

Solid Waste Management in the Slums and Squatter Settlements in the City of Bangalore

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Abstract: The economic growth and demographic changes in Indian cities are posing a serious challenge to urban local authorities. By the year 2020, Indian urban centers including Bangalore will witness a huge increase in population. With the rapidly growing urban population, the need for infrastructure services increases manifold. The increase in per capita income and the concomitant industrial and service activities have resulted in a high increase in consumption and consequently, in the quantum and complexity of the composition of the solid waste generated.

Solid Waste Management (SWM) in the expanding cities is affected by all kinds of problems associated with a constant population influx from surrounding rural communities, uncontrolled sprawl dominated by illegal settlements, extensive slums in the central and other areas, and traffic and population congestion in and around all major access points to the city. Both financially and physically, a city finds it difficult to provide facilities for waste collection, especially with regard to the urban poor. The urban poor are often left to contend with waste disposal on their own. Support given to the urban poor in slums and squatter settlements has serious deficiencies adversely affecting their health and generally the urban environment itself. Thus, the management of solid waste is an issue of vital importance to urban sustainability.

Slums and squatter settlements are characterized by a gross deficiency of basic services such as proper housing, provision and supply of safe potable water, sanitation facilities such as latrines and disposal of human excreta, drainage of sullage water, paved roads including accessibility etc. Often, even rain water does not get drained off from their regions. In the absence of these facilities, the quality of life in slums and squatter settlements is highly miserable and these dirty areas, whether legalized or not, should be given special attention and provided satisfactory SWM services. Keeping this in view, the authors describe the existing state and identify the shortcomings in various aspects of SWM and propose improved planning strategies which will make for a cleaner and more aesthetic city, reducing environmental pollution and protecting precious groundwater and land resources in the city of Bangalore.

Index Terms: Slums and squatter settlements, solid waste, environmental pollution, urban poverty, Urban Local Bodies, ecological characteristics

I. INTRODUCTION

With the increase in population and related activities, the demand for essential services namely water supply, drainage/sewerage, garbage collection and disposal, transportation, etc. far exceeds supply. Also, land use distribution patterns are unsatisfactory. While taking up developmental activities, the sustaining capacities of the environment are rarely considered. The Master Plans although allocate land for various uses, don't specify the extent and intensity of activities amidst all their contingencies in each of the land uses which would be inconsonance with environmentally satisfactory development. For example, the slums and squatter settlements are scattered in and around the cities. The environmental pollution problems in urban

areas are hence becoming complex and are highly risky. The solutions for waste management problems, particularly in slums and squatter settlements areas, are increasingly difficult due to ever-increasing gap between generation, accumulation and removal.

The growth of metropolitan cities in India has been largely unplanned and haphazard and this can be seen from the fact that nearly a quarter of the total urban population lives in slums and squatter settlements. In all these cities slums and squatter settlements mushroomed on public and private land and are characterized by high population density. The population of urban slums is composed largely of rural migrants to the city. When migrants reach the city, they invariably find themselves pushed into slums and squatter settlements. The local governments are totally unprepared in tackling these problems, mainly because of meager resources as also lack of expertise and proper planning. The Habitat – II conference at Istanbul in 1996 once again reiterated the need for ensuring adequate shelter for all and making human settlements safer, healthier, more livable, equitable, sustainable and more productive. Despite such exhortations, little attention has been given to solid waste disposal, particularly in urban slums.

There is a growing concern about how to make the city safe and sustainable. The city which makes vital contributions in social and economic development is struggling with serious challenges such as environmental pollution, congestion, increasing incidence of urban poverty, inadequate access to shelter and basic services, increasing inequality in income levels resulting in the proliferation of slums and squatter settlements with overall deterioration in the quality of life. And more so are the inequalities in the facilities to dump, collect and dispose of garbage and such other waste adding to the vast ugliness and intractableness of urban misery. Solid Waste Management (SWM) is one of the important obligatory functions of Urban Local Bodies in India. However, this service is poorly performed resulting in problems of health, sanitation and environmental degradation. Lack of financial resources, institutional weakness, improper choice of technology and public apathy towards SWM have made this service far from satisfactory (Supreme Court of India Report, 1999, p. 7). Adding to these difficulties of resource paucity at the public level is the growing inequalities in incomes and earning opportunities forcing the poor into slums and deprives them of access to supraminimal level of sanitary, waste disposal and drinking water facilities.

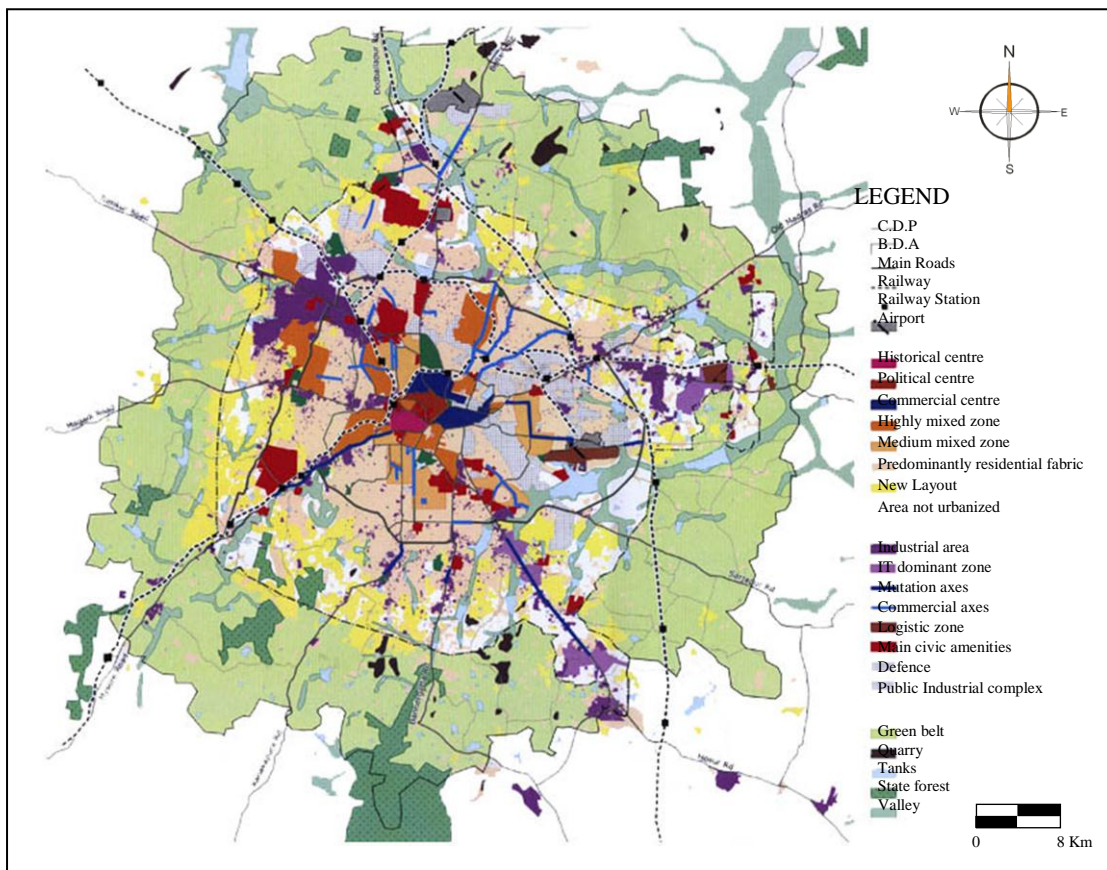
This paper examines ways to improve waste clearing and management in slums and squatter settlements in the city of Bangalore. The ecological characteristics of the slums are highly conspicuous and have received wide publicity and attracted hostile reaction from town planners, government officials and administrators.

II. BACKGROUND OF THE STUDY AREA

Bangalore, the capital of Karnataka, has history of 400 years. The origin of Bangalore city can be traced back to 1537 when it was founded by Late Magadi Kempegowda. The eastern portion of the city was however developed by the British early in the 19th century. Perhaps, the most spectacular growth of the city started after independence of the country in 1947 (see **Fig. 1**).

Bangalore is located at the Centre of the South Indian Peninsula, equidistant from both the eastern and the western coasts with an elevation of about 931 meters above the mean sea level and latitude 12° 58' north and longitude 76° 36' east in the southern corner of the Karnataka State in India. Bangalore developed not only as a headquarters of administration and an educational center of Karnataka but also has tremendous growth as a prominent industrial center in the country. Presently, it is the Silicon Valley of India.

Fig.2.1 Existing Land Use in Bangalore Metropolitan Area



Source: Revised Comprehensive Development Plan, 2005, B.D.A

Topographically, the city has slopes towards east and west with a smooth ridge running north to south. The city gets moderate rainfall of around 900 mm largely between June and October. On account of its elevation, Bangalore is bestowed with salubrious and equable climate comparable to those of temperate regions.

The population of the Bangalore Metropolitan Area (BMA) was 8.47 million, according to the 2011 Census, as against 5.69 million in the 2001 census. As per the 2011 Census, Bangalore ranks 5th among the largest Metropolitan Cities in India. Now it is estimated that the population of the BMA by the year 2021 would be 12.6 million in addition to floating population around 1.5 to 2.00 million daily in the city (see **Table 1**). The ever-increasing population would add to the problems of the already strained infrastructure facilities associated with environmental decay and decline in the quality of life in the city. The intra-city population density has witnessed a rapid increase.

The City is expanding from city center towards BMA and is growing in all directions. Development is in an irregular radial pattern. The Revised Master Plan for 2016 is proposed for an area of 1279 sq. km wherein area for development (Conurbation limits) is 531 sq. km and green belt is 742 sq. km.

Table 1. The Population growth, density and spatial development of Bangalore

Census Year	Pop. in Mn	% Increase	Area (Sq. Km)	% Increase	Density of Pop./sq. km
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1901	0.22	-	144.78	-	1517
1911	0.26	14.5	156.43	8.05	1666
1921	0.31	19.2	160.94	2.88	1925
1931	0.39	27.5	174.55	8.76	2228
1941	0.51	28.9	181.24	3.84	2817
1951	0.99	94.9	193.08	6.53	5130
1961	1.20	21.4	255.62	32.39	4688
1971	1.65	37.0	285.95	11.87	5760
1981	2.91	76.72	366.39	28.13	7950
1991	4.13	39.89	466.63	21.14	8843
2001	5.69	37.77	531.00	19.05	10704
2011	8.47	48.85	1279.00	140.00	6622
2021 (Est.)	12.60	48.76	1279.00	-	9851

Source: Census book – 2011 and BDA, Bangalore. (Compiled by Authors)

Bangalore population has been growing rapidly in the last three decades. Today, Bangalore has gained all-round importance as an administrative center and a trading and industrial center, along with large IT and BT industries and also as a center of strategic importance due to the concentration of defense establishments. With the establishment of Indian Space Research Organization (ISRO) and several high technology electronics industries, it has become the seat for scientific and technological advancement. Naturally, Bangalore has become the focus of migration of population from rural areas and other centers, both within and outside the state.

Water is being supplied from a distance of 90 km and is being pumped around 600 meters up spending an enormous amount of energy. In addition to the above, nearly 40 percent of population of Bangalore solely depends on underground water. Ground water recharge depends on the harnessing of rainwater. Therefore, the protection and maintenance of these watersheds and tanks are vital. The ever-increasing population would add to the problem of the already strained infrastructure facilities associated with environmental decay and solid waste management.

The industrialization of Bangalore is apparently co-related to migration and the spurt in the number of slums in the city. Ever since the factories were established and commercial activities developed, the slums too began to come into existence. Day by day the number of slums is on the increase by leaps and bounds. According to reliable sources there were 230 slums in Bangalore in 1975, 401 in 1989 and 545 in 1992; but presently there are over 778 of them. It is estimated that in 1981, 10.5 percent of Bangalore population were slum-dwellers. As per the estimates presently 30 percent of the Bangalore population is slums and squatter settlements-dwellers. It cannot be denied that considerable efforts are being made on a large scale to provide shelter to the urban poor. In spite of this the number of pavement dwellers, slums and squatter settlements are increasing every day. There seems to be two basic reasons for the failure of these schemes – location discrepancy and unaffordability. When the migrants move into a city, they settle themselves at a particular place where they have managed to secure for themselves a source of income and employment - nearness to the place of work and affordability of accommodation.

2.1 Defining the Slums and Squatter Settlements

As per the Section 3 of the Karnataka Slum Areas (Improvement and Clearance) Act, 1973, the slum means; (a) any area is or likely to be a source of danger to health, safety or convenience of the public of that area or of its neighborhood, by reason of the area being low lying, insanitary, squalid, over-crowded or otherwise; or (b) the building in any area, used or intended to be used for human habitation are, - (i.) in any respect unfit for human habitation; or (ii) by any reason of dilapidation, over crowding, faulty arrangement and design of such building, narrowness or faulty arrangement of streets, lack of ventilation, light or sanitation facilities, or any combination of these factors, detrimental to safety, health or morals, it may, by notification declare such area to be a slum area (Unpublished- Document, 1999, p. 3).

2.2 Actions by State Agencies

The three agencies concerned with the improvement of the living status of low-income people in Bangalore City are – (a) **Bangalore Development Authority (BDA)**, (b) **BruhatBangalore Mahanagara Palike (BBMP)**, and (c) **Karnataka Slum Clearance Board (KSCB)**. These three agencies have different jurisdictions, which sometimes overlap. Because of the multiplicity of State agencies undertaking similar work, a mess has been made of the slum clearance programs.

BDA's main functions and responsibilities are – land acquisitions, layout planning and development, which includes construction of roads, bridges and surface drains, parks, open spaces, etc.; providing services such as water supply, underground drainage, street lighting, etc.; housing, which includes other amenities such as markets, hospitals, schools etc. The BDA proposes new layouts and allocates plots. Improvement of slums located within the metropolitan boundary is carried out by the BDA. A certain percentage of plots in the newly developed areas are allocated to the economically weaker sections. The BDA provides developed plots to slum dwellers at low cost, the repayment being spread over a number of years.

The BBMP has been mainly concentrating on upgrading the basic services of the slums under the Environmental Improvement Programs. No improvement of the individual hutments is undertaken as part of this program. The corporation regularizes the slums and re-allots the plots to the individual residents, but no financing is provided. In some cases the corporation undertakes the construction of houses in the same areas but since the cost is often beyond the means of the slum dwellers, they often rent out the house assigned to them and continue to squat elsewhere. Hence the corporation has not been able to check the growth of slums within the corporation boundary. This ineffectiveness goes to show that, concurrent with slum improvement efforts, there requires being measures to increase incomes and skills of the poor.

Though Karnataka Slum Clearance Board (KSCB) is a statutory body, most of its executive directives come from the Government Secretariat. According to the terms of the Improvement and Clearance Act, 1973, the KSCB can declare areas to be slum on the basis of overcrowding, insanitary conditions, and unfitness of buildings for human habitation. The slums thus designated are taken up for development under the Slum Clearance and Improvement Scheme financed by the Central Government (Krishnamurthy, Nalini & Kumar, S. Shiva, 1983, p. 21).

III. MAJOR REASONS FOR CREATION OF SLUMS: HOUSING SHORTAGE

Bangalore is a low-rise city with individual plots and many open spaces in the residential areas. The city's large new extensions, which are far away from the Central Area embodying the main functions, do not serve low-income people owing both to the cost of land and to distances from their places of work. Hence the large housing shortage is being made good, though unsatisfactorily, by the slums which have been serving the purpose of providing basic shelter without any other basic amenities, but with the advantage of being located closer to people's places of work. Owing to the informal nature of jobs taken up by most people, there have been no housing schemes meant for them satisfying their economic needs. The need for domestic labor in the higher-income residential areas has given rise to slums in the vicinities. The villages, which have been absorbed into the city as the latter grew, have also developed into slums. One finds these pockets within the metropolitan boundary among the well-developed surrounding areas. It is estimated that almost one-third of the city's population are living in the slums and squatter settlements. These slums are essentially characterized by economically weak low-income population with low occupational status e.g., construction worker, daily wage laborers, service workers; and socially weaker section viz. scheduled castes, scheduled tribes, backward castes, minorities; and have a high migrant resident ratio. Thus, the slum is much more than living in a miserable shelter or environment and the problem of slum is not just the problem of housing shortage, or even substandard living. It is one of low skills, low and uncertain incomes and unfavorable social connections.

IV. EXISTING CONDITIONS OF SWM IN SLUMS AND SQUATTER SETTLEMENTS

Bangalore produces over 3000 tones of solid waste per day and the Municipal Corporation is miserably inadequate in managing the disposal of solid waste generated. It is estimated that the per capita generation of solid waste works out to 0.35 kg/day. Specifically, the amount of solid waste generated in all the slums and squatter settlements works out to be 0.3 kg per capita per day. This aggregates to about 762 tons per day, for the total slums and squatter settlements population of 2.53 millions or 30 per cent. The solid waste generated in slums is proportionately less because the consumption levels of the slum people are far lower than that the generality of the people. The sources of waste generation, and the amounts generated at each source are the **table 2**:

Table 2. Different sources of SW generation in Bangalore

Sl. No.	Source	Quantity (in MT/day)
1	Households (including Slums and Squatter Settlements)	1620
2	Shops, Establishments, Offices, Institutions	510
3	Markets and function halls	600
4	Others	270
	Total	3000

Source: Dept. of SWM, Bruhat Bangalore Mahanagara Palike, Bangalore, 2011.

The storage, collection, conveyance and disposal of solid wastes in Bangalore city are under the control of the Bangalore City Corporation. The SWM involves activities associated with generation, storage, collection, transportation and disposal of solid wastes, keeping in view the economy, aesthetics and energy conservation. The SWM is important from the point of view of safeguarding the public health, environment and aesthetics of the city. SWM in Bangalore is faced with innumerable problems associated with a constant population influx from the surrounding rural communities, uncontrolled sprawl dominated by illegal settlements (unauthorized construction), extensive slums and squatter settlements, traffic and population congestion in and around all major access points to the city.

In Bangalore, there are 542 slums and squatter settlements at present. Out of these 246 are declared by the KSCB under Slum Clearance Board Act (I&C) 1973. The remaining slums and squatter settlements are spread around on the city outskirts which are not notified so far. There is a distinct pattern as far as the location of slums is concerned viz., on low-lying areas, by the side of railway tracks, on the sides of open drainage, on tank beds, on the river banks, around/adjacent to apartments, in or adjacent to burial grounds, below high tension wires, on hillocks, at the base of hillock and in market places.

The squatter settlements are either on public or private land. The main occupations of these dwellers are construction work, road work, rickshaw pulling, taking children to school, vegetable vending, kerosene hawking, shoe repairing, hamali work in bus stand and railway stations, etc.

The slum locations are generally found to be least desirable from the point of view of living or staying. The authorities have been unable to clear the garbage from most of the slums. And this is due to the slum dwellers' practice of throwing their waste into drains and only a part of the waste generated is available for collection.

Many slum communities are located near open drains and for the inhabitants, it may be seen that the flowing water is the best place for consigning the waste especially if the waste is to move away from time to time by large flow of storm water. The slums are normally the filthiest and drains generally open. Water is usually stagnating because of poor gradients and the choked drains present sickening sights with offensive odor. Refuse is everywhere. Absence of adequate and earmarked space for the disposal of household garbage and other solid wastes in most of the slums is causing a major problem to the residents. As a result, the garbage and other solid wastes dumped in nearby small open spaces beside hutments are a common scene in these slums and squatter

settlements. This has resulted in piled up garbage mixed with drain water in low lying areas. These dumpsites are attracting different animals such as dogs, pigs and rodents. The dump itself is a breeding ground for house flies. The garbage containing human excreta can be a center for the outbreak of different communicable diseases. The municipal sweepers may even dump refuse into the drains and the slum people usually use them as latrines.

In the absence of a functioning sewage system, dirty water from the huts flow over the ground, not only making the place slushy but also causing serious health and hygiene problems. Some households have dug up small drains through their houses for the water to flow through but such arrangements offer no proper solutions and therefore hardly help to keep the place clean. Stagnating water from various sources gives rise to problems of mosquito breeding; fly nuisance and insanitary conditions around about human habitations affecting the health of the people. In addition to that there are large numbers of open storm water drainage channels running in the west to east direction. Liquid effluent whether by way of sewage, sullage and other domestic wastewater are flowing out from the tenements?

V. THE PROBLEMS OF SWM IN SLUMS AND SQUATTER SETTLEMENTS

Generally, the physical condition of the slums presents a picture of neglect, with woefully inadequate water supply, bath and toilet facilities and in front of most of the houses cesspools are stagnating. A special study on the existing conditions of 60 slums on either side of Railway tracks in Bangalore City reveals that 98 per cent of the sample house holds were without toilets, 92 per cent without bathrooms and 61 per cent without kitchens. Out of the total, 37 slums have no latrine facilities and the residents use the railway tracks and nearby open spaces. The remaining 23 slums are provided with latrines by corporation (BBMP)- 10, residents- 12 and slum association- 1 (APSA & Janasahayog, 1999). The problem is that improper upkeep and lack of regular maintenance due to lack of water facility inside or near the community latrine has resulted in the accumulation of filth and garbage. This has led to disuse of these latrines.

Improper and inadequate garbage collection system; lack of adequate open spaces and green areas; improper land uses; institutional and financial crisis; lack of awareness and political will are causes for the present conditions in slum areas. The provision of urban infrastructure becomes exorbitantly costly and will become unmanageable in slums and squatter settlements. Thus the entire system of WM is outdated, unscientific and highly inefficient. Institutional arrangements in Bangalore are inadequate and inefficient. There is lack of professionalism in the administration of this service. The laws governing the Urban Local Bodies do not have adequate provisions to deal with the situation effectively and local bodies do not have the necessary powers to punish defaulters (Supreme Court Report, 1999, p. 9). SWM should be tackled by continuous supervision, planning and monitoring on a day to day basis. Therefore there is need to have adequate infrastructure and active participation of community in civic affairs.

In this connection, we have to emphasize the need for reducing migration into the city. Provision of minimum basic facilities per unit population in metropolitan cities is far more expensive and administratively taxing than in smaller far away urban settings. Not only is development thus gets decentralized, but urban immiserisation gets drastically controlled by such a change in strategy.

VI. PLANNING FOR WASTE MANAGAEMENT

A well-prepared plan can have a positive influence on economic and social development while it takes sufficient care of the environmental protection in slums and squatter areas. Preparation of SWM plans for the slums and squatter settlement areas can go a long way in solving the accumulated problems and to prevent future problems. For preparing such plans, the causes of the problems needs to be identified and solutions envisaged for short-term mitigation measures and long term prevention measures. This may be done through environmental management plans. Pockets of squatter settlements destroy the image of clean and planned city and create urban form deterioration. Encroachment on prime land creates obstacles to the intended development and

use of that land. Squatter settlements with poor sanitation, drainage and garbage disposal systems degrade the environment. It creates low rise and high-density residential pockets.

6.1 Regulatory Legal Measures, Constitutional and Statutory Provisions

Laws and regulations must be enforceable, which means that the organizational machinery for their enforcement be created. The National Housing Policy Document has pointed out as early as in 1994 to (1) encourage slum renovation and progressive housing development with occupancy rights; (2) extend water supply, sanitation and other facilities to slums; (3) ensure maintenance of civic amenities through community involvement; and (4) provide night shelters and sanitary facilities for the pavement dwellers and the homeless. And pressure has to be exerted so that the above measures are carried out in a time bound and phased manner.

The following are some of the recommendations of the Supreme Court Committee to improve SWM in Class I Cities that are going to be mandatory (both for citizens and municipalities): (a) no garbage dumping on roads, (b) waste to be retained by all for 24 hours for doorstep collection, (c) curbs on cattle movement on streets; permitting only stall feeding, (d) debris must be stored within own premises until collected, not dumped on road or footpath, (e) decentralized composting of local waste is the best, (f) street should have litter bins for use by pedestrians and others, (g) silt overflowing from drains should not to be left on road for drying for more than 24 hours, (h) ban on burning of leaves and waste in streets, (i.) daily sanitary treatment of any un-cleared waste, storage-sites to control odor and uncontrolled rotting (by spraying of composting bio-cultures), (j) computerized weigh-bridges and management information systems, (k) payment on weight basis only for garbage transport contracts, (l) temporary toilet at all construction sites as soon as the work begins, (m) to prevent open defecation construct pay and use individual or group toilets, and (n) encourage private sector to participate up to 50 per cent in SWM (Swabhimana, 1999, p. 3)

Constitutional and other legal provisions are: (a) Article 47 of the Constitution of India enjoins, as a Directive Principle of State Policy that it shall be the primary duty of the State to raise the level of nutrition and standard of living and to improve public health. (b) Article 243-W of Indian Constitution directed the State Government to devolve powers and responsibilities to Municipalities for implementation of schemes as may be entrusted to them including those in relation the 12th Schedule which was added in 74th Constitutional Amendment Act, 1992.

The Karnataka Slum Areas Improvement and Clearance Act, 1973: The Act in its preamble envisages to provide for the removal of unhygienic and insanitary conditions prevailing in slums, for better accommodation and improved living conditions for slum dwellers, for promotion of public health generally and for the acquisition of land for the purpose of improving, developing or redeveloping slum areas, clearance of slum and rehabilitation of slum dwellers. According to the provisions of the Act, the people living in slums have right to access BASIC AMENITIES including garbage disposal and maintenance (Document by People from Valmiki Nagar & Janasahayog, 1999, p.3).

6.2 The NGOs and Institutional Measures

A number of NGOs are in Bangalore under the **Swabhimana Core Group**. Swabhimana is a people's movement. Through this organization, the spread of general awareness regarding waste management and the importance of keeping the environment clean by way of screening films and putting up posters to make the learning process more interesting. Out of that **Centre for Environment Education - South** (CEE) provides assistance to several resident groups in setting up waste management systems, integrating its efforts with other Swabhimana NGOs especially in waste management.

INTECH Waste Network provides engineering and technical inputs in the waste management process, suggesting policy changes and specific procedures for hotel/hospital/domestic waste, disposal grounds and sanitary landfills.

Rag-pickers Education and Development Scheme (REDS) is concerned with organizing rag-pickers for door-to-door collection and composting of garbage, and creating networks with the BCC, resident groups and individual households to institute waste collection systems. It also provides training to rag pickers and residents on practices and incentives for the sustainability of the various systems. Methods for rational disaggregation of solid waste with a view to recycling have to be emphasized.

Mythri Sarva Seva Samiti works for the development of slum communities, rehabilitation of waste pickers, and, through its program, Waste Wise, is involved in the development of waste management systems in various locations in the city using participatory techniques and value systems to improve community ownership and local initiatives. The objective is to develop a comprehensive waste management system with technical assistance from INTECH, CEE and REDS (Swabhimana, 1999, p.8).

The institutional measures such as training, incentives, enforcement, communications, public information, cleanliness campaign are the important factors in proper planning through planning department, local authority, architects/planners/developers, Ministry of Urban Development, political/interest groups, research & development organizations and media.

6.3 Financial Problems and Management

Slums and squatter settlements are in an unplanned and haphazard manner, which require high investments for providing necessary infrastructure facilities. Political will is necessary to achieve the proper management of waste through a greater degree of financial assistance. As per section 7 of the Karnataka Slum Areas (improvement and Clearance) Act 1973, the KSCB is providing basic amenities namely drinking water, street light, community latrines, community bathroom, drains, roads, storm water drain to the declared slums. Under the 'Basic Services to Urban Poor' (BSUP) scheme, during 2009-10, the Board has spent Rs. 645 million (Rs. 50/- = US\$ 1) and Rs. 690 million under plan expenditure towards construction of housing for the slum dwellers. (KSCB Annual Report, 2009-10, p. 3). This amount is too meager in comparison with the total sanitation budget of the BBMP – Rs. 2620 million during 2010-11.

VII. CONCLUSIONS, FUTURE STRATEGIC ACTIONS AND SUGGESTIONS

The first strategy is 'slum improvement' or 'slum up-gradation' to improve the environment and access to utilities in existing settlements. The second strategy called the 'sites and services' is to open up serviced plots in planned sites, on which people could gradually develop their own housing.

The suggestions for SWM are:

- The authorities should provide suitable site and other facilities for disposal of household garbage and other SW within or nearby the slum. And arrangements for timely and regular clearance of garbage collected in the bins for disposal. The effort has to enhance the awareness among the residents to use the specific space earmarked and/or garbage bins for dumping household garbage and other solid wastes.
- Developing, implementing and evaluating a community managed environmentally friendly and viable waste management system. The plan will include the various steps from collection to sorting, storage and disposal of different types of solid waste. An independent local authority should be created to plan and implement a long-range solid waste management program.
- Ensure sufficient quantity of water supply for domestic purposes by increasing availability time and number of taps. Organizing for bringing the problems to the notice of the concerned authorities and to put pressure for the provision of a sufficient number of community latrines along with adequate water facilities. And taking responsibility for maintaining cleanliness in the existing community latrines.
- Define, develop and implement cost effective plans and programs for SWM, which best serve the public health and environment.
- Encourage community-based and non-governmental organizations in their role of assisting and facilitating proper waste management.

- Keeping the slums and squatter settlements' environment clean healthy and pollution free is undoubtedly a major challenge. For this sustained awareness has to be created. The supply of water has to be monitored regularly. There is definitely a need to tackle the work of slum up-gradation on a war footing. Motivating students and also schools and colleges to take up slum up-gradation work for at least 10 to 15 days a year.
- States, local authorities and statutory bodies have to play a more active role in organizing the effort of mass production of cheaper building materials. It is necessary to discourage the plot development with individual tenements. Semi-detached housing, row housing and group housing should be resorted to. A phased up-gradation of the slums and squatter settlements has to be carried out and a civic sense inculcated among the people.
- While migration to the cities in search of job opportunities has to be discouraged, this can only be done if small and medium towns in the peripheral and neighboring areas of the core city are developed as growth centers.
- Urban poverty alleviation schemes should be implemented vigorously so that their living standard improves. One percent of the family income should be spent on solid waste services.

Slums and squatter settlements are characterized by the absence of basic services such as proper housing, provision and supply of safe potable water, sanitation facilities such as provision of latrines and disposal of human excreta, SWM, drainage of sullage water, paved roads etc. In the absence of these facilities, the quality of life in slums and squatter settlements is highly miserable and these dirty areas, whether legalized or not, should be given special attention and provided full SWM services.

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