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**CHALLENGES OF SOLID WASTE ACCUMULATION AND MANAGEMENT IN A
GROWING URBAN AREA -A STUDY OF ITANAGAR TOWN OF
ARUNACHAL PRADESH**

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Abstract

Urban development is a natural outcome of economic development. But it has a number of adverse effects like rapid urbanization may lead to the rapid growth of slum settlements, informal sectors as well as environmental problems like solid waste accumulation etc .Arunachal Pradesh had, no doubt, a late start in urbanization process but within two decades, it had overtaken Assam, which had a long history of urbanization. The growth rate of urbanization is high (101.29 per cent in 1991-2001). This fairly high growth rate of urbanization of the State has led to various environmental problems like solid waste accumulation. At present, the generation of huge amount of solid wastes has become a burning question in most of the urban areas. Itanagar, the capital of Arunachal Pradesh, is also facing serious threat to its evergreen atmosphere due to the prevailing scenario of increasing level of solid waste generation. Hence, the present study examines the current scenario as well as identifies problems of solid waste management in Arunachal Pradesh on the basis of the primary data.

INTRODUCTION

The concept of urbanisation is new in Arunachal Pradesh. It came in the map of urban centers of India only in the 1971 census, with the inclusion of its four towns. However, the growth of urban settlements in Arunachal Pradesh appears not to be the outcome of complex interactions of internal socio-economic and demographic forces of the tribal societies of the State, which is generally found elsewhere, rather, it seems to be the direct outcome of political and administrative development of the State. If we go through the history of urbanisation of Arunachal Pradesh, we find that in the 1961 census, none of the places in Arunachal Pradesh satisfied the criteria of being declared as census town and hence the entire State was declared as rural. However, some of the districts and sub-divisional headquarters of the State were found to possess distinct urban characteristics in 1971. In consideration of their pronounced urban characteristics and the occupational pattern, it was decided that the

districts and sub-divisional headquarters that recorded a population of 2,500 persons during 1961 census should be treated as towns for the purpose of 1971 census. (Barthakur, 1975) Accordingly Bomdila, Pasighat, Tezu, and Along were treated as census towns during 1971 census. Two more towns were added in the 1981 census and they were Old Itanagar, (Now Naharlagun) and New Itanagar, the temporary and permanent capital of Arunachal Pradesh respectively. During the 1991 census, this number increased from six to ten with the addition of four more census towns in the State. These are Ziro, Roing, Namsai and Khonsa. In 2001, the number of census towns rose from 10 to 17. As per the provisional census figure of 2011, the number of towns in Arunachal Pradesh increased to 27. Thus, the level of urbanisation increased from 3.70 percent in 1971 to 20.41 percent in 2001 against the all India average of 27.78 per cent. The details are given in Table 1.

TABLE 1
TRENDS IN URBANISATION OF ARUNACHAL PRADESH, 1971-2011

Year	Total Urban Population	Degree of urbanization	Number of Towns	Decennial Growth Rate (Percentage)
1971	17,288	3.70	4	-
1981	41,428	6.50	6	139.63
1991	1,10,628	12.80	10	167.04
2001	2,22,688	20.41	17	101.29
2011	3,13,446	22.67	26	40.76

Source: Census of India, 2001, census provisional 2011, Paper 2 of Arunachal Pradesh

Thus, Arunachal Pradesh had, no doubt, a late start in urbanization process but within two decades, it had overtaken Assam, which had a long history of urbanization. The growth rate of urbanization is high (101.29 per cent in 1991-2001). This fairly rapid growth of urban population deserves serious attention of urban planners. Besides, this fairly high growth rate of urbanization of the State has led to various environmental problems like solid waste accumulation. Solid Waste in urban areas popularly known as municipal solid waste (MSW) refers to materials discarded in the urban areas, which municipalities are responsible for collection, transportation and final disposal. The Ministry of Environment and Forest,

Government of India defined municipal solid wastes (MSW) as commercial and residential wastes generated in urban areas or notified areas in either solid or semi-solid form excluding industrial hazardous wastes but including treated bio-medical wastes. (The Ministry of Environment and Forest, Government of India, 2000). Thus, the municipal solid wastes (MSW) comprises of domestic waste, commercial waste, institution waste, street sweeping, industrial/trade waste debris or construction rejects, dead animals etc.

There has been a significant increase in solid waste generation in India in the last few decades. This is largely because of rapid population growth and economic development in the country resulting in an increase in migration of population to towns and cities, changing life style and consumption pattern etc. As per the information available on the website of TERI, in 1947 the cities and towns in India had generated an estimated 6 million tons of waste products, whereas in 1997, it was about 42 million tons per year. More than 25 per cent of the municipal solid waste (MSW) was still not being collected at all and 70 per cent of the Indian cities lacked adequate capacity to transport it. The waste quantities are estimated to increase from 46 million tons in 2001, to 65 million tons in 2012 (Kumar and Gaikward, 2004).

Although in Arunachal Pradesh, the true figure of solid waste management is not available, it is estimated, a net total of 230 tons of wastes is generated per day (Arunachal Pradesh Development Report, 2009). Although the figure may not be alarming but it needs the special attention of the urban planners for its proper disposal. The disposal of urban waste product is generally done by the Directorate of Urban and Housing Department, Government of Arunachal Pradesh in the absence of a Municipal body. It should be noted that the towns of Arunachal Pradesh do not have any municipal body till today. The services are provided by the Government agencies like the Directorate of Urban and Housing Department. There are three sections in this paper. The first section deals with the methodology. The second section deals the results and discussion of the study and finally the conclusion follows.

SECTION-I

METHODOLOGY

The present study was based on a survey of solid waste management undertaken by the Department of Housing and Urban Development, Government of Arunachal Pradesh. The survey was undertaken in 3 (three) consecutive days in 2006-07, i.e. on Saturday, Sunday and Monday. A random sample of around 300 households was conducted in Itanagar town in order to examine the extent and composition of solid waste accumulated by the households of Itanagar town. Finally, the houses were divided into three categories namely a) High Income

Group (HIG), b) Middle Income Group (MIG) and c) Low Income Group (LIG) on the basis of the income level. This was supplemented by a separate survey undertaken by the researches in 2010-11 in Itanagar town in order to know the awareness as well as the responses of the households regarding solid waste management provided by the Urban Department, Government of Arunachal Pradesh.

SECTION-II

RESULTS AND DISCUSSION

The survey results show that per capita waste generation per day in Itanagar town was found to be 456 gm which is higher than the estimate of around 100 gm in small towns as per the Central Pollution Control Board (CPCB), 1999. On the basis of this figure of per capita waste generated per day and assuming that the population of Itanagar town is expected to touch around 50,000 in 2011 Census, then the total waste generated in Itanagar will be around 317 tons per day. This figure is much higher than the estimate of the Central Pollution Control Board (CPCB) which states that around 12 tons per day was generated in Itanagar town in 2005 (Arunachal Pradesh Development Report, 2009). In fact the figure is nearer to the figure for Guwahati City which was estimated of around 320 tons of municipal waste per day in 2001, (Dutta, 2008). However there are little variations of waste generated on the basis of different income groups (Table 2).

TABLE 2
WASTE GENERATED PER DAY (IN KG) IN ITANAGAR TOWN ON THE BASIS OF DIFFERENT INCOME GROUP

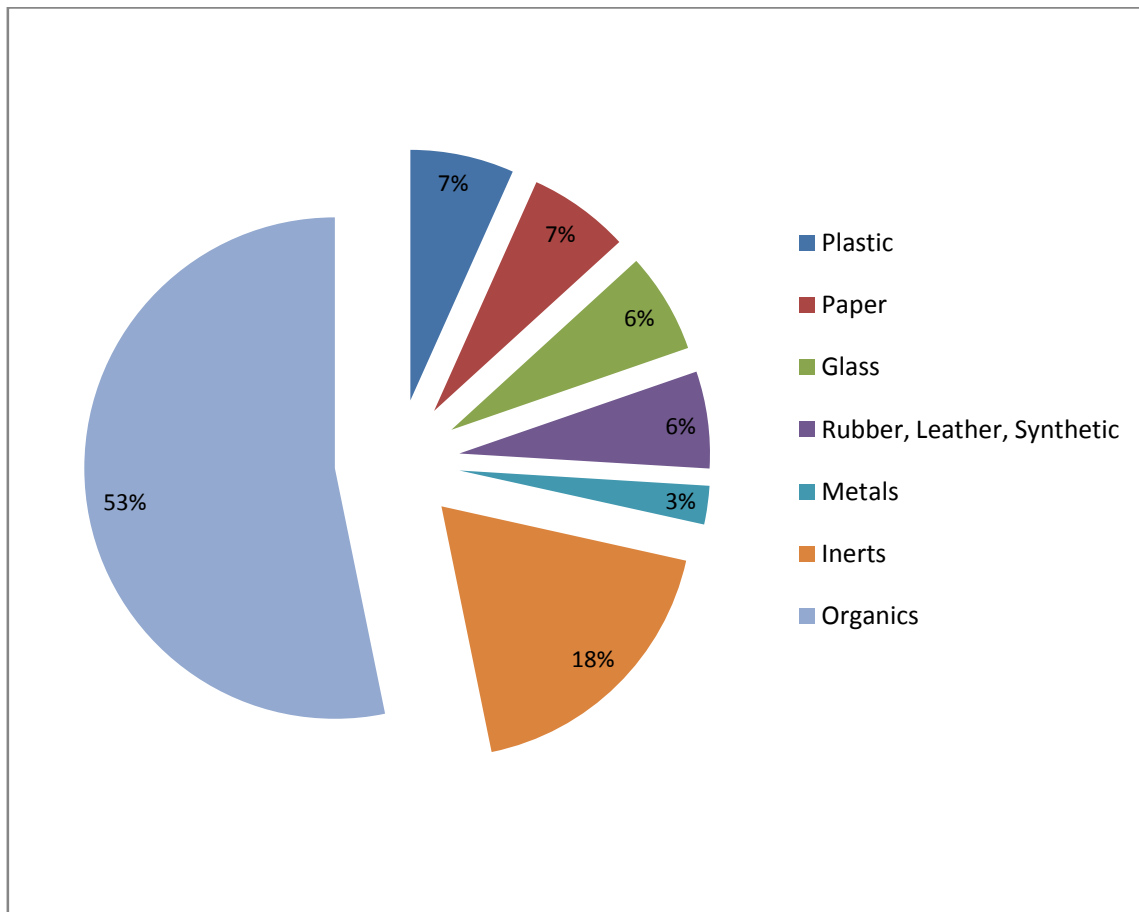
Income Group	Amount Generated (in kg)
High Income Group (HIG)	0.456
Middle Income Group(MIG)	0.416
Low Income Group (LIG)	0.464

Source: Department of Housing and Urban Development, Government of Arunachal Pradesh, Itanagar.

Table 2 shows that the per capita per day waste generated was highest among the lower income group (0.464 kg) followed by the higher income group (0.456 kg) per day and lowest waste generated was the middle income group 0.416 kg per head per day.

DIAGRAM 1

**PERCENTAGE COMPOSITION OF DIFFERENT TYPES OF WASTE
GENERATED BY HOUSEHOLDS IN ITANAGAR TOWN (PER DAY)**



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Source: Department of Housing and Urban Development, Government of Arunachal Pradesh.

Now if we look at the composition of waste generated by different income groups in Itanagar town (Diagram 1), it was found that the waste generated was a mixed kind of waste in nature. Organic waste consisted of highest (53 per cent) followed by inerts (18 per cent).Plastics consisted of 6 per cent of the total and rubber, leather and synthetics also

consisted of 6 per cent of the total waste generated. Hence, it is observed that organic waste constituted a significant part of the total waste generated in the State. It may be noted that biodegradable waste can be easily decomposed and used as compost in agriculture.

An attempt was also made to look into the different components of garbage generated on the basis of different income groups. It was found that there was not much difference in the composition of different components of garbage generated on the basis of income (Table3).

TABLE 3
PERCENTAGE COMPOSITION OF WASTE GENERATED BY HOUSEHOLDS IN
ITANAGAR TOWN ON THE BASIS OF INCOME GROUP

		INCOME GROUP					
		High Income Group (HIG)		Middle Income group (MIG)		Low Income Group (LIG)	
Sl. No.	Components of Bags	Wt. (in kg) per capita	Percentage in terms of bag	Wt. (in kg) per capita	Percentage in terms of bag	Wt. (in kg) per capita	Percentage in terms of bag
1	Plastic	0.029	6.50	0.027	6.55	0.032	6.83
2	Paper	0.030	6.59	0.027	6.45	0.031	6.59
3	Rubber, Leather and Synthetics	0.028	6.13	0.026	6.15	0.026	5.48
4	Glass	0.029	6.47	0.027	6.47	0.031	6.54
5	Metals	0.011	2.36	0.010	2.52	0.012	2.55
6	Inerts	0.082	18.12	0.077	18.50	0.086	18.42
7	Organic	0.245	53.78	0.222	53.36	0.247	52.68

Source: Department of Housing and Urban Development, Government of Arunachal Pradesh, Itanagar.

For example, among all the income categories, organic consisted of highest component of waste generated followed by inerts. However, from Table 3 it is found that plastic waste generated per head per day is the highest in the lower income group (0.032 kg) to higher income group (0.029kg). However, the rubber, leather and synthetic waste generated were found to be the highest among the high income group, 0.028 kg per head per day.

In view of the above fact, a primary household survey was undertaken regarding the people's consciousness and the nature of the problems of solid waste accumulation in Itanagar town. It was found that 56.5 per cent respondents were of the opinion that inadequate solid waste collection was the major problem in the town, followed by the problem of liquid waste (23.71 per cent) and presence of litter and illegal piles (17.39 per cent).

From our survey, it was found that as high as 30.41 per cent of surveyed household used to throw their waste product on the road sides. Around 60.86 per cent of the surveyed households throw their waste product in dustbins in the neighbourhood area. It was found that these neighbourhood dustbins were cleared on an average after every three days. Hence, as a result, 73.01 per cent of residents were not satisfied with the kind of waste disposal services. It was also found that the majority of the respondents (56.52 per cent) did not know about the final disposal of the waste product. In fact, around 60 per cent of the respondents neither know nor are interested to know regarding the question of whether final disposal is environmentally safe or not.

SECTION-III

CONCLUSION AND SUGGESTIONS

From the study it is found that in Itanagar town waste generated per day per head was quite high as compared with the all India average of small towns. However, there is not much variation among the different income groups regarding the solid waste accumulation. The residents used to throw their waste products in the neighbourhood dustbin or in the road side. The organic waste constituted a significant share of the total waste in the State. However the problem is that it is observed that there is a lack of planning for waste management in the newly created capital town. In fact, there is a lack of proper institutional set up for waste management. In view of the absence of municipal body, it is directly done by the urban department of the State Government. There is inefficiency on the part of the State government in connection with the management of waste products. For example, primary collection of waste product is not done at any place of waste generation in the town. People

throw their waste product in the neighborhood dustbin or in the roadside. It is observed that most of the residents of the locality used to throw the garbage in the by lanes. This results in littering of garbage on the road side which is not at all hygienic for the residents. The Government takes hardly any steps to clean these unhygienic spots. Hence, on the basis of the study the following suggestions are made:

- a) There is a need for improvement of the efficiency of urban department for solid waste management. The Department should try to involve the community in solid waste management, which is expected to yield a better result. An attempt may also be done to outsource the waste management to local NGOs, or private agencies.
- b) It calls for creation of better and efficient infrastructure for proper implementation of urban solid waste management.
- c) There is also a need for awareness and community participation for solid waste management in urban areas.

Finally, it can be concluded that adequate policies are needed to ensure the management of municipal waste through appropriate segregation, collection, treatment and recycling. Wherever possible the collection and conversion of organic waste into useful compost on a small scale could be undertaken with the involvement of private entrepreneur and NGOs.

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