



SOLID WASTE MANAGEMENT MODEL FOR TULJAPUR PILGRIMAGE CITY, MAHARASHTRA, INDIA

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ABSTRACT

Indian pilgrim towns known for its festivities and temples have far more moments of solid waste generation than other places in the country, because of regular temple tourism activities and different religious occasions celebrated round the year. The heavy influx of pilgrims in temple towns leads to the creation of the huge amount of solid waste, besides causing various environmental problems. Since temple tourism activities are important aspects of social and culture of our society, and also for the fact that they are the primary source of economy of these temple towns it is very important to find panacea to the problem of solid waste management.

This floating population with the resident population is primary stakeholders of solid waste generation. The activities of these groups are the main reason for Solid waste generation in the city. This waste causes damage to historic sites in the town and also inconvenience to the stakeholders. Hence, the aim of the research is to review relevant literature for research methods to assess, quantify and prepare a Solid Waste Management Model for Tuljapur pilgrim city

KEYWORDS : Solid Waste Management, Pilgrim sites, Temple tourism

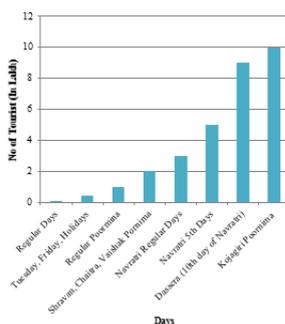
INTRODUCTION

Tuljapur town is named after the temple dedicated to goddess Tulja Bhavani. The town has an area of 416.44 hectares. And is situated in the Balaghat mountain ranges, Maharashtra. The town has a population of 31,714 and 6,563 households, according to the Census of 2001. The Tulja Bhavani temple is very important for this town's economy as 70 % of resident Population depends on the temple for its Economic activities (Shinde, 2015). Thousands of Visitors visit this pilgrim town every day. On normal days around 10,000-12,000 visitors and on busy days like Friday, Tuesday and Holidays number goes up to 45,000-50,000 and it increases up to 5 to 10 Lakh during *Navratri*. (Refer TABLE 1)

A Clean environment is an important part of the place which enriches the quality of life people around it. It should provide physical and social satisfaction to the inhabitants. But "Not in my Backyard" is a shout heard around the world. The attitude towards solving the huge growing bulk of garbage is "out of sight, out of mind". Only when this accumulation reaches a saturation of unbearable level, the public and the government authorities start talking about air and water contamination, health hazards, methane gas leakages, sheer ugliness and slowly initiate action. It has so far been curative and not preventive, as it has to be, in order to be effective. (Krishnamoorthy, 2008)

Similar situation also exists in Tuljapur where solid waste accumulation reaches to an unbearable level during busy days, thus causing the disposal of waste in historic monuments, kunds/ponds causing damage to the same (Refer Figure 1) and also causing hazards to the people and animals in the vicinity. Even after spending immense amount on waste disposal, the city has not been able to cope up with the solid waste management service requirement.

TABLE 1: ANNUAL VOLUME DISTRIBUTION OF VISITORS AT TUJABHAVANITEMPLE



Source: Tulja Bhavani Temple Trustee



Figure 1: Solid Waste disposal in Mankawati Kund, Tuljapur causing closer of springs and drying of Kunds **Source: Researcher**

SOLIDWASTE MANAGEMENT IN INDIA

In Indian Cities and towns, municipal or other Government authorities are considered responsible for the management of solid waste. A typical solid waste management system in Indian cities includes the following elements:(Khan, 1996)

- Waste generation and segregation of recyclable at the source level (Collected by Scrap dealers)
- Primary waste collection and transportation to a community bin
- Cleansing of public places and Street sweeping
- Secondary collection and transport to the waste disposal site i.e landfills/dump yards
- Collection, Transport and treatment of recyclable at all points on the solid waste pathway

Currently even through the collection and disposal of waste is taken care of by municipal or other governmental authorities in India. Treatment of recyclables is carried out by the informal sectors like rag pickers, waste pickers, scrap dealers. They play an important role in the SWM value chain by recovering valuable materials from waste, and also reducing environmental impacts by improving resource recovery. But the current methods used by these informal

sectors are unscientific and non-effective e.g. burning of waste in dump yards to recover metals from the waste. This kind of practice causes environmental degradation and health hazards to the rag pickers. By integrating this informal sector into the formal solid waste management system and by having a scientific and systematic approach towards recovering of materials, these hazards can be reduced. Thus the MoUD in its Solid Waste Management Manual suggests that by integrating this informal sector into the formal solid waste management system reduction of the overall system costs, support to the recycling industries and create new job opportunities can be achieved. (Ministry of Urban Development (MoUD), 2014)

SOLID WASTE IN TEMPLE TOWN/PILGRIMAGE CITY

In India, religion is an integrated part of life. It is an intrinsic element of the entire Indian culture. People worship God and are accustomed to going to the temples and offering different items extensively. (Gupta, 2011). As the scale of these temple increases with the increase in the number of visitors it starts affecting the economy and culture of the place positively. Many towns in India depend on the temples for their major economic activities. Thus the entire existence of these towns is based on these temples. Few examples of pilgrimage cities are Haridwar, Pandharpur, Varanasi, Tirupati, Jagannath, Shirdi, Jejuri, Alandi, Tuljapur etc.

With an increase in visitors/ pilgrims there is also increase in solid waste generation which creates severe health, sanitation hazards and environmental pollution.

Aprana Singh and Ghanshyam Gupta in their paper proves with the solid waste characterization that **the percent of** Biodegradable waste is 44.61%, non-Biodegradable waste is 22.56% and miscellaneous waste is 32.83% in their study area. (Singh, July 2011). A similar survey was conducted by Kaushik, S. and Joshi, B. D during the 2010 Kumbh festival, to find out the environmental impact of pilgrims on Mansa Devi and Chandi Devi hillock, Haridwar, India. The average composition of this total amount of solid waste during festivals and normal days, when there is visitation of 15,000 to 50,000 per day is 64 % biodegradable waste and 11% non-biodegradable and 25 % miscellaneous waste. (Kaushik, 2012). Dilip Jagdhar and P. A. Hangergakar in his paper, Characterize Municipal Waste in Pandharpur characterized waste in regular days. The inference of this survey was as following: 55% biodegradable waste, 20% non-biodegradable waste and 25% miscellaneous waste (Dipali and Hangergakar, Apr-2016)

The Biodegradable content of the Pilgrimage cities is more as compared to other contents. This organic waste, mainly consisting of food and floral waste. There is a tremendous amount of research available for utilization and management of this biodegradable component of the waste. Following are few of these researches:

Bio-gas generation:

Food, vegetable, flower waste of the city can be used for bio gas generation and since these pilgrim cities have many mega kitchens in the form of *bhojnalaya* (Temple Mess), restaurants, Hotels where there is a good potential for this energy's use.

The biogas system by ARTI (Appropriate Rural Technology Institute) is a very economically viable and effective means for solid waste management in restaurants, Hotels, Houses and *Ashrams* (Hermitage) as it can work using only household food waste and any starchy material in a biogas plant.

Puja Singh and Usha Bajpai worked on the anaerobic digestion system for methane production from flower waste. An experiment was conducted to determine the quality of gas produced. They concluded that this process eliminated the pollution effects caused due to flower disposal and also removed pollutants like BOD and TS and also produced Biogas as a byproduct (Bajpai, 2011)

Utilization of flower waste:

The foremost used offering in temples is flower waste. After fulfilling their purpose, these flowers also become an environmental menace just like the other offerings. Such flower waste can be used in different manners to produce valuable products. The enormous amount of marigold flower waste is produced in the temples can be utilized in making dyes for dyeing of cotton, wool and silk on an industrial scale. (Vankar, 2009)

Another case where floral waste management is of Ajmer Sharif Dargah of Khwaja Moinuddin Chishti, with technical assistance from CIMAP, Lucknow, the Dargah Committee has established a rose water distillation plant at the outskirts of Ajmer to recycle 15 to 18 Quintals of flowers offered daily at Dargah this also generate employment for local women. (The Indian Express, 2010)

METHODS

Ministry of Urban Development with GIZ Germany has prepared a Manual for Municipal Solid Waste Management this manual suggests to Quartering & Coining Sampling Procedure by taking 10 kg of homogeneous solid waste for Waste Quantification. The density of waste (mass per unit volume, kg/m³), Moisture content, Calorific Value, Biochemical Characteristics like Chemical characteristics, Biochemical characteristics, Toxicity are analyzed as all these factors are very important for selection of appropriate collection, transportation, processing, treatment and disposal practices. (Ministry of Urban Development (MoUD), 2014)

PREPARATION OF A MUNICIPAL SOLID WASTE MANAGEMENT PLAN

To deal with the environmental improvement of such pilgrim places in the state of Maharashtra. MPCB has Undertaken specific project in Shirdi, Shani Shingnapur and Alandi. This project is based on the concept of the eco-city project undertaken and implemented by the MoEF/CPCB at places like Mathura, Vrindavan, etc. The Entire project is divided into 14 tasks catering to environmental, tourism and archeological-historic needs of these places. This Project states that it is very important to formulate an integrated solid waste management plan which fulfills the MSW Rules (2000) requirements and also functions efficiently during peak tourist seasons (MPCB, 2004-05)

CONCLUSION

Even though there is a tremendous amount of research available for this waste treatment, lack of management system, Lack of community awareness and interest and coordination between government departments and contextual understanding has led to constraints in development of Solid Waste Management System.

The organic fraction of pilgrimage cities is an important component, not only because it constitutes a sizable fraction of the solid waste, but also because of its potential for reuse.

There is a huge fluctuation in the number of devotees visiting these pilgrim cities throughout the year as current dates are considered very auspicious for temple visitation. This also led to the huge variation in Solid waste generation at these places.

A proper Systematic approach for collection, transportation and treatment of waste is required with a contextual understanding of the place. Modern technologies should be used for the same. This waste should be treated in decentralized manner as much as possible as centralized treatments are not cost and management efficient.

MPCB: Maharashtra Pollution Control Board

CPCB: Central Pollution Control Board

MoEF: Ministry of Environment, Forest

SWM: Solid Waste Management

BOD: Biological Oxygen Demand

TS: Total Solids

REFERENCES:

1. Bajpai, S. a. (2011). Anaerobic digestion of flower waste for methane production: An alternative energy source. Lucknow: Wiley Online Library.
2. Dipali and Hangerakar. (Apr-2016). Characteristics of Municipal Waste in Pandharpur. International Research Journal of Engineering and Technology (IRJET), Volume: 03 Issue: 04.
3. Gupta, A. S. (2011). Generated household and temple waste in Chitrakoot, a pilgrimage point in India: Their management and. Indian Journal of Science and Technology, Vol. 4 No. 7.
4. Kaushik, B. a. (2012). Solid waste management at Mansa Devi and Chandvi Devi temples in the Shivalik foothills, during Kumbh. Uttarakhand: sciencepub.net.
5. Khan, M. R. (1996). Conversion and utilization of waste materials. Washington, DC: Taylor & Francis.
6. Krishnamoorthy, B. (2008). Environmental Management. Mumbai: Eastern Economy Edition.
7. Ministry of Urban Development (MoUD). (2014). MUNICIPAL SOLID WASTE MANUAL.
8. MPCB. (2004-05). Annual Report Places with a Religious significance in Maharashtra. Mumbai: Maharashtra Pollution Control Board (MPCB).
9. Shinde, K. A. (2015). Placing communitas: Spatiality and ritual performances in Indian. Research Gate, 335-352.
10. Singh, A. (July 2011). Generated household and temple waste in Chitrakoot, a pilgrimage point in India: Their management and. Chitrakoot, Satna, Madhya Pradesh: Indian Journal of Science and Technology.
11. The Indian Express. (2010, May 10). Archive. Retrieved from Journalism of Courage-Archive: <http://archive.indianexpress.com/news/with-cimap-help-flowers-at-ajmer-dargah-to-bring-jobs/616548/>
12. Vankar, P. S. (2009). Utilization of Temple Waste Flower- *Tagetes erecta* for Dyeing of Cotton, Wool, Silk on Industrial Scale. Journal of Textile and Apparel Technology Manage, 1-15.