

Scavenger Cooperatives in Asia and Latin America

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Abstract

The informal recovery of materials from waste represents an important survival strategy for disadvantaged populations throughout the developing world. Scavengers are perceived as the poorest of the poor and marginal to mainstream economy and society. In many cases, they are subject to exploitation and discrimination by middlemen and by local and federal government policies. This paper argues that, when scavenging is supported – ending that exploitation and discrimination– it represents a perfect illustration of sustainable development that can be achieved in the Third World: jobs are created, poverty is reduced, raw material costs for industry are lowered (while improving competitiveness), resources are conserved, pollution is reduced, and the environment is protected. The paper also proposes a typology of public policies toward scavengers and analyzes recent experience on the formation of scavenger cooperatives. It also examines the use of appropriate waste management technology, and suggests ways in which scavengers could be incorporated into formal waste management programs.

1. Introduction

The socioeconomic conditions prevalent in Third World cities differ markedly from those in industrialized countries. Third World cities are experiencing rapid urbanization brought about by fast population growth, as well as high immigration rates. Urbanization often takes place as the expansion or creation of new slum areas and squatter settlements. Typically, these settlements grow organically and lack any planning, resulting in twisting and narrow streets, as well as in the occupation of environmentally sensitive and disaster-prone areas, such as wetlands, river beds, creeks, flooding plains, and steep slopes.

The physical characteristics of Third World cities, their rapid expansion, and the lack of resources to provide them with the necessary infrastructure and urban services translate into an insufficient collection of the wastes generated, as well as their improper disposal on the streets, vacant lots and in municipal open dumps. Most Third World cities do not collect the totality of wastes they generate. Despite spending 30 to 50% of their operational budgets on waste management, Third World cities only collect between 50 to 80% of the refuse generated [1].

Low-income neighborhoods, slums, and squatter settlements constitute the areas where municipal collection of wastes often does not exist. Residents of areas without refuse collection may resort to dumping their garbage in the nearest vacant lot, river, or simply burn it in their backyards. The improper disposal of solid wastes constitutes a source of land, air and water pollution, and poses risks to human health and the environment.

Third World cities, preoccupied with extending waste collection and with improving final disposal, generally lack recycling programs. This paper analyzes the informal recycling activities carried out by scavenger cooperatives in Asia and Latin America. The paper argues that scavenger cooperatives can increase the income of their members,

improve their working and living conditions, and promote grassroots development.

2. Scavenging and appropriate waste management technology

Solutions commonly proposed to the problems of waste management in Third World cities often have the following characteristics:

- Centralized and un-diversified: solutions that do not distinguish the heterogeneity and different needs of neighborhoods within each city
- Bureaucratic: top-down approaches, usually without any, or with little, community participation
- Capital-intensive approaches: involving advanced technology, frequently imported from industrialized countries
- Formal: conventional solutions only consider the formal sector, ignoring the existence and possible contributions of the informal sector that has developed around waste collection and recycling in many Third World cities
- Further, conventional solutions consider wastes as a disposal problem, rather than as a resource management one. Conventional solutions seek to maximize refuse collection and upgrade disposal facilities. A more socially desirable option would be to give the highest priority to waste reduction, reuse and recycling [2-3].

Conventional approaches often fail in developing countries. Profound differences exist between industrialized and developing countries in terms of income, standard of living, unemployment, consumption patterns, capital available, and institutional capacity.

Conventional solutions fail to consider these differences, resulting in less than optimum

outcomes. The following constitute the major differences between the developing and developed world:

1) Industrialized countries enjoy a relative abundance of capital and have high labor costs, while developing countries have an abundance of unskilled and inexpensive labor, and scarcity of capital. It makes economic sense for the former to devise solid waste management (SWM) systems intensive in capital that save labor costs, but it often does not make sense for the latter to follow the same approach. The Third World needs affordable SWM solutions that create income opportunities for unskilled workers, particularly the poor.

2) The physical characteristics of cities in developing and industrialized countries differ markedly. Areas with narrow, hilly and unpaved streets abound in Third World cities. This often impedes access to conventional refuse collection vehicles.

3) Many Third World cities have a dynamic informal sector that includes informal refuse collection and scavenging. These activities provide income opportunities for migrants, unemployed, children, women and handicapped individuals.

4) The amount and characteristics of waste generated in First and Third World cities differ markedly. The quantity of waste generated tends to go up as income increases.

Industrialized country cities typically have higher waste generation rates than Third World cities. The average U.S. resident produces over 1.5 kg of garbage per day, while the waste generation rate in Cotonou, Benin, is only 125 gr. / person / day [4].

Waste composition tends to differ between industrialized and developing countries. Waste produced in the latter contains a large percentage of organic materials, usually three times higher than in the former. Refuse is also more dense and humid, due to the consumption of fresh fruits, vegetables, and unpackaged food. Residents of industrialized countries consume more processed foods, packaged in cans, bottles and plastic containers. As a result, wastes in cities in developed countries contain more packaging materials, a lower density, and a higher calorific content than refuse in Third World cities.

Due to the different conditions, technology commonly used in developed countries often fails in Third World cities. Experience with the use of compactor trucks, incinerators, material resource facilities (mechanized plants that recover recyclables), and automated composting plants in the Third World has been mostly negative. Compaction of wastes in Third World cities is often unnecessary because the refuse has a high density to begin with. The low calorific value of wastes does not sustain combustion and does not generate usable energy. Equipment tends to break down often and requires frequent maintenance and repair. In short, the transfer of waste management technology from the First to the Third World is expensive and largely inappropriate to the conditions and needs of the latter. Consequently, a new approach is necessary [5-6].

In conclusion, it can be argued that low-income communities need an approach nearly the opposite of conventional solutions: affordable solutions that work well in a Third World context, that create jobs, that protect the environment, that promote community participation, that encourage and support the entrepreneurial spirit in the community, and that consider the contribution that informal refuse collectors and scavengers can make. Community-based waste management systems take advantage of the creativity and

entrepreneurial abilities of individuals who are familiar with their communities, with the surrounding environment and the opportunities it offers to them. Community-based systems promote investment in locally made collection vehicles and equipment. Indigenous equipment used by community entrepreneurs tends to be appropriate to the conditions in which operates. Local equipment does not require foreign currency to be acquired, as well as to obtain spare parts. Repairs of local equipment also tend to be cheaper and available in the city. In short, these systems tend to rely on the resources that exist in their communities.

2.1 Informal Refuse Collection

Many areas in Third World cities –mostly low-income neighborhoods, slums and squatter settlements– lack municipal waste collection. In some of these areas, informal refuse collectors charge a fee to residents for picking up their garbage, and retrieve the recyclables contained in it. In many Latin American and Asian cities, informal collectors using pushcarts, tricycles, donkey carts, horse carts, or pick up trucks serve the poor. For example, in Santa Cruz, Bolivia, informal refuse collectors serve about 37% of the population. And in the Mexico City suburbs of Ciudad Nezahualcoyotl, Chalco and Iztapaluca, hundreds of informal collectors using pick up trucks, push carts and horse carts provide service in areas not served by municipal authorities. In some Indian communities, residents pay a fee to local sweepers for cleaning the street in front of their houses [7-8].

The continued operation of informal refuse collectors demonstrates that low-income residents are willing to pay for waste collection service. Informal refuse collectors have a definite advantage operating in low-income neighborhoods. Given the conditions of hilly, unpaved or narrow streets common in those settlements, sanitation trucks may have no access to them. Alternatively, if they do enter those areas, the vehicles break down easily

considering the harsh conditions of the streets and roads. It is not uncommon for Mexican cities to have, at any given time, half of their collection vehicles idle in the garages awaiting some kind of repair. Additionally, faulty or nonexistent maintenance as well as lack of spare parts contribute to that high percentage of idleness. Thus, the vehicles used by the informal collectors are more appropriate to the conditions of the slums, and can provide the service at a lower cost than a private company using state-of-the-art, imported, and expensive compactor trucks, as programs in Colombia and Brazil, previously discussed, have demonstrated [9].

Informal collectors, however, often simply dump illegally the collected garbage in vacant lots, river banks or ravines, posing risks to human health and the environment. Given that dumps or landfills tend to be at a considerable distance from residential areas, and that animal-drawn and man-pushed vehicles have the disadvantage of a limited range, it is convenient for those informal collectors to dump the collected refuse as soon as they can. Incorporating the informal collectors into a formal program could bring some control over their operations, and stop the illegal dumping. For example, if incentives were created for the informal collectors to bring the refuse they collect to transfer stations, local authorities then would be responsible for its transport to the final disposal sites. Thus, pick up charges would be standardized, the informal collectors would be accountable for their actions and would be encouraged to use the transfer stations. Service would be improved, particularly in slum areas, at an affordable cost to the city (no expensive and imported collection trucks would be needed) and jobs would be created for unskilled individuals [10- 11].

Other examples of transfer of advanced technology to developing countries that may fail are: incineration, in-vessel composting, and mechanical equipment to sort wastes in material recovery facilities. Expensive incinerators have been built in cities such as Manila,

Mexico City, Lagos, Nigeria, and Istanbul that have not operated as expected. For example, three incinerators built in Lagos in 1979 with a Western European grant (at a cost of U. S. \$30 million) were never used, two of them were dismantled in 1989, and the third was converted into a civic center. In most cases, developing countries' garbage does not sustain combustion, making necessary the addition of fuel, increasing the costs of an already expensive technology. In-vessel composting also requires costly equipment and electrical power. Large-scale composting projects in Latin America, Africa and Asia were often too complicated, expensive and inappropriate to the local conditions. As a result, some facilities closed, others were scaled down, and many operate below their planned capacities. A more appropriate alternative may be the windrow composting method, which uses solar energy to decompose organic waste and unskilled labor, thus creating jobs. An additional advantage of this method is that it requires a lower investment than in-vessel composting. Furthermore, scavenging activities can facilitate the composting of the organic portion of wastes by removing the inorganic materials [12-13].

Open dumps constitute a health hazard. Sanitary landfills represent a dramatic improvement over open dumping. Their main drawback is the high cost of building and operating them. Many developing countries cannot afford sanitary landfills. A lower-cost alternative may be the so-called "Manual sanitary landfill", which, instead of using bulldozers and heavy construction equipment, uses light compacting equipment operated manually by workers. Again, the denser, more organic garbage generated in developing countries does not need as much compaction as in industrialized countries. Scavenger coops could operate these landfills. However, this method may be more appropriate to smaller settlements and outlying areas of cities. It has been used successfully in the town of Marinilla, Colombia [14].

3. Current Situation of Scavengers in Asia and Latin America

Recycling of municipal solid wastes in developing countries relies largely on the informal recovery of materials from waste carried out by human scavengers. It has been estimated that in Asian and Latin American cities up to 2% of the population survives by scavenging. Scavengers recover materials to sell for reuse or recycling, as well as diverse items for their own consumption. These individuals are generally known as 'scavengers' 'waste pickers' or 'rag pickers' in English-speaking areas, but they also receive different names, depending on the local language, on the place they work, and on the material(s) they collect. In Mexico, for example, dumpsite scavengers are known as 'pepenadores,' while the term 'cartoneros' applies to the cardboard collectors, 'buscabotes' to the aluminum can collectors, and 'traperos' to rag collectors. And Colombians use the generic term 'basuriegos,' while scrap metal collectors are known as 'chatarreros,' glass bottle collectors as 'frasqueros,' and so on [14-15].

Most studies report that human scavengers constitute disadvantaged and vulnerable segments of the population. Third World scavengers face multiple hazards and problems. Due to their daily contact with garbage, scavengers are usually associated with dirt, disease, squalor, and perceived as a nuisance, a symbol of backwardness, and even as criminals. They survive in a hostile physical and social environment. In Colombia, for instance, the so-called 'social cleansing' campaign, conducted by some paramilitary groups, considers scavengers as 'disposable' and harasses, kidnaps and expels them from certain neighborhoods and towns. Prostitutes and beggars are also frequent targets of this campaign. One of the most dramatic illustrations of this campaign occurred in 1992, when 40 corpses of scavengers were found at a local university (the *Universidad Libre de Barranquilla*), located in the Colombian town of the same name. The scavengers had been

killed, their organs recovered and sold for transplants. The rest of their bodies was sold to the university to be dissected by medical students. Approximately 2,000 *disposable* individuals had been killed by the end of 1994 as a result of the 'social cleansing' campaign in Colombia [17-18].

Scavenging may pose high health risks to the individuals engaged in it. According to a study, Mexico City dumpsite scavengers have a life expectancy of 39 years, while the general population's is 67 years. Another study, conducted in Port Said, Egypt, found that the scavenger community had an infant mortality of 1/3 (one death of an infant under one year out of every 3 live births), which is several times higher than the rate for the region as a whole. The prevalence of enteric and parasitic diseases was also higher in the scavenger community than in the region. In Cairo, one in four babies born in the scavenger communities dies before reaching their first year [19-21].

In Manila, more than 35 diseases have been identified in scavenger communities and areas that lack refuse collection and sanitation, including diarrhea, typhoid fever, cholera, dysentery, tuberculosis, anthrax, poliomyelitis, skin disorders, pneumonia and malaria. The health effects of practicing this activity on scavengers deserve careful study. Serious investigations on this topic are scarce [22].

Even though scavengers are not always the poorest of the poor, their occupation is generally ascribed the lowest status in society. Historically, outcasts and marginal groups, such as slaves, gypsies and migrants have performed waste collection and recycling activities in developing countries. In India, the harijans, formerly untouchables, play an important role in garbage collection and recovery of recyclables from waste. And in Muslim countries, non-Muslims usually perform refuse collection and recycling activities since contact with waste materials is considered impure [23-25].

Scavengers' low incomes can often be explained by the low prices paid by middlemen. In some cases, middlemen, especially in monopsonistic markets grossly exploit scavengers. A monopsonistic market exists where there is only one buyer, as opposed to a monopoly, where there is only one seller. Dumpsite scavenging in particular is susceptible to the development of monopsonistic markets, due to the relative isolation of many dumps, which makes it nearly impossible for scavengers to transport materials to the nearest town. Another factor that encourages the formation of monopsonistic markets is the awarding of concession for the recovery of recyclables. Mexican cities usually require that anyone wishing to recover materials from dumps/landfills obtain a concession. Middlemen and scavenger leaders colluded with middlemen can obtain concessions. These concessions in actuality legitimize monopsonistic markets at the disposal sites, and in some cases, the exploitation of scavengers. For example, scavengers in some Colombian, Indian and Mexican cities can receive as low as 5% of the price industry pays for recyclables, while middlemen obtain high profits. See Table 1. Thus, opportunities exist for the improvement in scavengers' living and working conditions by circumventing the middlemen [26-27].

4. Scavenging Patterns

The recovery of materials by scavengers in Asia and Latin America takes place in a wide variety of settings. Although the circumstances of recovery of materials in a particular place may be unique, scavenging patterns do exist despite socioeconomic, political and cultural variations among Asian and Latin American cities. According to where they occur along the waste management system, scavenging activities can be classified into the following:

4.1 Source separation at the household or place generating waste materials

At these places, items are reused, sold or given away. Residents in many Mexican cities, for instance, separate stale tortillas and bread, which are used to prepare traditional dishes, such as tortilla soup, 'chilaquiles' and 'capirotada.' Alternatively, stale bread and tortillas can be sold to pig farms located near towns. Many Mexican households collect and sell the aluminum cans from beverages consumed at home. In many developing countries refillable glass bottles are still widely used, and families routinely take the empty bottles to grocery stores when they purchase beverages. If someone does not bring an empty bottle when purchasing a beverage in a refillable bottle must pay a deposit equivalent to the cost of the bottle. This encourages the return of the reusable bottles [28-29].

4.2 Collection crews sort recyclables while on their collection routes.

Open collection vehicles, in particular, offer easy access for the recovery of recyclables from collected mixed wastes. Sorting of recyclable materials also exists when compactor trucks are used, prior to the compacting of the refuse. This activity is particularly common in Mexico, Colombia, Thailand, and the Philippines. Collection crews later sell the materials on their way to transfer or disposal facilities, and divide the proceeds among them. While some time is wasted in the process, strong monetary incentives encourage collection crews to sort recyclables, since engaging in this activity can double their income. A more socially desirable alternative exists in some Mexican cities, where volunteers retrieve the recyclables, so that the sorting does not distract the collection crew from performing their duties [30-31].

4.3 Informal collectors retrieve recyclables prior to the disposal of the refuse they pick up.

In Cairo, for instance, some 30,000 informal refuse collectors –locally known as 'zabbaleen'– constitute an effective collection and recycling system. A pair of *zabbaleen* working with a donkey-drawn cart can collect garbage from 350 households in a day. After sorting the garbage, the collectors feed the edible portion to pigs; sell pig droppings and human excrement to farmers to be used as fertilizer; and sell scrap metal, glass, paper and plastics to middlemen, who then sell the materials to craftsmen or to industry [32-33].

4.4 Itinerant buyers purchase source-separated recyclables from residents.

In Philippine and Mexican cities itinerant buyers purchase from residents various types of items for reuse and recycling, such as cans, bottles, paper, and old mattresses. The vehicles used to carry these materials include pushcarts, animal-drawn carts and pick up trucks [34-35].

4.5 Scavengers retrieve materials at the communal storage sites, as well as from commercial and residential containers placed curbside.

Scavengers consider refuse from high-income residential areas, hotels and stores as particularly valuable, since wealthy individuals tend to discard more recyclables and items that can be repaired or reused [36].

4.6 On the streets or public spaces, picking up litter

This is a common practice throughout Third World cities. In Pune, India, approximately 10,000 'rag pickers' in the city recover recyclables from garbage thrown into the streets [37].

4.7 In vacant lots, where garbage is dumped, as well as in illegal dumps

Residents in areas lacking refuse collection often dispose of their waste in vacant lots that may eventually become illegal open dumps. At these sites, scavengers salvage any materials that can be reused or recycled [38-39].

4.8 In canals and rivers that cross urban areas carrying materials dumped upstream

This type of scavenging activity is usual in cities that have rivers and canals, such as on the Pasig River and its tributaries in Manila, and on the Chao Phraya River in Bangkok. Recovery of recyclables usually takes place from small boats, where scavengers transport the materials. Recyclables are more abundant during the rainy season, as runoff water carries materials littered on the streets [40].

4.9 At composting plants

At the composting plant Monterrey, Mexico, scavenging activities are allowed in its premises. At this plant, scavengers sort inorganic materials from the wastes before the organic fraction is composted. This does not interfere with composting operations and reduces the presence of inorganic materials in the compost [41].

4.10 At municipal open dumps

Many scavengers live and work sorting out recyclables. As many as 20,000 scavengers live and work in Calcutta's municipal dumps, 12,000 in Manila and 15,000 in Mexico City. Sometimes large scavenger communities form around the dumps. By settling around the dumps, scavengers minimize their transportation costs, occupy land that may be undesirable to others, have access to discarded materials that can be used as construction

materials for their homes –usually shacks– and thus save on housing costs. Settling around a dump also allows entire families to recover materials there and to raise pigs by feeding them discarded organic materials found in the dumps [42-43].

4.11 At landfills

Prior to the burial of wastes, scavengers recover materials, such as in Mexico City's landfills. At these sites, scavenging operations have been integrated into the normal operation of the landfills. As soon as the refuse is dumped on the ground, scavengers pick over the piles of mixed wastes. Later during the day, bulldozers compact the wastes and cover them with a layer of earth [44].

5. Economic and Environmental Impact of Scavenging Activities

Scavengers are usually perceived as being among the poorest of the poor, and scavenging is considered a marginal activity. Scavengers tend to have low incomes, but they can obtain decent earnings when they are not exploited by middlemen, as it is argued below.

Regarding the second common perception of scavenging as a marginal occupation, it is often wrong.

A thorough analysis of the linkages between scavenging and the formal sector has been conducted elsewhere [45]. As an illustration, a short discussion of scavenging and the paper industry in Mexico is presented. The Mexican paper industry has suffered a chronic shortage of raw materials since the first paper mill was established in 1590 in the vicinity of Mexico City. Throughout the seventeenth, eighteenth and nineteenth centuries, the Mexican paper industry made paper from old rags. The rags collected in colonial Mexico (New Spain) were in short supply due to the fact that inhabitants used their clothes as long as

possible, and discarded them infrequently and in small quantities. During that period, rag collectors were known as *traperos*.

The recovery of discarded rags for papermaking during the seventeenth and eighteenth centuries was of such economic importance that commanded royal attention. Felipe III of Spain, for instance, authorized the *Reglamento de Libre Comercio de Indias* (free trade law between the Spanish Crown and its territories in the Americas) in 1778, which exempted from the payment of import tariffs the rags collected in the Spanish possessions in the Americas. This *Reglamento* attempted to encourage Mexican *traperos* to increase their gathering of rags, which would be exported to Spain, transformed into paper, and part of the paper sent back to New Spain [46].

It was in the early twentieth century that the Mexican paper industry began making paper from wood pulp, but the switch from rags to pulp did not alleviate the shortage of raw materials. Mexican Indians own most of the forested areas in the country, but many lack deeds or their ancestral rights to the land have not been recognized. The lack of definition of property rights has led to the plundering of forestry resources by outsiders, as well as reluctance from investors to put their money into commercial timber plantations. Moreover, the remaining woodlands in the country are located in remote and inaccessible areas. Since the Mexican government does not subsidize the construction of access roads, the cost of road construction must be considered in each logging project, which accounts for about 50% of a logging project's total costs. Finally, the small scale of logging operations and the use of outdated technology drives up the cost of the timber obtained to such degree that the prices of domestic forest products often exceed international prices. The previous factors translate into an insufficient domestic supply of pulp: Mexican logging operations provide only 40% of the country's consumption of fiber [47-49].

Due to the impracticality of achieving backward vertical integration with the forestry sector, the Mexican paper industry has undertaken vigorous efforts to increase the use of recycled fiber. In 1984, the Mexican paper industry used 58.3% wastepaper as a fiber source, while in 1994 it had increased to 73.8%. Correspondingly, primary fiber (wood pulp and sugar cane bagasse) utilization decreased from 41.7% in 1984 to 26.2% in 1994. The industrial consumption of the cardboard collected by scavengers illustrates these efforts. Contemporary scavenging plays a critical role in the supply of raw materials to the Mexican paper industry [50].

Scavenging activities represent important cost savings for the Mexican paper industry: the cardboard collected by the *cartoneros* cost the industry 300 Mexican pesos a ton in June 1994, while the ton of U. S. market pulp cost the equivalent of 2250 pesos plus transportation costs. By engaging in recycling, the paper industry saves not only in raw materials: the construction and operating costs of a paper mill consuming wastepaper are a fraction of those of a plant using wood pulp. Faced with such a large difference in costs, the Mexican paper industry has integrated vertically with scavengers via middlemen [51-52].

As a result of NAFTA, market barriers to trade in most paper and paperboard will be phased out in the year 2003. The Mexican paper industry is currently trying to survive by upgrading its processes and by lowering its costs, which means maximizing the use of wastepaper and cardboard collected by scavengers [53-54].

In conclusion, scavengers (*traperos* during the seventeenth, eighteenth, and nineteenth centuries, and *cartoneros* and wastepaper collectors in the twentieth century) have played a critical role in supplying raw materials to the Mexican paper industry. For its entire existence, the Mexican paper industry has had backward vertical integration with *traperos* and *cartoneros*. Rag and cardboard collectors, therefore, have never operated in the

margins of the Mexican economy.

Despite the lack of data at the national level, various studies have highlighted the economic importance of scavenging activities. In Bangkok, Jakarta, Kanpur, Karachi and Manila, scavenging saves each city at least U.S. \$23 million / year in lower imports of raw materials, and reduced need for collection, transport and disposal equipment, personnel and facilities. Indonesian scavengers reduce by one-third the amount of garbage that needs to be collected, transported and disposed of. In the city of Nuevo Laredo, Mexico, the economic impact of scavenging activities has been estimated at nearly half a million dollars per month [55]. Clearly, scavenging can be a profitable activity when scavengers are organized and authorities sanction –or at least tolerate– their activities. Scavengers at the Beijing dump, for instance, earn three times the monthly salary of university professors. A strong case can be made that authorities should be supportive of scavenging activities. However, most often authorities consider scavenging as a problem to be eliminated. The next section elaborates on this.

Scavenging also renders significant environmental benefits: recycling materials saves energy, water and generates less pollution than obtaining virgin materials. See Table 2. Further, scavenging reduces the amount of wastes that need to be collected, transported and disposed of, lessening air pollution from fewer dump trucks, and extending the life of dumps and landfills.

6. Public Policy Towards Scavengers

Public policy towards scavengers in developing countries is often based on the perceptions previously referred to, as well as on the need to minimize the risks to human

health and the environment form the handling and disposal of solid wastes. Authorities in developing countries display a wide variety of policies that deal with scavengers. Those policies can be classified into the following:

6.1 Repression

The dominant view of scavenging, which still prevails in many developing countries, sees scavenging as inhuman, a symbol of backwardness, and a source of embarrassment and shame for the city or country. Based on this, scavenging has been declared illegal and punished in many Third World cities, such as in several Colombian, Indian, and Philippine localities. Restrictions and a hostile attitude towards scavengers typify repressive policies. In one of those instances, Cairo authorities banned the donkey carts where the zabbaleen transport wastes on the streets between sunrise and sunset [56-59].

6.2 Neglect

In other cases, authorities simply ignore scavengers and their operations, leaving them alone, without persecuting or helping them. African cities such as Dakar, Senegal, Bamako, Mali, and Cotonou, Benin, illustrate the policy of neglect towards scavengers. Indifference towards scavengers and their activities characterizes a policy of neglect [60-62].

6.3 Collusion

Government officials sometimes develop with scavengers relationships of exploitation and of mutual profit and mutual assistance; that is, relationships of political clientelism. Mexico City illustrates a situation of collusion between authorities and scavengers' leaders. Over the last five decades, a complex structure developed, involving legal and illegal

relationships between dump scavengers, the local bosses known as ‘caciques’, street sweepers, refuse collectors, middlemen, industry, and local authorities. Some of the illegal relationships include the payment of bribes to government officials by the *caciques* for ignoring the *caciques*’ abuses of power; the tips that refuse collectors demand from small industries and some households to pick up their waste, and the ‘sale’ of refuse collection routes in wealthy neighborhoods. The *caciques* have close ties with government officials and the PRI (until recently Mexico’s long-time ruling party), and the most powerful scavenger boss became deputy representative in the Mexican Congress in the mid-1980s. Scavengers have disguised themselves as peasants and workers in official parades and during PRI and pro-government rallies. Scavengers have also beaten up anti-government demonstrators. Thus, the Mexican government gets bribes and political support from scavengers, and scavengers obtain legitimacy and stability in their operations [63].

6.4 Stimulation

The multiple and repeated failure of American and European waste management technology in developing countries, as well as environmental awareness has effected a change of policies towards scavengers. Recognizing the economic, social, and environmental benefits of scavenging and recycling, governments have started to change their previous attitude of opposition, indifference or tolerance, to one of active support. Supportive policies range from legalization of scavenging activities, encouraging the formation of scavenger cooperatives (in Indonesia), the awarding of contracts for collection of mixed wastes and / or recyclables (in some Colombian towns), to the formation of public-private partnerships between local authorities and scavengers (in some Brazilian cities) [64].

6.5 The need for policies that support scavenging

In many cases policies strive for the elimination of scavenging by enacting bans and by trying to find alternate employment for the scavengers. Rarely a comparison of costs and benefits of scavenging is conducted.

Supporting scavenging, particularly the formation of scavenger cooperatives, can result in grassroots development, poverty alleviation, and environmental protection. Repressive, neglectful or collusive policies often have a deleterious impact on scavengers' working and living conditions. Scavenging in developing countries is caused by chronic poverty, high unemployment, industrial demand for recyclables, and by the lack of a safety net for the poor. None of these factors is likely to disappear in the foreseeable future and scavenging is likely to continue to exist [65].

Efforts to eliminate scavenging and to encourage scavengers to engage in other occupations usually fail. Authorities often ignore scavengers' opinions. Studies have found that when scavenging is tolerated or supported, scavengers can earn higher incomes than unskilled, formal sector workers [66].

Many scavengers like their occupation because of the money they earn, the fact that they do not have a boss, and because they have a high degree of flexibility in their working hours. Furthermore, an important percentage of scavengers would be unable to find a job in the formal sector, due to their low educational level, their young or advanced age –many children and older individuals survive by scavenging– and to the difficulty for mothers to perform a paid activity while taking care of their children. Consequently, scavengers may be reluctant to adopt changes that affect their income, working and living conditions. Even if some scavengers get a formal sector job or another occupation, other poor individuals are likely to replace them, given the widespread poverty and unemployment

prevalent in developing countries.

Solid waste management plans and development efforts aimed at eliminating scavenging often have a detrimental impact on scavengers' standard of living. In Bogota, for example, dumpsite scavenging was common until the late 1980s. After the construction of a sanitary landfill, scavenging was prohibited at the disposal site. Considered as an advance and as a success by some, the scavenging ban at the landfill had a negative impact on scavengers [67].

The scavenging ban at the landfill forced scavengers into the streets of Bogota. Street scavenging requires a vehicle to transport materials, and scavengers had to invest in acquiring pushcarts or horse carts. Some scavengers had to get in debt in order to purchase a pushcart. Scavengers gathering materials on the streets must contend with the traffic, steer the pushcart with a heavy load, and walk long distances. In order to collect enough materials to sell, scavengers must walk up to 8 kilometers a day and sometimes are forced to sleep on the streets, until they get an acceptable amount of recyclables, before returning to their homes. Since they spend a considerable amount of time walking, the productivity of street scavengers (the amount of materials collected per day) is lower than that of dumpsite scavengers, and thus the landfill ban lowered their income. Street scavengers are sometimes assaulted by street gangs and persecuted by police. In conclusion, the landfill ban had a serious negative impact on scavengers' income and standard of living. Similar experiences have been observed in other Asian and Latin American cities [68-69].

Scavenging tends to persist despite efforts to eradicate it. Therefore, a more humane and socially desirable response would be helping scavengers to achieve a better existence. Supporting scavengers to organize themselves, to obtain higher incomes, and to improve their working and living conditions can also make economic and environmental sense.

7. Formation of Scavenger Cooperatives

Industries that consume recyclables in developing countries encourage and support the existence of middlemen or waste dealers between the companies and the scavengers in order to assure an adequate volume and quality of the materials. As a result, opportunities arise for the exploitation and / or political control of the scavengers, since they must sell their pickings to a middleman, who in turn sells to industry. Industry demands a minimum quantity from their suppliers and will not buy materials from individual scavengers. Industry usually also demands that the materials be clean, baled, crushed and sorted, processing that the middlemen carry out.

Most Third World scavengers can be considered as poor, given their low income, their low purchasing ability, their substandard living conditions, and the fact that not all their basic needs are satisfied. Scavenger poverty can be largely accounted for the low prices they are paid for the recyclables. The low prices paid for recyclables, in turn, are often the results of high profits obtained by the middlemen that purchase the recyclables from the scavengers, as Table 1 illustrates.

Middlemen can achieve high profits due to the fact that they often operate in a monopsonistic market. In Mexico City, for instance, dumpsite scavengers must sell their pickings to their leader, who sells the materials to industry at a markup of at least 300%. As a result, Mexico City dumpsite scavengers usually earn incomes lower than the minimum wage, are forced to live around the dumps, and have a life expectancy of 39 years [70].

Similar situations are common in the developing world, where middlemen exert monopsonic power, resulting in low prices for recyclables and poverty for scavengers. The formation of scavenger cooperatives attempts to circumvent the middlemen and thus pay higher prices to the coop members. Higher prices to the coop members, in turn, translate

into a higher income and a better standard of living for the scavengers. It is possible for scavengers to organize themselves in cooperatives in order to bypass the middlemen and to break the “vicious circle of poverty” in which most scavengers find themselves. Efforts to promote the creation of scavenger coops are common in Asia and Latin America [71].

8. Successful Scavenger Cooperatives in Latin America

8.1 Colombia

The most dynamic scavenger cooperative movement in the world today exists in Colombia. The *Fundación Social*, a non-governmental organization, has been assisting scavengers in the formation of cooperatives since 1986. That year, a sanitary landfill replaced an open dump in the city of Manizales, displacing 150 families that, until then, had been recovering materials at the dump. The foundation helped the displaced scavengers to form a cooperative. When the positive impact of that effort became apparent, the foundation began assisting groups of scavengers in other cities to also create cooperatives. In 1991, the *Fundación Social* launched its National Recycling Program, which at present includes over 100 scavenger coops throughout the country [72-73].

The foundation also awards grants, makes loans for specific coop projects, and provides the coops with legal, administrative and business assistance, as well as free consulting services. In 1998, the foundation donated and made loans to the coops for over U.S. \$800,000. Any new coop may decide to join the National Recycling Program, which developed an organizational structure that includes national, regional and local associations of coops. The Bogota Association of Recyclers, for example, represents seven scavenger coops located in the capital city. All five regional associations and the individual coops also belong to the National Association of Recyclers. The major goals of the association include

educating Colombians on the social, economic and environmental benefits of recycling, as well as improving the working and living conditions of Colombian scavengers. The National Association of Recyclers employs full-time *multiplicadores* –former scavengers themselves– who provide assistance to any group interested in creating a coop [74].

The coops affiliated with the *Fundación Social's* National Recycling Program represent a wide variety of working conditions. Some members use pushcarts to transport materials, while other use horse carts or pick up trucks. Some, such as the *Cooperativa Reciclar*, in Cartagena, are located next to the local dumps, from which members salvage materials. Others follow established routes along city streets, retrieving items from containers placed at the curbside for collection or from materials littered in public places. Still other coops take part in source separation programs, collecting recyclables from households, offices, commercial establishments and small industries, sometimes under formal contracts [75].

Scavenger cooperatives have formed regional marketing associations, which allows them to accumulate and sell recyclables in important volumes, obtaining higher prices than what each coop would be paid individually. In total, Colombian scavengers recover and sell over 300,000 tons of recyclables each year, mostly paper, glass, scrap metals, plastics and organics. Coop members report a higher standard of living, as well as improvements in self-esteem and self-reliance compared to when they worked independently and on their own [76-77].

The *Cooperativa Recuperar* is one of the most successful scavenger coops in Colombia and Latin America. *Recuperar*, based in Medellin, was created in 1983 and today has 1,000 scavenger members, 60% of them women. Members of *Recuperar* earn 1.5 times the minimum wage and are affiliated to the Colombian system of socialized medicine. Members can receive loans from the coop, scholarships to continue their studies, and have

life and accident insurance [78].

Recuperar carries out three types of activities. First, it offers MSWM services. Coop members collect mixed wastes and source-separated recyclables. The coop signed a contract with the city of Guarne and now collects, transports and disposes of the solid wastes generated in the town. In 1996, *Recuperar* earned 30 million Colombian pesos and the contract saved the city 5 million pesos (approximately U.S. \$30,000 and 5,000, respectively). The coop also operates a materials recovery facility (MRF). In 1998, *Recuperar* recovered 5,000 tons of recyclables, mostly paper, cardboard, glass, metals, textiles, and plastics. Second, *Recuperar* provides cleaning and gardening services to the local bus terminal, private companies, public spaces, local fairs and conventions. Third, the coop offers its members as temporary workers that can be hired by public or private organizations to perform various activities [79-80].

8.2 Brazil

Important efforts to support the formation of scavenger coops also exist in Brazil. Brazilian scavengers, popularly known as ‘catadores de lixo,’ have formed cooperatives in Rio de Janeiro, Belo Horizonte, Recife, Niteroi and Salvador. In Rio alone, 14 coops exist with 2,500 members. And in Porto Alegre, scavengers were incorporated into the city’s curbside recycling program, reducing overall costs, and serving 79% of the city’s 1.1 million residents.

CEMPRE, an industry association, has prepared an educational kit for scavengers and NGOs to help them in the creation of scavenger coops. CEMPRE publishes a monthly newsletter and manages a data bank on solid waste management, as well as a scrap broker hotline that answers questions about recycling. Coca-Cola, Mercedes-Benz, Nestle, Pepsi-

Cola, and Procter & Gamble are among the companies that support CEMPRE financially. CEMPRE's success has encouraged efforts to create similar programs in Argentina, Costa Rica, Mexico and Uruguay [81].

Coopamare, one of the most successful scavenger coops in Brazil, collects 100 tons of recyclables a month in Rio, half of what the recycling program operated by the government in São Paulo collects, and at a lower collection cost. Coopamare members earn U.S. \$300 per month, twice the minimum wage in Brazil. By comparison, half of the country's labor force earn less than U.S. \$150 a month [82].

8.3 Mexico

The *Sociedad Cooperativa de Seleccionadores de Materiales* (SOCOSEMA) that operates in Juarez, on the U.S.-Mexico border across from El Paso, Texas, constitutes one of the most successful scavenger coops in Mexico. Today, scavenger members recover nearly 5% of the wastes arriving at the municipal dump: 150 tons of paper, cardboard, glass, rubber, plastics, animal bones, organic material, and metals per day. Until 1975, before the coop was created, a middleman had a concession to recover the recyclables at the dump. The middleman, operating in monopsonistic markets, paid low prices for the materials recovered by scavengers, and dictated which materials he would buy. As a result, scavengers had very low incomes.

In 1975, the middleman announced that he would buy only paper from then on, and at a lower price. Scavengers protested immediately. With the assistance of a college professor, supported financially by a local businessman and a sympathetic Mayor, the coop was formed. That year, local authorities awarded a concession to the coop for the recovery of recyclables contained in the wastes arriving at the dump. The impact of the creation of

SOCOSEMA was impressive: within a few months after its creation, and the displacement of the middleman, the incomes of scavenger members increased tenfold.

The coop also receives donations of recyclable materials –largely paper and scrap metal– from the border assembly plants popularly known as 'maquiladoras.' SOCOSEMA members provide cleaning services to these plants as well for a fee. Coop members now enjoy higher incomes, participate in training courses and formal education programs sponsored by the coop, have access to health care and to legal protection. SOCOSEMA has developed good relations with industry, despite initial reluctance to do business with the coop. Industrial demand for recyclables in Mexico is strong, and the coop often buys materials from independent scavengers in order to satisfy the demand [83-84].

Over the last few years, the creation of scavenger cooperatives has gained momentum in the region, and coops have been created in Venezuela, Peru, Ecuador, Guatemala, and Costa Rica.

9. Successful Scavenger Coops in Asia

9.1 Philippines

The formation of scavenger coops has gained also impetus in Asia over the last few years. In Manila, Philippines, the non-governmental group Women's Balikatan Movement created the Linis Ganda program. Originally developed as a formalized system of scavengers and itinerant buyers of recyclables working for a particular middleman in the city of San Juan in 1983, the program is now composed of cooperatives. Today, there are cooperatives in each of the 17 cities and towns that comprise Metro Manila.

In this program, each scavenger –called 'Eco aide'– has a fixed route in which purchases source-separated recyclables at households and schools. Eco aides wear green uniforms and

use green pushcarts or bicycles. At present, the program includes 897 middlemen organized in 17 cooperatives and approximately 1,500 Eco aides. Scavengers affiliated to the program recover 4,000 tons of recyclable materials per month. The typical scavenger earns from U.S. \$5-20, depending on the income level of the community where the Eco aide works. The coops can obtain low-interest and collateral-free loans from the Philippine Department of Trade and Industry and from the Land Bank. Linis Ganda plans to start composting operations and biogas recovery from market and slaughterhouse wastes in the near future [85-86].

9.2 India

In Madras, the non-governmental organization EXNORA created a waste collection program in low-income neighborhoods. The program formalized scavenging activities in those areas. Scavengers were incorporated as waste collectors, or 'street beautifiers.' Communities obtain loans to purchase tricycle carts to be used as refuse collection vehicles by the street beautifiers. Prior to disposal, the street beautifiers recover the recyclables contained in the collected wastes. Residents pay U.S. \$0.30 per month for having their refuse collected. Pick up fees are used to pay back the loans and to pay the street beautifiers' salaries. Today in Madras, about 900 collection units involving scavengers exist in slums, as well as in middle and upper-income neighborhoods. The program has dignified scavenger activities, raised their earnings, reduced littering, increased refuse collection, and contributed to a cleaner urban environment. In the city of Pune, approximately 6,000 'rag pickers' formed a cooperative, which in 1995 recycled 25% of the waste generated by the city's one million residents [87].

9.3 Indonesia

Unlike the previous cases that involve industry and NGOs, Indonesia has enacted national legislation in support of scavengers. In 1992, then President Suharto declared that scavengers were beneficial to the country's economy and environment. Now the central government supports the formation of cooperatives of dumpsite and street scavengers. Private banks have granted loans to scavenger coops, and the national government has imposed a duty on imported waste materials, in an effort to increase scavengers' income [88-89].

10. Lessons Learned

10.1 NGO Support Needed

Non-governmental organizations (NGOs) have played a critical role assisting in the formation and operation of scavenger cooperatives. Their energy, creativity and familiarity with the local conditions allow NGOs to develop initiatives that have a good chance of succeeding. They can help coops obtain loans and grants, or furnish the credit themselves. NGOs also provide essential technical, business and legal assistance to the coops.

Newly constituted coops are particularly vulnerable, considering that they may have to deal with opposition from the middlemen being displaced. Industry may be reluctant to have their usual supply channels disrupted. And the authorities may covertly hinder the efforts to create a new scavenger coop if a patron-client exists between particular government officials and the scavengers. Patron-client relationships between authorities and scavengers exist in some Asian and Latin American cities, such as Mexico City, where approximately 10,000 dumpsite scavengers support the ruling party and obtain in exchange legitimacy and stability in their activities.

10.2 Timing in the Formation of a Cooperative

The timing in which a coop is formed can contribute to its success. A window of opportunity appears during changes of administration, particularly at the local level. A new Mayor, especially a member of a different political party than his / her predecessor, may be more inclined to support a recently formed scavenger coop in order to demonstrate his / her commitment with the poor and in favor of change. Such an action could improve the Mayor's image, while scoring political points. A mass media campaign conducted by the involved NGO, which shows the scavengers' plight, their harsh working and living conditions, as well as the benefits the community receives from their work, may increase public support for the scavengers and their efforts to organize. Further, a grassroots information campaign can also be conducted among community leaders, schools, and neighborhood associations. This approach has been successful in several Colombian cities.

10.3 Threats and Opportunities posed by Privatization Programs

Latin American and, to a lesser extent, Asian countries have conducted ambitious efforts to diminish the role of the state in their economies. Many cities have privatized, or are in the process of privatizing, municipal solid waste management services. The privatization of MSWM services presents both risks and opportunities for scavengers. Companies awarded contracts to collect and dispose of MSW usually do not allow scavenging activities in the dumps / landfills they operate. Thus, as sanitary landfills replace open dumps, scavengers are forced to collect materials on the streets instead. As previously discussed, this has a negative impact on the earnings and standard of living of scavengers.

On the other hand, privatization of services does provide opportunities for scavenger coops. The coops can render services for a fee, such as the collection of mixed wastes and /

or recyclables, street sweeping, composting operations, and materials recovery facilities. As previously discussed, the incorporation of scavengers into formal MSWM programs and the awarding of contracts to scavenger cooperatives can save cities money while providing a steady income to scavengers.

11. Conclusions

Scavenging represents an important survival strategy for the poor in Asia and Latin America. Individuals recover materials from waste in order to satisfy their needs. Despite the fact that scavenging occurs in quite different settings throughout the developing world, it shows distinct patterns. Scavengers are usually poor immigrants from rural areas. The recovery of materials takes place in a wide variety of conditions, from open dumps to garbage floating in canals and rivers. Scavengers respond to market demand and not to environmental considerations. The underlying factors that cause people to become scavengers are the poverty resulting from underdevelopment, the inability or unwillingness of individuals to obtain other forms of employment, as well as industrial demand for inexpensive raw materials.

Authorities in many Asian and Latin American countries do not fully realize the social, economic and environmental benefits of the recycling activities carried out by scavengers. Development banks also tend to ignore the benefits that scavenging renders to society. Consequently, scavenging is often ignored when designing SWM policies and plans. Alternatively, when scavenging is considered in SWM plans, one of the objectives is usually its elimination. As long as poverty and industrial demand for materials persists, scavenging is likely to continue to exist. Official efforts to eradicate scavenging have not succeeded and have caused further deterioration in the working and living conditions of

scavengers.

Middlemen perform useful services to industry, by doing further sorting and processing of materials, accumulating and selling them in the amounts that industry demands. But, particularly in dumpsites, opportunities arise for the development of monopsonistic markets controlled by middlemen and the exploitation of scavengers. The formation of scavenger cooperatives can bypass the middlemen, dismantle the monopsonistic markets, and thus increase scavenger earnings.

NGOs can play an important role in organizing scavengers and in helping them, particularly in the formative and initial stages of their operations. Development banks should consider actively supporting scavenging activities in their lending. Scavenger coops can be a means of achieving a better standard of living for its members, dignify their occupations, and strengthen their bargaining power with industry and authorities. Equally important for a coop is the support of the local authorities, who can legitimize their activities, award concessions or contracts for the provision of SWM services. Industry can also facilitate scavenger coops' activities by purchasing materials from the coops, or even taking a more active role supporting the formation of scavenger coops, as CEMPRE does in Brazil. The most successful scavenger coops in Latin America –Recuperar in Colombia and SOCOSEMA in Mexico– have learned that diversification can increase their earnings. Both coops also provide cleaning services to cities and private industry. Other successful coops add value to the recyclables they gather by processing the materials and engaging in the production of salable items such as hoses and compost.

Scavengers can be successfully integrated into formal SWM programs for the collection and recycling of solid wastes, as several cases in Asia and Latin America demonstrate. By supporting scavenger cooperatives, refuse collection could be extended at a low cost,

creating jobs and benefiting low-income communities. Instead of being a problem, scavengers can be part of the solution to the seemingly intractable problem of collection and disposal of solid wastes in Asia and Latin America. Scavenger cooperatives can promote grassroots development in an economically viable, socially desirable and environmentally sound manner. When supported, scavenging can represent a perfect example of sustainable development.

References

- [1] Bernstein, J. *Alternative Approaches to Pollution Control and Waste Management: Regulatory and Economic Instruments*. Urban Management Discussion Paper No. 3. Washington, DC: The World Bank, 1993.
- [2] Jaramillo, J. *Relleno Sanitario Manual El Chagüalo, Colombia*. In J. Guibbert (ed.) *Saneamiento Alternativo o Alternativas al Saneamiento*. Bogota: ENDA-America Latina, 1988: 279-298.
- [3] Medina, M. *Informal Recycling and Collection of Solid Wastes in Developing Countries: Issues and Opportunities*. Tokyo: United Nations University / Institute of Advanced Studies Working Paper No. 24, 1997.
- [4] Medina, M. *Scavenging on the Border: A Study of the Informal Recycling Sector in Laredo, Texas, and Nuevo Laredo, Mexico*. Ph. D. Dissertation, Yale University, 1997.
- [5] Cointreau, S. *Environmental Management of Solid Wastes in Developing Countries*. Washington, DC: The World Bank, 1983.
- [6] Medina, M. *Informal Recycling and Collection of Solid Wastes in Developing Countries: Issues and Opportunities*. Tokyo: United Nations University / Institute of Advanced Studies Working Paper No. 24, 1997.
- [7] Herrera, J. *Pepenadores de todo en la Basura*. *Excelsior*. May 22, 1995: 4-A, 28.
- [8] Phatak, P. *Urbanisation, Poverty and Environmental Considerations: A Micro-Level Perspective*. In V. Agnihotri (ed.) *Environment and Development*. New Delhi: Concept Publishing Co., 1993: 449-467.
- [9] Maynez, S. *El Reino de la Basura. Proceso*. Mexico City. February, 1988: 38-39.

- [10] Pickford, J. The Solid Waste Problems of Poor People in Third World Cities. In Holmes, J. (ed.) *Managing Solid Wastes in Developing Countries*. New York: John Wiley & Sons, 1984.
- [11] Medina, M. *Informal Recycling and Collection of Solid Wastes in Developing Countries: Issues and Opportunities*. Tokyo: United Nations University / Institute of Advanced Studies Working Paper No. 24, 1997.
- [12] Main, H. *Urbanisation, Rural Environmental Degradation and Resilience in Africa*. In U. Agnihotri (ed.) *Environment and Development*. New Delhi: Concept Publishing Co., 1993.
- [13] Lardinois, I. and A. van de Klundert. *Recycling Urban Organics in Asia and Africa*. *BioCycle*. June, 1994: 56-58.
- [14] Jaramillo, J. *Relleno Sanitario Manual El Chagüalo, Colombia*. In J. Guibbert (ed.) *Saneamiento Alternativo o Alternativas al Saneamiento*. Bogota: ENDA-America Latina, 1988: 279-298.
- [15] Bartone, C. *The Value in Wastes*. *Decade Watch*. 1988; September: 3-4.
- [16] Medina, M. *Informal Recycling and Collection of Solid Wastes in Developing Countries: Issues and Opportunities*. Tokyo: United Nations University / Institute of Advanced Studies Working Paper No. 24, 1997: 1-2.
- [17] Anon. *El Carnaval de la Muerte*. Bogota: *Semana*, March 10, 1994: 18-23.
- [18] Anon. *Colombia, Indefensa ante el Fenómeno Limpieza Social*. Mexico City: *Excelsior*, November 3, 1992: 1,4.
- [19] Castillo, H. *La Sociedad de la Basura: Caciquismo Urbano en la Ciudad de México*. Second Edition. Mexico City: UNAM, 1990.
- [20] Semb, T. *Solid Waste Management Plan for the Suez Canal Region, Egypt*. In Thome-Kozmiensky, K. (ed.) *Recycling in Developing Countries*. Berlin: Freitag, 1982: 77-81.
- [21] Meyer, G. *Waste Recycling as a Livelihood in the Informal Sector- The Example of Refuse Collectors in Cairo*. *Applied Geography and Development*, 1987; 30: 78-94.
- [22] Adan, B., V. Cruz and M. Palaypay. *Scavenging in Metro Manila*. Manila, Philippines: Report Prepared for Task 11. 1982.

- [23] Blincow, M. Scavengers and Recycling: A Neglected Domain of Production. *Labour, Capital and Society*, 1986; 19: 94-115.
- [24] Medina, M. Informal Recycling and Collection of Solid Wastes in Developing Countries: Issues and Opportunities. Tokyo: United Nations University / Institute of Advanced Studies Working Paper No. 24, 1997: 2-25.
- [25] Furedy, Ch.. Socio-political Aspects of the Recovery and Recycling of Urban Wastes in Asia, *Conservation & Recycling*. 1984; 7: 167-173.
- [26] Medina, M. Informal Recycling and Collection of Solid Wastes in Developing Countries: Issues and Opportunities. Tokyo: United Nations University / Institute of Advanced Studies Working Paper No. 24, 1997.
- [27] Holmes, J. Solid Waste Management Decisions in Developing Countries. In Holmes, J. (ed.) *Managing Solid Wastes in Developing Countries*. New York: John Wiley & Sons, 1984.
- [28] Medina, M. Recovery of Recyclables in Mexico City. *Urban Issues*. New Haven: Urban Resources Institute, 1992: 17-18.
- [29] Kresse, K. and J. Ringeltaube. How Resource Recovery and Appropriate Technologies Can Cut Costs of Waste Management in Developing Countries. In J. Thome-Kosmienzky (ed.) *Recycling in Developing Countries*. Berlin: Freitag, 1982: 34-47.
- [30] Castillo, H. *La Sociedad de la Basura: Caciquismo Urbano en la Ciudad de México*. Second Edition. Mexico City: UNAM, 1990.
- [31] Gonzalez, J., M. Cadena and M. Suremain. Estudio Sobre los Circuitos de Reciclaje de Desechos Sólidos en la Ciudad de Bogotá. Bogotá: ENDA America Latina, 1993: 45-67.
- [32] Meyer, G. Waste Recycling as a Livelihood in the Informal Sector- The Example of Refuse Collectors in Cairo. *Applied Geography and Development*, 1987; 30: 78-94.
- [33] Furedy, Ch. Resource-Conserving Traditions and Waste Disposal: The Garbage Farms and Sewage-Fed Fisheries of Calcutta. *Conservation & Recycling*, 1984; 7: 181-190.
- [34] Medina, M. Informal Recycling and Collection of Solid Wastes in Developing Countries: Issues and Opportunities. Tokyo: United Nations University / Institute of Advanced Studies Working Paper No. 24, 1997.

- [35] Lohani, B. and J. Baldesimo. Foille et tri à Manille. Dakar, Senegal: Environnement Africain, 1990; 29-30: 181-190.
- [36] Ouano, E. Developing Appropriate Technology for Solid Waste Management in Developing Countries: Metro Manila Pilot as a Case Study. International Expert Group Seminar on Policy Responses Towards Improving Solid Waste Management in Asian Metropolises. Bandung, Indonesia, February 4-8, 1991: 13.
- [37] Chapin, Ch. The Rag-pickers of Pune. The UNESCO Courier. March, 1995: 18-19.
- [38] Vogler, J. Waste Recycling in Developing Countries: A Review of the Social, Technological, and Market Forces. In Holmes, J. (ed.) Managing Solid Wastes in Developing Countries. New York: John Wiley & Sons, 1984: 244.
- [39] Mendoza, G. Contaminación por Desechos Sólidos en el D.F. Mexico City: IPN, 1983: 78.
- [40] Abad, R. Squatting and Scavenging in Smokey Mountain. Ateneo de Manila: Philippine Studies, 1991; 39: 267-285.
- [41] Vogler, J. Waste Recycling in Developing Countries: A Review of the Social, Technological, and Market Forces. In Holmes, J. (ed.) Managing Solid Wastes in Developing Countries. New York: John Wiley & Sons, 1984: 244.
- [42] Medina, M. Informal Recycling and Collection of Solid Wastes in Developing Countries: Issues and Opportunities. Tokyo: United Nations University / Institute of Advanced Studies Working Paper No. 24, 1997.
- [43] Furedy, Ch. Resource-Conserving Traditions and Waste Disposal: The Garbage Farms and Sewage-Fed Fisheries of Calcutta. Conservation & Recycling, 1984; 7: 181-190.
- [44] Cointreau, S. and M. de Kaadt. Living with Garbage: Cities Learn to Recycle. Development Forum, Jan-Feb, 1991: 12-13.
- [45] Medina, M. Scavenging on the Border: A Study of the Informal Recycling Sector in Laredo, Texas, and Nuevo Laredo, Mexico. Ph. D. Dissertation, Yale University, 1997.
- [46] Lenz, H. Historia del Papel en Mexico y Cosas Relacionadas (1525-1950). Mexico City: Porrúa. 1990.
- [47] Cortez, C. El Sector Forestal Mexicano: Entre la Economía y la Ecología? Comercio Exterior. Mexico City. 43 940. 1994.

- [48] Lenz, H. *Historia del Papel en Mexico y Cosas Relacionadas (1525-1950)*. Mexico City: Porrúa. 1990.
- [49] Espinosa, M. *Recesion e Importaciones Deprimen la Industria de la Celulosa y Papel*. Excelsior. Mexico City. 21 September, 1F, 3F, 1994.
- [50] Espinosa, M. *Recesion e Importaciones Deprimen la Industria de la Celulosa y Papel*. Excelsior. Mexico City. 21 September, 1F, 3F, 1994.
- [51] CEPAL. *Reciclaje de Papel en America Latina: Tendencias y Desafios*. Santiago, Chile: Comision Economica para America Latina y el Caribe. 1992.
- [52] Medina, M. *Scavenging on the Border: A Study of the Informal Recycling Sector in Laredo, Texas, and Nuevo Laredo, Mexico*. Ph. D. Dissertation, Yale University, 1997.
- [53] Jaffe, M. *Paper Industry's Amazing Resurgence*. Standard & Poor's Industry Surveys. Building and Forest Products. 163, Section 1, August 10, B76, B91. 1995.
- [54] Medina, M. *Scavenging on the Border: A Study of the Informal Recycling Sector in Laredo, Texas, and Nuevo Laredo, Mexico*. Ph. D. Dissertation, Yale University, 1997.
- [55] Baldesimo, J. *Scavenging of Municipal Solid Waste in Bangkok, Jakarta and Manila*. Environmental Sanitation Reviews No. 26. Bangkok: Asian Institute of Technology. 1988.
- [56] Gonzalez, J., M. Cadena and M. Suremain. *Estudio Sobre los Circuitos de Reciclaje de Desechos Sólidos en la Ciudad de Bogotá*. Bogota: ENDA America Latina, 1993.
- [57] Furedy, Ch. *Survival Strategies of the Urban Poor – Scavenging and Recuperation in Calcutta*. GeoJournal. 8.2, 1984: 129-136.
- [58] Keyes, W. *Manila Scavengers, the Struggle for Urban Survival*. Manila: Ateneo de Manila, 1974.
- [59] Meyer, G. *Waste Recycling as a Livelihood in the Informal Sector- The Example of Refuse Collectors in Cairo*. Applied Geography and Development, 1987; 30: 78-94.
- [60] Waas, E. and O. Diop. *Economie Populaire du Recyclage des Déchets à Dakar*. Environnement Africain., 1990: 105-128.
- [61] Diallo, S. and Y. Coulibaly. *Les Déchets Urbains en Milieu Démuni à Bamako*. Environnement Africain., 1990: 159-176.
- [62] Tonon, F. *Gestion des Ordures Ménagères à Cotonou*. Environnement Africain., 1990: 79-92.

- [63] Castillo, H. *La Sociedad de la Basura: Caciquismo Urbano en la Ciudad de México*. Second Edition. Mexico City: UNAM, 1990.
- [64] Medina, M. *Scavenging on the Border: A Study of the Informal Recycling Sector in Laredo, Texas, and Nuevo Laredo, Mexico*. Ph. D. Dissertation, Yale University, 1997.
- [65] Medina, M. *Scavenging on the Border: A Study of the Informal Recycling Sector in Laredo, Texas, and Nuevo Laredo, Mexico*. Ph. D. Dissertation, Yale University, 1997.
- [66] Medina, M. *Scavenging on the Border: A Study of the Informal Recycling Sector in Laredo, Texas, and Nuevo Laredo, Mexico*. Ph. D. Dissertation, Yale University, 1997.
- [67] Gonzalez, J., M. Cadena and M. Suremain. *Estudio Sobre los Circuitos de Reciclaje de Desechos Sólidos en la Ciudad de Bogotá*. Bogota: ENDA America Latina, 1993: 45-67.
- [68] Gonzalez, J., M. Cadena and M. Suremain. *Estudio Sobre los Circuitos de Reciclaje de Desechos Sólidos en la Ciudad de Bogotá*. Bogota: ENDA America Latina, 1993: 45-67.
- [69] Medina, M. *Scavenging on the Border: A Study of the Informal Recycling Sector in Laredo, Texas, and Nuevo Laredo, Mexico*. Ph. D. Dissertation, Yale University, 1997.
- [70] Castillo, H. *La Sociedad de la Basura: Caciquismo Urbano en la Ciudad de México*. Second Edition. Mexico City: UNAM, 1990.
- [71] Medina, M. *Scavenger Cooperatives in Developing Countries*. *BioCycle*, June, 1998: 70-72.
- [72] Fundacion Social. *Memorias del Primer Encuentro Nacional de Recicladores*. Bogota: Fundacion Social-Programa Nacional de Reciclaje, 1990.
- [73] Medina, M. *Supporting Scavenger Coops in Colombia*. *BioCycle*. June, 1997: 45-47.
- [74] Fundacion Social. *Tecnología, Diseño Industrial y Factores Humanos en el Reciclaje de Basuras*. Bogota: Fundacion Social-Programa Nacional de Reciclaje, 1991.
- [75] Medina, M. *Supporting Scavenger Coops in Colombia*. *BioCycle*. June, 1997: 45-47.
- [76] Fundacion Social. *Memorias del Primer Encuentro Nacional de Recicladores*. Bogota: Fundacion Social-Programa Nacional de Reciclaje, 1990.
- [77] Medina, M. *Supporting Scavenger Coops in Colombia*. *BioCycle*. June, 1997: 45-47.
- [78] Fundacion Social. *Memorias del Primer Encuentro Nacional de Recicladores*. Bogota: Fundacion Social-Programa Nacional de Reciclaje, 1990.

- [79] Jaramillo, G. Cooperativa Recuperar: De Basuriegos a Empresarios. In *Trabajando Con Desechos: Experiencias Colombianas*. Bogota: Fondo Rotatorio Editorial, 1991.
- [80] Medina, M. Scavenger Cooperatives in Developing Countries. *BioCycle*, June, 1998: 70-72.
- [81] Wells, Ch. Managing Solid Wastes in Brazil. *BioCycle*. June, 1995: 53.
- [82] Wells, Ch. Managing Solid Wastes in Brazil. *BioCycle*. June, 1995: 53.
- [83] Anon. *La Basura y el Medio Ambiente*. Premio Serfin al Medio Ambiente. Mexico City: mimeo, 1982.
- [84] Medina, M. Scavenger Cooperatives in Developing Countries. *BioCycle*, June, 1998: 70-72.
- [85] Medina, M. Collecting Recyclables in Metro Manila. *BioCycle*. June, 1993: 51-53.
- [86] Medina, M. Scavenger Cooperatives in Developing Countries. *BioCycle*, June, 1998: 70-72.
- [87] Medina, M. Scavenger Cooperatives in Developing Countries. *BioCycle*, June, 1998: 70-72.
- [88] Anon. *The Jakarta Post*. September 24, 1992: 3.
- [89] Anon. *The Jakarta Post*. September 24, 1992: 12.

Table 1

Prices Paid for Corrugated Cardboard Along the Recovery Route

Country	Currency	<u>Price per ton at which:</u>		
		Scavenger Sells to Small Merchant	Small Merchant Sells to Large	Large Merchant Sells to Industry
India	Rupees	100-200	900	1,800
Colombia	Pesos (Colombian)	1,000	3,000	5,500
Mexico	Pesos (Mexican)	900	1,100	4,000

Source: Holmes, J. 1984.

Table 2
 Environmental Benefits from Substituting
 Secondary Materials for Virgin Resources
 (%)

Environmental Benefit	Aluminum	Steel	Paper	Glass
Reduction of Energy Use	90-97	47-74	23-74	4-32
Reduction of Air Pollution	95	85	74	20
Reduction of Water Pollution	97	76	35	--
Reduction of Mining Wastes	--	97	--	80
Reduction of Water Use	--	40	58	50

Source: Cowles, R., 1986. Source Separation and Citizen Recycling. in
 W. Robinson, The Solid Waste Handbook. New York: John
 Wiley & Sons