

Quantification of the Temple Waste of Jaipur City

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Abstract—Increasing amount of solid waste and its disposal is an issue worldwide. As the rate of generation of solid waste is continuously increasing, the issues related to its environment friendly disposal are also growing. Problems related to the proper management of solid waste are more prominent in developing nations than in developed nations. Besides the general basic categories of solid waste like domestic waste, industrial waste, agricultural waste, etc another important category which can be considered in India is temple waste. Many festivals and rituals are being celebrated round the year in temples, where people present different offerings to the deities. These offerings after fulfilling their purpose are dumped in some water body or are left untreated in open. This proportion of waste generally does not get any attention and contributes to deterioration of the environment. To find out sustainable ways to manage the solid waste, quantification of the total solid waste of ten popular temple of Jaipur city was done. In addition to this, general information about the waste and its management from the selected temple was collected through questionnaire, in order to attain the concept of “GREEN TEMPLE”. It was found from the study that out of ten, four temples generated waste below 30 kg, four temples generated waste about 50 kg and two temples generated above 100 kg. It has been concluded from our study that a huge quantity of biodegradable waste is generated from temples. Further studies can be conducted to find sustainable methods to utilize this to develop some valuable products like biogas/vermicompost/perfume/scent sticks/handmade paper etc. so that the green temple concept can be implemented for sustainable waste management.

Keywords: solid waste, quantification, waste management, sustainable development and green temple.

1. INTRODUCTION

Degradation of environment is a major cause of concern for the world today and one of the major causes of degradation is the solid waste and issues related to its disposal. Every human activity causes the generation of solid waste, which is generally discarded as useless or unwanted (Bundela *et al*, 2010). Solid wastes are those organic and inorganic waste materials produced by various activities of the society, which have lost their value to the first user. Solid waste can be categorized into different types based on the source such as residential waste, commercial waste, institutional waste, municipal waste, etc. (Das and Baishya, 2017).

A trend of significant increase in solid waste generation has been recorded worldwide. India being a country of spirituality and temples offers a unique share of flower wastes into the total solid waste generated, although flower wastes are included into organic wastes which make up for over 70% (Rajput *et al*, 2009) of the total solid wastes. Flower wastes vary from city to city, some cities in India are specially known for temples and pilgrimages, in such cases the flower waste content in the waste is increased, and over tenfold during special occasions like festivals, religious ceremonies, etc. Some of the major flowers offered in temples are: *Jasmine*, *Marigold*, *Chrysanthemum*, *China Rose*, *Rose* etc. these flowers are either discarded as waste or given for decoration and to devotees, whichever way it be they are finally thrown away and find their way into environment unless handled otherwise (Ravishankar *et al*, 2014).

Jaipur is popularly known as a city of temples; local as well as people from all over the country visits the city for religious purposes and usually offers flowers to Gods and Goddesses (Jain, 2016). Improper disposal of floral waste leads to numerous environmental problems. Keeping in view this problem a study was conducted in the popular temples of Jaipur city with the aim to manage the waste. Objectives of the study were to quantify and segregate the total solid waste into biodegradable and non biodegradable components so that the flowers could be separated from total waste.

2. METHODOLOGY

2.1 Selection of popular temples of Jaipur

Jaipur is well known for its temples and heritage values. It is also known as “*Chhoti Kashi*” due to its religious significance. There are temples in almost every part of the city (Tiwari and Juneja, 2016). Since the study deals with the flower waste management; quantification of the solid waste generated from temples waste was done for which ten temples were selected on the basis of their popularity and regular availability of flowers. **Figure 1** shows the location of ten popular temples of the city most of them are concentrated into the walled city. *Shila Mata* temple in *Amer* is the only temple from the selected ones which is in the outskirts of the city.

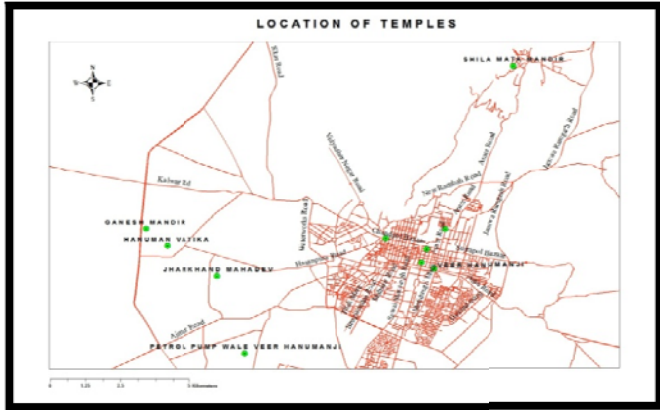


Figure 1: Location of selected temples of Jaipur city

2.2 Visit to the temples on specific days

After selecting the temples, on the basis of the number of devotees visiting that particular temple due to the religious beliefs attached to a specific God, regular visits were made to the respected temples on specific days of the week. In order to get fair results and average of the waste generated, each temple was visited thrice according to the days selected. **Table 1** shows the schedule of visits to the selected temples.

Table 1: Schedule of visit to the selected temples

Name of Temples	Month of Visit	Day of Visit
Jharkhand Mahadev Temple	November and December	Mondays
Tadkeshwar Temple	December	Mondays
Hanuman Vatika	September and October	Tuesdays
Shila Mata Temple	October	Navratri
Chandpole Wale Hanuman Ji	December	Tuesdays
Chote Hanuman Ji	January and December	Tuesdays
Sai Baba Chaura Rasta	January	Thursdays
Ganesh Ji Temple	December	Wednesdays
Veer Hanuman Temple (Paschim Mukhi)	August	Tuesdays
Veer Hanuman Temple (Dakshin Mukhi)	August	Tuesdays

2.3 Collection of data (from temple authorities)

For getting reliable information on the necessary inputs for the proposed study, a suitable schedule was designed to get the approximate data involving the number of visitors visiting the

temple, quantity of the waste generated on daily/festivals basis and the current methods of disposal being followed in the selected temples.

2.4 Collection of total solid waste and its quantification

Floral waste was collected during visits from all the selected temples on the specific days mentioned. Waste was collected either in basket or in disposable bags. Total waste collected from the selected temples was thereafter weighed at the site, using the spring balance.

2.5 Segregation and quantification of the waste

After weighing the total solid waste collectively, it was segregated into biodegradable and non-biodegradable components. Further the different categories were weighed separately and analysed.

2.6 Sorting of flowers

From the segregated biodegradable waste, the floral waste was sorted out.

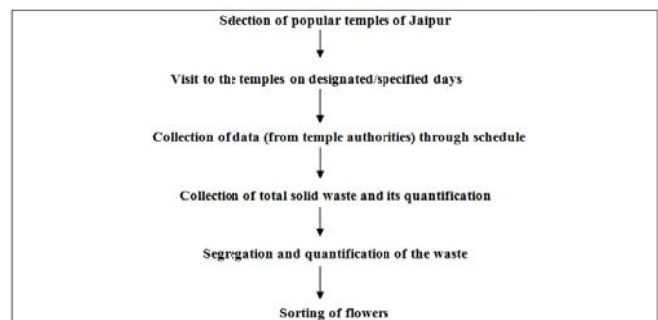


Figure 2: schematic representation of the work plan

3. RESULTS AND DISCUSSION

3.1 Collection of data (from temple authorities)

On analyzing the data collected from temple authorities through schedule, it was concluded that the number of visitors varied from temple to temple and accordingly the amount of offerings also varied. Out of all the offerings like *prasad*, coconut, *etc.*, flowers and garlands were common in every temple. It was observed that none of the ten selected temples followed any kind of waste management system. The temple authorities, along with other solid waste, discarded the floral waste either on road sides or collected by municipality vans from temples.

3.2 Segregation and quantification of solid waste

It was found that in all the temples, the entire solid waste (including the floral waste) was discarded in open either the temple premises or outside the temples on road sides. However, the waste finally gets picked up by the municipalities van. An accurate assessment of the quantity and

characteristics generated is very important in formulating the solid waste management plans in any temple. The following table (Table 2) presents the amount and types of waste generated in the popular temples of Jaipur city.

Table 2: Quantification of the total waste collected from different temples.

Name of Temple	Average of total waste (kg)	Average weight of non-biodegradable waste (kg)	Average weight of biodegradable waste (kg)	Biodegradable waste (in %)
Hanuman Vatika	27.6		27.6	100
Amer Temple	42.3		42.3	100
Jharkhand Mahadev	242.3	4	238.8	98.5
Tarkeshwar Ji	342.3	2.3	340	99.32
Chandpol Hanuman Ji	40		40	100
Ganesh Ji	30		30	100
Chote Hanuman Ji	51		51	100
Sai Baba (Chaura Rasta)	52.3		52.3	100
Veer Hanuman (Sanganeri Gate left)	43		43	100
Veer Hanuman (Sanganeri Gate right)	61.6		61.6	100

On interpreting the results summarized in Table 2 it was observed that the total waste generated and proportion of biodegradable and non biodegradable waste, varied from temple to temple. The temple waste ranged from few kgs i.e. 27 kgs to 300 kgs per day. Waste generated from *Jharkhand Mahadev* and *Tarkeshwar Ji* contributed substantially to the total generation of waste per day which comprised of 238.8 kgs and 340 kgs respectively. On the other hand the minimum contribution was from *Hanuman vatika* and *Ganesh ji* temples i.e. 27.6 kgs and 30 kgs respectively. Out of all the selected temples solid waste of *Jharkhand Mahadev* and *Tarkeshwar Ji* temples contained non biodegradable waste besides the biodegradable waste, while in rest of the temples only biodegradable solid waste was found. The non biodegradable waste found in aforementioned two temples basically consisted of milk packets thrown away after offering milk to Lord Shiva. During collection of waste it was also observed that few temples like *Shila mata temple* of *Amer*, *Chandpole Hanuman Ji* and *Sai Baba temple (Chaura Rasta)* have

completely banned the use of polythene and other plastic items in their premises.

3.3 Segregation of flowers

After weighing total solid waste, the non biodegradable waste was removed and the biodegradable waste was further sorted. The biodegradable waste was analyzed for different components in terms of the varieties of flowers and other materials like vegetables, fruits, coconut shells, leaves, buds, etc. It was observed that the most commonly found flowers were *Jasmine*, *Chrysanthimum*, *Rose*, *Marigold* and *Ankra* flowers. However, quantity of rose and marigold was the highest.

4. CONCLUSION

It is concluded from the study that some of the temples of Jaipur city generate moderate amount ranging from 30-50 kgs of, while rest of the temples generated in huge amount ranging from 100-300 kgs. There is no proper waste management system in any of the selected temples, infact the waste generated is either thrown on road sides or is collected by the municipality vans to be dumped at dumping yards. The amount of waste generated from temples increases up to ten folds during festivals and other special occasions. As this proportion of waste is organic, therefore it can be utilized in making of some useful products like handmade paper, vermicomposting, holi colors, incense sticks, etc. in temples. The product manufactured can eventually generate additional revenues for sustainably managed temples.

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