## Preface

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**Biographical notes:** Manfred Fehr is a Chemical Engineer with accumulated professional experience in 28 countries on five continents and PhD from Université Laval, Canada, post-doctoral research at KTH, Sweden. He engages in environmental management, sanitation and urban sustainability. He is retired and collaborating professor. He is founder of two local chapters of the Brazilian Chemical Engineering Society. He is registered professional engineer. He speaks in five languages, has to his credit more than 490 publications of all kinds, more than 75 international biographical reference listings and more than 360 literature citations.

Household Waste (HW) is a specific component of Municipal Solid Waste (MSW). It originates from normal daily activities in municipal residences. Generation rate and composition depend on geographical location as well as social stratification of communities. HW is a quite heterogeneous commodity that comprises biodegradable as well as inert material in various proportions and states of mixture.

In some regions of the World source separation is mandatory, but separation and collection procedures vary. In the recent past, landfills have been associated with the lack of municipal sustainability because they increase the ecological footprints of communities. Consequently, bulk collection and tipping of waste is being progressively abandoned as management strategy worldwide. Many types of diversion procedures of HW from landfills have been experimented with in all parts of the World, with variable degrees of success. These procedures include centralised and decentralised management models with or without the participation of private initiatives. Separation is the basic requirement for diversion, but it may occur at various stages of the reverse logistics chain, which in turn has diverse characteristics in different parts of the world.

The aim of this special issue is to bring together experiences reported from different geographical regions and local contexts in the effort to divert HW from landfills, with the respective results and prospects. The issue presents experiences reported from Jamaica, Ghana, India, Australia, Canada, Sri Lanka and Thailand.

The waste reduction strategies of source reduction, recycling and composting are studied by a survey in Jamaica. Factors designated as incentives to waste reduction exist primarily at the household level, specifically waste segregation, household education, environmental concern, and knowledge; whereas the barriers exist primarily at the national or regional levels, namely government policies and finances. The greatest potential for initiating waste reduction strategies and diverting waste from a landfill in this developing world setting is thus within the household, specifically by

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community-based waste reduction initiatives that build upon already existing practices and improve local solid waste management.

The properties of MSW in Accra, Ghana are discussed in order to gauge their suitability for sustainable composting programs. The results show that MSW has 60% moisture content by weight. The proportion of the biologically-originated carbon is high when compared to nitrogen, giving carbon-to-nitrogen ratios in the range of 27/1 to 100/1. The percentage composition of materials ranges are 55-65% and 40-45% for compostable and combustible materials, respectively. MSW in the metropolis is a good candidate for successful composting programs if social and economic factors were conducive.

In a study from India, an attempt is made to identify sustainable alternatives for solid waste management, which can facilitate diversion of HW from a landfill site by using a multi-criterion decision matrix. The alternative "centralised composting of source segregated organic waste" is found to be the most sustainable choice.

An alternative landfill capping technique known as 'Phytocapping' (establishment of plants on a layer of soil placed over the waste) is reported from Rockhampton, Australia. Twenty one tree species were grown for three years on two types of phytocaps and their growth, transpiration loss, canopy rainfall interception and methane oxidation were studied. The canopy of the trees grown on the phytocaps intercepted, on an average, 30% of the rainfall thus preventing a significant proportion of the rain water from entering the soil. The phytocaps were also found very effective in oxidising methane. The trial demonstrates the potential of phytocaps to reduce landfill remediation costs while offering additional environmental benefits.

Another study from Australia explores the possibility of making the usually uneconomic process of converting green waste to energy economically viable. It assesses the total waste resources available in a given region that could be used in charcoal and energy production, evaluates the markets that could be used to sell the potential products, tests selected wastes for charcoal producing ability and quality, and undertakes preliminary engineering design and costing.

The present inability to predict waste generation at construction sites is addressed by a study from Canada. It discusses data collected during the construction of a four-storey research facility with a floor area of  $6420 \text{ m}^2$ . Collected data as well as a predictive model are presented, together with potential applications and limitations of the model.

Another study from Canada discusses an advanced landfill concept referred to as biocell, which involves sequential application of anaerobic degradation, aerobic decomposition, and waste mining in a single waste cell. Biodegradation of waste in the biocell is enhanced through leachate re-circulation coupled with landfill gas collection in the anaerobic, and air injection in the aerobic phase. Leachate enhancement is also used for optimisation of bacterial activity during biodegradation. The biocell is expected to realise sustainability of solid waste management by reusing the location where solid waste is treated, thereby eliminating the need for new land for waste disposal.

A paper from Sri Lanka presents a case study conducted in Moratuwa, a suburban municipality. Municipal officials, more than 300 householders belonging to different income groups and landfill operators were interviewed to examine current practices and related environmental problems. The main environmental impacts associated with current practice of waste management in Moratuwa are presented.

Natural ventilated composting units with 185–200 litre volume were developed and tested for household use whereas a 2000-litre aerated composting unit was applied to

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fresh market and restaurant wastes in Thailand. The composting period for HWs were 8–10 weeks during which volatile solid reduction of 75% was obtained. The final compost product contained N : P : K of 2, 2 and 0.5%, higher than organic compost standard. Economical analysis performed for a community with total population of 25,000 suggests that the investment is feasible with Net Present Value (NPV) of 3.34 million baht (1 US\$ = 35 baht) at a discount rate of 5% in ten years. Benefit-cost (B/C) ratio and Economical Internal Rate of Return (EIRR) are 1.37% and 12.0%, respectively.

The purpose of this special issue to bring together experiences reported from different geographical regions and local contexts in the effort to divert HW from landfills has been met.