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Challenges and Issues in Collection, Transportation and Disposal of Municipal Solid Waste in Srinagar City

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ABSTRACT:
Overburdened and ineffective collection, transportation and disposal of municipal solid waste are major environmental problem in many cities. With every fraction of increase in population, the waste generation rate also increases. People adopting higher living standard produce more per capita waste. This paper is to present a case study on municipal solid waste collection transportation and disposal in the city of Srinagar in Jammu and Kashmir in India. The present facilities and growing needs for improved collection transportation and disposal system has resulted in accumulation of solid waste within cities producing unsanitary conditions and posing risk to the inhabitants. The city of Srinagar has a land area of approximately 279 sq. km. The average generation rate of MSW in 2011 was 271 gm/capita/day. Food waste comprise of 54.99%, followed by fine earth 17%, plastics and polythene 8%, paper/cardboard 6.8%, rags 5.27% and glass/ceramics 2.97%. While all other wastes including metals, stones, bricks, rubber, leather and wood accounted for less than 4%. More than 380 metric tons of refuse and garbage are generated per day in Srinagar city. At present only 60% of total waste generated is being collected by door to door collection method and street bin systems and is transported for dumping to open landfill site which is at Syedpora Achan about 6 km from canter of Srinagar city. In order to meet the needs of growing solid waste management the study recommends establishing of timeframe for completion of works, spreading of awareness among citizens, allocating funds for improving the transportation and collection facilities and manpower, lack of proper monitoring and accountability of workers, local government and official needs to be addressed.

Keywords: A chan, landfill, solid waste, Srinagar Municipal Authority

INTRODUCTION:

Human activities generate waste materials that are often discarded because they are considered useless. These wastes are normally solid, and the word waste suggests that the material is useless and unwanted. However, many of these waste materials can be reused, and thus they can become a resource for industrial production or energy generation, if managed properly. Increasing scale of economic conditions has lead to a sharp increase in the quantity of waste generation. The term “municipal solid waste” (MSW) covers wastes from different sources: from domestic, commercial, industrial (small and cottage industries), institutional (public administration, schools, etc.) activities; from markets; and from street sweeping and the cleaning of other public areas in urban communities. The proportion of different constituents of waste varies from season to season and place to place, depending on the life style, food habits, standards of living, the extent of industrial and commercial activities in the area etc. (Katju, 2006). Ecological effects such as land degradation, water and air pollution are related to improper management of municipal solid waste (Khajuria et al. 2008)

The population of Srinagar has increased from 6.06 lacs in 2001 to 12.03 lacs in 2011 and is estimated to increase to 24.93 lacs in 2021. As a result of rapid population growth and economic development there has been a significant increase in Municipal Solid Waste generation. Due to people adopting high living standards the per capita waste generation is also going to increase. Management of municipal solid waste continues to remain as one of most neglected areas and also one of the most important. The most common problems

associated with improper management of solid waste include diseases transmission, fire hazards, odour nuisance, atmospheric and water pollution, aesthetic nuisance and economic losses.

Study area

Srinagar the summer capital of Jammu and Kashmir is located about 890 km NNW of Delhi on the banks of Jhelum River Situated an oval shaped valley. Srinagar is located in the northern most part of India between 74° 56' and 75°79' east Longitudes and 33° 18' and 44°45' North Latitudes. According to Srinagar municipal authority more than 380 metric tons of waste is presently being generated on daily basis, out of which only 60-65% is being collected. This waste is collected by door to door collection method and street bin systems and is transported for dumping to sanitary landfill site situated at Syedpora Achan about 6 km from city centre. The remaining 35-40% of waste is dumped illegally into depressions, river embankments or is locally burned. The Achan landfill is situated on the edge of Anchar wetland and has a river close to it. The cities prime hospital lies not more than half kilometre away. Srinagar city once called Venice of East is presently facing a serious problem in the form of improper solid waste disposal. As per report of Ministry of Urban Development government of India, Srinagar city was ranked as the fourth dirtiest among 423 cities of the India. The first three are noncapital cities making Srinagar the dirtiest capital city in entire country.

Methodology

The methodology adopted for collecting data with regard to collection transportation and disposal of municipal solid waste, include collection of information pertaining to solid waste management, from published documents, data available with agencies and through consultations. More data was collected from the Srinagar municipal authority about manpower, transportation facilities, data regarding primary collection. The landfill site was visited and data was collected from responsible authority's presents

Waste generation and characteristics

It is estimated that solid waste generated in small medium and large cities and towns in India is about 0.1 kg, 0.3-0.4 kg, and 0.5kg per capita per day respectively. According to study carried out by National Environmental Engineering Research Institute (NEERI) the per capita generation rate increases with the size of city and varies between 0.3-0.6 kg/d. the quantity and magnitude of actual waste generated at various sources and reaching to local dumps and final dumping site final disposal are not same. It is determined by the efficiency of collection and transportation of waste, retrieval of recyclable material at different levels and other factors.

Table 1: The physical composition of the waste is obtained as a percentage of the different constituents

S. No.	Parameters	Percent Composition for Srinagar	Permissible range (%)
1.	Metal (Ferrous/Non-ferrous)	0.47	0.0-1.55
2.	Earth/Stone/Bricks	2.73	0.5-10.0
3.	Glass/Ceramics	2.97	0.0-6.0
4.	Fine earth	17.0 1	5.0-49.0
5.	Paper/Cardboard	6.80	2.0-8.5
6.	Wooden matter	1.05	0.0-6.5
7.	Rags	5.27	0.0-6.0
8.	Rubber/Leather	0.93	0.0-10.0
9.	Plastics/Polythene	8.17	3.25-15.5
10.	Food Waste/Grass, Leaves	54.99	30.6-69.0

Collection and transportation of waste

Solid waste collection and transportation involves storage at generation and pick up points, pick up by the crew, trucks driving around the neighbourhood, and truck transport to transfer station or disposal point. The

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collection is difficult, complex and costly. Collection of solid waste typically consumes 60-80% of total solid waste budget of a community. Therefore any improvement in the collection system can reduce the overall cost significantly.

The Srinagar city has been divided into 34 wards. For collection and lifting of the city waste from interiors at ward levels hand carts, radees etc. For collection of city waste from nock and corner of city spread over 279 Sq. K.M. having 575 temporary collection points the existing garbage transportation fleet is inadequate, old and unscientific. Against the requirement of 3600 safai karamcharis the Srinagar municipal corporation is presently having only 2108 safai karamcharis, 1765 on regular basis and 343 on consolidated basis. Existing infrastructure facilities is not sufficient to cater the requirements for 100% collection of waste on door to door basis and seep the city roads which consist of 174 running km main roads and 860 km other roads. Recently the municipal corporation has provided 40 litre green dustbins to each household to collect waste for nominal payment of Rs. 100/month. New projects have been started for door to door collection of garbage. But it covers only 5% of the city population. Most people dump their waste in open spaces due to shortage of dustbins. Safai karamcharis carry out the sweeping on beat basis consisting of 100-200 households. They collect the waste from main roads, link roads and lanes and collect them in community bins. Municipal solid waste collected in community bins and other places is transported to Achan dumping site, using a variety of vehicles like non-tipping and tipping trucks, tractors, detachable trailers and hydraulic lifting system. In Srinagar municipality transportation cost is more than 75% of total expenditure made on solid waste management. The transportation of waste faces a typical problem. Waste clearance is delayed due to inadequate transportation vehicles. Trucks used are open and mostly overloaded. As a result while transportation of waste to dumping site, roads are littered creating nuisance. The vehicles are almost never cleaned. The poor maintenance of transportation vehicles and machinery results in large percentage of vehicles remaining of roads which is already facing shortage of vehicles.

Table 2: List of transport fleet Vehicle Machines of Srinagar Municipality:

S. No	Type of Vehicle	Existing Number	Actually Required
(i).	Mini Truck.	05	05
(ii).	Truck-Tipper.	24	34
(iii).	Hook Trailer (transfer station)	--	08
(iv).	1. Refuse Collector	01	10
	2. Refuse Collector Bins.	20	400
(v).	1. Dumper Placer vehicle.	12	25
	2. Dumper Bins.	110	400
(vii).	Tricycle	20	500
(viii).	Hand Carts	500	500
(ix)	Wheel Barrows	1000	150
(x).	Containerized handcarts	--	2000
(xi).	Front-End-Loader	20	20
(xii).	TATA ACE for door-to-door collection of waste	-	20
(xiii).	Road Sweeping Machines	--	04
(xiv).	Compactors for dumping site.	01	03

Disposal of Municipal Solid Waste

Srinagar at present generates more than 380 metric tons of solid waste per day. This waste in dumped in the lone sanitary landfill site in Syedpora Achan. The site is situated at a distance of 6km from city centre. The site has an area of 29 hectares. The site was in use for open dumping for the previous 25 years since 1985.

The site itself is inappropriate since it is located at the edge of Anchar wetland. On the other side it has a river well within the buffer zone. The site has a difficult approach through built up area. The expansion of residential

houses has started towards the landfill site with many houses well within 100-200m range from site. Moreover the cities prime hospital is situated at half kilometre distance from site. It was found that the waste brought to the dumping site had not undergone any separation and segregation. Segregation is completely absent. No waste is recovered for recycling. Despite the municipality efforts to ban polyethene a large quantity finds its way to the dumping site thus creating problems for compaction. Rag pickers and dog nuisance goes unchecked. A large number of dogs posing threat to the workers and people living in nearby areas were found. No proper compaction of waste is done. Site has a single bulldozer used for some little compaction occasionally. Proper soil cover is not applied which hampers the proper solid waste degradation and site has become a nuisance. The ramp providing excess to the landfill dyke was found in shabby condition making it difficult to walk on it. The site still has got capacity to absorb the city waste for next 15-20 years if waste disposal is carried out in proper scientific manner.

Table 3: Proposed Collection of MSW for different areas by Srinagar municipality

S.NO.	SOURCE OF GENERATION	COLLECTION SYSTEM	AUTHORITY
1.	Residential Areas Low Income Group Middle Income Group High Income Group	Community bins Door step House to House	Srinagar Municipality/ Own arrangement Srinagar Municipality/ Own arrangement
2.	Construction and Demolition Waste	Transportation Vehicles	Srinagar Municipality on payment basis/own arrangements
3.	Garden Waste	Community bins/ Compositing	Srinagar Municipality
4.	Shops/Commercial establishments	House to House Door Step	Own arrangements/Srinagar Municipality
5.	Vegetable Market	Community Bin	Own arrangements/Srinagar Municipality
6.	Hotel/Restaurants	House to House/ Door Step	Own arrangements /Srinagar Municipality
7.	Bio Medical waste	As per guidelines State Pollution Control of Board	Srinagar Municipality
Source: Municipal Solid Waste Collection and Disposal Site Development for Srinagar by Economic reconstruction Agency: 2006			

Conclusion and Recommendations

Srinagar city generates large amounts of municipal waste and due to inadequacy of financial and infrastructural facilities; the municipal corporation is able to attend only 65% of waste daily. Rest of the waste remain either unattended or is disposed of by open dumping. As a result of increasing population and changing life style of people the quantity of MSW is increasing rapidly. The current infrastructure facilities and the MSWM systems are inadequate in meeting the increased waste growth rate. Thus there is an urgent need to improve the present solid waste collection, transportation and disposal system both technically and financially. Focus should be kept on solving the present problems in addition to planning for long term solutions. Following recommendations can be made.

- Lack of public awareness is a major problem. More and more public participation is required to improve the existing solid waste management. The help of NGO's might be taken in this regard.

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- Solid wasted is managed only by landfill disposal. Other processing units for solid waste management and volume reduction may be setup, to decrease the burden on landfill.
- The operation of landfill at Achan is not completely scientific. Use of daily cover material should be done properly. The site should be kept free from stray animals.
- The spread of habitation near the landfill site should be checked. Proper buffer zone should be maintained.
- Funds should be provided to municipal authorities for increasing manpower for waste collection. Improved transportation facilities must be adopted.
- The transportations vehicles should be properly covered during waste dumping and should be washed regularly.
- Awareness programmes should be started for implementation of segregation at source and for following the 3R's concept i.e. reduce, reuse, and recycle.
- The municipal authority shall provide covered community bins/ garbage sheds to avoid public nuisance and effective collection of waste.
- More efforts should be made for improving the door to door waste collection

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