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Practices and Challenges of Municipal Solid Waste Management in Gangtok Town of Sikkim Himalaya, India

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ABSTRACT

Industrialization, growing population, congested and ill-conceived development of towns makes the management of solid waste a major problem ultimately effecting health and environment. Based on the secondary information collected from various sources the paper tries to appraise the making, distinctiveness, and management of solid waste in Gangtok a hill town Eastern Himalaya. Currently solid waste is managed by Municipal Cooperation of Sikkim under the Department of UD & HD. It has been observed that some new techniques of collecting, transporting and disposal along with creating awareness among the people and improving the governmental framework such as strict rules and regulations have been planned giving importance on environmental protection and public health.

1. Introduction

The growth of waste and its management has become a great problem throughout the world, particularly in small growing towns and cities of developing countries having mountainous terrain. Statistics show that the world population reached six billion in 2001 with 46% of this population residing in urban areas (HMGN and MoPE, 2003). Global municipal solid waste generated in 1997 was about 0.49 billion tons with an estimated annual growth rate of 3.2- 4.5% in developed nations and 2-3% in developing nation (Suocheng et.al. 2001). Interestingly is is also noticed that rapid industrialization and urbanization have changed the characteristic of solid waste. As a consequence, the solid waste management system needs to be updated to suit the waste quality, quantity, and composition.

Waste generation is as old as human history, but waste management is considered to be a new approach. Industrialization has given a new thrust to waste management after realizing the treat of solid waste to environment on one hand and solid waste as a resource on the other. World over, a large amount of money is being allotted every year for management of waste. The management of solid waste is becoming herculean task day by day specially in high and difficult mountainous terrain like Sikkim. Solid waste is regarded as one of the most undesirable but unavoidable form of pollution which needs environmentally sustainable solutions to reduce overall environmental problems with a resource potential.

2. Study Area

Sikkim is a Himalayan state in the north-east region of India. It borders Tibet in the north and northeast, Bhutan in the east, Nepal in the west, and West Bengal in the south. Sikkim is also located close to India's Siliguri Corridor near Bangladesh. Sikkim is the least populous and second smallest among the Indian states. A part of the Eastern Himalaya , Sikkim is famous for its biodiversity, including alpine and subtropical climates, as well as being a host to Kanchenjunga, the highest peak in India and third highest peak in the world. Gangtok is the capital and largest city of Sikkim. Almost 35% of the state is covered by the Khangchendzonga National Park. Sikkim is very rich in natural resources. It is home to nearly half of the nation's biodiversity. The state has wealth of one third of the country's flowering plant. Amphibians 50, as many as 165 plants are named after Sikkim. The major soil types found in Sikkim are mountain meadow, brown, red, yellow and lateritic soil. In South District soils are derived from sandstone phyllite, schists, gneisses and colluvial materials. Soils are generally acidic to very acidic in reaction having pH between 5.0 and 6.0.

Fig 1: Map of Sikkim

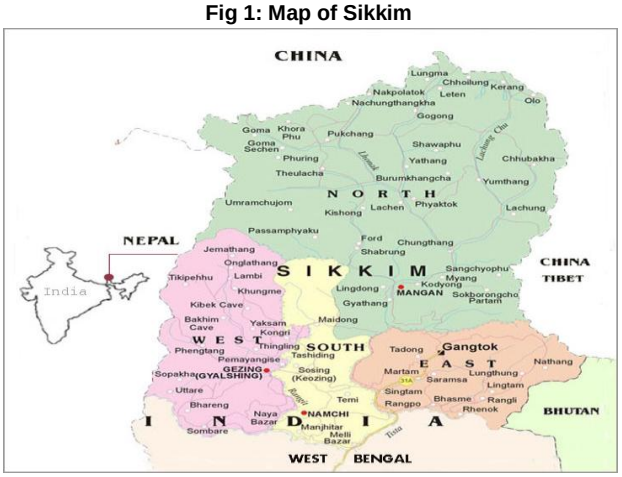


Fig 2: Map of Gangtok

Gangtok, the capital of Sikkim State, is situated at an average elevation of 1,650 meters (5,410 ft). Gangtok is a Municipal Corporation, the capital and the largest town of Sikkim state. Gangtok, at present have 55.5% of urban settlement and this is because of the rapid growth of population in the selected area. As per the 2001 census the population of the town was only 29,354 within the notified town area. In Gangtok, only 40% of the waste is collected and the rest is dumped into natural water systems and valleys. In 2015, all districts combined produced 105.7 metric tons/day, and this is projected to increase to 141.9 mt/day in 2025 (Sikkim Strategic Plan, 2008). The worst part is that even toxic and biomedical wastes do not have disposal mechanisms. Waste accumulation causes increased level of pollution resulting into increasing frequency and magnitude of various diseases, some of them are absolutely new to otherwise healthy hill environment, in pockets that do not have effective disposal mechanisms. Hence, there is a need to understand the composition of municipal solid waste for proper recycling and appropriate management.

The government of India, Ministry of Environment and Forest has framed Municipal Solid Waste (Management and Handling) rules 2000 and has notified the same in September 2000, making it mandatory for all the municipal authorities in the country and for those who are responsible for the management of Solid Waste in the country to implement the rules. The Government of Sikkim (State Government) has also passed numerous gazette notifications in respect to the management of Municipal Waste in the State. They are regarding making Sikkim a plastic free state, segregation of waste and handling of waste, making MG Marg a litter and spit free zone etc.

3. Objective of the study

The main objective of the study is to evaluate the operational system in order to understand issues and challenges related to solid waste management in Gangtok.

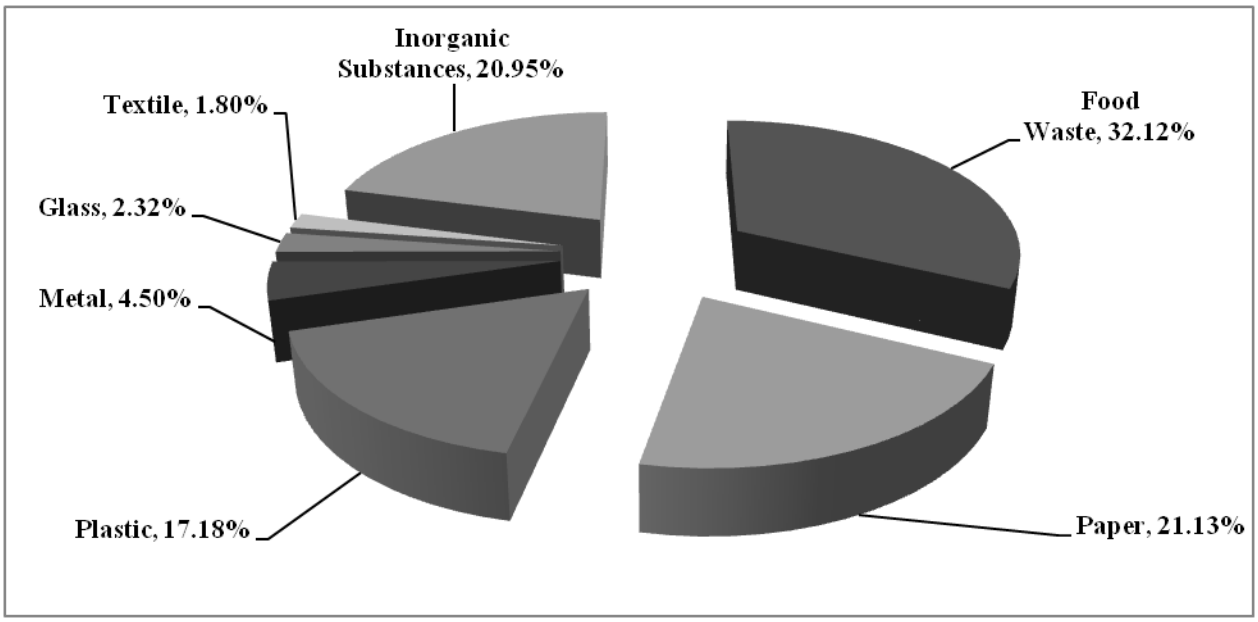
4. Materials and Methods

Different sources have been used gor gathering the information related to the issue of solid wate management and it's relating problems. The present study is based on secondary data source. The date and the information has been mostly obtained from reports, books and papers from Sikkim State Pollution Control Board (SPCB) Government of Sikkim, UD&HD and PHED Government of Sikkim.

5. Characteristics

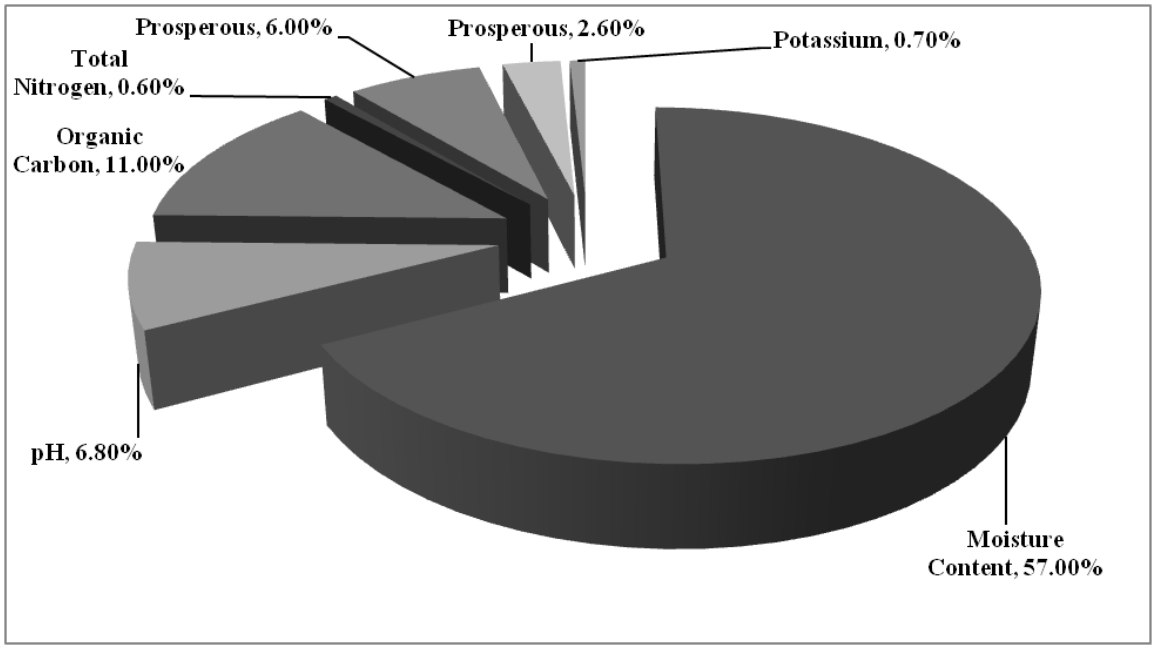
Of the total urban population of Sikkim, Gangtok Municipal Corporation has a share of 55.5%. Including Gangtok, East District has a share of 88% of the total urban population in Sikkim. It has been observed that with the increase of population, the Municipal Solid Waste (MSW) generation also increases which makes MSW difficult. Waste generated by the city of Gangtok is approximately 360 grams/capita/day. This includes all types of waste such as domestic waste, commercial waste, construction waste, market waste, etc. It is estimated that the waste generated per day in Gangtok is 45 Metric ton per day (MT/day).

Fig 3: Physical Composition of Waste (% by weight)



Source: SPCB, Government of Sikkim

Fig 4: Chemical Characteristics of Waste (%)



Source: SPCB, Government of Sikkim

6. Discussion

Disposal of Solid Waste in Gangtok City

The collection through community bin and collection from door steps is done, in 2014- 15 it is reported that 40 tonnes per day waste was collected. MSW from Namchi Municipal area is dumped at Sipchu, near Jorethang (west Sikkim), the site is funded by CPCB. The municipal waste collected by Namchi Municipal Corporation in 2014-15 was 5.25 tonnes per day. MSW from Gyasing Municipal Corporation is also sent to Sipchu. The total municipal waste collected from GMC was 2 tons per day out of 3 tons of waste generated per day.

The waste consisted of 60-65% organic waste and 30-35% recyclable waste (CPCB Sikkim). It was also noted that these municipal corporations have delivered partial compliance, in other words approximately 50 per cent of the MSW rules have been followed by the local bodies. Solid waste disposal is one of the biggest problems for urban centers in Sikkim. In Gangtok, only 40% of the waste is collected and the rest is dumped into natural water systems and valleys. In 2015, all districts combined produced 105.7 Metric tons/day, and this is projected to increase to 141.9 MT/day in 2025 (Sikkim Strategic Plan, 2008). Even toxic and biomedical wastes, generated mostly from hospitals and pathological clinics, do not have disposal mechanisms. This leads to serious problems of health and hygiene.

In the city of Gangtok, MSW (Municipal Solid Waste) collection is done through community bins and then transported by municipal trucks on pre-informed timing. The arrival of these trucks is notified by ringing of bells. MSW from areas under Gangtok Municipal Corporation are sent to *Martam*. The waste is dumped here; however, the dumping site of sanitary landfill in Martam is underway. The project was funded by Asian Development Bank (ADB) and is operated and monitored by Urban Development and Housing Department of the State. However, unfortunately the recent estimates show that the landfill area that is designed to last for 15 to 20 years may not last that long. Hence, the principles of 3R and waste segregation are mandatory for effective treatment of waste in this city.

Currently the Public and private partnership is being considered as a viable concept that has been appreciated in most quarters. The Municipal Corporation is planning to conceive the idea of waste treatment, regulation of waste and to strictly monitor the performance of certain programme and that of the private agencies. NGO's and local communities have been encouraged by the organization to collect the waste from almost every household and transfer it to the designated points. Currently two such NGO's (1. Watson Committee 2. Golden Circe) are engaged in collection of household waste in the designated areas. Experience has proved that this has been a successful exercise to some extent and the department is looking at up scaling such partnerships. Now the UD & HD Department has launched a more intense public participation and awareness programme under the JNNURM (Jawaharlal Nehru Urban Renewal Mission) that will incorporate the principles of waste segregation and 3R's. Among the many features of this Mission, waste management plays a very pivotal role in development and sustenance of Gangtok city.

7. Future challenges

The holistic solid waste management system should be integrated, cost effective, sustainable, and acceptable to the community. It should emphasis on technologies suitable for environmental conservation and which are affordable and assure public health. SWM should implement solid waste management hierarchy that gives the priority to waste reduction through 3R, intermediate treatment and final disposal.

Rapid economic growth will impact the composition of solid waste. The changes in life style, particularly in the urban areas have led to more acute waste problems. Abandoned dumping in open spaces, narrow roads, and congested

infrastructure are the problems that are widespread, which corresponds to human behavior contributing to human health problems. Waste minimization and improving resources are the major concern of sustainable waste management. It is obvious that some amount of waste will be generated but proper disposal and treatment should be done so that our present and future generation will not be affected.

Wastes collected are disposed in the municipal landfills. However, the landfills need to be improved in the location site. Lack of skilled manpower, irregular collection services, inadequate equipment used for waste collection and resources are the key factors that are challenging the waste recycling scenario in the state toady.

8. Conclusion

Himalayan urban areas are struggling to plan a functional and cost-effective solid waste management system. Due to lack of funding, unscientific management, shortage of bins, waste management system is not working successfully, which has rigorously spoiled the environmental conditions and also stimulated the growth of stray dog population another cause of various problems. The negative impacts associated with open dumping and open burning must be strongly stopped. New techniques must be adopted to enhance the social, economic and environmental and sustainable development incorporating recycling of waste.

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