

Solid Waste Management in **Bhaktapur Municipality**



His Majesty's Government
Ministry of Local Development
Solid Waste Management and Resource Mobilisation Center



Clean Energy Nepal



Environment and Public Health Organisation

Preface

Solid Waste Management in Bhaktapur Municipality¹ is one among a series of 58 reports, which briefly describes the current situation of solid waste management in each of the 58 municipalities in Nepal. The information presented in this report was obtained from a review of relevant literature, interviews with key municipal staff as well as other stakeholders, and a waste generation and composition survey. As the report is based on information collected over a short period, including a one-week field visit conducted in September 2003, this is not a comprehensive study, but it provides a brief overview of the solid waste management situation in the municipality.

This study was commissioned by Solid Waste Management and Resource Mobilisation Centre (SWMRMC) of the Ministry of Local Development. A team of four experts, Dr. Nawa Raj Khatiwada, Bhushan Tuladhar, Ashok Tuladhar and Dinesh Raj Manandhar, coordinated the study. The field investigations in each of the 58 municipalities were conducted by a team of environmental officers under the guidance of the coordination team.

This series of reports will be valuable for researchers as well as planners and managers of solid waste management systems. An analysis of the key findings from all the 58 municipalities is presented in a separate report published by SWMRMC.

Clean Energy Nepal (CEN) and Environment and Public Health Organization (ENPHO) wishes to thank Mr. Surya Man Shakya, General Manager of SWMRMC, for taking this bold and innovative initiative of gathering information on the solid waste management situation in all the 58 municipalities of Nepal for the first time. We also wish to thank the coordination team, as well as Mr. Murali Ranjit and Mr. Nirmal Acharya of SWMRMC, for their valuable input. Finally, we are very grateful to all the environmental officers who visited the municipalities to collect the required information and the municipal staff and the local people who have provided us with this information.

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¹ This report was prepared by Bhushan Tuladhar and Gopal Raj Joshi based on field investigations done by Amrita Sharma.

1 Introduction

Bhaktapur is a mid-sized municipality located 12 km East of Kathmandu Metropolitan City, within the Kathmandu Valley. This historic city, which is also the Headquarter of Bhaktapur District, is renowned for its elegant art, fabulous culture, colorful festivals, traditional dances and the typical Newar lifestyle. The city attracts thousands of tourists each year and the historic Bhaktapur Durbar Square has been listed as a World Heritage Site by UNESCO.

Table 1: Background Information

NAME	BHAKTAPUR MUNICIPALITY
District	Bhaktapur
Year of Establishment	2006 B.S.
No. of Wards	17
No. of Urban Wards	NA
No. of Rural and semi urban Wards	NA
Total Area	6.56 sq. km
Built-up Area	NA
Major Rivers and Ponds	Hanumante River Khashyan - khusung stream
Total Road length	Black-topped: 10.6 km Earthen: 6km
Population (2001)	72543
No. of Households (2001)	12133
No. Shops	1875
No. of Restaurants, hotels and shops	334
Annual Population Growth Rate (1991-2001)	1.7
Estimated Population for 2003	75,030
Population Density (2001)	11058.38 per sq. km

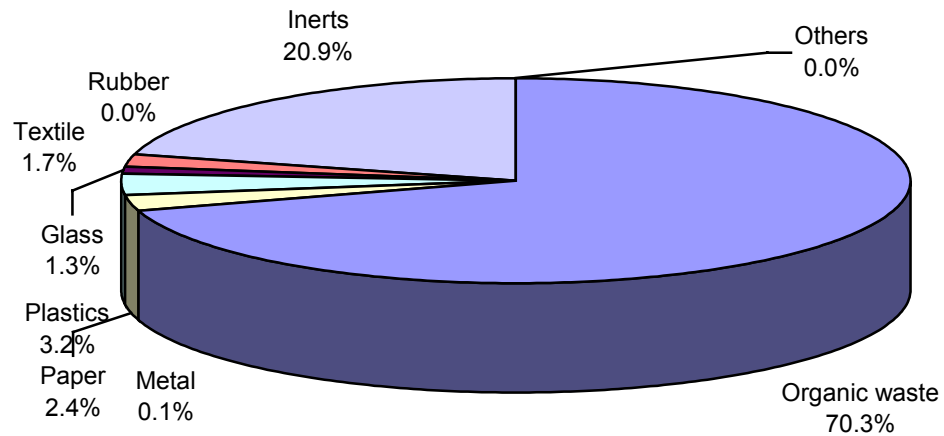
2 Waste Generation and Composition

According to the field survey done in 2003, the average per capita household waste generation rate in Bhaktapur was 0.386 kg/person/day. This is a bit higher than the average waste generation rate in urban areas of Nepal, which is approximately 0.25 kg/person/day. Considering the total population of Bhaktapur in 2003, which is estimated to be 75,002, the total amount of household waste generated in the municipality comes out to be 28.95 tons per day. Assuming that household waste is about 75 percent of the total municipal waste, the total amount of municipal waste generated in Bhaktapur becomes 34.6 tons per day. A recent study by JICA estimated the total waste generation rate in Bhaktapur to be 26 tons per day.

The survey also showed that approximately 70 percent of Bhaktapur's waste is organic in nature, while about 21 percent consists of inert materials. The percentage of organic materials in the waste stream is similar to the average organic content in waste from Nepalese municipalities, which is approximately 65 percent. But organic content in the waste will probably be higher in certain seasons as most of Bhaktapur residents are farmers who generate large amounts of agricultural waste during the harvesting season. The high

percentage of inert waste is probably because the production and use of clay pottery is quite popular in this town.

Figure 1 Waste Composition



The loose density of household waste in Bhaktapur was calculated to be 171.78 kg per m³. This seems to be a fairly low figure, especially considering the fact that the amount of relatively dense materials such as inerts was found to be high in the waste stream.

Information on Bhaktapur's waste generation and composition is based on waste collected from 90 households with 632 people.

3 Waste Collection

According to Bhaktapur Municipality, the city generates approximately 22 tons and collects approximately 20 tons of waste per day. This would mean that the city is collecting about 90 percent of the total waste generated, which is fairly high, but not impossible for a city like Bhaktapur, which has allocated a large amount of resources, both human and financial, for waste management. If the waste generation rate is assumed to be 34.6 tons per day, then the collection rate becomes 58 percent.

Bhaktapur municipality has 130 people assigned for waste collection. Out of these 26 are sweepers who are permanent staff of the municipality, 57 are sweepers on contract and 47 are waste pickers who are assigned to important areas in the city and they collect any waste that they see on the streets. Most of the streets in Bhaktapur are swept on a daily basis. In central city and major tourist areas, municipal staff are involved in waste collection throughout the day. The staff, who are called "Tippan Tappan" go around and collect any piece of waste that might be lying around. As a result, central Bhaktapur is usually very clean.

The municipality has two power tillers and 8 small pick-up trucks (1.34 m³ capacity) for waste collection and transportation. These vehicles seem appropriate for a city like Bhaktapur with many narrow lanes. Waste is placed in

designated waste collection points by the households and the sweepers arrange the waste in piles before it is picked up by the collection vehicles. In some places, people put the waste directly in the vehicles as they pass through the streets.

The collected waste is either taken to the Bhaktapur Compost plant or the dumping site located on the banks of Hanumante river.

The municipality does not have bulk containers or door-to-door collection system.

4 Final Disposal

Most of the waste from Bhaktapur is being disposed at a crude dumping site along the Hanumante river about 1 km West of the city. This site covers an area of about 10 ropani (0.5 ha) and has been in operation for 2 years.

The municipality is planning to build a landfill at Taikabu in Tathali VDC, which is 2.5 km east of the city. This site was identified by the GTZ funded Environmental Geology Project as a very suitable site for a landfill and an EIA for the site is currently being done.

5 Composting and Recycling

The Bhaktapur Compost Plant, which was established by the municipality with assistance from GTZ, is currently composting about 10 percent of the city's waste. The plant is located in Bhelukhel in ward 11 of the city. At the plant, mixed waste is placed in long windrows that are approximately 2 m wide and 1.5 m high. The waste is turned after a few months and when the compost is ready, it is screened manually using inclined screens. The compost is sold to farmers. The plant has 16 staff. This is the largest compost plant in Nepal.

Some studies done in the past have shown that the operation of the plant can be improved by improving waste screening, regular turning of the piles and proper marketing of the compost.

Bhaktapur municipality is also operating a small paper recycling plant, which produces a variety of items such as folders, notebooks, photo albums, cards, etc.

6 Special Waste Management

Bhaktapur municipality does not have any system for managing special waste. Hazardous medical waste is mostly burned by the hospitals and other special waste such as dead animals and construction and demolition debris is managed along with ordinary municipal waste.

7 Community Mobilization

Many Bhaktapur residents are positive and supportive of Bhaktapur Municipality's activities on waste management. Occasionally some organizations organize clean-up activities but there are no non-government organizations dedicated to solely to waste management. One NGO, Pratyatna Nepal recently organized an exhibition of crafts made from waste materials.

The municipality has published several pamphlets to inform people about waste management services offered by the municipality.

8 Organizational and Financial Aspects

The main responsibility for solid waste management lies with the Sanitation Section of Bhaktapur Municipality. The section has a total of 212 employees. These include 1 City Inspector, 15 Ward Inspectors, 11 drivers, 20 helpers, 83 sweepers, 47 waste pickers, 14 toilet/latrines cleaners, 16 compost plant operators and 5 other staff. Mr. Dilip Suwal from the Sanitation has received a six-month training on waste management from UDLE.

The municipality spends approximately Rs. 16 million in waste management each year, which is 10 percent of the total municipal budget of about Rs. 160 million. The municipality collects approximately Rs. 300,000 per year in revenue from cleaning fees and sale of compost. In the year 2059/60, the municipality earned approximately Rs. 43,000 from the sale of compost.

9 Major Problems and Issues

The main problem associated with waste management in Bhaktapur is the lack of a sanitary landfill. This problem may be solved if the Taikabu site is developed.

The compost plant is a very good initiative but production and marketing of compost can be improved and the amount of revenue generated by the plant can be significantly increased. This requires professional management of the plant and possibly private sector participation. Source separated collection can significantly reduce the amount of glass pieces in the compost which has been a major problem. Similarly, reduction in compost production time by providing regular aeration of the compost piles and proper marketing of the final product can significantly increase the capacity of the plant as well as the revenue.

The municipality has also mentioned the lack of financial resources as a problem. This situation can be improved by increasing the waste management fee, which at present is only Rs. 1 per household per month and increasing the revenue from the compost plant.

10 Conclusion & Recommendations

Bhaktapur Municipality has so far done a good job on solid waste management by keeping the city clean and operating a compost plant. But it is still dumping most of its waste in the Hanumante River. It needs a landfill site and it also needs to upgrade the compost plant and make it more effective.

Recommendations:

1. SWMRMC should assist Bhaktapur Municipality in developing a landfill at Taikabu.
2. The waste collection system should be improved so that waste is collected door-to-door to the extent possible. Besides increasing the efficiency of the collection system, this will also allow the municipality to increase the waste management fee, which at present is very low.
3. The municipality has plans to introduce source-separated collection. It has already distributed separate buckets for organic and inorganic waste in ward 17. This should be implemented throughout the city as this is

important to improve the quality of compost as well. In order to make this effective, it should be supplemented by a public awareness campaign.

4. The compost plant should be made more effective and expanded. The windrow system is good but the piles need to be aerated or turned more often. A proper marketing strategy should be developed and implemented to increase the revenue from the compost plant.
5. Community mobilization related activities need to be expanded so as to increase waste management at source.

For more information please contact:

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Street Sweeping



Waste Collection in Pick Up Truck



Pigs Enjoying a Waste Pile



Waste Collection Point



Bhaktapur Compost Plant



Incinerator at Bhaktapur Hospital



Existing Dump Site Next to Hanumante River



Proposed Landfill Site at Taikabu