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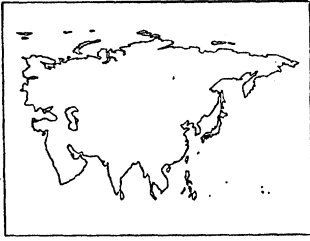
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Garbage: exploring non-conventional options in Asian cities

Christine Furedy

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1. White, R. and J. Whitney (1991), "Cities and the environment: an overview," in R.R. Stren, R. White and J. Whitney, *Cities and Sustainable Development*, Westview, Boulder, pages 8-51.

2. Some recent meetings devoted to the malaise of municipal solid

I. INTRODUCTION

THIS PAPER DESCRIBES some small-scale, community based waste management projects in Bangalore, Manila, Madras, Jakarta and Kathmandu. Its main concern is to assess their potential to change the simple, and increasingly ineffectual, conventional organization of residential solid waste services in Asian cities. Each of the projects described went beyond community participation in waste collection to incorporate other social and ecological goals. The significance of these approaches is that they combine social, economic and environmental motivations for recovery and recycling and thus have the potential (as yet unrealized because of their small scale) to develop a broad base of cooperation for environmental improvement in Third World cities. Before presenting the case studies, the paper outlines some of the salient features of "the waste economy" in Asian cities⁽¹⁾ which have prompted such voluntary efforts for changes in local waste management. Later sections suggest further actions needed to address the sources of solid waste problems. Two case studies are attached to this paper: the first on street pickers in Calcutta slums, the second on a programme to support the renovation and sale of second-hand shoes in Delhi.

II. BACKGROUND

A NEW PHILOSOPHY of resource management is beginning to transform solid waste management worldwide. It is grounded in what can be called "resource recognition". Most waste material can be regarded as unused resources, so environmentally sound waste management entails the reduction of waste in production and distribution processes and the enhancement of re-use and recycling. In Northern cities these principles are being translated into practice through government regulation, stakeholder cooperation and citizens' initiatives. In Southern cities, solid waste management is still focused on improving the conventional engineering systems (essentially, the collection, transport and disposal of solid wastes).⁽²⁾ Estab-

waste management have broadened the discussion. See Furedy, C. (1989), "Challenges in reforming the philosophy and practice of solid waste management: a social perspective." *Regional Development Dialogue*, Vol. 10, No. 3, pages iii-x; World Health Organization, Promotion Environmental Planning and Applied Studies (1991), "Workshop on recycling and recovery from municipal solid waste", unpublished report; and World Health Organization, South East Asia Regional Office (1991), "Consultation on national solid waste management for the South-East Asia region", New Delhi, WHO/SEARO, unpublished outline.

lished environmental movements are not yet much interested in this subject, while city cleansing departments tend to look to higher technology and privatization for solutions to the environmental problems of uncollected and unsafely dumped wastes. Consequently, the few examples of alternative thinking are especially important for assessing ways of making solid waste management more effective in Third World countries.

Each of the projects and initiatives examined in this paper represent non-conventional approaches to solid waste management. The focus is on small-scale, community-level initiatives that go beyond clean-ups and community efforts designed to improve conventional systems. To qualify as a "non-conventional" approach to solid waste problems for the purposes of the present discussion, a project must have **some general social and ecological goals and a potential to change the simple collect-transport-dispose organization of waste services**. In the initiatives that I have investigated, these broader goals entail linking "resource recognition" to social betterment and attitudinal change at the local level. These include:

- assisting poor people whose livelihoods depend on wastes to do safer, more acceptable work;
- promoting the separation of wastes to facilitate more thorough or more efficient recycling (including decentralized compost-making);
- developing community/private sector/municipal partnerships;
- furthering environmental education; and
- pragmatic accommodation of informal activities in waste recovery and recycling.

III. ADJUSTING SOLID WASTE MANAGEMENT TO WASTE ECONOMIES

IN RESOURCE-SCARCE Third World cities, much consumption is frugal and wastes of all kinds are extensively exploited by poor people and by small and large industry. It can be argued that the principle of "resource recognition" must be acted upon differently here than in the wasteful societies.

An underlying theme of the non-conventional approaches discussed here is that the collect-transport-dispose systems of waste management need to adjust to some aspects of what actually happens to recyclable wastes in Asian cities. The following generalizations summarize some features that seem significant to those who have become involved in community based action for solid waste management.

Asian cities have extensive "waste economies," structured through itinerant waste buyers, waste pickers, small waste shops, second-hand markets, dealers, transporters, and a range of recycling industries. The preferable aspects of these informal recovery and recycling systems are affected by socio-economic changes as cities grow and are better regulated. Principally, the collecting and trading of clean wastes (that is, those kept separate at the source of generation) through itinerant buyers and small shops becomes difficult because the operations of collectors are more restricted or become more costly in large and better regulated cities. At the same time, modern consumption by more affluent households renders their residual wastes more attractive both to pickers and to the municipal collection crews. The increase of recyclables in the final waste streams also

3. Furedy, C. (1990), "Urban wastes and sustainable development; a comment on the Brundtland report" in Polunin, N. and R. Burnett (editors), *Maintenance of the Biosphere*, Edinburgh University Press, Edinburgh, pages 213-218.

makes dump-picking more worthwhile. In addition, picking is becoming increasingly hazardous, as Asian urban refuse now contains more broken glass and cans, more toxic materials, and more biomedical waste. If cities take steps to deal with inefficient waste services, friction between informal recovery and the official solid waste system may increase (with temporary accommodations achieved by more corruption, in the form of payments by collectors and pickers to the police or municipal employees).

Nevertheless, waste pickers and waste buyers usually feel insecure in their work. Downturns in the economy are reflected in more people resorting to waste-picking as a "survival strategy." It is a typical activity of street children. While poor and inaccessible areas are plagued by the pollution from uncollected wastes, many of the inhabitants of these areas depend upon waste recovery and recycling to meet some of their basic needs - for shelter, food and employment. They want access to good wastes as close as possible to the sources in better-off residential and commercial areas.⁽³⁾

While migrants from rural areas may be familiar with composting, they do not think of neighbourhood based composting as an urban waste treatment process. It is not seen as an income-earning option because there are no ready markets for small quantities of compost in cities.

The social status of waste pickers in particular is very low. Since there is no societal recognition of the importance of waste-recycling to the economy, waste pickers usually have no concept of their work as being useful or worthy of regularization.

In seeking adjustments between municipal solid waste systems and informal practices, proponents of non-conventional approaches usually seek some regularization and improvement of these practices. A further step is community cooperation in waste separation and collection that can dovetail with both the regular waste system and private sector recycling. The projects described below depend upon a linking of the resources of better-off neighbourhoods (where solid wastes have a greater amount of recyclables) with people who want access to wastes as raw materials. Furthermore, the supporters of these initiatives are beginning to develop a socio-environmental ethic that combines social and ecological motivations for cooperation in solid waste management. These examples suggest the kind of relationships that can be exploited to enhance both community participation, and city/NGO/private sector partnerships for environmental improvement in Southern cities.

IV. COMMUNITY BASED SOURCE SEPARATION EXPERIMENTS WITH SOCIAL AND ENVIRONMENTAL GOALS

a. Garbage and Human Concern Project, Bangalore

THE HISTORY OF the Waste Wise pilot project named "Garbage and Human Concern" shows how a comprehensive view of local solid waste problems can evolve from grassroots' social action for waste pickers.

In the late 1970s, the Ragpickers' Education and Development Scheme (REDS), supported by the Marist Brothers Order in Bangalore, was designed to help street children who survived by waste-picking.

Through work with youths who had an intimate knowledge of wastes, and two experiments (in a waste-purchasing shop and a cooperative) REDS acquired knowledge of the city's waste recovery and recycling system. The shop and the co-op failed and REDS then concentrated on training to enable the youths to enter other occupations, an approach that has been typical of charitable organizations working with waste pickers. But it was clear that the programme could retrain only a few of the many pickers, and the numbers of people resorting to this work were increasing. Anselm Rosario, REDS' director, reflected upon the city's solid waste collection problems. Waste recovery and recycling were central to the informal economy of Bangalore: was it possible to improve the conditions of work in the initial levels of the recycling system while at the same time contributing to better solid waste management in the city?

In 1990 the Waste Wise project was launched by Anselm Rosario through Mythri Trust (which had been formed to carry on REDS), with funding for one year from *Terre Des Hommes* of Switzerland. Later, the Karnataka State Council for Science and Technology gave assistance. The general goal is to explore alternatives to the conventional solid waste system, based on waste reduction, separation of compostable, recyclable and other wastes, and decentralization. The project has specific social, economic, environmental and educational goals. Socially, the focus is upon waste pickers, their status, and the hazards and low earnings of their work. The aims are to bestow legitimacy on informal waste work, improve earnings, and create opportunities for upward mobility whereby waste pickers can enter into waste-processing, trading or recycling. Waste Wise hope to change attitudes to wastes so that their importance as resources is acknowledged; it also plans to promote compost-making in parks, and to reduce the problems from large quantities of mixed wastes overflowing from communal containers.⁽⁴⁾ The project organizers argue that composting in parks enables people to see the process of recycling, and the problems that arise when synthetic materials are not kept separate from the organics. The Waste Wise group aims to analyze and discuss current solid waste management methods, to bring together environmental and community groups for education and project work, and to examine low-cost technologies that can improve waste-processing and handling. In seeking the cooperation of city authorities, they point to the cost reductions in collection and transportation if wastes are reduced and some waste treatment is decentralized, as well as job creation, and the reduction of waste-picking.

For the past year, Waste Wise carried out a pilot project in an affluent-to-middle-class residential area, Jayanagar IV Block, which also has some offices, shops, institutions and auto repair workshops. Considerable amounts of recyclables are generated here. There are a number of waste dealers' shops, and Mythri has been working with the street pickers for some time. A great deal of preliminary work was done to prepare for the source separation experiment: research into waste characteristics and collection,⁽⁵⁾ surveys of and discussions with householders, negotiations with the Bangalore Corporation and the local ward office, and the Housing and Urban Development Authority, and a series of meetings with the local waste pickers. A slide show and video were prepared to explain the benefits of separating recyclables, local composting, and recycling in general; these have been shown in Jayanagar and to special interest groups.⁽⁶⁾

The corporation agreed to make available land in the local park for the composting. The 300 project households were given bamboo

4. Rosario, A. (1992), "An introduction to the Bangalore waste wise project, 'garbage and human concern'", unpublished, duplicated.

5. Rosario, A. and A. von der Weid (1990), "Towards socially and environmentally sound solid waste management in Bangalore", *Proceedings of International Workshop on Waste Management and Resource Recovery*, GTZ and Solid Waste Management Project, Kathmandu, mimeo; and von der Weid, A. (1990), "The wastes that people want", unpublished.

6. Waste Wise (1991), "Our city in our hands", slide-tape packet, unpublished.

baskets to hold the dry wastes, and told to segregate compostable materials and insanitary waste (to be disposed of via the city collection). Former waste pickers now operate in pairs, picking up the separated wastes from the project households. They are equipped with handcarts and baskets, and are trained by a supervisor paid by Waste Wise. The collectors visit each house daily, take the organics to the compost site, sell the dry recyclables and dispose of residues in communal bins. Households pay a small fee per month for this service (Rs. 5 or 10). The project field supervisor meets weekly with the collectors for a training session and to discuss problems. Anselm Rosario oversees the project for Waste Wise.

The collectors are paid Rs. 300 per month from the fees collected and also get payments for tea and food. They earn about Rs. 15 a day through the sale of recyclables to local waste shops. (It should be noted that these collectors only get the residual wastes as the main recyclables are sold or bartered to itinerant buyers by householders).

The collectors are all children, 10 to 15 years old. Waste Wise initially considered employing adult waste pickers as collectors, or even a family of pickers. It was found that adults were not interested because the earnings were below what they could make by independent street-picking throughout the day. The house-to-house collecting is done in "prime time" for street-picking, so the two jobs could not be effectively combined.

Waste Wise, which is still a "shoe-string" organization headed by Anselm Rosario who is helped by a few volunteers and one or two part-time assistants. They are frank about the problems they have encountered.⁽⁷⁾ The residents are generally supportive of the concept of source separation, but the work is left to servants who may resent the extra work required. Although collection at the door is appreciated, some households are not prepared to pay anything for this convenience, and most want to pay very little, since they consider that their property rates should cover waste services. About 70 per cent of the households are, however, paying as agreed. The schedule of the collectors is not always convenient for all households. Orthodox Hindu families usually expect wastes to be removed from the house early in the day, and again later, so if the collectors do not call early, these wastes are put in the communal bins. The collectors do not always manage to keep to the advertised collection times. There is a tendency for residents to be suspicious of the waste collectors, who are still perceived as street people, since they still live as pavement dwellers or in dealers' shops. Householders do not like the friends of the collectors to accompany them on the route. Any thefts on properties tend to be attributed to the collectors. Although they have supported the experiment, the corporation officials are taking a "wait and see" attitude rather than being active partners. The compost pits were not well designed at first (now compost piles with perforated poles for aeration are being used). There is a problem with rats. Recently, they have started vermiculture with the park compost. There are not enough staff or volunteers to do the educational outreach necessary to significantly expand the project.

The Waste Wise team continue to discuss the direction of the project. They are seeking business corporations' support, liaising with other NGOs, and reporting their results through international networks (e.g., the CITYNET group of ESCAP).⁽⁸⁾ Different approaches to community participation, such as getting street committees organized to sustain interest and cooperation, are being considered. With more participation, other activities could be undertaken, such as

7. See reference 4.

8. ESCAP (Economic and Scientific Commission for Asia and the Pacific) (1991), "CITYNET project" flier.

street and drain-cleaning, and clearing out wastes from illegal dumping spots.

The Waste Wise group hope to transform approaches to solid waste management in Bangalore by building upon social and environmental motivations. Young street pickers can gain clean, more productive, and more respectable work. Keeping waste resources separate to enhance their value for recycling can become part of an environmental ethic in the city, Waste Wise argues. These altruistic motivations will be strengthened if the neighbourhood environment improves through the elimination of overflowing communal bins.

This conceptually innovative project combines a general understanding of the local waste problems of Bangalore with a practical sense of what is feasible for community based waste management in better-off neighbourhoods. Its continuance would seem to depend upon gaining more resources and staff to expand participation.

b. San Juan "Linis-Ganda," Metro Manila

Among the projects of the Metro Manila Council of the Women Balikatan Movement, Inc. (MMWBM), a regional women's organization, is one for source separation of dry recyclable materials in San Juan City. From its foundation in the late 1970s, some MMWBM members had worried about the increasing quantities of wastes and the deterioration of collection and cleaning services in Manila. Representations to city authorities brought no lasting improvements. Leonarda Comacho (now chair of the council) proposed a pilot project (the "Cash in Trash" project)⁽⁹⁾ to improve the collection of recyclables as part of a solid waste reduction strategy. This project, which was carried out by a government centre in 1978, was not successful. The women's group did not give up on the idea, but continued to argue that separation of materials in households was the basis for improvement.

In 1983, Leonarda Comacho initiated the San Juan "Linis-Ganda" ("clean-beautiful") project.⁽¹⁰⁾ The Women's Council (MMWBM) first attempted unsuccessfully to persuade the city administration to institute a source separation programme based on wet/dry separation. The council then decided to seek the cooperation of householders in separating some dry waste materials as a community project. They were thus able to shape and supervise the project closely and could avoid the pitfalls of the earlier pilot project.

An important part of the undertaking is that the collecting and trading of the recyclables is done through existing waste dealers, not by setting up new "redemption centres." Eight major dealers in San Juan participate. The project supplies identity cards and a uniform for the "push cart boys" who are recruited by the "junk shop" dealers. There are 60 registered push cart collectors, who are dubbed "eco-aides." The collection carts, with "Linis-Ganda San Juan" painted on them, are jointly funded by the dealers and the project. The dealers advance the money that each collector needs to buy materials each day. At the outset, the council organized the routes and schedules for collection and mounted an intensive educational campaign in San Juan before the project began. This education is maintained through a programme of talks to schools and community groups.

As an incentive to cooperation from the dealers and to reassure them that this project, unlike the "Cash in Trash" one, works through the dealers rather than trying to by-pass them, the project organizers researched the markets for the new kinds of wastes coming from households (e.g., styrofoam, polypacks) and put the dealers in touch

9. Furedy, C. (1990), *Social Aspects of Solid Waste Recovery in Asian Cities*, Environmental Sanitation Information Centre, Bangkok, No. 30 of *Environmental Sanitation Reviews*.

10. This section draws heavily on Comacho, L.N. (1990), "Garbage management in San Juan, Metro Manila" unpublished, duplicated; Comacho, L.N. (1991), "Recycling in Philippines", letter to editor, *Development Forum*, Vol. 19, No. 2, March-April; and personal communication.

with prospective buyers. Thus the dealers were able to expand their scope of business.

For several years, project organizers met weekly with the waste dealers to monitor the work and deal with any difficulties between the crews of push cart boys and the dealers. These meetings now take place only monthly. About 60 per cent of the 18,000 households in San Juan participate in separating and selling wastes. From time to time, fliers are circulated to remind households of the importance of supporting the collection system. In general, the police have recognized the project "eco-aides" and they work without harassment, under improved conditions. They collect about 50 tonnes of recyclables per month for most of the year. (During the wet season, it is difficult for them to do collections and for this period the workers may look for other jobs). They are paid a fixed price for each type of material, regardless of the market price fluctuations. Some of the junk shop dealers have built dormitory accommodation for these workers, and 14 of the youths are attending school regularly.

Recently, some cities in Metro Manila have shown interest in following this model. It has been started on a smaller scale by volunteers in neighbourhoods in Pasig, Quezon City and Manila.⁽¹¹⁾ International recognition, such as the participation of Leonarda Comacho in the Global Assembly of Women and the Environmental meeting in Miami in 1991, and in a World Bank research project, is helping to sustain volunteer interest. The World Bank is now supporting an experiment in decentralized compost-making. The Women's Council continues to argue that wet/dry separation should be required by municipalities and that the organic wastes should be composted as part of a comprehensive solution to the urban area's solid waste crisis.

In spite of the successful operation of this community project for almost a decade, Leonarda Comacho admits that it has had little direct impact on the official waste management system. There has been no support from the city administration, and about a year ago the Philippine Government tried to close the whole project down. The main argument was that the hand carts were an obstruction to municipal collection vehicles and that separation and trading of recyclables through the "informal sector" offered no solution to the metropolitan area's solid waste crisis. Leonarda Comacho was able to fight off this challenge by arguing that any waste diversion lightens the burden of municipal waste disposal, and the project also gives employment to former street youths.

The Women's Council has demonstrated how an NGO can work for social and environmental goals by adapting to the ongoing waste-dealing system. In a small way, the project has extended the traditional system of source separation and recycling of Philippine cities.

c. Civic Exnora, Madras

In Madras, an organization that has mounted a successful street and neighbourhood clean-up drive (called "Civic Exnora") has developed social and environmental goals similar to Waste Wise's in Bangalore. This is Exnora International, which was founded by M. B. Nirmal, a branch manager for the Indian Overseas Bank in Madras. The solid waste thrust was begun through helping residents in elite and middle-class areas to form Civic Exnora units.⁽¹²⁾ The units "adopt" roads for cleaning and other improvements, such as tree-

11. Comacho, personal communication.

12. Padmanabhan, M. (1991), "Cleansweep" *Sunday*, 31 March, page 45.

13. Narayanan, K. V. (1991), "NRIs try to beautify Madras" *India Abroad*, May 3, 1991, page 15.

14. Krueger, C., personal communication.

15. See reference 13.

16. Dattatri, G., personal communication

17. Nirmal, M. B., personal communication.

planting. Collectors, known as "street beautifiers" and who may be former pickers have been selected and trained, as in Waste Wise, to collect wastes from households and either deliver them to municipal vehicles or deposit them at transfer points. They are paid by the households, through the street organizations. Households pay Rs. 15-20 per month, depending on the wealth of the location. One street unit might collect Rs. 800 each month. Of this, Rs. 600 will go on wages, Rs. 100 will be used to pay off the bank loan, and the remainder will go into a sinking fund in case of defaults. The street units buy or rent bicycle carts for the collectors with small bank loans.⁽¹³⁾ Sometimes, donations are sought from local businesses in order to buy equipment.

Street clean-ups and regular street-sweeping have also been organized in this way. There is discussion on expanding clean-ups and waste removal from slum and squatter areas, which would be financed by extra donations from well-to-do neighbourhoods.⁽¹⁴⁾ More than 60,000 people are now receiving waste services on some 500 roads in about 80 neighbourhoods, organized by 150 Civic Exnora units - an impressive achievement.

The goal of social advancement for people who have suffered discrimination (the waste pickers), although not an initial concern, is becoming important in some areas. Besides the regular work, basic literacy classes are arranged by some of the chapters. Nirmal has mentioned opposition from elites in Madras who do not want waste pickers to have legitimate roles in affluent areas.⁽¹⁵⁾ Judging from the enthusiasm for creating Civic Exnora units, however, this opposition seems very minor. In Madras, waste pickers are not usually excluded from wealthy areas.⁽¹⁶⁾

The system can work effectively if most households keep up their payments. Where too many have defaulted the street unit has lapsed. In some cases the breakdown has occurred because the Madras Corporation has not kept to its side of the bargain and picked up the wastes from the transfer points. As the Civic Exnora units have no means of transporting wastes to dumps, the transfer points rapidly become a nuisance without regular service from the municipality.

Another problem is that the street units deal only with household wastes. Each street also has garden wastes and construction wastes. If the municipal crews cease to enter streets having Civic Exnora units, these wastes will soon become a problem.

Since Nirmal and Rosario (of Waste Wise) are both Ashoka Fellows (i.e. they have received support from the Ashoka Foundation based in the USA), they have shared ideas and, in the past year, Exnora has begun to promote source separation in some of the project neighbourhoods. Experiments have begun in backyard composting, and composting in boxes on apartment balconies.⁽¹⁷⁾

V. DECENTRALIZED COMMUNITY BASED COMPOST-MAKING EXPERIMENTS

BECAUSE THE SOLID wastes of Asian cities are typically comprised of 70-85 per cent organics, dirt and dust, compost-making has long been considered a way to reduce waste volumes for municipal disposal. Centralized compost-making through mechanical plants has generally failed, so now attention is being given to both decentralized approaches and dump-site composting.

18. Hardi, L., personal communication.

The most experimentation with decentralized composting, in the sense of compost-making in neighbourhoods, has been carried out in Jakarta. For about three months in 1990-91, composting was done at five sites contributed by the Cleansing Department in a project conceived by the Centre for Environmental Studies of the Institute of Technology in Bandung, supervised by the Technology Development Centre there, and supported by the Department of Public Cleansing of Jakarta.⁽¹⁸⁾ Householders were not asked to separate dry and wet wastes, but waste pickers engaged by the project collected wastes from transfer points, composted the organics and sold recyclables to waste dealers. Residues were returned to the transfer points for municipal collection.

These experiments began as a result of an elaborate proposal for decentralized solid waste management (called "integrated resource recovery") for Indonesian cities in which each neighbourhood would have a station (called "garbage industrial estate") at which the organics and synthetic recyclables would be separated and the organic wastes composted. The rationale includes a social advancement component: the workers at these estates would be former street and dump pickers who would be trained in compost-making. It is argued that the approach would change public prejudice against waste recovery and recycling. The waste sorters/composters would derive their income from payments from householders, and by selling recyclables and compost. The system could be subsidized by the cleansing departments from savings achieved in collection and transportation costs.⁽¹⁹⁾

19. Poerbo, H. (1991), "Urban solid waste management in Bandung: towards an integrated resource recovery system" *Environment and Urbanization*, Vol. 3, No. 1, pages 60-69.

These Jakarta experiments concentrated on the technology of compost-making and did not attempt to implement the social goals of the integrated resource recovery plan. There were insufficient resources to investigate and establish markets for the compost. The infrastructure of the sites was inadequate for leachate control. There was no attempt to monitor the social acceptability of the concept in the neighbourhoods. The choice of sites for the projects suggested that the city authorities believed the compost stations should be out of the public view.⁽²⁰⁾

20. Poerbo, H. personal communication.

The outcome did not establish economic or social feasibility for this approach to decentralized composting. Nevertheless, faculty at the Technology Development Centre at the Institute of Technology in Bandung still support the idea of decentralized solid waste management based on compost-making, the sorting out of recyclables, and technological improvements in small-scale recycling. Professor Hasan Poerbo, who conceived the original idea as a result of community development work in the early 1980s in Bandung, concedes that it does not seem likely that compost could be made and transported cheaply enough to secure stable outlets. He is now pressing for consideration of subsidies for decentralized composting.⁽²¹⁾ Experiments in composting are continuing.

21. Poerbo, H. personal communication.

The Javanese "garbage estate" concept could incorporate source separation. It is possible that, if only composting were being done on properly constructed sites, residents who currently oppose the idea would find it acceptable. It could only be extended to poor neighbourhoods, if estates in affluent areas subsidized the low-income *kampungs*, since the wastes of the latter would be unlikely to contain enough valuable recyclables to interest people in working in these areas.

The Urban and Environment Project of the Centre for Policy and Implementation Studies in Jakarta has a project in which waste dealers (*lapaks*) are being supported to branch into composting,

22. Sadoko, I., personal communication.

23. Poerbo, H., personal communication.

24. Chen, Lixing, personal communication.

25. Sasono, A. (1988), "Role of the informal sector community in dealing with garbage problems", Workshop on Waste Management, University of Indonesia and University of Toronto, Jakarta, unpublished paper.

employing waste pickers as workers. These act as collectors of both synthetic recyclables and household organics. Some materials are bought from households but most is collected from transfer points. The main goal of this project is to improve solid waste management in the neighbourhood.⁽²²⁾ In areas where waste dealers have premises suitable for composting, this approach seems more feasible than that of acquiring sites for garbage industrial estates. Indeed, the most successful of the Jakarta compost experiments was carried out on a river bank beside a *lapak's* enterprise which was the market for the synthetic materials taken out of the refuse.⁽²³⁾

Community based compost-making is feasible, given appropriate sites and some technical training but only in rare cases will there be ready markets that would allow the compost to be sold at a price adequate to meet costs. Those who promote the concept now argue that compost should be subsidized, perhaps by city parks departments. The absorption of compost could be integrated with tree-planting drives and community gardening. In this way, solid waste treatment could be associated with more popular environmental causes. In neighbourhoods with gardens, there is clearly scope for backyard composting, provided rodents can be controlled.

One vehicle for the recovery and composting of urban wastes that has not been exploited is the efforts of institutions, such as schools, religious houses, correctional homes and the like. In China, schools and workplaces contribute food wastes to poultry and pig farms, or even keep animals to eat wastes, and schools may raise money through waste-collecting drives, the recyclables being sold in the official redemption centres.⁽²⁴⁾ Ranganan Zoo in Jakarta has had a successful compost project for a few years. In India and the Philippines, convents are often models of traditional waste reduction and recycling. Such institutions might agree to provide space in their grounds for composting organic wastes from the surrounding area.

VI. ATTEMPTS TO IMPROVE THE INFORMAL COLLECTION AND RECYCLING OF WASTES

IN MOST LARGE Asian cities, one can find an NGO project that has something to do with the collection and/or recycling of solid wastes. Usually these projects started with the wish to assist street and dump pickers to improve their earnings, health, living conditions, and security or to help small entrepreneurs working in recycling. Now the promotion of waste recovery and recycling is coming to be recognized as helping solid waste management for the city while serving social development. This view has gained some acceptance in Indonesia since President Suharto, learning of work being done in academic institutes, referred to waste gatherers as a "self reliant brigade" in 1989. Faculty at some research and development centres have been encouraged to undertake action research projects with waste pickers and dealers.

Principal among these is the Institute for Development Studies (Lembaga Studi Pembangunan - LSP) in Jakarta. An approach favoured by LSP is the encouragement of co-operatives of waste pickers and collectors, in order to improve their bargaining power vis-à-vis the waste dealers.⁽²⁵⁾ Recently, German Technical Assistance (GTZ) has given funds for "Scavengers in Indonesia - a human development programme," for which LSP is the coordinating agency,

26. LSP (Lembaga Studi Pembangunan) (1991), "Scavengers in Indonesia: a human development programme", brochure.

27. Nicolaisen, D., U. Plog, E. Spreen and S.B. Thapa (1988), *Solid Waste Management with People's Participation: An Example in Nepal*, GTZ, Eschborn, Germany.

28. Khyaju, B. (1986), "Scavenger activities and health hazards to scavengers" Kathmandu Solid Waste Management Project, Report No. 12.5.

29. Furedy, C. (1991), "International workshop on solid waste management and resource mobilization, Kathmandu", *Environmental Conservation*, Vol. 18, No. 2, Summer, page 183. See also Spreen, E. (editor) (1992), *Proceedings of International Workshop on Waste Management and Resource Recovery*, GTZ Solid Waste Management Project.

30. See the paper by Mike Douglass in this issue of *Environment and Urbanization*.

working with the Development Technology Centre of ITB and Yayasan, an NGO in Surabaya. Projects in Jakarta, Surabaya and Bandung, will undertake research, education, community development, technical and business training, and "political dialogue" to improve the productivity and status of waste pickers, to lobby for legitimization of their work and to encourage their participation in local decision-making. The rationale for the programme mentions the role of waste pickers in shouldering "part of the ecological costs of development" by saving resources and reducing waste transportation and disposal costs.⁽²⁶⁾ Cleansing departments and government agencies are to cooperate with the institutions in each city. This is the most prominent example in Asia of international aid being given to NGOs to address issues of waste workers and the relations of informal to conventional solid waste management.

GTZ was also responsible for an initiative in Kathmandu whereby waste pickers have been helped to organize improvements in their working and living conditions. When the German aid programme for solid waste management began in Kathmandu nearly ten years ago, the presence of waste pickers, many of them women and children, was recognized as an intrinsic aspect of the existing system.⁽²⁷⁾ A survey to identify health needs was carried out⁽²⁸⁾ and pickers given access to a clinic. A picking platform has been built at the composting site so that pickers can retrieve recyclables from the wastes delivered for composting; pickers are also allowed to go over the windrow piles on the site. In 1990, some land was acquired adjacent to the composting plant and the pickers working at the site were helped in building a shelter for themselves. Social workers doing research in the solid waste project have regular contact with the picker families. The Kathmandu Solid Waste Project's recognition of the range of issues in waste-picking and trading was highlighted in an international workshop sponsored by GTZ and the Nepal Ministry of Housing, during which measures for promoting waste-recycling in Nepal were also discussed.⁽²⁹⁾ Now that the German aid is coming to an end, it remains to be seen whether this social concern will be sustained in waste management in Kathmandu.

VII. HANDICAPS AND STRENGTHS OF COMMUNITY EFFORTS

THE COMMUNITY EFFORTS to address social and environmental problems related to solid waste management in Asian cities that have been initiated by local groups suffer the typical limitations of small volunteer projects. The volunteer, and often too few, staff have to manage on short-term funds.

The organizers have educated themselves on matters of solid waste and feel the need for more expertise, but have no way to obtain appropriate training. They may be too optimistic at first about the income-generating possibilities of the project. They have difficulty getting the cooperation of city solid waste departments and cannot directly influence solid waste planning or the industrial causes of waste problems. They are handicapped by the problems of lack of access to resources and to "political community" explained by Michael Douglass in his discussion of community based environmental management.⁽³⁰⁾

Most of these projects came about because of the vision and drive

of individuals. In some cases their concern began with understanding the plight of waste pickers (Bangalore, Jakarta); in other cases, awareness of improvements in municipal solid waste management abroad was the stimulus (Manila, Madras, Kathmandu). The role of programmes such as the fellowships of the Ashoka Foundation illustrates how small amounts of funds (Ashoka gives a stipend for a year and some money for books) can release an innovator to get a project going. In the Manila case, a well established, middle-class women's organization has provided the backing to the innovator. The Kathmandu and Jakarta projects have been supported by German aid, in the first case to a quasi-governmental agency and in the second to several NGOs.

How replicable and stable are the projects analyzed here? Both the MMWBM and Exnora International are optimistic about expansion, while Waste Wise is still on such a small scale that it is struggling to keep the project going. The Indonesian GTZ project has yet to report any results. The Kathmandu centre will probably need more funds and technical assistance from German aid. All the projects require more local support, both governmental and private to be sustained after the initial phase. If the city authorities fail to maintain a commitment to disposing of wastes and facilitating resource recovery, the projects are unlikely to have a long-term impact on municipal solid waste management.

The strength of the initiatives described here is that they are built on a social and environmental rather than a technical view of municipal solid waste management. They have begun to link social, economic and ecological issues to the mundane problems of solid waste collection and disposal. Partnerships of city authorities, NGOs, private enterprises, and local citizens' groups are developing. By building upon diverse motivations (for social welfare, convenience, earnings, and cleanliness), these partnerships can further the environmental awareness and community involvement that is essential if sound practices in solid waste management are to become routine in Asian cities.

VIII. CONCLUSION: TOWARDS BUILDING A COMPREHENSIVE APPROACH TO MUNICIPAL SOLID WASTE MANAGEMENT BY COMMUNITY ACTION

WORLDWIDE, SOLID WASTE management is being transformed by national planning for waste reduction, the promotion of recycling, and stakeholder cooperation. But there is no large city in Third World Asia that has yet applied these principles to solid waste management. What this review of some community based projects suggests is that the ways in which new approaches will emerge in Asian cities may differ from the patterns seen in the past decade in the West and Japan. Although the physical and political problems of overflowing dumps and lack of sites for new ones are real and often very urgent, these have not so far created a general interest in waste issues in Asian cities. Even the pressing needs of poor neighbourhoods for waste removal have only prompted effective action in scattered instances. Until the call for national solid waste planning⁽³¹⁾ is acted upon, creative thinking in municipal solid waste management seems likely to be shaped by the experiments of community groups and NGOs with social as well as environmental goals.

31. Sakurai, K. (1990), *Improvement of Solid Waste Management in Developing Countries*, Institute for International Cooperation, Japan International Cooperation Agency, Tokyo.

Because the most immediate social problems of municipal solid waste management in poorer Asian cities relate to the recovery of resources by poor people, the social orientation leads community based organizations to seek improvements in methods of resource recovery. Because of their orientation to employment and social advancement for underprivileged persons, the main projects described here have had to find ways in which street people can become legitimate waste collectors, and informal waste traders can contribute to community projects. Because their financial resources are slim, their social purposes are adjusted to market realities. Their educational aims are to change attitudes towards waste workers and waste work as well as to change waste management habits.

Although poor neighbourhoods have urgent need for waste services, Asian NGOs and CBOs are finding that, in working towards comprehensive solutions to solid waste problems, it is more effective to begin in affluent and middle-class areas. Source-separation and decentralized composting are more worthwhile and feasible in these areas because the wastes have more recyclables, the householders understand the purposes of waste reduction, they can pay for collection services, and there is space for composting. If these experiments in waste-sorting, trading, and composting prove sustainable, then it should be possible to regularly cross-subsidize services to more needy areas.

Starting from community activities, the project participants are developing an understanding of the complex resource and waste issues in modernizing societies. They are demonstrating how social, economic and ecological goals are relevant to the daily problems of waste collection and disposal, and so are helping to develop diverse motivations for environmental improvement. Among the projects mentioned here, there is a range of ideas that, if translated into practice on a larger scale, could form the basis for community action to ameliorate solid waste problems throughout the large cities of Asia, Africa and Latin America.

CASE STUDY 1: Street pickers in Calcutta slums

Christine Furedy and Mohammed Alamgir

I. INTRODUCTION

WASTE PICKERS ARE numerous in Calcutta, as in similar Asian cities. Pickers can be seen gathering materials from street piles, garbage containers, transfer points and small dumps throughout the urban area as well as at the main garbage dump (Dhapa-Bantola). Media references focus on the dump but in terms of numbers there

are many more city street pickers than dump pickers. From the point of view of resource recovery, street pickers are also more important because they obtain materials before these have been greatly damaged and dirtied by the process of collection and transportation for disposal. There is great variety to be found among garbage pickers in Asian cities; the circumstances of street pickers and dump pickers differ considerably. This report refers to underprivileged street pickers whose average earnings are low.

The United *Bustee* Development Association (UBDA) carried out a pilot survey in 1990 based on half-hour interviews with waste pickers in two *bustee* (slum) areas of the Calcutta metropolitan area: Tikiapara in Howrah on the west side of the Hooghli River, and Tiljala, near Park Circus Railway Station on the east edge of Calcutta city. The Tiljala neighbourhood also contains a squatter area along the eastern railway tracks. The aim was to obtain information on city waste-picking as an occupation, on the pickers' awareness of possible health hazards, their perceptions of their social status, how they are treated by the public, and how they think others view them.

The interviewers were members of the UBDA who have been doing community work in these *bustee* areas for some time, and so were known by the waste-picking families. Persons identified as waste pickers were those working mainly at gathering wastes from streets, transfer points and area dumps, for most of the year. (In the monsoon season, many pickers have to give up this work as the wastes are spoiled by the rains). The UBDA made a selection of persons to be interviewed with a view to representing women and men, and different age categories. As no demographic information is available for the districts, nor any enumeration of waste pickers, it was not possible to use any "random sampling" to choose the respondents.

A total of 29 people were interviewed - five women and 24 men. These included eight children under the age of 15. In Tikiapara 11 were Hindus and two Muslims, while in the Tiljala area, all were Muslims. Fourteen of the respondents lived in slums and 14 in squatter shelters while one was a pavement dweller. They are members of low status Muslim and Hindu social groups, several of which are known as "sweeper castes." Only two of the respondents had any schooling at all: one had four years and another five.

II. STUDY AREAS

THE TIKIAPARA AREA is mainly a congested *busti* or area of irregularly built huts, with a total population of approximately 80,000. There are also pavement-living families, numbering about 45 to 50. In this neighbourhood there are from 200-300 waste pickers, according to local social workers. In general the *busti* dwellers in Tikiapara work at occupations such as rickshaw and cart puller, workers in small industries such as sandal-making, street vendors and messengers.

The Tiljala squatters' settlement beside the railway tracks opposite Park Circus Station contains about 700-800 families, about 5000 people; the population of the adjacent slum area is about 30,000. Predominant occupations here are rickshaw puller, house servant, casual agricultural labourer. There are about 1000 people doing waste-picking. Most squatters here are migrants from the urban fringe area of 24 Parganas.

III. OVERVIEW OF STREET BASED WASTE-PICKING WORK

THE USUAL METHOD of putting out wastes from residences and shops is to place them in piles on the pavement. The Tikiapara area and part of the Tiljala slum area have a few street bins, mainly three-sided masonry ones. There are a few open transfer points where municipal sweepers deposit wastes for pick-up and some open dumping areas for the unserved squatter settlement. The casual waste collection practices allow pickers ready access to wastes to search for recyclables. Most of the materials available are paper, plastics and broken glass, with metal scraps being the most prized. They may also find leather scraps, rubber and bones. What they are able to retrieve represents the leftovers after the better recyclables have been set aside in households, shops and businesses to be sold to itinerant buyers or local waste shops. None of the pickers had ever approached a house or shop to buy better materials as itinerant buyers of wastes are a different social category from street pickers. (The only exception here is that some women have an arrangement to get burnt coal cinders directly from restaurants and sweet shops). The pickers did not report paying any fee for the right to work in these areas, either to the police or to gangs, in contrast to dump pickers. They start early in the morning, and may go out again after a rest in the afternoon. About half work a regular "beat" and the others move around according to their anticipation of the availability of wastes, and their energy for walking and carrying. (None of the pickers has a handcart or bicycle to carry materials; they carry their findings in cane baskets or gunny sacks). Occasionally pickers report friction with other pickers over "territory," presumably when someone intrudes upon another's regular beat. Some respondents commented that picking is becoming more competitive.

Most of the pickers learnt the work from a relative or friend; seven said they were recruited to work by waste shopkeepers, or learnt by their own observation. About 59 per cent started on the work as children, aged 12 or less. About a third of the respondents preferred to pick straight from the roadside, another third preferred to pick from street bins and the remainder had no preferred spot.

The family incomes ranged from Rs. 200 to 1000 earned from this work per month. Seventy two percent, however, earned below Rs.600. In most cases, it is a single member of the household doing waste-picking, except in the case of children, who usually reported that another member of the family was a picker. However, 50 per cent of pickers said other family members helped with sorting, cleaning and selling materials to small waste shops. The "processing" done by the pickers is elementary; apart from sorting and drying they pass on their pickings daily in the condition in which they obtain them. Further sorting and cleaning is organized by the dealers. (Possibly the pickers have found that they cannot increase their earnings much by such processing). In the rains, however, they cannot sell damp paper or very dirty plastic, so they may take the wastes home and dry them out for a day or two before selling. The capacity to do this depends upon the amount of living space the family has around the dwelling. Many pickers abandon the work during the heavy rains and seek manual labour.

IV. RELATIONS WITH DEALERS

PICKERS SELL THE materials, on a weight basis, to dealers operating small shops, depots or "godowns" (warehouses). In the Tiljala squatter colony there are three such shops. Most pickers prefer to deal with the same trader over a period of time, usually the one most conveniently situated. Four of the respondents were recruited into picking by waste dealers. The pickers surveyed do not "shop around" among dealers to obtain better prices. If they establish a good relation with a shopkeeper or dealer, they can obtain very small advances and loans (not more than Rs.100) and the dealer may give a present of clothing at festival time. When asked what profit the shopkeepers make on the different materials, most pickers said they had no idea. Only one indicated any knowledge of how the materials were recycled.

V. AWARENESS OF HEALTH RISKS

THE PICKERS ARE mainly unaware of infectious hazards associated with gathering wastes. They mention getting backache and rheumatic pains, and cuts but they do not take any precautions against infection. For instance, none washes his/her hands using soap after this work, although they do wash each evening. Some who use a metal rod or stick to rake through the garbage see this as a protection against cuts; others did not regard this as a health precaution but only as a convenience for finding materials. Sixty-two per cent did not favour taking precautions such as using gloves to protect their hands; others were willing to experiment with gloves, if these were provided free of cost. There was one identified case of tuberculosis. Other health problems are unknown as the pickers do not receive any medical check-ups, and they did not name any particular illnesses when questioned.

VI. PERCEPTIONS OF STATUS AND ACCEPTANCE IN THE NEIGHBOURHOOD

IN GENERAL, THE pickers are treated as "outcastes." Their main complaint is the difficulty they have in obtaining access to water sources, because higher caste groups object to their using the local pumps and wells (in Tiljala) and the fact that they are regarded as thieves (Tikiapara). Most of the respondents expressed dissatisfaction with waste-picking as an occupation. They believe they are perceived as having very low status; only one thought that his waste-recycling work could be regarded as having any value for society. Over 72 per cent commented that they and their work are seen as "rubbish." One said that in spite of this he felt no shame in doing the work. Many do not think that they have any prospect of other work. Some are hopeful that their children will not have to be waste pickers but most parents said they had "no hope" for a better life for their children. Almost all reported some form of local "opposition" to their work, usually that they were suspected of being thieves or of having the intent to steal. A few commented that they were not permitted to

come near to higher status people and one said that a "distance" is maintained in "every sphere of life."

VII. CONCLUSION

THE MOST PROMINENT aspects of the study results are the low earnings, low status and low self-esteem of the pickers, and the fact that all report that they suffer active discrimination and harassment in the course of their work and daily lives. These pickers in poor areas of Calcutta have minimal earnings compared to pickers in more affluent cities. Their very low levels of education (if they received any) most likely account for their unawareness of health hazards and elementary precautions and also their acceptance of their relations with dealers. None showed any knowledge of the level of profits that the dealers could make, or how the wholesale prices of materials fluctuated. They seemed unaware of possibilities of increasing their earnings by adding value through more cleaning and sorting, or by seeking better prices from dealers. They see their job security resting on establishing a good relation with a dealer; this means not bargaining for a better price.

Experiments in containerization of wastes and an increase in street bins have not decreased picking in Calcutta city. In fact, there have only been selected experiments in certain areas, and the Howrah and Calcutta areas covered in this study do not have roll-on-roll-off containers and have very few bins of any kind. Street-picking is likely to remain a popular occupation, one that is easy for new arrivals to the city to enter, and one that offers more money for a hard worker than many other unskilled jobs.

For this reason, and also because many children engage in picking, organizations working in low-income areas are interested in ways in which the working conditions of street pickers can be improved. The first step, in the opinion of the United *Bustee* Development Association, is to increase the self-awareness of picker families, to enable them to organize to seek mutual benefit. Concurrently, education of the general public so that the societal benefits of waste-recycling are understood, could help to decrease the stigma and harassment that they suffer. The UBDA has begun a pickers' organization in Tiljala, and is offering classes to pickers and their children. They anticipate that the increased awareness of the reputation of Calcutta for waste-recycling will gradually filter down to poorer areas and help to the transform attitudes towards waste pickers.

Most studies of waste pickers in Third World cities have been of colonies working at garbage dumps.⁽¹⁾ There are examples of community organizations and even cooperatives being sustained among dump pickers. Dump pickers tend to be more organized because in order to operate on the dump they usually have to pay fees to dump managers and vehicle drivers and they usually have to organize themselves to parcel out picking territories at the dump; furthermore, they frequently live in squatter settlements on the dump fringe or nearby and their first concerted effort is often to resist eviction; they have access to larger quantities of wastes, albeit wastes that are in poorer condition than city street wastes.

It may prove more difficult for city pickers to organize even with dedicated and intense support from community based groups. Street pickers are unlikely in general to be able to bypass local waste

1. Blore, I. (1992), "Domestic waste collection, treatment and disposal in Calcutta", paper prepared for International Workshop on Planning for Sustainable Urban Development, University of Cardiff, July; and Kungskulniti, N. (1990), "Public health aspects of a solid waste scavenger community in Thailand", *Waste Management and Research* Vol. 8, No. 2, pages 167-172.

dealers, but they might improve their earnings and decrease health risks through organization. However, since it is the very act of picking from mixed garbage that is regarded with disdain by society at large, it is unlikely that they could attain any real improvement in status by earning more and doing picking more safely.

A change in status might come if pickers could find a niche in recovery from "clean" waste streams below the door-to-door buyers. This would depend upon householders and shopkeepers further separating their wastes and making these materials free to the new category of collectors. A pilot project along these lines has been initiated in Jayanagar, Bangalore, by an NGO called Waste Wise (see above paper for details).

CASE STUDY 2: Small businesses from urban wastes - shoe renovation in Delhi

Raj Mangal Prasad and Christine Furedy

FOR A TWO-year period, the International Labour Office ran a pilot project in selected slum areas of Delhi to explore ways of starting small businesses or developing existing ones so as to create new jobs, develop skills, and thus raise productivity and earnings. Shoe renovation was one of the skills included in the work done at Raghbir Nagar by the ILO team. Shoe renovation, a form of waste recycling, is well established in the Delhi urban area. It is estimated that more than 10,000 old shoes are put back into use each month rather than going to the garbage dump.

The Raghbir Nagar squatter settlement consists of about 4000 *jhuggis* (shelters constructed from waste materials and mud). From the original group of families selected by the ILO project team, 35 have settled for the work of shoe renovation. The project team taught the skills to repair and substantially remake the shoes, including redyeing.

In Raghbir Nagar, the settlement itself provides most of the raw materials for repair as well as the final market. The source of old shoes that can be remade is the traditional *feriwallahs*. The *feriwallahs* of Raghbir Nagar are mainly women from Gujarat state. They go to better-off areas and obtain used shoes and clothing from housewives by bartering steel utensils and crockery items. They then sell these in the daily local market, which is now housed in a market area constructed by the Delhi Development Authority Slum Wing. Among the 4000 households, there are approximately 3000 women doing this work, so there is a ready supply of recyclable clothing available

in the area.

The shoe renovators purchase materials such as ready-made soles, adhesives, thread, nails and leather pieces from the local market. Special care is given to making the renovated shoes look new. Light coloured shoes are redyed for instance. According to the condition of the old shoes, soles and uppers are replaced or repaired. A renovated pair of shoes will sell for about Rs. 50 and will last for 3-4 months; a new pair from Bata Shoe costs about Rs. 300 and lasts for a year. Few of the residents of the area can afford brand name new shoes; they provide the market niche for the renovators, who can earn a profit of between 50 per cent and 150 per cent.

At first, there was an attempt at cooperative organization of the enterprise, but this did not work successfully as some of the renovators were not used to a cooperative system; the better workers felt they were impeded by the slowness or unreliability of others. After discussion the project emerged as one for self-reliant development. The participants were enabled to obtain bank loans, open savings accounts, and to upgrade their skills. They had several study tours to observe different styles of production in shoe-making. Many of the participants joined in an informal society, which may eventually be registered under the Societies Registration Act. This group functions for mutual aid, social and cultural activities for the families.

Over a period of 16 months, the shoe renovators developed confidence that they have marketable skills and could run a business. The success of the shoe renovators has led to a 30 per cent increase in persons entering this trade in the past year; at the same time, the shoe renovators in Raghbir Nagar have improved their earnings.

Besides shoe renovation, there are also businesses based on paper bag-making, toy-making, selling old clothes. Most of this work depends upon re-use or recycling in some way. Thus, it indirectly reduces the quantities of waste in the city. In addition, the "raw materials" are always in good supply and cheap enough to allow a further profit for the recyclers.

Capital to start up small businesses is scarce in India; ingenuity and careful planning can make a great difference to whether employment projects succeed. There appear to be two main factors in the success of the small business programme of the ILO in selected Delhi slums. The activities chosen are ones that do not have a "motivation lag". That is, people can start work almost straight away, using, with some further training, skills they possess. Secondly, a management approach has been taken, as against a subsidy or welfare approach. The people have been able to improve their earnings from their own efforts; they are not kept going by charity. The major constraint for shoe renovators is good markets. The shoes are sold on pavements and in the weekly market. The expansion of shoe renovation will depend on developing further outlets for sales.

The development of enterprises based on waste-recycling has great potential in countries like India because there are thousands of slum dwellers who are familiar with waste recovery and some aspects of recycling and because the use of secondary materials means that the operating costs can be kept quite low.

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