

Sustainable landfill

A developing world perspective

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The modern trend for waste disposal in the industrialised world has been towards engineered containment of land-filled waste coupled to leachate and landfill gas control. The reality, however, is that countries such as the UK have a finite void space for waste disposal. Incineration is considered to be a more sustainable option than landfill because of the reduction in greenhouse gas emissions compared to landfill, and the decrease in final waste volume. Recycling and composting are actively encouraged by many municipalities in order to reduce the amount of waste going to landfill and incineration. These technologies in conjunction with waste minimisation measures are seen as the sustainable option and have been placed in the following hierarchy:

- waste reduction;
- re-use;
- recycling, composting and energy recovery;
- disposal to landfill and incineration with no energy recovery.

The situation in newly industrialised countries is very different, and at first glance activity is at the lower end of the waste hierarchy. Waste disposal, usually, is a low priority area for investment, generally lacking in infrastructure development compared to high visibility engineering projects. Because of the general lack of engineering controls and little or no consideration of geology or hydrogeology during site selection, landfills can be a source of adverse environmental impacts including: groundwater contamination from uncontrolled discharges of leachate; atmospheric pollution from waste burning; litter; and vermin. All these impacts pose serious human health hazards. Leachate can be toxic, and waste burning in the open is a source of carcinogenic compounds, including dioxins and polycyclic aromatic hydrocarbons. However, the pervading philosophy is one of 'out of sight, out of mind'.

Paradoxically, landfills and wastes are a rich source of re-useable materials and most developing-country landfills support active scavenger communities. This culture of re-use usually begins at the waste source. Waste collectors



Unloading tannery waste, Leon Guanajuato, Mexico.

recover high value items such as intact glass and plastic bottles before the material is delivered to the landfill. At the landfill scavengers collect other recyclable materials including glass, paper, card, plastic and scrap metals from the waste. The overall benefits of such activity are not well quantified, but indications are that between one and five per cent of the disposed waste is recovered and incomes from such activity often exceed local minimum wages. Developing country wastes typically contain between 25 and 70 per cent of putrescible material, and an activity which receives attention is composting which, together with recycling, are effective methods of waste minimisation.

Engineered landfill liners are relatively fragile systems and the danger of perforation and destruction due to waste scavenging make the two activities, at first sight, incompatible. The issue is how to accommodate an informal re-use industry, which in some respects is actually more effective than its western European counterpart, with the requirement to engineer landfills to avoid detrimental environmental impacts. This is the challenge for the landfill designer in newly industrialised countries: to design an operational system which in some way meets the needs of the informal recycling sector, while at the same time guaranteeing the state of the environment.

Waste reception, Leuwigadja Landfill, Bandung, Indonesia.

