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Depletion of Urban and Coastal Environment Related to Solid Wastes in Puri, Odisha, India

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Abstract

Urbanisation is a dynamic term refers to modern world where many anthropogenic as well as economic activities are grown up time to time. In many developing countries, urbanisation is contemporary issue. It is now experiencing that rapid number of semi urban and fringe area are converting into urban area in India. Due to rapid increase in urbanization, industrialization and population, the generation rate of Municipal Solid waste(MSW) in India Cities and towns is also increased .Municipalities in India or Urban Local Bodies(ULBs) face the challenges of keeping the town /city clean by removing the solid waste generated in residential and commercial places. Municipal Solid Waste (MSW) management is an essential, but often neglected part of the urban environmental management of the cities and towns. Due to inadequate manpower or mismanagement of Municipalities or Urban Local Bodies, the Municipal Solid Waste (MSW) can issue adverse environmental impacts, public health risk and other socio-economic problems. The urban environment services of the Puri city is dealt through many areas and affected by many factors like SWM, Water Pollution, Noise Pollution, Air Pollution, Soil Degradation and many more. Therefore the holy city has affected very much by the said activities. At the same time the coastal city is under threat by various anthropogenic activities and coastal ecosystem is also affected. This paper presents an overview of status of solid waste management of Puri Municipality, Puri City, Odisha, India. This paper can help the competent authorities or policy makers to prepare more efficient plans.

Key words: Municipal Solid Waste Management (MSW), Urban Local Bodies (ULBs), Quality of Life (QOL), Temporary Transfer Stations (TTS), fringe area.

Introduction: India is the second largest nation in term of population in the world after China, with a population of 1.21 billion, accounting for nearly 18% of world's human population but it does not have adequate system in place to treat its solid waste .Decadal population growth rate is 17.64%.India is facing a sharp contrast between its increasing urban population and available services and resources. Solid Waste Management (SWM) is

one such service where India has enormous gap to fill. Domestic and Commercial wastes are commonly termed Municipal Solid Wastes (MSW) and both account for a relatively small part of the total solid waste stream in the developed countries (Polbrasert, 1996, Gardner and Sampat, 1999, Hawken, 1999, Pipkin and Trent, 1997, Rathje and Murphy, 1992). Improper solid waste management deteriorates public health, causes environmental pollution, accelerates natural resource degradation, causes climate change and greatly impacts the quality of life of citizens. The mid-term appraisal of 9th five year plan states that solid waste management is most neglected areas of urban development. It is highly satisfactory for India that Swacha Bharat Avijan has been initiated by the Government.

Materials & Methods:

(A) Description of site: This study was undertaken in Puri City, situated (lat. 19°47'55"N, long. 85°49'5"E) on the shores of the Bay of Bengal, in the Puri District, Orissa, India. The sea beach City is popular for tourists not only Indians but also foreigners too. The sacred city of Puri, in the Indian Province of Orissa, is best known throughout the world for its great temple of Lord Shri Jagannatha. The study area landscapes are distinct. This region may be divided into two dissimilar natural divisions, (a) The littoral tract & (b) The level of alluvial tract. Climate of the area is pleasant not too hot not too cold (Max. 39.90°C in summer & 20°C in winter), medium humidity & enough rainfall on monsoon period (average rainfall-135.23cm). By railway and road it is 63 km and 60 km respectively away from Bhubaneswar, the Capital City of State. The holy city has its own identity distinguished economy, culture and lifestyle. Environmental problems are identified and also try to understand the relationship between man and environment of the surroundings.

(B) Data collection and analysis: The total field work was subdivided into three parts i.e. (1) Pre-field, (2) Field, (3) Post-field. Pre-field parts are based on collection of data, information, maps as well as check out or planning of work. Field parts are depend on observation, questionnaire survey etc. Post field parts are mainly processing of data, construction of maps and diagrams as well as report formation with proper shape and size. The survey was conducted through field level interviewing of different people from the city region, Municipal Office and waste collectors, Institutional Officials and Faculty members. The Puri Municipality maintains the solid waste management network in Puri City. The solid waste collection and transportation is carried out by the staff headed by the Health Officer. The city has been divided into 7 zones, each headed by sanitary inspector. Under the sanitary inspector there are 24 Jamaders and 464 sweepers. For better management of sanitation work, the whole Municipal area is divided into 7 (seven) conservancy District and for control the mosquito, one Malaria section functions. There are 8 members of Sanitary Inspector and 10 Conservancy Jamaders, are supervising the work of 464 Safai karmacharies. The various cleaning activities include (i) Road Cleaning, (ii) Drain cleaning, (iii) Public latrine (community latrine), (iv) Garbage loading and Unloading, (v) Spraying of Baytex, Malaria oil, Abeta for anti-mosquito development.

Primary Collection of wastes:

- **Domestic, Market and institutional Waste:** Primary collection is carried out by hand wheels borrows in the narrow lanes of the city,while in another locations wastes are lifted from the waste bins and heaps are formed on the street side. There are more than 300 hand wheel barrows owned by the municipality for the purpose of primary collection of wastes.
- **Hospital and Nursing Home Waste:** Presently there is very low facility for solid waste management of hospital wastes. At the District headquarter Hospital deep burial is done for infectious waste in a concrete cement well of 1.5 diameter and 3.5 meter depth. Other wastes are dumped along with the municipal solid waste.
- **Hotels and Restaurant waste:** Hotels and Restaurants dispose off their waste into the waste bins provided by the municipality or in heaps along the street sides.
- **Slaughter House Waste:** The slaughter house is situated along the Puri Bhubaneswar Road. About the 40-50 goats are slaughtered daily and few wheel barrow capacity of waste is generated and transferred to the compost plant. The waste is stored temporarily near the boundary wall of the slaughter house openly before being transferred to the compost plant.
- **Street Sweeping:** The timings of street sweeping are 7-11 am and 3-6 pm. However streets are swept only in the morning hours. The street swept with long handles and tins are used for lifting wastes.
- **Transportation of waste:** The waste is transported via the above mentioned vehicles to the compost plant.

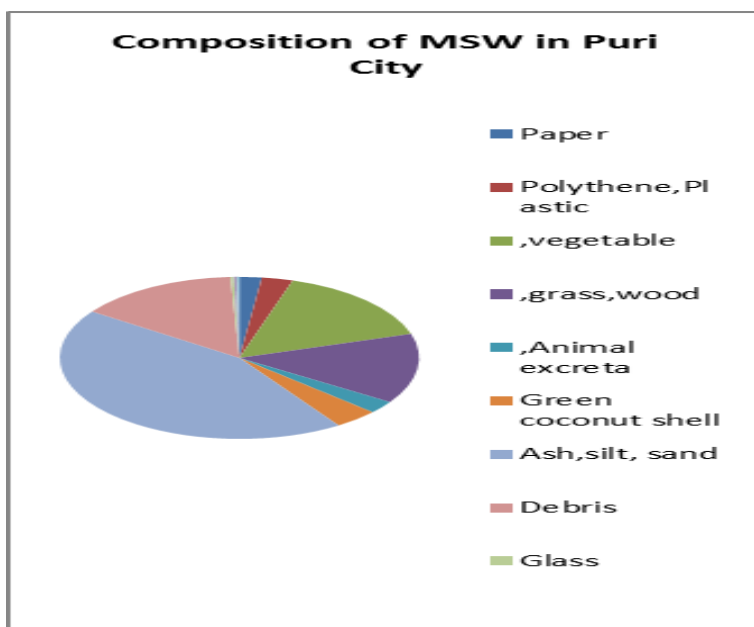


Table-1

MSW Components	Materials
Compostable	Food waste, landscape and tree trimmings etc.
Recyclables	Paper,Cardboard,Plastics,Glass,Metals etc.
Inerts	Stones and silt, bones and other inorganic materialised.

Composition	% by volume	Compostable(C)/ Recyclable(R)/ Inserts (I)
Paper	2.0	R
Polythene	2.8	R

Green leaves, vegetables	15.4	C
Dry leaves, grass, wood etc	14.0	C
Cow dung, Animal excreta	2.5	C
Green coconut shell	4.0	C
Ash, Silt, Sand	44.0	I
Debris	14.5	I
Glass	0.3	R
Leather waste	0.3	R
Metal scrap	0.2	R
Total	100	



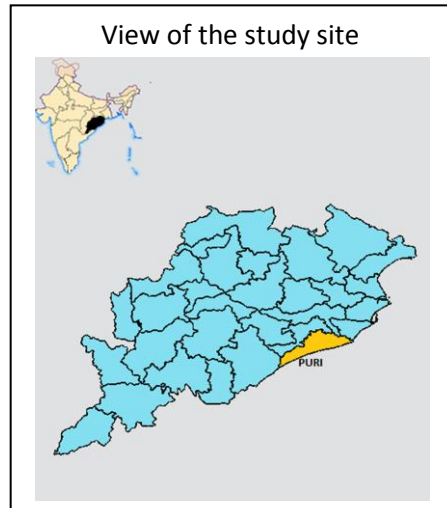
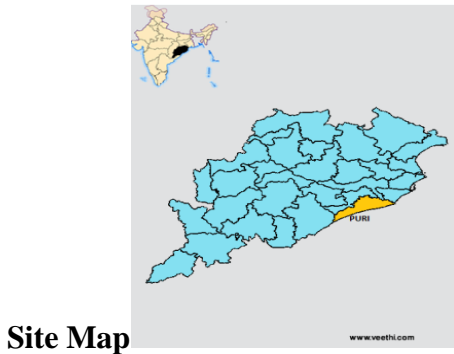


Table-3: Municipal Organisation of Puri City.

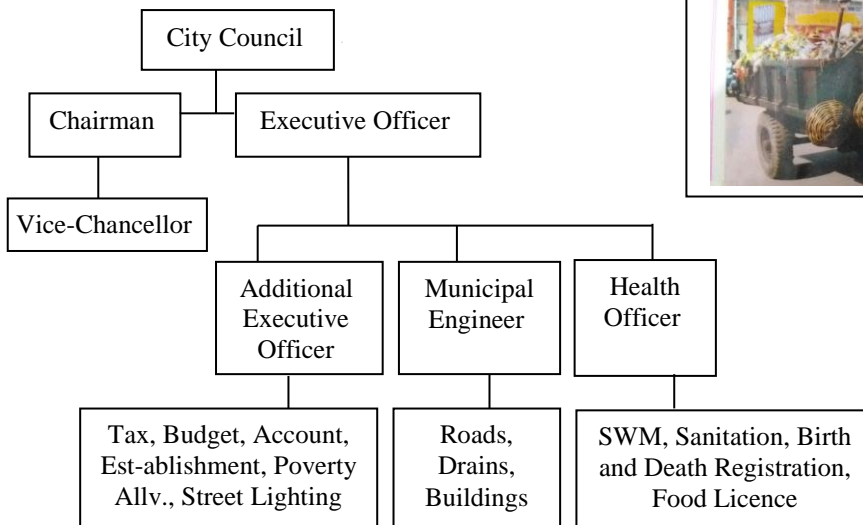
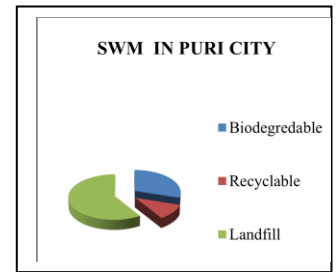


Table-4

State	City	Class (2011) Population	2001			2011		
			Population	Per capita Waste Generation (Kg/day)	SWM Generated TPD	Population	Per capita Waste Generation	SWM Generated TPD
Odisha	Puri	Class-G	157837	0.573	91	208029	0.654	136
Odisha	Bhubaneswr	Class-C	658220	0.360	237	867534	0.411	356
Odisha	Cuttack	Class-C	587182	0.296	174	773906	0.338	262
Odisha	Rourkella	Class-D	484874	0.330	160	639064	0.376	240
Odisha	Berhampore	Class-E	307792	0.351	108	405670	0.400	162
Odisha	Percentage increased in MSW generation since 2001 is 50%							

Table-5: Flow chart to treatment of solid waste in composition plant.

1	Waste collection from the town. Transport to solid waste compost plant.
2	Dumping of waste in plant site into windsocks.
3	Treatment of waste with culture powder (Bacteria inoculums)
4	Drying of treated waste.
5	Turning of waste heaps after 10, 17 and 24 days.
6	Screening in trammels of 32,16,6 and 1 mm size.
7	Semi-finished material stored in go down.
8	Screening with vibro shaker and sand separator.
9	Asperator fans to separate fine dust/sand.
10	Addition of water and inoculums.
11	Compost product.



- Apart from the 7 larger dumping areas there are 60 small waste bins called Temporary Transfer Stations placed at various locations. Waste is transferred by trucks and tractors to a solid waste compost plant for processing. As far as composition of MSW is concerned, 59% by volume is inorganic matter and rest is organic matter. The density of waste is 426Kg/Cum. And moisture content is 38%. The MSW generated in Puri City is 0.453 Kg/Person/day. During festive occasions the quantity raises 3/4 times more.

Significant issues are: The Waste is also indiscriminately dumped along major drains and water bodies posing a severe health hazard and rendering the city un-aesthetic. Door to door collection and source segregation of waste is abjectly neglected. Significant portion of collection infrastructure is reportedly damaged. Capacity of Municipality is far less than required for management of solid waste. Public awareness is at minimum level adding further to the problem.

Apart from SWM the other urban environmental problems are:

Air pollution: Air pollution consists of substances present in atmosphere in high enough levels to harm humans, other animals, plants or materials. The air quality of Puri Town is influenced by the increase in various activities like transportation, hotel industry, burning of solid waste etc. Puri is a rapidly developing town, in future the amount of vehicular traffic and other activities will only increase.

Water Pollution: Monitoring is done for five tanks thrice a year in Puri by OSPCB. The tanks are very important part of the Puri Town as they have a historic and cultural

significance. The OSPCB carries out monitoring for 7 parameters namely pH, TSS, BOD, TC, SO₄, PO₄, and NO₃. Water Pollution in the tanks already reached high levels. Another major issue is quality of the beaches in Puri. The pollution is occurring at beach is a major issue which has not been taken up due to lack of data.

Public Toilets: A number of public toilets have been built in the town to cater to the pilgrims who come to Puri on day visits from nearby villages and to the floating work-force. The amenities are however insufficient and a large number of people use beach as an open defecation ground. 8 public latrines are maintained by municipality. 12 sulabha sacuchalay are maintained by Sulabha International Social Service organisation.

Preservation of Water Bodies: The holy town of Puri has six important sacred tanks which is historically and spiritually important. They are 1. Narendra Tank. 2. Indradumna Tank. 3. Markandaya Tank. 4. Swetaganga Tank. 5. Parbati sagar Tank. 6. Chudanga Tank. Besides the above there are as many as sixty two ponds which got an affiliation to the community place. These ponds are used by the locality for their day to day needs.

Results, Discussion and Recommendations:

On the basis of above discussion and using various methodology to analyse and computing the accumulated data, we are shown that:

- 1) There is need of a brief and scientific environmental protection plan which is taken by respective government department.
- 2) Introducing social forestry along with coast line of Puri.
- 3) Introducing wastage management plan with five **R** (Reuse, Recycle, Reclamation, Refuse, Rot or Composting).
- 4) Built up a good drainage plan to remove municipal wastages.
- 5) Well defined municipal dumping yard to store waste material.
- 6) People awareness through various environmental campaigns, like as people interaction, meeting with local stake holders, organising govt. level workshop and seminar etc.
- 7) Anaerobic digestion is the latest and greatest process of in-vessel treatment of waste.
- 8) Sanitary landfill is to be use as an effective mitigation tools for prevesention environmental pollution as well as environmental degradation.
- 9) Growing awareness of the fishermen to minimise their wastage material related to their fishing activities.

Conclusion: Puri town today is the forerunner of the Jagannath culture in Orissa, which saw the flowering of several temples dedicated to Jagannath all over the world . It attracts millions of devotees throughout the year in different occasion. Puri town now is a popular as a tourist place. Today tourism provides livelihood for almost 80% people of the town. The total economy of town is dependent on the inflow of tourist population. So therefore the need of proper infrastructure cannot be ignored in city development. Therefore proper infrastructure and necessary infrastructure may be provided during the mission period so as make all intervention in protecting and preserving the heritage of the city. The city development plan can never be complete without taking into all the ritualistic aspects of the Grand Festival and without giving a complete profile of all activities and arrangement that are parts of Rath Yatra.

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