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Municipal Solid Waste Management, a Major Impacted Sector of Urban Environment due to Residential Land Use Activities- Study of Kozhikode City

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Abstract

According to United Nation's World urbanization prospects Report, urban population in the world is expected to touch 70% of the total population by 2050. Urbanization trend in the world has made residential land-use, a major shareholder amongst urban land uses. This land-use has become the major deciding factor for urban infrastructure development at large. Municipal solid waste management and its related infrastructure provision have become a major concern to many of the urban local self-governments in India. Major objective of this paper, which is based on a doctoral research work on the residential land use impact on urban environment is to examine the relative position of municipal solid waste management sector among the other identified sectors of urban environment and also to evolve a waste management index that can be used to compare urban areas in terms of its waste generation and management perspective. An AHP based expert questionnaire survey of 93 experts across India was conducted to identify the significance of municipal solid waste management sector along with the identified impacted sectors of urban environment due to residential land use activities. A household survey was conducted in 51 wards of Kozhikode Corporation to check the performance of the waste management index generated out of the expert survey. The results of the survey show that the municipal solid waste management sector is the most impacted sector among the urban environment sectors. Waste management index of the surveyed wards revealed that the index is aligning very well with the residential density as well as the residential land-use characteristics of the area under consideration. This index has immense potential to identify the urban areas that require intervention possibly by providing infrastructure for municipal solid waste management. Survey inputs are gathered, compared and composed in this regard and the results are presented and communicated in this paper.

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1. Introduction

As per the UN-HABITAT Annual report 2005, it is estimated that 93% of the urban growth will occur in Asia and Africa and to a lesser extent in Latin America and the Caribbean [UN-HABITAT annual report 2005]. It is predicted that along with this population increase there is going to be a dramatic growth in the extent of individual urban centers too [NB Grimm, S. F. 2008]. The increasing trend of this urbanization has made residential land use a major shareholder in urban land uses. Residential land use calls for the requirement of various types of infrastructure, in which solid waste management has a major role. This paper primarily converses on the relative position of municipal solid waste management sector with respect to residential land use impacts, among the other identified sectors of urban environment and also to evolve a waste management index that can be used to compare urban areas in terms of its waste generation and management perspective. An AHP based expert questionnaire survey of 93 experts across India was conducted to identify the significance of municipal solid waste management sector amongst the identified impacted sectors of urban environment due to residential land use activities. A household survey was conducted in 51 wards of Kozhikode Corporation to check the waste management index generated out of the expert survey. The results of the survey show that the municipal solid waste management sector is the most impacted sector among the urban environment sectors. Waste management index of the surveyed wards revealed that the index is aligning very well with the residential density as well as the residential land use characteristics of the area under consideration.

2. Literature Study

In India, according to 2001 census, 285 million Indians lived in urban areas and expected to rise to 550 million by the year 2021 and 800 million by 2041 [NIUA 2000]. Growing trend of urban population and thereby the spread in an urban area has made residential land use a major shareholder in all urban land use plans. For example in India, UDPFI (Urban Development Plan Formulation and Implementation) guidelines issued by MoUA (Ministry of Urban Affairs) suggests that 40% of the developed land in a metro city should be allocated for residential activity, whereas this share should be 50% in case of small urban centres [Urban Development Plan Formulation and Implementation, 2014]. Growing population and the resultant need for basic amenities are always causing a great threat to urban environment conditions. The Urban environment getting affected due to urban land uses is a complex mix of natural elements (including air, water, land, climate) and the build environment (ie. a physical environment constructed or modified for human habitation and activity encompassing buildings, infrastructure, and urban open spaces) [Nunan, F. Te et al, 1999].

In Indian cities, per capita domestic waste generation ranges between 0.2 kg and 0.6 kg per day which is amounting to about 1.15 lakh MT of waste per day and 42 million MT annually [NEERI, 1995]. This is an eight-fold increase since independence [CPCB, 2000a] and not more than 72 percent is collected daily, which leads to accumulation and decomposition of the waste in public places with adverse effects on public health. The growth of Municipal Solid Waste has overtaken population growth in recent years as a result of changing lifestyles, food habits, and rising living standards [GOI 2002]. About 48 million tons of solid waste are generated in the urban areas every day, the waste generation rates in India are lower than the low-income countries in other parts of the world and much lower compared to developed countries. However, lifestyle changes, especially in the larger cities, are leading to the use of more packaging material and per capita waste generation is increasing by about 1.3 percent per year. It is estimated that waste generation will exceed 260 million tons per year by 2047—more than five times the present level. [MOUD Report, 2005] Domestic waste constitutes a major share in municipal solid waste in India.

An effective SWM system should include activities associated with generation, storage, collection transfer & transport, processing and disposal of solid waste, but in Indian context this six stage solid waste management systems are mostly reduced to three stages namely collection, transport and disposal. A variety of reasons from lack of infrastructure to available finance can be reasons for this cut short system of municipal solid waste management [Sharholly et al, 2008]. Though regional and centralized waste processing has been tried out over the years, the availability of landfill sites is becoming a growing problem due to the resistance from the residents who do not like a landfill site in their neighborhood. Landfill sites and plants planned in the outskirts have gradually become part of the city owing to city's natural outgrowth. The landfill sites too are seldom managed in an environmentally

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