



Waste disposal in third world countries – the Botswana experience

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WASTE DISPOSAL COSTS are generally very high, thus becoming a problem for developing countries. It is an indisputable fact that developing countries are faced with many problems such as famine and war which tend to absorb the little resources that these countries have. Thus, to talk about waste disposal costs to citizens of a country which is hard-hit by famine, appears like a waste of time because all they want is combating the famine. What happens to the environment resulting from waste is not really in their minds as it is not a priority. Countries which attempt to protect the environment cannot afford because, in most cases, a large proportion of their budget goes to the military leaving virtually nothing for environmental protection.

This paper looks at existing internationally accepted waste disposal methods, what is happening in the third world, and how these countries try to cope with the available technologies. It goes on to identify problem areas, the potential impacts to the environment with particular reference to Agenda 21 on *Sustainable Development* of the 1992 Rio Earth Summit.

The paper critically looks at the situation in Botswana and assesses areas of success and goes on to see whether or not that could be duplicated in other countries. Where there are failures the paper also looks at how this could be avoided in future, especially if the systems used are to be adopted by another country.

The paper concludes by giving suggestions and recommendations which are believed to be practicable in many developing countries.

Background

Sound Waste Management policies are not practised in many developing countries. Research has shown that waste disposal often receives the least attention. Until recently, Botswana fell within the same category as many of these developing countries. To address the above issues, the governments of Botswana and Germany entered into a bilateral agreement in 1993, to establish a waste management project. The overall goal of the project was to reduce the risks of environmental pollution and reduce wastage of natural resources.

Before getting into the depth of this paper it is important to look at an observation made by Christian Zurbbrug in 1999, that:

“Most of the municipal solid waste in developing countries is dumped on land in a more or less uncontrolled manner Whenever solid waste management

systems based on user fees are introduced, the fees often barely cover collection and transport costs, leaving practically no financial resources for the safe disposal of waste.most people are willing to pay for the removal of the refuse from their environment, but are generally not concerned with its ultimate disposal and act according to the motto “out of sight, out of mind”!”

Botswana has taken steps in an effort to address the problems mentioned in the this observation. This is very important for Botswana because she relies heavily on groundwater. About 70% of Botswana’s water resources comes from groundwater. The high temperatures that Botswana has make the little surface water evaporate rapidly, making the country have a negative water balance. Thus, the importance of proper waste disposal methods to protect the groundwater needs not to be over-emphasised.

Situation on the ground

Botswana is a vast country of about 584 000 square kilometres in size, with a total population of about 1.5 million which is sparsely distributed over the vast land-mass. The country experiences very hot summers with temperatures sometimes reaching +40 degrees Celsius.

Botswana has, since independence in 1966, experienced a fast economic growth resulting in a marked change in the lifestyle of the people of Botswana. Traditionally, people lived on subsistence agriculture where the type of waste generated was mainly simple bio-degradable material from agricultural products. Now, types of wastes started coming into the country from the new industries and from imported goods. Disposal of these types of waste has since become problematic, and hence the need for a paradigm shift to protect the environment.

Botswana felt there was need to establish a legislative framework which would support implementation of waste management in the country. Botswana, thus developed a Strategy for Waste Management in 1998. This realisation further, led to the birth of the Waste Management Act (1998), hereinafter referred to as the act. The act establishes the Department of Sanitation and Waste Management (DSWM) which has the overall responsibility to advise and regulate waste management in the country.

Because of the vast nature and the sparse population, the country is divided into nine districts which source funds individually from central government.

Botswana felt there was need to establish an accurate account of the waste problems in the country. To this end,

the country conducted studies on various types of wastes, viz. : clinical/hospital wastes, oil containing wastes, metal wastes, packaging wastes, tyre and battery wastes and industrial wastes. Furthermore, three landfill model case studies were conducted to set examples for future developments throughout the country. These case studies involved closure and rehabilitation of a dump, upgrading of a dump to a landfill and the establishment of a new landfill. Botswana has well over 200 recorded dumping sites scattered around the country, of which only a few are considered to be landfills.

The waste management strategy

This is a policy document that was established in 1998 in an effort to implement the aims and objectives of Agenda 21 of the Rio Summit. The strategy embodies the following core principles whose basic premise is to minimise environmental pollution, viz.:

- principle of prevention;
- polluter pays principle; and
- principle of co-operation

The waste management act

Based on the above strategy, a waste management act was developed and was promulgated on 4th September 1998. This act was set up as the legal framework to strengthen, implement and support the strategy. Of critical importance, here is that the act requires that all waste disposal sites have to be registered, and also that all waste management facilities have to be licensed by the department.

Guidelines for the disposal of waste by landfill, 1997

This is a document that sets out standards on landfill development in Botswana. Landfilling was found to be the most economic and also environmentally friendly as well as socially acceptable method of waste disposal. The country had looked at other waste disposal methods such as incineration, which is commonly practised in the first world. This was found to be very expensive and unsustainable as it is highly mechanised and hence would require highly skilled manpower, which already is a problem in the third world. To this end, Oeltzschner and Mutz observe that:

"A well known possible method of waste treatment, reducing the amount of materials which finally will have to be disposed of is incineration. But for most developing countries and especially for countries with a tropical climate waste incinerators are inappropriate because of the composition of waste (high humidity and low calorific value), the high costs and technical difficulties of operation...)"

Construction of landfills is strictly based on engineering designs in order to achieve the main objective, that is, prevention of groundwater pollution. Following the con-

struction, is the operation and management of the landfill, which requires qualified personnel to ensure that everything goes well according to conditions of the licence. It is important to emphasise here that landfilling is a very expensive exercise and thus requires careful planning. This clearly goes along with the adage that *"He who fails to plan, is planning to fail"*. Thus, planning is an integral part in landfill development. It is for this reason that the act requires councils to produce Waste Management Plans that have to be approved by the DSWM.

Landfills classification in Botswana

Below, is a landfills classification matrix that has been adopted by Botswana. It is based on waste quantities and population size, though the former is more prevalent.

Landfill Size Class	MARD Tonnes p.a.	Indicative Population Size
Very Small	<500	2 000
Small	500 – 6 500	26 500
Medium	6 500 – 65 000	150 000
Large	>65 000	>150 000

Source: *Guidelines for the Disposal of Waste by Landfill, 1997*

To develop a landfill, the guidelines require the below steps to be followed as a critical path to enable the facility to obtain a licence:

- classification of wastes and landfills;
- site selection;
- site investigation and characterisation;
- Environmental Impact Assessments (EIA);
- design and construction;
- landfill operation and monitoring;
- documentation and record keeping;
- restoration and aftercare; and
- water quality monitoring.

Landfill Financing

Finance is a critical aspect of landfill development. As mentioned earlier, landfill development is a very expensive exercise. The following are good examples of landfill development in Botswana:

- Pilane Landfill : P 4 500 000.00 (about US\$850 000.00 on 25th March 2001)
- Francistown Landfill: P23 000 000.00 (about US\$5 million on 25th March 2001)

The above costs include investigations, design, construction, plant and equipment. It must be noted here that these

are just capital costs. After this, there is operational and maintenance costs, which could be much higher than the above costs especially if the sites are not run by qualified personnel.

So far, almost all the landfills are developed and operated by councils who get funds from the Ministry of Finance and Development Planning through the Ministry Local Government. The former emphasises cost recovery principles, so that the systems could, in future, sustain themselves.

Landfills could be self-financing if full cost recovery is implemented. But, this is difficult in Botswana at this stage, as the costs could be too high for the beneficiaries of the service. Where cost recovery is to be implemented, Government may have to subsidise a certain category of the society. Besides being able to afford the service, there is need for change of attitudes by members of the public on acceptability to pay for their waste just as they do for their water and other utilities. Hence the need for a paradigm shift as mentioned earlier.

Regional Landfills

Having seen the examples of the Francistown and Pilane landfills above, it goes without saying that landfills are indeed very expensive to develop. What we see above are just capital costs. Operational costs are hidden, as they will only come in once the landfill starts operating. It is estimated that operating costs absorb about 70% of the total landfill costs. Therefore, whilst we are still concerned about capital costs we should seriously think about how to minimise costs in landfill development. It is for this reason that the concept of regional landfills comes in. It may be very difficult to spend so much money in a country that is hard-hit by famine.

To date, there are over 220 registered dumpsites in the country. This number includes just a handful of properly engineered facilities/landfills. We obviously cannot have 220 landfills in the country. It is therefore prudent to try and introduce the regional landfilling concept wherever possible. This means those villages and or towns within a given radius should share facilities. This could mean that a town or village could use facilities from another district.

What should also be considered now is the implementation of the cost recovery policy of the Ministry of Finance and Development Planning.

Another possibility is to contract out waste management services so that councils do not spend so much money that could be used on other spheres of development.

Problems encountered

It must be acknowledged that waste management is a new concept in Botswana as well as in other developing countries. What Botswana has achieved so far, in terms of a legal and institutional framework, will be hindered from implementation by the following problems:

- lack of financial resources
- lack of skilled manpower

- the country's small population which is sparsely distributed over the vast size of the land mass makes it very expensive to establish landfills. Where several villages could share a landfill, this gets inhibited by haulage distances.
- lack of co-operation between local authorities which share boundaries. This is a problem in that villages which are close to a landfill in the adjacent political district could easily dispose of their waste at that landfill.
- sandy soils which occupy about two thirds of the country limit availability of lining and cover material as soils may have to be imported from long distances which could be very costly.
- poor maintenance of plant and equipment by Local Authorities because of unnecessary bureaucracy when repairs are supposed to be done.
- some consultants tend to over-design and over-equip landfills for their own financial gain.

Recommendations

1. There is need to have regional facilities where haulage distance is economic.
2. Where possible, the regionalisation concept should be extended across international borders.
3. Countries with acute water shortage like Botswana should have all their large landfills properly engineered and lined to prevent pollution of groundwater.
4. Waste management services should be contracted out to facilitate operation of landfills without continuous break-down of plant and equipment on site, or have preventative maintenance contracts.
5. Third world countries need to minimise costs on the military and but instead, spend money to conserve the environment.
6. Third world countries should attempt establishing the legal and institutional framework like the one established by Botswana, and then request donor agencies to assist them with funds to implement the legislative and policy requirements, which should be sustained by cost recovery principles.
7. Use of the trench method to dispose of waste in small villages, as this does not require engineering designs and lining.

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