

Industrial mass production in the 20th century gave rise to the use-and-throw-away culture. In turn, this tendency has caused mountains of solid waste to accumulate around the globe.

Growing consumption underpinned by rapid urbanisation and population growth is perpetuating this habit in the 21st century.

In 2016, over 2 billion tons of solid waste was generated, amounting to a footprint of 0.74 kilograms a person a day. Annual solid waste generation is projected to increase by 70 per cent from the 2016 level and reach 3.4 billion tons by 2050.

Poorly managed waste contributes to environmental damage and becomes a breeding ground for disease vectors. Proper waste management is expensive and often costs about a quarter of municipal budgets.

The United Nations' Sustainable Development Goals imply that managing waste properly is essential for building livable communities and cities. Yet, waste management remains a challenge for developing as well as high-income countries.

Singapore generated 7.7 million tons of solid waste last year. This comprises several waste streams with varied recycling rates.

For example, the recycling rate of construction debris, ferrous metal, non-ferrous metal and used slag is 99 per cent, while for scrap tyres it is 90 per cent and horticulture 71 per cent.

In stark contrast, the recycling rate of food is 17 per cent, textiles and



Plastic problem

leather 6 per cent and plastic only 4 per cent.

Singapore is now focusing on tackling food, plastic, packaging and electronic wastes in order to achieve a zero-waste and circular economy.

Low rate of recycling is a concern for many countries. Enterprise Singapore is actively trying to follow the International Organisation for Standardisation's principles, framework, terminology and management systems.

Recently, Singapore committed \$400 million to upgrade islandwide drains and boost recycling rates. One of its targets is plastic waste, which poses a major environmental problem.

Though thousands of varieties of synthetic plastic have been created for diverse applications, they have triggered a negative reaction among people in recent years who have come to believe that plastic is indeed harmful.

More than 75 per cent of all plastic produced finishes as waste. Only less than 20 per cent is recycled.

One-third of plastic waste ends up in nature – the figure was 100 million in 2016.

Plastic has been found at depths of 10km in oceans, in Arctic ice and in coastal ecosystems around the world. According to the World Wildlife Fund, oceans will contain one ton of plastic for every three tons of fish by 2025.

Animals get entangled in plastic

debris, leading to injury and even death. They ingest plastic that cannot be passed through their digestive systems, resulting in abrasion, blockage and death. Toxins from ingested plastic also harm breeding and impair immune systems.

Studies have shown that, via the food chain, people ingest 5gm of micro-plastics and nano-plastics a week.

Questions are being raised on the harmful health effects of ingested plastic and additives. For example, leaching of chemicals from plastic into water bodies, soil and the ecosystem can affect the human hormonal system.

In order to mitigate the undesirable effects of plastic, diverse strategies are being pursued by companies, governments and people. Policy makers are emphasising the need to reduce consumption of single-use plastic.

Governments are exploring the option of setting hard targets for recycling of plastic by companies and municipalities and digital tracking and sorting of plastic.

Companies are looking to redesigning products with single plastic material to facilitate higher recycling rates. More efficient technologies are being tested to recover material and energy resources and value from plastic waste.

Multi-national companies are developing plans to switch to bio-plastics and natural polymers.

Bioplastics are made from plant

crops instead of fossil fuels with the assumption that they will be more environmentally friendlier than conventional synthetic plastic.

Research engineers are also synthesising new plastics which are truly biodegradable yet offer desirable functional properties.

Plastic cannot be totally eliminated from modern life. Hence, what we need is plastic which is safe and sustainable.

With concerted and sustained efforts and new innovations, plastic will be very different in future.

Moreover, with existing as well as new technologies, humans are seeking to thoughtfully manage solid waste, thus paving the way for livable and sustainable communities and cities for future generations.

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