Scavenging, Solid Waste and the Future of Trash Disposal In the City of Matamoros

Photo: Oralia de los Reyes

April 6, 2007

Prepared by Karen Chapman & Oralia de los Reyes

The authors wish to thank:
Dr. Baltazar Acevedo, Javier Miranda, Ing. Salvador Treviño, Ing. Jorge Leal, and the City of Matamoros for their assistance and cooperation.

environmental defense
finding the ways that work

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I Definitions

Municipal Solid Waste: (MSW) refers to trash discarded in urban areas. Municipalities are responsible for safely disposing of MSW. The efficient and complete collection, transport and final disposal of such materials can be problematic in areas where resources and infrastructure are lacking – as in many U.S.-Mexico border towns. MSW encompasses household refuse, institutional wastes, street sweepings, commercial wastes, construction and demolition debris, industrial waste, dead animals, and fecal matter. (Medina, globalization)

Pepenadores: The term used in Mexico for refuse scavengers. In this report the terms pepenador, refuse worker, scavenger and refuse scavenger will be used interchangeably to refer to the Matamoros dumpsite workers.

Oficio: Trade or career based on experience, not necessarily combined with a formal education.

Dump: A municipal solid waste disposal site where trash is dumped in the open air and left to decompose without the benefit of burial or further processing.

Landfill: A municipal solid waste disposal site that contains "cells" where trash is buried in layers with dirt, soil monitors are installed and layers build up over time.

Environmental Defense is a not-for-profit conservation organization with more than 400,000 members, 300 staff and over 10 offices in the US. Environmental Defense is dedicated to protecting the environmental rights of all people, including future generations. Among these rights are clean air, clean water, healthy food and flourishing ecosystems.

Additional attributions: The Cross Border Institute for Regional Development at the University of Texas Brownsville collaborated in the initial production of this report, but due to changes in personnel and other circumstances, did not participate in its release. However, CBIRD is referenced throughout this report and CBIRD refers to the Cross Border Institute for Regional Development.

II Life at the Dump

On the dirt road leading into the Matamoros dump, thousands of plastic bags drape from skeletal trees and blow horizontal in the incessant wind, flying over the sewage canal that borders the road. Trucks collecting sewage wastes from the city pour the black water directly into a canal that dissects the dump and leads, eventually, to the Laguna Madre of Tamaulipas.

The air along the canal and inside the dump is gritty with black soot, smoke and particles. The soil is dark grey and dusty. Clouds of flies, gulls, crows and grackles swarm around old and new piles of rotting garbage, sickening sour smells emanate from all sides. When a fire burns, the eyes sting and it becomes more difficult to breathe. In this environment, some 150 men, women and children work daily to collect recyclable materials that they then sell – most frequently to a middleman elsewhere in the city.

Many of the female workers wear makeup and jewelry, even though by the end of a shift, hands will be black and clothes completely stained. Some of the workers wear gloves; others sort trash with their bare hands. Frequently, evangelical missionaries visit the dump, bringing food and pamphlets to the workers. Ambulatory taco vendors visit the dump to sell food and soft drinks. There is no place to wash hands and no constructed lavatory or outhouse. Workers create staging areas where they gather to eat and bring the recyclables or food they've collected and where they park vehicles, if they have any, and rest in the meager shade. They sift through mountains of trash for glass, carton, plastic, metal, food and anything else that might be useful. The workers tie the collected goods together, binding them for transport with salvaged plastic bags, ropes and pallets. They pile their goods onto bicycle carts, in the beds of dilapidated trucks, in wheelbarrows and on their backs, hauling them precariously down the long road to town.

The dump is inhospitable to an outsider's eyes, but the workers do not seem to mind the atmosphere. On the contrary, they go about their business as any other worker, with the attitude of one who is doing a necessary job and making a living.

> *There is no welfare in the dump, but there is work, care, sweat, and dignity.*
>
> - Urea, L. By The Lake of Sleeping Children, 1996, p. 42

III Introduction

The city of Matamoros, Tamaulipas, Mexico is making plans to close the open-air dump that has been in operation there for many decades, and has begun operating a new landfill in the southwest part of the city, just before the customs checkpoint and turnoff to the coastal village of Mesquital. This new regional landfill is receiving waste from both Matamoros and Valle Hermoso, a city located 47 kilometers southwest of Matamoros.

This report came about because both CBIRD and Environmental Defense were interested in exploring how the new regional landfill and the closing of the existing dump might improve air quality problems that plague both Brownsville and Matamoros as a result of the periodic fires that burn in the dump. At the same time, we were interested in learning more about what would become of the salvage workers described above, known as "pepenadores," once the dump is closed and the regional landfill is fully operational.

Both the old dump and the new landfill are in operation as of the writing of this report: the old dump will need to be closed in an appropriate manner before these serious air quality issues will be resolved. Paradoxically, while the present open dump represents a threat to the environment, and certainly to the pepenadores themselves, it also provides them with an income that might not be available to them otherwise.

According to a November 2004 article in the Inter-American Development Bank magazine, informal recycling activities in "developing" countries has occurred for many decades, but has grown in recent years due to several factors: high rates of municipal growth and a corresponding inability to keep up with needed infrastructure; the increased use of disposable packaging in a variety of products; and higher unemployment rates as rural residents flock to the cities in search of jobs.

As cities attempt to modernize waste collection and disposal practices, informal refuse workers are increasingly viewed as a nuisance. In some countries, however, a concerted effort to formalize these workers, either through government programs or by setting up worker-controlled cooperatives, are underway, with varying degrees of success. In Matamoros, city officials report they are offering formal employment to the pepenadores as street sweepers or on cleanup crews, but are not offering employment that allows the pepenadores' to continue practicing a trade as recyclers and scavengers. This has led to discontent among many of the pepenadores, who say scavenging is the only life they know, recycling is their preferred trade, and that life as a street sweeper poses more hazards for them and their children.[1]

[1] See attached article: *En Matamoros, ni siquiera pepenar entre la basura es un trabajo seguro*; Julia Antonieta le Duc, La Jornada, February 8, 2006.

The objective of this demographic profile and report is two-fold: to find out who these workers are, including the type of conditions they live in, what skill sets they may have, and how they may be impacted by the pending closure of the old dump site; and also to report on what the City of Matamoros is undertaking in new technology to both combat widespread waste tire dumping and deal with serious air quality issues associated with the operation of the existing open air dump.

This report will also discuss some of the things that have been done in different parts of Mexico and Latin America to develop a better quality of life for refuse scavengers. There are several studies, for example, that validate the real economic impact of activity of recovering recyclable raw materials.

Road to the Dump. Photo: Karen Chapman

The Regional Matamoros-Valle Hermoso Landfill

The new landfill was inaugurated November 21, 2005. The 113-hectare site is located 21.6 kilometers south of the city of Matamoros along the main road to Ciudad Victoria on a former farm named Rancho Buenos Aires.[2] According to city planners the new facility will eventually be able to receive and process 700 tons of trash daily and will have a life span of 40 years.[3]

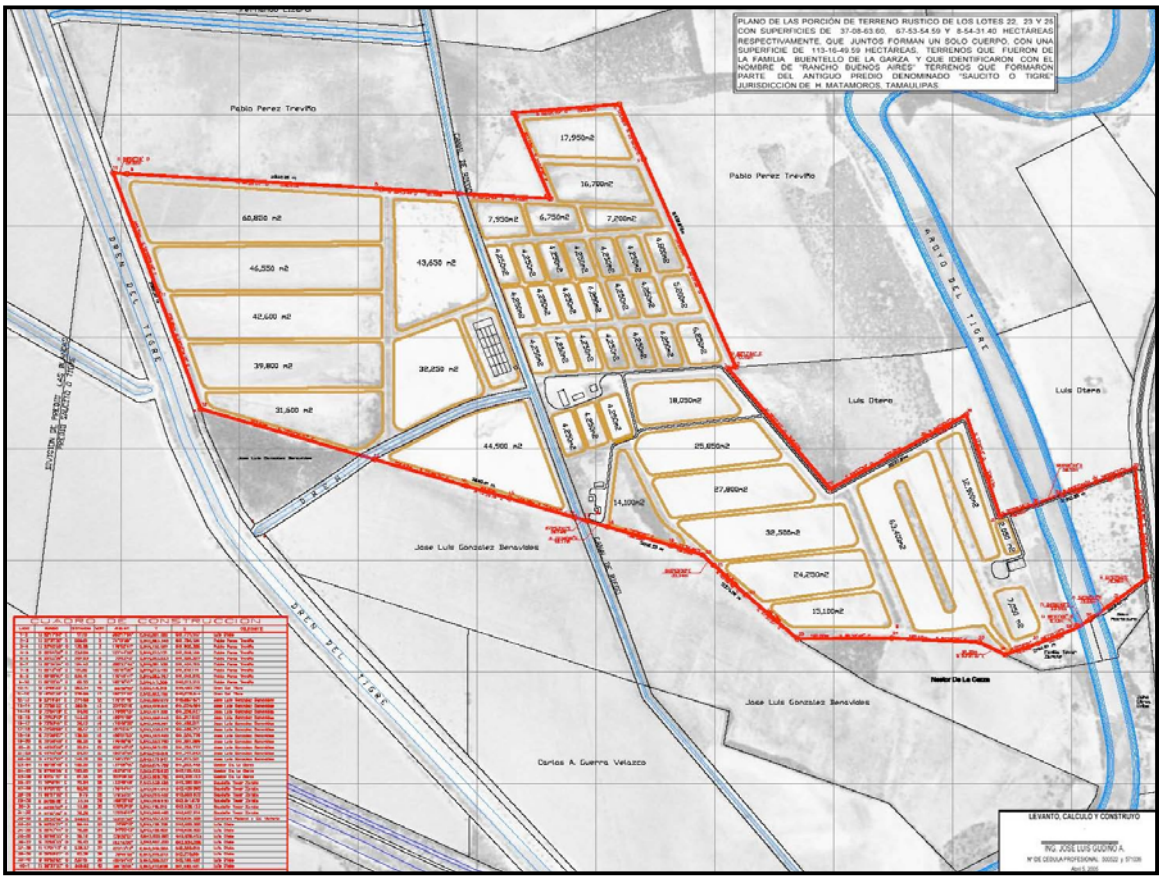
Map 1: Regional Matamoros-Valle Hermoso Landfill

Entrance to the new landfill. Photo Chapman

[2] 1er informe de gobierno, Matamoros 2005
[3] Press Release, Tamaulipas Government
http://www.tamaulipas.gob.mx/saladeprensa/boletines/boletin.asp?no_

The project has been constructed with funding from the Tamaulipas state government, with municipal funding and with a grant of $50,000 dollars[4] from the North American Development Bank (NADBANK),[5] which was used to conduct the feasibility study for the project. Total investment in the project is projected to be $10,000,000 dollars.[6] The mayor of Matamoros - Baltazar Hinojosa - reported an investment so far of more than 18 million Mexican pesos.[7] With its landfill, Matamoros joins the other small minority (5%)[a8] of Mexican cities to have a landfill instead of an open-air dump.

Map 2: Regional Matamoros-Valle Hermoso Landfill Layout



The new regional landfill was developed to ameliorate a variety of environmental problems created by the existing dump, where semi-permanent fires blow fumes, smoke

[4] North American Development Bank, Press release. May 9, 2005.
[5] The North America Development Bank is a financial institution created under the North America Free Trade Agreement and funded in equal parts by the governments of Mexico and the United States. Its principal focus has been to provide financing for border environmental infrastructure projects, focusing on water, wastewater and municipal solid waste.
[6] Banco de Desarrollo de América del Norte. Infome de Análisis del SWEP (Programa Ambiental para el Manejo de Residuos Sólidos) 23 de Junio del 2005
[7] Matamoros, Tamaulipas. Presidencia Municipal, 1st Informe de Gobierno. 2005.
[8] Jorge Leal, Director, Matamoros Office of Environmental Control.

and dust into the surrounding city of Matamoros and across the border into Brownsville. The Brownsville/Matamoros area receives winds out of the SE for approximately nine months out of the year and at around 10-15 knots,[9] exacerbating the problem. These conditions, combined with a lack of available personnel to monitor, report and extinguish the fires, has led to an on-going air quality issue, the effects of which are described in more detail later in this report. Once started, the fires are difficult to control. Presumably some of the fires start when different chemicals in the trash blend together and micro explosions occur; others are started by the pepenadores themselves, who use fire to clear other debris out of the way while searching for metals.

IV Methods

This report is based on data collected via personal interviews with local government officials, Matamoros' public works employees and pepenadores, and research conducted via the internet. CBIRD personnel formulated the questionnaire, applied through personal interviews with refuse scavengers at the Matamoros dump. Photographs were taken to help describe the working environment and the life styles of the subject population. Environmental Defense' Brownsville Texas office provided assistance gathering interviews, writing the environmental portion of the report and editing final copy.

A survey pilot run was administered during the month of August, 2005. Once the questionnaire was validated and the project was approved by the Institutional Review Board Human Subjects of the University of Texas at Brownsville and Texas Southmost College at the end of 2005, the survey was administered in February 2006. Other personal interviews had been in progress since the beginning of the project in August 2005.

Written consent to conduct the survey was kindly provided by the Municipality of Matamoros, Secretariat of Urban Development and Ecology.

Written consent to take pictures and participate in the study was also granted by the pepenadores, whose identity, dignity, and integrity was respected at all times during the course of conducting the study and writing this report.

Information on the city of Matamoros' solid waste "modernization" project was gathered through interviews with city officials, consultants and non-profit groups working within the pepenadores' community, as well as through site visits to the open air dump and the new regional landfill.

Refuse workers questionnaire

[9] http://www.tceq.state.tx.us/compliance/monitoring/air/monops/windroses.html

The questionnaire was administered on two different dates, as described above, by CBIRD and Environmental Defense personnel and volunteers from a non-profit organization called Instituto Fronterizo de Estudios para el Desarrollo, A.C. (IFED) in Matamoros, which has previously worked very closely with this population on diverse issues such as medical waste, health, and environmental concerns.

Youth from IFED interview pepenedores. Photo Karen Chapman

Unofficial numbers provided by the pepenadores' leader show that the total population of registered pepenadores is 152. The original intent was to survey the total population, but due to scheduling constraints, we were able to interview first and second shift scavengers only (third shift scavengers, mostly men, work overnight).

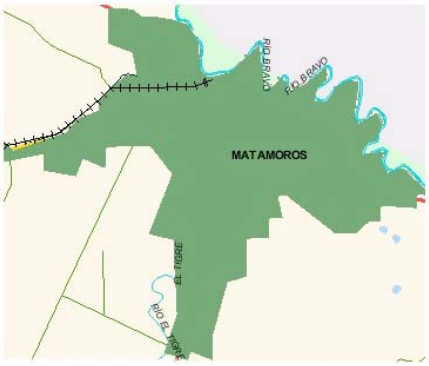
With the two samples taken, the total number of complete and valid surveys was 143. Nevertheless, for the purpose of this report, we are only using 103 questionnaires in this analysis, which represents 67.8% of the total pepenadores registered population.

CBIRD processed the survey using an excel spreadsheet to clean, codify and table the information. Once clean, staff ran the necessary statistical analyses. The statistical analysis of this report will consist of descriptive statistics and frequencies, as well as some correlations among variables.

V Socio-geographic Context

Matamoros is located on the U.S. Mexico border, in northeastern Tamaulipas state, across the Rio Grande from Brownsville, TX. Like many border towns it is somewhat isolated from other cities in the state of Tamaulipas and from the rest of Mexico.

Map 3: Region



Map 4: Matamoros urban footprint

Matamoros is 47 kilometers from Valle Hermoso and directly east of the Gulf of Mexico. According to the Mexican census bureau INEGI,[10] Matamoros had a population of 418,141 in 2000. The population agency - CONAPO[11] - projected that figure would rise to 511,271 by 2006. In 2000, 39% of the population was economically active in the labor market, and Matamoros had a 1.2% unemployment rate. As shown in Table 1, in 2004, 63% of employment was concentrated in the maquiladora industry, 13.5% of the employed population was working in the retail services sector, and 8% in business services. It is worth noting that 40 years ago Matamoros was predominantly an agricultural-based community, but today less than 1% of the economy is based on agriculture. This transformation of the Matamoros economy also implies a needed transformation in workers' education levels and skills. However, current educational attainment suggests these shifts are taking longer than 40 years [Table 2].

Matamoros Economic distribution – Employment by Industry

Table 1: 2004 Matamoros Employment by Industry

Industry	Number	Percent
Agriculture, cattle, fishing	832	0.82
Mining, Oil and Gas Extraction	135	0.13
Manufacturing	64,432	63.62
Construction	5,457	5.39
Retail services	13,716	13.54
Transportation and Warehouse Services	3,386	3.34
Business Services	8,305	8.20
Social Services	5,010	4.95
Total	101,273	100

Source: IMPLAN with data from IMSS. December, 2004.

[10] Instituto Nacional de Estadistica, Geografia e Informatica: a federal agency in charge of conducting Mexico's national census and maintaining geographical information systems and databases.
[11] Consejo Nacional de Población

Level of Education

The educational attainment in Matamoros for the population over15 years old in 2000 is shown below:

Table 2: Matamoros Educational Attainment		
	Number	Percentage
Illiterate	14,723	5.35
No Middle School	110,099	39.99
No High School	190,568	69.22
Source: INEGI-XII Censo de Población y Vivienda 2000		

These numbers seem to suggest that the transition from primarily agriculture to other economic sectors has not been fully achieved in Matamoros. With 69% of the population over 15 years old lacking a high school diploma, Matamoros attracts intensive labor industries like manufacturing plants or maquiladoras. Matamoros ranked # 5 of 12 border towns in the number of maquiladora establishments in 2004 (Table 3).

Table 3: Mexico's Northern Border Maquiladora Establishments	
Tijuana, B.C.	576
Juarez, Chi.	296
Reynosa, Tam.	136
Mexicali, BC	134
Matamoros, Tam.	122
Tecate, B.C.	115
Nogales, Son.	78
Acuna, Coah.	47
Nuevo Laredo, Tam.	42
Piedras Negras, Coah.	31
Agua Prieta, Son.	21
Mexico's Northern Border	1,598
Source: IMPLAN with INEGI data. December 2004	

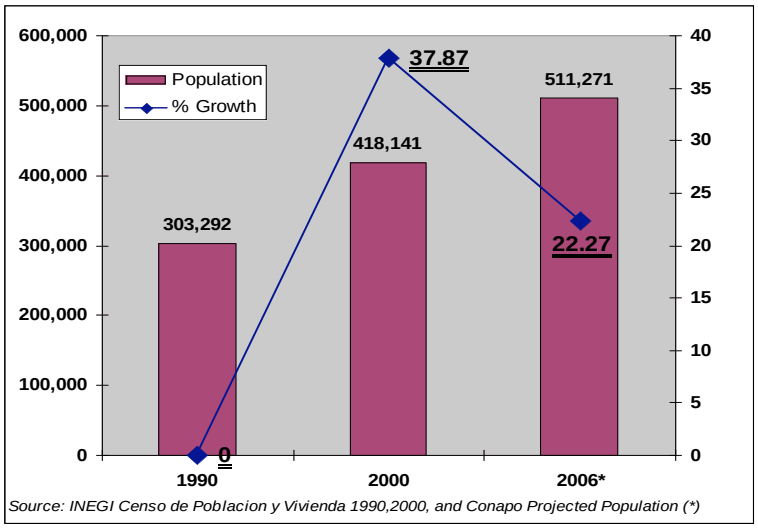
Growth patterns

Like many other border towns, Matamoros has experienced rapid growth in the past several decades, due primarily to several programs initiated by both the U.S. and the Mexican federal governments to attract first agricultural workers and later industrial sector workers to the border zone. This may explain in part the prevalence of the agricultural employment sector 40 years ago and subsequent shift to manufacturing employment.

As shown in Graph 1, Matamoros' population grew by almost 38% in the decade from 1990 to 2000 and has grown 22% from 2000 to 2006.

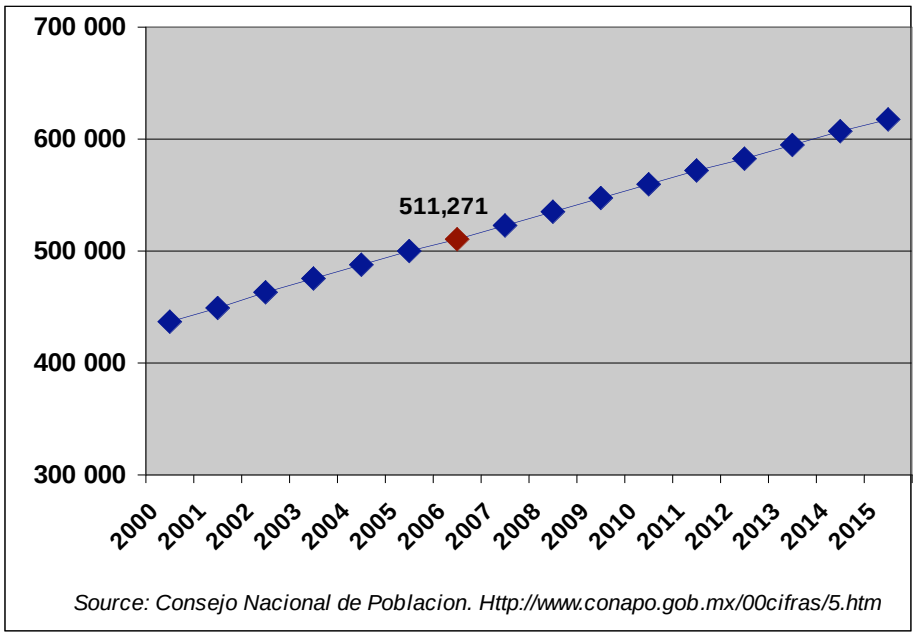
Many reports and analyses have been written regarding the growth of the border zone, subsequent infrastructure strains and attendant health and environment issues. It is outside the scope of this report and redundant to address these issues, but it is worth noting that when educational attainment does not keep up with available employment, and growth outstrips the pace of infrastructure development, communities of unskilled workers living in extreme poverty, like that of the pepenadores, might be one natural result.

Graph 1: Matamoros Population Growth



Source: INEGI Censo de Poblacion y Vivienda 1990,2000, and Conapo Projected Population (*)

Graph 2: Matamoros Population Projected Growth (CONAPO)



Source: Consejo Nacional de Poblacion. Http://www.conapo.gob.mx/00cifras/5.htm

VI Environmental context: Health effects of open air trash burning

When trash is burned, particulate matter is released. Typically, it is the size of the particulate matter that is of concern when considering the health effects. The U.S. Environmental Protection Agency says that particles less than 10 micrometers in diameter are the most dangerous because of their ability to penetrate the lungs and from there possibly the bloodstream. Particles found in smoke and haze are 2.5 micrometers in diameter and are considered fine particles. Exposure to these types of particles can affect the lungs and heart, and are particularly problematic for vulnerable populations like children, people with asthma and the elderly.

From the Environmental Protection Agency website:*

Numerous scientific studies have linked particle pollution exposure to a variety of problems, including:

- *increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing, for example;*
- *decreased lung function;*
- *aggravated asthma;*
- *development of chronic bronchitis;*
- *irregular heartbeat;*
- *nonfatal heart attacks; and*
- *premature death in people with heart or lung disease.*

**http://www.epa.gov/oar/particlepollution/health.html*

In addition, while there are no known studies on the composition of the haze generated by fires in the Matamoros dump, there is a high likelihood that the ash and smoke is hazardous. Heavy metals such as lead, mercury, and arsenic, as well as toxic organic compounds such as PCBs and dioxins (a potent carcinogen) come from burning common household items like plastics, treated or inked paper products, batteries, fluorescent lighting fixtures, electronics, light bulb sockets, and plated metal products.[12] There are a large number of tires at the dump which, when burned, would release known carcinogens like benzene. When there is a particularly large fire at the dump, or when southeast winds are strong, there is an unmistakable and recognizable acrid odor that drifts across the border into Brownsville.[13] Just in the past two years, several dump fires have prompted

[12] http://www.nmenv.state.nm.us/aqb/projects/openburn/trash_qa.html#Ash%20toxic
[13] *Mexican, U.S. officials address landfill fires*, Brownsville Herald, online edition, January 28, 2005

news stories[14] and warnings to susceptible individuals (those with asthma and other respiratory ailments, as well as infants and the elderly) to avoid going outdoors.

Tire gasification plant and "green energy" project

As part of an overall plan to improve this air quality problem and provide a source of "green" energy for the city, Matamoros public works department personnel have been working on a project to capture and use landfill gas and deal with a chronic waste tire problem. With funds from the Canadian International Development Agency (CIDA), Matamoros contracted with international environmental consulting firm, Golder Associates, to conduct a feasibility study (including technical, social and environmental studies) for the project. The feasibility study has been carried out in accordance with requirements of the Border Environment Cooperation Commission.

The project calls for a gasification plant installed at the site of the existing previously "closed" landfill and dump (see following section description and map referring to location) that would convert waste tires into energy, using the gases generated from the dump to fuel the heating sources needed for the gasification facility. Plans call for the gasification facility to "process" 150 tons per day of waste tires and generate some 10 to 12 megawatts of electricity. Additional plans call for a wind farm adjacent to the dump that would install 10 1-megawatt wind turbines.

A fire burns in the distance. Photo Karen Chapman

Golder Associates is currently evaluating a test site at an existing tire dump in Matamoros, including testing air emissions and energy output.

In order to successfully launch the project, the city will need to properly close the already closed landfill, clean up the existing dump and control all fires in the closed landfill

[14] See Brownsville Herald on-line articles dated January 27, 2005 (*Landfill smoke nudges air quality from "good" to "moderate"*), July 23, 2004 (*Landfill fire still burns in Matamoros*), December 23, 2004 (*Matamoros landfill fire prompts health concerns*).

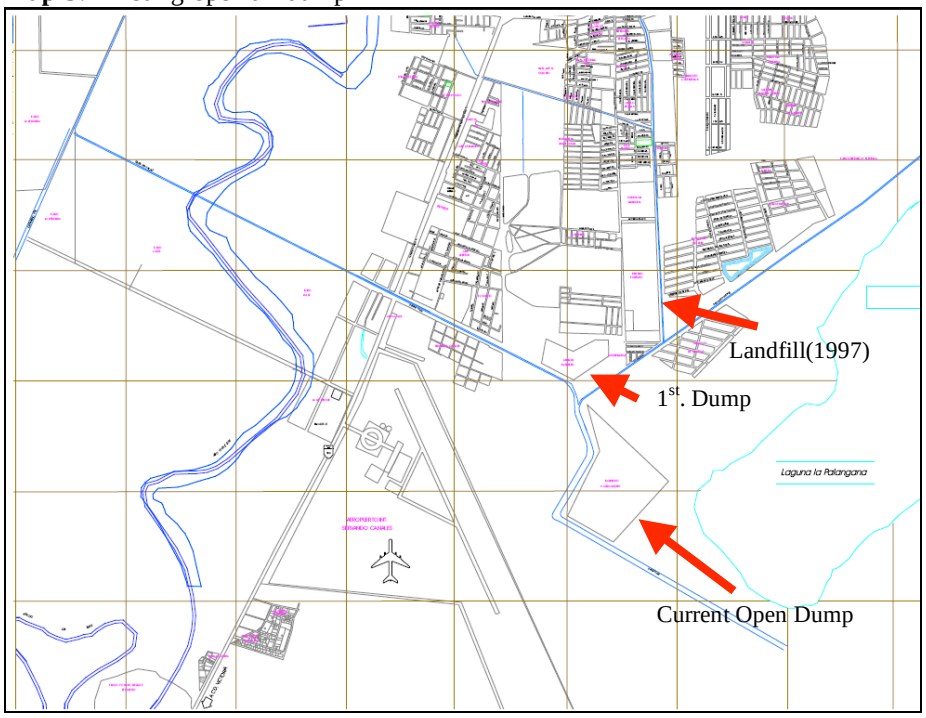
and dump site. According to Golder Associates,[15] once the gasification facility consumes all available landfill and dumpsite gas at the "old" site, the facility will be moved to the new regional landfill and begin to operate there.

According to both Golder Associates and Matamoros city officials, the city has already begun to implement a social integration plan that was developed in the feasibility stage, including offering jobs within the parks and sanitation department to all the pepenadores formerly working at the dump and closed landfill.

VII El Basurero: the Open Dump

The current dump site is located nine kilometers south of the city of Matamoros, three kilometers east of the main road to Ciudad Victoria and about 1.5 kilometers[16] northeast of the Matamoros International airport "Servando Canales."

Map 5: Existing open air dump



This 33-hectare property served as the principal dump for the city of Matamoros since the early 80's. In 1996[17] the city of Matamoros prepared a feasibility study to construct a landfill within the current open dump site.[18] This project was approved and launched in 1997 with federal funds on an 8-ha lot adjacent to the existing dump. Technical assistance

[15] Email correspondence, Karina Lopez, Mexico projects representative Golder Associates, 9/12/06
[16] Manejo Integral de Residuos Sólidos para la Ciudad de Matamoros, Tamaulipas. Julio de 1998
[17] Under then-mayor Ramon Antonio Sampayo Ortiz.
[18] Manejo Integral de Residuos Solidos para la Ciudad de Matamoros, Tamalulipas

was requested from the Border Environment Cooperation Commission (BECC)[19] to conduct several studies and to help in the development of an Integrated Master Plan. The plan was developed and presented to the federal secretariat for urban development (SEDESOL) the BECC and the North American Development Bank (NADBank) in July 1998 (Manejo, 1996, p. 4).

Did you know that…?
The quantity of waste generated is directly related to income. On average a U.S. resident produces over 1.5 kg. of garbage per day, vs. 125 grams generated by a resident of Cotonou, Benin in Africa.)
(Medina, Cooperatives, p.4)

The study shows that in 1996 Matamoros had a population of 348,186 and was generating 145,558 tons of trash a year or an average of 399 tons per day, equal to 1.14 kilos per day per person. As part of the justification for the new project, Matamoros leadership recognized that their infrastructure and the equipment they were using to pick up and handle the trash was inefficient. They reported that they only had capacity to render service to 68% of the population, and that 27% of these services were provided by private organizations (carretoneros[20]) that were charging a toll to pick up the trash. It was estimated that 5% of the trash was staying in the streets as well as in vacant lots. The report also discloses the existence of 13 illegal dumpsites being used by the carretoneros.

Trash in Matamoros

It is not clear that conditions have improved since 1996. The population increased by 20% from 1996 to 2000 according to INEGI's figures, and 46.8% from 1996 to 2006, according to CONAPO's projection for the 2006 population. Matamoros now has a population of 511,271, generating close to 560 tons of trash daily[21] or 1.09 kilos per person/day, slightly less than in 1996.

VIII Refuse Scavengers in Matamoros: who are they?

The scavengers, or pepenadores, as they are usually called in Mexico, are people that sort through the trash after if has been dumped looking for recyclable materials such as plastic, metal, paper, cardboard, aluminum cans, clothes and food. These individuals, while ages vary widely [Graph 3, Table 4], have some common characteristics. Most of the pepenadores working at the Matamoros dump have a

Did you know that…?
2% of the population in Asian and Latin American cities survives by scavenging.
(Medina, Cooperatives, p.9)

[19] Set up under the NAFTA side accords to operate in tandem with the North American Development Bank, the BECC provides review, technical assistance and approval of border infrastructure projects prior to financing.
[20] Often consisting of a horse or mule-drawn cart with one driver, the carretonero charges residents a fee to pick up and dispose of trash, particularly in areas where municipal trash collection is sporadic or non-existent.
[21] Personal communication, Jorge Leal, Director, office of Environmental Control: confirmed that current figures put trash per person per day at around one kilo.

family to support, very little or no education, live in the colonias surrounding the dump, and are unable, or unwilling to engage in employment involving formal working hours or to find a job in the formal economy of the city.

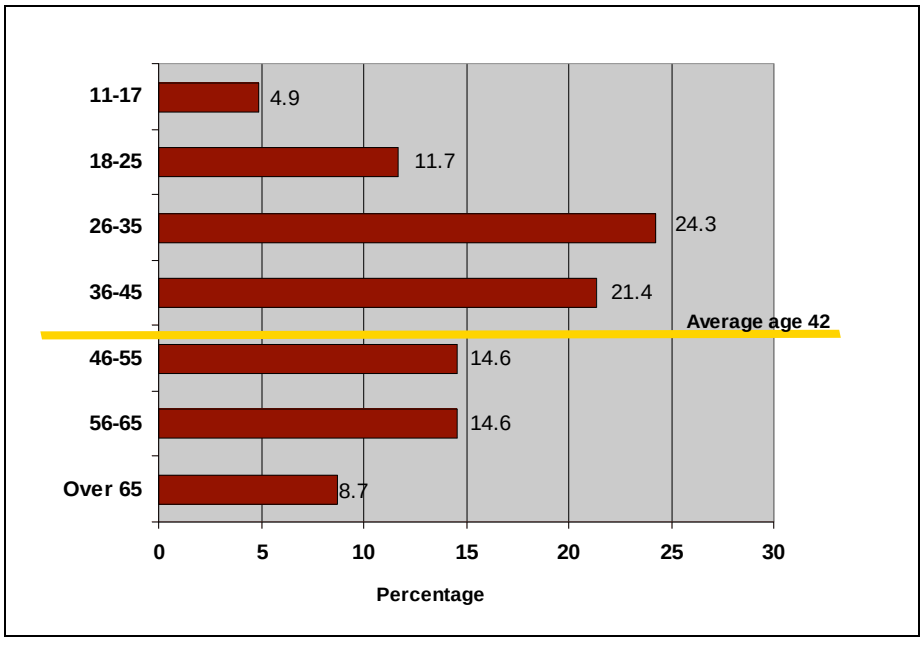
For some, the advantages outweigh the disadvantages. For example, jobs in the dump do not come with a supervisor, and rules are not formally written down, though informal rules and something of a hierarchy seems to be in place. There are no benefits, but showing up for work is optional. Other comparative advantages: there is no dress code, shifts are defined by the worker, productivity is determined by the amount of income the worker may need for that day or week, the quality control department is non- existent and workers get paid at the end of every day for any recyclables found.

Table 7: Population Distribution by Place of Birth

	Matamoros	Basurero
Matamoros	n/a	44.8
Tamaulipas	72.1	83.6
Other State	25.6	16.4
Other Country	2.3	0

Source: INEGI, Censo Nacional de Población y Vivienda. 2000 & CBIRD Matamoros Dump Survey, 2006

The downsides are, of course, numerous: an extremely hazardous, unsanitary and foul working environment, no safety equipment or supplies, and no guarantee of income. Work is never suspended regardless of climate conditions or holidays, and seemingly anyone can enter the workplace, day or night.



Graph 3: Matamoros Scavenger's Age Distribution

This "oficio" or trade is often taken up by children and the elderly, who otherwise have very little or no opportunities to enter the job market. The average age of the pepenadores at the Matamoros dump is 42, and the mode[22] is 29. According to Gibson and Perez (2003, p.12), in 1990, the highest growing age bracket in Matamoros was 15-to-30 year-olds, perhaps a reflection of the maquiladoras' impact in attracting a young child-bearing population from outside Matamoros. This was clearly reflected longitudinally in 2000 with a growth in the 25 to 45 age group. A direct correlation between the city's demographic trends and the dump's population trends can not be confirmed due to lack of information, but interestingly, this same age cohort is the most prevalent at the dump.

According to the INEGI 2000 census, Matamoros median age in 2000 was 23 and 58 percent of the population fell within the Mexican workforce ages of 15 and 55 (Gibson, pg. 13). At the Matamoros dump, in 2006, the median age is 40 and 73% of the population falls within the ages of 15 and 55. The high percentage of working age population represented at the dump shows the lack of opportunities available to the most unfortunate, and illiterate of society. When the question was posed to the pepenadores, "where would you work if not at the dump?"; 30%, mostly women, said that they would work as housekeepers; 19%, mostly men, said they would work as carpenters, mechanics, electricians' aids or in the construction business; only 12% said they would work at factories. These are individuals that might qualify to work in a factory but have chosen not to do so, perhaps because they make comparatively more money scavenging than what they would make in the formal sector (Florisbela A, Wehenpohl G, 2001). Another 10% said they would not work (the elderly or infirm), 17% mentioned they would work at grocery stores, in restaurants, as drivers, or as laborers, and 12% said they did not know what they would do.

[22] "mode" means the most repetitive age number in the survey.

Social Characteristics

Table 5: Comparison of Socioeconomic Characteristics of Scavengers and the General Population of Matamoros

	Scavengers	Matamoros General Population (2000)
Median (40) Mean (42) Age	40	
Female	52.4	50.7
Male	47.6	49.3
% born in Tamaulipas	83.6*	72.1
% born in Matamoros	44.8*	n/a
Migrants	65.2	n/a
Illiterate (Population over 15)	26.3	4.2
Illiterate (Males over 15)	34	3.6
Illiterate (Females over 15)	19.2	4.7
Knows how to read	80.6	94.65
Knows how to write	74.8	94.65
Complete at least Elementary School	18.2	39.9
Complete at least Secondary School	6.1	69.2
Home connected to Water System	52.4	93.2
Home Connected to Electric Grid	60.8	95.2
AVG Hours Worked per Week	36	41.53
Single Parent	19.6	
Household Size	n/a	4
Avg. children per household	2.56	
Daily Income (pesos)	53.32	143.64
* Sample = 67		
Source: INEGI Censo de Población 2000- CBIRD computations, Matamoros Dump Survey, 2006.		

In a comparison of different social variables between the pepenadores and Matamoros' general population, there is clearly a gap in educational percentages, weekly income, and literacy. These gaps show the overall living conditions of the pepenadores and the disadvantages they must overcome in order to compete for jobs in an open market and a global economy.

Where do Scavengers live?

Scavengers generally settle around the dump or in communities within walking distance to the dump [Table 6]. By doing so, dump workers minimize transportation costs, occupy land that may be undesirable to others and have access to discarded materials that can be use to construct their homes, thereby also saving on housing costs (Medina, n.d., p. 14-15).

Table 6: Matamoros Scavengers distribution by place of residence

Name of Colonia	%
Los Olivos	9%
Estrella	5%
Servando Canales	5%
El Cambio	17%
Libertad	13%
Bermudas	12%
Ejido La Luz	10%

Source: Matamoros Dump Survey, 2005

Table 7: Transportation means used by Matamoros scavengers

Cart pulled by donkey	6%
Public transportation	5%
Ride	2%
On foot	33%
Truck	20%
Bicycle	17%
Car	10%
Tricycle	8%

Source: Matamoros Dump Survey, 2005

In Matamoros, there did not appear to be any individuals living inside the main dump among the trash, in contrast to other cities such as Mexico City, Tijuana or Guadalajara. However there is a community called Las Bermudas located inside the foot print of the dump boundaries. Las Bermudas is a tiny neighborhood along the unpaved access road to the dump of approximately 40 families; it is situated north of the open dump and south of the 1997 closed landfill.

Table 8. Pepenadores' homes by construction materials.

Wood	74%
Concrete Block	20%
Carton/recycled materials	6%

Source: Matamoros Dump Survey, 2005

Colonia Las Bermudas. Photo Chapman

Sandwiched between the two sites, one or both of which frequently catch fire, Las Bermudas is a community at risk of respiratory diseases because it is frequently exposed to the fumes from incinerating chemical compounds, bad smell of rotting food and smog from the dump and the landfill. Most of the homes there are built with recyclable materials, wood, and black carton, there are just a few homes built out of concrete blocks. About 70% of the total pepenadores at the Matamoros dump live near the periphery of the dump [Table 5], and 14% live elsewhere in the city.

Like the Bermudas community, the rest of the colonias where pepenadores reside have the same type of housing construction materials [Table 8]. Most of the neighborhoods have dirt roads and lack public services, and very few have sewage systems. The majority do have running water and electricity.

Source: INEGI, 2000

Table 9: Matamoros' Homes distribution by Construction Material

Wood	30,996	30.4%
Concrete Block	68,477	67%
Recycled Material, Black Carton and Metallic Sheets	1,395	1.4%
Cane and Bamboo	151	0.15%
Adobe	263	0.3%
Not specified	633	0.6%

There are marked differences between the pepenadores' housing versus the general housing in Matamoros (Table 9). 67% of the general housing in Matamoros is built of concrete block vs. only 20% in pepenadores communities; 74% of the pepenadores possess homes made out of wood vs. 30% wooden homes in the rest of Matamoros. Surprisingly, only 6% of the pepenadores declared having homes made out of carton and/or recycled materials, but driving though the neighborhoods, the CBIRD research team noticed most of the wood homes had recycled materials as part of their structures (walls, frames, windows and doors).

IX The Dilemma of "informal recycling"

> In 1996, the city of Matamoros had capacity to render trash collection services to only 68% of the population. 27% of the population was served by "carretoneros" and 5% of the generated trash remained on the streets and vacant lots though out the city.
>
> (ETEISA, 1996, p. 2) *http://www.cocef/aproyectos/Matamoros_final.pdf*

There are differences of opinion among researchers and the public in general as to the benefits of having "human scavengers" recycling materials. Governments tend to believe that getting rid of the pepenadores is the best thing to do.

The work of trash collection can be divided in two parts. The government pays for maintenance, installation and operation of collection vehicles and processes. Revenues from the recycling of the materials and selling of these sub-products go to the pepenadores and some leaders[23] (Castillo, 2004).

Waste management usually accounts for 30-50 percent of municipal operational budgets. This expenditure does not ensure efficiency in the collection service, thus, cities generally collect only between 50 and 80 percent of all the generated trash (ETEISA, 1997 & Medina, globalization). These inefficiencies open up windows of opportunity for carretoneros who render collection services for a toll in poor, outlying areas, as has been mentioned above (Medina, globalization).

To further illustrate this point: in Mexico City, each household spends around 500 pesos annually (approximately $48 USD) on tips given to the informal refuse workers who pick up their trash (Castillo cited by Castellanos, 2004). This amount is higher than what they would have to pay for a formal private collection service.

[23] Although in the case of Matamoros, many of the pepenadores mentioned having to sell to middlemen who travel to the dump, lacking their own transportation to carry the material to a central collection point in the city.

The following section will discuss an editorial written by Martin Medina from El Colegio de la Frontera Norte (COLEF) in Tijuana, Baja California, for the Inter-American Development Bank. Medina has studied refuse scavengers throughout the world and is probably the leading authority on the subject. In the article he discusses a variety of "myths" about refuse scavenging and recycling, which we will partially present and examine here in the context of the situation in Matamoros.

Table 10: Years working at the Matamoros' dump by age

Over 40 years	7%
Over 20 years	25%
10 to 19	18%
5 to 9	20%
1 to 4	28%
Less than 1 year	8%

Source: Matamoros Pepenadores' Survey. 2005

In his article, Medina says that many people believe that scavenging is a recent phenomenon (having started up in the past few decades), when in fact informal recycling goes back thousands of years.

Table 11: Years working at the dump

Mean	12.1
Median	8.0
Mode	3.0

Evidence was not found as to when the recycling phenomenon started in Matamoros. As far as the life of the current dump, some of those surveyed declared they had been working at the dump for as long as 50 years. According to a study by the World Bank in 1993, "the problem of scavengers in seven border cities," Matamoros had 370 scavengers working at their public dump in 1993, and it was estimated that scavengers had been working there since 1968. Today, the dump has a roster of 150 people actively working, scavenging the trash. 56% of the surveyed scavengers declared they had been working at the dump for less than 10 years. Although this number might show that half of the population working there is relatively new, 7% of the surveyed population has been working there for over 40 years, and 25% for over 20 years [see tables 10 & 11]. The dynamics of the economy and the unemployment rates make the number of pepenadores fluctuate from time to time.

Medina also strives to refute claims that scavengers are extremely poor and indigent, showing that in some places, scavengers earn above-minimum wage. Where they do earn

comparatively less, Medina believes this is due to "the low prices paid by middlemen" (Medina, cooperatives, p.11).

Table 12: Scavengers Average Income per day

Mean	$53.23
Median	$45.00
Mode	$40
Minimum	$10
Maximum	$300

Table 13: 2000 Matamoros Employed Population by Income Range.

Income Range	Employed Population	% of Employed Population	2006 Daily AVG Salary (In Mexican Pesos)
Note: m.s.= minimum salary			
Do not Receive a Salary	2,531	1.6	$ -
Up to 50% a m.s.	1,984	1.2	$ 22.6
from 50% to 1 m.s.	5,646	3.5	$ 33.9
1 minimum salary	0	0.0	$ -
between 1 and 2 m.s.	51,660	31.6	$ 67.9
between 2 and 3 m.s.	39,637	24.3	$ 113.1
between 3 and 5 m.s	31,565	19.3	$ 180.9
between 5 and 10 m.s.	14,482	8.9	$ 339.3
Over 10 m.s.	6,396	3.9	$ 452.4
not specified	9,379	5.7	n/a
Total employed population	163,280	100.0	

Source: CBIRD with INEGI 2000 data & 2006 minimum salary

Matamoros scavengers are indeed poor people, but there are other places around the city where extreme poverty is as evident, for example, some "vecindarios"[24] in downtown Matamoros. The pepenadores are working families that strive to survive like anybody else, but they have to deal with lack of benefits and unsafe working conditions. In Matamoros, according to our survey, some pepenadores can earn slightly above the Mexican minimum wage, making on average $53.23 pesos or about $5 a day. Mexico divides the country into three geographic areas based on minimum wage - A, B, and C, C being the higher end of the scale. Matamoros has been classified in geographic area C. Since January 1st 2006, the new minimum wage for area C was $ 48.67 pesos a day (Mexican Law, Dec. 2005), an increase of 1.87 pesos (3.99%) from the 2005 minimum wage of $46.8 pesos for area C.

Some 65% of scavengers declared they make less than $50.00 Mexican pesos a day, 29% make between $50.00 and $100.00 pesos daily, 5% make between $100.00 and $160.00, and only 1% declared they make an average of $300.00 pesos daily (Table 12).

[24] In Mexico, the "vecindarios" or "vecindades" are small communities in the heart of the cities where 5 or 7 families live in shacks, share toilet and shower facilities, and have a common laundry area.

While many people certainly view scavenging as a marginal economic activity, the pepenadores undoubtedly provide a valuable service. According to the Matamoros department of environmental control, scavengers in the city collect between 30-40 tons of recyclables daily.[25] These are carted to some 50 recycling centers around the city and from there trucked to larger processing centers in Monterrey. This is borne out by the surveys; most of the pepenadores questioned said they do transport items to buyers in the city.

The pepenadores' activity appears to be more organized than one might expect. There are three shifts of workers in the dump, as we noted previously in this report, and while a hierarchy was not immediately visible during the shifts we visited (morning and afternoon), we observed that the individuals scavenging did not seem to be in direct competition with each other. For example, they did not rush to the site of each newly-arrived truck in order to be the first to comb through the load. Usually a group would gather at the site of the fresh dump, watch as contents were dumped, and proceed calmly to sift through the trash. While Medina mentions that in some areas of Mexico the pepenadores have organized themselves into cooperatives,[26] it did not appear to us that the pepenadores in Matamoros had organized themselves in this manner. There is a "leader" of sorts, who we worked with and who acted as our point of contact, but we did not delve into the nature of his leadership or how he came to be the leader, nor whether he is considered the leader of some or all the pepenadores working in the dump.

Medina addresses, to a certain extent, the issue of the scavengers presenting a "nuisance" to the city. As we've seen, they do provide a public service, but the manner in which they scavenge can present a public health issue for officials to deal with: both from the standpoint of the pepenadores' health and because they are blamed for starting many of the fires that can burn out of control, posing an air quality problem.

Medina's view is fairly sympathetic toward the pepenador. He points out that trying to eliminate the problem by prohibiting scavenging, without eliminating the root cause (poverty) will only make living conditions worse for the scavengers and exacerbate poverty.

We did not conduct a formal survey of or interview Matamoros government officials about their particular views on this point, but city environment officials do blame pepenadores for starting dump fires.[27] Nevertheless, officials have also expressed that they are concerned with the welfare of the pepenadores, and although the new landfill is closed to scavenging, officials have reportedly begun to implement a plan that will

> Scavengers have a significant impact on garbage collection, decreasing the need for garbage trucks and sanitation workers, and lengthening the useful life of garbage dumps and sanitary landfills.
> *Medina, "Ten Myths…"*

[25] Personal communication, Jorge Leal, Director, Dirección de Cont
[26] *Dignity at the Dump*, Paul Constance; IDBAmerica, online article
[27] *Mexican, U.S. officials address landfill fires*, The Monitor, online article, January 29, 2005

transition the pepenadores to another economic activity. It is not clear that many or even some of the pepenadores will be able and willing to accept such a transition: many of the pepenadores we interviewed did not have an idea what they would do once the dump is closed, but neither did they appear overly concerned about the imminent closure.

Medina believes that scavengers play a useful role and need not be drummed out by modernization (see sidebar quote), but it is difficult to imagine a modern structure that would embrace an unregulated situation with myriad health impacts, particularly when funding from a variety of sources - including international sources - would be needed.

Matamoros city officials do indeed appear to be embracing modern waste management techniques in the design of the new landfill, and are prohibiting scavenger activity there. This is likely at least in part due to the effort to attract foreign financing for the project. There are examples of attempts elsewhere in Latin America to incorporate pepenadores into a legitimate employment structure, with varying rates of success.

In Argentina, the city of Buenos Aires in 2003 offered to register and license scavengers so that they could receive vaccinations for their children and partake in basic government health benefits. The program registered (by 2004), some 9,000 scavengers; many did not register however, reportedly because they were in the country illegally and did not want to call attention to themselves.

A social program to provide loans and improve living standards for scavengers in Paraguay was sponsored by the Inter-American Development Bank,[28] and a community near Mexico City is implementing a plan to organize and make safer the informal system of individual dumps that has been the model for scavengers there. In this project, the scavengers are already divided into four groups, with one group on rotation within the actual landfill while the other groups maintain separate dumpsites for sorting recyclables. The city proposed a plan for dedicating certain tracts of land for the sorting groups, providing sanitation and storage facilities on the sites and a system for collecting and depositing non-recyclables and transporting them to the landfill.[29]

In Brazil, the pepenadores and "triadores" (those who work in central collection areas outside of the dump or landfill proper) have formed cooperatives recognized by the state which are exempt from certain taxes levied on businesses but which are nonetheless offered vacation time, medical support and a retirement fund.[30]

X Conclusion

[28] *Dignity at the Dump*, Paul Constance; IDB America, online article, April 7, 2006
[29] *De pepenadores y triadores. El sector informal y los residuos sólidos municipales en México y Brasil*: Anna Lúcia Florisbela dos Santos & Gunther Wehenpohl; published in INE-SEMARNAT: gaceta ecológica; número 60; México 2001; pp. 70-80.
[30] *Ibid.*

The new regional landfill does not have a means of recycling the material that pepenadores traditionally recycled, so the 40 to 50 tons of glass, carton, metals and plastics that the workers now recycle daily will be added into the landfill space.

Notwithstanding the availability of other employment for the pepenedores, it seems likely that incorporating them into the new landfill in some fashion – as recyclers, sorters, etc – appears a desirable strategy for both increasing the life of the landfill and for taking advantage of the skills the pepenedores already have.

This report recommends, therefore, that the city of Matamoros and the funding agencies involved in the construction of the new landfill and the closing and cleanup of the existing dumps examine ways to recycle items through continued employment of the pepenedores that are already trained to sort such items, eliminating the need to either dispose of these items in the new landfill or to look for new means of recycling them.

Staging Area at the dump，Photo Karen Chapman

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