# Chapter 3
# Solid Waste, Treatment Technologies, and Environmental Sustainability:
## Solid Wastes and Their Sustainable Management Practices

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## ABSTRACT

*Waste has a long history of association with humans and other organisms. It is inevitable and has different sources right from crop residues (agriculture), food production and its movement through food chain, industries and their processes. Waste has different environmental implications like leachate and can contaminate groundwater. Emissions from waste burning cause air pollution, and its dumping in soil cause soil pollution. There are different methods and technologies being used in the world to minimize waste. All the technologies being used are reviewed and presented in it with their pros and cons of all the technologies. This chapter will include all these technologies and associated environmental concerns.*

DOI: 10.4018/978-1-7998-4921-6.ch003

## INTRODUCTION

Solid waste is every type of solid substance which arises from human and other organisms and considered as unwanted. Solid wastes can be organic or inorganic fractions and generally do not carry any value to any organism. Wastes can be kitchen refuse, packaging, clippings, cloth, bottles, paper, cans, and dry batteries. There are different types of solid wastes on the basis of biodegradability, inertness, e-wastes, composites and domestic. All these wastes are generated from industrial processes and domestic activities (Kumar et al., 2018).

## BACKGROUND

Expanding population, growing economies and fast urbanization has incredibly accelerated the metropolitan waste generation rate in developing nations (Guerrero et al., 2013). Cities typically are responsible for waste generation (Burnley, 2007; Sujauddin et al., 2008). Solid waste is one of the important byproducts of urban lifestyle, which is growing faster due to rapid urbanization. In the last 1 year, the world population increased from 2.9 to 3 billion, but waste generation increased from 0.68 to 1.3 billion tons, and per capita generation increased from 0.64 to 1.2 kg/day, which become almost double within 10 years. A prediction was made on the basis of increasing solid waste generation; about 4.3 of urban population will generate 1.42 kg/capita/day of municipal solid waste by 2025. However, per capita solid waste generation varied in different countries and different cities within a country (Mian et al., 2017).

There are different associated risks of solid wastes and their treatment technologies. Like leachates in landfill sites cause soil and groundwater pollution, gaseous emissions from combustion, incineration, pyrolysis and waste to energy processes cause air pollution and climate change, solid waste smell and its presence in any area creates nuisance (De and Debnath, 2016).

## MAIN FOCUS OF THE CHAPTER

To avoid all the risks associated with solid wastes, numerous technologies are devised to manage them. Some are old and conventional (recycling, open burning, dumping into the seas) and pose further environmental risks, some are new (landfilling, biomethanation, pyrolysis, composting, plasma gasification, waste to energy and incineration). These methods also have some minor environmental implications like pyrolysis, combustion etc. have gaseous emissions problems. So, there was a need of some ways to manage solid wastes with sustainable way. This purpose was accomplished when 3Rs and agricultural wastes disposal with agricultural wastes residues incorporation into the fields, composting of municipal wastes, production of biofuels and biogas was invented. These practices are sustainable as well as profitable because they do not only reduce wastes but also generate biofuels, energy and electricity as well.

## SOLID WASTES, TYPES, AND SOURCES:

There are different types of solid waste that are released from different sources and they are described briefly in the following;