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SOLID WASTE MANAGEMENT AND GREEN INITIATIVES: A CASE STUDY OF DIMAPUR MUNICIPAL COUNCIL

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***Abstract** :*

The unabated population growth and increasing human activities with the help of modern technologies has enhanced the capabilities of creation and production of many things. But life has been put at a higher risk due to haphazard and unmanageable wastes produced through human activities.

It has been widely understood that Solid waste refers to the range of garbage arising from animal and human activities that are discarded as unwanted and useless. Solid waste is generated from industrial, residential and commercial activities in a given area, and may be handled in a variety of ways.

Regardless of the origin, contents or hazards potential, solid waste must be managed systematically to ensure environmental best practices. As solid waste management is a critical aspect of environmental hygiene, it needs to be incorporated into environmental planning and administration.

This paper will present the state of solid waste management in Dimapur city by the Dimapur Municipal Council (DMC) and its initiatives to convert the unorganized dumping sites into green and scenic locations with public amenities.

Key words used: **Solid, waste, management, organic, hazards, green.**

INTRODUCTION:

Solid Wastes and its unhygienic disposal are global phenomena. The menace of waste from households, industries, business establishments, offices, institutions, hospitals, construction and demolition of buildings and structures, etc is phenomenal that threatens peaceful existence of humanity today.

Waste management is becoming a serious concern all over the world due to rapidly growing urban centres, especially in developing countries. The unsustainable production and consumption patterns among the growing population generate unprecedented piling of garbage in the streets, making it difficult to manage by the municipal authorities. Eventually, this can harm the environment and effects health. In the other way round, poor people often make a living on waste, and this can be beneficial, as long as it is not done in a harmful manner.

Solid waste can be categorized based on materials, such as plastic, paper, glass, metal, and organic waste. Categorization may also be based on hazard potential, including radioactive, flammable, infectious, toxic, or non-toxic. Categories may also pertain to the origin of waste, such as industrial, domestic, commercial, institutional or construction and demolition of buildings and structures.

Regardless of the origin, contents or hazards potential, solid waste must be managed systematically to ensure environmental best practices. As solid waste management is a critical aspect of environmental hygiene, it needs to be incorporated into environmental planning and administration.

The term 'Solid waste management' is used to refer to the process of collecting and treating solid wastes or garbage arising from animal and human activities that are discarded as unwanted and useless. It also involves solutions for recycling items that do not belong to garbage or trash but are reusable. Solid waste management is all about how solid waste can be collected, segregated and processed for usable and total discarding of the useless.

According to Britannica, *"Solid-waste management, the collecting, treating, and disposing of solid material that is discarded because it has served its purpose or is no longer useful. Improper disposal of municipal solid waste can create unsanitary conditions, and these conditions in turn can lead to pollution of the environment and to outbreaks of vector-borne disease—that is, diseases spread by rodents and insects."*

Improper and unhygienic disposal of municipal solid waste can create unsanitary conditions, and these conditions in turn can lead to pollution of the environment. The tasks of solid waste management present complex technical challenges. They also pose a wide variety of administrative, economic, and social problems that must be managed and solved.

Solid waste management should be sincerely practiced by each and every household including the business owners across all sections of the society.

Solid waste management has three main components: i) collection and transportation ii) reuse or recycling and iii) treatment or disposal. Waste has different origins and different properties. The main types are household waste, industrial waste and hazardous waste of various types.

SOURCES OF URBAN SOLID WASTE:

The main sources of solid waste include residential, commercial, institutional, and industrial activities. There are various types of hazardous wastes that cause immediate danger to exposed individuals or the environment. The inability to fully grasp the problems of waste, its generation, composition and characterization have resulted in transforming the solid waste management as one of the most compelling and complex problem of urban cities, as well as urban environmental degradation. The household produce variety of waste including bio-degradable waste such as kitchen scraps, leftover foods, etc; non-biodegradable materials such as plastics, glasses, etc; hazardous materials like used batteries, e-waste, bio-medical waste and sanitary waste like diapers, sanitary diapers, etc; making it complicated situation to handle. In addition to this, the wastes generated from commercial establishments and industries add a different dimension to the waste generation scenario. The mixture of these different types of waste with the solid waste makes the surroundings unhealthy and unsafe, for both human health and environment. Solid waste also includes construction and demolition wastes or debris, making it a significant component of total solid waste quantities.

The composition and problems of urban solid waste varies from place to place depending on the local situation. Solid waste can be classified in several ways but the following list represents a typical classification:

- Biodegradable waste: waste from kitchen like food, paper
- Recyclable materials: Clothing, plastics, metals, bottles, glass, cans, textiles, aluminum foils, batteries, tyres, toys, etc.
- Waste from construction sites, demolition debris, etc.
- Electrical and Electronic wastes: Electrical appliances, TV, mobile phones, light bulbs, computers, washing machines, watch, etc.
- Toxic and hazardous wastes including herbicides, pesticides, fungicides, used oil from machineries and vehicles, etc
- Biomedical wastes, expired pharmaceutical drugs, etc.

Categorization of wastes may also be based on hazard potential, including radioactive, flammable, infectious, toxic, or non-toxic. Regardless of the origin, contents or hazards potential, solid waste must be managed systematically to ensure environmental best practices. As solid waste management is a critical aspect of environmental hygiene, it needs to be incorporated into environmental planning and administration.

India's growth rate in terms of economy and population is phenomenal over the years. With such a dynamic development, the management of solid waste in the urban areas has emerged as a severe problem, not because of the environmental and aesthetic concerns but also because of sheer quantities generated by the population every day. The Central Pollution Control Board (CPCB) consulate Annual Report of 2015-16 states that the total quantity of waste generated was 1,35,198 TPD (Tons per day), out of which 1,11,028 TPD was collected, 25,572 TPD treated and 47,456 TPD landfilled. As per the data of the Housing and Urban

Affairs Ministry data, out of over 1.43 TPD of solid waste generated across the country, only about 33,800 TPD (23.73 percent) was being processed on 31st January 2018.

The "Swachh Bharat Abhiyan" or "Clean India Mission" is a major campaign initiated by the Government of India, launched on 2nd October 2014, the birth anniversary of Mahatma Gandhi, is an answer to the waste problems in India. Through this initiative, a number of schemes have been introduced to assist both the authorities and the public in achieving the vision towards a clean India mission. Towards this end, the government of India adopted the Solid Waste Management Rules, 2016 (SWM Rules) in supersession of the Municipal Solid Waste (Management and Handling) Rules, 2000 to address the rampant waste generation.

OBJECTIVES OF THE STUDY:

1. To find out the role of municipality in solid waste management in Dimapur city.
2. To study the plans and programmes initiated by municipal council to content solid waste.
3. To study the remedial measures to overcome problems in solid waste management.

METHODOLOGY:

Descriptive and survey method was used in the present study.

TOOLS USED:

In order to identify exactly the roles and measures taken up by the Dimapur Municipal Council (DMC) interview schedule was used along with field visits.

DELIMITATION OF THE STUDY:

The present Study was delimited to the following:

(i) The study was delimited to the Dimapur Municipal Council (DMC) area only.

ANALYSIS AND DISCUSSION:

Dimapur Municipal Council initiatives:

Due to phenomenal change in the solid waste activities among human population, it has necessitated to streamline the procedure of solid waste management involving the government agencies. In this regard some tangible objectives have been visualized. The primary objectives involved reducing and eliminating adverse impacts of waste materials on human health and environment to support economic development and superior quality of life.

Dimapur, a cosmopolitan town and also the main business hub in Nagaland is administered under the ambit of Dimapur Municipal Council (DMC). Its jurisdiction covers a population of 125,513 and an area of 18.13 sq. km. The DMC is designated local authority, which has been authorized to manage the waste in Dimapur city.

As per 2011 census, Dimapur Municipal Council (DMC) is divided into 23 wards comprising of about 96 colonies. An in-depth assessment of waste management by Dimapur municipal Council in Dimapur municipal area through Life For Environment (LiFE) for a period of 24 days from February 12 to 13 March 2019, it has shown that on a daily basis 111124.56 kgs/111.12 tons of waste is being generated. The report stated that within a year's time, the waste generation would increase by at least 15 tons per day.

The Dimapur city has been plagued with potholed roads and garbage strewn across everywhere. The developmental works carried out by the government agencies are not enough to build Dimapur a modern city. Along with the developmental activities done by the government agencies, the Dimapur Municipal Council has also initiated various programmes within its administrative areas to deal with the problems and challenges of waste disposal/management. But the pace of development has been very slow. However, with the launching of 'A Better Dimapur' project on 1st June 2017, which was aimed to improve the city's sanitation, environment and aesthetic appeal through the active participation of the community, Dimapur is slowly transforming into a better outlook.

The Dimapur Municipal Council (DMC) has initiated to transform the commercial hub of Nagaland, Dimapur under the banner of "Better Dimapur" envisaging a "Cleaner, Greener and a Healthy Dimapur with Community Participation" initiative. Towards this mission, the DMC had taken up a planned initiative to clear and clean the haphazard dumping areas under its jurisdiction and transform it into beautiful, pleasing and environmentally friendly spaces.

'A Better Dimapur' was conceived with the idea of instilling civic sensibility among the citizens and also to imbibe a sense of social responsibility in the movement towards a cleaner, greener, healthier and hygienic city. Towards this cause, various sections of people came forward in support of the project and actively participated in transforming the city.

Towards this goal the DMC has partnered with like-minded groups and institutions such as Team Clean, Team Green, Living for Environment (LiFE), NGOs, Healthy Dimapur, Act of Kindness Movement and the Dismantling Team.

All these teams along with various organizations, educational institutions and civil societies carried out various activities

Team Clean, which comprises of around 100 volunteers install metallic dustbins around the city. This team has also conducted several cleanliness as well as plantation drives.

Team Green, a small group of working individuals from different professions has been actively engaged in cleaning and beautification drives. The team's main agenda was to beautify and to increase green cover around the city through the plantation of trees and ornamental plants along the road dividers. The team could transform few dumping areas in the city into hang out spots, waiting sheds, etc.

The dismantling team has been engaged in bringing down the outdated structures, boards, etc and thus recreated a clean and smart image of the city.

"Garbage to Gold", a waste management project undertaken in collaboration with a non-governmental organization (NGO) called "Pro Rural" also aims to turn kitchen waste into fertilizer.

Act of Kindness was another team that has been tireless working on cleaner and peaceful atmosphere by providing free social services in the form of skill and labour.

Living For Environment (LiFE), an NGO has also been actively involved in the DMC towards 'A Better Dimapur' project. They were involved in managing the problems of recyclable and plastic wastes in Dimapur. It strives towards bringing about a better solution for creating a 'Cleaner, Greener and zero waste Dimapur'. In this process, the DMC and LiFE have started a waste segregation at source and door to door collection of waste has been initiated. The wastes are segregated into three categories – Dry (inorganic waste), Wet (organic waste) and Sanitary/Bio waste (sanitary pads, diapers, hairs, cotton, etc). They have also embarked upon converting plastic waste into plastic road construction in a few places in Dimapur on experimental basis.

A number of institutions had also come forward in support of the mission 'A Better Dimapur' and actively participated in cleaning the city streets and localities from time to time.

In order to drag in the services of citizens into the mission, the DMC had also initiated the "Cleanest Colony Competition" and award cash to the cleanest colony annually. Each month, the DMC selects two colonies and donates 30 buckets each for households within the colonies of the city. The cleanest colony of the month is also given a bonus of 50 buckets.

Current Waste Management System:

The civic services in Dimapur, like many other cities and urban establishments in the country, are short of the modern day approach to Solid Waste Management (SWM). The methods and practices in our present context do not meet the standards of the working system of SWM Rules to achieve the desired goal due to outdated machineries and equipments, inefficient manpower and lack of strategic plans and programmes. However, the DMC is trying its best to mitigate the over growing challenges with its limited funds and infrastructure.

Presently, a number of factors contribute towards inefficiency and modernization of the SWM system in Nagaland as a whole.

Some of those factors are:

- lack of knowledge
- lack of funds
- lack of modern technology
- lack of awareness and
- lack of long term planning

However, the current Solid Waste Management system in Dimapur Municipality areas is as follows:

- **Collection, storage and transportation of waste:**
  The total quantity of waste generated in Dimapur Municipal area is about 100 Tons per Day (TPD). The wastes generated from the households are collected by the DMC from door to door on a daily basis. Community bins have also been provided for the places like markets, institutions, offices, etc that are collected on daily basis. Currently the DMC deploys 14 Tata 407 series trucks, 7 tractors. The market area is covered by 6 Dumpers and 3 JCBs. The collected wastes are transported to the designated dumpsite for disposal. The generation of waste in the city is generally from- household, markets, hospitals, hostels, hotels and restaurants, industries and institutions.
- **Biomining:** Biomining is the technique of extraction and segregation of minerals and useful materials from mounds of waste which have been treated by a bio-culture to reduce waste to its simplest form. Biomining can be deemed as the final process in effective bioremediation for any site that has been used as a storage area for garbage. Recently the DMC has procured the machinery and installed at the designated dumping site at Burma Camp.
- **Disposal of waste:** The wastes collected are disposed off in the designated dump site. Boundary walls have been constructed around the dumpsite. It has set up a sanitary landfill and solid waste processing plant in accordance with the SWM Rules. Thus the DMC has started treating the existing dumpsite through bioremediation process to alleviate the impact of waste.
- **Plastic waste, E-waste and Biodegradable waste:** As per the provisions of the Plastic Waste Management Rules, 2016 as amended by the Plastic Waste Management (Amendment) Rules, 2018, DMC has been making an effort to collect and utilize plastic waste by collaborating with a Non-Governmental Organisation (NGO).

Green Initiatives:

Along with the waste management process, the DMC in collaboration with various NGOs have initiated programmes and activities to transform Dimapur into a greener city. In its pursuit towards greener and healthier Dimapur, the DMC has collaborated with teams like Team Green Dimapur, Team Healthy Dimapur, Team Clean, Act of Kindness Movement, LiFE, Pro Rural and other Civil Society Organizations.

With the initiative of the DMC, Team Green Dimapur and other NGOs have carried out plantations along the road dividers and also transforming garbage dumping areas into hang out places by constructing sheds and additional beautification to attract people. Some of those images are as follows:

Ornamental plants along the road dividers

Dumping areas transformed into hang out places

DMC designated dump site Bioremidation process

Facing tremendous pressure from the denizens for not disposing off the garbage hygienically at the designated dump site, the Dimapur Municipal Council (DMC) has initiated measures to step up its responsibility by roping in an expert from outside the state to recycle the piled up waste at the site.

Raaginii Jaain, a Swacch Bharat Mission national expert who is also empanelled by Ministry of Urban Development and Health, began recycling wastes at DMC's landfill site on July 2018. In seven days time, people living in the vicinity testified that there had been significant and visible change. That was one of the most significant achievements among many projects taken up by the DMC.

It was reported that the recycling process was done with the help of GE microbes, a harmless soil based bacteria produced and patented by Geetanjali Envirotech.The microbe used in the recycling is a rare kind of molasses based bacteria which is non-hazardous, non-pathogenic, and one that works at a very quick pace.

Findings:

- Dimapur Municipal Council initiated various programmes/projects towards Better Dimapur.
- Regular collection of waste from the households has been seriously taken up.
- Bioremediation process has been initiated.
- More than 10 (ten) dumping sides in and around the town have been transformed into aesthetic sites.
- Plantations along the town road dividers have been initiated.
- Dividers along the roads have been painted.
- Biomining machine has been procured and installed at the DMC dump site for extraction and segregation of waste.
- One of the major problems faced by the DMC is shortage of manpower, finance and modern machineries to combat waste management problems.

Challenges

- To make the citizens fully aware of the consequences of haphazard waste disposal.
- Awareness of the people to keep the town and roads clean.
- To let the people voluntarily involve in initiating and resolving waste management.
- Lack of modern machineries and equipments.
- Maintenance of public amenities constructed or installed.
- Above all those problems and challenges, shortage of funds with the Dimapur Municipal Council makes it difficult to combat increasing problems of waste management under its administrative jurisdiction.

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