municipalities had to manage their own revenue collection services with terrible results given the lack of specialists and experience. Concurrently, the Peruvian government with help from the Spanish Technical Assistance Agency began to develop the SUNAT model. This entity responsible for national revenue collection has insistently avoided becoming involved in municipal tax administration given the high level of fragmentation of districts in addition to their politics.

The Tax Administration Service – SAT was created by the Metropolitan Metropolitan of Lima through Edict N° 225, on October 4, 1996, as a decentralized public entity, with a legal status and administrative, economic, budgetary and financial autonomy inspired by the SUNAT model but designed for the local scale. From this date forward this model has been replicated in only eight more provincial municipalities: Piura, Cajamarca, Tarapoto, Chiclayo, Trujillo, Chimbote, Huancayo, and Ica¹². However there are twelve other municipalities among the 20 largest cities in the country that chose not to develop this type of revenue collection instrument¹³.

The 12 years of experience of the SAT have demonstrated that comparable solutions in urban centers governed by analogous codes of conduct can be implemented with similar legal frameworks due to their homogeneous and standardized methods, systems and procedures. Solutions can indeed be “exportable” to other municipal organizations. Moreover, given that their rules and procedures essentially come from SUNAT, it is not outlandish to argue that SUNAT could be the tax collection agent at a national scale, placing it in charge of local tax collection presently managed by municipalities.

¹² For more information review the introduction on the Association of Administrative Tax Services -ASAT at: www.asat.org.pe

¹³ The twelve largest provincial municipalities that do not have SAT services are: Callao, Arequipa, Iquitos, Lambayeque, Cusco, Pucallpa, Sullana, Huánuco, Tacna, Juliaca, Puno and Ayacucho.

On the other hand municipal revenues, almost always meager, had to subsidize waste programs given their difficult situation. Transfers from the central government to the Municipal Compensation Fund – FONCOMUN were vital for this effort. The Peruvian Constitution and the rest of the current legal framework specifies that the revenue of any municipal organization can be created, modified and abolished within its jurisdiction and in compliance with the law.

Municipal taxes, contributions, duties, fees, permits and licenses stated in the municipal ordinance and the resources set aside from the Municipal Compensation Fund – FONCOMUN are all sources of municipal revenue.

Municipal Revenue sources:

Table 2: Types of Municipal Revenue

Tipos de ingresos municipales	
Municipal Taxes	District administration: Property tax, gaming tax (pinball, bingo, raffles and the like), property sales tax, public events tax (not including sporting events) Provincial administration: car ownership tax, gambling tax, and lottery tax
Contributions and Municipal Fees	Municipal contributions: Special contribution of municipal works. Municipal fees: Fees for public services, fees for administrative services or rights, fees for the opening of an establishment, parking fees, public transport fees, other fees for activities subject to investigation and control by the municipality.
National taxes created for local municipalities	These are collected as national taxes throughout the country but return to each municipality through the FONCOMUN. - Municipal promotion tax: 2% of the operations affected by the sales tax - Tax applicable to gasoline, with a rate of 8% on top of the price for sale within the country or higher if importing - Tax on recreational boating: 5% of the value of the vessel.

Types of Municipal Revenue

Participation in revenue collection from customs and gambling	Participation in revenue from customs: 2% of the revenue collected by customs. Casino and slot machine tax: 12% on top of the net monthly revenue excluding maintenance costs. About 60% of this tax revenue goes to local governments.
Other municipal revenue sources	The municipal compensation fund – Foncomun, comes from the following resources: the revenue from the municipal promotion tax, the gasoline tax, the recreational boating tax, resources from industry payments: mining, fishing, hydroelectric, natural gas, forestry, petroleum; the national school food subsidy and mining rights fees.

Below are the main factors that explain the problem of the financial non-sustainability of waste services:

- Municipal budget deficits are hidden through budgetary transfers from other sources and budgetary revisions that allow it to cover up losses in budgetary items related to waste management. Maintaining the sustainability of projects that improve municipal waste services by receiving subsidies from other income sources managed by the municipality does not promote responsible municipal management.
- SUNAT currently collects the municipal promotion tax - IPM, which forms part of the 19% national sales tax and that is later “returned” to the municipalities as a direct transfer from FONCOMUN based on social distribution criteria. Likewise, the law of Municipal Taxation clearly identifies taxes as the jurisdiction of municipalities and not SUNAT. In the past years SUNAT has taken on the responsibility of revenue collection for five entities: Customs, the Social Security Agency, the National Health Insurance Agency, and the National Training Service for the Construction Industry and the National Service of Industrial

Training. However, it has avoided taking on this responsibility for the municipalities.

- The excessive fragmentation of cities in a large number of districts: The city of Lima has 43 district municipalities and there are 6 district municipalities in Callao, making a total of 43 municipal organizations with their own mayors, councilmen, public officials, waste management systems and revenue collection systems within the same city. In many of the large cities in the country the set-up is similar, which makes it difficult to reach technical and political agreements and achieve sufficient economies of scale.
- The situation of rural municipalities: The current situation of many small district municipalities is dramatic because they practically do not generate their own revenue, surviving thanks to transfers from the central government. Most rural municipalities try not to create more work for themselves because they do not have the systems or the personnel necessary for the task. They often ignore their responsibilities without residents even noticing.
- The lack of uniform administrative systems in municipalities: managing 1,834 municipalities with the same problems and issues but without the means to harmonize their work specifications or at least work with similar operating platforms. The information systems for data processing are different. The lack of qualified personnel worsens the management of these complex, bureaucratic entities.
- The political factor: Many mayors are afraid to implement stricter revenue collection measures that would collect more income through coercive measures because these are unpopular. This is

flagrant during re-election. In Peru, elections are held every four years.

- Lack of proper resources to manage solid waste systems: Municipal officials claim to not have the resources to properly manage solid waste. However, in many cases they restrict their investments to the bare minimum, prioritizing urban zones and neglecting peripheral and marginalized zones with the highest population density and lowest income levels (the poorest and most vulnerable). This propagates a dangerous vicious circle. Services are not improved because there are not enough funds and funds are not increased because the service is lacking.
- Cultural considerations of residents: There is a widespread attitude of demanding respect of citizen rights, however this is not matched by an understanding that in order to exercise such rights they must fulfill their duties so that waste services are not solely maintained through transfers from the central government.

This topic is incredibly complex and we are trying to stimulate collective reflection to formulate a solution. Here are some possible options:

- Delegate municipal revenue collection to SUNAT. SUNAT should absorb local SAT's and develop a proper administrative structure based on their regional offices, keeping affiliated offices in each municipality.
- Allow indirect payments through public or private service providers, eliminating restrictions placed on municipalities. Years ago Congress tried to do this and the principal restrictions that exist for its implementation are difficult to amend.

- Strengthen autonomous municipal entities specializing in revenue collection (replicating the SAT model). The central government should set up a system of incentives for municipalities so that they assume the responsibility of organizing local replicas of the SAT in Lima, facilitating access to guaranteed bank financing and encouraging provincial SATs to progressively take on the management of revenue collection under contract with district municipalities.
- Transfer waste service fees to national sources, like the national sales tax (IGV), and therefore ensure the direct financing of national taxes to support local operations through the monthly transfers that SUNAT offers.
- The creation of the National Supervisory Superintendent for municipal public services, including waste services. The intention is that this organization has the proper legal framework and sufficient ability to investigate and sanction municipalities, requiring them to provide quality services with satisfactory coverage that is directly financed by the respective municipality.

1.1.9 The Growth of Cities in Peru

Peru is growing economically along with its cities according to the 11th national population census and the 6th national household census of INEI¹⁴. In 2007 the urban population totaled 20,810,288 inhabitants residing in 1,833 urban centers distributed throughout 25 regions. Residents demand a high quality of life, and want to live in sustainable cities. As a result, they demand improved public services including proper solid waste management. See Table 3.

¹⁴ 2007 National Population and Household Census.

Table 3: Urban Population by Department

Departamentos	Población 2007 ¹⁵
AMAZONAS	166,003
ANCASH	682,954
APURIMAC	185,671
AREQUIPA	1,044,392
AYACUCHO	355,384
CAJAMARCA	453,977
CALLAO	876,877
CUSCO	644,684
HUANCAVELICA	144,022
HUANUCO	323,935
ICA	635,987
JUNIN	825,263
LA LIBERTAD	1,218,922
LAMBAYEQUE	885,234
LIMA	8,275,823
LORETO	583,391
MADRE DE DIOS	80,309
MOQUEGUA	136,696
PASCO	173,593
PIURA	1,243,841
PUNO	629,891
SAN MARTIN	472,755
TACNA	263,641
TUMBES	181,696
UCAYALI	325,347
TOTAL:	20,810,288

Date source: INEI.

The population of cities grows 2.1% annually, and this year it is estimated that there are 21,256, 908 inhabitants in urban areas. Assuming a steady growth rate, in 10 years there will be 25,733, 453 people living in urban areas. Today the urban population constitutes 76% and the rural population constitutes 24% of Peru’s total population. In 2018, if this trend continues, the urban population will constitute 80% and the rural population will constitute 20% of Peru’s total population.

Table 4: Urban and rural population

Área	1993	2007	2008	2018
Urbana	15,458,599	20,810,288	21,256,908	25,733,453
Rural	6,589,757	6,601,869	6,602,735	6,610,534
Total	22,048,356	27,412,157	27,859,643	32,343,987

Data source: INEI, 2007 Census.

As a result of centralized population growth, the department of Lima constitutes 40% of the national population. The regions of Piura, La Libertad and Arequipa distantly follow with more than 1 million inhabitants each. See Table 5.

Table 5: Urban population growth in the regions

	1940	1961	1972	1981	1993	2007	2008	2018	Tasa de crecimiento anual
Amazonas	26,648	45,977	67,357	81,973	119,517	166,003	169,945	209,911	2.4%
Ancash	98,673	194,578	346,635	439,597	548,028	682,954	693,776	799,225	1.6%
Apurimac	36,936	57,116	75,088	83,422	133,949	185,671	190,052	234,441	2.4%
Arequipa	155,144	250,746	420,801	583,927	785,858	1,044,392	1,065,826	1,279,652	2.1%
Ayacucho	85,601	103,900	150,537	183,688	236,774	355,384	365,843	474,976	2.9%
Cajamarca	66,048	107,175	156,892	211,170	311,135	453,977	466,395	594,617	2.7%
Callao	81,268	204,990	313,316	440,446	639,232	876,877	896,901	1,098,996	2.3%
Cusco	122,552	198,341	262,822	348,396	471,725	644,684	659,230	805,834	2.3%
Huancavelica	37,843	57,736	79,628	85,775	100,439	144,022	147,778	186,309	2.6%
Huanuco	42,213	68,352	106,399	148,427	252,778	323,935	329,725	386,723	1.8%
Ica	62,225	137,589	255,284	341,619	472,232	635,987	649,656	786,684	2.1%
Junin	137,776	255,752	414,751	510,662	678,251	825,263	836,909	949,404	1.4%
La Libertad	122,177	246,847	473,465	631,529	870,390	1,218,922	1,248,600	1,550,418	2.4%

	1940	1961	1972	1981	1993	2007	2008	2018	Tasa de crecimiento anual
Lambayeque	98,501	211,616	373,990	518,631	709,608	885,234	899,328	1,036,711	1.6%
Provincia de Lima	433,987	954,915	2,641,895	3,722,651	5,185,062	7,596,058	7,806,090	9,977,951	2.8%
Lima Provincias	98,093	398,681	299,578	410,130	496,879	679,765	695,154	850,313	2.3%
Loreto	49,292	100,395	179,276	255,290	398,422	583,391	599,500	766,050	2.8%
Madre de Dios	1,306	3,783	8,499	15,960	38,433	80,309	84,650	135,950	5.4%
Moquegua	8,342	24,638	52,107	78,391	106,601	136,696	139,146	163,266	1.8%
Pasco	29,950	49,113	102,017	121,802	133,383	173,593	176,891	209,541	1.9%
Piura	145,276	297,828	462,865	697,191	976,798	1,243,841	1,265,500	1,478,211	1.7%
Puno	71,079	124,147	186,160	283,222	423,253	629,891	648,035	836,754	2.9%
San Martín	52,797	95,784	131,793	181,210	335,942	472,755	484,433	603,415	2.5%
Tacna	19,283	45,980	77,358	122,187	195,949	263,641	269,289	325,884	2.1%
Tumbes	10,698	33,794	52,729	81,837	136,287	181,696	185,467	223,128	2.1%
Ucayali	5,332	29,724	67,675	102,660	204,795	325,347	336,284	452,833	3.4%
Total	2,197,133	4,698,178	8,058,495	11,091,923	15,458,599	20,810,288	21,256,908	25,733,453	2.1%

In-house preparation. Source: INEI Census, 2007

The growth of cities is still fragmented. Excluding the analysis of the 43 districts of Lima and Callao, according to the 2007 Census results, 92% of all cities have less than 20,000 inhabitants and make up only 31% of the population; 4% of cities have between 20,000 and 50,000 inhabitants and make up 17% of the total population; 2% have between 50,000 and 100 thousand inhabitants and make up 24% of the total population; and finally, only 1% of cities have more than 100,000 inhabitants and make up 28% of the population. See Table 6. .

Table 6: Districts and urban population

Stratification of districts according to population	N° of Districts	%	Population	%
Population less than 1.000 inhabitants	782	44%	397,685	3%
Population greater than 1.000 and less than 5.000 inhabitants	649	36%	1,394,461	11%
Population greater than 5.000 and less than 20.000 inhabitants	221	12%	2,315,451	19%
Population greater than 20.000 and less than 50.000 inhabitants	72	4%	2,149,255	17%
Population greater than 50.000 and less than 100.000 inhabitants	43	2%	3,081,658	25%
Population greater than 100.000 inhabitants	23	1%	2,998,843	24%
TOTAL	1,790	100%	12,337,353	100%

Date source: INEI, 2007 Census.

In small cities with less than 20,000 inhabitants, 44% of the districts have less than 1,000 inhabitants; 36% have less than 5,000 inhabitants; and 12% have less than 20,000 inhabitants¹⁵ The

¹⁵ íbid

majority of these small cities share similar characteristics: isolation from capital cities, insufficient urban infrastructure, poor sanitation services, environmental contamination and their residents live in conditions of poverty and extreme poverty¹⁶.

Peru exhibits an extremely dynamic economic growth in Latin America, however it is making slow progress towards achieving the Millennium Development Goals¹⁷. The efforts of the international community are to achieve dignified living conditions for all. Table 3 presents some of the goals and objectives projected for the year 2015.

A total of 39.3% of the population lives in poverty and 13,7% in extreme poverty. In urban areas 25.7% of the population lives in poverty and 3.5% live in conditions of extreme poverty. The mortality rate for children under five is high, with 30 deaths per each 1,000 child born. This is directly related to poverty, education level and the living conditions of the population.

Even if the country dramatically reduces poverty levels, there are still a significant number of households that suffer from a caloric deficit (27.1%), that is to say families that do not consume the daily minimum energy requirement. This affects the development of children and adolescents. Public policies fail because they assume that it is only a question of nutrition and therefore do not address other causal factors such as improper sanitation services, including solid waste management. Other factors include the high prevalence of disease vectors (flies, rats, etc.) and illiteracy, among others.

¹⁶ However, it is important to keep in mind that in areas close to mining operations there are small cities that as a result of the increase in mining taxes now have large municipal budgets

¹⁷ Millennium Summit convened by the United Nations in 2000 and endorsed by Peru.

Access to education must be improved because in 2006 the net enrollment rate of primary education¹⁸ was 96%, the net rate of completion for primary education¹⁹ was 57.4% and the illiteracy rate of the population, whose age fluctuates between 15-24 years²⁰, is 95%. However, the real problem lies in the poor quality of education because many students have problems with math and reading comprehension. Moreover, Peru does not have any formal environmental education program.

A total of 79% of the population in urban areas lives in homes with access to the public potable water network; 4% of the population has access to public wells; and, 5% has access to water trucks. On the other hand, 73% of the urban population has access to toilets; 5% has a septic tank; and, 13% has a pit. The censuses still do not include information about access to solid waste management services.

¹⁸ ENAHO 2006.

¹⁹ Ibid.

²⁰ Ibid.

Table 7: Millennium Development Goals

Millennium Development Goals	2015 Goal	Current Situation ²¹
Eradicate poverty and hunger <ul style="list-style-type: none"> • % of the population in extreme poverty • % of the population in poverty • % of homes with a caloric deficit 	11,5% 27,3%	13,7% 39,3% 27,1%
Achieve universal primary education <ul style="list-style-type: none"> • Net enrollment rate for primary education²² • Net completion rate for primary education²³ • Illiteracy rate 15-24 years²⁴ 	100% 100% 100%	96% 57,4% 95%
Reduce the mortality rate of children less than 5 <ul style="list-style-type: none"> • Mortality rate of children less than 5²⁵ 	17/1000	30/1000
Improve coverage of water and sanitation services ²⁶ <ul style="list-style-type: none"> • Potable water • Basic sanitation services 	88% 78%	69% 61%

In-house preparation

1.1.10 An Estimate of Solid Waste Generation

Based on municipal and institutional data, solid waste studies and projections from the 2007 census of the urban population growth rates of different regions, in 2008 it is estimated that urban areas²⁷ generated 17,916 tons of solid waste daily. See Graph 1.

²¹ Including both rural and urban populations.

²² ENAHO 2006.

²³ Ibid.

²⁴ Ibid.

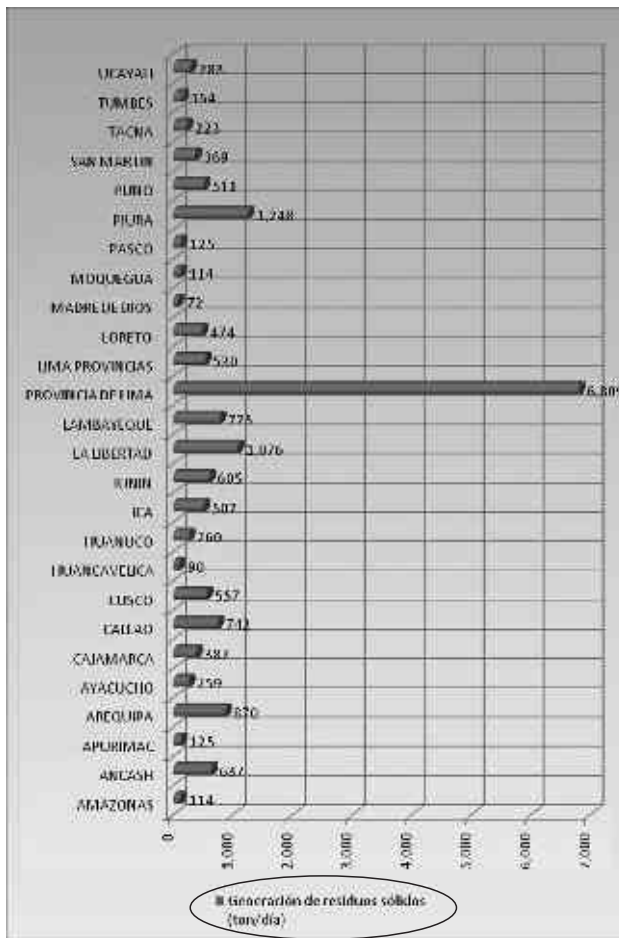
²⁵ ENDES 2004/2005.

²⁶ INEI, 2007 Census.

²⁷ The information provided by DIGESA corresponds to the generation of household solid waste nationwide, including urban and rural areas.

Lima is the province with the highest population density (36.5%) and that which generates the largest amount of solid waste daily, 6,809 ton/day. Piura and La Libertad follow, with more than 1,000 tons/day. The regions of Arequipa, Lambayeque, Callao, Ancash, Junín, Cusco and Lima (outside the metropolitan area) all generate more than 500 tons/day.

Graph 1: Generation of Solid Waste by Region



Due to urban population growth throughout the country, the cities in 783 districts generate less than 0.5 tons/day; 601 districts, between 0.5 and 2 tons/day; 140, between 2 and 5 tons/day; 155, between 5 and 20 tons/day; 61, between 20 and 50 tons/day; and 93 cities generate more than 50 tons/day. See the following table.

Table 8: Districts by generation of solid waste

Generation of Municipal Solid Waste	N° of Districts	%
Less than 0.5 tons/day	783	42.7%
More than 0.5 and less than 2 tons/day	601	32.8%
More than 2 and less than 5 tons/day	140	7.6%
More than 5 and less than 20 tons/day	155	8.5%
More than 20 and less than 50 tons/day	61	3.3%
More than 50 tons/day	93	5.1%
Total	1,833	100.0%

In-house preparation

If we exclude Lima and Callao from the previous table, there are: 1,784 districts, of which, 782 are districts that generate less than 0.5 tons/day; 601 districts generate between 0.5 and 2 tons/day; 136 cities between 2 and 5 tons/day; 152 cities between 5 and 20 tons/day; 54, between 20 and 50 tons/day; and, 59 cities generate more than 50 tons/day.

**Table 9: Districts by Generation of Solid Waste
(Excluding the provinces of Lima and Callao)**

Generation of Municipal Solid Waste	N° of Districts	%
Less than 0.5 tons/day	782	43,8%
More than 0.5 and less than 2 tons/day	601	33,7%
More than 0.5 and less than 2 tons/day	136	7,6%
More than 2 and less than 5 tons/day	152	8,5%
More than 20 and less than 50 tons/day	54	3,0%
More than 50 tons/day	59	3,3%
TOTAL	1,784	100%

In-house preparation

Based on this information, it would be helpful to revise the solid waste management policy guidelines because the current policies, rules and strategies are impractical for the 1,384 districts that produce less than 2 tons of waste per day, which is clearly the majority of districts. These constitute 68% of municipalities nationwide that claimed no revenue collection for providing waste services (1,244 vs. 1,829). They employ only a small number of workers dedicated to cleaning part of the city center, the waste collected is thrown on empty plots of land, on the shores of rivers, or possibly they are burned or used to feed pigs.

1.2 Reflecting on what Hampers or Facilitates Progress

1.2.1 Political Will

Political will is crucial issue to achieving significant progress in solid waste management. Political will is not a mere declaration of

intentions by the mayor, but rather it should materialize into concrete actions at all levels of local government: from the commission of councilmen in charge of the issue to the waste management team of officials, including other municipal departments.

Frequently we bear witness to the good intentions of mayors to work on this issue, but later their own trusted officials block their actions. They do not understand the process or they assume that this will just give them more work to do. Some worry that it will cause them to lose their position or take a pay cut. The relationship with some municipal labor organizations is also complicated and in some cases purposely promotes chaos and disorder in order to reap secondary economic benefits.

Municipalities are known to be plagued by a variety of behaviors:

- ? Officials and authorities buy equipment without checking if they match the technical specifications required with respect to: the characteristics of the area, their lifespan and maintenance costs.
- ? Supervisors reach agreements with fuel vendors to receive money and bribe drivers to sabotage the odometers.
- ? Employees from the workshop lose spare parts that later need to be purchased from a specific “buyer”, or else weeks will pass without providing service to the community.
- ? Municipal employees scavenge waste during the collection service and later, on the way to the landfill, take a detour to sell the recyclable material.
- ? A widespread disrespect for punctuality. Meeting schedules are set and almost never respected.
- ? Ordinances and regulations are approved prior passage through a series of reports from different departments.

A good example of how political will can change for the better is Carhuaz. During the administration of José Mejía Solórzano, the mayor, his councilmen, officials and workers dedicated themselves to: the creation and approval of ordinances, allocating resources, participating in clean-up campaigns, and setting a positive example for residents. As a result, the community responded positively to events, meetings, workshops, work days and service fees. The mayor also played a strong leadership role in promoting civic participation in the community and convincing other communities in the Callejón de Huaylas to stop polluting the Santa river thereby improving cleanliness and health.

1.2.2 CONAM – Ministry of the Environment

After the approval of the General Law of Solid Waste N° 27314, CONAM has implemented a series of efforts to promote its adoption. One of the principal contributions was the National Solid Waste Management Plan approved on April 22, 2005, which was a joint collaboration among several institutions (including Ciudad Saludable).

Another important contribution of CONAM has been the publication of a series of manuals to help local governments develop their solid waste management plans:

- ? Guidebook to Create an Integrated Solid Waste Management Plans (PIGARS).
- ? Guidebook to Create Ordinances for the Environmental Management of Waste, the National Guidebook to Implement Waste Exchange Programs.
- ? Technical Guidebook to Formulate Plans for the Minimization and Reuse Solid Waste at the Municipal Level.

? Technical Guidebook for the Closure and Conversion of Solid Waste Dumps and the Manual for Waste Management in Educational Institutions.

Similarly, in the past couple years CONAM provided support for a team in charge of implementing the Capacity Building Solid Waste Management Program. This program developed two action areas: Knowledge Development and Capacity Development. As regards Capacity Building, CONAM (today the Ministry of the Environment) has created a Network of Solid Waste Management Capacity Building Institutions of which Ciudad Saludable is a member.

This network supported the initiative of Ciudad Saludable in organizing and implementing an International Course “Design, Operation and Closure of Sanitary Landfills: Modern Approaches” to address the critical situation of waste disposal in our country. To plan for this course, a technical team with representatives from DIGESA, CONAM, and Ciudad Saludable was organized and received the sponsorship of the Pan-American Health Organization, the Pan-American Center of Sanitary Engineering and Environmental Sciences (CEPIS), the National Service of Agricultural Health (SENASA) and the National Environment Council (CONAM).

Our new Ministry of the Environment, under the leadership of Minister Dr. Antonio Brack Egg, has defined solid waste management as one of its three principal priorities and this has sparked the launching of the program “Eco-Efficient Municipalities”. This program addresses three key areas: treatment of wastewater, solid waste management (recycling and final disposal) and municipal zoning. The program seeks to make Peru a clean country for everyone. In particular, the action area corresponding to the management of solid waste promotes: the minimization of domestic and industrial solid waste, recycling,

collection, efficient transport and transfer, and final disposal of solid waste.

The Ministry of the Environment has the authority to:

- ? Coordinate the enforcement of the law with sector and municipal authorities
- ? Approve the National Solid Waste Policy.
- ? Promote the creation and implementation of the PIGARS.
- ? Include an analysis of solid waste management in the National Report on the State of the Environment in Peru.
- ? Include information on solid waste management in the National Environmental Information System.
- ? Integrate environmental impact assessment criteria with political guidelines established by the law.
- ? Through the Tribunal for Environmental Disputes resolve at the highest administrative level issues in relation to resolutions or administrative acts carried out by various authorities related to solid waste management.
- ? Through the Tribunal for Environmental Disputes resolve at the highest administrative level non-compliance with resolutions or administrative acts that breach political guidelines and other provisions as established by law.
- ? Promote the proper management of solid waste through the National Solid Waste Management System established by Law N° 28245 and the approval of policies, plans and integrated solid



Infrastructure for the final disposal and treatment of solid waste is gradually being built. These are photographs of the sanitary landfill of the city of Cajamarca, the first of its kind in the highlands of Peru and in a city other than Lima.



waste management plans through the Cross-Sector Environmental Commission.

Regional governments should promote solid waste management in their jurisdiction. They should prioritize public, private or mixed investments for the construction of environmental/sanitary retrofitting of solid waste infrastructure in their jurisdiction in coordination with the respective provincial municipalities.

When appropriate, the regional government should provide, in coordination with the health authority of their jurisdiction and the Ministry of the Environment or at the request of these authorities, solid waste management services to complement or replace those of the provincial or district municipalities that cannot properly manage them or in the case of an environmental or sanitary emergency. The cost of these services should be covered by the appropriate municipality.

1.2.3 Municipal Management Instruments

Municipalities should revise and improve the managerial and administrative aspects of public services, for example: (1) recruitment of experienced technical staff to manage and administer these services; (2) adoption of a service management system (planning, implementing and monitoring, evaluation and feedback); (3) determination of how such services will be financed (cost calculation and control, types of taxes, tax collection including coercive collection); and, (4) approval of a participatory management model to guarantee the effective engagement of civil society in service management.

Regarding the technical staff required in order to properly manage public waste management services, Peru does not have a sufficient

supply of sanitary engineers. As concerns the demand, municipal budgets do not have enough funds to recruit them. Each municipality must develop its own waste management capacity and train their technicians in order to improve their solid waste management services. It is obvious that these trained technicians must have stable jobs in view of the fact of the high rate of rotation of municipal officials in charge of these services.

The ideal profile of a public official is someone intelligent, who has leadership and communication skills, a mind and heart willing to listen to neighbors, workers, and authorities and who knows how to handle both compliments and complaints. These people are known as “tigers” because deal with many issues with tact and tenacity, but above all creativity, a capacity for innovation, well-grounded values and a desire to learn everyday.

These individuals will also have to be resolute and exercise their self-respect because they must be able to stand up to authorities and say “No”. Unfortunately, in most cases their favorite words are: “Yes Sir”, even though they know that the order given is inappropriate and will lead to failure. As a result, these individuals must have professional competency and ethics to substantiate their reasons or proposals. Obviously, they will have to stand up for their proposals and not relent and give way to appeasing their superiors.

Professionals in engineering, economics, or administration with training in human resource management are direly needed. Process management is fundamental as well as stewarding large groups of people. Another important characteristic is the ability for dispute settlement. Preferably, municipalities should employ professionals with at least one year of experience in this field.

The question is, does Peru have officials with these traits? Yes, but not many. The important thing is that we must have more

professionals with the necessary strength of character and eagerness to constantly learn and who share the dream of a better Peru if each person does his bit.

Despite the fact that the foregoing explanations are important, their scope is relative for most municipalities in Peru. Municipalities are characterized by: having less than 500 inhabitants in the city, their only means of income comes from transfers from the central government; they have few workers and have very low access to the market. In these cases, “turn key” solutions should be implemented that signal clearly and simply what actions need to be taken for the collection, transport, treatment and final disposal of solid waste. This should clearly identify local resources (such as community land, the practice of community work days, etc).

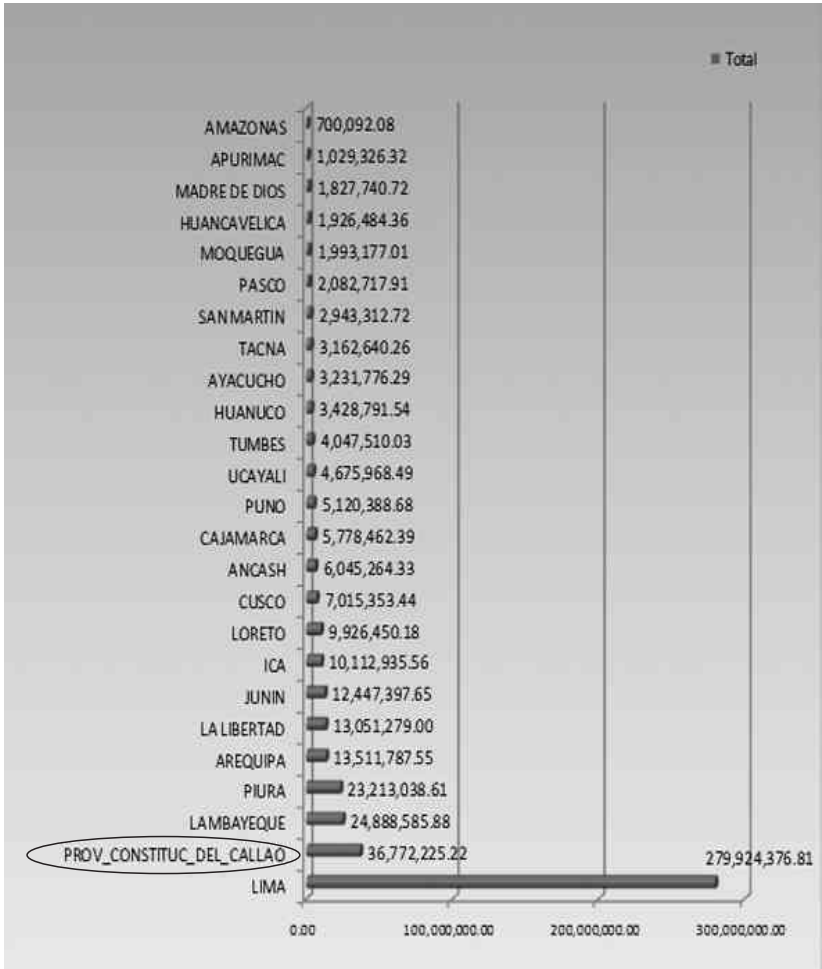
A second aspect to consider is that the Annual Operating Plans (POA in Spanish) of most municipalities are not instruments based on the prior approval of Comprehensive Solid Waste Management Plans (PIGARS) or District Solid Waste Management Plans (PDGARS), but rather are merely public service programs with their own budgets. For MEF officials instruments previously approved by MINAM are not necessary. Compliance with the formulation and coordination of the PIGARS in the municipal POAs are required.

In relation to a third aspect: funding, as previously mentioned in section 1.1.8 the lack of funding services is a serious problem in most municipalities. In 2007, 568 municipalities in 178 provinces that form part of the integrated system of Financial Administration had expenses totaling S/. 6,230,151,206 and for waste services the expenses totaled S/. 478,857,083. That is to say, barely 7.69%²⁸ of the total budget.

²⁸ <http://ofi.mef.gob.pe/transparencia/Navegador/default.aspx?y=2007&ap=ActProy>.

The largest expenditure for waste services was in the province of Lima with S/. 266,814,687 followed by Callao, where S/. 36,772,225 was spent; followed by Lambayeque, Piura, Arequipa, La Libertad, Junín and Ica, with expenses topping S/. 10 million soles/year. See Graph 2.

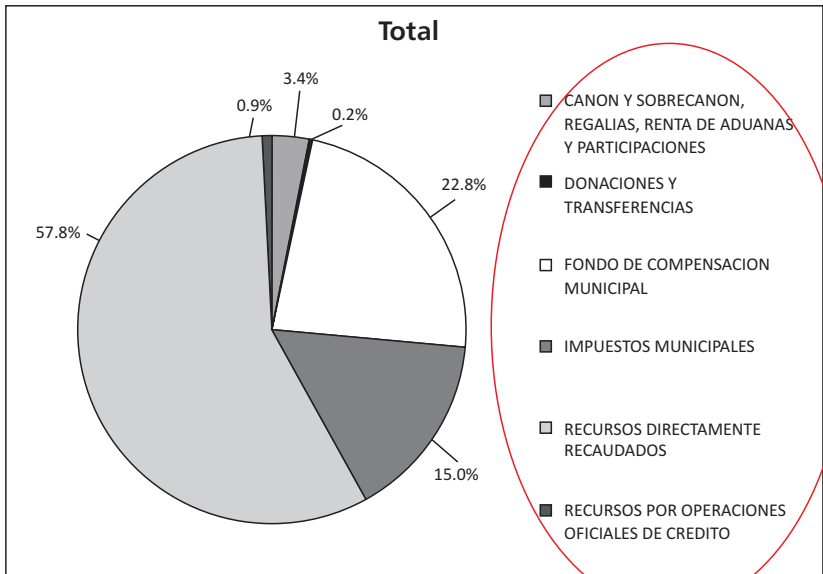
Graph 2: Municipal waste service expenses - 2007



Source: Economic Transparency –MEF.

The financing for these expenses came from several sources. A total of 57.8% comes from resources directly collected; 22.8% from the Municipal Compensation Fund; 15.1% from municipal taxes; 3.4% from industry payments and customs revenue; 0.9% from credit operations and, 0.2% from donation and transfers. See Graph 3.

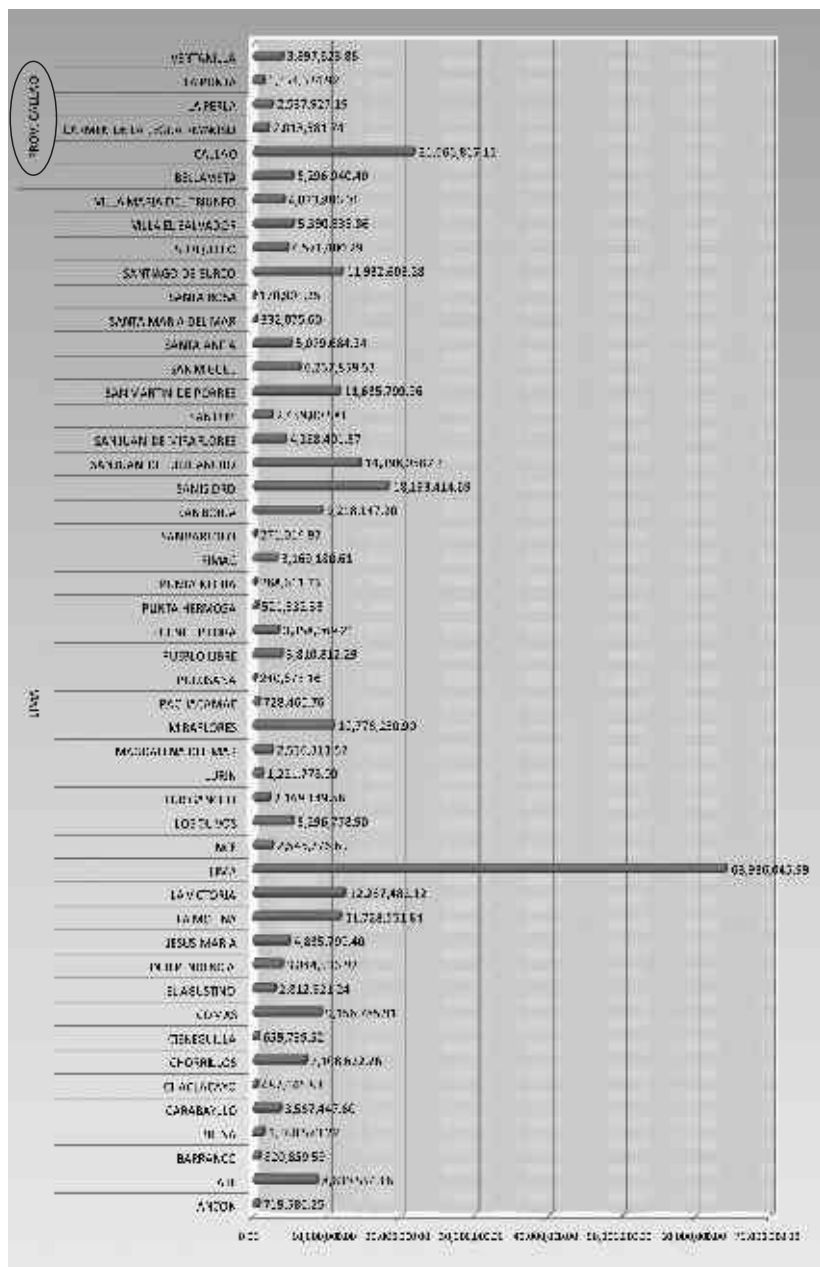
Graph 3: Municipal Waste Service Expenses



Source: MEF, Economic Transparency, 2007.

The municipalities that spent the most per year are the Metropolitan Municipality of Lima and the Provincial Municipality of Callao, followed by the municipalities of San Isidro, San Juan de Lurigancho, San Martín de Porres, La Victoria, La Molina and Miraflores.

Graph 4: Annual Expenses on Waste Services



FROM WASTE, CHANGING MINDS AND HEARTS

While San Isidro invests an average of S/. 286 per resident/year, Villa El Salvador only invests S/. 14 per resident/year, a proportion of 20 to 1. The required investment is possibly higher in San Isidro because of the mobility of its population. The district of Miraflores invests S/. 127 per resident.

With regard to the implementation of a participatory management model that guarantees effective mechanisms to facilitate civil society participation, it is very important that this model secure commitments from the parties involved to implement PIGARS. This ensures clarity regarding the rights and obligations of both the local government and civil society. It is important to ponder how to secure the commitment of the largest number of citizens.

1.2.4 Investment in Infrastructure for Final Disposal and Treatment

This section describes a series of reflections that promote investments in infrastructure for the final disposal and treatment of solid waste in 1,384 districts both in large and small cities in Peru.

1.2.4.1 In the Large Cities of Peru

Unfortunately the sanitation sector in Peru has been widely interpreted as the implementation of water and wastewater systems and has not included solid waste management, unlike other countries in Latin America. This has resulted in the absence of solid waste management on the agenda of international aid organizations with funds exclusively channeled towards infrastructure in water and wastewater and not for solid waste management. Solid waste management needs to be urgently included as part of the sanitation sector and must be a top priority on the national agenda and part of bilateral and multilateral negotiations with our national government

Conditions must also be created to foster private sector investment, guaranteeing the existence of land for this type of project. Law 27314 describes the municipal zoning plans. Obviously, all the paperwork for permits and licenses involved in the application process will be expedited in public offices.

Project profiles created under the National Public Investment System (SNIP) for waste management should be designed in a comprehensive manner taking into consideration each step of the waste cycle. Moreover, they should be complemented by cross-cutting themes such as environmental education and community participation.

The Formulation Units (UF) and in the Project Investment Office (OPI) must have skilled people. In our experience consultants bid on municipal projects such as background studies, pre-feasibility and feasibility studies and later the municipality does not have qualified people to revise and approve them. The municipality must then hire another consultant to evaluate and recommend approval to the UFs and then to the OPI, which makes the process even more cumbersome and expensive. Often municipalities have money, especially those that receive funds from mining industry payments, but they don't have projects approved by the SNIP in which to invest.

The section dealing with infrastructure for the treatment and final waste disposal stresses this weak spot. Waste separation also presents an interesting push from the public sector, especially after the program promoted by the District Municipality of Surco, directed at 20,000 homes, by which waste is collected and transported to a separation plant where the waste is classified and packaged for sale.

There are a number of other business initiatives in districts in Metropolitan Lima and other regions of the country. Unfortunately, they have not been sustainable because they have neglected to take into account the sizeable and long-term investment needed for such an operation. Additionally, municipal organization costs are high, managerial skills are not always taken into account when recruiting people for jobs nor the fact that the quality of waste varies depending upon on the socio-economic characteristics of the population. The case of the municipality of Independencia in Huaraz is unique because it has a separation plant but no system of selective collection.

Concerning waste transfer infrastructure, according to information from DIGESA about Lima and Callao, only the Huayna Capac transfer station in San Juan de Miraflores has authorization to operate and is currently only used by the municipalities of Lima (Central) and San Isidro. Even though there are other transfer stations like La Chira (in Chorrillos), Comas, Miraflores, Las Conchitas (in Villa María del Triunfo) and two in the district of Villa El Salvador (one belongs to Patresol SAC/Diestra SAC and a second belongs to the municipality) these are not authorized.

The operation of municipal vehicle fleets that carry out maintenance and repair of municipal vehicles is also complex and all too many wind up as “truck graveyards”. Since the vehicles are of different brands and are usually outdated models, it is obvious that the efficiency of the fleet of vehicles is extremely limited since it cannot reach an economy of scale.

This situation spells out the overall disorder making the solid waste management problem prevalent throughout. Lima will need a more organized system of transfer and final waste disposal, but unfortunately this is one of the areas where the Metropolitan Metropolitan of Lima lacks leadership, so much so that it is one of

the municipalities that does not have a PIGARS yet. Its current efforts are restricted to cleaning the downtown historic center of the city..

1.2.4.2 In Most Cities and Districts of Peru

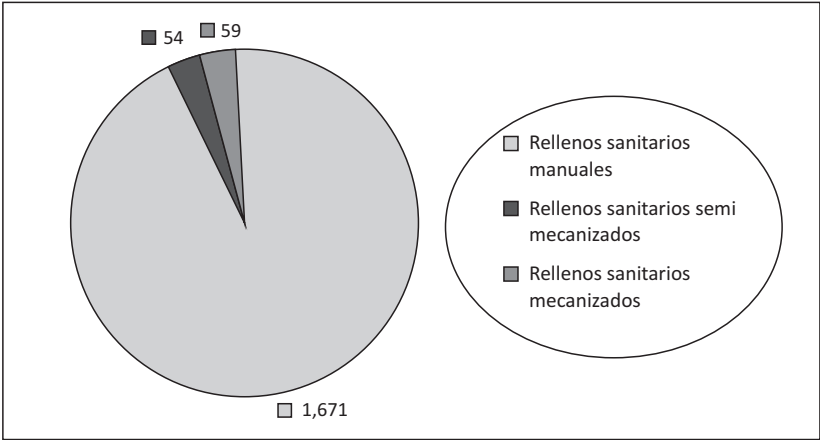
In response to the question posed regarding revising political guidelines for solid waste in the 1,384 districts that generate at least 2 tons of waste per day, the following reflections are presented below:

- a. The General Law of Solid Waste, under the framework of government institutions, promotes the participation of private investment in providing public services and the construction of solid waste infrastructure. However, small cities require small investments that are overlooked by private investors. It may be of interest to local private initiatives, but since the General Law of Solid Waste has been enacted no regulations have been issued to promote small public service companies.

- b. The technical and legal requirements to construct final solid waste disposal systems must be revised..There are 1,671 districts that generate less than 20 tons/day of waste and all are obliged to have manual sanitary landfills to properly dispose of their waste. There are 59 districts that should have mechanized sanitary landfills and 54 districts that should have semi-mechanized sanitary landfills. See Graph 5.

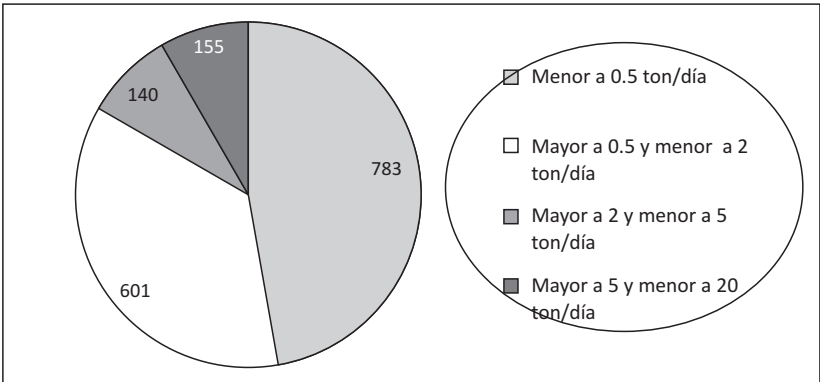


Graph 5:
Districts classified according to the infrastructure requirements of final disposal of solid waste (not including the provinces of Lima and Callao)



In-house preparation

Graph 6: Small districts that generate less than 20 tons/day of waste



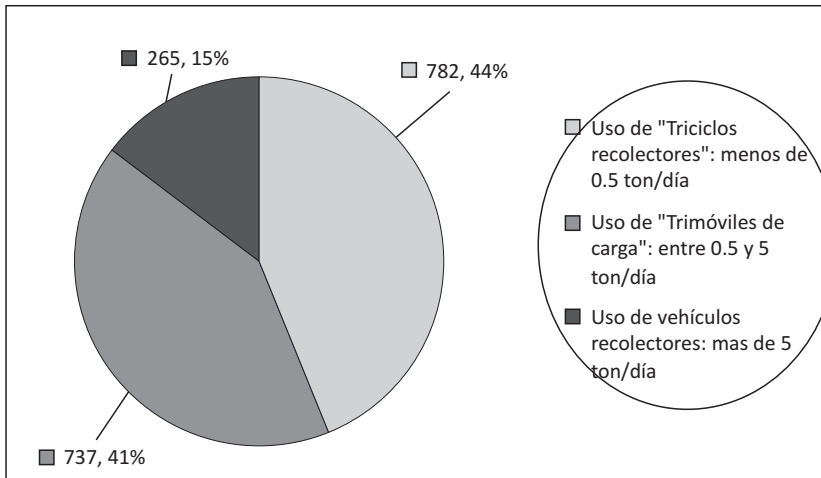
In-house preparation

There are 783 districts that generate less than 0.5 tons/day of waste, 601 districts that generate less than 2 tons/day and 140 districts that generate less than 5 tons/day. Would it not be more feasible to promote simpler solutions that are environmentally and socially acceptable and are much less expensive to implement and manage? See Graph 5.

1.2.5 In Collection and Street Cleaning

Revising the technology used for collection and street waste services: Cities that generate less than 0.5 tons/day of waste, could continue to use non-conventional systems such as tricycle carts and even small animal-powered carts . Cities that generate less than 20 tons of waste per day could use small motorcycle carts²⁹. If these were options, equipment investments would be significantly reduced, operation costs would be lower and fees would be more affordable to local residents. This system could even be successful in urban areas that generate less than 20 tons/day of solid waste especially if the law permits the final disposal site to be no less than 1 km. from a populated area. See Graph 7.

Graph 7:
Equipment requirements for the collection of solid waste



In-house preparation

²⁹ When less than 0.5 tons/day are generated.

Consequently, we need to work with authorities and municipal officials and with local leaders to grasp the following message: “The environmental remediation of our cities is part of our fight to reduce poverty”. The appropriate use of non-conventional technologies allows for more effective, efficient systems that create jobs and pay higher wages for families living in poverty and who are socially excluded.

On the other hand, since our major cities have grown without proper planning a combination of conventional technologies (trash compactors³⁰) and non-conventional technologies (tricycles or motorcycle carts) is becoming more acceptable. The management system ends up being more effective (larger coverage) and more efficient (lower cost). However, it is necessary to replace the poorly named “collection points” for transfer stations, an infrastructure conveniently located to facilitate the transfer of solid waste to collection vehicle with larger capacities.

At present cities with limited motor vehicles increasingly use non-conventional technologies to improve manual street cleaning services. Formerly, at best waste was bagged and stored on street corners along the pick up route of a garbage collection truck. At worst waste accumulated at “collection points” in the city until picked up by a garbage collection truck. Tricycle carts and motorcycle carts are effective and economic and socially beneficial in transferring solid waste to collection trucks and improve the performance of manual street cleaning in lieu of mechanized street cleaning.

³⁰ The use of dump trucks and garbage trucks is becoming less frequent because of their low performance output and high operation costs. In the case of dump trucks, they require an especially large investment.

Chapter II:

Invisible Actors:
“Recyclers”, the Public Value
of their Investment

As we have mentioned, in the past years selective solid waste collection systems have progressively been implemented in Peru. Few municipalities provide selective waste collection services although the law allows them to contract private businesses that are compensated according to the amount of waste they collect. Municipal authorities are willing to “get trash out of the district whatever the cost”, without regard to compliance with the law or the goals and objectives of the National Comprehensive Solid Waste Management Plan³¹ approved in 2005. Corruption within public entities only exacerbates this problem.

“Clean cities are not those that clean more, but rather are those that litter less”. In this vein, we propose that municipalities take steps to implement a sustainable and integrated solid waste system that prioritizes the creation of solid waste minimization programs. The reduction of solid waste at the source is the most effective way of reducing the quantity and costs of waste management while minimizing negative environmental impacts.

The reduction of solid waste can also be carried out in homes, educational institutions, and commercial and industrial complexes through the selective sale, reuse or recycling of waste. Separation at the source provides a number of advantages:

1. Each time solid waste is separated and stored properly we facilitate its handling by reducing contamination risks and the presence of disease vectors. Additionally, we can recover a larger volume with a greater value.
2. Each time solid waste is separated, the amount of waste disposed of in sanitary landfills is less thus protecting the environmental quality of the soil, air and water. When the

³¹ Management Council Decree N° 004-2005/CONAM/CD, published on 6/2/05.

populations of cities grow, a larger area is needed for sanitary landfills therefore separation at the source increases the lifespan of sanitary landfills.

3. New prime material can be generated at a lower cost, saving natural resources and energy. Every time products are produced with recycled materials, energy is saved along with natural resources such as water, fuel, trees, energy, minerals, etc.

Additionally, selective solid waste collection provides the following advantages:

1. Solid waste management is improved. Larger quantities of solid waste can be recovered at the source, reducing contamination risks and increasing the value of the waste recovered.
2. Municipal solid waste collection costs are lower because of savings in man hours, fuel, vehicle wear and tear among other things. Programs that promote separation at the source and selective collection reduce the volume of waste collected that needs to be treated or disposed of in landfills, reducing costs for the municipality.
3. Selective collection of solid waste in Peru is an opportunity to create decent jobs with higher wages for hundreds of poor families, the recyclers. Selective solid waste collection is a strategy to fight against poverty by providing jobs for hundreds of poor families who informally scavenge garbage on streets and in dumps with tricycles or on foot, day or night, for solid waste that they store and sell to warehouses that buy separated waste. This is their main means of livelihood.

2.1 Recyclers in Peru

There are an estimated 15 million recyclers in Asia, Africa and Latin America, especially in large cities. Generally these are people from the most vulnerable groups: immigrants, the unemployed, senior adults, children, people with special needs, single mothers, and the uneducated.

In Peru there are more than 100,000 recyclers who work in cities throughout the country. There are an estimated 1,500 recyclers in Callao, which has a total population of 800,000. This means that recyclers make up 0.25% of the total population.

2.1.1 History and Testimonials

The first question that comes to mind is: How long has Peru had recyclers? And the answer is: for a very long time, with a larger number starting after the development of industrial activities at the beginning of the twentieth century. Since then, there has been a sizeable population that collects solid waste. When we speak of those older than 60, like Mr. Alberto Castillo, we refer to them as: “botellers” (bottle sellers). He has worked as a recycler for more than 40 years. “I have always done this, every day I cover the area from Pamplona in San Juan de Miraflores to Barranco, where ‘cachineo’³² and at the end of the day I head to Gamarra in La Parada (a large market in central Lima), to sell what I have collected that day”, he tells us.

When cities form and population density increases the waste problem becomes more apparent because the larger the population, the larger the amount of waste generated. Changes in

³² “Cachineo”, refers to the purchase of used items, in some cases broken items that are repaired and then sold.

consumer levels and modernity also have an effect on the composition of waste produced. Today we generate more waste and types of waste than can be recovered and integrated into production. Some waste cannot be recycled, and as a result this has a more harmful effect on the environment and public health.

The self-titled “cachineros” are pioneers because they have always bought bottles, iron, old cots, and used clothes. Then came the “recaladores” that rip open bags or “buzos” in dumps. There are also the “chanceros” or pig farmers that have agreements with restaurants, hospitals and even households in peri-urban areas to collect their organic waste for their pig farm.

The unemployment crisis in the country has sparked an increase in the number of recyclers because in a country like ours it is difficult even for professionals to find a job. It is especially difficult for those that did not have the opportunity to complete their schooling and go to college or receive technical training. This is the case for most recyclers in Peru, as it is in other countries in Latin America, Asia and Africa.

We always refer to recyclers as “entrepreneurs”, because they are not on the streets begging for money or food. They have created their own job, but this job must be improved. They must have better working conditions and EVERYONE, absolutely EVERYONE from authorities, officials, businessmen, the media, social leaders, professors, and students should see them as “Cleaners of the Planet” and not as pariahs or delinquents that should be eradicated.

Several days ago we had a case that unfortunately occurs frequently in this country. In Miraflores we have organized the selective collection of solid waste and every 15 days the recyclers come to pick up the recyclable material. When they were taking

the recyclable material a Serenazgo (Public Safety and Security Unit) truck stopped them and confiscated the recyclable material, saying that in Miraflores there was an ordinance prohibiting recycling. Upon asking to see this ordinance, I explained to the Serenazgo members that the General Law of Solid Waste 27314, its regulation D.S. 057-2004, and the D.L. 1065-2008 encouraged recycling and that they should instead be thanking these men that come to collect recyclable material.

Unfortunately this situation is all too common in several districts of Lima. Municipalities like San Isidro and San Miguel for example, spent money to convene a councilmen meeting and bribed its councilmen to approve an ordinance outlawing recycling in public. They paid for the publication of the ordinance and have hired security forces to eradicate recyclers instead of organizing and educating residents so that they separate their waste. They could have easily implemented a formalization program for recyclers and selective collection that would create jobs, reduce waste service expenditures and protect the environment.

Each story, each testimonial of the recyclers with whom we have worked all these years is sad but at the same time bursting with an incredible and unyielding courage, bravery and optimism. We often ask ourselves if under the same circumstances we would have been able to do the same. We often remember their smiling faces or their warm hugs each time we bump into each other and this is a great source of comfort which fills our souls with a sense of fulfillment..

Here is a small sample of some of their testimonials. For obvious reasons we have changed their names.

Teresa and her granddaughters

Teresa commented, "I cannot work during the day like everyone

else. I need to keep working at night because I have to take care of my granddaughters. I have two granddaughters that I take care of, both products of the rape of my daughters. My three daughters have been raped by the same man, and two of them were impregnated. But with my recycling I am getting ahead, first for my daughters so that they finish school and can get ahead in life in spite of what happened to them because it was not their fault." Asking what happened to the rapist, she says "We turned him in to the police but later they let him go and now he walks around the streets like nothing happened. I feel enraged when I see him, but we must keep moving forward..." this is especially remarkable because Teresa is one of the leaders of her recycling association, she participates in the assemblies, assuming this role with great responsibility., Hearing her, one only want to hug her and give her the grace of God.

Maria and her long journey

Maria was born in the highlands of Peru. Like she says, "I only remember with happiness those few years that I lived in my small town in the middle of farmland. My father hit my mother, I don't remember him hitting me, and the embrace of my mother is still with me, the warm food". When she was 6 an aunt took her from her house, she was confused and did not know what was happening, only that she was going far from home: first by horse, they by car, then in a small boat. It was a never-ending journey until it she reached in the jungle of Puerto Maldonado, a very remote area. That's where her hell began. She endured physical abuse on a daily basis. She was a servant and every plate of food meant more insults. She tried to escape, but she didn't get far. When she was 15 she returned to her town yearning to see and hug her parents. That was when she learned that her aunt had sent her away because her mother had died, and sometime later her father also died.

There was no one in the little house she remembered. Her siblings shared the same fate, all were divided up between other relatives. She faced a series of hardships to get to Lima, traveling on top of cargo trucks. Finding herself sitting alone on a bench in the Manco Cápac plaza, she saw an old woman collecting bottles, who offered to teach her the profession. She left her in one of her pens which marked the beginning of her life as a waste recycler. Now she heads an organization of recyclers and every day she must deal with municipal officials who do not appreciate nor understand her work, but she continues to be steadfast.

As is evident from these testimonials recyclers often come from very difficult backgrounds plagued by abandonment and domestic violence. If we were to include other testimonials, we would discover people who lost their job as older adults, older adults without retirement pensions, single mothers abandoned by their husbands/boyfriends and disabled people looking for a way to survive.

These are the stories of the brave, worthy to be published on the headlines of newspapers and broadcast on TV newscasts to inform the public of their plight and success and to spread their enthusiasm, courage, desire to overcome their difficulties, and conviction that it is possible to create one's own means of livelihood. Additionally, waste scavengers and recyclers clean the planet of mountains of trash. We therefore ask ourselves: Can we all change our minds and hearts and pool our efforts so that the recyclers of Peru and of the world can be appreciated, recognized, formalized and have laws and rules to enable them to secure human working conditions?

2.1.2 The Work They Do

The public knows that recyclers are people who collect waste to sell, but they do not know that they work such long hours, are victims of harassment, are poked fun at and humiliated. They have to work with their spouses and children because they have no other place to go and their children are often discriminated against at school.

These children find it difficult to access the formal education system because their knowledge and abilities are out of context and not appreciated, such as basic arithmetic calculations.. If these children “don't know” math then how on Earth do they know how to buy and sell products, or to design their own collection routes?

International organizations frequently decry child labor and we all join in chorus. However, forbidding child labour in itself does not suffice. Parents must be given adequate opportunities so that their children do not have to work. When trash recyclers are able to gain a better income and can leave the dumps and streets and practice selective collection, the first thing they do as parents is send their children to school. This has stood out clearly in most of our projects. At our workshops with group work when we ask the participants about their dreams everyone, absolutely everyone, dreams of sending their children to school and to college so that they can get ahead in life. They dream of having their own house with basic services. To make this dream become a reality we must give them opportunities.

If we ask each recycler why they do this job, most say they do it out of need, because they have no other means of income. They also admit that they could lead a better life if they could get a job in the formal sector, if the authorities would offer them a legal job. Curiously, this is much less than street vendors, who occupy common spaces and litter the streets, ask of mayors; or motor taxi

and bus drivers who litter and increasingly threaten the safety of passengers and pedestrians alike with their wreckless driving.

The members of Recyclers Associations and the National Movement of Peruvian Recyclers (MNRP) are now aware of the fact that they can become proper recycling businessmen since they are excellent allies for municipal authorities and community members. They actually clean up the city and sell their waste to exporting and recycling businesses and have become a formidable labor force as the first step in the recycling chain. Nonetheless, they are still the most vulnerable link of this chain.

As the recyclers themselves declare, "Once we are organized and formalized we can eliminate the drug addicts and delinquents that use recycling as a quick means of making money to buy drugs or to get involved in illegal business. The government should take action to avoid having so many drug addicts, predators and delinquents living on the streets because this affects community safety. If the government finally takes action the public will no longer point a finger our way."

2.1.3 Socio-Economic Characteristics of Recyclers

The socio-economic study on recyclers in the District of San Juan de Miraflores, located south of the city of Lima, has provided us with valuable information about what is going on.

Heads of household that recycle are 70% men. The average family size of a recycling family is 6.2 people per family. A total of 46.67% of families are nuclear families (made up of parents and children) and 33% are extended families (live with more than one nuclear family and/or more than two generations).

A total of 83% of the heads of household are older than 36, and the largest group is between 36 and 45 years old (40% of the total). A total of 33% of the heads of household were born in the city of Lima and 66% were born in provinces outside of Lima. Most immigrants come from the highlands, especially from Huamanga, Andahuaylas and Puno. A total of 48.3% of the heads of household have domestic partners, 27.6% are married, 13.8% are separated, 6.9% are single and 3.4% are widowers. A total of 74% have lived in Lima for 26 to 50 years, and the majority arrived in the 1960s and 1970s.

Only 27% have a fixed telephone line, 43% have a prepaid cell phone, and 27% use the internet. A total of 83.3% have their own house, and 64% of the homes are made of brick, 84% have polished cement floors, 50% have a corrugated plastic roof and 25% are made of concrete. Most are squatters, living on public or private lands that have gradually obtained basic services. Many homes have a basic structure that is the main investment made by the families over a span of several decades.

With respect to the education level of the heads of household, 53.3% have attended secondary school and only 13.3% have completed secondary school. A total of 33.3% have not completed primary school. Regarding the education level of the children of recyclers, for those between the ages of 6 and 11, 85.7% are in primary school, 7.1% in kindergarten and 7.1% are not in school. Only 92.9% are enrolled. Of those between the ages of 12 and 18, 54.8% are enrolled, however almost half do not go to school, 11.1% have dropped out and 7.4% have not passed the grade. The greatest economic and social hardship of recyclers is reflected in the secondary school dropout rate of their children.

With respect to the health of the recyclers, 25.8% have had some form of respiratory infection: influenza, cough, asthma, bronchitis, etc., 6.6% digestive infections: diarrhea, gastritis, colitis, etc. When

they get sick 46.7% go to the local health post, 10% to the health center, a natural healing center, or the pharmacy, and 13.3 % do not go to any health center. The major issue is the lack of follow-up in the treatment they receive. For instance, they do not have the money to pay for necessary lab tests and to buy the medicines prescribed to them by physicians.

With respect to the knowledge and abilities of the heads of household it was discovered that:

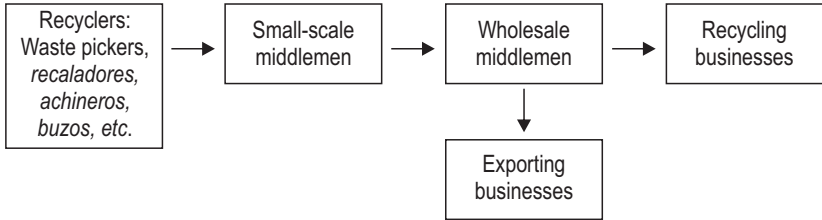
- 93.3% know how to read and write and 6.7% are illiterate.
- 33.3% know the four basic math operations (addition, subtraction, multiplication and division).
- 33.3% know three basic math operations (addition, subtraction and multiplication).
- 20% only know two basic math operations (addition and subtraction).
- 6.7% only know one basic math operation (addition).

A total of 42.3% only have one source of income (recycling), 35.7% have two jobs, 10.7% have three jobs and 10.7% have four jobs. If they have to work in other sectors, they tend to work as street vendors, construction workers and in small animal husbandry. In relation to employment and income, 66.7% of households have two or more members involved in recycling, and 33.3% of households only have one member involved in recycling. Most work between 5 to 6 days a week for more than 8 hours a day.

In relation to their civic responsibilities, it was found that 83.3% have a National Identity Document (DNI), 13.3% do not have the document, and 3.3% have the document (DNI) but it has expired. Among the reasons why some do not have their document are that they do not have the money to pay for the cost of the DNI and do not have time to do the necessary paperwork.

2.2 Where the Work of Recyclers is Headed

2.2.1 The Recycling System



Below are the recycling systems categorized by type of material. The value chains corresponding to waste are as follows: waste is first collected from homes, businesses, educational institutions, private businesses, public spaces and other areas in the municipal sphere. In the non-municipal sphere, waste is collected from factories, foundries and diverse industries that generate large volumes of waste as by-products of their activities.

On the first level, waste is collected by recyclers or picked up by vendors hired for this activity. Informal recyclers sell their products to formal and informal small-scale middlemen who then sell them to wholesale middlemen and informal storage spaces. Wholesale middlemen are the main providers of waste to industry who prefer to purchase from formal companies in large quantities.

With respect to the external market, some formal vendor companies both wholesale and small-scale also export solid waste, just as some factories export the by-products of their activities. This waste is used by industries as a raw material that is often combined with non used prime material or exported as waste to be used as raw material.

Recycled paper. At the global level, trunks and wood fibers are the principal sources of fiber to make pulp. Some types of pulp are produced by using other less common materials such as cotton fiber, *bagazo*³³, bamboo, synthetic fibers and recycled paper. To make paper from recycled raw material, white paper and thick paper from notebooks, books, magazines and other sources are used and the ink is removed. Hence the pulp is then ready to be re-used in order to produce new paper. This pulp is used instead of cellulose or crude material, which helps conserve nature by reducing the dependency on wood and other natural resources. The types of paper that are most commonly recycled are: white paper, *couche* paper, newspaper, magazines, *carablanca*, telephone books and mixed paper (first and second class).

Recycled cardboard. Cardboard is characterized as first class, meaning used but clean, and second class, meaning dirty but usable. The reuse of cardboard as a raw material is important because it contains a large quantity of fiber that can be reused multiple times. Some factories use 100% of recycled cardboard as raw material. Recycled cardboard is used to make craft paper, bulky paper, corrugated cardboard and other products.

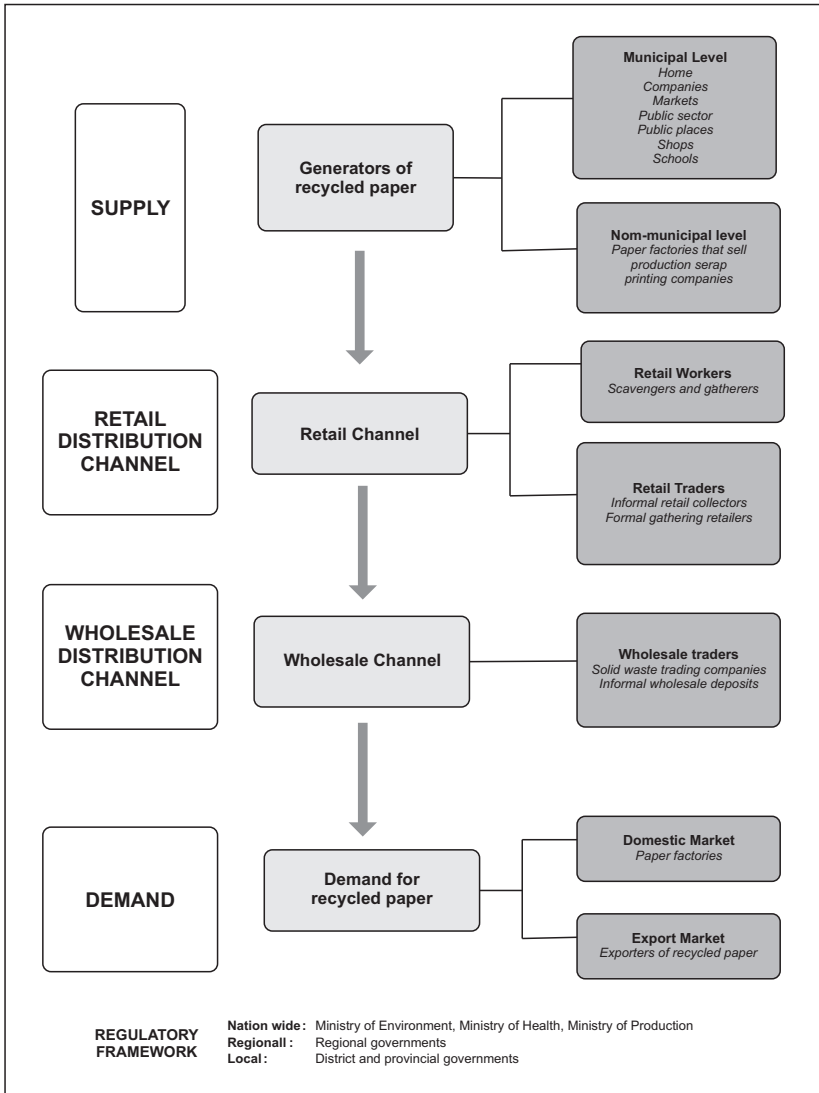
Recycled PET plastic. PET or polyethylene terephthalate is a transparent, light, durable and completely recyclable plastic. It is estimated that 75% of recycled PET is transformed into polyester fiber that is used to produce blankets and clothing, car rugs and floors, jacket stuffing, sleeping bags and comforters. The other 25% is used to make thin plastic sheets and small fibers. A large portion of this material is exported.

³³ A by product of sugar cane, *bagazo* is a prime fibrous material for the production of pulp in Peru. It is a much simpler material than wood for heating and separation of fibers.

Other plastics. In the case of other plastics, recycling is completely informal. There are a wide variety of plastics but only some are recyclable. The plastics most widely used as raw materials are: Polypropylene, polyester, PVC, and mixed plastic amongst others. Recycled plastics are mostly used to produce PVC pipes, toys, bags and bottles. Polyethylene is used for the production of buckets, gallon jugs and the like. Polyester is used to produce toys, shoe heels, glues and buttons, while PVC is used for make shoe soles, hoses and tubes.

Scrap metal and recycled metal. Scrap metal can be heavy and made of iron and lead or light from light aluminum, cans and other materials. Metal waste sells at higher prices than other waste, but it is not commonly found in households and office waste. Mining companies, power companies and similar industries that sell waste from workshops and businesses that sell vehicles, trains, boats, barges and other products are the main producers of metal waste. The most common metal waste in the national market are iron scrap, aluminum, bronze, copper, manganese, stainless steel, lead, and antimony in the form of cans and thin metal sheets. Peru exports metal waste made of antimony, aluminum, steel and copper.

Graph 8
Value Chain: Recycled Paper



In-house preparation: with the exception of the scrap and metal chain, the other chains are very similar.

The first step in the value chain is made of the recyclers who collect waste from producers in households and businesses. This waste passes through a long chain of small-scale and wholesale middlemen who sell the waste to recycling and exporting businesses.

It is important to work with all the actors involved in the recycling chain because recycling and exporting businesses can be strategic partners in organizing recycling associations and small businesses to add value to collected waste. Recyclers can also work directly with them to increase their income.

Obviously this may only be feasible if recyclers are organized, have proper storage centers and access to credit in order to set up and outfit these centers, adding value to their “products”. This would create jobs, especially for senior adults who have a difficult time covering large areas of the city pushing a tricycle cart, but who cannot retire because they don't have a pension and do not receive social security.

Average profit margins for each step

Table 10 summarizes the average price for each step of the chain by material type. These values were obtained by using minimum and maximum prices at each step according to recyclers, small-scale vendors, wholesale vendors and factories. Prices are listed for each value chain: paper, cardboard, PET plastic, other plastics, and metal and scrap metal

The first column of Table 10 corresponds to the price paid by small-scale vendors to informal workers (recyclers and waste pickers). The second column corresponds to the prices paid by wholesale vendors to small-scale vendors, while the third column corresponds to the prices factories pay wholesale vendors for recyclable materials.

Table 10
Average Prices for Recyclable Material without General Sales Tax
(In Nuevos Soles per Kilo)

Material	Price paid by small vendors to recyclers	Price paid by wholesale vendors to small vendors	Price paid by factories to wholesale vendors
Document paper	0,75	0,75	n.d.
Mixed paper	0,15	0,20	0,36
Carablanca paper	0,70	0,70	0,80
Newspaper	0,15	0,18	0,30
Telephone books	0,10	0,15	n.d.
Cardboard	0,15	0,25	0,40
PET Plastic	0,80	1,20	1,50
Polyethylene Bags	0,60	0,70	n.d.
Hard Plastic (PVC)	1,00	n.d.	n.d.
Mixed Plastic (PE, PP, PS)	0,80	n.d.	n.d.
Tin sheets	0,20	0,50	n.d.
Iron Scrap	0,40	0,60	1,00
Aluminum Scrap	3,00	3,50	n.d.
Bronze Scrap	6,00	10,00	n.d.
Copper Scrap	7,00	9,80	n.d.
Lead Scrap	2,00	4,00	n.d.
Antimony Scrap	1,00	2,00	n.d.
Manganese Scrap	n.d.	6,00	n.d.
Steel Scrap	n.d.	6,00	n.d.

n.d.: No data.

Source: Interviews and surveys with informal recyclers, vendors and factories. November 2007

As we can see from Table 10 there are some materials that are not used by the largest factories, but rather they are directly exported, as in the case of PET plastic and several metals. These are also bought by small factories, especially small plastic factories that buy hard plastic and mixed plastic from recyclers or small-scale vendors. Plastic bags are used for the export of scrap PET fragments.

It is important to point out that wholesale vendors acquire some materials from the waste of factories. In the case of certain metals, they are not collected by recyclers but are bought directly from the mining and electrical industries by small-scale and wholesale metal vendors

The highest demand for recyclable material in Lima used in the national production of goods is for: cardboard, newspaper, carablanca paper, and PET plastic and several metals that are bought by foundries to sell to the iron and steel sector. Factories pay higher prices and demand certain conditions: an invoice with the General Sales Tax (IGV) included, quality specifications, and minimum order requirements. Due to these conditions, factories prefer to deal directly with formal wholesale vendors. This is why recyclers are creating associations and implementing storage centers, first to sell material to recycling businesses and later on they will be able to sell directly to factories.

The average profit margins of each step have been calculated for their respective value chains and are outlined in Table 11.

Table 11
Profit Margin per Kilo (In Nuevos Soles per Kilo)

Material	Profit margin for recyclers	Profit margin for small vendors	Profit margin for wholesale vendors
Document paper	0,75	0,00	n.d.
Mixed paper	0,15	0,05	0,16
Carablanca paper	0,70	0,00	0,10
Newspaper	0,15	0,03	0,12
Telephone books	0,10	0,05	n.d.
Cardboard	0,15	0,10	0,15
PET plastic	0,80	0,40	0,30
Polyethylene bags	0,60	0,10	n.d.
Hard plastic (PVC)	1,00	n.d.	n.d.
Mixed plastic (PE, PP, PS)	0,80	n.d.	n.d.
Tin sheets	0,20	0,30	n.d.
Iron scrap	0,40	0,20	0,40
Aluminum scrap	3,00	0,50	n.d.
Bronze scrap	6,00	4,00	n.d.
Copper scrap	7,00	2,80	n.d.
Lead scrap	2,00	2,00	n.d.
Antimony scrap	1,00	1,00	n.d.
Manganese scrap	n.d.	6,00	n.d.
Steel scrap	n.d.	6,00	n.d.

n.d.: No data.

Source: Interviews and surveys with informal recyclers, vendors and factories. November 2007.

Based on the information in Table 12, recyclers have the largest profit margins for material within the value chain. This is because they do not pay those that produce waste for the material they collect. However, it is important to point out that recyclers work very long hours and are only capable of collecting small volumes of material, of which a large portion is too dirty to have a significant resale value.

In the case of small-scale vendors, even though they have a smaller profit margin on a per unit basis than recyclers, they store a larger volume of materials from several recyclers without added costs. Wholesale vendors store material sold by several small-scale vendors. Formal wholesale vendors buy material from both formal and informal small vendors.

The profit margins presented in Table 12 have been calculated using average prices. Dirty materials will sell at lower prices, and material that have been cleaned, transformed and/or compacted according to the requirements of the buyers will sell at higher prices. Informal small-scale vendors and formal and informal wholesale vendors earn the highest profit in the chain. Formal small-scale vendors face high costs with low profit margins, making it difficult for them to compete with informal small-scale vendors.

Formal wholesale vendors receive good prices because they have access to waste produced by large factories and at the same time can sell directly to factories and/or export to the international market.

It is important to point out that the global economic crisis is directly affecting the prices of materials that recyclers sell. This sector has been hit hard, and we have recently reviewed prices from the US, Canada and Puerto Rico that show that this crisis is worldwide. The price drop of cardboard, scrap metal, PET plastic and paper is

drastic. For example in Puerto Rico, according to the Authority of Solid Waste (12/10/08), a month ago a ton of corrugated cardboard sold at US\$125, but the previous week sold at US\$20. The price of scrap metal spiked at US\$450 six weeks ago, but currently there is no demand for it. The price of newspaper, which topped off at US\$125, now sells for only US\$20.

Below is a table of prices from the first week of November (2008) from recyclers in the district of San Juan de Miraflores (Lima):

Table 12. Profit per kilo of waste (in New Soles per kilo)

Material	Price/kilo September	Price/kilo November	Observation	Drop in Soles
White paper	0.80	0.80	stable	0.00
Color paper	0.30	0.30	stable	0.00
Mixed paper	0.20	0.20	stable	0.00
PET plastic	1.00	0.40	dropped	0.60
Hard plastic	1.00	1.00	stable	0.00
Milk cans	0.80	0.20	dropped	0.60
Cardboard	0.35	0.28	dropped	0.07
Film	1.00	1.00	stable	0.00

Source: RECICONSUR , San Juan de Miraflores, Nov. 08

The situation worsened in December, creating more financial problems for recycling families.

2.2.2 The National Public Sector

Legislative Decree 1065, which amends Law 27314, the General Law of Solid Waste, was enacted on June 28, 2008. Article 4

specifies that the political guidelines under subsection 10 state as policy “to encourage the formalization of people, operators and other entities involved in solid waste management without the corresponding authorization. Measures to prevent work-related injury, create safe and healthy working conditions, and value the social and economic contributions of their work must also be addressed.”

Subsection 3 of Article 27 of the Legislative Decree 1065 states that “Solid waste management services and the sale of waste material by small businesses are restricted to non-hazardous waste in accordance with the regulatory provisions that dictate its promotion.”

Article 43 of Law 27314, states that “the sector and municipal authorities shall establish favorable conditions that directly or indirectly create an economic benefit in favor of those persons or entities that carry out activities of minimization, separation of waste at the source for its reuse, or investment in technology and practices, methods or processes that help to improve the management of solid waste in the economic sector and activities linked to its production”.

Likewise, Article 45 of the same Law 27314 states, whenever it is technically and economically feasible, “the state, through its relevant entities, shall promote the creation of markets for by products and that the national producers and distributors of imported products shall establish mechanisms that involve the participation of consumers in the recovery of reusable packaging...”

Article 16 of Supreme Decree N° 057 Regulation of the General Law of Solid Waste states that the separation of solid waste is permitted at the source of generation or in a treatment facility operated by a

solid waste service provider EPS-RS or a municipality, when it is an authorized operation. A solid waste vendor CE-RS may also separate solid waste if they have the proper facilities to do so. Article 54 states that “the producer shall implement strategies that minimize or reuse waste that are provided for in their respective waste management plan, which will be promoted by sector authorities and provincial municipalities.” Article 55 states that the object of separating waste is facilitating its reuse, treatment or sale, through the safe and sanitary separation of its components, complying with article 16° of the regulation.

Additionally the sixth temporary provision of the regulation of the General Law of Solid Waste establishes in its second paragraph that “...Provincial municipalities nationwide shall implement, within their jurisdiction, a Program of Formalization of Solid Waste Recyclers with the goal of their constitution as small businesses; in accordance with the guide that the health minister will write in coordination with the Ministry of Labour and Social Promotion”.

On October 7, 2008 according to Ministerial Resolution 702/2008/MINSA the NST Number 073-2008-MINSA/DIGESA/V.01 “Technical health regulation that guides the selective management of solid waste by recyclers” was enacted and has entered into force nationwide. It aims at establishing the guidelines for participation in operational activities involving the handling, separation, packaging, collection and transport of municipal solid waste before its reuse in order to promote the sanitary and environmentally friendly reuse of solid waste. The specific objectives are:

- a. Provide orientation for operational activities that involve the manipulation, separation, packaging, collection and transport of solid waste before its reuse.

- b. Ensure proper management to diminish public health risks, to protect and promote environmental quality, health and human well-being.

On October 30, 2008 the proposed Bill 2819, The Recycler's Law, entered into debate in the National Congress. It was drafted by a commission made up of the Ministry of the Environment, the National Human Rights Institution, the Metropolitan Metropolitan of Lima and Callao, the Regional Government of Junin, the National Movement of Peruvian Recyclers (MNRP), the Congressional Commission of Andean, Amazonian and Afro-Peruvian Populations and the Environment, *Ciudad Saludable* to mention a few. The following are some of the key elements included in this draft legislation:

- a. That the state recognizes the work done by recyclers, promotes their formalization and integration in the solid waste management systems in each city in Peru through district and provincial municipalities.
- c. That the local regulatory framework should be geared towards including recyclers as part of the local solid waste management system.
- d. That the programs and projects for the management of solid waste implemented by local governments should include the work of independent recyclers.
- e. That local governments should establish rules that promote and regulate the work of recyclers of non-hazardous solid waste in coordination with registered recyclers' associations within their jurisdiction.



Waste recyclers from all over Peru present the bill "Law that regulates waste recycling activities" before the Congress of the Republic (on October 30,2009).



The President of the Congress of the Republic and several congressmen welcome the members of the committee made up by the MNRP, Ciudad Saludable, municipal and governmental authorities who presented the bill to regulate the activity of waste recyclers.

Dr. Antonio Brack Egg, Minister of the Environment, has recently encouraged municipalities to formalize recycling by suggesting that informal recyclers become members of formal local councils and should use uniforms so that the public can easily identify them. Informal recyclers must be integrated into the efforts that all municipalities undertake to preserve the environment.

2.2.3 Municipalities and the Formalization of Recyclers

It is encouraging to know that at the level of municipalities progress is being made. Municipal ordinances have approved the implementation of selective collection programs and the formalization of waste pickers:

- Provincial Municipality of Callao (Ordinance N° 060-2007-MPC, approved December, 18, 2007),
- ? Provincial Municipality of Coronel Portillo (Ordinance 004-2008-MPCP, approved March 11, 2008),
- ? Provincial Municipality of Huaraz (Ordinance N° 019-2008-GPH, approved June 2008),
- ? District Municipality of San Juan de Miraflores (Ordinance N° 000038-2007-MDSJM July 18, 2007).

A series of economic incentives are being examined in addition to the recognition of residents, institutions and businesses. Rules and regulations are being studied for recyclers. Non-compliance will be met with sanctions.

One of the most progressive municipalities with respect to this issue is the Provincial Municipality of Callao which has amended its Sole Code of Administrative Procedures - TUPA and has enacted Ordinance N° 038-2008-MPC, adopted on July 25, 2008, that outlines the registration process of authorized operators in the

Municipal Registry for the selective collection of solid waste in keeping with the following requirements:

1. An application for a permit presented to the mayor indicating name, surname, DNI, home address, Waste Picker Association affiliation, area code, the service provided, invoice identification number and date received, signature and finger print.
2. Photocopy of membership card from the Waste Picker Association to which they belong.
3. Photocopy of training course certificate approved by or taught by the municipality (Only for the registration).
4. Photocopy of proof of tetanus vaccination.
5. Photocopy of a health certificate issued by the municipality (only for people who work with organic solid waste).
6. Payment of the processing fee, equal to 0.4% of the UIT (for 2008 the cost was 14 nuevos soles).

The main delay in the municipal process is the approval of the regulations of the ordinance since this depends upon a series of reports from other departments and each takes several weeks, even months. This puts patience and perseverance to the test.

Several municipalities have not created ordinances but have nonetheless made significant progress in the implementation of selective collection programs, such the district of Villa El Salvador. This municipality pioneered the selective collection with the participation of recyclers in the Green Voucher program. Villa María del Triunfo, Comas, San José (in the province of Chincha), San Juan Bautista (Province of Maynas), La Victoria in the area of Cerro El Pino, and the provincial municipalities of Sechura, Piura and Moyobamba have also made significant progress in this area.

There is no doubt that the value of this progress lies in its ability to show authorities and municipal officials that implementing a

selective collection program and formalizing waste pickers is a win-win situation. The economic, social and environmental benefits are universal:

- ? The municipality wins because it stops paying for the collection, transport and final disposal of solid waste, thereby saving money.
- ? Residents win because they will pay taxes at a discounted rate using their voucher. They also may receive incentives like cleaner green spaces and housecleaning campaigns, like those in the district of Comas.
- ? Businesses win because they receive a “Green Stamp” that will allow them to implement a tangible social responsibility initiative, which is part of their social marketing.
- ? Recyclers win because they will have better working conditions, will increase their earning potential and will no longer be stigmatized by society.

2.2.4 Towards an Entrepreneurial Business

The first step to organize and formally set up a recyclers association or business is to legally incorporate it as an EC-RS in the public registries and DIGESA. Moreover, the association must have its bylaws that describe the nature of their work and the management of their resources. The members of the association should know each other well before incorporating the association or business.

Five stages are developed prior to creating a recyclers' organization:

1. Collection of material on streets and in dumps without coordination with municipalities and the community.
2. Organization of selective collection in neighborhoods by a recyclers' association in conjunction with the municipality and with the clear cooperation of district residents.

3. Organization of selective collection in neighborhoods and businesses by a recyclers' association in conjunction with the municipality and with the clear cooperation of district residents and businesses.
4. Organization and implementation of storage centers where recyclers store their material and later sell it to businesses or large-scale vendors, thereby moving up the value chain.
5. Adding value to recyclable products and diversifying services within the recyclers' associations.

Most recyclers in Peru are in the first stage, but significant progress is being made in the second and third stages. As mentioned, this organizational level is associated with household selective collection.

In the fourth stage, the implementation of storage centers is a fundamental step to consolidate the operation of the recyclers' association. This step represents a qualitative leap because it is a space where recyclers manage the center with shared interests, there is a mutual trust involved in providing capital for a common task, basic control procedures are established for the purchase and sale of recycled material, and more is invested in the market because they play a more active role in the recycling value chain.

2.2.5 Selective Collection in Homes and Businesses

Selective Collection in Homes

To optimize this process, the following needs must be addressed:

- ? The work zones must be defined.
- ? Schedules must be defined for the service and selective collection.
- ? The equipment must be defined.

- ? Worker safety clothing and accessories must be chosen.
- ? Relationship with residents or clients.
- ? Relationship with the municipality: authorities and officials.
- ? Sale of recuperated materials.
- ? Community-based incentive mechanisms must be created.

We have observed that it is more effective to promote the waste separation in homes using the following methods:

1. *House visits.* 100% of the population must be contacted and the best strategy is home visits. Reader-friendly outreach and support material must be prepared. This includes a waste catalogue with photos describing the different types of waste, such as organic wastes, recyclable waste, non-recyclable waste and the benefits of recycling.

House visit campaigns must be carried out by local volunteers, young students, local leaders and the recyclers themselves, with an ID issued by the municipality. They will use a map of the community and the waste catalog to outline the health, environmental and quality of life benefits of recycling for the community. Promoters should be divided into teams and break out to visit different areas of the community. Families who receive training should be registered so that the whole community can be contacted.

2. *Training leaders of community groups.* Several environmental topics should be presented ranging from “What is the environment? What are the types of pollution?” to “How to participate in a solid waste management system”. The training should employ adult education techniques and build on the previous experience of the leaders, reinforcing their knowledge. In this manner an appropriate action plan for training community members can be designed.



Selective waste collection in neighborhoods generates huge benefits for citizens, municipalities, the recyclers and the environment.



"1st Training Workshop for Waste Recycler Leaders" held in August, 2008.

3. *Environmental Watch Committees.* The role played by these committees relies on their commitment as leaders and good neighbors, despite having little free time. They will be in charge of monitoring public waste services and selective collection aside from observing the behavior of neighbors: at what hours do residents take out their garbage and if they dump the bags on the street. Special forms have been designed for this task and this information is then shared with municipal officials and citizens.
4. *Outreach through different media.* Another fundamental aspect of the strategy allows reaching different segments of the population and influencing public opinion. In medium and large cities this is an indispensable strategy to reach most of the population. Not only should we work with the larger media outlets, but also with local radio and television stations to reach different audiences. Messages or spots must be prepared beforehand and can be broadcast through loudspeakers in markets or the community.

The media has been very helpful and has transmitted our messages free of charge. We have also used educational murals, painted in areas with dense pedestrian traffic. These murals are painted by local youth and students as part of contests and other educational programs. Finally, posters can be placed in well-transited areas of the neighborhood such as stores, meeting spaces, health posts and other public areas.

Carrying out Selective Collection in Businesses includes the following activities under the umbrella of the “Recycling Together” program:

1. *Presentation of a proposal to the management team:* To reach agreements and communicate the implementation of the program to all departments.

2. *Technical visit*: Information gathering to implement the selective collection program that prioritizes the recycling of paper, cardboard and plastic.
3. *Design to implement the program based on the characteristics of the business*: Includes the definition of goals, objectives, actions, procedures, service schedules, and reporting and monitoring procedures. Material needed to train workers must also be discussed such as: posters, cards and stickers.
4. *Training/Awareness Campaign to implement the program*:
 - a. Awareness campaign directed at workers from all departments on the topics of environmental values and the principles of minimization with the designation of a team leader in charge of promoting the participation of workers within a department. One leader per department or floor is recommended.
 - b. Training workshop for the janitorial staff in the topics of proper waste management and safety and security.
 - c. Placement of colored bins in central locations for the temporary storage of paper/cardboard and plastic. Some recommended areas for these bins are: the lobby, meeting rooms, photocopy rooms, offices, etc. A calendar/log book and labels to distinguish the bins will be helpful.
 - d. Introduction of the recycler(s) who will carry out the selective collection, will receive training and technical assistance and will be attend the "Recycling Together" program.
 - e. The quality of the selective collection provided by the recyclers will be monitored frequently. This includes the

improvement of the quality of life of their family (education and health conditions of their children, family health insurance, among other factors) directly resulting from higher wages and better working conditions.

5. *Program Implementation:* of selective collection “Recycling Together”. The recyclers coordinate the collection schedule and the amount of recyclable waste available with the janitorial staff. This includes the public launch of the institution participating in the program “Recycling Together” with a press conference that focuses on the benefits of the program and that promotes the incorporation of new institutions into the program.
6. *Program Monitoring:* is the responsibility of Ciudad Saludable and the representatives designated by the senior management of the institution. The material collected is weighed, registered and reported on a monthly basis to facilitate follow-up with all participating institutions. The participating institutions receive a solid waste economic valuation certificate and an accreditation of effective participation in the “Recycling Together” program.

As a result of the recent price increases of recyclable material more competitors seek these products to generate an income, especially institutions with very important social objectives. Some of these institutions work with special needs children and with burned children, as well as educational institutions (schools and universities) and municipalities that are understand that waste recycling is a good opportunity.

These institutions often contact us to work jointly on these initiatives but unfortunately we must decline. Despite the fact that this income may contribute to the financial sustainability and achievement of the worthy goals of these institutions, their

proposal would jeopardize the interests of the recyclers since this is their sole means of livelihood.

2.2.6 Tools To Promote the Work of Recyclers

This section describes the strategies to train recyclers and the credit program that is being developed. At present we are only providing training to formalize recyclers, but storage center management training and the new product development will be future projects of Ciudad Saludable and specialized institutions.

a) Training of Recyclers

Three training levels have been developed:

a.1 Training to formalize recyclers *Ciudad Saludable* signed an agreement with the National Industrial Training Service (SENATI) to design and publish six training modules for recyclers.

They include the following topics:

- ? Comprehensive Solid Waste Management
- ? Occupational Health in the Separation of Solid Waste
- ? Social Skills and Personal Development
- ? The Separation of Solid Waste as an Entrepreneurial Activity
- ? Using Management Tools in my Business (Part 1): Marketing and Strategic Planning
- ? Using Management Tools in my Business (Part 2): Calculating My Costs and Promoting Association for Entrepreneurial Growth

Each training module was developed using the workshop methodology with a constant interaction between the trainers and recyclers. The program covers 36 class hours and has trained recyclers from southern Lima and all the leaders of the National Movement of Peruvian Recyclers (MNRP). Soon recyclers from other

areas of Lima and other large cities throughout the country will be trained in conjunction with SENATI.

The most important part of this step is build the capacities of the recyclers to work in a formal employment through associations and businesses.

Lo más importante de esta primera fase, es que permitirá el desarrollo de competencias en los recicladores para trabajar en el marco de la formalización del reciclaje, promoviendo la asociatividad y el desarrollo de su actividad como una empresa con oportunidades.

a.2 Storage center management training Since the recyclers need to acquire business skills this includes the management of a storage center that involves two aspects:

? Technical considerations that involve the classification and packaging of waste custom tailored to clients needs: large recycling businesses or exporting businesses. Recyclers must have the knowledge and information required to purchase and maintain paper and metal compacting equipment, paper shredders, etc.

? The organization of the work environment. Management skills need to be developed involving logistics, profits and expenses, finances, tax payments and product marketing.

a.3 Training in new product development and service diversification This includes the creation of final or intermediate products such as the production of brooms, benches, school desks, building materials, etc.

Given the complexity of this step, recyclers will have to first develop a business plan and look for strategic partners who have the strengths required in order to move up the value chain. Technicians and experts will provide assistance to manage this operation, implement these initiatives and provide information about financing options for this activity.

b) The Credit Program

When we began working with recyclers we secured funds to donate the necessary equipment and tools required in order to carry out selective collection in neighborhoods. The average amount provided to each recycler was S/. 1,700, which did not include the costs of technical assistance and training. This was not very complicated when working with small groups of recyclers, but authorities and municipal officials along with larger recycling associations (with more than 20 members, including some with up to 250 members) took notice and began to show interest.

If we keep in mind that there are an estimated 100,000 recyclers in Peru, and that S/.1,700 is needed for basic equipment this means that S/. 170 million is needed to finance all recyclers in the country. Furthermore, if these funds can be sought through state donations, private business contributions and assistance from aid organizations then the question is “How can this initiative be sustainable?”

After 10 years as an organization, the experience of recyclers in other Latin American countries has lead us to conclude that the equipment and tools donated always go to the same groups and is constant. These groups have the best leaders, are the best organized and are model groups for cities.

An initiative such as this can be carried only if the subsidy is permanent. The investment of involved actors is incredibly limited

and always depends on public support or aid agencies. Most entrepreneurial businesses show that the development of businesses is strongly linked to the entrepreneurial spirit of assuming risks. When taking into consideration State behaviour it is evidently based on paternalistic policies that are a far cry from achieving sustainable change. This only creates a stronger dependency by the most vulnerable sector of society.

In view of the foregoing explanation, we realized that we have to replace donations with credit and this has to do with the decision of which should be the credit-granting entity. We quickly discarded the option of Ciudad Saludable as the credit entity, since it is not feasible to create a financial department within the organization. As a small organization we do not have this capability and the costs of branching into this area could be very high. The second option, that is to set up a guaranteed fund within a financial entity³⁴ providing more support for credit and payment operations, was the best choice.

It is too early to declare any results at this point however there is no doubt that this initiative is certainly a huge challenge. This will be no easy task since recyclers have a very low level of access to bank services, i.e. less than 4%. Generally they have no credit rating in the financial system, several recyclers have no national identity documents (13%) and no collateral. In order to include them in the credit program, the endorsement of their association and the social pressure is crucial for their timely payments of the loan..

In order to make this initiative truly viable recyclers must be creditworthy; the banks must be familiar with their organizations

³⁴ The key factors in this choice have been: partnerships with a large network of offices throughout the country, offering certain flexibility in granting credit and affordable interest rates for potential clients.

and businesses. This would open the doors for larger credits that would enable recyclers to construct storage centers and eventually develop initiatives to add value to their products.



Chapter III

Environmental Education and Waste Management

Six years ago *Ciudad Saludable* started to work in the formal and non-formal environmental education sector. During this time the teams in different geographic areas have developed a methodology based on certain institutional principles that gradually have made it possible for us to develop an institutional educational model.

As an institution we strive to promote and develop educational processes at the regional and national level in Peru and abroad with especially vulnerable populations on environmental health topics. We also work with sectors that need training and we raise awareness of the business sector that has greater economic possibilities but lacks a proper understanding of our environmental reality.

Our educational intervention initiatives have been implemented in intermediate or small cities and small communities with the following characteristics: 1) Peri-urban, 2) Rural and 3) Indigenous Rural.

3.1 Our Education Model

All of the educational initiatives of our institution have the following characteristics:

- **Integrated:** We uphold this principle starting with the selection of our local teams. We seek to form interdisciplinary teams that allow us to better understand the local reality, and as a result design and implement alternative solutions with a holistic approach. The solid waste problem is not restricted to being a technical issue, but rather overlaps into a social issue as well.
- **Contextualized:** We work in different educational realities and as a result it is important that each of our initiatives capture the local culture and is validated by different stakeholders in the community where we work. We try to involve local primary and secondary students, college students, and housewives as

volunteers that allows us to reach the population with language and messages that are contextualized in the local manner

- **Progressive:** We believe that changing mindsets and particularly the behavior of populations is a gradual process. The initial diagnostic for each initiative allows us to establish participation levels and processes for every stakeholder as well as to identify mechanisms to measure progress thereby strengthening the change process
- **Inclusive Participation:** The active participation of each and every stakeholder in the community is sought throughout each stage of the design and management of the initiatives. With this in mind, we design programs and plans that generate spaces for dialogue and allow anyone from neighborhood sports clubs to religious groups to assume shared responsibilities in a democratic environment
- **Replicable:** We implement highly creative educational processes, such as outreach activities in the community that are easy to replicate:
 - a. local educational policy, through plans and/or agreements with entities and/or institutions of public education management such as Local Management Groups, Regional Education Departments or National Education Departments of the Ministry of Education
 - b. a training program or custom tailored to the needs of each stakeholder through models based on daily Problem-Based Learning (PBL) in solid waste management.
 - c. shared management to replicate the experience in highly mobilized and active communities. Additionally, operating costs are less because trained local volunteers can support project monitoring without expenditures on items such as transport.
 - d. replication costs are lower if the program modules are distributed and if CD's are made instead of printing hard copies.



Young girls dressed up as flowers to mark the Day of the Earth (2007).



Exhibition of works during the training course.

Each one of these characteristics is composed of daily work through two educational methods, formal education and non-formal community education.

3.2 Formal education

We have established a program within the framework of educational institutions that supports the “Safe, Clean and Healthy Schools” campaign promoted by the DIECA³⁵ and the SIGAE³⁶ certification program under the auspices of CONAM³⁷ in previous years.

- Program of Continuous Teacher Development “Environmental Management of Solid Waste in Educational Institutions”: This program is in its fourth edition and has been implemented in Lima, Huaraz and Pucallpa, with teachers from kindergarten, primary and secondary schools, and special education programs.
- The objective of the program is to provide teachers who participate with a space for reflection on local environmental problems within the context of their schools and to design alternative solutions for their daily work. The certification of this program is conditional on the successful implementation and evaluation of results achieved by the teachers' environmental education projects.
- Environmental Education Program “Separating Together in School”: This program is held annually in all the communities where we work and includes the following activities that help improve environmental management in the educational institution.

³⁵ Community and Environmental Education Department—Peruvian Ministry of Education.

³⁶ School Environmental Management Program.

³⁷ National Environment Council, now under the umbrella of the Peruvian Ministry of the Environment..

- Creation of an Environmental Diagnostic and its insertion in the basic documents of school management like the PEI³⁸, PCC³⁹ and PAT⁴⁰.
 - Formation of a School Environmental Committee (CAE), Environmental Brigade, or Environmental Club⁴¹.
 - Formulation of an Action Plan by the CAE, Environmental Brigade or Environmental Club.
 - Implementation of the activities in the plan.
 - Implementation of a system of separation at the source.
 - Training and information-sharing with all the stakeholders of the educational community.
 - Monitoring and continuous evaluation by the CAE and the management of the educational institution
- Distance-learning Program “Challenges and Tools for the Integrated Management of Solid Waste”: Currently in its fifth edition, it is a joint effort with the Institute for Quality at the Pontificia Universidad Católica del Perú (PUCP) to improve the technical training of professionals from Peru and from other countries in the Andean and Caribbean region.

The principal audience is public officials of municipalities and other public institutions, NGO officials, technicians from private institutions that work on environmental issues and professionals that specialize in or want to specialize in environmental management and solid waste management. The majority work on these issues within their organizations.

³⁸ Institutional Educational Project.

³⁹ Curriculum Center Project.

⁴⁰ Annual Work Plan.

⁴¹ Commonly known as an Ecoclub.

The topics covered include:

1. Environmental management of municipal solid waste
2. Collection and transport
3. Final disposal and treatment
4. Separation, recycling and sale
5. Environmental education and community participation
6. Environmental legislation
7. Management of industrial waste
8. Management of hospital waste

The program has been structured as a virtual course using e-learning strategies from the Virtual Campus of PUCP. The principal characteristics of the module are: self-learning, flexibility in learning pace, opportunities for soliciting feedback, and the choice of several learning methods. Participants complete written assignments and evaluations on-line, take part in discussion forums and chat sessions, and complete a final project report and presentation. All of these activities are structured and organized daily on the study planner. The duration is eight months and it requires a time commitment of nine hours per week.

The program began in 2003, with the support of the Open Society Institute – OSI and the Avina Foundation. It was initially targeted towards public officials from the Callejón de Huaylas. The results achieved and the materials produced generated an enormous enthusiasm and sparked the interest of PUCP to propose a regular offering of virtual training. Since then, more than 130 people from most parts of the country, and including other countries, have completed the training course..

- In-person training program for recyclers “Best Practices and Business Management in Recycling”: In conjunction with SENATI⁴² six continuing professional development modules have

⁴² National Service of Industrial Training.

been specially developed with the needs of recyclers in mind. This will provide them with tools that will improve their daily work and will allow them to be protagonists in the processes of labor insertion and social inclusion at the national level. This initiative is included in Bill 2819, known as the “Recycler’s Law”. The topics covered in the module are:

3.3 Community education:

- Training plan for local leaders “Separating together at home”: The leaders of every community organization are invited to be trained in Integrated Solid Waste Management in households so that they may include an environmental component in their work plans, influence public opinion regarding environmental problems and participate in community-wide activities such as house visits⁴³, parades, etc.
- Training plan for a Neighborhood Environmental Watch Committee: the members of the CVA are neighbors dedicated to the environmental management of their community and need to know the legal framework of good management of solid waste, such as the real labor conditions of recyclers. This plan aims to empower the leaders of this group so that they support the formalization of waste pickers.
- Mass Awareness Campaign: several means of communication (written materials, radio and TV) are used to transmit content and messages in line with the target audience: adults, children and adolescents, and women. We have created messages in several languages and usually receive the cooperation of

⁴³ House visits are a community outreach strategy that allow you to gauge public opinion of the community with regard to the integrated management of solid waste and to restructure the content and procedures of household waste separation. They consist of volunteers visiting every household to introduce the initiative and educate neighbors about the positive community impacts of addressing solid waste management.

journalists in the region, mainly from local channels, interested in contributing to the promotion of healthy cities.

Part of the community awareness activities consists of the organization of awareness campaigns coinciding with environmental holidays: June 5th, World Environment Day and the third Saturday of September, the DIADESOL (Inter-American Cleanliness and Citizenship Day). These are always great opportunities to achieve mass participation of the population to promote environmental conservation and clean commutes in particular.

- Training program for volunteers “Green Circle”: There are two levels of this program: 1) Volunteers that participate as part of the local team and have a training plan that includes integrated solid waste management and environmental education, and 2) Volunteers that participate in the awareness campaigns and house visits in their community

Chapter IV

Experiences in Solid
Waste Management and
the Social and Economic
Inclusion of Recyclers

Below we present five successful experiences in solid waste management: the integrated management of solid waste in the province of Carhuaz, the small businesses that form part of the integrated waste system in Pucallpa, the Green Voucher program in Villa El Salvador, the Movement of Colombian Recyclers and the National Movement of Peruvian Recyclers (MNRP).

4.1 Carhuaz: integrated solid waste management

The provincial municipality of Carhuaz is located in the Callejón de Huaylas, in the region of Ancash, 40 km from the city of Huaraz. Before the project started with the provincial municipality of Carhuaz, only 30% of residents paid for waste services, the city-wide waste collection service dumped waste into the Santa river or in the irrigation canals throughout Carhuaz, and environmental education was not included in the curriculum of local schools. This was the first important initiative of *Ciudad Saludable* that received support from the Open Society Institute (OSI) and the Avina Foundation.

- A team was formed with the municipality, the staff set up in the municipality, they created an operational plan and the budget was shared with all the stakeholders involved.
- A PIGARS and municipal ordinances were created to improve waste management. The municipal team was also trained.
- Environmental education was heavily promoted through training of teachers who, in turn trained children and adolescents and households and local businesses through workshops and house visits promoting the participation of the whole family with the slogan: “Who doesn't want to live in a healthy city?”

- Collection and transport was increased and optimized, training the workers and re-designing transport routes. A treatment plant and sanitary landfills were designed and implemented.
- The entire process was monitored by the participation of the municipal team led by the mayor, the councilmen (from all political parties) and the Ciudad Saludable team.

After two years of hard work, significant results were achieved: 92% of households and local businesses separated “dry and wet” waste. 100% of waste was collected: twice per week for wet waste and once per week for other waste. Only 15% of waste ended up in the sanitary landfill because 85% was treated or sold. The compost and vermin compost produced was used for local farms and materials like plastic, paper, cardboard and metal were sold. Hospital waste was disposed of in a special hazardous waste landfill, and this service was provided to clinics throughout the region. The collection of payment for public waste services increased from 30 to 70%.

Recognitions for the program were quick to follow: first was the Annual Prize for the Responsible Management of Solid Waste – 2005, as the most successful experience of waste management in Peru in the category of local government, sponsored by CONAM. The criteria evaluated were: planning, minimization, separation at the source, reuse, collection, transport, final disposal, education and community participation, cost and fee systems, fee collection systems, supervision and follow-up on goals and indicators, and promotion of a “culture of payment” for services.

The second recognition received was the 2005 Cambie Prize, Fourth Edition - Environmental Conservation Prize, sponsored by the Universidad Científica del Sur and the Cambie Foundation in the category of Clean Technology Use. The prize was awarded to the Municipality of Carhuaz for being an institution that has coordinated efforts so that its activities do not damage the environment.



Organic waste treatment plant of the Provincial Municipality of Carhuaz: organic waste is transformed into compost and humus for agricultural purposes.



Finally in 2006 the project received the prize for Good Government Practices from the organization Ciudadanos Al Día. This experience has also been recognized by municipal officials from all regions of the country in the form of educational visits organized by student groups and by Ciudad Saludable as well as by national and international experts. The process was systematized and the analysis of the experience was covered by several international media outlets, such as the American television channel PBS and French and German channels. Without doubt it has been a key experience in the development of Ciudad Saludable's strategy.

4.2 Pucallpa: Small Businesses as Part of Waste Services

Pucallpa is the capital of the province of Coronel Portillo, which includes the districts of Calleria, Yarinacocha, Iparia, Nueva Requena, Masisea, Campoverde and Manantay. It is located in the Ucayali region in the Peruvian Amazon.

Since 2006, the project “Revaluing waste to make Pucallpa a healthy city”, has been implemented by the provincial municipality of Coronel Portillo and Ciudad Saludable. Facing the challenge of providing solid waste collection services in areas inaccessible to municipal vehicles (in addition to a lack of vehicles), this partnership was formed to implement an integrated waste management system in these neighborhoods with the following characteristics:

- Create a small business that provides selective collection services and sells recyclable material and treated organic waste. To this end, waste pickers that were working in the dump were recruited to work in these neighborhoods.
- Create a small business that provides selective collection services and sells recyclable material and treated organic waste. To this

end, waste pickers that were working in the dump were recruited to work in these neighborhoods.

- Separation of waste at the source in homes, educational institutions, markets and health centers: In the market the separation of organic waste was encouraged through the placement of brown and grey bins for organic waste and other waste, respectively. In order to reduce the volume of hazardous waste produced in health centers, the separation of recyclable waste was encouraged through the placement of blue bins for paper and cardboard, white bins for plastics, yellow bins for metal and green bins for glass.
- Selective collection of solid waste: The small business carries out the collection using modified tricycle carts. They follow a collection schedule, collecting organic waste on Monday, Wednesday and Friday, recyclable material on Tuesday and Saturday and other wastes on Thursday.
- Awareness, education and training at the formal and non-formal level: We developed a dynamic, fun and intensive program directed to each one of our target audiences the educational community, the market workers, the general population, health workers and the recyclers that work in the small business.
- Communication of the integrated initiative: We fostered a close and cooperative working relationship with different media outlets such as radio channels, regional TV shows, newspapers, speakers in the market and in neighborhoods. We broadcasted key messages that encouraged everyone to participate in the initiative and helped create a “culture payment” for the service. Three spots were developed for TV and radio with messages directed to: 1) promote separation of waste at the source, 2) encourage a “culture of payment” for the service and, 3) promote dedicated participation in the Neighborhood Environmental Watch Committee.

- **Monitoring of the service:** The active participation of members from the Neighborhood Environmental Watch Committee monitor the services provided by the small MYPE (medium and small business enterprise) and promote the participation of the community through various activities such as clean up campaigns, training workshops, and observation so that community members separate their waste.

Initially one small business, SENRES SAC, was formed in August 2006. As a result of its good performance and acceptance by the community, two other small businesses were started: UTL-Pucallpa SAC and MIRES-Pucallpa SAC. These three MYPES include 45 workers that use 19 tricycle carts and work formally on contracts with the provincial municipality of Coronel Portillo. In total, they provide collection services for 45,000 city residents. The MYPES workers carry out their duties with uniforms and the proper security equipment. All are registered in the Integrated Health System (Ministry of Health healthcare program directed to low-income Peruvians) and in an agreement with the health center have received tetanus and hepatitis vaccinations.

The collection is selective and is divided by waste type:

Recyclable Material	Organic Waste	Regular Waste
<ul style="list-style-type: none"> • Plastic packaging • Hard plastic • Glass bottles • Ferrous and non-ferrous metals • Paper and cardboard 	<ul style="list-style-type: none"> • Kitchen and food waste • Garden waste • Manure 	<ul style="list-style-type: none"> • Toilet paper • Disposable diapers • Plastic wrappers • Dirt • Debris, etc

Collection of regular waste. The collection of regular waste is carried out every Tuesday and Thursday. After collecting the waste, it is transported to a transfer station where its weight and volume is calculated and recorded. It is then transported with municipal compactors to the final disposal site.

Collection of recyclable waste. The collection of recyclable waste is carried out every Thursday. After collecting the material it is then transported to a storage center to be separated and weighed before its sale.

Collection and treatment of organic waste. The collection of organic waste is carried out three days a week: Mondays, Wednesdays and Fridays. The collection activities are the same throughout the day, but the treatment activities periodically vary until the compost is harvested and sold.

A monthly report is presented to the municipality based on management indicators for the small businesses and the collection service, volumes of waste and recyclable material collected and sold, and the amount of compost created and sold.

A second strategy implemented is the participation of eighteen recyclers (forming part of the Association of Urban Recyclers of Pucallpa ARUPULSA), in the selective collection of waste in the areas where the municipality collects waste. This is similar to the Green Voucher program, with the difference being that a storage center was built at the beginning of the program and the collection focuses on the more commercial areas of the city.

4.3 Villa El Salvador: The Green Voucher Program

The Green Voucher Program: This is a recycling system promoted by the municipality of Villa El Salvador⁴⁴ since 2004 to improve the environment, create jobs and give tax discounts to residents.

The Green Voucher program works in the following manner:

1. Residents separate recyclable solid waste like paper, cardboard, plastics, glass bottles, metal, etc. during the week.
2. Then a recycler, with the appropriate safety equipment, collects these products and hands each participating resident a ticket. After receiving four tickets in a month, they can redeem them for a Green Voucher that entitles them to up to a 20% discount on the public sanitation services tax.
3. Then the recycler sells the collected material to large recycling businesses and earns a larger profit that he/she would have before the program started.

Thanks to the Green Voucher program, more than 80 recyclers that previously had to search for waste on the streets are now formalized in associations. After being trained, they are now are conscious of the work that they do, providing recycling services, and have a stable job that pays a living wage. The Green Voucher program also helps residents to properly manage their inorganic waste.

⁴⁴ It is worth mentioning that the municipality of Villa El Salvador has historically developed several innovations in the field of public administration and citizen participation like: valuable experience in the promotion of economic development through the creation of an industrial park, promotion of the participatory budget process (long before the approval of the Law of Citizen Participation), and the treatment and reuse of grey water. It was recognized by the Ministry of the Environment on June 5, 2008.

The expectation of municipal authorities is to manage 60 tons of solid waste daily through this system and achieve a sustained reduction in public sanitation service costs. Recently with the support of FOVIDA, three recycling associations have created a business that operates a storage center located in the industrial park in Villa El Salvador. In addition to the storage space, they own equipment to add value to recyclable products like plastic and metal.

The most pressing challenges affecting this experience are associated with:

- The existence of a large number of small waste businesses that purchase waste from residents that separate their waste.
- Educational institutions create selective collection programs to generate income for their activities, which affects the income of the recyclers.
- The success of selective collection strategies is strongly associated with the quality of public waste services, which is a constant challenge for municipal administrators.

This has been an inspiring experience for municipal authorities and institutions. Several municipalities throughout the country have considered implementing this model to develop initiatives to formalize recyclers in the integrated management of solid waste..

4.4 National Association of Colombian Recyclers - ANR

One experience to analyze and learn from is that of the National Association of Recyclers, ANR, which was formed during the 1st National Recyclers' Meeting. This meeting was convened in November 1990 by the Association of Recyclers of Bogota ARB and was promoted by the Social Foundation. The association was

formed after three days of meetings: sharing stories and experiences, getting to know each other, identifying problems, needs and discrimination that they experience, the harassment by state authorities (through the police), economic exploitation by middlemen amongst a host of other difficulties.

The general sentiment of the recyclers in attendance was the need to create a sector association that represents their interests and they recommended the creation of a national recyclers' organization, electing provisional leaders representing the regions of Manizales, Neiva, Bogotá, Ibagué, Villavicencio and Pasto.

When the organization of recyclers in Colombia was just in its beginning steps, growing at the local level and giving form to a regional organization, the country was shaken by the murder of 11 recyclers at the Universidad Libre in the city of Barranquilla and the subsequent use of their bodies as teaching tools by the medical school. This shocked the country and spiked the awareness of recyclers' throughout Colombia.

Recyclers took to the streets and marched in protest of the crime and demanded respect and understanding from the state and from society in general. The Andean Commission of Judges (CAJ), a human rights organization, filed suit for a crime against humanity, the NGO's focused on this population, and the Senate received the leaders of the recently-formed ANR, which was not yet legally recognized.

This atrocious crime woke up all Colombians and drastically reduced the number of selective murders carried out by the infamous "social cleaning" groups. From this moment forward, the country has slowly advanced in the recognition of recyclers as a community whose labor contributes to urban environmental management in Colombia.

In 1993 the mayor of Bogotá recognized the ANR and its legal status as a non-profit labor entity. For 10 years, the Social

Foundation guided the recyclers until 1998 when they decided to step down and the recyclers started managing themselves. The ANR has forged partnerships with other organizations like: the Social Solidarity Network, a humanitarian government organism under the executive office of the president, the Dutch aid organization Novib, and the Environmental Action Fund, an aid organization dedicated to promoting environmental protection in Colombia. Thanks to these partnerships the ANR continues to move forward, reaching thousands of recyclers.

The association has experienced three key moments in its development and promotion of the profession at the national level. It is worth noting that while they have achieved significant advances, the social and economic reality of recyclers is far from ideal. They work with 4,500 families, which represents less than 10% of recyclers in Colombia whose numbers exceed 50,000.

From 1994 – 1998, with the legalization of this national entity, more groups were legally recognized with community organizations in different municipalities. These included the regional groups of ARCON on the Atlantic coast FEDESURCO in the southwest, ARCESCO in Huila and Caquetá, ARR in the coffee-producing provinces, with state entities achieving the following:

- Won the First Colombian National Habitat Prize during the Second Colombian Habitat Conference in the city of Popayán, with project Paraíso, the first initiative for waste management at final disposal sites proposed by the ANR and ANB that works on contract with the municipality of Chiquinquirá for the collection, waste services and cleaning of the market plaza
- In Bogotá the district administration contracts the collection of waste in different areas to different waste service companies. The Social Foundation contracts the collection of 18 thousand tons of waste and ARB carries out the operation through a subcontract with this entity

- The Rescue Cooperative, celebrates a temporary union in the collection of waste in Ciudad Bolívar to the south of Bogotá. The service is systematized and later integrated in the CORPOASEO TOTAL consortium, representing the first case where investment capital is associated with a communal process of recyclers.

In 1998 the Social Foundation, after 10 years of support and guidance, steps down and the ANR begins to function independently. This sparks the process of organizing recyclers in Colombia.

From 1988 to the present the ANR, with complete autonomy, through the difficulties of not having the resources to sustain itself, and after contacting many private and state institutions, obtained funding for three years from the aid organization Novib, from the Netherlands. This funding went to strengthen the institution and the profession through institutional consolidation. The Network of Social Solidarity joined this process, supporting some projects of the ANR, strengthening its regional offices and financing productive projects of local groups.

A total of 15 Colombian municipalities (Bogotá, Medellín, Cali, Barranquilla, Cartagena, Neiva, Ibagué, Pasto, Popayán, Buga, Armenia, Manizales, Pereira, Soledad and Sincelejo) have signed a formal contract with the ANR and are planning their policies of waste elimination in coordination with the local delegations of the ANR. In some cities the local delegations of the ANR work on subcontracts or in collaboration through shared-risk businesses with private waste management companies.

During these years the ANR has received numerous recognitions at the national level, which are listed below:

- Honorary Title for its contribution to the environment and society in the development of solid waste reuse processes (March 1, 2001)

- Management entity, Plan Colombia registry L.014.
- Project Gestores 009, Today: Law 511 of 1998.
- Habitat Colombia Prize (Paraíso Project 1993)
- National Prize for Organizational Excellence May 1992.
- National Environmental Prize 'SINA', June 1998.
- Environmental Expo Prize 1999
- One of the 20 best practices in urban development (Istanbul, Turkey, June 1997)
- Alejandro Ángel Solidarity Prize.

4.5 The National Movement of Peruvian Recyclers (MNRP)

On October 27, 2007 the first Conference of Peruvian Recyclers was held, sponsored by *Ciudad Saludable* and the Association of Municipalities of Southern Lima – AMASUR. Efforts were made to guarantee the attendance of leaders from several cities of the country, such as Pucallpa, Chimbote, and Cañete. For the first time recyclers from different organizations in Lima and Callao could share experiences with their counterparts from other regions.

Silvio Ruiz, the national leader of recyclers in Colombia, participated in this conference along with officials dedicated to the formalization of recyclers in the Metropolitan of Lima, the district municipalities of Villa El Salvador, San Juan de Miraflores, Villa María del Triunfo and the provincial municipality of Cañete.

This event allowed for the exchange of ideas among leaders of the organizations in attendance. Everyone agreed on the need to organize at the national level and work together so that the national, regional and local governments recognize the existence of this important sector and, above all, lobby for a Recycler's Law and local rules that allow them to work in the formal sector.

Ciudad Saludable, leveraging the interests of the leaders, supported the process of forming an Organizing Commission for the National Movement of Peruvian Recyclers made up of leaders from: Villa El Salvador, San Juan de Miraflores, La Victoria, Comas, Villa María del Triunfo, Callao and Central Lima.

A series of meetings was held to recruit new organizations to be a part of the process. Here are some highlights from these meetings:

- A signed petition sent to the president with copies for: the Ministry of Health, the Ministry of Labor and Promotion of Employment, the mayor of the Metropolitan Metropolitan of Lima, the mayor of the provincial municipality of Callao and the director of DIGESA, soliciting the approval of the regulation of “Selective Management of Solid Waste with the goal of reuse by Legal Persons”.
- The participation of 10 leaders of the National Movement of Peruvian Recyclers in the first World Congress of Recyclers and the third Latin American Conference of Recyclers held in the city of Bogotá – Colombia, (March 1-4, 2008). This event allowed them to meet counterparts from 47 countries from around the world and to inspire them to lobby for the legal status of the National Movement of Peruvian Recyclers.

On June 1, 2008 leaders from 16 recycling organizations from Piura (Castellanos de Piura and 1º de Junio), Huaraz (Cordillera Blanca), Chimbote (Chimbote Saludable), Pucallpa (SEMRES-Pucallpa SAC, MIRES-Pucallpa SAC, UTL-Pucallpa SAC, ARUPULSA), Central Lima (AMELITRAMERIS), Cañete (SUMAC WAYRA), Callao (ATURCA), San Juan de Miraflores (RECICONSUR), Comas (FELN and Nueva Jerusalén), Villa El Salvador (Los Tigres de las 200 Millas and Las Águilas) and Villa María del Triunfo (Las Palmeras), officially joined the National Movement of Peruvian Recyclers – MNRP. They elected their first Managing Board made up of: Walter Correa – President (ATURCA-Callao), Miguel Arce – Executive Director (RECICONSUR – San Juan de Miraflores), Yolanda Agüero (Sumac Wayra – Cañete),



New working experiences promoted by Ciudad Saludable on selective waste collection in Lima, Cajamarca, Pucallpa, Ancash and other cities throughout Peru.



The media fulfils a fundamental role in implementing society's environmental culture: a TV interview of a well known recycler leader of Callao.

Llermé Cárdenas (UTL-Pucallpa) and Balbino López (Castellanos de Piura –Piura).

These members met to create a work plan, for June through December, to strengthen the MNRP.

Based on the work plan, and with the technical assistance of Ciudad Saludable, the following has already been achieved:

- Creation and presentation of the Recycler's Bill, with the participation of Congressional representatives on the Environmental Commission, Ministry of the Environment, Office of the Ombudsman, Metropolitan Metropolitan of Lima, provincial municipality of Callao, National Movement of Peruvian Recyclers -MNRP, Ciudad Saludable and the regional government of Junin, including representatives of FOVIDA, Prisma and Ecociudad. This task was made possible thanks to the support of the AVINA Foundation through Ciudad Saludable. The meetings were held periodically.
- Execution of the first National Leader Training Workshop for recyclers in the founding organizations of the Movement and others that are now joining such as: Nuevo Paraíso from Huaraz, Damero de Pizarro from La Victoria, Cachineros de Gamarra from Barranco, ATRACA from Callao, La Perla from Callao, and ARUPULSA from Pucallpa. This training is certified by SENATI, a recognized technical training institution in Perú, under the program "Good Practices and Business Management of Recycling Operations", designed by Ciudad Saludable and offered as part of an agreement with SENATI.
- Strategic Planning Workshop for the MNRP, (September 26 - 28), which has helped define, with the support of all the member organizations, the objectives that will guide the actions of the MNRP in the coming year.

- MNRP Website, www.mnnp.org, which is still in development and will inform all member organizations of the activities of the MNRP such as the public policy initiatives the MNRP will carry out in the country.

Chapter V:

Other Alternatives for the Reuse of Waste

The pig farm complex of Ventanilla (located in the district of Ventanilla on the outskirts of Callao) presents a bleak picture of environmental and social issues. Waste management does not exist either for organic or inorganic waste. Waste from restaurants close to the area are collected and bought by pig farmers to feed the pigs that they raise (very few farmers feed their pigs a balanced diet). These wastes contain a number of different materials and the inorganic waste left by the animals begins to accumulate.

Organic waste is of special interest in the pig farm complex. Pig excrement accumulates without any control and is later incinerated. The environmental problems that this causes are myriad, but the detrimental health effects on the local population are even more troubling. The shores of the Chillón river are uncontrolled dumpsites, polluting the sources of potable water for the entire provinces of Lima and Callao.

Disease, infections, bad odors, and poverty are some of the characteristics of the pig farm complex. All this from an industry that sells and distributes pork in the national market, where any health problems the pigs have developed here could be a potential problem for pork consumers in Lima or Callao.

The project that Ciudad Saludable is implementing in Ventanilla, with the support of IQS- Universidad Llull, Barcelona, la Universidad Politècnica de Catalunya – Barcelona, the Foundations CODESPA and ROVIRALTA, the Hábitat Grupo cooperation and the law firm Graells Marchs, aims to improve the living conditions of the population that live in the pig farm complex. This improvement includes the modification of the environmental and working conditions of the complex. The proper management of solid waste is being promoted within the complex, with a central focus on organic wastes because they represent the large majority of waste.

In order to implement a more appropriate technology or combination of technologies to be used in this complex and to later carry out a feasibility study on the optimization of technology in the

complex, a preliminary study was conducted on anaerobic digestion of liquefied pig excrement under the existing conditions of the pig farm complex.

5.1 Anaerobic Digestion

Anaerobic digestion is the process of degradation of organic material in the absence of oxygen. This process is carried out by anaerobic microorganisms (it is part of a natural biological process) that function inside a biodigester. This biodigester or reactor is nothing more than a hermetic air chamber where organic material is stored without oxygen to undergo fermentation. Anaerobic digestion presents an opportunity for the possible treatment of organic waste.

Digestible waste includes: animal excrement, vegetable and plant wastes, and agro industrial waste or residual water. Although most organic substrates are appropriate, wood or woody wastes are not advisable (Werner, 1989).

This conversion occurs in several environments whether they be natural, like the gastrointestinal system (rumen), marine, river and lake sediments, or thermal sources or in controlled systems like fermenters or anaerobic digesters (Vincent, 1997).

Liquid organic fertilizer, solid organic fertilizer and biogas are the principal products of the degradation process. This process also offers enormous advantages for the transformation of waste:

- Improves the fertility of the excrement, reducing its toxicity.
- The effluent has a much weaker odor than the affluent.
- Control of pathogenic microorganisms.

The biogas produced is a renewable energy with no net greenhouse gas emissions or negative effects on the environment. It is considered a dependable fuel. The advantages for the users of biogas are an economic savings due to the use of byproducts

(savings in fuel, availability of energy for other activities, savings in fertilizers), less work and some other qualitative benefits (ease of cooking and better sanitary conditions, better lighting, energy independence, improvement of farm work, and improvement of soils) (Werner, 1989; Sasse, Kellner and Kimaro, 2004).

5.2 Our Program

Based on the results of the study, two types of biodigesters have been constructed. These are already operative and form part of the environmental management system for the pig farms outlined below:

Is it possible to use pig excrement for heating during the winter and cooking gas for the farmers to cook their food? Yes, in the pig farm complex in Ventanilla there is a pilot project that addresses these issues.

Since June 2006, *Ciudad Saludable* has carried out a solid waste and waste water management project in homes in this part of the Callao region.

The project consists of using pig excrement and urine to create fuel (biogas) and organic fertilizer (biol).

In the homes where a biodigester has been installed, it is used for cooking and heating through heaters installed in the pig corrals. The biol and compost are used to fertilize family organic gardens.

The excrement is diluted with animal urine and the grey water is used to clean the corrals with a concentration of three parts liquid per one part solid.

After draining this mixture, it is added to the biodigester and after 45 days it produces biol and biogas. The latter is transported by tubes to the home's kitchen and to the heating system installed to

heat the animals. The project does not only consist of installing this network, but also includes the construction of cement corrals and gutters to channel the grey water used to clean the corrals.

In the first step, the system was installed in eight homes to eliminate the accumulation of pig excrement in the pig farm complex.

Storage ponds for the treatment of wastewater and organic gardens that use the organic fertilizer were also constructed. In this manner, the living conditions of the families that raise pigs are improved.

It is worth mentioning that the living conditions of the families that raise pigs in Ventanilla are very precarious. They live in houses made of cardboard, scrap metal and plywood. They have running water for a couple hours a day, but lack sewer systems, telephones, etc.

Through this integrated solid waste and wastewater management system the living conditions of the residents of this area can gradually improve. The project also includes training and technical assistance for raising pigs which allows them to improve their methods and economic prospects.



Pork excreta is transformed into biogas that generates enough power for the farmers of the Pork Farm of Ventanilla (Lima) to cook their meals and use electricity. Part of the work involves organizing vegetable gardens called biohuertos.



Chapter VI

Principal Challenges

6.1. For the Improvement of Solid Waste Management

That all provincial municipalities, including the Metropolitan Metropolitan of Lima, create and approve their Integrated Solid Waste Management Plan and designate funds for its implementation.

To enable municipalities to implement a viable strategy that increases their income for the management of solid waste through one of the following options:

- Delegate the responsibility of municipal tax collection to SUNAT
- Allow payment through public or private service providers
- Strengthen autonomous municipal entities specializing in revenue collection (replicating the SAT model)
- Transfer waste collection fees to other national fees like the IGV
- Create a National Supervisory Superintendence for municipal public services, including waste services

That initiatives for the management of solid waste in small cities throughout the country are implemented in the coast, highlands and jungle based on local capacity and local resources available in most municipalities.

That municipal officials and authorities be innovators in proposing alternatives that prioritize the use of appropriate technology and leverage local resources (both human and material). It is worth mentioning that not only trash compactors and dump trucks can be used to collect solid waste, but tricycle carts, modified motorcycles, etc. can be used as well.

That the technical groups that form part of the Municipal Environmental Commissions are dynamic and assume responsibility of the monitoring and evaluation of the implementation of the PIGARS.

That environmental education and community participation be included in the environmental management of solid waste, and that they guarantee the sustainability of the programs and projects.

That a multidisciplinary team exist in municipalities, and that integrated waste management is not seen as only part of waste collection services but rather as a task related to the following departments:

- The Department of Taxes and Revenue (to follow up on revenue collection for waste services and sanitary landfills)
- The Department of Community Participation (to encourage the active participation of citizens)
- The Education Department (to raise awareness, train and educate about minimization in educational institutions and diverse community organizations to help create a “culture of payment” for public services in the community)
- The Department of Urban Development (to define the areas where infrastructure for the treatment and final disposal of solid waste should be constructed, this includes municipal blueprints and zoning, amongst others)

That training programs for authorities and municipal officials be developed in the integrated management of solid waste on topics like biosecurity, customer service amongst others for solid waste service operators in every stage in the solid waste cycle.

That economic, social and environmental incentive programs are implemented for the population and that businesses and institutions actively participate in the program of separation at the source and minimization of waste.

That the municipalities, in coordination with regional governments with the support of the central government and private businesses,

make investments in infrastructure for the treatment, transfer and final disposal of solid waste.

That the certificates granted by the National Culture Institute – INC, and INDECI be less bureaucratic and that the process necessary to close dumps or to prevent that waste be disposed of in rivers, lakes and oceans be streamlined.

That the Department of Environmental Health of the Health Ministry streamline the approval process for environmental impact studies (EIA) and technical approvals; That they monitor to assure compliance with technical plans and with environmental impact studies instead of erecting barriers to the review process.

6.2. For the Economic and Social Inclusion of Recyclers recicladores

Recycling constitutes a component of proper solid waste management that capitalizes on the reuse of waste. The most appropriate manner to carry this out in Peru is the close coordination of municipalities with recyclers' associations.

Although the General Law of Solid Waste called for the development and use of technologies, methods, practices and processes of production and sale that encourage the reuse of solid waste, public policies have not been implemented that allow for this to occur. The same rule charged municipalities with the task of progressively implementing programs of waste separation at the source and selective collection of solid waste throughout their jurisdiction, which continues to be an objective that has yet to be achieved.

However, the shortcomings of the institutional framework and the absence of public policies that favor the reuse of waste in Peru, similar to other countries in the region, have created a considerable recycling market. It is estimated that there are more than 100,000

people that work in recycling in Peru. Unfortunately, most of these people carry out these activities in inefficient conditions, assuming large economic (low, volatile wages), social (social stigma and public harassment), and personal (occupational health) costs.

In this context, *Ciudad Saludable* works on initiatives to strengthen the recycling sector to promote the economic and social inclusion of recyclers and to promote selective collection in communities and businesses through: agreements with municipalities and businesses, organization of recyclers, development of more just sales mechanisms, technical training with educational institutions, financing recycling activities, strengthening the National Movement of Peruvian Recyclers and influencing local and national public policies.

However, a national institutional framework is needed to promote these efforts to address these problems in a comprehensive manner and render the guidelines of the General Law of Solid Waste more efficient. As stated in the Recycler's Bill, incentives that encourage the participation of citizens and businesses must be fostered while simultaneously affirming the rights and obligations of recyclers.

Another key element to create viable strategies for the social and economic inclusion of recyclers is the leadership of authorities and public officials to promote recycling. Consequently, ordinances must be created that replicate the initiatives that have been carried out in Villa El Salvador and other municipalities like Huaraz, Pucallpa, Callao, etc. Hence, recyclers will be incorporated into the solid waste collection system.

The primary goal is to get the recyclers out of the dumps and help them organize themselves, implementing selective collection services in neighborhoods. This depends upon the commitment of local political authorities, the adoption of the Recycler's Law, and the supervision and control of the Ministry of the Environment.

Recyclers associations must be trained in business skills, they must enhance their organization, resource administration, relationships with clients and partners, negotiation and dispute settlement, enter into agreements with municipalities and companies that buy their products, etc. As seen from experience elsewhere this is no easy task.

The training program that *Ciudad Saludable* runs jointly with SENATI must be expanded. Consequently, leaders of the recyclers' organizations in large cities of Peru must be trained. In order to finance this initiative we need to secure the support of municipalities, aid organizations and recyclers.

