

# Solid Waste Management in **Biratnagar Sub-Metropolitan City**



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 Biratnagar Sub-Metropolitan City<sup>1</sup>** 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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<sup>1</sup> This report was prepared by Bhushan Tuladhar and Gopal Raj Joshi, based on field investigation done by Eureka Tuladhar.

## 1 Introduction

Biratnagar is a historical town situated in the Terai area of Koshi zone of eastern development Region. It was established in the year 1971 B.S. when the headquarters of the Morang District was transferred from Rangeli to Biratnagar. It was made Municipality in 2008 B.S. and was declared Sub-Metropolitan city in 2052B.S. Singhiyahi River borders the municipality in the east, Kesalya River in the west, Tankisinwari VDC in the north and India in the south.

Biratnagar is the second largest city in Nepal, after Kathmandu and it is also the major industrial and commercial hub of eastern Nepal.

**Table 1: Background Information**

NAME	BIRATNAGAR MUNICIPALITY
District	Morang
Year of Establishment	2008 B.S.
No. of Wards	22
No. of Urban Wards	22
No. of Rural and semi urban Wards	0
Total Area	58.48 sq. km
Built-up Area	1480 ha
Major Rivers and Ponds	Kesalya River, Singya Khola
Total Road length	Black-topped: 96 km Graveled: 160 km Earthen: 360km Mule Track: 29 km
Population (2001)	166,674
No. of Households (2001)	33678
No. Shops	12000
No. of Restaurants, hotels and shops	16
Annual Population Growth Rate (1991-2001)	2.6 percent
Estimated Population for 2003	175,454
Population Density (2001)	2850.10 per sq. km

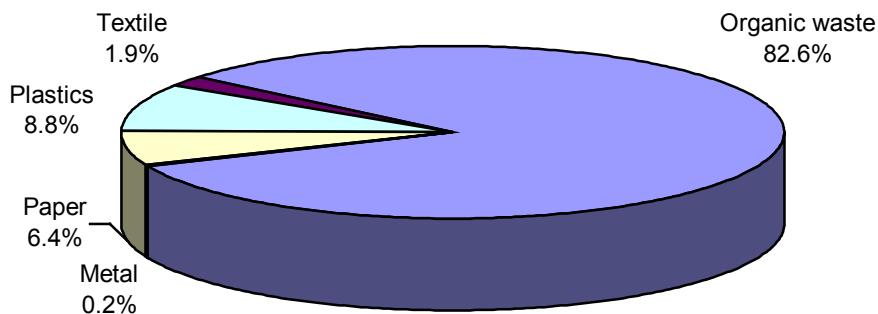
## 2 Waste Generation and Composition

According to the field survey done in 2003, the average per capita household waste generation rate in Biratnagar was 0.172 kg/person/day. This is a slightly low rate for a large city like Biratnagar. The average waste generation rate in Nepalese municipalities is 0.25 kg/person/day. Considering the total population of Biratnagar in 2003, which is estimated to be 175,333, the total amount of household waste generated in the municipality comes out to be 30.16 tons per day. As Biratnagar is an industrial and commercial city, it probably generates a large amount of non-household waste as well from industries, offices and markets. Assuming that 75 percent of the total municipal waste is generated by households, then the total municipal waste generation in Biratnagar becomes 40.2 tons per day.

A waste characterization study done as a part of the survey indicated that more than 80 percent of the waste is organic, while plastics and paper made up 8.8 and 6.4 per cent of the waste stream respectively. Although it is not surprising that organic waste is the major component of the waste stream, the amount of organic waste seems to be higher than normal and the absence of other types

waste such as glass and inert materials is surprising. This may be due to error in the survey process.

**Figure 1 Waste Composition**



The loose density of household waste in Biratnagar was calculated to be 423.5 kg per m<sup>3</sup>. This figure seems quite high for loose waste, especially when the waste did not contain heavy materials such as glass and inerts.

Information on Biratnagar's waste generation and composition is based on waste collected from 101 households that had waste from 618 people.

### 3 Waste Collection

Biratnagar municipality has seven tractor trailers, which have a volume of 3 m<sup>3</sup> each. Similarly, the municipality has 14 rickshaw and 22 hand carts each having capacity of 0.5 m<sup>3</sup>. According to the municipality authority, the city is collecting approximately 40 metric ton waste per day, which would mean that almost 100 percent of the waste is being collected. This is very unlikely. Therefore, either the generation rate is more than 40.2 tons per day or the collection rate is less than 40 tons per day.

Biratnagar municipality has 74 sweepers who sweep major streets and public places of city streets on a daily basis.

Beside this the municipality has also signed an agreement with a private party for solid waste management services. Biratnagar Municipal Corporation-Silt Environmental Services (P.) Ltd. (BMC-Silt) has been involved in door-to-door waste collection and street sweeping since 2055 B.S. The company has 112 staffs who collect waste from 4215 households and sweep the core and roadside area daily. The company has distributed 2 waste collection bins each having capacity of 17 liters and 25 liters. Rickshaws, trolley and tractors are used for the collection of waste. The company has developed special waste collection trolleys with detachable containers.

Sweeping is done using ordinary brooms with long handles and the waste is collected in handcarts, rickshaws, tractor-trailers using shovels. Thus collected waste is transported to transfer station.

The transfer station that covers total area of 0.3 hectares is situated in ward no. 14. Four tractor trailers each having capacity of 3 m<sup>3</sup> are used for the secondary transportation of the waste.

## **4 Final Disposal**

The collected waste is disposed in a crude dumping sites about 6 km from the city. The site with an area of 0.13 ha has been used for the past two years. Previously, waste was also dumped on the banks of Singya Khola. Some eroded and wastelands are also used as disposal sites.

The municipality has plans to construct a landfill site at Tankisinwori, but political problems are creating hindrance for the work. The municipality estimates that the landfill site could be developed and operated within one year if political hindrance is resolved .The proposed site is located at a distance of 10 km from the city and has an area of about 10 ha. The municipality feels that this site, if developed, can be used for more than 25 years.

## **5 Composting and Recycling**

Biratnagar Municipality doesn't have any special programs to promote recycling and composting at the household level.

However, BMC -Silt is running a compost plant in ward no.14. The compost plant has been established in a leased private land that occupies an area of 1.33 hectare. Approximately 18 tons of waste generated from household and vegetable market is composted everyday using the pit method.

As source separation of the waste is not commonly practiced, the separation of waste is done by manually before composting. Then separated organic waste is buried in a pit. It generally takes one year for the composting process to complete. Some local people are blaming the compost plant for foul smell and dirty surroundings.

At present, BMC-SILT is screening the compost manually and selling the final product to nurseries and local people who use compost in their kitchen garden. For the purpose of marketing the compost is packaged in 1 to 50 kg plastic sacks. Effective marketing, however, continues to be a challenge.

BMC-Silt is also making bee-hive briquettes from yard waste in a limited scale. Bee-hive briquettes are made by first burning the organic waste in a special drum that restricts air flow to prepare char. The char is crushed and mixed with clay in a fixed ratio and then compressing it to form a cylinder with holes.

The municipality has plans to set up a new compost plant in partnership with neighbouring municipalities of Itahari and Dharan. It is estimated that the output capacity of the compost plant will be 2-3 ton per day.

Till date the municipality has not initiated any programmes for waste minimization or recycling. But individual scavengers, scrap dealers, and BMC-Silt is involved

in recycling. BMC-Silt prepares visiting cards, greeting cards, covered files etc using recycled paper.

## **6 Special Waste Management**

Biratnagar municipality does not have any special system for collecting and managing medical waste separately. The medical waste as well as other types of special waste such as construction/demolition debris, industrial waste and dead animals is collected, transported and disposed along with household and municipal waste.

## **7 Community Mobilization**

Biratnagar Municipality is trying to work with local communities and NGOs in conducting activities to raise awareness on waste management and promote recycling and composting. It has conducted several community clean up campaigns in conjunction with local neighbourhood committee (Tole Samittee), traffic police and schools.

Beside the municipality, BMC-Silt is also involved in public education and awareness. It frequently conducts school-based programs, miking and clean up campaigns. It has also published and developed pamphlets/brochures, hoarding boards/sign boards. It also provides training on composting and briquette preparation. It is planning to manage hazardous and industrial waste and to establish demonstration site for organic farming and renewable energy.

Biratnagar is one of the leading municipalities in involving private sector in waste management. It has signed an agreement with BMC-Silt for waste management services and the private company is all waste management related activities from waste collection, to recycling and sanitary landfilling.

## **8 Organizational and Financial Aspects**

The municipality's Sanitation Section is responsible for solid waste management. This section consists of 81 manpower including one engineer, one junior engineer, one office assistant, 4 supervisors and 74 sweepers. But lack of trained manpower, equipment, and infrastructure are the important and crucial hindering factors for the effective solid waste management.

The municipality spends approximately Rs. 78,00,000 in waste management each year. This is the amount provided to BMC-Silt for managing waste. BMC - Silt also collects approximately Rs.9,00,000 from households as average annual fee for providing door to door waste collection services. The company charges Rs.30 to Rs. 1000 per month from its customers. Therefore, the total cost of waste management in Biratnagar is approximately Rs. 8.7 million. The municipality's total expenditure for the fiscal year 2058/59 was Rs.116,967,552. So the municipality is spending about 6.67 percent of its total expenditure on waste management.

## **9 Major Problems and Issues**

The main problems associated with waste management in Biratnagar are the lack of a proper sanitary landfill, central composting facility. The municipality does not have the necessary resources and trained manpower to develop an

effective solid waste management plan. Lack of public awareness of cooperation is also a major concern.

## **10 Conclusion & Recommendations**

Biratnagar has done a good job in involving the private sector in waste management, and the private party (BMC-Silt) has also been quite effective, in spite of difficult circumstances. The challenge is to improve the working relationship between the municipality and the private company and improve and expand the services. The municipality should also work on increasing the revenue raised from the waste generators. Currently only about 10 percent of the expenditure on waste management is raised from the waste generators. Although this is higher than most municipalities, there is room for improvement.

Recommendations:

1. Plans for developing an integrated waste management facility, that includes a compost plant and a sanitary landfill should be implemented as soon as possible. SWMRMC should provide the necessary assistance in this process.
2. The door-to-door waste collection system should be expanded to the extent possible to improve the efficiency of the waste collection system.
3. The municipality should plan to introduce source-separated collection. This should be implemented in a phased manner. In order to make this effective, it should be supplemented by a public awareness campaign.
4. The municipality should work with BMC-Silt and local hospitals and industries to introduce an effective system for managing medical waste, industrial waste, and other special waste.
5. The municipality has done a good job in promoting private sector participation. However, in order to make it more effective, the municipality should have a clear strategy and plans for involving the private sector in waste management.
6. Although there is some community mobilization activities in Biratnagar this needs to be expanded and improved. The municipality should also help BMC-Silt expand the school-based programmes.
7. The compost plant run by BMC-SILT should be improved and managed properly. The municipality should assist in marketing the compost so that the plant can operate in a sustainable manner.

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**Annex 1: Photographs**



**A Household Waste Collection Bin**



**A Street Bin Set Up by BMC-SILTES Company**



**Street Sweeping**



**A Hand Cart Used for Waste Collection**



**Dumping of Waste along the Highway**



**Tractor Used for Waste Collection**



**Site for Waste Transfer and Vehicle Parking**



**Waste Disposal and Composting Site**



**Bags of Compost Waiting to be Sold**



**Paper Recycling Unit**