

Recycling our way to more waste in New Zealand: Insights from systems modelling

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Extended Abstract

Solid waste represents a loss of resources and leads to various forms of human and environmental harm. Despite increasing effort being put into waste management solutions, the volume of waste created around the world continues to increase (see Figure 1). Waste hierarchy principles attempt to reduce the flow of materials through society, and recycling is often touted as one of the solutions to achieve this.

A case study approach has been adopted for this research, examining how single-use plastic packaging materials flow through the New Zealand economy to eventually become solid waste. A System Dynamics analysis has been undertaken to investigate the relationship between the act of recycling, and the demand for new single-use plastic packaging in New Zealand.

System Dynamics causal loop diagrams and stock and flow simulation models were co-developed based on literature reviews and one-on-one unstructured stakeholder interviews. Life Cycle Assessment studies and waste data from various sources were used to parameterise the model and approximate the harm created from the simulated material flows. Energy use has been used as the metric of harm, as this is considered a good proxy for overall environmental performance.

The perceived benefits of recycling appear to be greater than any realised benefits, and they are internalised more quickly than observations of reality. This means that the act of recycling creates an exaggerated perception of harm reduction, which improves product attractiveness and provides a justification for increasing consumption rates.

These results suggest that the act of recycling is contributing to a rebound effect, which is inducing more demand for virgin material than it is preventing. This has wide-ranging implications for how we promote and invest in recycling initiatives and provides a new perspective on traditional waste management practices.

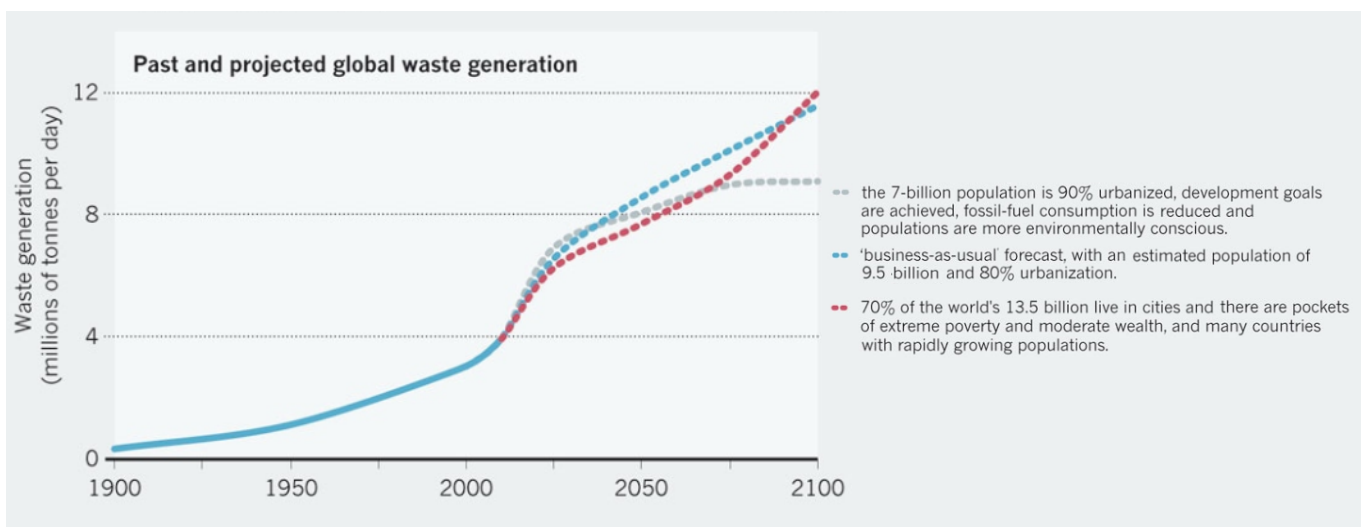


Figure 1. Past and projected global solid waste generation under three different scenarios (Hoornweg, D., Bhada-Tata, P., & Kennedy, C. (2013). Waste production must peak this century. *Nature*, 502, 615-617)