JOURNAL OF THE ROYAL LAUREATES ACADEMY

www.rlaindia.org

REGULATORY COMPLIANCE AND ECOLOGICAL GOVERNANCE: ASSESSING WASTE MANAGEMENT POLICIES IN UTTARAKHAND

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ABSTRACT

This paper examines the evolving landscape of waste and septage management in the Himalayan state of Uttarakhand, focusing on the shift from neglect to systematic, technology-driven intervention. Historically, sanitation in the region's mountain settlements remained a "quiet crisis," characterized by reliance on unmanaged pit latrines and septic tanks. However, recent initiatives by the Urban Development Directorate (UDD) and the National Institute of Urban Affairs (NIUA) have begun operationalizing state-wide management protocols through capacity building and district-level workshops.

The study highlights a critical dichotomy in waste management strategies: the centralized Sheeshambara plant in Dehradun, which faces logistical and public opposition, versus the successful decentralized pilot project at Nathuwawala ward. The latter, developed as a "Sanitation Park" in collaboration with the NGO Feedback Foundation, demonstrates a sustainable, zero-waste model compliant with the Solid Waste Rules (2016). Further analysis of Dehradun's waste profile reveals a direct correlation between socio-economic status and waste composition, where higher income levels transition from organic waste to increased paper and plastic output.

Despite progress in modernized collection and the state's ambitious "Zero Waste to Landfills by 2040" goal, approximately 40% of waste remains unmanaged. The paper concludes that while

centralized infrastructure is straining under rapid urbanization and tourism, the Nathuwawala decentralized model offers an economically viable, scientifically sound, and community-driven blueprint for urban local bodies across the hilly terrains of India.

Keywords: Decentralized Waste Management, Septage Management, Uttarakhand, Nathuwawala Sanitation Park, Urban Local Bodies (ULBs), Public-Private Partnership (PPP), 5R Framework.

INTRODUCTION

On a crisp morning in Gopeshwar Nagar Palika, a town in the Garhwal hills, in Chamoli district, a group of municipal officials gathered in a quiet conference hall, notebooks open and calculators ready. At the front, a newly appointed executive officer carefully walked through the sludge volume calculation for his town, estimating how much waste accumulates, how often it needs to be emptied, and what kind of systems would be required to manage it. It was a modest exercise, but one that carried weight. For the first time, many participants were looking at sanitation not as an afterthought, but as a system: measurable, manageable, and directly connected with public health. Outside, the town moved at its usual pace. Inside, a different kind of momentum was building.This wasn't just a workshop. It was a point of no return.

The quiet crisis below our feet

In most Indian towns, sanitation is a silent issue. It is seen only when it overflows or stinks. In Uttarakhand, settlements are snugly nestled in the mountainsides and sparsely populated. The state runs 67 sewage treatment plants (STPs) and is planning to double its operational capacity in the coming years. But most towns rely on septic tanks and pit latrines. Out of sight and out of mind, they collect years of human waste in silence. Until they don't.

Without scheduled desludging, scientific disposal, or reliable service providers, many of these containment units have the potential to cause environmental and health hazards. They leach into water sources, overflow during rains, or are emptied illegally into rivers. The environmental and health costs are invisible but immense. But the solution doesn't lie in billion-rupee infrastructure alone. It starts with something quieter and closer to the ground, i.e. understanding, calculations and a sense of ownership.

A mission to transform, one town at a time

Earlier this year, at the behest of the Director of Urban Development Directorate (UDD), the Sanitation Capacity Building Platform (SCBP) at NIUA, with support from the Uttarakhand Urban Development Directorate, embarked on an ambitious mission: to operationalise the State Septage Management Protocol and used water management across all Urban Local Bodies (ULBs) in the state. This meant hitting the road, conducting in-person workshops district by district, and sitting down with the very people responsible for implementing sustainable sanitation: the executive officers, junior engineers, sanitary inspectors, environmental supervisors and more.

Sanitation is directly related to public health and a variety of health related facilities are provided by the government to the society but basically public health is associated with sanitation. In general, sanitation is the responsibility of local bodies like Nagar Nigam, Nagar Palika Parishad and Nagar Panchayat at urban level and Gram Panchayat and Jila Panchayat at rural level. Though these bodies are responsible for multiple services like education, registration of birth/death, street light, construction of internal roads and drains in cities/towns etc but sanitation is the main focus of these local bodies. The base of all the living conditions depends upon sanitation and the level of Sanitation depends upon the solid waste management process adopted by these bodies. Kumar (2010) has indicated a report of a high power committee on Urban Solid Waste Management in India which has pointed out that Urban Solid Waste Management is one of the most neglected area of Urban Development.

Establishment of Solid Waste Management Processing Plant is essential for proper Solid Waste Management. Waste Management applies those techniques and systems that ensure proper storage, collection, transportation and disposal of a waste stream (Pichtel, 2014). Public Participation is required to solve the problem of any area. The role of NGO is also very important. According to Shorholy and others (2008) the involvement of people and private sector through NGOs could improve the efficiency of MSWM. Public awareness should be created. Proper segregation, Scientific and systematic waste management is required for a successful waste management. Jasti and Subbaiah (2010) has also focussed upon adaptation of technologies to provide environmental friendly processing of waste saying that MSW disposal does not entirely depend upon the efficiency of Municipal Corporation. Ahsan and others (2014) has also stated that integrated solid

waste system should be based on local needs, socio-economic setting and technological capabilities. Solid Waste Management Rules (2016) and Advisory on On-site Decentralized Composting of Municipal Organic Waste (2018) focus on decentralized waste treatment system.

In Uttarakhand, all the Urban Local Bodies are facing sanitation problems due to a lack of systematic solid waste management planning. Solid Waste Management Processing plants have been established and are functional only in Nagar Nigam Haridwar and Nagar Nigam Dehradun in the state. Both of the plants are running under Public Private Partnership (PPP) mode. The major objective of "Swachh Bharat Mission" is to motivate private sector in expenditure. In Dehradun, Sheeshambara plant is centralized plant covering 69 wards of the city and whereas 31 wards still uncovered by the plant. This plant was established in 2017 and is facing many problems including public opposition. Waste management problems are enhanced with addition of 40 ward (72 villages) in 2018. So Nagar Nigam has started solid waste management process in decentralized way as a pilot project in Nathuwawala ward, Dehradun (uncovered by Sheeshambara plant) and is handed over to Feed back Foundation (Non Governmental organisation) for solid waste processing. The Foundation has developed the solid waste processing area as Sanitation Park and declared the Nathuwawala ward zero waste zone. So the researchers have decided to study the Solid Waste Management process of Nathuwawala, which is known as "Sanitation Park " at present.

The solid waste management challenges in Uttarakhand are intricately linked to the region's rapid urbanization and burgeoning tourism industry. As Uttarakhand's natural beauty and religious sites draw increasing numbers of visitors, contributed significantly to solid waste generation, straining existing waste management infrastructure, consequently the demand for effective waste management solutions becomes paramount. To address this, the state government has adopted comprehensive measures, emphasizing scientific methods and public involvement, aiming for zero waste to landfills by 2040. The strategies adopted by Uttarakhand, focusing on the 5R's (Reduce, Recycle, Reuse, Recover, and Restrict) transition towards a circular economy, highlight a comprehensive approach to waste management. This initiative not only aims to manage waste effectively but also aligns with broader environmental and sustainability goals. By integrating these strategies, Uttarakhand can potentially reduce its ecological footprint, promote resource efficiency, and safeguard its natural and cultural heritage. The municipal solid waste management

practices emphasis on waste collection, segregation, processing, and recycling which underscores a commitment to sustainable development and responsible resource management. This approach reflects a shift towards more circular and regenerative economic practices, ultimately contributing to preserving the state's ecological and cultural richness. Thus, the current article is a comprehensive review to provide an overview of the present scenario of solid waste management practices, challenges and the participation of communities in managing, minimizing and eliminating these solid wastes in the Uttarakhand region. Additionally, the results of the article demonstrated that Uttarakhand is still far from the ideal situation related to solid waste management which carves limitations and milestones in the process of sustainable development.

Uttarakhand is a hilly state which consists of 90 urban local bodies, facing the problem of Solid Waste Management. There are only two solid waste plants in the state. Solid Waste Management process in decentralised method has recently been started at Nathuawala ward in Dehradun, having a population of 13000. The solid waste processing area has been named “Sanitation Park”. The researchers have found that the waste is disposed systematically in a scientific manner in this area, as per Solid Waste Rules 2016. There is no eyesore in this area. All the community members participating in this project have appreciated the work of the leading NGO “Feedback Foundation”. It is a combined effort of Nagar Nigam, Feedback Foundation and Community of Nathuawala ward. It may be concluded that decentralized method is economically sustainable and can be adopted by Urban Local Bodies of Uttarakhand for Solid Waste Management process. This project can turn out to be a role model for other Urban Local Bodies all over India.

Municipal solid waste management in Dehradun- Dehradun is the capital of Uttarakhand. With the population of 500000. Dehradun generated 291.840 metric tonnes of municipal solid waste per day. Government has many policies and projects to manage the waste. Table – 4: Physical Characterization of the MSW Organic waste 44.76 18 Discussion Paper No. 1, Feb 2019 12.83 Fuel Potential Organic waste Fuel Potential 44.76 12.83 (Development et al., 2017) Table – 5: Current Estimates of Waste Composition Organic Income Level (%) Paper Glass Metal Plastic Other (%) Low Income 64 5 (%) 3 (%) (%) (%) 3 Lower Middle Income 59 9 3 2 8 12 17 15 Upper Middle Income 54 14 5 3 11 13 High Income 28 31 7 6 11 (Series & Papers, 2012) 17 Organic waste is generated by low level income groups of people such as wood, food waste, grasses, leaves

etc. Paper waste, highly made by high income level groups includes wrapping paper, books, magazine, newspaper, cardboards etc. The generation of waste is directly related to the income of people. With the increase in the level of income of person the paper waste increases positively. So, we can say that, the composition of various wastes is highly dependent upon the income level of the person rather than any other factors. Present waste management system in Dehradun- Before shifting of Solid waste management department to the health department, city was not having proper door to door solid waste collection facilities. Households, mainly low income residing in the city dump their daily wastes on street, river or hills. Middle- or high-income groups appoints private sweepers on the monthly basis. Waste remain 19 Discussion Paper No. 1, Feb 2019 untreated because of unavailability of treatment plants in Dehradun. Authority weren't concerned about processing of garbage. Table – 6: Number of existing vehicles with Dehradun Municipal Corporation Type of vehicles Tipper Lorries No. of vehicles Dumper Placer Lorries (Eicher & Tata) 4 Tractor Trolley 7 2 tractor containers 2 Big RCs 2 Small RC 2 TATA 709 1 JCB 1 Loader 710 (Scott) 2 Cattle Catcher (Mazda) 2 Mini RC 1 RC 1 Source – Nagar Nigam Dehradun 1 Proper waste management and disposal practices were proposed by government and now comparatively better waste collection and processing systems are taken up. Vehicles of waste collection have been increased and modernized (segregated blocks). Their size depends upon the income of the people of area located. Still 40% of the collected waste remain unutilized or unmanaged by municipal authority. After a long wait, Dehradun got its first waste treatment plant at Shishambara ,20 km away from the city of Dehradun.

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