

CHAPTER 29

A REVIEW OF SOLID WASTE MANAGEMENT IN DEVELOPING COUNTRIES WITH REFERENCE TO BOTSWANA

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Introduction

“Solid Waste Management is a serious issue which must not be treated lightly and its examination should not be confined to its narrow and technical definition”, said the Minister David Magang at the closing of a Waste Management Workshop at Gaborone Sun on June 8th, 1993. The Minister said it was *“essential to take a broad approach of waste management because of waste’s impact on the environment and natural resources”*.

The statement made above indicates quite vividly that waste management has in the past been treated in a callous matter-of-fact manner and largely regarded as mere waste, which did not have any specific valuable use. In fact the adage “Out of Site Out of Mind” tends to portray the contextual understanding within which waste was handled. The renaissance of Waste Management in the Developing Countries and most importantly in Botswana has resulted from a diversity of directives: *legal local authority impositions; fiduciary responsibilities, constraints and limitations in resources allocations; slow but definitive incremental approaches*. Other significant approaches and potential growth patterns in the waste management sector could be associated with the political prescriptions; Government contribution to stimulate service provisions; Private Sector initiatives; and most importantly for Botswana, the NCS/GTZ Waste Management Project co-sponsored by the Federal Republic of Germany and the Government of Botswana. This project started initially with a preconceived idea of preventing and controlling water pollution through proper identification and planning of waste disposal sites. The project is predicated on pre-determined key factors that are critical to the overall goal conceptualised as *“The reduction of the risks of environmental pollution and waste of natural resources”*. Aside from minimisation of environmental pollution and health risks, the Waste Management philosophy in Botswana considers waste as an economic good where this proves feasible. It identifies waste as a source of raw material whose beneficial use will compliment a conservative use of existing stocks of natural resources, so that future generations could enjoy the rich legacy of the stocks the present generation has reserved for them. Waste Management in Botswana has an actionable Waste Management Strategy, which requires the substantive provision of infrastructure networks to promote collection, storage, transportation, treatment, and disposal.

General

Waste Management developments in Botswana have resulted from a diversity of various directives, incremental approaches, and from the bilateral technical co-operation project with the Federal Republic of Germany. In particular evolution of the waste management sector could be associated with the Legal and Political Prescriptions; Constraints and limitations in resources allocations; Government's Contributions to stimulate service provisions; Private Sector Initiatives; and NCS/GTZ Waste Management Project.

Legal and Political Prescriptions

Chapter 40 of the Laws of Botswana did not only create Local Authority Administrative Structures, but also gave them mandates to provide services in their areas of jurisdiction. The law gave specific powers to these councils to ensure that negative impacts were abated and that protection of the environment and conservation of its natural resources was guaranteed. In particular in exercising his legal prerogative to establish a council, and subject to such conditions as he deemed fit, His excellency the President of Botswana required councils under the stewardship of the Ministry of Local Government, Lands and Housing (MLGLH) to provide services to the constituencies they served. Through such legal directives, Councils were and still are empowered to secure and to promote health, order and good Government of the area for which they are responsible. To execute their statutory responsibilities for the maintenance of health, safety and well being of the inhabitants of their areas of jurisdiction, Councils were authorised to make bye-laws that contributed to or provided approximate cause for "Pristine Environmental Conditions". Therefore, within the context of the Local authority bylaws approved by the Minister of the MLGLH, the prescriptions empowered councils to prevent the "accumulation of waste, to ensure substantive provisions necessary to maintain health and sanitation".

Constraints and Limitations in the Waste Management Sector

The Waste Management Sector like its co-existing environmental disciplines was established based on both Central and Local Governments' ability to pay. Various financial and technical subsidies could not confer a panacea (cure-all) because of the following critical limitations: -

- ❑ Competing interests within all productive sectors in the country's economy;
- ❑ Mandatory economic/financial and human resources ceilings; and

- ❑ Inadequate collections of revenues to recover the cost of services or for further developments within the sector.

Despite these limitations and in order to stimulate waste management sectoral advances, Government introduced specific financial contributions.

Government's Contributions to Stimulate the Waste Management Sector Developments

In conjunction with the Ministry of Finance and Development Planning (MFDP), the MLGLH established, by delegation to Councils, the service delivery programmes in Waste Management achievable through capital and resources subsidies and ensured that accountability through project reviews and verifiable performance indicators within the sector were adequately demonstrated. Waste Management Developments made slow quantum leaps through the fiduciary provisions and affordable financial and economic guarantees in the National Development Plans.

The Sector Performance Within the National Development Plans (NDP) 6 and 7

NDP 6 formulated a waste management intervention strategy that recognised waste management as a fundamentally Government sponsored programme with very little potential investor entrepreneurship contribution. The onus of responsibility became that of Government's Ministries of Local Government, Lands, and Housing, Health, Mineral Resources and Water Affairs, and the Local Authorities. NDP 7 provisions and allocations which were budgeted to affect the waste management sector more meaningfully were predicate to the National Rural Sanitation Programme which addressed in a limited sense and in all the nine national districts procurement of refuse collection vehicles, and the development of Refuse Disposal sites. The urban local authorities benefited from township services subsidies. Funds from the budgetary provisions indicated above are disbursed through the Planning Division of the MLGLH to individual Councils upon effective justification through project memoranda to procure sanitation vehicles and to sponsor construction of waste disposal sites.

Most importantly the MLGLH carried out the following: provided for resources mobilisation, assisted in project designs and implementation, and furnished technical support in waste management programmes. The MLGLH also assisted in the evaluation of new directions and philosophies and in the case of Gaborone City Council the ministry participated in testing the feasibility and physical delivery of services through management by contract (privatisation). The conclusions drawn from this pilot reference will be used to provide other

innovations in our service deliveries. As an author of the National Conservation Strategy that addresses waste management developments, MLGLH is also responsible for ensuring that physical developments made are environment friendly. Out of the above legal administrative structures, there is a discernible trend in partnership among government's ministries and local authorities within which waste management programmes have developed.

Private Sector Initiatives in Waste Management

To ensure that the potential of waste was fully realised, the private sector initiatives attempted to convert waste into an "Economic Good". An example of such conservative programmes is evident in the City of Gaborone where out of investment motives and possibly environmental consciousness some private companies attempted to establish waste resource recovery projects. For instance Collect a Can established a can recovery enterprise; Skip Hire rented out skips, and positioned "Bottle Banks" at strategic places; in schools and next to residential centres to collect bottles. Waste Paper Recovery collected, bailed and transported waste paper to both South Africa and Zimbabwe for reprocessing while Plastic Waste Recyclers collected plastics for conversion into useful by-products. These reuse projects are a positive contribution in the management of wastes but most importantly they demonstrate a burgeoning responsible partnership by industry in waste handling.

Waste Management/Protection of Water Resources Project (Current National Initiatives)

The initial idea to implement a project focusing on the prevention and control of water pollution through proper identification and planning of waste disposal sites came from the Ministry of Mineral Resources and Water Affairs through the Department of Geological Surveys (DGS) The project effectively commenced following the signing of the Botswana – German Technical Cooperation Agreement, in 1992. Furthermore after a more detailed planning had taken place a project appraisal was carried out in Botswana culminating in an Aid Memoir which was prepared, agreed upon, and finally signed on May 2nd, 1991 in Gaborone with the concerned authorities at the bilateral level. The project consists of two phases: the first from April 1993 to March 1996 and the second from April 1996 to March 1999. To ensure sustainability in the development of this project, the agreement recommended employment of counterparts by the Botswana Government. On the Botswana side, the National Conservation Strategy (Co-ordinating) Agency (NCS), and the Department of Geological Survey (DGS) support the project. The responsible partners on the German side are the Deutsche Gesellschaft fur Technische Zusammenarbeit (GTZ) and the Bundesanstalt fur Geowissenschaften und Rohstoffe (BGR). NCS

and GTZ are in charge of the overall project implementation whereas DGS and BGR are concentrating on the hydrogeological aspects and the vulnerability mapping.

Aims of the First of the Phase of the NCS/GTZ Waste Management Project

The project identified eight key factors in the first phase, some of these are:

- The legal and institutional framework;
- The vulnerability mapping;
- Establishment of a waste data bank;
- The research and development on specific waste streams; and
- State of the art landfill operations.

Sector Performance in Phase One (June 1993-March 1996)

Based on the findings of consultants, Integrated Skills limited, engaged by GTZ an analysis of the current waste laws was carried out in December 1994. Intensive consultations and discussions with all interested parties and a report describing the legal and institutional needs for waste management were prepared. It described the main features of a waste management bill and strongly recommended the establishment of a waste management agency at the central government level and waste management divisions within the local authorities.

Furthermore the report suggested a chronology for introducing the main elements of an environmentally sound waste management in Botswana.

Consequently, a Presidential Cabinet Directive of December 1995 issued the following instructions:

- (a) That the Attorney General drafted the Waste Act.
- (b) That with recommendations from the Ministry of Local Government, Lands and Housing, the Department of Public Service Management strengthened the National Conservation Strategy (Co-ordinating) Agency to enable it to effectively implement the Waste Act currently being drafted.

Effective Waste Management is legislation driven, and legislation is ineffective without enforcement. As a part of the legal and institutional framework, draft technical guidelines for landfill sites were developed and are currently being tested by all stakeholders in waste management for a period of twelve months.

Responses from the interested and affected parties will be consolidated into a final document which would form a national blueprint constituting a permitting process in landfall operations. The cartographic work on the vulnerability map scale 1:1,000,000 is complete and 2500 copies have been printed and distributed for planning purposes. Six vulnerability maps (indicate water resources areas that are fragile to pollution and that require adequate protection) at a scale 1:50,000 with explanatory notes are available and have also been distributed to the respective districts. Data about all major dumpsites/landfills have been collected and will serve as a basis establishing a national waste management data bank. Through another round of intensive contacts with districts the dump sites based on identified need will be upgraded into landfill sites. Three case studies on medical, metal, and oily wastes have been carried out. Physical implementation of the recommendations made will take place in the second phase of the NCS/GTZ Waste Management Project. Other research and development case studies will be carried out on individual waste streams in the second phase.

Decision has been made on the three case studies for landfalls to develop state of the art landfilling operations based on the technical minimum landfill guidelines. These will provide the necessary demonstration and promotion effect on proper landfill designs. The findings of these case studies will be translated into actionable plans in Phase Two. The project also provided for the consultancy to develop teaching materials for Environmental Impact Assessments on landfall sites. The University of Botswana conducted the course in June of 1996.

As part of capacity building among the local authorities, two weeks crash courses for waste managers and landfall operators were administered in April/Way 1995 in Kanye and in Molepolole in April 1996 with participants predominantly coming from all districts. The 2nd International Waste Management congress was held in Francistown during the week of 19 - 23 June 1995 under the theme "Waste Management - Pre-Requisite to Sustainable Development". A large portion of the participants came from central and local government, representatives of the House of Chiefs, University of Botswana, parastatal and private companies and non-governmental organisations. There were in addition participants from Zambia, South Africa, Germany, Kenya and consultants on specialised topics made available by GTZ. At the end of the congress the participants came up with twelve resolutions and recommendations, which will influence future programme areas, particularly the national waste management strategies and action plans.

The project carries out public awareness campaigns, develops teaching material and organises seminars and workshops. Through its long term experts from GTZ the project is also involved in ad hoc advice for Councils, the landfall case studies and technical guidelines for disposal of waste by the landfill. In addition to the eight aims mentioned above the project drafted a waste

management strategy/policy for the Government of Botswana, it has currently been reviewed and fine-tuned and will be circulated to government's ministries for comments before adoption and approval.

Waste Management Development

Prospects in Phase Two (April 1996 -March 1999 1999). At the September 1995 Project Planning Workshop attended by representatives from Local Authorities, several key factors were established and these would be implemented within the second phase. It is envisaged that this phase would also comprise recommendations from the Phase One of the project, which we consider crucial if major achievements within the sector are to be realised.

Critical factors were identified that would assist the sector achieve sound management of wastes through an enforceable legislation; intensive public awareness campaigns; resources; conservation and recovery established through waste reduction and recycling incentives. The project's target is to develop strategies and policies that are economically sustainable.

Core Problems

Inadequate waste management in general and the uncontrolled disposal of wastes in particular are considered to be some of the core problems affecting sustainable protection of water resources in Botswana. This is exacerbated by increasing waste generation due to rapid economic development, population growth and changing life style/consumer habits. Wastes include domestic or household waste, industrial waste, hazardous waste, clinical waste, sewage sludge, demolition waste, and excavation waste to name a few. Notably waste generation is the seamy side of our production and consumption of goods.

Without preventive measures and tight controls, high risks of water pollution (ground water as well as surface water) are possible. With the current practice of uncontrolled dumping of wastes the deterioration of drinking water quality may be an unavoidable result, thus constituting a severe threat to public health, the human and the natural environment. These problems have to be seen in the context of a semi-arid country, where ground water resources are scarce and water resource management would become even more difficult.

Other problems resulting from uncontrolled dumping of wastes are that toxic substances could enter the food chain through plants and animals and that insects and rodents breeding on these sites could cause a transfer of infections to people. Furthermore the occurrence of bad odours and smells from the uncontrolled burning of wastes and the ugly visual intrusion on landscape which is created with the present throw away mentality is a nuisance not only to the inhabitants

of Botswana but also affects the tourist industry in the country. Finally the economic effects should not be underestimated because on the one hand waste which is thrown away is 'raw material in the wrong place'. On the other hand it will cost future generations huge amounts of money to clean up an environment which we have damaged through our carelessness.

A Summary of Project Goals - Phase One (1993-1996)

During February 1994 the participants of a ZOPP IV workshop agreed on the **Overall Goal** of the Project to be: "The risks of environmental pollution and waste of natural resources are reduced".

The **Project Goal** for Phase One was formulated as follows: "Waste Management started to be introduced on national level."

The following results were to be achieved:

1. A legal and institutional framework for waste disposal and waste management at the national level should be prepared.
2. The vulnerability of water resources should be identified.
3. The database with regard to environmental issues in the field of water quality, waste generation and current practices of waste management should be improved.
4. Concepts for the reduction, re-use and recycling of certain specific wastes (cans and metal scrap, plastic wastes, waste oil and wastes from health/medical facilities) will be established.
5. Case studies on the identification, planning, operation and closing/after care of landfill sites at three elected locations will be carried out to defame a state of the art for landfilling in Botswana.
6. The qualification of technical staff and planners should be improved.
7. Public awareness with regard to proper waste handling and disposal as well as protection of water resources in general needs to be promoted.
8. *Ad hoc* immediate advice on waste management questions at local level (with specific regard to landfilling) needs to be provided to urban and district councils.

Although this was considered to be a very ambitious project most of the targets were addressed with success during Phase One, especially that all the parties

informed so far have agreed that the waste problem needs urgent attention and the project has come at the right time.

A Summary of Project Goals - Phase Two (1996-1999)

The attendants at the OPP V workshop agreed in September 1995 that for Phase Two, the **Overall Goal** of the project, which is “Risk of environmental pollution and waste of natural resources reduced”, should not be changed.

The **Project Goal** was agreed as: “Central Government Administration, Local Authorities, Politicians, Traditional Leaders, NGOs, Churches, Waste generators, and the Waste Handling Industry establish, execute and actively engage in a sound and effective waste management programme.” Five key results were agreed upon, which were at a later stage revised to produce six key results by splitting result 1 into two independent results, as follows:

1. Set up of Waste Management Division within NCSA as well as waste management units at local level supported.
2. Adequate legal framework at central and local level facilitated.
3. Improvement of political understanding and public awareness in waste management encouraged.
4. Improvement of collection, transport, interim storage, and landfilling supported and facilitated.
5. Reduction, reuse, recycling and treatment of specific wastes encouraged.
6. Economic sustainability of effective waste management facilitated.

Present Status of the Project (Department of Sanitation and Waste Management)

The decision of the Government of Botswana to establish a new Department of Sanitation and Waste Management, which will be exclusively responsible for ‘executing government policy in sanitation and waste management, indicates clearly that Government now assigns adequate priority to sanitation and waste management. This is furthermore expressed by the positive development with respect to the adoption of the waste management strategy, the Waste Management Act and the Landfill Guidelines. Staffing and budgeting, always a contentious issue in the past has turned out better with all the Botswana Counterparts in place. More officers are to be employed in the new Department

and relevant finances planned for waste management under NDP 8. Therefore, institutional and capacity building within the project necessary to achieve sustainable development of the waste management sector is well on track.

Conclusion

There are clear indications that Botswana is making steady but definitive progress in environment friendly waste management programmes. With the implementation of the national aims and objectives spearheaded by the NCS/GTZ Waste Management Project, and with effective national commitments towards environmental protection and conservation, the sector will enjoy continuous growth. For any future waste management strategies to be more meaningful and progressive they should substantively depart from heavy governments subsidies in preference for a more sustainable government, parastatal organisation, local authority, and private enterprise partnership. The future prospects for Waste Management in Botswana will be realised not by singular government's involvement but certainly through the principle of co-operation.

While the project offers a golden chance to reduce environmental pollution, its impact will have been achieved if within its scope and content it could influence common regional approaches that enjoy replicability, that are affordable in character, and that would stand the test of times.

A Catalogue of Project Report Listing

Reports Developed by the Project

| Report No. | Title | Author | Date |
|------------|---|---|-----------|
| 1 | Pollution Protection of Water Resources and Solid Waste Disposal Management - Main Report Mission (GTZ & BGR). | German Project Appraisal | July 1991 |
| 2 | Pollution Protection of Water Resources and Solid Waste Disposal Management - Annexes, Photo Documentation, Map and Literature. | German Project Appraisal Mission (GTZ & BGR) | July 1991 |
| 3 | Situation Analysis - Preliminary Report. | Dr. Jacobus P. Venter and Mrs Vidette Engelbrecht | Jan 1994 |
| 4 | Legal and Organisation Issues. | Nicholas Crick and Richard | |

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|----|--|---|-----------|
| | | Hawkins | Dec 1994 |
| 4A | Legal and Organisation Issues (Appendices). | Nicholas Crick and Richard Hawkins | Dec 1994 |
| 5 | Landfill Case Study No. 2 - Pilane Waste disposal site upgrading. | Mr. David Hojem GTZ (German Technical Co-operation) | Mar 1995 |
| 6 | Recycling Study on Metal Wastes Minutes of Interviews. | Dr. Ing. Heino Vest | June 1995 |
| 6A | Recycling Study on Metal Waste. | Dr. Ing. Heino Vest | July 1995 |
| 7 | Clinical Waste - Final Report. | Nicholas Crick and Derek Johnson (Integrated Skills Ltd) | July 1995 |
| 7A | Clinical Waste Management - Implementing the Code of Practice - Training Manual. | Nicholas Crick and Derek Johnson | July 1995 |
| 8 | Report on the Project Progress Review | German Review Team Mr. Menche, Mr. Mutius and Mr Oeltzschner | Sep 1995 |
| 9 | Landfill Case Study No. 3 - Maun Waste Disposal Site Closure & Rehabilitation. | Mr. David Hojem GTZ (German Technical Co-operation) | Sept 1995 |
| 10 | Management of Oil Containing Wastes | JHW du Toit, Toicon cc and GWP de Mattos Lombard & Associates | Oct 1995 |
| 1A | Management of Oil Containing Waste - Appendices. | JHW du Toit, Toicon cc and | |

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| | | GWP de Mattos Lombard & Associates | Oct 1995 |
| 11 | Environmental Impact Assessment for Sanitary Landfill in Botswana - An Introduction and Case Studies. | NCSA/GTZ and the University of Botswana | 1995 |
| 11A | Environmental Impact Assessment for Sanitary Landfill in Botswana - An Introduction and Case Studies. | NCSA/GTZ and the University of Botswana | |
| 12 | Sanitary Landfall Guidelines (Draft). | Nicholas Crick (Integrated Skills Ltd.) and Jarrod Ball, Jarrod Ball & Associates | Dec 1995 |
| 13 | Landfill Case Study No. 1 - Selection and Development of a new Landfill Site Ghanzi/Gantsi. | Mr. David Hojem GTZ (German Technical Co-operation) | Jan 1996 |
| 14 | Organisational and Human Resources Development for Waste Management in Local Authorities. | The National Conservation (Co-ordination) Agency | Aug 1996 |
| 15 | Botswana's Strategy for Waste Management (Draft). | NCSA/GTZ Waste Management | Jun 1997 |
| 16 | Collection of Industrial Waste Information - Final Report. | The National Conservation Strategy (Co-ordination Agency & GTZ - German Technical Co-operation) | Dec 1996 |
| 17 | Risk Assessment and Environmental Impact Assessment for burning small quantities of household waste at villages in Botswana. | NCSA/GTZ Waste Management Project | Mar 1997 |

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| 18 | Implementing Metal Waste Recycling. | Dr Ing. Heino Vest | Aug 1997 |
| 19 | Development of Guidelines for the Disposal of Large Quantities of Animal Carcasses. | Ecosurv (Pty) Ltd. Mr D. Parry (Team Leader) | May 1997 |
| 20 | Management Information Systems - Final Year Project. | Samuel Serero (UB) | Apr 1997 |
| 21 | Guidelines for the Disposal of Waste By Landfill. | David J. Hojem, GTZ/NCSA | |

PART 6

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| 30 | Application of Appropriate Technologies in Waste Management in Developing Countries - Brighton Kaonga | 379 |
| 31 | Transnational Movement of Hazardous Waste in Developing Countries Prof F A O Otieno | 401 |
| 32 | Transboundary Movement of Hazardous Waste - Georges Ekosse | 417 |
| 33 | Waste Management Services in Botswana: Evolution of Problems, Perspectives and Responses - V T C Matsoga | 433 |
| 34 | A Comparative Approach to Laboratory Waste Management - Georges Ekosse | 441 |
| 35 | Management of Effluent and Sludge from Treatment Systems - Yvonne Gotlop Bogatsu | 453j |