Untapped Potential: Securing livelihoods dependant on 'Waste'

A Review of Law and Policy in India

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Executive Summary

This study seeks to improve our understanding of the legal framework impacting the workers in the waste and recycling industry. As workers are directly impacted by laws that governing the entire waste management and recycling industry, it was envisaged that a more holistic approach be adopted, to understand the law and policy framework governing the waste and recycling industry.

Waste picking ranks lowest in the hierarchy of urban informal occupations and a large number of the workers are women and children. Unskilled persons, migrants, those lowest in the caste hierarchy and the poorest of the poor are predominant in this occupation, as they are unable to find any other kind of employment. Generally, there is no employer-employee relationship in this trade even though it is possible that some of the scrap picking activity is organized by contractors. Waste pickers are therefore categorized as self-employed workers and the transaction between the waste pickers and the scrap traders is a sale purchase transaction.

Currently, there are no clear or comprehensive policies or legislations to protect the rights of the waste pickers, in India. The lacunae brings to fore the lack of vision in protecting livelihoods in the country. Not only does the formal system of collecting and segregating waste provide scope for employment, the informal economy of the recycling industry provides ample opportunities to protect and encourage self-employment. The right to waste and access to waste, need to be envisaged in a holistic solid waste management system that gives due recognition and protection to the waste picker. An integrated waste management system, in which segregation at source enables sustainable management of waste and provides employment with better working conditions to waste pickers, needs to be mandated by law for all local bodies across the country.

This study was undertaken as a precursor to a larger national study, to help sharpen the research questions. This pilot study has attempted to look at the following issues in the two (pilot) cities of Pune and Bangalore –

(a) Identify municipal regulations and rules impacting waste-pickers with the purpose of guiding researchers in other states on what and where to look, in compiling state specific information.
(b) Identifying the key areas that need further research and enquiry. Mapping and creating a template for the analytical research thus furthering our understanding of the 'waste' sector.

The report provides an overview of the Solid Waste Management scenario in India and provides a fairly detailed understanding of government efforts at managing solid waste in the country. In mapping the law and policy framework of solid waste management, the report critically analyses the situation of the waste pickers and the protection accorded to them. The report identifies and concludes that legally mandating the 'access and right to waste' to waste pickers would be a crucial aspect that can help the secure the livelihood of the waste pickers. It also concludes by identifying future threats, as waste management models transform with changing needs. It must be noted that the privatization has the potential to cut off the access to

waste of traditional waste pickers. A new class of contractors and waste sorters are likely to be employed by the private actors, with no effort at absorbing the existing communities that work in this trade.

In conclusion, the report provides a framework for a comprehensive policy and recommends a 'rights based approach' to securing the livelihoods of waste pickers. Finally, it draws up a template for further research, while providing a critique of the existing legal framework pertaining to waste pickers and the recycling industry.

I. Introduction

Waste pickers are crucial to a sustainable waste management system. In India, municipal solid waste management is the responsibility of the municipal bodies or local bodies. Nearly 55 per cent of urban household waste generated consists of organic waste that can be composted, and another 15 per cent which can be retrieved as recyclables. The residual 30 per cent would require scientific land filling.[1] However, most cities and towns in the country have a barely functional waste sorting, collection and disposal mechanism in place.

Municipal solid waste management is a growing problem that needs urgent policy and legal intervention. Presently, health and environmental concerns largely inform the approach to policy and legal framework relating to 'Municipal Solid Waste' (MSW) - both national and international. However, the law and policy framework has rarely viewed 'waste' as an important source of livelihood.

Indeed, 'waste' and the related informal economy (including recycling) support livelihoods of a large number of people – both unseen and unrecognized. As the nature, quantity, and quality of waste generated transforms, there is now a burgeoning market around waste recovery, waste recycling and waste products. Waste pickers play an important role in collecting and segregating waste such as paper, glass, plastic, metals and other such recyclable materials. The Second National Labour Commission estimated nearly 50 lakh workers in the country, excluding those working in the recycling industry. The hand picking and sorting at dumps and landfills is tedious and hazardous work, fetching the waste picker a meagre livelihood. Though being the lowest in the recycling rung, they are vital to an environmentally sustainable waste management model. Remarkably, their contribution is rarely documented or quantified. These livelihoods need to be protected and mandated through law and policy in the country. This report focuses on the law and policy framework impacting livelihoods in 'Waste'.

The first rung in the 'Waste pyramid' is waste picking either through primary collection from source or through sorting at dumps, bins or landfills. Waste picking ranks lowest in the hierarchy of urban informal occupations and a large number of workers are women and children. Illiterates, unskilled persons, migrants, the lowest in the caste hierarchy and the poorest of the poor are predominant in this occupation, as they are unable to find any other kind of employment. The majority of workers sell to retail traders within their neighbourhood.

Generally, there is no employer-employee relationship in this trade even though it is possible that some of the scrap picking activity is organized by contractors. Waste collectors are therefore categorized as self-employed and the transaction between the waste pickers and the scrap traders is a sale purchase transaction. However, some waste pickers are 'tied' to the scrap trader through credit arrangements that bind them

[1] Da Zhu, P.U. Asnani, Chris Zurbrugg, Sebastian Anapolsky and Shymala Mani, *Improving Solid Waste Management in India: A Sourcebook for Policy Makers and Practitioners*, (Washington D.C: World Bank, 2008) at 130.

in an exclusive relationship with the trader. This arrangement helps the waste picker tide over lean periods of work and provides immediate credit in times of need.

Currently, there are no clear policies or legislative effort to protect the rights of the waste pickers, in India. Apart from labour protection, the right to waste and access to waste, need to be envisaged in a holistic solid waste management system that gives due recognition and protection to the waste picker. The present lacunae brings to fore the lack of vision in protecting livelihoods in the country. Not only does the formal system of collecting and segregating waste provide scope for employment, the informal economy of the recycling industry provides ample opportunities to protect and encourage self-employment. Additionally, the recovery and recycling of resources contributes in positive ways to the environment, while reducing the burden on land filling of waste. An integrated waste management system, in which segregation at source enables sustainable management of waste and provides employment with better working conditions to waste pickers, needs to be mandated by law for all local bodies across the country.

II. About the Study

A. Context for the present study

WIEGO (Women in Informal Employment: Globalizing and Organizing) is coordinating an international project on law and the informal economy. India has been selected for the first year of the project to carry out a pilot study. The overall goal of the project is to make a significant contribution to the development of an enabling legal environment for informal workers that promotes work and economic opportunity, labour rights, benefits and protection, and actively encourages the growth of strong, democratic, sustainable unions /member-based organizations of informal workers, that can successfully represent informal worker interests in forums affecting their work and lives. Specifically, the project seeks to develop a *platform* of legal demands and an 'observatory' that documents successful modes of interaction and struggle innovative strategies for legal and policy reform, successful use of litigation, participation in policy formulation. The platform/observatory will identify labour specific legislations and other legislation central to worker rights.

In the first phase of the project, the WIEGO Pilot assisted the Indian Alliance of Waste Pickers, India in drafting a policy document. The draft policy document states that in view of the vital importance of effective solid waste management for protecting human and animal life, for protecting the ecology and for the protection of livelihoods of persons engaged in the recycling sector, it is imperative that an integrated and inclusive policy framework be adopted. Building consensus, educating and lobbying for adoption of the policy document is the next phase of work for the Alliance in taking forward the project.

During the discussions of the policy, the Alliance articulated a need for a greater understanding and analysis of the legal framework impacting the workers in the waste and recycling industry. As the workers are directly impacted by related laws that govern the industry, it was envisaged that a more holistic approach be adopted to understanding of the law and policy framework governing the waste and recycling industry. It would help unravel the complex legal maze that impacts the waste

industry – ranging from environmental laws, land use laws to labour laws. The broad contours of the study and the research questions have been compiled by the Alliance partners based on their experience and learning on the field. Accordingly, the second phase of the India Pilot for the Waste pickers sector was conceived of in two parts.

In the first part, the attempt is to compile and analyse the court judgements that impact the waste sector and these include subject areas such as environment, labour, municipal taxes, recycling, waste handling and management, pollution, land use, development planning, finances and privatisation. This study attempts to explore some of these questions but acknowledges that a more comprehensive picture would emerge when all state laws, policies and high court judgements are reviewed carefully.

In the second part, it was envisaged that researchers would compile and analyse the rules, regulations, notifications issued in each state (more specifically a municipality in a state) to understand better the legal framework governing waste pickers and more broadly, the recycling sector. This report is a short pilot to help sharpen the research questions for further research and study in the second part.

B. Scope of this Study

To sharpen the research questions, a three month pilot study has been attempted keeping in mind the broad parametres stated above. The study looked at the following in the two (pilot) cities of Pune and Bangalore –

(a) Identify municipal regulations and rules impacting waste-pickers with the purpose of guiding researchers in other states on what and where to look, in compiling state-wise information.
(b) Identifying key areas that need further research and enquiry. Mapping and creating a template for the analytical research, thus furthering our understanding of the 'waste' sector.

C. Limitations of the Study and relevance for future research

The study provides a broad overview of the entire sector at the national level with two state specific case studies. Waste Management is a state subject and variations across states do exist, thus limiting the scope for generalizations across states. The choice of Pune and Bangalore as the two case studies is influenced largely by the locational advantages of the researchers. However, it is important to note that the two cities have made significant progress in improving waste management. Thus, the study does not capture the realities of cities where the waste management is still in its infancy, with little or no effort being made to improve the situation. Additionally, the informal economy around waste recycling varies from region to region, requiring specific studies to document regional variations. Each city/state would need to be studied individually to understand the nuances and intricacies of the recycling sector. The report is largely based on secondary material and it is hoped that subsequent studies based on the template provided herein, would throw up interesting and rich insights from primary data gathering.

III. Solid Waste Management in India: An Overview

"Solid Waste Management is associated with the control of waste generation, its storage, collection, transfer and transport, processing and disposal in a manner that is in accordance with the best principles of public health, economics, engineering, conservation, aesthetics, public attitude and other environmental considerations."[2] Urban waste can be divided into organic/ bio-degradable and inorganic/non-bio-degradable. Organic waste can be further divided into three categories: putrescible, fermentable and non-fermentable. Putrescible waste tends to decompose rapidly emitting unpleasant odours and sights; fermentable waste tends to decompose rapidly but without the attendant unpleasantness; and non-fermentable wastes break down very slowly. Non-bio-degradeable wastes consist of inorganic and recyclable materials such as plastic, aluminum, glass, etc.

The entire solid waste management system in the country is managed by the formal sector (managed largely by the local bodies) and the informal sector (the recycling industry). While the formal sector represented by the local bodies, health department and the state pollution control board is regulated and efforts are being made to improve the functioning through law and policy intervention, the informal sector has largely been ignored with little or no recognition in the law and policy framework. Nevertheless, the contribution of the informal sector to waste management, recycling and the environment is invaluable. The focus of this report is the informal waste sector; the possible interface between the formal and the informal; and the need for policy and legal intervention to protect livelihoods in this sector. Before we focus on the informal waste sector, a brief overview of the municipal solid waste management system in the country will help provide the context for the present study.

A. Municipal Solid Waste Management – Indian Scenario

The unplanned and indiscriminate growth of urban areas and townships across the country contributes to the complexity of sustainable and efficient solid waste management system. The Central Pollution Control has collated data for the volume and characteristics of waste generated in 56 cities in the country and it indicates a high level of organic (bio-degradable) material and recycleable material (details are at Annexure I and II.) The Working Group on Solid Waste Management[3], the Eleventh Planning Commission, estimates that about 1,15,000 MT of Municipal Solid Waste is generated daily in the country.

The Eleventh Planning Commission figures again estimate 70 to 90 % efficiency in urban waste collection in large metros and below 50 % in small towns. The urban local bodies spend approximately Rs. 500 to Rs. 1500 per ton on solid waste collection, transportation, treatment and disposal. Nearly 60 – 70 % is spent on street

[2] T.V. Ramachandra, *Management of Municipal Solid Waste,* (New Delhi: Capital Publishing Company, 2006) at 7.

[3] Government of India, Eleventh Planning Commission, Report of the Working Group on Solid Waste Management on Urban Development (excluding Urban Transport), Urban Water Supply and Sanitation (including Low Cost Sanitation, Sewerage & Solid Waste Management) and Urban Environment for Eleventh Five Year Plan (2007-2012) accessed at : http://planningcommission.nic.in/aboutus/committee/wrkgrp11/wg11_urbandev.pdf.

sweeping, 20-30 % on transportation and less than 5 % on final disposal.[4] These figures are telling as it indicates large scale neglect and lack of planning for final disposal of huge quantities of waste. The planning commission report notes that the landfill sites of several urban local bodies are overflowing and with little or no resources to invest in new landfills, the efficiency in collection and disposal of waste is adversely impacted.

The per capita waste generation in urban cities varies from 0.2 kg to 0.6 kg per day depending on size of population and the lifestyle of the people. It is also believed that the per capita waste generation is increasing rapidly at the rate of 1.3 % per year. Added to this is an annual increase in urban population resulting in an overall increase of urban waste generation at 5 % per annum.[5] Urban local bodies are unable to cope with this rapid increase as the management planning for Solid Waste Management is outdated. The severe lack of funding targeted specifically at solid waste management compounds the problems presently being faced by urban local bodies.

The sources of municipal solid waste can be classified into (a) Domestic Waste which includes Household waste- kitchen waste, house cleaning, old paper, packing, bottles, crockery, furnishing materials, garden trimmings etc; (b) Commercial Waste which waste generated at business premises, shops, offices, markets, hotels, departmental stores (paper, packing material, spoiled discarded goods). These could be organic, inorganic, chemically reactive and hazardous waste; (c) Institutional waste which is waste generated at schools, colleges, hospitals, government offices, private tutorials etc; (d) Street sweeping which includes littering by pedestrians, vehicular traffic, stray animals, road side tree leaves, rubbish from drain cleansing, debris; etc and (e) Industrial and trade waste which manufacturing and material processing trade generates; (f) Construction debris which includes frequent digging of roads by various utilities comprising earth, bricks, stones, wooden logs, etc; and finally (g) Offal which is generated from slaughter houses, food, packing institutions, and cold storage premises, etc.

B. Current Waste Management Practices

The three important stages in waste management in the formal sector or urban waste management systems in the country are waste collection, street sweeping and cleaning of public places; storage and transport; and waste disposal. The process of segregation, reuse and recycle of waste and the efforts at composting the organic, degradable waste is a consistent manner continue to be the missing links in the waste management stream. We discuss here some of the key features found across the country.

Primary collection

In most large cities and towns, waste is collected from dustbins, door-to door collection and other collection points by the local body/municipal corporation from different parts of the city, transported and disposed of in 'landfills' or on land surrounding the city limits. The approach to waste collection varies across the country

[4] *Ibid* at 26.
[5] *Ibid* at 26.

and the increasing involvement of the private sector in this activity is discussed later in the report (see section on privatization). It must however be noted here that

Door-to-door collection of waste is prevalent in a few metros across India. Increasingly, this task which is labour intensive is being contracted out to private contractors/ NGOs, who employ labour on a contract basis. In some cities, Resident Welfare Associations (RWAs) have taken the initiative to collect the waste. Apart from door-to-door collection, the local bodies gather waste from the streets through street sweeping; waste from bulk waste generating institutions such as hotels, schools and colleges and waste from bins in market areas. Street sweeping employs the largest number of municipal workers (safai karamcharis/pourakarmikas) and in major cities, they work in shifts, with a night shift being introduced to clean busy roads in business areas and market places.

Transportation and Storage

The door-to door collection requires equipment for transportation, such as the hand cart or tricycles to collect and transport waste to transfer stations. These transfer stations could be open air dumps or closed sheds. Waste is sorted at the transfer stations and large amounts of waste is then transferred to dumping sites in mechanized vehicles such as trucks, tempos or tractors which transport the waste. It is now mandatory that the transportation of waste be carried out in closed carriers so that the waste does not spill out during transportation. Carriers such as container carriers that carry the waste bins and dumper trucks are popular within large municipalities.

It must be noted here that Municipal Waste also contains large quantities of medical waste, hazardous waste and other industrial waste. Though there are separate laws to deal with them, implementation across the country is substandard.

Waste Disposal

Waste disposal poses enormous problems. As efforts at segregation of recyclables and composting of organic waste by the municipality are non-existent, huge quantities of waste are being dumped on waste lands in and surrounding the city. Despite laws mandating scientific land filling, these facilities have not been set up. The other methods available for waste disposal are processing/ treatment and disposal of MSW are composting, vermin-composting, anaerobic digestion/biomethanation, incineration, gasification and pyrolysis, plasma pyrolysis, production of Refuse Derived Fuel (RDF), also known as pelletization and sanitary landfilling/landfill gas recovery. Some of these methods are now being introduced in several parts of the country and they are discussed in brief below.

A. Land Filling: Land filling is the most popular method for waste disposal. Sanitary land filling – which requires the use of technology and effective monitoring – is rarely practiced in the country. On the other hand, waste is dumped in open, abandoned land, often close to water bodies leading to large scale contamination of surrounding land and ground water sources. As a large amount of dumping across the country happens on fallow land in surrounding villages, the village local authorities there is growing protest from locals and local bodies in several instances, have refused permission for dumping. Several conflicts have also erupted as villagers protest wide spread contamination of their land and water sources.

Apart from the health and environmental impact, land filling as a technique requires more and more land to be acquired to keep pace with the generation of urban waste. Landfills also release methane gas, which is more potent than carbon dioxide, thus contributing to global warming. It is important therefore to reduce the emission through composting, recycling and reduction of waste generation. Thus, where land filling is inevitable, it must ensure leachate control and bio-gas utilization to ensure sanitary land filling at its optimum.

Sanitary landfill sites in India: The Municipal Solid Waste (Management and Handling) Rules 2000 requires municipalities to comply with sanitary land filling norms prescribed by the state pollution control boards and build facilities with a lifespan of 20 to 30 years. Until recently, all cities and towns disposed waste unscientifically in low lying areas or the lands designated for the purpose within or outside the city. In most cities, even today, the waste is dumped without being covered to prevent the foul smell and there are no efforts at preventing pollution. Of late four sanitary landfill sites have been constructed at Surat (Gujarat), Pune (Maharashtra), Puttur and Karwar (Karnataka). A few more sites are under construction. As construction of sanitary landfills is quite expensive and needs professional management, siting of regional facilities is, therefore, being actively considered in India in some states of West Bengal, Gujarat, Rajasthan, etc.

B. Composting: Composting as a method of effective disposal of organic waste is practiced in a few select areas. Composting is the decomposition of organic matter by microorganism in warm, moist, aerobic and anaerobic environment. This method is simple, effective, low cost and the compost generated can be sold to farmers in surrounding areas. In March 2003, the Ministry of Urban Development appointed an inter-ministerial task force on using city compost for plant nutrient management, in accordance with court orders. Its 2005 report has been accepted by the ministry and, in September 2006, the court also ordered its implementation with immediate effect. It recommended the setting up 1,000 composting plants based on garbage in cities across the country.

Vermi-composting is the natural organic manure produced from the excreta of earthworms fed on scientifically semi-decomposed organic waste. It requires less mechanization, is easy to operate but it requires careful handling to ensure toxic material does not enter the chain which could kill the earthworms. Only a few small towns in the country are practicing vermi-composting while some large cities have aerobic compost plants of a larger capacity. But many of these plants are functioning much below installed capacity.

C. Waste to Energy: An alternative is converting waste to energy—burning garbage to produce electricity. It involves large capital investment and several government subsidies are on offer to encourage businesses from taking up WTE projects. The Ministry of Non-conventional Energy has been promoting waste-to-energy projects through two schemes-(a) National programme on energy recovery from urban and industrial wastes and (b) UNDP/GEF-assisted project on development of high-rate biomethanation processes.[6] Only four WTE (biomenthanation) plants have been set

[6] Lalitha Rao, India gets serious on waste to energy, accessed at: http://www.projectsmonitor.com/NEWPROJECTS/india-gets-serious-on-waste-to-energy.

up in the country – one each in Hyderabad, Vijayawada, Lucknow and Delhi. The Delhi plant was forced to shut down soon after it was commissioned and the lucknow plant was never operational. The viability of WTE projects are largely determined by the quantum of investment, scale of operation and the availability of quality waste.

There are several waste to energy technologies such as the Anaerobic Digestion and Biomenthanation, RDF or pelletization, incinerators and pyrolysis gasification processes. A bio-menthanation plant is functioning at Vijayawada but the scale of operations is limited. RDF or pelletization plants are in their early stages of experimentation in the country. The Department of Science and Technology (DST) had set up a demonstration plant at the Deonar Dump Yard of the Mumbai Municipal Corporation. Fuel pellets produced in the demo plant were found to have a calorific value consistently in excess of 3000 k cal per kg and the fuel was test marketed around Rs 1000 per tonne in and around Mumbai. The technology was then transferred to M/s. Selco International Limited, Hyderabad and M/s. Sriram Energy Systems Ltd. for scaling up and commercial operation.[7]

Pyrolysis gasification process produces fuel gas/fuel oil, which replace fossil fuels and compared to incineration, atmospheric pollution can be controlled at the plant level. It is a capital and energy intensive process and net energy recovery may suffer in case of wastes with excessive moisture and inert content. Concentration of toxic/hazardous matter in gasifier ash needs care in handling and disposal. It is an emerging technology for MSW and no plants have yet been set up in India.

Incineration is another method to convert waste to innocuous material, with energy recovery. Incinerators however are severely polluting and release dioxins, a human carcinogen. Incinerators also require a highly specialised hazardous-waste landfill to contain the toxic ash generated. Typically, an incinerator produces around one tonne of toxic ash for every three tonnes of garbage burned. An incinerator capable of generating 3.75 MW power from 300 TPD MSW was installed at Timarpur, Delhi in the year 1987. It could not operate successfully due to low net calorific value of MSW. The plant is lying idle and the investment is wasted.[8]

IV Government efforts to improve Municipal Solid Waste Management

The earliest known Committee to study solid waste management was set up by the Ministry of Health and Family Planning. The Committee on Urban Waste constituted in 1972 under the Chairmanship of Mr. B. Sivaraman, (Vice-Chairman, National Commission on Agriculture) sought detailed information from various urban local bodies and also visited South-East Asian countries to study best practices in SWM. The report submitted in 1975 made recommendations on various aspects of collection, transportation, composting and disposal. The report also gives a comparative

[7] P.U. Asnani, Solid Waste Management, India Infrastructure Report, 2006 accessed at: http://www.iitk.ac.in/3inetwork/html/reports/IIR2006/Solid_Waste.pdf.

[8] Report of the Regional Centre for Urban and Environmental Studies, Lucknow, 'Solid Waste Management in Agra: Detailed project report', accessed at: http://localbodies.up.nic.in/Doc181209/DPRs/SWM%20-%20Agra.pdf.

assessment of the Municipal Acts in some of the states and urban centers and brings out the need for enacting model legislation.

As a result of this report, a central scheme on Solid Waste disposal was initiated in the year 1975 during the fifth plan period. The scheme involved provision of grants for efficient collection and transportation and for construction of compost plants. The Ministry of Agriculture provided capital subsidy to the extent of 33% of capital cost of the plants and the remaining cost was to be borne by the local bodies either from their own resources or through loans from the nationalized banks. The Ministry of Works and Housing was to provide financial assistance to the Municipal authority to improve collection and transportation. This scheme was primarily aimed at cities with more than 3 lakh population so as to enable efficient collection and transport of waste and compost of organic matter in mechanical composting plants. About 10 mechanical composting plants were set up during the 5th plan period under this scheme. However, majority of them have since closed for various reasons and presently only one of these plants is in operation at Delhi.

Following the outbreak of plague in Surat in September 1994, the Government of India appointed a committee in October 1994 with Prof. J.S. Bajaj, Planning Commission Member as its Chairman. The committee submitted its report on Urban Solid Waste Management in India in September 1995 giving a long term strategy and detailed recommendations on all aspects of solid waste management.

In 1995, a National Workshop was jointly sponsored by Ministry of Health and Family Welfare and CPHEEO to discuss improvements to Solid Waste Management as a priority. The World Bank in collaboration with MoEF and MoUD jointly sponsored a study by NEERI which provided a road map for immediate, short and long term goals in a report submitted in 1996.

The biggest impetus for change and action on the SWM front occurred in 1996, when a public interest litigation was filed in the Supreme Court of India to direct the State and Central Government as well as the local bodies to improve the Municipal Solid Waste Management practices. The Burman Committee appointed by the Supreme Court for Class-I cities reviewed all aspects of the problem and made several recommendations in its final report submitted in March 1999. The committee authorized the Government to exercise the powers under the Environment (Protection) Act of 1986 and also recommended the constitution of a technology mission for improving SWM practices in the country within five years.

Following the recommendations of the Committee, the Ministry of Urban Development, in August 1999, constituted an Advisory Group on Solid Waste Management to collect information on various proven technologies for processing & disposal of wastes, identifying appropriate and cost effective technologies suitable to Indian conditions, and to suggest any pilot projects, if necessary and to provide technical guidance to the State Governments and Urban Local Bodies for adopting and suggesting feasible technologies. It was also entrusted with work of identifying training needs, developing mechanisms to meet the training needs and to designate institutions in states/regions as resource centers for providing such training.

Based on the recommendations of the various committees and of the Supreme Court Committee, the Ministry of Environment & Forests promulgated the Municipal Solid Waste (Management & Handling) Rules, 2000 under the Environment (Protection) Act of 1986. The Rules provide detailed guidelines on various aspects of Solid Waste Management and identifies the Central Pollution Control Board as the nodal agency to monitor its implementation directly in the Union territories and in the case of the States, through State Pollution Control Boards. With a view to provide proper guidance to the local bodies in managing their solid waste, the Central Pollution Control Board has proposed to set up model facilities which will also provide the requisite guidance and expertise to the municipal agencies.

Thus, in the past decade, there has been a gradual progress in the government action at various levels with regard to MSW. The complexity of the problem demands a more rapid response on all fronts. More importantly, as we discuss in the next section, it requires a reframing of the waste management problem from a workers perspective and a sustainable environment perspective. Waste management needs to be viewed by the government as an opportunity to create and sustain livelihoods of the poor.

V. Law and Policy Framework

The livelihoods of waste pickers and recyclers enmesh seamlessly with both the formal structure of municipal waste collection/disposal and the informal recycling industry. We examine here the law and policy framework governing both the formal and informal sector. Though the entire focus of this study is on livelihoods in the recycling industry, we examine briefly some of the emerging changes to the sector (primarily through law and policy interventions) that have a direct impact on livelihoods. For instance, the introduction of the incinerator technology may well mean the poor recovery of recyclables with an adverse impact on the recycling industry.

It is only appropriate to pause here, briefly, to discuss the informal sector in India and contextualize the situation of waste pickers within it. Of the total employment of 458 million in the country, the unorganised or informal sector constituted 395 million. Within the agricultural sector 65 percent of workers were self-employed (around 166.2 million) whilst in the non-agricultural sector nearly 63 percent (92.1 million) were self-employed. Thus, a majority of the workers in the unorganised are in the category of ‘self-employed workers’ - a largely uncharted territory in government policy and law making. The waste pickers are a part of this large and rapidly expanding category of workers in the country. Studies on the entire sector and the workers are few[9] and hence it is difficult to draw up a comprehensive overview for the entire country.

Waste pickers are self-employed workers and the Unorganised Workers Social Security Act, 2008 defines a self-employed worker thus: 2 (k) "self-employed worker" means “any person who is not employed by an employer, but engages himself or herself in any occupation in the unorganised sector subject to a monthly

[9] Until the 1990s, waste picking was viewed as scavenging and not as ‘work’ undertaken on a regular basis. Perhaps the first study quantifying ‘waste picking’ as ‘work’ was commissioned by the ILO in 2000-01 in collaboration with SNDT’s Women’s University in Pune and KKPKP.

earning of an amount as may be notified by the Central Government or the State Government from time to time or holds cultivable land subject to such ceiling as may be notified by the State Government." A new category of workers have emerged in certain cities like Pune and Delhi, where the workers have formed worker cooperatives to bid for door-to-door collection contracts put out by the municipalities. These workers are entitled to wages as regular workers but retain their traditional claims over the waste that is sorted and collected by them, thus retaining their 'self-employed' status.

A. Formal Sector:

Door-to door collection of waste is only a decade old in the country. Prior to this new method in waste management, waste in cities was dumped in large bins in residential areas and cleared at regular intervals by the Municipality. 'Municipal Solid Waste Management' is the responsibility of the Municipality or the local body. Entry 6 of List II (or the 'State List') to the Seventh Schedule of the Indian Constitution, vests in state governments powers over "public health and sanitation". Though an onerous task, most states have not set up a separate department to deal with waste management and continue to undertake waste management activities through the health department. Besides, over the years, the local bodies/municipalities have not revamped their methods, infrastructure and budget to meet the growing demands of waste generation and land filling. Unable to cope, several municipalities in large metros[10] have only now resorted to partial privatization, where certain wards have been contracted to private actors for door-to-door collection of waste. Thus, the only evident shift has been the contracting out of waste collection and transportation to third parties, while earlier the work was carried out by municipal workers employed by the municipality. Even the law and policy framework is archaic, with changes occurring only in the last decade.

Noteworthy among the changes in the area of municipal solid waste management is the notification of the Municipal Solid Waste (Management and Handling) Rules, 2000. Additionally, the 74th amendment to the Indian constitution creates three tiers of Urban Local Bodies:

i) Municipal Corporations
ii) Municipalities
iii) Transition areas; such as Nagar panchayats and town panchayats

The country has nearly 4378 municipal authorities. These authorities are responsible-under the respective state laws and the Municipal Solid Waste (Management & Handling) Rules, 2000 for managing municipal solid waste in an appropriate manner.

Policy Framework:
At the level of policy, more recently, the National Environment Policy, 2006 attempts to integrate the waste pickers into the waste collection system when it states, "Give legal recognition to, and strengthen the informal sector systems of collection and

[10] Ahmedabad, Bangalore, Calcutta, Chennai, Delhi are a few of the metros that have resorted to partial privatization.

recycling of various materials. In particular enhance their access to institutional finance and relevant technologies"[11]

MSW policy at ULB level: At the ULB level, each Municipal Corporation has taken the initiative to provide for MSW. It would be important to examine the rules and guidelines set out by local ULBs with regard to each State. Some instances of policy, rules and guideline may be cited here:

a) The Karnataka Government has a policy statement on SWM (for details see below the section on case studies) and has also prepared technical manuals on (a) design and specifications of the tools and equipment for SWM and (b) treatment and landfill operations.
b) The Gujarat Government has passed a resolution to allot land to municipal corporations at 25 per cent of the market value and to smaller local bodies on a token lease rent for a period of 30 years for treatment and disposal of waste. Thus, 147 out of 149 cities and towns have been able to earmark appropriate land and these sites have been duly authorized by the state pollution control board for treatment and disposal of waste.
c) The Rajasthan Government has issued a policy document for solid waste management after a cabinet approval in the year 2001. This policy document outlines the manner in which private entrepreneurs would be selected for setting up waste to energy or waste to compost plants in the state, the type of facility that would be extended to them and the responsibilities that would be placed with them. The state government has set up a state level empowered committee under the chairmanship of Secretary, Local Self Government to recommend the proposals received for useful conversion of solid waste.

Legal Framework:
Indian Constitution and Solid Waste Management

The Indian Constitution provides the broad framework of powers and functions vested in different branches of the state. Article 243 (W) of the Constitution of India specifies the powers, authority and responsibility of the Municipalities. The Article provides for the State government to empower Municipalities to carry out the functions listed in the Twelfth Schedule of the Constitution. The functions that are relevant to the informal sector in solid waste management are entry 6: public health, sanitation conservancy and solid waste management; entry 8: protection of environment; entry 9: safeguarding the interests of weaker sections of society; and entry 11: urban poverty alleviation.

Several provisions in the Directive Principles of State Policy define the state's role in protecting the marginalized and weaker sections of society, ensuring better wages and the protection of the environment. Article 38 urges the State to secure a social order for the promotion of welfare of the people. It states – "(1) The State shall strive to promote the welfare of the people by securing and protecting as effectively as it may a social order in which justice, social, economic and political; shall inform all the institutions of the national life. (2) The State shall, in particular, strive to minimise the inequalities in income, and endeavour to eliminate inequalities in status, facilities and

[11] Section 5.2.8 Part (iii) Action Plan E.

opportunities, not only amongst individuals but also groups of people residing in different areas or engaged
in different vocations.

Likewise Article 39 maps the principles of policy to be adopted by states. These are: (a) direct its policy towards securing that the citizens, men and women equally, have the right to an adequate means of livelihood; (b)that ownership and control of the material resources of the community are so distributed as best to subserve the common good; (c) that the operation of the economic system does not result in the concentration of wealth and means of production to the common detriment; (d) that there is equal pay for equal work for both men and women; (e) that the health and strength of workers, men and women, and the tender age of children are not abused and that citizens are not forced by economic necessity to enter a vocations unsuited to their age or strength; (f) that children are given opportunities and facilities to develop in a healthy manner and in conditions of freedom and dignity and that childhood and youth are protected against exploitation and against moral and material abandonment. All of these have a bearing in formulating policy for the waste pickers.

Article 41 requires that the State within the limits of its economic capacity and development, make effective provision for securing the right to work, to education and to public assistance in cases of unemployment, old age, sickness and disablement, and in other cases of undeserved want. Crucially, Article 43 prescribes that the state, secure to all workers a living wage. It states that the "State shall endeavour to secure, by suitable legislation or economic organization or in any other way, to all workers, agricultural industrial or otherwise, work, a living wage, conditions of work ensuring a decent standard of life and full enjoyment of leisure and social and cultural opportunities and, in particular, the State shall endeavour to promote cottage industries on an individual or co- operative basis in rural areas."

Article 47 imposes a duty on the state to improve the standard of living and public health of its people. The Constitution also imposes certain duties on citizens of the country. Article 51(A) of the Indian Constitution obliges every citizen to protect and improve the environment. This duty of the citizen has been reiterated in Municipal Solid Waste Management Rules, 2000 wherein citizens are required to segregate and dispose waste in the manner prescribed under the Rules.

Significantly, the courts have also expanded the understanding of certain provisions in keeping with changing times and have read into Article 21 the right to clean environment including the right to sanitation. The courts are however, yet to assert that Article 21 the right to livelihood, implicit within it is the right to waste, for waste pickers. We examine below some of the court rulings pertinent to the waste sector.

Supreme Court and Waste

The Supreme Court and the high courts have in several cases held that maintenance of health and preservation of sanitation falls within the purview of Article 21 of the Constitution as it adversely affects impacts health and life of citizens, in the event of default. It has therefore mandated municipal authorities to remove rubbish, filth, night soil or any noxious or offensive matter and to ensure their proper and scientific disposal.

Apart from the municipal authorities, the Pollution Boards also have a basic duty under the Environment (Protection) Act, 1986 to assist in the proper disposal of the waste. In *Virendar Gaur v. State of Haryana*[12] the Supreme Court has declared that right to life under Article 21 encompasses right to live with human dignity, quality of life, and decent environment. Thus, pollution free environment and proper sanitary condition in cities and towns is considered to be integral part of right to life. It is noteworthy that none of these cases mention the central and symbiotic relationship played by waste pickers and the recycling industry in ensuring a clean environment and recovering resources for reuse, thus contributing significantly to the larger objectives of the 'right to life' enshrined in the constitution.

The land mark case that drew attention to and changed the manner in which waste is handled in major cities is the ruling in the Almitra Patel case. A writ petition was filed by Almitra H. Patel regarding the management of solid waste disposal in four metropolitan cities—namely, Mumbai, Chennai, Calcutta and Delhi. It also referred to Bangalore, but the Court took up the case of National Capital Territory of Delhi. The Court by an order dated January 16, 1996 appointed a Committee headed by Mr. Asim Burman to look into the aspects of 'municipal solid waste management'. The Committee gave its report which was circulated to all the States. The pronouncement made by the Supreme Court in *Almitra H. Patel v. Union of India*[13] compelled the Central Government, the Ministry of Environment and Forest to notify the Municipal Solid Waste (Management and Handling) Rules, 2000.

The Almitra Patel case brought to fore the need for door-to-door collection of waste, segregation of waste at source as dry and wet, new and appropriate technologies for the handling of waste and final disposal. While it was a good first step in addressing serious concerns relating to waste management, regrettably, the focus of this petition was not on reducing and recycling waste with the concomitant directions to ensure penalties on large polluters and reward efforts to recycle with tax breaks and subsidies. It may well be the subject of another writ petition.

Legislative framework

Environmental laws

The Central Government has enacted laws to regulate many kinds of waste generated in the country. The wide range of wastes include household/municipal waste, bio-medical waste, e-waste, waste electronic & electrical equipment, waste from construction and demolition activities, waste from end of life cars, mining waste, waste from power plants, hazardous waste, waste from agriculture/forestry etc,. The Environment Protection Act (EPA), 1986 is the umbrella Act that pertains to management of solid waste in the country. Ministry of Environment and Forests has enacted rules under the EPA that would govern the management of all kinds of waste in India.

MoEF has enacted the following rules to deal with various waste products :

- Management and Handling of Municipal Solid Waste (2000),
- Management and Handling of Bio-Medical Waste (1998, amendment 2003),
- Management and Handling of Hazardous Waste (1989, amended in 2000 and

[12] 1995 (2) SCC 577.
[13] (1998)2 SCC 416.

2003),
- Recycled Plastics Manufacture and Usage Rules (1999),
- Notifications for the disposal of fly ash, and
- Management and Handling of batteries.

In addition, it has circulated draft guidelines for the management of e-waste (2007). However, no rules/ guidelines exist in India for the disposal of the following kinds of waste: (a) construction and demolition activities; (b) end of life vehicles; (c) packaging (d) waste tyres (e) agriculture/ forestry (f) waste electrical and electronic items and (g) mining waste.[14]

The focus of this study is municipal solid waste. Municipalities are required by the respective municipal laws to handle and manage solid waste. The *Municipal Solid Waste (Management and Handling) Rules* passed in January 2000 under the Environment Protection Act, 1986 by the Ministry of Environment and Forests of the Government of India, after directions from the Supreme Court of India in the *Almitra Patel* case,[15] mandated a comprehensive policy for collecting, handling and managing solid waste. The Rules direct the municipalities in 41 Class I municipalities to extend their mandatory responsibility (collection from common points) and undertake measures for door-step collection of waste and citizens education for source segregation. The rules also mandate the composting of organic waste. It clearly states that "biodegradable wastes shall be processed by composting, vermi-composting, anaerobic digestion or any other appropriate biological process for the stabilisation of wastes".

Although the Rules do not make a specific mention of waste pickers, they are explicit in offering a wide range of choices to the municipalities in the systems that they may want to adopt depending on local conditions. Contracting out the system of doorstep garbage collection, partly or fully, to both local and multinational operators is the more popular because it is widely believed that privatisation of garbage collection is cheaper and more efficient. Frequently, these measures displace waste-pickers as the contracting party now has direct control over the waste and its disposal. To complete our discussion on laws governing the formal sector of waste management, we look at the MSW Rules, 2000 and their implementation across the country.

Municipal Solid Waste (Management and Handling) Rules 2000

The Ministry of Environment and Forest notified Municipal Solid Waste (Management and Handling) Rules 2000 after widely circulating the draft rules in 1999 inviting objections and made it mandatory for all municipal authorities in the country, irrespective of their size and population, to implement the rules. Some salient features of the rules are:

1. Prohibit littering on the streets by ensuring storage of waste at source in two bins; one for biodegradable waste and another for recyclable material.
2. Primary collection of biodegradable and non-biodegradable waste from the doorstep, (including slums and squatter areas) at pre-informed timings on a day-to-day basis using containerized tricycle/handcarts/pick up vans.

[14] Comptroller and Auditor General Report, 2008.
[15] *Almitra Patel v. Union of India* (1998) (2) SCC 416.

3. Street sweeping covering all the residential and commercial areas on all the days of the year irrespective of Sundays and public holidays.
4. Abolition of open waste storage depots and provision of covered containers or closed body waste storage depots.
5. Transportation of waste in covered vehicles on a day to day basis.
6. Treatment of biodegradable waste using composting or waste to energy technologies meeting the standards laid down.
7. Minimize the waste going to the land fill and dispose of only rejects from the treatment plants and inert material at the landfills as per the standards laid down in the rules.

Interestingly, the Rules do not mention the crucial role played by the informal sector workers in the waste management model envisaged therein. On the contrary, the promotion of newer technologies such as incineration seek to displace waste pickers as the focus is on collecting high calorific waste to make incinerators a viable proposition.

Responsibility for Implementation

The entire responsibility of implementation of MSW Rules, as well as development of required infrastructure, vests with municipal authorities. They are required to obtain authorization from the state pollution control boards/committees for setting up waste processing and disposal facilities and furnish annual report of compliance. The secretary, Urban Development Department of the respective state government is responsible for the enforcement of the provisions in metropolitan cities. A District Magistrate or a Deputy Commissioner of the concerned district is responsible for the enforcement of these provisions within the territorial limit of his jurisdiction in other places. The state pollution control boards are expected to monitor the compliance of standards regarding ground water, ambient air, leacheate quality and the compost quality including incineration standards as specified in the rules.

Reviewing the actual implementation on the ground, the Comptroller and Auditor General's (CAG) Report of 2008 after conducting a sample survey on illegal dumping in 24 states in the country notes thus:

- "Only in 25 *per cent* of the states action had been taken by PCB/government for illegal dumping of waste. In the sample, only one case of imposition of penalty was seen in the last 5 years in West Bengal. In Kerala, penalty was levied in two sampled municipalities. In Karnataka, one case had been filed for unauthorised dumping of municipal solid waste. In Himachal Pradesh, notices were issued to municipalities for illegal dumping of waste and in Rajasthan, cases were filed in the courts for illegal collection of bio-medical waste by kabadis. In Madhya Pradesh, PCB filed court cases against 17 health care facilities for non-compliance of bio-medical waste rules.
- No cases of levy of penalty or the polluter being held responsible for cleaning up the damage caused to the environment as a result of improper disposal of wastes were found in 46 *per cent* of the sampled states. In 29 per cent of the sampled states, it could not be verified whether any penalty was levied or action taken by the PCBs for illegal dumping of waste, despite they being empowered to do so under EPA."

Thus, while there are Central Rules for the handling and management of Municipal Solid Waste, it is the State Municipal legislations that will determine the structure,

process and method that will enable compliance with the central rules. It must be noted here that the health department continues to be the pivotal agency for dealing with 'waste and sanitation' and there is no dedicated department in any state to deal exclusively with solid waste management and its growing complexity.

The Rules have a direct impact on the livelihoods of waste pickers. Those absorbed into the door-to-door collection process have benefited from the generators sorting their waste before discarding it. However, in cities where they have not been absorbed, their access to waste has reduced considerably as municipal workers (at times contract workers) now have first access at the generators door step. In these instances, traditional wastepickers are forced to collect from the secondary sorting sheds or landfills only.

Criminal Laws and the Waste Management

There are two major criminal laws dealing with solid waste management—(a) The Indian Penal Code, 1860; and (b) The Criminal Procedure Code, 1973.

a) The Indian Penal Code and Solid Waste Management

Solid waste is equated with 'public nuisance' under this Code enacted during the British times. The Indian Penal Code of 1860 has dealt with solid waste management under Chapter XIV 'of offences affecting the public health, safety, convenience, decency and morals'. Since, solid waste gives rise to various types of diseases and is dangerous to public health; it has been treated as 'public nuisance' and has been made punishable. But there is no direct section in the Code which deals with the problem of solid waste.

b) Provisions under the Criminal Procedure Code, 1973

Section 133 of the Criminal Procedure Code, 1973 deals with 'removal of nuisance' and empowers the Sub-Divisional Magistrate or any executive Magistrate, on receiving report/information, to order the removal of the public nuisance and desist from carrying any trade, business which is causing public nuisance. The Courts have used Section 133 Cr.P.C. widely to deal with the problem of solid waste management.

In the famous case of *Municipal Corporation, Ratlam v. Shri Vardhichand*[16] Justice Krishna Iyer declared that '…the guns of Section 133 go into action wherever there is public nuisance. The public power of the Magistrate under the Code is a public duty to the members of the public who are victims of the nuisance.' If the order is defied or ignored, Section 188, I.P.C. comes into penal play. It held that 'S. 133, Cr.P.C. read with the punitive temper of Section 188 I.P.C. makes the prohibitory act *a mandatory duty*.' The Court also pointed out that Article 47 of the Indian Constitution makes it imperative that 'steps are taken for the improvement of public health as amongst its primary duties.' Despite legal provisions, there is very little effort at implementation.

The issue of lack of implementation was brought up in Almitra Patel's case[17], where it was pointed out in the judgement in B.L Wadhera's case pertaining to solid waste management in New Delhi had not been complied with. One of the difficulties pointed out to the court was that even though the MCD and the NDMC Acts permit

[16] AIR (1980) 4 SCC 162.

[17] Almitra Patel v. Union of India, Judgement dated 15-02-2000.

action being taken, inter alia, against persons who litter the city, sufficient number of judicial magistrates are not available for ensuring proper enforcement of the provisions of the said Acts. The court opined that the shortage of "judicial magistrates can be easily overcome by the Government appointing suitable persons as Executive Magistrates under Section 20 or Special Executive Magistrates under Section 21 of the Code of Criminal Procedure who can be empowered to deal with such minor offences under the provisions of the MCD and NDMC Acts. There are large number of retired government officials and ex-defence officers who have held responsible posts and are living in Delhi who, we are sure, will be willing to act as such Magistrates." Despite efforts at evolving innovative solutions, the formal sector continues to struggle with effective implementation of the primary laws that govern the sector.

Laws pertaining to land fills

Land fills are considered a growing menace. On one hand, their lack of availability reduces the ability of the local body to effectively manage and dispose waste. On the other hand, unsanitary land filling adversely impacts health and the environment. Increasingly, it faces resistance from locals where the land fills are sited. Both these problems are rampant and myriad issues relating to landfills have been brought to court. Landfills, in several parts of the country, are the primary source for collection of waste by waste pickers. The location of these sites has a direct impact on the livelihood access of waste pickers.

Reviewing the situation in Delhi, the court in Almitra Patel's case[18] noted that the MCD despite orders in Dr. B.L. Wadehra's case had neither identified nor handed over sufficient number of sites for landfills. One of the reasons cited for the sites not being made available, was that land owning agencies like the DDA or the Government of National Capital Territory of Delhi were demanding market value of the land of more than rupees forty lacs per acre before the land could be transferred to MCD. The Supreme Court held that "It is the duty of all concerned to see that landfill sites are provided in the interest of public health. Providing of land fill sites is not a commercial venture, which is being undertaken by the MCD. It is as much the duty of the MCD as that of other authorities enumerated above to see that sufficient sites for landfills to meet the requirement of Delhi for next twenty years are provided. Not providing the same because the MCD is unable to pay an exorbitant amount is un-understandable. Landfill site has to be provided and it is wholly immaterial which Governmental agency or the local authority has to pay the price for it."

Contentious as the use of land for dumping waste, there has been several struggles and resistance to indiscriminate dumping by the locals. To cite an instance, in 2007, a division bench of the Kerala High Court[19] which had directed the municipal corporation to dump waste at Brahmapuram, had to also order police protection if faced with villagers' protests. Violent protests had erupted against the indiscriminate dumping. The court was examining a contempt petition against the municipality for not submitting a detailed plan for solid waste disposal in accordance with previous orders. Thus, land filling concerns are slowly snowballing into major controversies not merely from a public health and environment perspective but also from locational

[18] Almitra Patel v. Union of India, Judgement dated 15-02-2000.
[19] Dejo Kappan v. Corporation of Cochin & Another. W.P. (C) No. 26304 of 2006.

concerns over which land is more suited for land filling. Town planning and zoning laws need to be examined carefully in this context. The newer technologies, which have a direct impact by displacing waste pickers, have proved to be troublesome too.

New technology and the law

Waste-to-energy technology seeks to convert municipal solid waste to energy through either a thermochemical or biochemical process[20]. Waste to Energy technology has been actively promoted with government subsidies. However, WTE projects have run into rough weather and increasingly become the subject of much controversy. The SELCO plant in Hyderabad, the project in Lucknow and the Timarpur plant in Delhi are a case in point.

In her petition to the Supreme Court, Altmitra Patel demanded a stay on the subsidy to WTE plants and an independent review of such plants based on the experience in the Lucknow and Hyderabad plants. In 2005, the Supreme Court ordered the creation of a committee to study the performance of WTE plants. This 14-member committee was chaired by Dilip K Biswas, former chairperson of the Central Pollution Control Board.

The committee's report came out in December 2005. Two of its members submitted differing reports but both reports raised apprehensions about the WTE plants at Hyderabad and Vijaywada. The majority report justified the subsidy on WTE projects because "the operational problems of one plant should not form the basis to judge the efficacy of a particular technology option or for rejecting the technology as a whole". It attributed the closure of the Lucknow plant to its operation at low capacities for one year due to an ineffective garbage segregation system. The differing report says the reason cannot be established, because the plant shut down before monitoring started.

Several problems are identified with new technologies. It is found that nearly 70 per cent of the waste produced is wet organic matter has a low calorific value and is not conducive for the WTE plants. Incinerators' emissions contain dioxins, the most toxic of all human made substance. Based on a critical analysis of biological treatment, an MoEF white paper recommended composting over incineration: "The experiences of the incineration plant at Timarpur, Delhi, support the fact that thermal treatment of municipal solid waste is not feasible in situations where the waste has a low calorific value." Likewise, tThe committee appointed in 1998 by the Supreme Court says: "Calorific value of Indian waste is 800-1,000 kilo calories, which is very low. It is not suitable for incineration." (People who understand garbage incinerators say waste should have a minimum calorific value of 2,000 kcal for making WTE work.) It does not recommend incineration of garbage as it is not environmentally friendly and in particular, waste in the country has high ash and dust contents. Incineration technology also requires high capital costs (especially for emission control) and has high operation and maintenance costs.[21]

[20] The thermochemical techniques consist of combustion, gasification, and pyrolysis that produce high heat in fast reaction times. The biochemical processes consist of anaerobic digestion, hydrolysis, and fermentation using enzymes that produce low heat in slow reaction times. See: http://www.arch.hku.hk/research/BEER/waste.pdf.

[21] Unfit to Burn, Down to Earth report, Volume 15, March 2007.

Apart from the above, the workers within the formal sector are governed by labour laws. As nearly all waste pickers within the formal sector are contract workers, it is only appropriate that we discuss the labour law protections and concerns of waste pickers in the next section on the informal sector.

B. Informal Sector:

The first part of this section deals with the primary actors in the recycling pyramid – the waste pickers – who largely are a part of the informal sector but in rare instances have been employed within the formal sector by contractors of municipal door to door waste collection. The second part attempts to look at the law and policies impacting the waste chain – ranging from the local kabariwala to the waste recycler at the top - in the informal economy. This sector includes waste pickers, small kabaris (small middlemen), thiawalas or bhangarwalas (collectors) and big kabaris (larger middlemen).

The Recycling Pyramid

Reprocessors/Recyclers
(informal sector)

Big Kabaris/Wholesale Scrap Traders
(informal sector)

Small Kabaris/Retail Scrap Traders
(informal sector)

Itinerant Buyers
(informal sector)

Wastepickers
(informal/formal sector)

The entire workforce involved in the recycling process counts more than one lakh in number. As municipalities do not engage in sorting of waste, the informal economy recovers large amounts of recyclable waste contributing immensely to the economy in the long run. The collecting, sorting and recycling of waste provides income to thousands of people of the informal sector. They work in the streets, at dumpsites, landfills, transfer stations or at separation plants. The informal sector is an important actor in collecting, recycling and recovering recyclables and organic waste from households and businesses.

I. Law and Policy framework relating to Wastepickers in the Informal Sector

Waste pickers are a critical link in waste management and recycling. The relevance and the value of the work and their economic and social contribution to the town planners, municipalities and local communities is yet to be fully acknowledged by government, commercial and private interests that benefit from their work. The growth of trade unions and networks among waste pickers is a reflection of the growing visibility of waste pickers and the articulation of their right to be heard as stakeholders in the management of solid waste.

The quantification of their contribution in economic, environmental and social terms indicates its magnitude even at conservative estimates. The data given below are based on a formal study commissioned by the International Labour Organisation and undertaken by a team of researchers from the SNDT Women's University in 2000-2001[22].

- Collectively, waste-pickers salvage about 150 tonnes of recyclable scrap prior to its transportation, thereby saving the municipalities the sum of Rs.15822750 (Rs.16 million) per annum.
- By implication each wastepicker contributes Rs.246 worth of unpaid labour per month to the municipality.
- Each waste-picker and itinerant buyer, average earnings of Rs.60 and 75 per day, respectively. At conservative estimates this amounts to Rs.3,75,000 per day, in the primary transaction that takes place between the scrap collector and the local retail scrap store.
- Further value addition takes place as the scrap is sorted, graded and traded. The margins in trading vary between 10 and 40 per cent depending on the quality, quantity, market conditions and the terms of trade.
- The environmental benefits that are derived from the work done by waste-pickers would be difficult to quantify in economic terms.
- The annual contribution of scrap trade to the total income generated in Pune is approximately Rs.185 million.

Waste picking ranks lowest in the hierarchy of urban informal occupations and a large number of them are women and children. As stated earlier, the sector has a large number of unskilled persons, migrants, those lowest in the caste hierarchy, as they are unable to find any other kind of employment. Waste pickers are generally categorized as self-employed as the transaction between the waste pickers and the scrap traders is a sale purchase transaction. Whilst there is no specific labour legislation protecting the workers, a wide array of other laws impact waste pickers.

Child Labour

Child Labour (Prohibition and Regulation) Act, 1986 and the National Policy on Child Labour provide the framework for intervention on child labour issues. The above law prohibits employment of children in certain listed hazardous industries and provides regulation of employment of children in other industries. In 2001 waste picking was included in the schedule of hazardous occupations prohibited children being employed under the Child Labour (Prohibition and Regulation) Act, 1986.

Migrant workers

Migration brings with it certain vulnerability for workers. A lack of support system in a new city denies them the bargaining power and the ability to protect their basic rights. Migrant waste pickers face regular harassment from authorities in various states.

Conditions of Work

[22] Chikarmane.P, Deshpande.M, Narayan.L, "Report on Scrap Collectors, Traders and Recycling Enterprises in Pune", International Labour Organisation,Geneva, 2001.

Conditions of work for the average waste picker are appalling and they are exposed to several contaminants in the course of their work. Waste-pickers suffer from occupational hazards such as musculo-skeletal problems, respiratory and gastro-intestinal ailments. They also face regular harassment and extortion from both the police and the municipal authorities. No social security benefits are available to workers in this sector.[23] Work can be unpredictable and seasonal too. In fact, in 2002-03 the Pune Municipal Corporation became the first municipality in the country to institutionalise the Scheme for Medical Insurance for all Registered Waste-pickers in its jurisdiction. Since 2001 waste-picking has been included among the hazardous occupations prohibited for children under the Child Labour (Prohibition and Regulation) Act, 1986.

Exploitation by Scrap traders

The relationship between the waste picker and the trader is almost always exploitative. Most women waste pickers have no idea at what price the trader is reselling the products and have no bargaining power, vis a vis the traders. Further, as result of their lack of education and literacy, waste pickers are exploited at all turns – traders under weigh the waste products, count money inaccurately, or manipulate prices. Under-weighing of scrap, random cutting of weights, price manipulation, deferred payment of dues and abuses are some of the common exploitative practices. Scrap traders do not issue any receipts so there is no record of the transaction. Credit arrangements with the trader is a double edged sword – on the one hand it helps the worker tide over lean periods and emergencies (and a steady tied source of supply of scrap for the trader), it also results in the trader sourcing the material at highly exploitative rates.

Place of Work

Most of the waste pickers work at dump site, collecting and segregating waste. Several workers also walk for miles picking up waste in the hot sun or in rain. Those who work in dump sites work under extremely unhealthy and unhygienic conditions. No protective gear such as gloves, aprons or boots is available to the workers. They often have no access to drinking water or public toilets. Many carry the heavy load on their head or shoulders and others cycle or use a pushcart to transport their load. The workers thus engage in manual work which is physically taxing.

Occupational health

The occupational health problems of waste pickers are very many. Apart from all the health issues that arise from poverty (such as malnutrition, anemia, tuberculosis), the conditions of work put them at special risk. The waste bins and land fills are a breeding ground for bacteria and parasitic diseases are common among waste pickers. At times, they come in contact with medical waste resulting in infections and blood-poisoning. They are often bitten by dogs and rats, get injured by broken glass and ragged metal edges, leading to tetanus or burns caused handling acid or explosives in the garbage. Infections also result from contact with human and animal excreta, sputum and dead animals. They often suffer from skin or stomach infections and also other diseases like scabies, asthma and other respiratory infections, due to unhygienic

[23] Report of the Second National Commission on Labour, Government of India, 2002.

conditions of work. Long hours of work, carrying heavy loads, poor living conditions further add to their vulnerability. For women waste pickers' the laborious work regime often takes a toll on their health. They often suffer from acute anemia, miscarriages and other reproductive ailments.

The problem is acute because waste pickers are not protected by occupational health and safety measures. None were found to use any kind of protective gear like gum boots, plastic aprons, masks or gloves. Moreover, waste pickers do not come within the purview of any labour legislation. Hence they are not covered by social security schemes that provide health cover.

Harassment

Harassment at work is very common for the waste pickers. Women waste pickers face harassment from police or municipal workers. They are also ostracized by the society, people hesitate to offer them even a glass of water and are often treated as ill omen. The residents welfare committee and security personnel of middle class residential areas often see them as 'thieves' and treat them with suspicion.

II. Laws pertaining to the other livelihoods in the Recycling Industry

Waste collection is the primary task under taken by the waste picker; it is the beginning of the long chain in the recycling industry. The other actors in the cycle include the itinerant waste buyer, kabariwalas, retail scrap dealers, whole sale scrap dealers and finally the reprocessing or recycling units. Access to waste for recycling is at multiple points: directly from the generator, from dust bins, sorting sheds and landfills, the local kabariwala or itinerant buyer and retail traders. Waste for recycling includes paper, cardboard, metal, glass, plastic and e-waste. The waste flow surveys of various cities indicate that the recyclable waste is bought and sold across cities, making the recycling trade fluid between state and city boundaries. As the recycling sector is largely dominated by private actors, there is no regulation of prices paid down the commodity chain and is determined by the viability of the small or large recycling unit at the end of the chain.

Kabariwala /Local Waste Collection Centre/Retail Scrap traders

The waste collected is then sold to the Kabariwala or the local shop that buys recyclable material from households and the waste pickers. In some cities, the kabariwala also doubles up as a waste collector from individual households. Alternatively, s/he could buy from individuals that collect recyclables directly from households. Some of these traders are also based in slums and other poorer localities where the waste pickers live.

These local shops in residential areas are required to comply with the Shops and Establishments Act which lays down the hours of work per day and week, guidelines for leave, over time work, rest interval, opening and closing hours, holidays, employment of children and women, maternity leave, termination of service and maintenance of records. Although primarily dependant on family labour, they sometimes employ women and children in the job of sorting by the retailers. They buy, clean and sort a large variety of waste materials before selling them to the

wholesale traders. Waste pickers form an important source of primary waste and many of the retail traders have a fairly consistent buying arrangement with the waste pickers. At times the waste picker is bound to the retailer through credit arrangements that require a mutual give and take, thus ensuring a stable work arrangement.

Wholesale traders

The wholesale traders are the intermediaries between the recycling units and the waste collection centres. They specialize in single waste and supply to the recycling units. Though the wholesale traders buy secondary waste material from a large number of retailers and other sources, some degree of sorting and separation of waste occurs at this level, too. The investment in the business is relatively high but since they deal in bulk, the profits do not fluctuate drastically and income for the wholesale trader is fairly stable. Waste pickers rarely have direct access to the wholesale trader.

Small Recyclers

The small recycler separates materials such as paper and aluminium sold to factories to be recast. At times, the small recycler uses basic technology to produce cheap recycled materials.

Large Waste Recyclers

Large waste recyclers deal with certain types of plastics, HDPE, e-waste etc and have a wide network depending at times on inter state sources for raw material. Some even deal with imported waste. These large establishments are governed by laws applicable to large companies and pay duties and taxes accordingly. These large players are also a part of large trade associations and frequently lobby for government subsidies and entry barriers to prevent small and larger players in the business. These businesses operate primarily in the organised formal sector of factories and establishments.

Workers in recycling units are casual daily wage earners. A study[24] conducted in the city of Hyderabad showed that workers though on casual or contract employment worked with the same unit for many years. Nearly 40 per cent of the workers were women. The smallest unit could be those that employ less than 20 but the study found that large units could employ up to 150 workers. Wages ranged from Rs. 1,400-3000 per month for men whereas women earned anywhere between Rs. 900 to Rs.1,900. While the workers did not receive any benefits under the law, a yearly bonus and credit facilities were accorded to the workers. A few units were also found to have provided medical benefits as illness such as chest pain, back pain and respiratory illness were found to be prevalent. The occupational hazards of working in these industries has not been intensely studied and documented.

The legislations that impact the informal recycling sector vary and along the commodity chain some of these would apply. For the most part, at the lower end of the chain, licences and permits and the Shops and Establishments Act are relevant. At

[24] S. Galab, S.Sudhakar Reddy and Isa Baud, 'Reuse, Recovery and Recycling of Urban Inorganic Solid Waste in Hyderabad' *in Solid Waste Management and Recycling: Actors, Partnerships and Policies in Hyderabad, Indian and Nairobi, Kenya*, (Isa Baud, Johan Post and Christine Furedy, Kluwer Academic Publishers, 2004).

the top end, some of these would apply: Industrial Disputes Act; Consumer Protection Act; Weights and Measurements Act; Standards set by BIS; labour legislations such as Minimum Wages, Factories Act, ESI, Bonus, Gratuity, Provident Fund , Shops and Establishments Act and tax legislations such as Sales tax, Professional tax, Entry tax, VAT, etc.

As the recycling industry is largely unregulated within conventional legal framework all levels of the commodity chain face harassment from the police and municipal authorities. They also regularly pay large sums of money in bribes to them. Better institutionalisation of the waste and recycling trade would bring it into the framework of legality. Recognition of the waste networks would enable more efficient functioning of the industry.

We now briefly, focus on issues that have a direct impact on the livelihood of the waste pickers. The 'right to waste' – a legal issue slowly emerging as livelihoods are directly linked to access to waste. We also look at finances and privatisation efforts in the formal sector to highlight the changing trends in waste management.

VIII. Finances

It is estimated that the municipal authorities spend nearly 5 to 25 per cent of their budget on SWM**.** However, there is no commensurate financial budgeting to collect the amounts from the generators of waste, leading to large deficits. The inadequate resources adversely impacts forward planning and adoption of innovative methods to handle waste across the country. Municipalities have tried to overcome this hurdle by encouraging demands for greater private participation to handle the financial crisis.

As waste collection work is labour intensive, approximately 90 per cent of the expenditure is incurred on labour and the remaining on capital expenditure and on operation and maintenance. In the case of transportation, expenditure on manpower still accounts for more that 50% of the total cost while O&M followed by capital expenditure form a comparatively significant proportion of total cost. Presently disposal is mainly through landfilling where after the initial cost, major expenditure item relates to O & M (more than 70 per cent) followed by labour and a very small proportion as capital cost.[25]

In the absence of regulation to aid in increasing finances, it is imperative that innovative models of revenue generation such as polluter pays, tax breaks, incentives, extended producer liability be experimented with. The Eleventh Planning Commission report notes that the 12th Finance Commission will provide for devolution of central grants to the urban local bodies for sanitation purposes.

IX. Privatisation

Private sector participation in SWM has been actively encouraged in the last decade in several urban local bodies. The scope of the participation however, is restricted largely to awarding contracts for door-to-door collection of waste, street sweeping, composting of waste, transportation of waste and storage in depots/dust bins. There

[25] World bank Report, See note 1 above.

have been a few experiments to set up treatment facilities for the final disposal of waste with or without financial participation of the urban local body.

In the privatization models, the workers employed (Safai karamcharis or Pourakarmikas) are contract workers. The provisions of Contract Labour (Regulation and Abolition) Act 1970 prohibit the contracting out of the services already being provided by the urban local bodies. Several urban local bodies have sought exemptions from the respective state governments for engaging contractors for providing SWM services or even privatizing those services. Private sector participation should generally be considered in those areas where Municipal Corporations or municipalities are not providing the service.

Different privatization models have been adopted by different cities in awarding private contracts.[26] For the most part, cities award contracts for door to door collection of waste and transportation of waste from the temporary waste storage depots through contractor's labour and vehicles. Tenders are invited and the lowest bidder given the contract for door-to-door collection or transportation of waste. Payments are made on the number of trips or per metric tonne basis, restricting the total tonnage per truck and having a penalty provision for failure to perform or delay in clearance of bins. We note here some variations:

(a) In certain cities, for instance Surat, contracts are awarded for night cleaning of major roads. Rate per square metre is fixed for making the roads litter and dust free.

(b) Hyderabad city has introduced a contractual system of street cleaning as well as transportation of waste where the city is divided into operational groups and contract is given keeping in view the quantities of waste generating in that area under normal circumstances. The contractors are paid fixed monthly amount for the area allotted to them.

(c) Several cities (Mumbai, Bhopal, Bangalore, Thane, Ahmedabad) have entered into a contractual arrangement with private sector for setting up compost plants themselves or through a franchisee where either the private sector or its franchisee invest money and the local body provides assured quantity of garbage at the processing plant without levying any changes. The private sector pays some royalty to local body and undertakes all the responsibility of managing the waste and its conversion into compost at its own cost. The land is given to the private sector on a nominal lease rent for a long term of 15 - 30 years.

(e) The State Government of Tamil Nadu has exempted the Chennai Municipal Corporation from the purview of contract labour (Regulation & Abolition) Act 1970 vide its order No. 40 MS No. 99 dated 8th July 1999 allowing the municipal corporation to engage contract labour for sweeping and scavenging activities. The private sector participation has been operationalised in one zone of the city since 5th March, 2000. Chennai is the first city in India to contract out MSWM services to a foreign agency. International tenders were called for and a contract signed with

[26] Accessed at http://urbanindia.nic.in/moud/publicinfo/swm/chap20.pdf

ONYX. The scope of the project includes activities such as sweeping, collection, storing, transporting of MSW and creating public awareness on MSWM.

X. Right to 'Waste'

Collection, transportation and disposal of waste is a function vested primarily with the local bodies. With time, however, a new category of workers have helped clean and recover waste for the municipality and these are the waste pickers. Rarely has their contribution to a sustainable and effective waste management system been recorded or accounted for by the system.

The quality of the waste has slowly transformed over the years and with it the value of the waste being collected for recycling. In recent years, products like e-waste bring to fore the value literally embedded in the waste being collected. This debate is bound to get polarised with the greater participation of private contractors in the near future. The Chintan study on privatization demonstrates that the contracts contain clauses that vest ownership in private actors. To quote from the study, specific to the Municipal Corporation of Delhi, it lists some of the important clauses in the contract:

- "The private contractor is paid for the waste collected by weight.
- The ownership of the recyclable waste lies with the contracting company.
- The private contractors have the right to manage the dhalaos as their own spaces, with rights to advertise on the walls and to fence off the waste dumped there.
- Additional spaces to store the segregated dry waste will be allocated to the contractors during the 8 year contract period. The contractor is expected to segregate waste in a graded manner over time."[27]

Thus, privatization has the potential to cut off the access to waste of traditional waste pickers. A new class of contractors and waste sorters are likely to be employed by the private actors, with no effort at absorbing the existing communities that work in this trade.

Though not legally contested, the fact that waste pickers are harassed in accessing and collecting waste and at times required to pay a bribe to the municipal authorities/contractor and the police, implies an ostensible government 'ownership' over the waste, once the generator parts with it. However, in the absence of legal claims to the contrary, the waste generator ought to be a public good, freely accessible to the waste pickers. Their claim to the waste needs to be strengthened as their efforts not only help them eke a livelihood; they help recover the recyclable resources thus contributing to an environmentally sustainable waste management model.

[27] Chintan Report, The Impact of Privatization of Solid Waste Collection and Transportation in Delhi : The Impact on the informal Recycling Sector, accessed at : http://www.chintan-india.org/others/ChintanPrivatizationPaper.doc.

VI. Case Studies

A. Bangalore City

i. Overview of SWM

Bangalore generates nearly 3613 tonnes of municipal solid waste per day. These statistics include bulk waste, construction debris and bio-medical waste. As per the TIDE quantification survey of 2001, they estimate that the average waste generation rate per capita is 0.27 kg per day, based on a population of 5.6 million people (including Greater Bangalore). Of the 1450 tonnes collected for recycling in Bangalore, 1077.8 tonnes come from intermediaries, 60.4 from 'itinerant waste buyers' and 312 tonnes come from waste pickers. The recyclable waste amount to 40 % of the total waste (i.e., 3613 tonnes per day) generated[28].

The core city of Bangalore is administered by the Bangalore Mahanagara Palike (City Corporation) which is the principal municipal provider. The core area is approximately 226 sq. kms while the entire city of Bangalore extends to approximately 531 sq. km[29]. The BMP manages nearly 40 % of the waste management in house employing its own staff, resources and infrastructure. The rest is contracted out to private companies and contractors who render the services.

Two Departments – the Health Department and the Engineering Department are responsible for waste management, The Health Department is primarily responsible for collection, street sweeping, transportation and disposal of municipal waste. The Engineering Department is responsible for the removal of construction and demolition waste and provides technical and infrastructural support to the Health Department.

The city has been divided into administrative units and the smallest unit is the Health Ward. (2 or 3 health wards combine to form a political ward.) The City has 100 administrative wards, divided into smaller units - 294 Health wards - for better management. Of these, 147 Health wards including two markets are under private contract system of cleanliness. The remaining 128 Health wards are managed through Pourakarmikas of the Corporation. Three or four wards combine to form a Range. There are 30 such Ranges in Bangalore which are grouped into three zones – Bangalore South, East and West.

The waste generated from the households is mostly organic in nature with some of recyclable material like paper, plastics, glass, leather, cloth and HHW. Presently, the household waste is either put into the community collection bins or is dumped along the road side or is disposed off by burning. The municipal contractors assigned to the area come and collect the waste once in a day or in some cases once in a week. The waste collected from all such locations of the town or city will be disposed on to open land just outskirts of the town/city.

A survey of municipal solid waste revealed that approximately 4500 MT/day of municipal solid waste excluding industrial waste and construction/ demolition waste

[28] T.V. Ramachandra, pg. 162.

[29] Integrated Sustainable Waste Management in Bangalore, India Lessons learnt from the UWEP programme WASTE, December 2004 at page 14.

is produced each day in the Bangalore city during year 2006. This equates to an average waste generation rate per capita of 0.27 kg/day. The major constituents of municipal solid waste in bangalore are organic matter/putrescible waste. Typically this comprises 74% of the municipal waste stream. The proportion of organic matter/putrescible waste is source-dependent ranging from approximately 16% of waste from commercial premises to 90% for market waste and street sweeping waste.

ii. Administrative set up - Bangalore

Organisational Chart for the Health Department, BMP

Chief Health Officer

Health Officer (3 Zones) Officer	Health Officer	Health
Deputy Health Officer (2 per Zone)	2 DHO	2 DHO
Medical Officer of Health (MOH – 17 Ranges)	MOH	MOH
Senior Health Inspector (100 admin Wards – 1 SHI per Ward)	SHI	SHI
Junior Health Inspector (2 JHI per ward)	JHI	JHI
Sanitary Dafedar (SD)	SD	SD
Pourakarmikas	PK	PK

The most common method of collection in Bangalore city is door-to-door collection, followed by community bin collection. In 2003, the door-to-door collection method was implemented in 60 health wards. A large quantity of organic waste is generated from 12 commercial vegetable markets. This waste is collected using separate trucks every morning and evening. The waste collected in pushcarts from lanes is transferred to a truck at a meeting point called a synchronisation point. The truck arrives at the designated point at a specified time and place. The waste is transported to the disposal site by means of a large capacity tipper truck, and in a few wards by a small capacity tipper truck or dumper placers. The truck is covered with a mesh and a polythene sheet to prevent scattering. Currently, Bangalore city has no transfer stations for intermediate storage of waste and intermediate segregation of waste.[30]

iii. Law and Policy

[30] T.V. Ramachandra and Shruti Bachamanda, Environmental Audit in Municipal Solid Waste Management, *Int. J .Environmental Technology and Management, Vol. 7, Nos. 3/4, 2007.*

Karnataka State Policy on MSWM

The Karnataka Urban Infrastructure Development Corporation (KUIDFC) has put in place a policy statement for Municipal Solid Waste Management. The policy states that goal of effective MSWM services is to protect public health, the environment and natural resources (water, land, air). Glaringly absent from the text is the crucial need to protect livelihoods dependent on Waste.

The stated objectives of the State Municipal Solid Waste Management Policy Plan are threefold – (a) Provide directions for carrying out the waste management activities (collection, transportation, treatment and disposal) in a manner that is environmentally, socially and financially sustainable. It should also be economically viable. (b) Establishing an integrated and self-contained operating framework for MWSM through the development of appropriate means and technologies to handle various waste management activities. (d) Enhancing the ability of ULBs to provide effective waste management services to their citizens.

Laying down the normative standards for collection, storage and transportation, it states that Pourakarmikas should also collect recyclable waste if the dwellers prefer to deliver to PKs for centralized collection. It further states that recyclables shall be delivered to a separate transport system using existing vehicles like tippers and tractor-trailers at pre-determined time schedules. It also lays down specific guidelines for collection of recyclable waste from households.

Recyclable waste collection – from houses:

- Periodical collection on scheduled days and at a specific time – once/twice in a week in a cyclic system during or after commercial waste collection.
- Duration of collection – 2 hours.
- Waste so collected would be delivered to a specified collector of recyclable waste.
- In the absence of an established collection system by the recycling operators, the ULB is to store at the disposal site and make arrangements for recycling agencies to collect the waste.

The document contains no reference to waste pickers or the recycling industry which is crucial to an effective and sustainable waste management system.

Municipal Laws

According to section 58 of the Karnataka Municipal Corporations Act 1976 the collection, removal, treatment and disposal of waste generated in the city is one of the obligatory functions of the corporation.

The Bangalore Hotels Associations had challenged the notification of BBMP issued in 2007 which levied Re one cess per kg for solid waste collected from the hoteliers in Bangalore. The amount levied by the BBMP varied from Rs 1000 to Rs 5000, the petitioners argued. According to Rule 19 (A) of the KMC Act, the maximum cess that can be collected by the owners and occupants of the Bangalore is Rs 600 per month.

However, Bruhat Bangalore Mahanagara Palike is collecting a huge amount, which is not permissible under the KMC Act, the petitioners pointed out.

The High Court directed the Bruhat Bangalore Mahanagara Palike (BBMP) to collect solid waste management cess from the hoteliers in Bangalore within the purview of rule 19(A) of the Karnataka Municipal Corporation Act (KMC), 1976. While disposing the petition filed by the Bangalore Hotels Associations and other hoteliers, Justice Ravi Mallimath observed that BBMP should strictly follow the procedure of KMC Act, while collecting waste management cess from the hoteliers.

Environmental Laws

The Karnataka Pollution Control Board keeps a check on all the activities that have the potential to pollute the environment, which includes the monitoring of the MSWM in the state. It reviews the Environmental Impact Assessment carried out by the agencies prior to the construction of a landfill site, installation of an incinerator or any other processing plant. It carries out public participation meetings to make the public aware of the proposed project and its benefits.

Labour Laws

The Municipalities Act specifies that pourakarmikas should be paid a monthly salary of Rs 2,400 and also be provided with rubber gloves and gumboots. They should be given free and regular health check-ups. For those employed by contractors, the tender documents require strict compliance with the labour protections. However, in reality, the labour protections are barely complied with. The contracted pourakarmikas sweeping the streets and cleaning the garbage dumps in Bangalore receive a meager pay of between Rs 1000 and 1500. They are not assured any guaranteed wages though the minimum wage is fixed at Rs. 1800. They suffer from several lung and other diseases as a result of poor working conditions.

B. Pune City

i. Overview of SWM

Pune city has a population density of 10,412 per square kilometre as per the 2001 census. However, Pune has a lower gross population density when compared to other peer group
cities like Ahmedabad, Chennai, Bangalore and Hyderabad.

The sectors that are vibrant in Pune today are auto, auto components, forgings, mechanical components; food processing and service industries like IT and IT enabled services. The city serves as the regional wholesale market for food grains and other commodities. It also serves as the market centre for agricultural produce such as green peas, wheat, rice, pulses, oilseeds, maize, etc., which are cultivated in the rural hinterland. Pune also functions as a distributing centre for agricultural implements, fertilizers, drugs and medicines, iron and steel, cement and minerals, petroleum products and forest produces such as timber, and readymade garments and textiles.

The study excludes medical waste, construction and demolition waste, industrial waste and hazardous waste. The jurisdiction of the Pune Municipal Corporation will constitute the *spatial boundary* of the study.

The PMC is the statutory local government authority responsible for providing solid waste services in Pune. Established in 1950, PMC is governed by the Bombay Provincial Municipal Corporation (BPMC) Act, 1949. As per this Act, PMC is obligated to provide basic infrastructure like water supply, drainage, sewerage, and roads and services such as conservancy, fire fighting, streetlights, education and primary health.

The administrative wing of PMC is divided into 14 wards, each headed by a ward officer. The total strength of officers and employees at PMC is about 16,731, as against the approved employment level of about 17,986.

The solid waste management system for Pune is subdivided into the five stages viz. (1) Waste Generation; (2) Primary Collection; (3) Secondary Collection and Transport; (4) Tertiary Collection and Transfer; and (5) disposal. The process in which the materials flow through the system will be discussed below.

Waste Generation (1) takes place at households or businesses. In addition, roads are also scheduled under waste generators because the road sweepings are also deposited in the containers that are collected by the PMC. Two activities make up Primary Collection (2): (a) Itinerant Waste Buyers (IWBs), who go door to door to collect recyclables; (b) Authorized Waste Pickers (AWPs) Service Providers, who also go door to door to collect recyclables as well as organic waste. The IWBs and AWPs bring the recyclable materials directly to scrap traders in the city. In addition, some commercial establishments also bring recyclable materials directly to the scrap traders, and organics to farms and piggeries.

The materials that remain uncollected in the primary collection stage are picked up in the Secondary Collection (3) stage. At this stage, municipal trucks collect waste from households going door-to-door; hotel trucks pick up waste from large commercial generators. Also, household and commercial waste is deposited in community containers at central drop-off points, after which the municipality arranges transportation to the transfer stations. Municipally collected waste from roads also ends up at the community containers.

The Transfer Station (4) receives organic waste, inert materials (sand, dust, etc) and recyclables in mixed form. The materials then leave the transfer station and go to the next stage disposal (5). Some recovery of recyclables by the formal and informal sector also takes place at the transfer station. From the transfer stations, recyclables either end up at the landfill or at the scrap retailers.

ii. Administrative structure

Municipal Commissioner

Medical Officer of Health

Dty. Health Officer (SWM)

Zonal Commr (I)	Zonal Commr (II)	Zonal Commr (III)	Zonal Commr (IV)
Ward Officers & Ward Medical Officers	Ward Officers & Ward Medical Officers	Ward Officers & Ward Medical Officers	Ward Officers & Ward Medical Officers
Prabhags	Prabhags	Prabhags	Prabhags
Kothis Mukadams	Kothis Mukadams	Kothis Mukadams	Kothis Mukadams

iii. Law and Policy

Municipal Laws

Pune city is governed by the Bombay Provincial Municipal Corporation Act. After the MSW Rules, 2000 was enacted the state of Maharashtra in 2006 enacted the Maharashtra Non-biodegradable Garbage Control Act. The Bombay Provincial Municipal Corporations Act (BPMC) of 1949 applies to the Pune Municipal Corporation (henceforth referred to as PMC) and Pimpri Chinchwad Municipal Corporations (henceforth referred to as PCMC). The civic bodies in these cities are mandated by the Act to provide for public receptacles for garbage, transport of garbage and its final disposal in such manner that is not detrimental in the interests of public health. Citizens are required to deposit garbage in the receptacles provided by the Municipalities and placed in public areas. The Municipalities are also required to undertake sweeping of public areas such as roads, markets and other open spaces; cleaning of gutters, drains and the sewage channels; and fumigation.

In a progressive move, the Pune Municipal Corporation passed a General Body Resolution No. 476 in October 2006, approving the formation of and support to the constitution of an entity that would integrate waste pickers into the door to door collection of solid waste. This allowed for one central worker Cooperative Kagad Kach Patra Kashtakari Panchayat, to take responsibility for the door to door collection of waste in the entire city. The Pune Municipal Corporation issued detailed guidelines for the segregation, collection and disposal of waste.

Labour Laws:

The Kagad Kach Patra Kashtakari Panchayat raised the demand for extension of the Mathadi Act to waste-pickers in 1998 at a mass rally attended by over 4000 members. Since then attempts have been made to initiate similar organised efforts in other parts of the state. State level Conventions of waste-pickers were organised at Pune on 25

March 1999 and 5 May 2001. The Maharashtra Hamal Mathadi and other Unprotected Workers (Regulation of Employment and Welfare) Act, 1969 is an existing legislation that can be extended to waste-pickers with some modifications. The Act has been very beneficial to the workers covered under it, in the three decades since its enactment. Its efficacy has been directly proportional to the strength of the workers trade unions in different districts of the State.

The Act presently applies to head-loaders/porters. The definition of "employer" and "wages" within the Act is fairly wide ranging and can be further modified. The Act provides for compulsory registration of 'employers' and workers with a Statutory Board. The constituents of the tripartite board include representatives of the employers/ traders organisations, trade unions of workers and the state. The costs of administering the Board are defrayed through a levy payable by the employers. 'Wages' are deposited with the Board by the 'employers' along with the levy, which includes contribution towards provident fund and other statutory benefits. The Board deducts the workers contribution and makes the wage payment to the workers. The Act allows for multiple employers and payment at piece rate. The Act applies to a list of scheduled 'employments' specified in the Act.

State Policy on SWM:

The State of Maharshtra has put in place an Action Plan for Effective Implementation of Municipal Solid Wastes (Management and Handling) Rules, 2000, through Government Resolution No. SWM 1006/C.R.53/ U.D.16 dated 26 October 2006. The Action Plan clearly identifies NGOs and SHGs as a cheaper alternative for the purposes of contracting out door-to-door collection. The Resolution adopts an inclusive approach to waste pickers and notes: “Instead of keeping them at the end of waste collection chain and obtaining recyclable things only from community bins or from the mixed garbage thrown on land fill sites, rag pickers should be given multiple contract to collect waste form door to door and take it to processing plants. In many cities, underprivileged sectors of the society such as rag pickers, women & youth groups are being involved for waste collection. Therefore NGO’s, voluntary organizations and self helpgroups should be encouraged to form co- operative organizations of rag pickers women groups under Suvarna Jayanti Shahari Rojgar Yojna.” The Action Plan also goes on to recommend the levy of user fee for door-to-door collection and further goes on to encourage the reduction of waste through composting and appropriate incentives and disincentives.

The Government has further strengthened the inclusive policy towards waste pickers by a 2002 order by the Government of Maharashtra, Water Supply and Sanitation Department [*Government Circular No. Ghakavya 1001/ Pra. Kra 546/ Papu-22 Mantralaya, Mumbai: 5 January 2002*] which states:

- Unorganized rag pickers collecting waste in different parts of the city should be organized with the help of NGOs and should register a cooperative. The local self-government should take the initiative to get these cooperatives registered. Registered rag picker organizations should be allotted the work collecting waste in parts of the city/wards with the help of NGOs.

- While allotting waste collection work to these cooperatives, citizens should be informed of this method. Discussions should be held with people's representatives, eminent citizens, Those rag pickers who have not registered in a cooperative can also be allowed, under exceptional circumstances, to collect waste on an individual basis after registering themselves with the proper authority.
- The civic authority should grant preference to cooperatives formed by rag pickers in the collection of dry waste.
- If the city has a waste processing unit, the waste collected by rag pickers should be used by it; but rag pickers should also have the freedom to sell it in the market. This will generate income to rag pickers and help improve their living standard.
- The civic authority/NGOs should issue identification cards to registered rag pickers. This will allow citizens to recognize registered pickers.
- The civic authority/NGO should allot a designated area, as per the situation, and assign registered rag pickers or their organizations the task of collecting waste from 250-300 homes.
- The task of collecting bio-medical waste and polluted/toxic waste should not be allotted to rag pickers. Civic authorities should make separate provisions for collecting these forms of waste, as well as for storing, disposing, and monitoring it effectively.

The Maharashtra State has thus adopted many progressive and inclusive policies in creating an enabling environment for informal sector waste recyclers.

Analysis of the case studies: The case studies demonstrate the lack of uniformity in approach to solid waste management. The institutional framework is a throwback from the colonial period and waste management continues to be viewed merely as a public health and sanitation issue. A comparison of the two cities throws up some interesting insights. Firstly, a comprehensive and inclusive policy governing waste management is missing in both cities. What is noteworthy however is that where the organizational capacity of workers is strong, the waste pickers have managed to push through government orders for inclusive policies, a more sustainable and equitable approach to waste management. Secondly, in the city of Bangalore, waste pickers are not organized and their contribution to the formal and informal sector has not been acknowledged by the government. Waste management has been parceled out to various private contractors who employ workers on a contract basis. In stark contrast, the organized strength of the workers in Pune has been awarded the contract for door-to-door waste collection. The workers cooperative has managed to transform not only the livelihoods of the workers but also the policy approach of the government.

Thirdly, both cities lack proactive legislative intervention for waste pickers. Neither demonstrates a willingness on the part of the state to mandate a 'rights based approach' or to enable better working conditions and social security for the workers. Sustained efforts within Pune city indicate a growing awareness among the elected representatives and bureaucrats to the concerns of waste pickers. Finally, the case studies stress once again, the need for a review of municipal law and policy with regard to waste management, to make them more inclusive, sustainable and equitable.

XII. Conclusion and Recommendations

In reviewing the law and policy framework pertaining to waste pickers in the country, we conclude that there is a dire need for a comprehensive and inclusive policy that deals with the whole cycle of waste management from generation to collection and disposal. The critical role of the waste pickers in the entire waste management cycle needs to be acknowledged and integrated. Our case studies reflect some adhoc attempts at adopting an inclusive policy by a few cities, due largely to the tireless efforts of organizations working with the waste pickers. Such progressive policy efforts need to be adopted by other states in the country.

However, this lacuna in policy brings to fore the lack of vision in protecting livelihoods in the country. Not only does the formal system of collecting and segregating waste provide scope for employment, the informal economy of the recycling industry provides ample opportunities to protect and encourage self-employment. The right to waste and access to waste, need to be envisaged in a holistic solid waste management system that gives due recognition and protection to the waste picker. An integrated waste management system, in which segregation at source enables sustainable management of waste and provides employment with better working conditions to waste pickers, needs to be mandated by law for all local bodies across the country. The 'access and right to waste' to waste pickers would be a crucial aspect that can help secure livelihoods of the waste pickers.

An inclusive law and policy framework also takes on greater significance in the background of the looming threats, as waste management models transform with changing needs. It must be noted that the privatization has the potential to cut off the access to waste of traditional waste pickers. A new class of contractors and waste sorters are likely to be employed by the private actors, with no effort at absorbing the existing communities that work in this trade. Newer technologies being promoted by the government also further seek to displace and alienate the workers. What is essential is an urgent response to the secure and protect this highly vulnerable class of workers.

In conclusion, the report provides a framework for a comprehensive policy and recommends a 'rights based approach' to securing the livelihoods of waste pickers. And in keeping with the focus on livelihoods of the waste pickers, we recommend certain policy measures to protect the livelihoods of workers.

Comprehensive Policy

(a) The waste recycling sector not only subsidizes the cost of waste handling and recycling but is critical in alleviating poverty and protecting the environment. Recycling, which is at the core of this model, needs to be recognized, regulated and incentivized. India has a strong tradition of reuse and recycling which needs to be protected and encouraged.

(b) The waste management plan of each urban/ rural, semi-urban or semi-rural local body be inclusive of the many workers engaged in the collection, transportation and conversion of waste into various products and depend on recycling waste for their livelihood. It is vital that the policy promotes safe and hygienic ways of waste

handling, sorting and conversion of waste through the active participation of the community at large, and ensure that regulators provide for safeguards to the people involved in collection, transportation, storage, conversion or disposal of waste.

(c) Waste pickers must be integrated into the door to door collection schemes of contracted out models so that it guarantees their access to scrap; improves their working conditions; improves their earnings; and transforms the status of the occupation from scavenging to service providers.

(d) The traditional rights of waste collectors to the waste/recyclable material, needs to be acknowledged and formalized. However, traditional methods and dehumanizing practices such as open manual handling without protective gear and scavenging at dump sites and land fills must be actively discouraged.

And in protecting livelihoods, an inclusive policy and a 'rights based approach' is at the core. It is important that the following rights of the workers be recognized and mandated by law.

(a) Access to the waste;
(b) Traditional rights of traditional communities over the waste collected;
(c) Right of the Waste Collector to be acknowledged as 'self-employed' worker;
(d) In a bid to assist the workers in skill upgradation and to help them move up the value chain, the right to door step collection be given to erstwhile waste pickers.
(f) Right to basic necessities like water, sanitation and facilities for clean living, rest and leisure at the place of work.
(g) Fundamental right to life and the right to good living through decent livelihood options.

It is imperative that waste and recycling be recognized as an opportunity for poverty alleviation and generating livelihoods for workers in the informal sector. Inclusive models of waste management are an equitable and environmentally sustainable alternative.

XIII. Template for further research

The larger research agenda has been stated above and it would be appropriate to reiterate the same. In the first part, the attempt is to compile and analyse the court judgements that impact the waste sector and these include subject areas such as environment, labour, municipal taxes, recycling, waste handling and management, pollution, land use, development planning, finances and privatisation.

Research questions

(a) What matters pertaining to 'waste' have been taken up in litigation by affected parties – an analysis of the nature of cases, the litigants and the judicial process? What kind of changes have been brought in waste handling and management (collection, transport, trade, processing, recycling, disposal, ownership) on account of public interest and other litigations?
(b) What implications do the court directives have for environment, labour, municipal taxes, recycling, waste handling and management, pollution, land use, development planning, imports hazardous waste?

(c) What implications do the court directives have on the lives and livelihoods of waste pickers and other workers in the informal economy?
(d) What implications do the court directives have on municipal workers; citizens and other stakeholders?
(e) A broad trend analysis of the court attitudes and approach to informal economy workers, their status, poverty and 'labour rights'.

In the second part, the attempt is to compile and analyse the rules, regulations, notifications issued in each state (more specifically a municipality in a state) to understand better the legal framework governing waste pickers.

Research questions

(a) How do municipal bye laws; rules and regulations; notifications recognise waste pickers and what is the evidence of that recognition? What are the new rules, regulations and policies being put in place to enable privatization or further sub-contracting of handling and management of waste?
(b) What kind of legitimacy do these bestow on waste pickers?
(c) What kind of resources is allocated to waste pickers?
(d) What kind of entitlements?
(e) How do the legal notifications get enacted and what factors pushed them? The legal chain of events (perhaps, even the non-legal chain of events) and their larger impact?
(f) Mapping changing trends in policy and law and what they reflect, keeping in mind the broad framework of informal economy workers.

Further questions that would need to be systematically explored in each city to get a fuller picture of the 'waste' sector are:

(a) Map the organizational and technical aspects of solid waste management (begin with the 7 mega cities), with specific focus on sorting and disposal of recyclable waste. In order to do this, the following questions need to be posed (this list is merely indicative and is in no way comprehensive):

(1) Is there a policy statement on solid waste management? What does it say about waste sorting at source, recycling and ownership over waste?
(2) What are the specific provisions pertaining to SWM in the municipal enactments? Are there specific rules/notifications/guidelines issued by the local body on SWM? Look for notifications/rules/guidelines pertaining to segregation at source, disposal of recyclables, secondary storage and sorting, transportation and landfills.
(3) What laws govern the informal recycling sector in the state?
(4) Map the types of waste produced in the city and additionally map the recyclable materials generated in the city.
(5) Document best practices, if any, in recovering and recycling of waste.
(6) Document the role of the waste pickers in the city – demographic and socio-economic profile, wages and working conditions, and contribution to the environment in the city.
(7) Monitoring mechanisms – look for annual compliance reports of state pollution control board. Carry out an independent survey to check compliance with the various Waste related laws in the country.

(8) Undertake city wide evaluation of the contribution of the waste pickers, waste collectors and waste recyclers to the larger economy and the environment. This would be critical in larger efforts to establish rights over waste.

ANNEXURES

Annexure I

Waste Generation and Composition

Quantities and waste generation rate in 59 cities is as under

S. No	Name of City	Population (As per 2001 census)	Area (Sq. Km)	Waste Quantity (TPD)	Waste Generation Rate (kg/c/day)
1	Kavaratti	10,119	4	3	0.30
2	Gangtok	29,354	15	13	0.44
3	Itanagar	35,022	22	12	0.34
4	Daman	35,770	7	15	0.42
5	Silvassa	50,463	17	16	0.32
6	Panjim	59,066	69	32	0.54
7	Kohima	77,030	30	13	0.17
8	Port Blair	99,984	18	76	0.76
9	Shillong	1,32,867	10	45	0.34
10	Simla	1,42,555	20	39	0.27
11	Agartala	1,89,998	63	77	0.40
12	Gandhinagar	1,95,985	57	44	0.22
13	Dhanbad	1,99,258	24	77	0.39
14	Pondicherry	2,20,865	19	130	0.59
15	Imphal	2,21,492	34	43	0.19
16	Aizwal	2,28,280	117	57	0.25
17	Jammu	3,69,959	102	215	0.58
18	Dehradun	4,26,674	67	131	0.31
19	Asansol	4,75,439	127	207	0.44
20	Kochi	5,95,575	98	400	0.67
21	Raipur	6,05,747	56	184	0.30
22	Bhubaneswar	6,48,032	135	234	0.36
23	Tiruvanantapuram	7,44,983	142	171	0.23
24	Chandigarh	8,08,515	114	326	0.40
25	Guwahati	8,09,895	218	166	0.20

26	Ranchi	8,47,093	224	208	0.25
27	Vijaywada	8,51,282	58	374	0.44
28	Srinagar	8,98,440	341	428	0.48
29	Madurai	9,28,868	52	275	0.30
30	Coimbatore	9,30,882	107	530	0.57
31	Jabalpur	9,32,484	134	216	0.23
32	Amritsar	9,66,862	77	438	0.45
33	Rajkot	9,67,476	105	207	0.21
34	Allahabad	9,75,393	71	509	0.52
35	Vishakhapatnam	9.82,904	110	584	0.59
36	Faridabad	10,55,938	216	448	0.42
37	Meerut	10,68,772	142	490	0.46
38	Nashik	10,77,236	269	200	0.19
39	Varanasi	10,91,918	80	425	0.39
40	Jamshedpur	11,04,713	64	338	0.31
41	Agra	12,75,135	140	654	0.51
42	Vadodara	13,06,227	240	357	0.27
43	Patna	13,66,444	107	511	0.37
44	Ludhiana	13,98,467	159	735	0.53
45	Bhopal	14,37,354	286	574	0.40
46	Indore	14,74,968	130	557	0.38
47	Nagpur	20,52,066	218	504	0.25
48	Lucknow	21,85,927	310	475	0.22
49	Jaipur	23,22,575	518	904	0.39
50	Surat	24,33,835	112	1000	0.41
51	Pune	25,38,473	244	1175	0.46
52	Kanpur	25,51,337	267	1100	0.43
53	Ahmedabad	35,20,085	191	1302	0.37
54	Hyderabad	38,43,585	169	2187	0.57
55	Banglore	43,01,326	226	1669	0.39
56	Chennai	43,43,645	174	3036	0.62
57	Kolkata	45,72,876	187	2653	0.58
58	Delhi	1,03,06,452	1483	5922	0.57

59	Greater Mumbai	1,19,78,450	437	5320	0.45

• Total quantity of waste generated in the country (based on weighment exercise by local bodies) is not reported. However, Ministry of Urban Development in its manual on solid waste management (year 2000) has estimated waste generation of 100,000 MT.
• CPCB with the assistance of NEERI has conducted survey of solid waste management in 59 cities (35 metro cities and 24 state Capitals: 2004-05)

(Source: Report of the Central Pollution Control Board accessed at http://www.cpcb.nic.in/wast/municipalwast/Waste_generation_Composition.pdf.)

Annexure II

Characterisation of waste

Characterisation of waste is necessary to know changing trends in composition of waste. Based on composition/ characterization of waste, appropriate selection of waste processing technologies could be selected.

Waste characterisation in 59 cities is indicated below:

S. No	Name of City	Composta bles(%)	Recyclables (%)	C/N Ratio	HCV* (Kcal/Kg)	Moisture(%)
1	Kavarati	46.01	27.20	18.04	2242	25
2	Gangtok	46.52	16.48	25.61	1234	44
3	Itanagar	52.02	20.57	17.68	3414	50
4	Daman	29.60	22.02	22.34	2588	53
5	Silvassa	71.67	13.97	35.24	1281	42
6	Panjim	61.75	17.44	23.77	2211	47
7	Kohima	57.48	22.67	30.87	2844	65
8	Port Blair	48.25	27.66	35.88	1474	63
9	Shillong	62.54	17.27	28.86	2736	63
10	Simla	4302	3664	2376	2572	60
11	Agartala	58.57	13.68	30.02	2427	60
12	Gandhinagar	34.30	13.20	36.05	698	24
13	Dhanbad	46.93	16.16	18.22	591	50
14	Pondicherry	49.96	24.29	36.86	1846	54
15	Imphal	60.00	18.51	22.34	3766	40
16	Aizwal	54.24	20.97	27.45	3766	43
17	Jammu	51.51	21.08	26.79	1782	40

18	Dehradun	51.37	19.58	25.90	2445	60
19	Asansol	50.33	14.21	14.08	1156	54
20	Kochi	57.34	19.36	18.22	591	50
21	Raipur	51.40	16.31	223.50	1273	29
22	Bhubaneswar	49.81	12.69	20.57	742	59
23	Tiruvanantapuram	72.96	14.36	35.19	2378	60
24	Chandigarh	57.18	10.91	20.52	1408	64
25	Guwahati	53.69	23.28	17.71	1519	61
26	Ranchi	51.49	9.86	20.23	1060	49
27	Vijaywada	59.43	17.40	33.90	1910	46
28	Srinagar	6177	17.76	22.46	1264	61
29	Madurai	55.32	17.25	32.69	1813	46
30	Coimbatore	50.06	15.52	45.83	2381	54
31	Jabalpur	58.07	16.61	28.22	2051	35
32	Amritsar	65.02	13.94	30.69	1836	61
33	Rajkot	41.50	11.20	52.56	687	17
34	Allahabad	35.49	19.22	19.00	1180	18
35	Visakhapatnam	45.96	24.20	41.70	1602	53
36	Faridabad	42.06	23.31	18.58	1319	34
37	Meerut	54.54	10.96	19.24	1089	32
38	Nasik	39.52	25.11	37.20	2762	62
39	Varanasi	45.18	17.23	19.40	804	44

40	Jamshedpur	43.36	15.69	19.69	1009	48
41	Agra	46.38	15.79	21.56	520	28
42	Vadodara	47.43	14.50	40.34	1781	25
43	Patna	51.96	12.57	18.62	819	36
44	Ludhiana	49.80	19.32	52.17	2559	65
45	Bhopal	52.44	22.33	21.58	1421	43
46	Indore	48.97	12.57	29.30	1437	31
47	Nagpur	47.41	15.53	26.37	2632	41
48	Lucknow	47.41	15.53	21.41	1557	60
49	Jaipur	45.50	12.10	43.29	834	21
50	Surat	56.87	11.21	42.16	990	51
51	Pune	62.44	16.66	35.54	2531	63
52	Kanpur	47.52	11.93	27.64	1571	46
53	Ahemdabad	40.81	11.65	29.64	1180	32
54	Hyderabad	54.20	21.60	25.90	1969	46
55	Bangalore	5184	2243	3512	2386	55
56	Chennai	41.34	16.34	29.25	2594	47
57	Kolkata	50.56	11.48	31.81	1201	46
58	Delhi	54.42	15.52	34.87	1802	49
59	Greater Mumbai	62.44	16.66	39.04	1786	54