

# TEMPLE FLORAL WASTE UTILIZATION

## A review for case of Bhubaneswar

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**Abstract** An increasing amount of waste generation, its disposal and treatment have become a worldwide issue now. The rate of various types of waste is continuously increasing by each passing day and it is becoming difficult to deal with the waste collection, its processing, and treatment. The problems related to the management of the waste generated are more in developing nations than in places which have already been developed. India is a developing nation and besides the general categories of waste like industrial waste, e-waste, domestic waste, etc. there is one more category of waste that can be considered in the case of India is the Temple waste or majorly the Temple flower waste. India is a country of festivals and rituals. Many festivals, rituals, and worship of different deities are practiced here. People present offerings in the form of flowers and Prasad etc and these offerings after fulfilling their purpose are dumped into some water body or left untreated in open. Certain measures and management methods can be adopted for such type of organic biodegradable flower waste to avoid its hazards and negative effects and also to further utilize the same floral or flower waste for making usable eco-friendly daily use products.

**Keywords** — Floral waste, Temple, Floral waste management, Waste generation, India, Bhubaneswar

### I. INTRODUCTION

India is the country of spirituality, beliefs and, prayers. To this, the flowers offerings to the temples offer a not so negligible amount of waste in the total count of the solid waste. These wastes vary from city to city and temple to temple [1]. Some cities in India are well known for its temples and pilgrimages, like the city of Bhubaneswar which is considered as the temple city or the city of temples. Being considered as the city of temples Bhubaneswar there is an increased flower waste in the total waste generated. Apart from this, the flowers that have already been offered at the temples are considered as sacred and treatment and care of the same is avoided. The improper treatment and management leads to the improper decomposition of such organic waste and finally ends up in rivers and other water bodies emitting a foul smell, danger to aquatic life and increasing environmental and human health risks. These wastes are fully biodegradable, due to the organic nature of the waste there are a number of management and treatment methods for it to avoid the hazards it can create on animal, human and environment [2], [5].

Present day, the management of waste is being done in all parts of the world. Methods are adapted to avoid, manage and treat these wastes in a very low initial and operational cost and in an eco-friendly manner. The result of such management gains useful products that are eco-friendly and sustainable [2], [3].

### II. CITY PROFILE

Bhubaneswar, the capital city of Odisha replaced Cuttack as the capital of Odisha in the year 1949. This temple city is designed by Otto Konigsberger in the year 1946. It also considered as the Temple City is also known as Ekamra Kshetra, *Ekamra Kshetra* that can be translated to mean area (kshetra) covered by mango trees (*ekamra*). As mentioned in a historical treatise, the presiding state of God Lingaraj was under a mango tree and hence the name *Ekamra Kshetra* gave birth to itself. The temple city of Bhubaneswar with a number of ancient sandstone temples, heritage ponds, and water tanks. The name temple city developed because of the presence of more than 700 temples in the city. All these temples are unique in its character from the type of deities worshipped here and the marvelous architectural structures in which they reside [22].

The temple city Bhubaneswar consists of an endless number of temples and an endless number of devotees. Each deity is worshipped majorly twice a day with a huge amount of Flower offerings. The flowers are of different varieties and species. The flowers after fulfilling the purpose and the next day is dumped into some water body or left open on ground. No such specific treatment or management is done to it.

So, if the flower waste that is being generated by the different temple offerings be managed, treated and recycled to give birth to new products that can be further utilized on

day to day basis can lead to a floral waste management system. This floral waste management system will not only deal with the management of floral waste but also, give rise to new products like incense sticks, natural dye, handmade paper, decorative items etc. and generate employment and economy as well.

### III. FLORAL WASTE MANAGEMENT AND RECYCLING PROCESSES ACROSS INDIA

#### A. Case of Jaipur city - Quantification of the Temple Waste of Jaipur City

All the information about the waste and its management was collected from the selected temples through a survey in order to attain a concept of 'green temple' in the future. It was noticed that four out of ten temples generated a waste of less than 30kgs, for out of the rest generated waste of about 50kgs and two of the 10 temples generated waste more than 100kgs. The waste was largely biodegradable. They proceeded with further study on the methods to be adopted for the management of the waste and utilization of the waste to convert into some valuable products like biogas, vermicompost, perfume, scent sticks, handmade paper, etc. so that sustainable waste management can be done for the 'green temple' concept [1], [5], [12].

Method used – Vermicomposting [1]

#### B. HelpUsGreen initiative in the city of Kanpur, Uttar Pradesh

The waste management initiative was started by a social enterprise 'HelpUsGreen' with a number of 18kgs of temple floral waste initially. Today the enterprise has successfully recycled 2,753 metric tonnes of flower waste. This project has given employment to the local women there and it is a part of the bigger project of cleaning the Ganges and making it pollution free [6], [7].

Method used – Organic extraction, composting [6], [7]

#### C. Ganesh Temple, Sangli, Maharashtra

Method used – Vermicomposting was the method used by the Ganesh Temple to treat their flower waste generated. The effluent produced by the biogas digester was mixed to the temple flower waste and cow dung in a certain proportion and then allowed to decompose for a period of 30days at a temperature of 30°C [3], [10], [12]. The result was a kind of vermicompost that was used as a fertilizer for flowering plants and they resulted in good growth of the plants in respect to its overall growth and flower-bearing capacity. Hence, vermicomposting was one eco-friendly method for flower waste management [11], [12].

### IV. PRODUCTS EVOLVED AFTER WASTE UTILIZATION

Khan and Rehman (2005) worked on the extraction and analysis of essential oil of Rosa species, they evaluated various parameters like oil yield, color and other physical

and chemical properties of two different species of rose that are Rosa Damascena and Rosa Centifolia. They concluded from their study that there was a quantitative and qualitative difference in chemical composition, aroma constituents of essential oil of two species [12].

Shri Mahakaleshwar temple is from one of the 12 Jyotirlingas in India and produces around 3 tonnes of organic waste which mainly consist of flowers. Agarwal; (2011) commenced a study to produce energy from the temple waste [14]. He used flower and kitchen waste to produce biogas and vermicompost from them. At Mahakaleshwar, mahakumbh takes place every 12th year, therefore he tried to develop a system there to generate energy from that waste [15], [9], [19].

Sl/No	Technologies Available	Product/Process	Technology Provider
1	Technology for utilization of waste	Incense sticks from waste flowers	CSIR- Central Institute of Medicinal and Aromatic Plants, Lucknow Website : www.cimap.res.in
2	Dehydration of flowers & foliage technologies	Artistic greeting cards, wall plates, landscapes, three dimensional interior decorative items, etc.	CSIR-National Botanical Research Institute, Lucknow Website: www.nbri.res.in
3	Eco-friendly dyeing and antibacterial finishing of soya bean protein fabric using waste flowers from temples	Natural dye	Department of Fibres and Textile Processing Technology, Institute of Chemical Technology, Matunga (E), Mumbai-400019, India mdt9pub@gmail.com ; javed_uict@yahoo.co.in
4	Production of Vermicompost from Temple Waste	Vermicomposting of temple waste is an excellent and eco-friendly method of temple waste management.	Department of Microbiology, K. W. College, Sangli, Maharashtra and Department of Biotechnology, Fergusson College, Maharashtra
5	Utilization of temple waste flower for dyeing of Cotton, Wool and Silk on industrial scale	_____	Indian Institute of Technology, Kanpur

Figure 1 – the technologies available, process involved and the product evolved

Sugar syrup and other food products can also be prepared by the use of floral waste. The extract from the mahua flowers is used in the preparation of jams, jellies, biscuits, etc. Marigold flower is a natural source of xanthophyll and its extract can be used as an additive in many of the food industries [5], [11], [12].

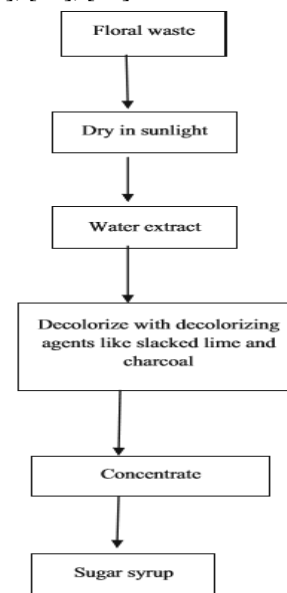


Figure 3 – Production of sugar syrup from floral waste

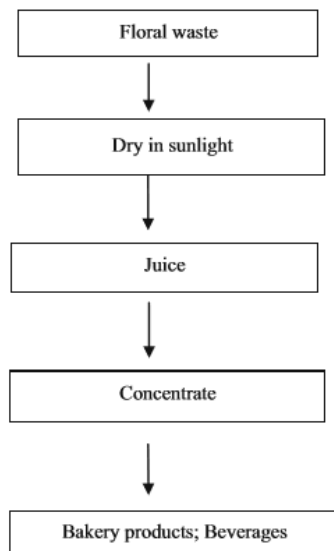


Figure 2 – Bakery products and beverage from the mahua flower waste

Floral waste also acts as a sustainable source of raw material for the production of handmade paper. Recycling and reusing the floral waste in the form of paper is the new practice developed [5], [11], [12]. The paper thus developed is free from wood and all other chemicals and has no harmful by-products during its manufacture.

## V. FLORAL WASTE QUANTIFICATION AND MANAGEMENT METHODOLOGY

For Bhubaneswar, in addition to all the information about the quantification and management of floral waste gathered from the above data the following points can be used for the same in the case of Bhubaneswar to develop the concept of ‘green temple’ – selection of the temples from the city through questionnaire survey, out of the selected temples, specify the days of worship when the temple offering is more and the temple produces more floral waste, collection of the waste from the temple, leaves, and weight of the waste from different temples. Categorization of the waste depending upon the type of flower and study about the species of the flower. Identifying and quantifying the waste and then utilization of the same to convert into value-added products by adopting eco-friendly and sustainable means like vermicomposting.

## VI. CONCLUSION

The waste from the temples is neglected and remains untreated for long. This negligence cause harm to the aquatic animals of the water bodies where the waste has been dumped into, also due to the open dumping practice of the floral waste it causes foul odor and breeding ground for the flies causing harm to the environment and health [1], [16]. This review study suggested that in the present day vermicomposting technique of management and treatment of the floral waste is successful and can be successfully applied without causing any damage to the human animal

and environment. Cost effective and pollution free method can be adopted on a large scale to manage the floral waste that is being generated in different parts of the country[3], [17].Vermicomposting is one such method for the management of the floral waste that is practiced on a wider scale than any other methods. Other methods used for the management of floral waste gives rise to valuable products like biogas, natural dye, essential oils, food products, handmade paper, incense sticks, and cones, etc. Awareness among the people is needed to understand the flower waste and the benefits it can cause even after it is disposed of the temple after the offering. Sustainable methods should be used and practiced by the people and the citizens to recycle and reuse the flower waste generated [6], [7].

Considering a future detailed study, data collection and analysis of the data for the temple floral waste in Bhubaneswar, a Temple Floral Waste Management Plan can be implemented at city level. Major Temples can be selected for the study to make the result more accurate and precise and to find the appropriate method for floral waste management in context of Bhubaneswar.

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