

Chapter 14

Conversion of Waste Into Different By-Products of Economic Value in India

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ABSTRACT

The management of solid waste has become a major problem even in rural areas of India, due to shrinkage of agricultural land and depletion of forest areas. During the recent past, people in rural areas were decomposing the waste, and finally, it was used as a manure in their agricultural areas. However, the trend is completely changing the Indian scenario of converting the backyard waste into manure. Now with the help of scientific knowledge, the waste is utilized as an energy resource, and waste from the rural areas is considered a raw material for this process. Different technologies in India are available to convert waste into energy apart from the technologies that have impact on the environment.

INTRODUCTION

There has been a continuous rise in industrial and technological development since the last century which results in improved living standards and population rise all over the globe i.e., in both underdeveloped and developed nations. As it is apparent, population rise is directly correlated with the increase in demand and consumption which results in a waste generation as no procedure is 100% competent. As the humans started to settle in a permanent establishment, waste has started to settle and became a

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problem to think off. Waste disposal is one of the major problems being faced by all nations across the world. Furthermore, quantity and composition of waste generated depend upon population, the number of people living in urban areas and level of comfort which depends upon income, Table 2 (Omran *et al.* 2009; Bogner *et al.* 2007; Hoornweg *et al.* 1999). Residents living in urban areas generate two-fold waste in contrast to individuals living in rural areas with equivalent privileged circumstances, which can grow to four-fold if they are thought-out to be more affluent. A total of 13% of the global population was residing in an urban area in year the 1900, generating 0.3 million tonnes of rubbish/day in contrast to the year 2000, 3 million tonnes of waste/day was created by 49% of the total population living in cities which are expected to be double by the end of 2025. Moreover, it was reported that solid waste was increased globally by 2.02 billion tons (7%) annually from the year 2003–2006 (UNEP, 2009) in contrast to years between 2007–2008 in which it was 8% per annum, increased by 1%. If it follows the same trend, 2.2 billion tons of solid waste will be generated by the end of 2025 (World Bank, 2017). The volume will uninterruptedly upsurge (until 2050), then drops gradually may be due to progress in scientific arenas. Similarly, waste ingredients change as the country develops more and more Table 1. More money means more expenditure on packaging (packing waste), electronics appliances (e-waste), toys (broken toys), etc. thus represents the impacts of urbanization and income on the environment. In most of the countries, management of solid waste remains a major challenge. As we know from the past there is a direct correlation between development and ecological squalor, it was reported that 1.43–2.08 kg day⁻¹ person⁻¹ and 0.77 kg day⁻¹ person⁻¹ of waste is generated in developed and underdeveloped countries (Troschinetz & Mihelcic, 2009). In contrast to developing nations where inadequate waste management practices cause environmental damage and pose serious hazards to human health (Moreno *et al.* 2008), developed nations generate higher quantities of waste, but due to the employment of advanced waste management technologies result in a decreased waste generation (Kathiravale & MuhdYunus, 2008). However, certain countries with a similar gross domestic product per capita generate more waste may be due to high population density. Annually, a significant amount of money has been spent on waste related challenges throughout the world. A total of \$205 billion was spent in 2010 which could rise up to \$375 billion per annum by the end of 2025 (World Bank, 2013). Reason for indiscriminate solid waste may be inadequate disposal facility, facilities not near residence, lack of enforcement of laws, illiteracy, no fee charged, the road is no mans land, poverty, no facilities at disposal point, attitudinal problem, carelessness, ignorance or high cost of collection (Onanuga & Odunsi 2018).

Nowadays, many people are worried about the quality of the surrounding environment as environmental management challenges are apparent in most cities of the globe. An assessment has been made that per capita waste generation is increasing by about 1.3% per year (Anonymous, 2009). Most of this is a wet waste, which can be used to produce fertilizer and generate electricity. Instead, huge mounds of it lie piled up in cities and villages, posing a serious threat to public health making them vulnerable to malaria, dengue, dysentery, typhoid, and cholera, and the environment such as attraction to insects and pests, pollution of atmosphere, hydrosphere and lithosphere, aesthetic loss, and disagreeable odors (Onanuga & Odunsi, 2018). Moreover, the leachate containing organic as well as inorganic pollutants, generated from unmanaged landfills in the rainy season may seep belowground into the aquifers.

Thus, it must be managed appropriately with the production of byproducts such as compost, bioenergy, etc. Recycling of municipal solid waste in the united states from 1960 to 2012 had elevated from 6.4% to 34.5% (EPA, 2014). Furthermore, in the year 2012, the average recycling rate in European countries was 32% with countries such as Germany, Austria, Belgium, and Switzerland top the list with

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