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COMPOST PRODUCTION THROUGH UTILIZATION OF MUNICIPAL SOLID WASTE AND SEPTAGE BY BARSHI MUNICIPAL COUNCIL

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Abstract:

Documented is a good practice conducted by Barshi Municipal Council (BMC), which effectively utilizes Municipal Solid Waste (MSW) and septage for production of compost. Barshi is an 'A' class Municipal Council in Sholapur division of Maharashtra State, situated at a distance of about 71 km from Sholapur City on its northern side. Barshi town generates about 46 tons of solid waste on daily basis; while on annual basis averagely 200 septic tanks were cleaned by Urban Local Body (ULB). With rapid increasing population, Municipal Solid Waste Management (MSWM) and septage management seems to be challenging issues for any civic administration. But Barshi Municipal Council is effectively handling both. The services related to collection of MSWM services of the Barshi have been contracted by ULB to Bharat Vikas Group, India from August 2010, but the treatment facility at Depot, is conducted by the BMC itself. It is a type of Public Private Partnership (PPP). At Depot, composting of collected MSW and septage is carried by ULB, which is auctioned on yearly basis, forming the source of revenue income for BMC. Some Geoinformatics maps based on Remote Sensing data are also made depicting necessitated phenomenon.

Keywords:
Municipal Solid Waste, Septage, Compost, Septic Tanks, Urban Local Body, Municipal Solid Waste Management, Septage Management, Public Private Partnership, Geoinformatics And Remote Sensing.

Introduction:

Municipal Solid Waste includes commercial and residential wastes generated in municipal or notified areas, in either solid or semi-solid form excluding industrial hazardous wastes, but including treated bio-medical wastes (Ministry of Environment and Forests, 2000). As per Municipal Solid Waste Management & Handling Rule 2000, notified by the Ministry of Environment and Forest, Govt. of India, it is the responsibility of ULB to safely process the waste generated. Rapid population growth and slum sprawl exerts pressure before ULBs, who are trying their level best to manage waste generated by their population.

Ministry of Urban Development intends to formulate a scheme for facilitating the ULBs in ensuring cleaning of septic tanks mechanically and proper management and treatment of septage. In developing country like India, septage management remains one of the neglected components of urban sanitation. Majority of ULBs generally dispose septage obtained from empting of septic tank into nearest water body or low lying areas or open dump it. This leads to serious health and environmental implications.

In contrast to this, BMC is efficiently utilizing MSW and septage for making compost and also generates revenue. Despite gaps in policymaking and weak MSW and septage management practices of ULBs, the paper presents identification and assessment of such good practices, which marks as an initiative towards improvement.

Aim and Objectives:

Aim: Compost Production through Utilization of Municipal Solid Waste and Septage by Barshi Municipal Council

Objectives:

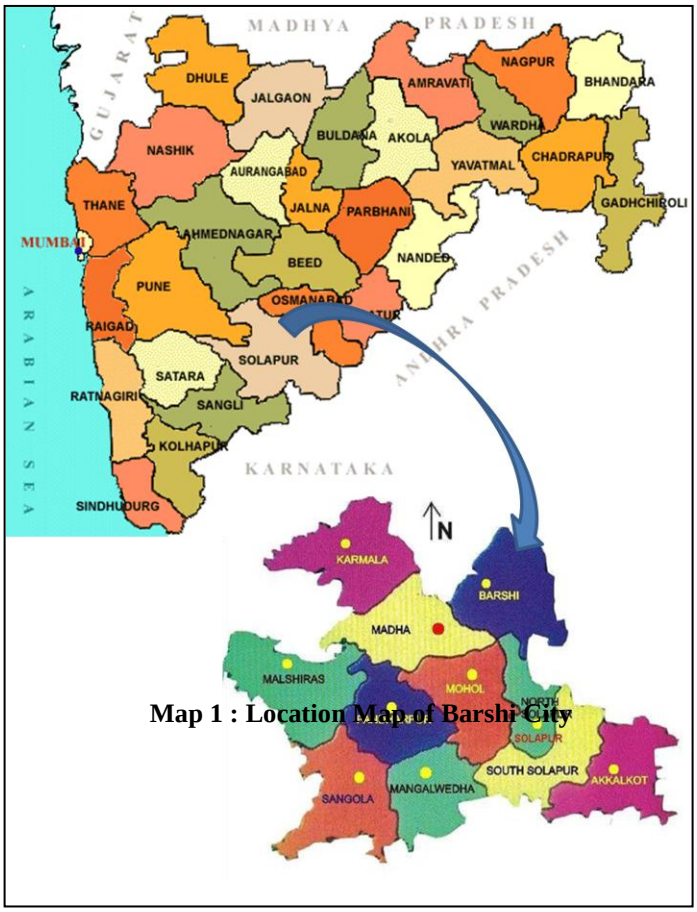
- Characterization of solid waste of Barshi city
- Processing mapping the existing system of collection, transportation and disposal of solid waste by Barshi Municipal Council
- To study the existing system of septage management by Barshi Municipal Council
- Good Practice documentation of efficiency of Barshi Municipal Council in utilization of MSW and septage for making compost
- To apply Geoinformatics in depicting locational maps and other related phenomena

Study Area:

Barshi town is situated at latitude of 18°-14’ N and longitude 73°-42’ E and at altitude of 515.62 m above sea level. All services in Barshi are provided and maintained by the Barshi Municipal Council, who is in-charge of administration in Barshi city. The city profile of Barshi is tabulated below.

General details	Year 2011
Area	36.26 Sq. Km
Population	1,18,475
No. of households	24,540
No of properties	2,25,333
No of election wards	38
No. of Slums	32

Table 1: General details of Barshi City (Source: BMC)



Map 1 : Location Map of Barshi City

Composition of Municipal Solid Waste:

The chart below shows composition of MSW in Barshi (Source- Environmental Status Report (ESR) 2009). The composition of MSW is related primarily to the standard of living and dietary habits of the population. The composition of waste is also time variant. As in Barshi, the organic content in the waste is at higher side, the collected waste is used for producing compost at Depot, which does not harm the situation.

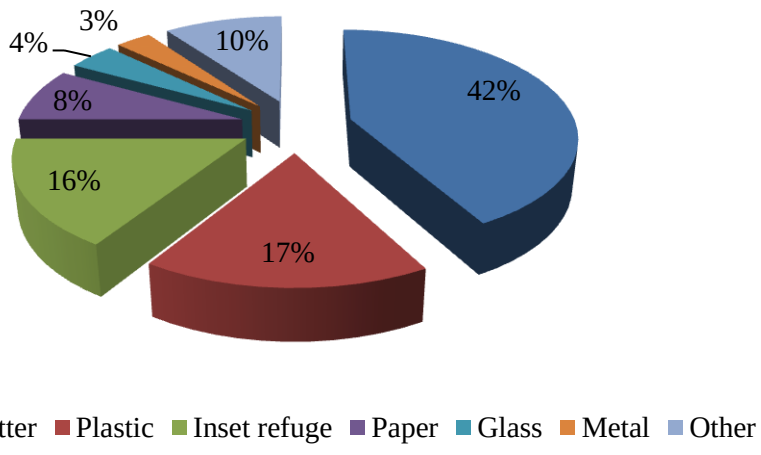


Chart 1: Composition of MSW in Barshi City (Source- Environmental Status Report 2009).

Municipal Solid Waste Profile:

Barshi town generates about 46 tons of solid waste on daily basis. Per person waste generation works out to about 439 g per day, slightly higher than the average considered as 400 g per person per day. Rapid urbanization and increase in growth rate of population accelerates the generation of municipal solid waste. The increasing population directly influences the Municipal Solid waste generated. The chart depicts the process mapping for solid waste collection in Barshi.

Figure 1: Process mapping for SWM collection in Barshi City

Barshi Municipal Council had contracted out services related to MSWM of the city to Bharat Vikas Group, India from August 2010. The service includes door to door collection, collection from open dump and secondary storage bins, road sweeping and transportation of collected solid waste to Depot. The validity of contract is for 5 years from the date of memorandum of agreement and is based on Public Private Partnership. The details of the service contracted along with costs are mentioned in table below.

Service contracted	Expenditure incurred
Cleaning & sweeping all roads in Barshi city manually and also with help of machines(tractor mounted sweeping machine); Collection & transportation of all MSW to Depot (vehicles provided by ULB)	7,98,000/-
Cleaning open & clos[illegible] from them to Depot, h[illegible]	6,11,000/-
Cleaning & repairing [illegible] and urinals within [illegible] limits of Barshi	[illegible]00/-
Total am[illegible] (per month)	**17,00,000/-**

Household level coverage
Open dump
Secondary storage bins
Collection & transportation
Depot

Bharat Vikas Group (BVG) covered all 38 wards of Barshi for the contracted services and had also deployed 1 Sweeping Machine, 1 Compactor, 5 Ape, 2 Tractors and 3

Table 2: MSWM PPP contract details of Barshi City (Source: SWM Tender document of BMC, 2010

Dumpers. According to the tender agreement, ULB also provided their 60 Laborers, 2 Work Supervisors, 3 Dumpers and 2 Tractors to BVG to reduce the expenditure on tender. BVG currently is providing 30 secondary storage bins along road side for MSW collection. Listed above sanitation services are conducted by BVG in morning once a day. Frequency of empting of secondary storage bins is done daily. BVG also extends the sanitation services as per the complaint received. The market place in city is swept twice and also the waste collection is done by BVG twice a day. BVG staff works on holidays also. The staff composed of men as well as women. For road sweeping, contractor deploys its own laborers. Out of 103.19 km of total road length, 86 km is being sweep daily in the town.

The characteristic features of services provided by BVG are:

- Mechanized technology also deployed along with manual force for road sweeping
- Primary, secondary and tertiary collection of MSW
- Mechanization of MSW handling tasks through lifting, compacting through use of compactor
- Sufficient staff strength and relatively young work force
- Extending satiation service in area where complaint is recorded within a working day

Photo plate 1: MSW phenomena

Issues in Municipal Solid Waste:

- **Non-point source:** There are different sources which generate the Municipal solid waste in large quantities which is difficult to manage. Any place where human activity is involved finds solid waste. Some people in Barshi utilize the household level coverage of solid waste services, while other throws the waste in community bins or in drains, on roads or along road side.
- **Lack of awareness in citizens:** Waste generation and waste segregation is related to attitude of society towards it. Also citizens play a major role in proper utilization and maintenance of MSWM services provided by ULB. During the field visit, it was observed on the lanes, roads are efficiently cleaned by contractor, but after the sweeping and cleaning is done, citizens again throw the waste along road sides. The issue of lack of public awareness is major affecting the overall sanitation service in Barshi. The PPP should involve public awareness also.

Septage Management:

Despite the widespread promotion of onsite sanitation systems, some of the ULBs do not address the issue of what people do with the septage that accumulates inside their septic tank. There

is absence of adequate public or private service providers for emptying septic tank with vacuum trucks. Absence of septage management services by public or private operators with mechanized equipment often leads to transport and disposal of septage several kilometers from people's homes in drains, waterways, open land, or agricultural fields. This posse a high loss to environment and soaring health risk.

But Barshi Municipal Council effectively conducts the septage management. Being a non sewered city, Barshi does not have underground sewerage network. Thus all the properties in Barshi city are depended on septic tanks, while each property in Barshi is connected to this safe disposal system.

Barshi Municipal Council addresses collection, transport, treatment, and safe disposal and reuse of treated septage from septic tanks in city. Following diagram shows complete septage cycle in Barshi.

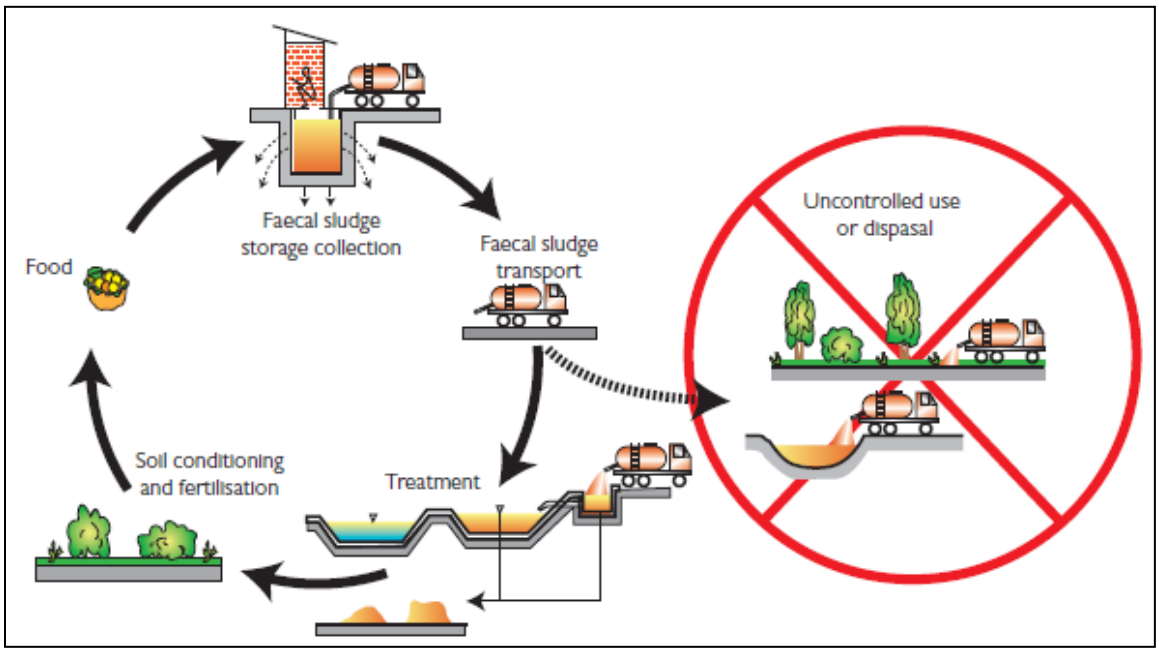


Figure 2: Septage management cycle in Barshi City

It is the role of Barshi Municipal Council to conduct the practice of emptying septic tank as well as septage management. Given the safety and health risks of manual emptying of septic tanks, BMC had deployed 2 septage suction vehicles to end this common practice of manual desludging. The photo shows the suction machine of BMC. The cost to empty septic tank within city limits is Rs. 450/per trip, while ULB charges Rs. 2500/- per trip to empty septic tank outside the city limit. Approximately 200 septic tanks are cleaned annually, which adds to revenue income of ULB.

Photo plate 2: Septage suction vehicle of BMC

Emptying of public septic tanks (septic tank connected to public toilets) is done through private contractor, using ULB's suction machines. All collected fecal sludge is used for producing compost.

Compost Production through Utilization of Municipal Solid Waste and Septage:

Organic matter constitutes 35%–40% of the municipal solid waste generated in India. This waste can be recycled by the method of composting, one of the oldest forms of disposal. Apart from being clean, cheap and safe, composting can significantly reduce the amount of disposable garbage.

Map 2: Location map of depot

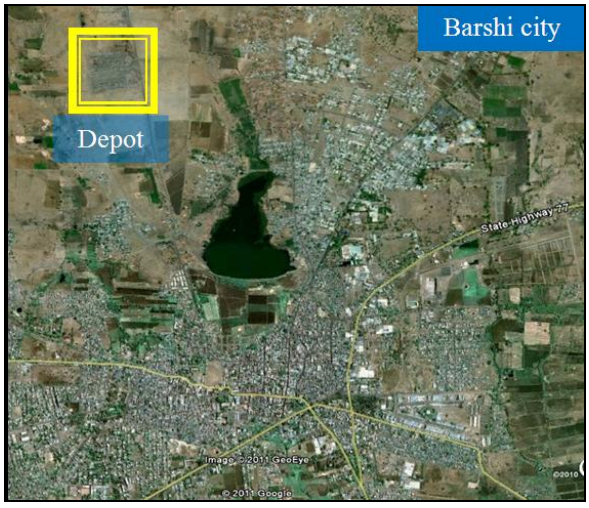


Photo Plate 3: Actual photo of the depot

The Depot is the dumping site of Barshi, where treatment of collected MSW and septage is done to produce compost. The Depot is spread over an area of 100 acre, having 326 dump pits excavated. At present is contractor (BVG, India) collects the MSW across the city and brings it to Depot. At the Depot, the ULB staff utilizes this MSW along with the septage, which the ULB suction machine collects and produces compost in the pits excavated.

Following table gives the result of solid waste test at the Depot, conducted during the winter and summer seasons in the year 2009 (Source- Environmental Status Report 2009). The parameters monitored were pH, moisture, organic carbon, nitrogen, phosphorus

and potassium. Not much variation was observed in the monitored data between the winter and summer seasons. The data shows that the site is suitable for producing compost.

No.	Parameters	Unit	Result on date 31.01.2009	Result on date 09.06.2009
1	pH	%	7.45	7.40
2	Moisture	%	28.50	26.70
3	Organic Carbon	%	12.10	12.05
4	Nitrogen	%	0.66	0.62
5	Phosphorus	%	1.20	1.15
6	Potassium	%	0.25	0.27
7	Carbon/Nitrogen Ratio		18.33	19.43

Table 2: Results of solid waste test at Depot (Source: ESR, BMC, 2009)

BMC has deployed 1 Work Supervisor and 4 laborers at depot. Firstly, they fill the excavated pit with MSW. Then the pit is set ablaze to burn the unwanted material in it as no segregation of waste is conducted. Then on this burnt and cooled pit, septage from the suction machine is poured. The pit is let a side for composting naturally. When the cracks develop on the surface of the pit, it is ready to sell. All the pits with compost are auctioned by Barshi Municipal Council in month of March every year. For the same ULB gives a public notice in the local newspaper and conducts bid on the scheduled date. ULB also maintains proper documents of bidding. Mostly local farmer takes and advantage of this compost for the agricultural purpose. This produced compost not only utilizes MSW and septage of the city but is also a source of revenue income for Barshi Municipal Council.

Photo Plate 4: A composting pit and a ready pit

Conclusion:

The waste process from Barshi in MSW and septage management shows that it can act as role model for other ULBs. BMC efficiently use the sanitation contracted services and its own staff for composting the waste and also generates revenue from the same. The farmers in the city are also benifited as they get the compost in cheaper rate from the BMC than the market rate. The open dumps is also not a issue in Barshi and the bidding of waste also clears the space for further compositng, thus

there is no accumulation of waste in city in form of open dumps. The septage is also not let into waterbodies, showing environment awarness of BMC, while succefully utilizing the septage.

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