

Towards a Model for Environmental Assessment and Management of Boreholes in Communal Areas in Namibia

A dissertation prepared in fulfilment of the requirements of the MPhil (Environmental Science) degree

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Executive Summary

'It is considered necessary that a formal process of environmental assessment for borehole provision programmes should be developed. This would be a process of environmental assessment, possibly based on existing environmental assessment procedures, but designed specifically for borehole provision programmes.'

(ENGE0, 1997: 181)

This was the final statement in a report, prepared for the Namibian Programme to Combat Desertification (NAPCOD), which researched the process, praxis and environmental impacts of borehole provision in communal areas in Namibia (ENGE0, 1997).¹

This dissertation is a response to this concluding statement. It presents a theoretical model which provides a comprehensive yet simple environmental assessment and management framework to inform, guide and manage the provision of boreholes in communal areas in Namibia. The model has been designed to be cost effective, appropriate for its context and 'user-friendly.'

Most importantly, the model aims to present a system which would promote principles of sustainability and, consequently, sustainable development in terms of borehole provision in communal areas in Namibia.

Background

Namibia's dry climate is, arguably, the single most important influence on and determinant of the range of biophysical, social and economic aspects that comprise the Namibian environment (ENGE0, 1997).

The coastal plain of Namibia may be considered a hyperarid region with a rainfall of less than 50 mm per annum. Rainfall generally increases from west to east and from south to north. The north-eastern regions, therefore, have the highest precipitation with areas such as the Caprivi receiving up to 700 mm per annum but no more than 10% of the country receives above 500 mm of rain per annum. The mean annual rainfall for the whole of Namibia is only 250 mm (DWA, 1991).

Combined with high evaporation rates, which range from 2 600 mm per annum in the north-east to 3 700 mm per annum in the south-west, it is not difficult to appreciate the fact that Namibia is the driest country in sub-Saharan Africa (Ashley, 1996; DWA, 1991).

Namibia is not only an arid country, but it has also been identified as containing 'dryland at risk of desertification' (Cardy, 1994).

¹ Note - at the time of writing this dissertation the ENGE0 report was a draft version pending final edits and final pagination

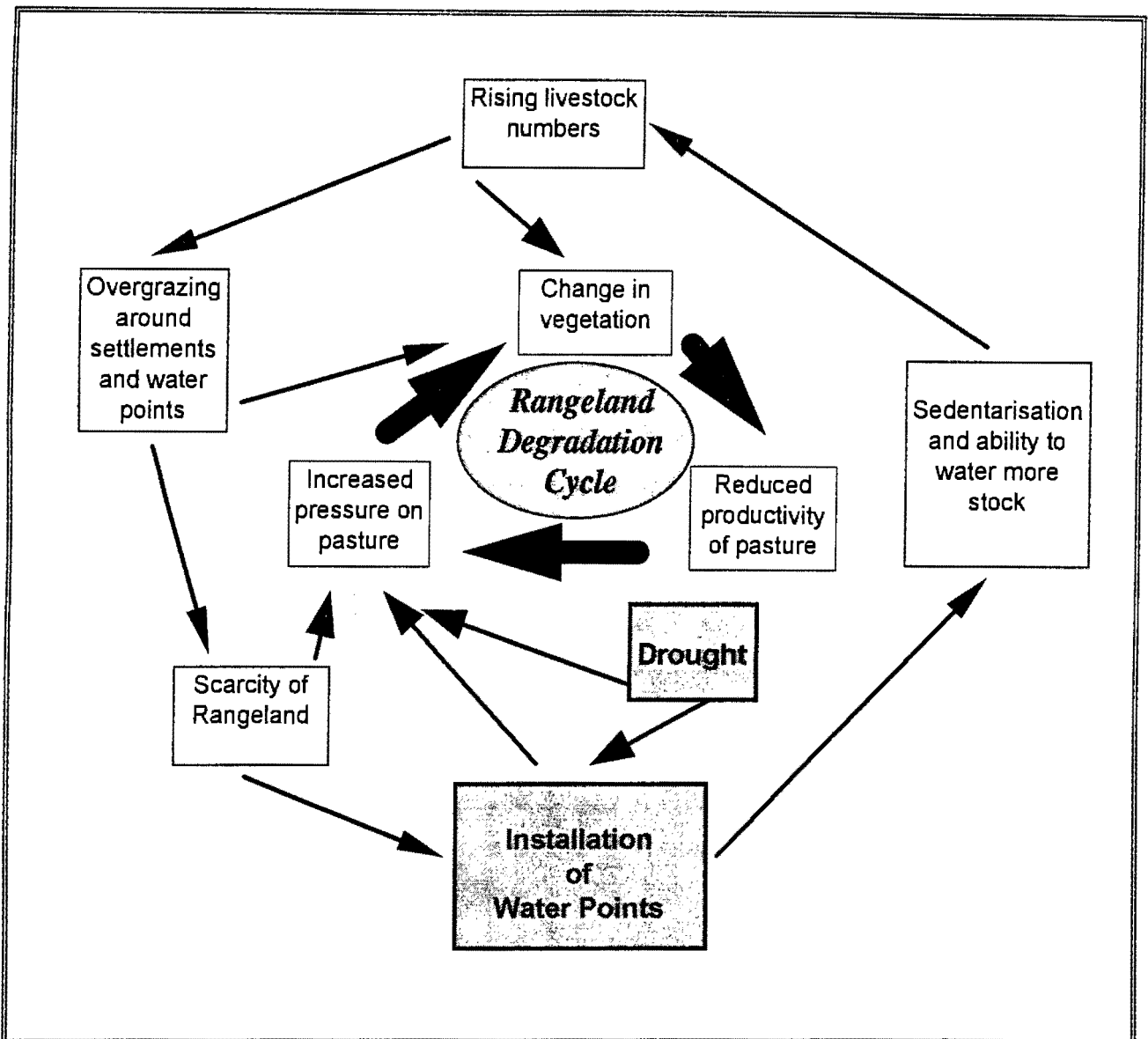


Figure 1: Schematic presentation illustrating mechanisms through which borehole provision and drought may contribute to rangeland degradation (adapted from Ashley et al, 1995)

The sustainable development dilemma

There is a dilemma in sustainable development in the provision of boreholes - a dilemma which has not been resolved. This can be summarised as follows:

The provision of a borehole in a communal area in Namibia represents the provision of an extremely basic human need - water. Water is essential for life and essential for economic activity and livelihood on the land. An abundant and healthy supply of water correlates strongly with an improved quality of life (Hardoy et al, 1990). In many communal areas where boreholes are provided there is no realistic alternative method of providing water (Koch, pers. comm.). Thus, the provision of boreholes is a fundamental and, arguably, absolutely necessary development activity in many communal areas in Namibia.

Provision of a boreholes in communal areas in Namibia, however, can result in land degradation, decline in land productivity and consequently an overall decline in quality of life (ENGEO, 1997).

Thus, paradoxically, by increasing water availability by providing water points, the land may become less productive, irreversible environmental degradation may occur, desertification become established and availability of groundwater resources decreased as water is extracted beyond recharge rates. Consequently, the livelihoods and local economies of rural people dependent on the land may be jeopardised. Boreholes as a development may result in overall loss to Namibia and its people.

Addressing this potential impasse

There have been several initiatives to address this problem including studies, information booklets with environmental guidelines for communities to implement, proposals of grazing tariffs, recommendations for environmental management plans for boreholes and recommendations for environmental impact assessments for boreholes (ENGEO, 1997; DRFN, 1993; DRWS, 1996; Ashley *et al*, 1995). However, to date, no holistic and comprehensive framework exists to guide and manage the environmental aspects and impacts of borehole provision (ENGEO, 1997).

This dilemma of sustainable development, the apparent conflict between the development initiative of borehole provision and the need for sustainable environmental productivity, could possibly be resolved through appropriate environmental management strategies which can integrate development needs with environmental protection and thus, sustainability.

'... it is clear that boreholes can be significant determinants of, and influences on, the social, economic and biophysical environment. Therefore, considering the range of possible environmental impacts and implications of borehole provision, the primary recommendation arising from this study is that borehole provision must be subject to a process of environmental assessment and holistic environmental planning and management.'

(ENGEO, 1997:vii)

EIA is inappropriate for this task

Environmental impact assessment (EIA), since its official inauguration in the United States of America by the National Environmental Policy Act (NEPA) in 1970, has been adopted in more than one hundred countries world-wide and is widely considered to be the core sustainability tool, or mechanism, for development projects (Abaza, 1995; Sadler, 1996).

However, boreholes as development activities differ from the type of development activity for which EIA has been developed. Boreholes are small-scale, low budget community developments in the context of communal land tenure. They are extremely necessary and basic development activities and

are common in rural Namibia. Environmental impacts of boreholes in communal areas in Namibia mostly relate to ongoing land-use practices associated with the borehole and to groundwater extraction rates. Although each borehole may have only a localised environmental impact, cumulatively the effect of boreholes could be highly significant (ENGE0, 1997).

Furthermore, Namibia as a developing country and more specifically rural Namibia and the communal land tenure system are a vastly different context from that for which EIA was first designed.

On reviewing the usefulness of conventional EIA for this context and environmental problem, it has four basic shortcomings:

1. Standard EIA procedure is not always suitable for the context of developing countries (Sadler, 1996; Fuggle, 1995).
2. A systematic weakness of EIA is the implementation of the information attained in the EIA process in ongoing environmental management, monitoring and auditing of the project (Sadler, 1996).
3. EIA is inappropriate for small-scale, low budget community development projects.
4. EIA, by not adequately addressing small projects with environmental impacts, does not address the cumulative effects of such small-scale development.

Justification for a new model

A new model for integrating environmental considerations with borehole provision is needed.

'To prevent ...degradation of the resource base...(it is necessary to) develop local management of boreholes and grazing for livestock; ensure new boreholes are in the context of a land/grazing management plan.'

(Ashley et al, 1995:8)

It is an initiative which also has international support. In addressing the problem of desertification, UNEP states:

'.....we plan to work with affected countries...the administrative challenges of implementing a truly 'bottom-up approach' are formidable: how it will be done is not yet clear, but we shall be actively encouraging important initiatives in this direction'

(Cardy, 1994:15)

Sustainable use of natural resources in Namibia is essential (Ashley, 1996), but exactly how to achieve this in respect of borehole provision seems to be a persistent dilemma. Not even the ENGE0 baseline report, which aimed to resolve this dilemma, produced a specific or convincing solution.

This dissertation aims to make a contribution towards the resolution of this environmental problem by proposing a model to guide and direct provision and environmental management of boreholes.

Process adopted to build this model

The model is developed in three steps:

1. An analysis of sustainable development and its relevance in terms of an ideological basis and guide for the model;
2. Analysis of Integrated Environmental Management (IEM) in South Africa, Environmental Management Systems (EMS), community-based conservation programmes and the 'Fast-track' system for environmental management of mineral prospecting in Namibia. These approaches are analysed in terms of 'sustainable development potential' and applicability to boreholes in rural Namibia.
3. Synthesis of key concepts, processes, principles and techniques from these approaches into a model of environmental assessment and management appropriate for boreholes in Namibia.

Sustainable development

Sustainable development is a difficult term to define. Sustainable development has often been defined in terms of one discipline: social, ecological, technical or economic sustainability.

The Brundtland Report (WCED, 1987) succeeds in extending this definition to a holistic expression of meeting human need in the present as well as the future. This non-unitarian approach is commendable but demands a complex integration of multiple aspects of development.

In the context of rural Namibia, it is proposed that this type of 'holistic' approach to sustainable development will only be achieved through promotion of four basic principles of sustainability:

- 1. Basic needs of local communities must be met;**
- 2. Natural resources should be subject to local control;**
- 3. Local communities must have the decisive voice in planning;**
- 4. Local communities should represent themselves in and through their own institutions.**

(Colchester, 1994)

These principles emphasise the role of local or indigenous people in resource management and the importance of indigenous or local knowledge in resource management.

There are also several good pragmatic reasons supporting the local bias of these principles of sustainability:

- local people are familiar with local conditions;
- local people often have a deep appreciation for the social, economic, ecological and cultural context of resource management;
- local people are the *de facto* custodians of areas which, in developing countries, are often beyond the effective reach of government administration;
- local people have a vested interest - often as important as their very livelihood - in the success of local resource management.

(Berkes, 1995; Metcalfe, 1994)

On the basis of the foregoing, the importance of community participation in development and the well recognised need for devolution of control and resource management to local communities, community co-management is promoted as the framework to achieve sustainable development in the context of rural Namibia.

Community co-management involves the conditional devolution of resource rights to local communities. In community co-management systems,

'...governments may retain some rights or demand responsibilities when devolving tenurial rights. Co-management limitations balance the immediate needs of resource owners with the longer term societal interest in maintenance of resources. Co-management should be introduced with procedural safeguards and remain subject to periodic review.'

(Western and Wright, 1994:528)

This community orientated understanding of sustainable development guides further analysis.

Integrated Environmental Management (IEM)

IEM is relevant as it was formulated as an environmental assessment procedure suitable for South Africa - a developing country.

IEM, as a successful application of EIA to a developing country, contains important principles and conceptual underpinnings that are of direct relevance to the task of designing a model for environmental assessment and management of small projects in Namibia.

IEM has also significantly influenced Namibian EIA procedure. IEM makes several contributions to the model in terms of ideology, concepts and principles for EIA in developing countries.

Key contributions of IEM to the model are presented below:

- The definition of the term environment is broad, inclusive and holistic. It is inclusive of the range of biophysical, social and economic aspects that affect the human environment.
- The environment is not romanticised but seen as a resource for necessary development.
- The primary aim, therefore, is to guide development rather than to set out to stop it.
- To this end, the process aims to mitigate negative aspects and enhance positive aspects as well as consider alternatives of development.
- It aims to guide and influence the project right from its early stages of design to end stages of decommissioning.
- It aims to promote full public participation in the process.
- Participation involves active engagement of the public and overcoming social, educational and political obstacles to full participation.
- Participation prioritises capacity building, empowerment and access to information.
- The goal of informed decision-making involves integration of public and expert opinion and knowledge.

(Fuggle, 1995; Sowman *et al*, 1995; DEA, 1992)

These are aspects of IEM upon which the model is founded. However, there are shortcomings of IEM which make it inappropriate for application to boreholes in rural Namibia.

In this respect, there are three key issues:

1. IEM generally assumes an understanding of development which is based on the western development paradigm which is largely characterised by modernisation, economic growth, industrial development and infrastructural development. A model of sustainable development in rural Namibia would preferably allow scope for communities to define the nature of development itself and the development agenda rather than merely participate in a pre-determined development agenda.
2. IEM is a relatively complex and expensive process to implement. It makes provision for streamlining the approval of small projects without significant environmental impacts. However, because of logistical constraints it would be unlikely to be able to comprehensively address small, low budget projects such as provision of a borehole without disproportionate expense.
3. IEM improves on conventional EIA because it emphasises ongoing environmental management of a project. However, this is still a less clearly defined and structured aspect of IEM. Simple and effective ongoing environmental management would be essential in terms of mitigating environmental impacts of borehole provision.

Environmental Management Systems (EMS)

EMS provide a clear, structured and effective approach to ongoing environmental management of a project. Although designed for the corporate context, EMS as described by ISO 14 000 (ISO, 1996), make two significant contributions to the model:

1. A management cycle of continual improvement

The Deming Cycle which underpins ISO 14 000 is a dynamic management cycle which emphasises four stages of environmental management: planning what is to be done, doing what is planned, checking that what was planned was done and acting on the results of the checking procedures to revise, modify and improve the initial plans (Starkey, 1996).

2. Key requirements for this cycle of continual improvement

EMS describe four key requirements for effective ongoing environmental management (Hill and Soboil, 1996).

- *An Environmental Policy*
- *Organisational Structure*
- *An Environmental Management Programme*
- *Environmental Audit*

EMS are a 'state-of-the-art' approach to environmental management in the context of a the corporate environment. Where EIA has been used mostly as a predictive exercise, the forte of an EMS is environmental management. It has been suggested that IEM be integrated with EMS to form a comprehensive environmental assessment and management process called Integrated Environmental Management Systems (IEMS) (Hill, 1996). This fusion of an IEM type environmental assessment stage and a well structured EMS stage is a conceptual underpinning of the model.

Community-based resource management

The subject of boreholes in rural Namibia does not only concern impact assessment and environmental management but it also concerns communities and community resource management.

There is a growing trend throughout the developing world and also in Africa to increasingly involve local communities in management of natural resources (Harsch, 1995). Community-based conservation projects such as CAMPFIRE in Zimbabwe and CBNRM in Namibia which link and integrate conservation with development, are promising initiatives in sustainable development. Both CBNRM and CAMPFIRE involve conditional devolution of rights over wildlife to local communities (Jones, pers. comm.; Metcalfe, 1994).

In CBNRM, communities are allowed to benefit from wildlife either through direct consumptive use, game farming, tourism ventures, trophy hunting or in any other way deemed suitable by the community. Proceeds of benefit may be used and distributed at the discretion of the community. There are broad

conditions on wildlife use - it must be sustainable and legal and proceeds are to be distributed equitably within the community (Jones, pers. comm.).

It is, therefore, a co-management system for a natural resource. As such it makes a significant contribution to the co-management concepts and system in the model.

Key aspects contributing to the model include:

- devolution of the 'locus of control' over a natural resource to the community level;
- the establishment of a local management body representative of the community and accountable to the community and to the relevant government ministry;
- the promotion of sustainability, equity, accountability and conservation within the co-management framework and in the context of a communal land tenure system.

The 'Fast-track' system for prospecting in Namibia

In 1996, the DEA in Namibia, faced with the dilemma of ensuring sound environmental management in diamond prospecting operations on the north bank of the Orange River, devised the 'fast-track' system for mineral prospecting. In order not to jeopardise these semi-formal and economically marginal operations by imposing standard EIA procedures, the DEA developed the process techniques of the 'fast-track' environmental management system for prospecting (Tarr, pers. comm.; Glazewski and Tarr, 1996). These techniques which are central to the model include the:

- pro-forma environmental contract;
- environmental questionnaire;
- letter of conditions of approval.

A prospector, in order to obtain a prospecting licence, signs the pro-forma environmental contract which is an agreement between the prospector and the government of Namibia. This stipulates general environmental terms and conditions for prospecting as well as requiring the prospector to fill in the environmental questionnaire. In the environmental questionnaire the prospector will formulate his or her own environmental management plans. These are then approved or modified by the MET and are re-written as the letter of conditions of approval of the prospecting licence. The letter of conditions that will govern environmental management at the prospecting site is essentially an environmental management plan (Tarr, pers. comm.).

The final environmental contract which includes the pro-forma environmental contract, the environmental questionnaire and the letter of conditions of approval, could be described as a 'bottom-up negotiated agreement' (Tarr, pers. comm.). It allows the proponent to determine the details of environmental management and the level of environmental performance.

The environmental commitments are, therefore, self-motivated and fully cognisant of the scope of prospecting activities, the capacities of the prospector and the local environment. It is also a type of co-management system as it involves a partnership in responsibility for environmental management for the prospecting operation and a conditional devolution of rights to the prospector.

Synthesis and synopsis of the model

The proposed model is based on IEM, EMS, IEMS, CAMPFIRE and CBNRM and the 'Fast-track' system for prospecting. The key contributions to the model of each of these approaches is summarised in Table 1.

	<i>Basic approach of the model</i>
IEM	Based on principles appropriate to environmental assessment in a developing country, the development of an information base of the environmental impacts and management of boreholes.
EMS	A locally appropriate, well structured environmental management system committed to continual improvement and implemented by those in the best position to do so - the local community.
IEMS	Integration of IEM and EMS: a baseline IEM-type process is integrated into and informs an EMS-type stage.
CAMPFIRE/ CBNRM	Conditional devolution of rights of resource management to local community as implicit in the concept of community co-management and supported by the success, in terms of sustainable development, of community-based resource management.
'Fast-track' process	The pro-forma environmental contract, environmental questionnaire and letter of conditions as an efficient mechanism to implement a local environmental management plan and co-management system.

Table 1: A summary of key contributions to the model for environmental assessment and management of boreholes

These components are adapted, modified and synthesised into a comprehensive yet administratively streamlined model of environmental assessment and management for boreholes in communal areas in Namibia.

A schematic overview of this proposed model is presented in Figure 2 on the following page and further described in the following text.

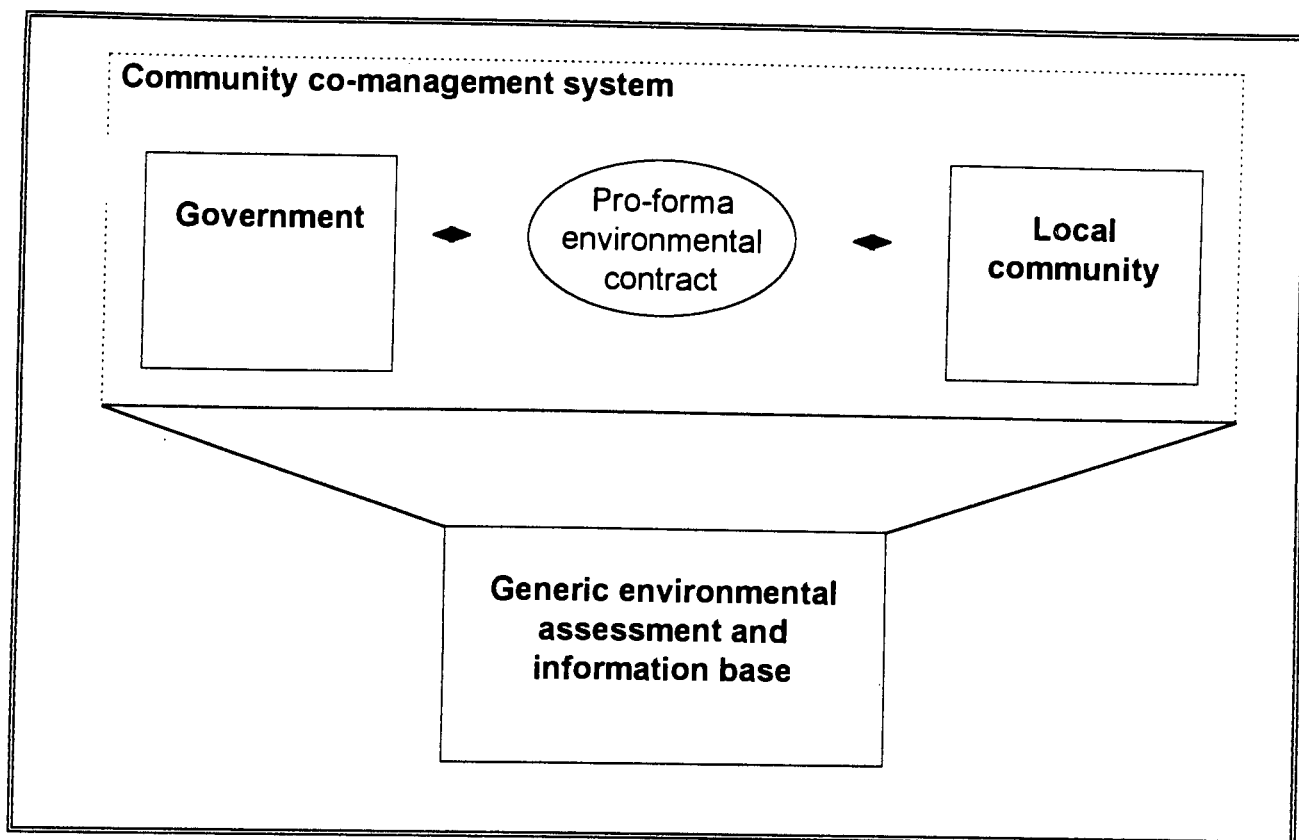


Figure 2: Schematic representation of proposed model for environmental assessment and management of boreholes in Namibia. The diagram depicts how a 'generic environmental assessment' provides an information base which informs and establishes a community co-management system for boreholes - a partnership in environmental management defined by a pro-forma environmental contract.

There are three basic facets of the model:

1. A '**generic environmental assessment**'
2. A '**pro-forma environmental contract**'
3. A '**community co-management system**' involving:
 - conditionally autonomous local community management administering a locally appropriate environmental management system,
 - in partnership with government administration,
 - informed by and based on the generic environmental assessment.

These components of the model are presented and discussed in turn.

The generic environmental assessment

The generic environmental assessment would be similar to a programme level IEM process. It would be a 'once-off' environmental assessment which would provide a comprehensive information base for planning the co-management system and informing the environmental plans and measures that would form the co-management system. Similarly to an IEM process it would be performed by an environmental consultancy team and integrate and analyse information from all stakeholders in the provision and management of boreholes. This would include local communities, scientists, government officials and other role-players in the process of borehole provision. Unlike IEM, it would not be a predictive exercise for one project but retrospective as it can examine the environmental impacts of existing boreholes. It has been termed a '*generic environmental assessment*' as it is for a project type or 'genus' and not one specific project. The result would be a comprehensive information base regarding the environmental impacts and possible environmental management measures for the project type.

The pro-forma environmental contract

Like the 'fast-track' system for prospecting the model uses a pro-forma environmental contract. The pro-forma environmental contract would form the legal basis of the co-management system between a representative government body and a representative local community body. The content and scope of the pro-forma environmental contract would be informed by the generic environmental assessment.

The pro-forma environmental contract for boreholes would efficiently establish an environmental policy for borehole management, the definition of rights and responsibilities in the co-management system and the environmental conditions on which a community may proceed with a borehole.

The pro-forma environmental contract would require the community to fill in an environmental questionnaire. This would be reviewed and rewritten by the government party as a letter of conditions of approval which would become, in essence, the environmental management plan. This mechanism would allow the community scope and flexibility to design a locally appropriate and acceptable environmental management plan to be implemented by the community in the local environmental management of the borehole. The community also would have the benefit of the information base which would have been obtained by the generic environmental assessment. It also would allow the government party to ensure a sound yet contextually appropriate standard of environmental management to be targeted.

The community co-management system

The system for environmental management of boreholes which is thus defined would be similar to an EMS yet within the framework of community co-management. Unlike EMS or the 'fast-track' system for prospecting in Namibia it would be informed by a comprehensive information base. The

primary role of the community in defining environmental management within the broad framework of co-management would allow full inclusion of local knowledge, conditions, priorities, customs, culture and aspirations into environmental management. The locus of control to define development and environmental management would be within the community arena.

The pro-forma environmental contract would define the broad overall policy of borehole management. It would empower the environmental questionnaire to be rewritten as a letter of conditions and environmental management plan. It would allow the community the scope to implement, monitor and review the plan. Environmental reports would constitute an additional feedback mechanism to the government party so that it could work together with the community to continually improve the environmental management of boreholes.

Set-up stage

The model requires a 'once-off' set-up stage. This is centred on the generic environmental assessment and the establishment of the necessary information base. It also would involve a process of consultation with stakeholders and formalisation of various components and aspects of the system. This would include drafting of the pro-forma environmental contract, the environmental questionnaire and the reporting format. Furthermore, organisational structures would need to be established as well as enabling legislation drafted.

Operational stage

Once the components, process and legal prerequisites of the system are established, it would be a relatively streamlined, inexpensive and efficient system to operate and administer. This is particularly true when compared to the impossible alternative of undertaking an individual EIA and formulating an environmental management plan for each and every borehole.

The main reason for this is that the local community would assume most of the responsibility for assessing the local environmental conditions, devising an environmental management plan and implementing this plan on a day to day basis. The community also would assume responsibility for monitoring and improving environmental management measures.

Entering the process of co-management

The ongoing operational stage of the model is summarised in Figure 3.

When a community itself decides to drill and install a borehole, it would undertake this task in the framework of co-management. This would either be a legal requirement or an incentive driven choice. The first step in the process would be to form the local water committee to represent the community - if one does not already exist. The local water committee would then obtain the

relevant documentation from, for example, the DRWS. Initial documentation would include the:

1. Pro-forma environmental contract;
2. Environmental questionnaire.

Also available and supplied with these documents would be well presented, useful and comprehensive information about the co-management system, environmental issues and impacts related to boreholes and relevant environmental management ideas, options and strategies. This information would, therefore, include an array of alternative environmental management measures and recommendations that could contribute to the tailor-made environmental management plan.

With due consideration of this information, and in consultation with the government party and the community itself, the local water committee would enter the co-management system through the agreement of the pro-forma environmental contract.

Consequent on this step, the community, represented by the local water committee and having considered the environmental ramifications of a borehole in the local context, would complete the environmental questionnaire. The environmental questionnaire records the environmental commitments and objectives of the community as well as the details of measures comprising the environmental management plan.

The completed environmental questionnaire would then be reviewed by the government party which either approves it as it is and rewrites it as the letter of conditions of approval, or makes modifications and re-writes this as a letter of conditions of approval which may be accepted by the local water committee.

In the event that modifications are extensive and the local water committee is not satisfied with modifications to the commitments of the environmental questionnaire as they appear in the letter of conditions of approval, the conditions of approval may be re-negotiated with the government party. However, the final authority would rest with the government party to determine the conditions of approval - the maintenance of a sound yet contextually appropriate level of environmental management being the responsibility of the government party.

The final contract between the local water committee and the state, therefore, would consist of three components:

1. Pro-forma environmental contract;
2. Completed environmental questionnaire;
3. Letter of conditions of approval.

On receiving approval for the borehole development, the local water committee would be able to proceed to site, install and operate the borehole according to these conditions of approval which, in effect, constitute the environmental management plan.

Also required by this environmental management plan is the monitoring of the stated environmental parameters using a selection of simple environmental indicators. The local water committee, with its mandate for sound local environmental management, would be expected to keep records of monitoring and take appropriate corrective action as necessary.

Periodic reports would be submitted in a pro-forma format, and would be used to assess environmental performance and attainment of environmental objectives, to identify problems and successes in environmental management and to update the information base. Importantly, reporting would provide the feedback necessary for review, analysis and continual improvement of the management system for this particular borehole.

Periodic auditing of the local management system by the government party could take place at the discretion of the government party. This would also serve to improve the knowledge base and increase understanding of the efficacy of the system, record keeping and reporting. As experience and knowledge regarding environmental management of boreholes are gained in the co-management system, environmental management plans may be modified and this may be documented as mutually agreed amendments to the conditions of approval.

Thus an efficient, dynamic, co-operative co-management system for environmental management of boreholes would be shared between government and the local water committee. It would be an environmental management system which is able to detect, recognise, record and learn from failures and successes and, therefore, continually improve day to day environmental management of boreholes

Summary

The model integrates a full environmental assessment into a comprehensive environmental management system for boreholes. This is within the framework of community co-management and local resource management. The use of a generic environmental assessment, the emphasis on community management and the process techniques of the pro-forma environmental contract system allow the model to be an efficient and streamlined approach to environmental assessment and management of boreholes. This model is not only potentially logistically efficient but upholds the principles of sustainability in development. It allows basic needs to be met, it encourages local development, resources are managed at a local level and communities have the decisive voice in planning. It is a model that is, arguably, able to achieve the objectives of sustainable development by integrating the development needs of communities with the need for protection of the resource base.

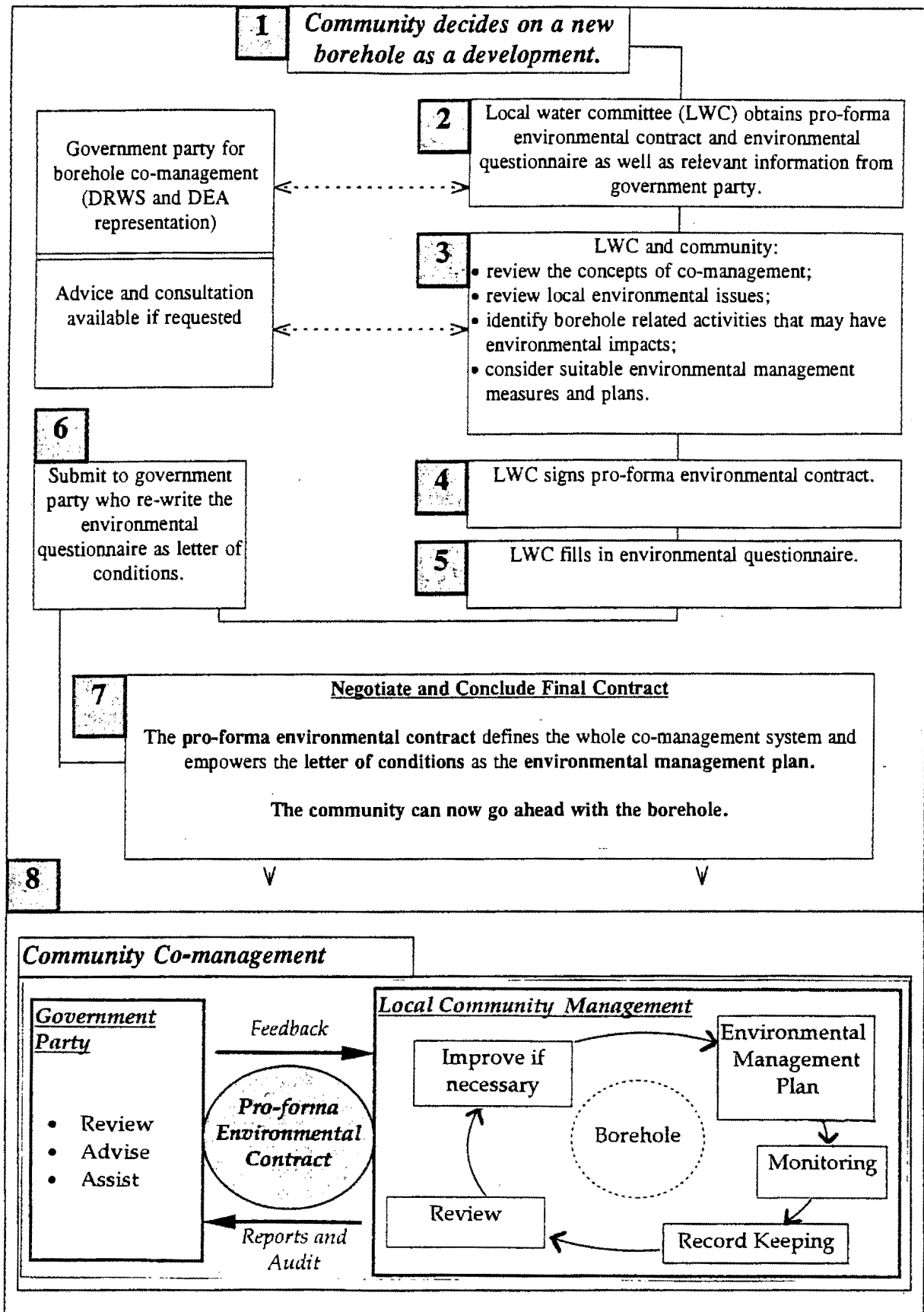


Figure 3: Process for a community to enter into the co-management system for boreholes and schematic summary of the co-management system

Conclusion

The model is a theoretical proposition which could contribute towards sustainable development in respect of rural water supply and drought relief in communal areas in Namibia. As a model it is in its early theoretical and conceptual stages.

However, it is suggested that the concept of this model has the potential to contribute towards the resolution of the sustainable development dilemma of borehole provision in Namibia. In a country which can not afford to damage its resource base the model provides an effective, community-based approach to environmental assessment and management of boreholes. This is a process which is logistically streamlined and has the administrative simplicity and elegance to support its success in sustainable development.

The model has been developed for boreholes in communal areas in Namibia. However, as a model it could possibly find a wider applicability to environmental assessment and management of other small-scale, informal sector or community development projects.

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List of Abbreviations

CAMPFIRE	Communal Areas Management Programme For Indigenous Resources (Zimbabwe)
CBNRM	Community Based Natural Resource Management
CSO	Central Statistics Office, Namibia
DEA	Directorate of Environmental Affairs, Namibia
DEA	Department of Environment Affairs, South Africa
DRFN	Desert Research Foundation, Namibia
DRWS	Directorate of Rural Water Supply, Namibia
DWA	Department of Water Affairs, Namibia
EA	Environmental Assessment
EEAN	Environmental Evaluation Associates of Namibia Pty Ltd
EIA	Environmental Impact Assessment
EMS	Environmental Management System/s
ENGEO	Department of Environmental and Geographical Science (University of Cape Town, South Africa)
ENWC	Eastern National Water Carrier
GDP	Gross Domestic Product
GNP	Gross National Product
GRN	Government of the Republic of Namibia
I & AP's	Interested and Affected Parties
IEM	Integrated Environmental Management
IEMS	Integrated Environmental Management Systems
ISO	International Organisation for Standardisation
LWC	Local Water Committee
MAWRD	Ministry of Agriculture, Water and Rural Development, Namibia
MET	Ministry of Environment and Tourism, Namibia
MME	Ministry of Mines and Energy, Namibia
NAPCOD	Namibian Programme to Combat Desertification
NDP	National Development Plan, Namibia
NDTF	National Drought Task Force, Namibia
NEPA	National Environmental Policy Act
NGO	Non-Government Organisation
NPC	National Planning Commission, Namibia
N\$	Namibian Dollar (Approx. N\$ 4.5 : US\$ 1.0 - July 1997)
PRA	Participatory Rural Appraisal
SEA	Strategic Environmental Assessment
SSD	Social Science Division, University of Namibia
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WASP	Water and Sanitation Policy, Namibia
WCED	World Commission on Environment and Development

Glossary of Terms

- Agenda 21** A product of the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, Agenda 21 is a forty chapter summary of internationally agreed principles, guidelines and goals to promote programmes for sustainable development into the 21st century.
- Annual grass** A grass species that will grow again from seed with each rainy season (*cf.* perennial grass).
- Arid climate** An arid climate is usually characterised by a rainfall of less than 250 mm per annum. Rainfall is typically erratic, patchy, highly variable from year to year and evaporation rates are high.
- Bush encroachment** A process of land degradation and a sign of desertification which involves gradual replacement of grasses by a few woody shrub species. These are not only less palatable or inedible to cattle and sheep but can make land inaccessible to livestock because of the bush density.
- CAMPFIRE** An acronym for Communal Areas Management Programme For Indigenous Resources, CAMPFIRE is a community-based conservation programme in Zimbabwe. Its success has resulted in it being widely acclaimed as a model for conservation in Africa.
- Carrying capacity** The maximum number of a species that can be sustainably supported in a given area.
- CBNRM** An acronym for Community Based Natural Resource Management Programme, CBNRM is a conservation initiative in Namibia which is similar to CAMPFIRE in Zimbabwe as it allows communities in communal areas to form conservancies for the sustainable use and conservation of game.
- Communal land** The communal land tenure system is characterised by open access and common property resources. Land allocation is by customary law. Nearly 70% of Namibians live on communal land and have only usufruct rights.
- Community Co-management** A system of resource management where local communities share rights and responsibilities for management within a framework of government partnership. It usually involves conditional devolution of rights (including rights of use and benefit) to local communities.

- Conservancy** An area where commercial farmers or communities in communal areas have pooled land and resources for the purposes of conserving and sustainably using game and biodiversity.
- Desertification** Land degradation in arid or semi-arid areas resulting from various factors but including the combined effects of human impacts and difficult environmental and climatic conditions. It is practically irreversible once it is established.
- Developed and Developing countries** In this dissertation the terms 'developed' and 'developing' have been used for want of better terminology. Unfortunately these terms are not neutral - implicit in these terms is a specific western development ideology of modernisation and industrialisation. The terms 'First world' and 'Third world' would be more acceptable but have become politically incorrect. The 'neutral' terminology of 'North' and 'South' unfortunately lacks geographical accuracy. Thus until better terminology is available 'developed' and 'developing' will remain widely understood terms. In this dissertation, however, these terms are used without deference to their ideological implications.
- Generic Environmental Assessment** A term developed in this dissertation, it refers to an environmental impact assessment which is not for a specific project but for a type or 'genus' of project. For example, a generic environmental assessment of boreholes in Namibia would research the typical and characteristic environmental impacts of boreholes in Namibia.
- ISO 14000** This is a specification for environmental management systems which has been developed by the International Organisation for Standardisation to provide an international standard for environmental management systems.
- Land Degradation** The process of declining productivity and vitality of land and ecosystems as a result of human pressures, inappropriate land-use practices and/or mismanagement.
- Namibian dollar (N\$)** Approximate exchange (July 1997): N\$ 4.5 : US\$1
- Perennial grass** A grass species which grows from seed one year and continues to grow as an established plant for several years (*cf.* annual grass).

- Pro-forma environmental contract*** An environmental contract of a standard format for a type of project and not reformulated for each specific project. The concept of the pro-forma environmental contract was developed for and pioneered in the 'fast-track' environmental management system for mineral prospecting on Namibia.
- Rangeland*** Open lands - usually grasslands - used for grazing livestock.
- Strategic Environmental Assessment*** Strategic Environmental Assessment (SEA) is an environmental assessment process which examines the environmental impacts, consequences and issues of policies, plans and programmes. Thus, it aims to be broader than the project specific EIA.
- Sedentarism*** A lifestyle, land-use and farming strategy that is characterised by permanent settlement (*cf.* Transhumance).
- Transhumance*** An adaptive farming strategy which involves moving livestock, and people moving with livestock, in response to rains, good grazing and seasonal variations in rangelands.

Note: In order to avoid trite and limiting definitions of complex terms, many of these have been omitted from this list but have been fully explained and discussed in the text - in the context of their use. These include terms such as 'sustainable development'.

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1. Introduction

'Active involvement of communities in managing their environment must be the order of the day. Equality, equity, access accountability, transparency and sustainable living must be our watchwords'

- Nelson Mandela
(Mandela, 1995:5)

This dissertation is a proposition of a model for a community based environmental management system to address the problem of environmental degradation associated with borehole provision in communal areas in Namibia. It is a model that is, arguably, able to achieve the objectives of sustainable development by integrating the development needs of communities with the need for protection of the resource base. The key to the model is that it effectively includes environmental considerations into a system which empowers a community to manage its own environment and natural resources. Although environmental management by the community is autonomous, it is within a framework of partnership with government administration. Thus, it is a co-management system.

1.1 Background

Namibia is a country which is highly dependent on its environmental integrity for economic activity. Furthermore, most of the population live in rural areas in Namibia and are directly dependent on the environment for their livelihoods. However, Namibia's environment is mostly very arid and consequently ecologically fragile. Land degradation, including desertification, is increasing, resulting in loss of productivity of land and loss to the economy.

Boreholes, which are provided in rural areas as part of ongoing rural water supply development or as part of drought relief schemes, can, in certain circumstances, be a contributor to the process of desertification and land degradation. The environmental impacts of borehole provision in the communal areas in Namibia may, therefore, not improve land productivity and quality of life for people in communal areas but result in an overall decline in land productivity and compromise the ability of people to support themselves on the land.

These were the findings of a report commissioned by the government of Namibia as represented by the Namibian Programme to Combat Desertification (NAPCOD) and undertaken by Environmental Science Masters students from the University of Cape Town, South Africa.

The report, titled *'A Retrospective Assessment of the Environmental Impacts of Emergency Borehole Supply in the Gam and Khorixas Areas of Namibia'* (ENGE0, 1997), studied the environmental impacts of borehole provision in two case study rural areas in Namibia. This report was motivated by the

recognition that boreholes can be significant contributors to environmental degradation. The terms of reference for the report were, in summary, to review the process and environmental impacts of borehole provision in communal areas as it occurred as part of drought relief schemes in the drought of 1992 and 1993 and the drought of 1995 and 1996. The report, on the basis of its findings in two case study areas, was to develop recommendations and guidelines to inform the future provision of boreholes in communal areas.

Further to the findings presented above the report stated that,

'The provision of water on an emergency basis without reference to holistic land use planning occurring in conjunction with affected users, has engendered a situation which might be unsustainable in the long term in the two case study areas.' (ENGE0, 1997:171)

The report proceeds to make reference to possible solutions to this situation:

'However, if accompanied by appropriate land use management practices, with plans which take environmental limitations and social systems into account, the provision of artificial water points need not contribute to an unsustainable situation. Consideration should be given to all aspects of sustainability and the needs of people now should be balanced against needs in the future.' (ENGE0, 1997:171)

A central recommendation arising from this research was that boreholes should be subject to environmental assessment.

'From the study it is clear that boreholes can be significant determinants of and influences on the social, economic and biophysical environment. Therefore, considering the range of possible environmental impacts and implications of borehole provision, the primary recommendation arising from this study is that borehole provision must be subject to a process of environmental assessment and holistic environmental planning and management.' (ENGE0, 1997:vii)

To this end the report makes several recommendations in terms of environmental considerations for the provision of boreholes - targeted at the national level, programme level and individual borehole level. These recommendations, however, tend to be general, vague and difficult to implement.

For example, a key 'national level recommendation' reads:

'Every development plan, policy and programme should be assessed at a strategic level in terms of its impact on the environment.' (ENGE0, 1997:vii)

and a 'programme level recommendation':

'It is imperative that borehole provision programmes, whether under emergency conditions or as ongoing rural water supply, be submitted to a full process of environmental appraisal.' (ENGE0, 1997:viii)

and at 'individual borehole level':

'Full community participation is required at all stages of decision-making and planning.' (ENGE0, 1997:ix)

The report does not specify how these recommendations are to be achieved or how 'holistic environmental planning and management' are to be implemented. This is a significant failing of the report as it does not adequately provide useful, practical recommendations and specific mechanisms which are workable and effective in the task of achieving sound environmental planning and management for boreholes in communal areas in Namibia. This is the point of departure for this dissertation.

The dissertation will use this report - which will from now on be referred to as the '*ENGE0 baseline report*' - as a basis and source of information to develop a proposal for a specific, practical, appropriate and effective environmental assessment and management system for boreholes in communal areas in Namibia.¹

1.2 Boreholes and environmental management - a résumé of the dilemma

There has been long-standing concern over the potential negative environmental impacts of boreholes in arid communal areas in Namibia (Tarr, pers. comm.). There have been several attempts to address this problem including studies, information booklets with environmental guidelines for the community to implement, recommendations for environmental management plans for boreholes and recommendations for environmental impact assessments for boreholes (ENGE0, 1997).

However, there is a dilemma in the provision of boreholes which has not been resolved - a dilemma invoking the sustainable development debate. This can be described as follows:

Firstly, the provision of a borehole in a communal area in Namibia represents the provision of an extremely basic human need - water. Water is essential for life and essential for economic activity and livelihood on the land. An abundant and healthy supply of water correlates strongly with an improved

¹ Note - at the time of writing this dissertation the ENGE0 baseline report was in draft version pending final edits and pagination.

quality of life (Hardoy *et al*, 1990). In many communal areas where boreholes are provided there is no realistic alternative method of providing the vital resource of water (Koch, pers. comm.). Thus, the provision of boreholes is a fundamental and, arguably, absolutely necessary development activity in many communal areas in Namibia.

Provision of a borehole, however, can result in land degradation, loss of land productivity and consequently an overall decline in quality of life (ENGE0, 1997).

This irony, which is essentially a dilemma in attaining sustainable development, could possibly be resolved through appropriate environmental management strategies which can integrate development needs with environmental protection and thus, sustainability.

However, the environmental issues and impacts surrounding borehole provision would appear to be refractory to amelioration by conventional methods of environmental assessment and management. Environmental impact assessment is not part of the process of borehole provision (Koch, pers. comm.) and indeed would seem logistically and financially impossible to apply.

Groundwater consultants have on occasion implemented their own basic environmental guidelines for providing boreholes such as planning spacing of boreholes (Simmonds, pers. comm.).

Environmental management initiatives such as education programmes seem to have met with limited success (ENGE0, 1997). Propositions for environmental control mechanisms such as grazing tariffs have also been considered (DRWS, 1996).

However, to date there is no overall, holistic framework which integrates environmental concerns into borehole provision. Thus, there is a persistent environmental problem and an ongoing contributory factor to environmental degradation and desertification in Namibia.

It is suggested that this unresolved problem of environmental degradation resultant from boreholes is due to the nature of the development and the nature of the context of the development which make conventional methods of environmental management inappropriate. Thus environmental impact assessment has not been implemented.

These characteristics of boreholes as a development and the context of the development are explored in more detail later in the dissertation.

However, it is argued that, in summary, there are several key factors that contribute to the particularly difficult problem of environmental management for boreholes.

These key factors are:

1. Borehole provision is a fundamentally necessary development activity.
2. Boreholes as development are extremely common in rural Namibia.
3. Each borehole on its own may have limited environmental impacts but the cumulative effect of many of boreholes may have highly detrimental, irreversible and widespread negative environmental impacts.
4. A borehole is a development activity of a relatively small-scale and low budget.
5. Consequently, an environmental impact assessment and management plan for each borehole is not practical in terms of logistics, cost and administration.
6. The management of a borehole and the natural resource it accesses - groundwater - is a problem of environmental management for a common property resource in the context of a communal land tenure system.

These are the factors that contribute to the inappropriateness of applying conventional environmental management systems to the issue of borehole provision in rural Namibia.

Given these arguments which are further developed in the course of the dissertation it is suggested that a new model of environmental management for boreholes must be developed to attain effective environmental management.

1.3 The key research problem

The central question which is asked at every stage of this dissertation is:

What are the key principles, concepts and processes which are able to contribute to a model of environmental assessment and management for boreholes in communal areas in Namibia in order to achieve sustainable development in this respect?

These key principles, concepts and processes have been studied and analysed and then synthesised into an environmental assessment and management model for boreholes in rural Namibia. The essence of the model - which is the product of this research and analysis - is presented in the hypothesis.

1.4 Hypothesis

The environmental impacts of individually small developments, such as borehole provision in communal areas in Namibia, are not adequately addressed through current environmental legislation, assessment and management processes and practices. As significant environmental degradation may occur as a result of small development activities and the cumulative effects of such developments, it is essential that a mechanism of environmental management is developed which can assist in the mitigation of negative impacts and enhance the positive impacts of a small-scale, but common community development activity, such as provision of a borehole.

Present environmental assessment and management procedures, although useful for large scale projects, can not adequately address or manage the impacts of important small-scale community developments. However, despite the shortfalls of existing environmental assessment and management strategies, they do contain important and useful principles and procedures which can be modified and incorporated into a new model of an environmental management system which is able to address small-scale community development such as the provision of a borehole.

The key to this model is the pro-forma environmental contract which underpins a system of environmental management for small-scale mineral prospecting operations. This 'fast-track environmental management system for prospecting' was designed and implemented by Mr Tarr of the DEA in Namibia (Tarr, pers. comm.).

Effective environmental management for community development projects such as provision of a borehole can be attained through a model which uses a pro-forma environmental contract to establish a flexible system of local, community based environmental management which works in partnership with government level administration - implementing a system of community co-management.

The model which includes the pro-forma environmental contract and emphasises research germane to the particular type of development in question, is proposed as an effective, feasible and appropriate environmental assessment and management approach for small, low budget developments, such as borehole provision.

The management framework which the model supports is that of community co-management. It is in this community co-management framework that effective and appropriate environmental management of boreholes can be attained.

This proposed model has four components:

1. a baseline or **generic environmental assessment** of the type of development in question such as a borehole;
2. a **pro-forma environmental contract** based on this assessment which efficiently and inexpensively establishes the scope of environmental management for boreholes and the definition of the partnership of community co-management between the:
 3. **Local community** and
 4. **Government administration.**

This model is schematically presented in Figure 1.1.

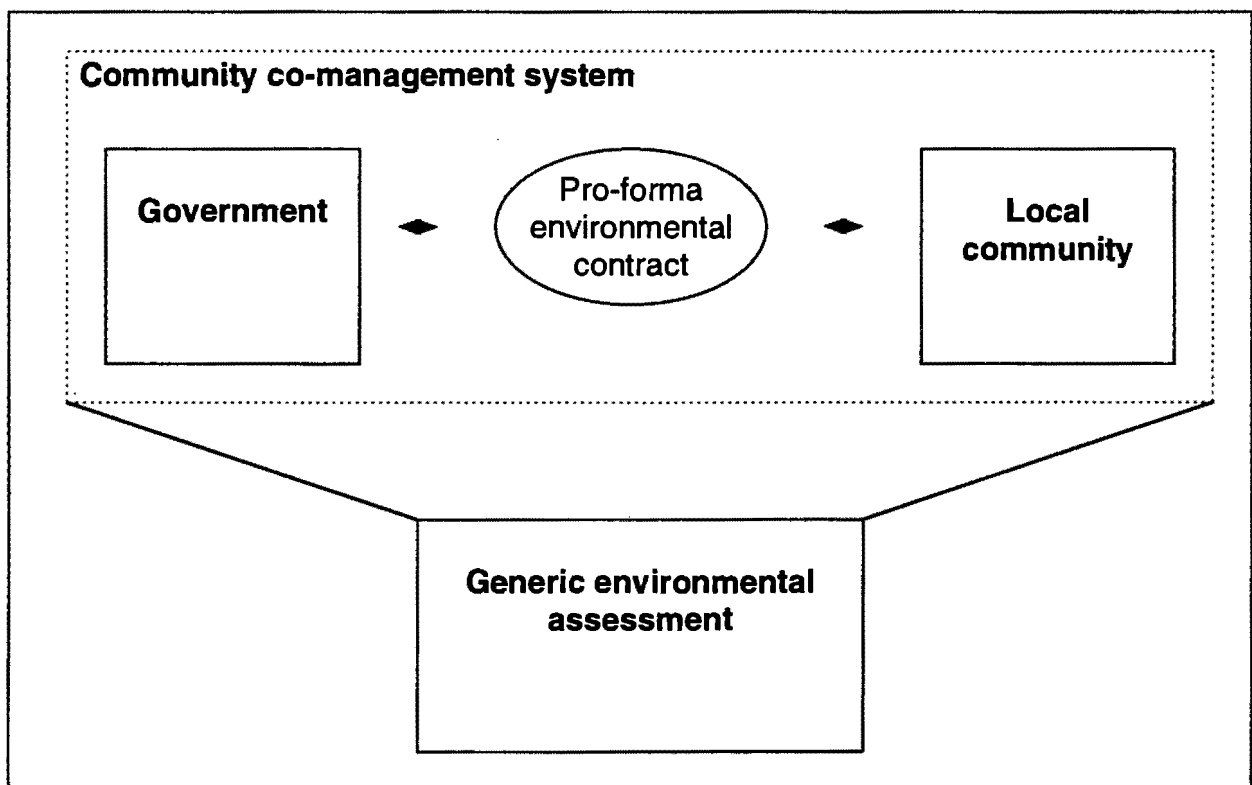


Figure 1.1: Schematic representation of proposed model for environmental assessment and management of boreholes in Namibia. The diagram depicts how a generic environmental assessment provides an information base which informs and establishes a community co-management system for boreholes - a partnership in environmental management defined by a pro-forma environmental contract.

1.5 Aims and Objectives

The overall aim of the dissertation is, therefore, to argue convincingly that the model of environmental management described in the hypothesis above and characterised by a generic environmental assessment, a pro-forma environmental contract and community co-management is a possible and realistic solution to resolving the dilemma of environmental management for the important development activity of borehole provision. It is a primary aim of the dissertation to theoretically argue and prove that this model could be the key to sustainable development as it relates to provision of boreholes in communal areas in Namibia.

In pursuit and support of this aim, the specific objectives and goals of the dissertation can be further characterised and itemised as follows:

- To briefly present relevant aspects of the biophysical, social, political and economic context of borehole provision in Namibia;
- To highlight the importance of environmental integrity and ecological productivity for the livelihoods of most Namibians and for the Namibian economy;
- To demonstrate that this environmental integrity is fragile and land degradation and desertification are significant and costly problems;
- To illustrate how boreholes in communal areas contribute to land degradation and desertification;
- To show that conventional environmental assessment and management methods would not adequately address this issue and that there is a need for a new, appropriate model for environmental management of boreholes as low budget, small-scale community development activities;
- To review the concept of sustainable development and to show that sustainable development is only achieved where communities are meaningfully empowered in the development process to determine a locally appropriate definition of sustainable development and implement this at a community level;
- To demonstrate that the proposed model incorporates and is based on the concepts, practices and principles from successful environmental assessment and management approaches which are most compatible with this definition of sustainable development and this context of environmental management of boreholes;
- To illustrate how these concepts, principles and methods can be integrated and synthesised into the proposed model and show how the implementation of the model may achieve the goal of sustainable development in respect of borehole provision.

The dissertation argues a theoretical basis for the development of the model and why it should be successful. It does not set out to describe the exact details of an environmental assessment and management plan for boreholes but the framework or mechanism by which this could successfully occur - that defined by the model.

Lastly, the dissertation aims to suggest that this model for borehole provision in rural Namibia may be applicable, in a modified form, to many other small-scale community or informal sector development activities in developing countries.

1.6 Methodology

In developing this model for environmental assessment and management of boreholes, extensive use is made of the information contained in the ENGEO baseline report. As this forms the basis of the dissertation the methodology involved in this report will be briefly presented before the methodology specific to this individual dissertation is presented.

1.6.1 Methodology of the ENGEO baseline report

The ENGEO baseline report employed several methods in its research.

Initially a thorough literature review was undertaken. Following this the research team conducted interviews with key stakeholders and informants in Windhoek and the two case study areas. This was in many ways a scoping stage which obtained information from government representatives, government ministries, non-governmental organisations, aid agencies, researchers and scientists, groundwater consultants and members of local communities. This was complemented by field work in the two case study areas. Field work included visits to boreholes and consultation with local user communities.

Field work at borehole sites included, *inter alia*:

- Qualitative analysis of soils;
- Assessment of vegetation and land use;
- Assessment of water quality in terms of total dissolved solids and bacterial contamination;
- Assessment of top structures for boreholes.

Participatory Rural Appraisal (PRA) exercises and informal interviews were used to elicit information from user communities regarding, *inter alia*:

- Borehole yields;
- Land use and farming patterns and practices;
- Social structures and organisation;
- Livelihoods and resource use.

1.6.2 Methodology for this dissertation

This dissertation makes extensive use of the information gained in the ENGEO baseline report.

In addition this dissertation makes use of:

- a further literature review,
- specific interviews and
- critical contextual analysis of existing environmental assessment and management methods,

to develop, argue and promote the processes, concepts and principles that constitute and support the model.

Literature review

An extensive literature review was undertaken. The primary aims of the literature review were:

1. To research and develop an understanding of sustainable development appropriate within this context of communal areas in Namibia.
2. To search for an environmental assessment and management system that has been successfully used to address a sustainable development dilemma similar to that presented by the provision of boreholes in rural Namibia. A specific search for literature on the use of pro-forma environmental contracts was undertaken.
3. To review the efficacy of EIA in its application to this type of context.
4. To identify and study environmental assessment and management processes which may be useful in this context.

Libraries and library databases searched included that of the

- University of Cape Town, South Africa;
- Waikato University, Hamilton, New Zealand;
- Social Science Division, University of Namibia;
- Directorate of Environmental Affairs, Namibia (Departmental Library);
- Directorate of Water Affairs, Namibia (Departmental Library).

An extensive internet search for relevant literature was also undertaken.

Interviews

In addition to approximately fifty interviews which contributed to the information base of the ENGEO baseline report, specific interviews with key informants were undertaken. These included experts in the field of community co-management in Namibia, government officials in relevant line ministries and Mr P. Tarr regarding his unique work with pro-forma environmental contracts in the informal mining sector.

Analysis

The key methodology employed in the report in the formulation of the model is one of analysis of existing approaches to environmental assessment and management. Four key successful processes for environmental assessment and management are analysed in the light of a clearly formulated, contextually appropriate interpretation of sustainable development. Through this analysis useful concepts, processes and principles are identified and discussed in terms of relevance to the model.

Synthesis and integration

The final stage in the methodology of the production of the model is a synthesis of these concepts, principles and processes into a theoretical model. This is integrated with the extensive information base of the baseline report to theoretically illustrate the functioning of this environmental assessment and management model for boreholes.

1.7 Limitations

The key limitations of the model may be discussed under four headings:

1.7.1 A theoretical model

The model is theoretical. It is based on theories of sustainable development and theories of environmental assessment and management. The product is a theoretical formulation of an environmental assessment and management system for boreholes. This dissertation, therefore, is a theoretical proposition of a model.

In view of this, care has been taken to meticulously build the logic of the argument so that it is coherent from a theoretical point of view.

Extensive use is made of examples of practical applications of elements of the model. This is done in order to prove that the component concepts, principles and processes which constitute the model are in many cases proven in practice. It is recognised, however, that the synthesis of the model as a new entity may not necessarily be successful in practice merely on the basis that its constituent components and principles have been found to be successful in practice.

As a new model and a theoretical proposition for sustainable resource management, this approach has yet to be tested in practice. Despite extensive literature searches no similar model was found and there is, therefore, no collaborative evidence from practice in support of the model.

1.7.2 Consultation with community

Although based on research which involved the type of community which would be affected by implementation of the model, the model itself has not been developed in consultation with the communities who will be affected by it. As the very first stage in the development of a new concept this was

beyond the theoretical and logistical scope of this dissertation. It would possibly be an appropriate following stage in the evolution of the model.

1.7.3 Use of global literature

The model draws significantly on world-wide literature as well as literature more specific to the context. In formulating concepts based on international literature there is always a danger that the conclusions may be 'totalising' and assume a homogeneity and universality in their application. Significant caution has been exercised in this regard and the very nature of the model itself is able to diffuse totalising approaches by its emphasis on locally defined management which is cognisant of local diversity.

1.7.4 Limits to scope of dissertation

It is beyond the scope of this dissertation to finalise the details of the model as it would apply to environmental assessment and management of boreholes. The intention of the dissertation is to provide the framework of the model and the principles, concepts and mechanisms illustrating how the model would function.

As the model is innovative and despite extensive search of the literature no similar environmental assessment and management processes could be found, it is not possible to evaluate how the model may function in practice. It is also beyond the scope and intention of this dissertation to implement this model and assess how it functions in practice.

1.8 Structure of dissertation

This dissertation is divided into twelve chapters.

Chapter 2 is an introduction to relevant background information about Namibia which is crucial to understanding the context in which this model for a holistic approach to environmental management and assessment of boreholes is formulated. This chapter also discusses the concepts of desertification, the role of boreholes in desertification and the relevance of this to Namibian people. It highlights the tension between sustainability and development in this context.

In **chapter 3**, conventional environmental assessment processes are briefly discussed in terms of their contribution to solving the sustainable development dilemma in this specific context. It is argued that there are several shortfalls in conventional environmental assessment processes which make them inappropriate for this task. In the light of this, **chapter 4** is a motivation for the need to develop an environmental assessment and management tool, mechanism or process which can address this sustainable development dilemma inherent in borehole provision.

Chapter 5 is a broad theoretical chapter which analyses sustainable development and its interpretation in the developing world and the Namibian context.

Chapter 5 sets the ideological measure by which four environmental assessment and management processes are analysed in **chapters 6, 7, 8 and 9**. These processes are critiqued in terms of their applicability to the sustainable development dilemma of borehole provision in rural Namibia, with a view to the potential contribution each approach is able to make to a suitable model to promote sustainable development with respect to boreholes. These four chapters also draw the discussion from a broad theoretical perspective of sustainable development in the developing world to its meaning in Africa and specifically Namibia, by focusing on increasingly more local and specific initiatives.

This information is then crystallised and distilled into key concepts in **chapter 10** and synthesised into the model - the hypothesis - which is presented as the environmental assessment and management process to ensure sound environmental management is integrated into the development activity of borehole provision. This is further illustrated in **chapter 11** using information gained in the ENGEO baseline report.

In conclusion, **chapter 12** reviews the model in terms of its suitability for the purpose for which it has been developed and its potential in other similar applications.

1.9 Wider applicability of the model

The dissertation aims to argue, from a theoretical point of view and from principles inherent in this model which have been successful in practice, that this model is a feasible approach to attain the goal of sound environmental management for boreholes in rural Namibia. It is also possible that its application may be extendible beyond boreholes to other small-scale or informal sector developments which have similar characteristics, in terms of a development activity, to boreholes.

Therefore, although the model is argued and developed concerning the issue of boreholes in communal areas in Namibia, it is not necessarily exclusive to this issue.

Achieving sustainability in management of development projects is a complex task which necessitates the prudent integration of multiple social, economic, ecological and biophysical variables. It is proposed that the environmental management model presented in this dissertation has the ability, scope and administrative elegance to achieve this objective in the context of rural Namibia and other similar contexts.

1.10 Intent of dissertation

In conclusion, therefore, the intent of the dissertation is twofold:

1. To provide a model for discussion and review which may be able to make a contribution towards improving environmental management for sustainable development as regards boreholes in Namibia.
2. To formulate this model in such a way that it is not specific for boreholes in rural Namibia but may be useful for other similar type community and informal development in developing countries.

2. Namibia - A Contextual Orientation

The objective of this chapter is to provide a review of key background information to contextualise the research, discussion and analysis of this dissertation. A sketch of directly relevant information regarding the biophysical, political, social and economic characteristics of Namibia will be presented. Emerging trends in policy, discourse and rural development will be highlighted and examined where relevant to borehole supply in communal areas in Namibia. Discussion develops around the themes of sustainability, desertification and dependence on environmental integrity.

As environmental impact assessment is central to the dissertation, this chapter also aims to sketch the context and highlight the challenges, difficulties, opportunities and need for environmental assessment and management in a developing country such as Namibia.

Lastly, borehole provision and the environmental ramifications of boreholes are discussed.

2.1 Namibia - an overview

2.1.1 Geography

Namibia is situated on the south-west coast of Africa between the latitudes 17.5° and 29° south. It covers an area of approximately 824 000 km². Namibia is bordered on the western side by the Atlantic Ocean forming 1400 km of coastline. To the north Namibia shares a border with Angola and Zambia, to the east lie Botswana and Zimbabwe and to the south, South Africa.

Windhoek, the capital city, is inland and centrally located. It lies just north of the tropic of Capricorn.

In terms of topography, Namibia is, in broad terms, divided into three zones. From west to east land rises gradually to approximately 500 metres, forming the narrow coastal plain, before rising steeply to altitudes in excess of 2000 metres, the escarpment. This gives way to the wide inland plateau with altitudes ranging between 1000 metres and 1500 metres above sea level. (See Figure 2.1)

However, another 14% of the total is lost through evapotranspiration. Only 2% of the total rainfall is available to be captured through surface storage facilities while only 1% of the total rainfall contributes to Namibia's most important water resource - groundwater. (See Figure 2.2)

Several perennial rivers arise in catchment areas of neighbouring countries and form aspects of Namibia's borders. These are the Kunene, the Okavango, the Kwando-Linyati-Chobe and Zambezi river systems in the north. On Namibia's southern border with South Africa is the Orange River. Only ephemeral rivers are to be found within Namibia's borders and these flow after heavy rains in their catchments but remain dry for most of the year.

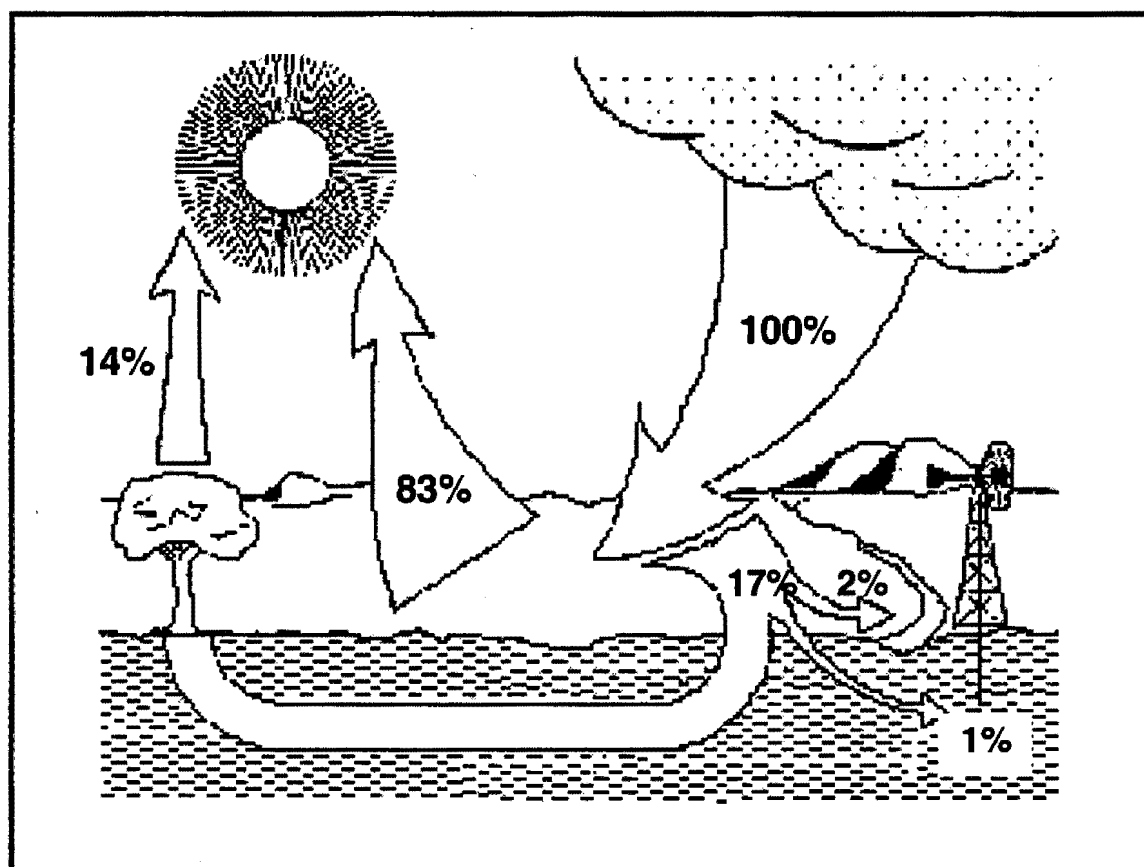


Figure 2.2: Schematic presentation of the average trends in Namibia's hydrological cycle (Reproduced from: DWA, 1991:5)

Groundwater is the most important water resource providing for approximately 57% of Namibia's water supply while 23% is derived from perennial surface water and 20% from ephemeral surface water (DWA, 1991). More than 80% of the population, however, rely on groundwater which is accessed by means of boreholes - and in rural areas shallow wells as well as boreholes (DWA, 1991).

2.1.4 Political history

The Republic of Namibia was formally declared on 21 March 1990, heralding the end of a legacy of more than a century of colonial rule as South West Africa.

In 1884, Bismarck proclaimed South West Africa as a German protectorate. Its early history as a colony was characterised by several wars between German settlers and indigenous population groups.

South Africa occupied South West Africa during 1915. After World War One Britain officially took over responsibility for South West Africa, but under a 1920 League of Nations mandate, control was passed to South Africa. The League of Nations was succeeded by the United Nations in 1945. South Africa refused to transfer control to UN trusteeship. The United Nations formerly rescinded the mandate in 1966 and renamed the territory as Namibia in 1968.

However, South Africa continued occupation and its introduction of apartheid policies. As a result of the recommendations of the Odendaal Commission in 1964 the country was divided into several ethnic 'homelands' for the Black population. These areas constituted about 41% of the land while 44% was reserved for 'whites' and the remaining 15% comprised game reserves and mining areas. Typically, the homeland areas were more marginal areas while more productive farmlands were included in 'white areas'.

In 1971 the International Court of Justice ruled South African occupation illegal.

A war of independence, fought mainly in the more densely populated northern regions began in 1966 and gradually escalated in intensity. Further momentum towards independence was provided in 1978 when the UN Security Council adopted Resolution 435 in an attempt to end South African occupation.

This eventually resulted in the first democratic election which was held in November 1989 and supervised by the United Nations. Independence was formally declared on 21 March 1990 and Dr Sam Nujoma was instated as President of the Republic of Namibia.

The new independent government has effected significant change through a new constitution necessitating new policies and new government institutions. As a fledgling democracy in the developing world, Namibia faces many challenges and opportunities in rebuilding a democratic and prosperous country. At present the country is still administered centrally but more responsibility is likely to be devolved to local government after regional elections.

2.1.5 Population

As a result of its aridity and the low productivity of the land, Namibia is one of the most sparsely populated countries in the world, however, it has a relatively high population growth rate (NPC, 1995).

The population census in 1991 estimated the total population to be approximately 1.4 million, while the annual population growth rate was estimated to be approximately 3% - the expected doubling time of the population is 23 years. The projected population density for 1995 was 1.61 million. (Central Statistics Office, 1994; Population Planning Unit, 1994)

Namibia being a vast country of more than 824 000 km² has, therefore, a very low population density - estimated to be 1.7 people per square kilometre in 1991 and approximately 2 people per square kilometre based on the projected figures for 1995.

It would, be erroneous to suggest, however, that Namibia does not have a problem of population pressure as, being the driest country in sub-Saharan Africa, and consequently a very low potential for primary and secondary production, it has a very low human carrying capacity (Brown, 1992).

Namibia's economy in its present form and with its present land use and land management practices is unlikely to be able to continue to support the relatively fast growing population in the long term (Dewdney, 1996; Ashley, 1994; Ashley *et al*, 1995).

Furthermore the population is not evenly distributed. Population densities in the northern territories range between 5 and 15 people per square kilometre, although in the Cuvelai drainage area which supports 28% of the population in little over 1% of the land, population densities reach peaks of 100 people per square kilometre (Population Planning Unit, 1994). In most of the rest of the country population densities are less than 0.5 people per square kilometre (Population Planning Unit, 1994). Thus, despite the overall low population density, population pressure on the fragile resource base is already considerable in some areas.

It is also important to note that almost 70% of the population live in rural areas. However, urbanisation is occurring at a relatively fast rate resulting in urban areas experiencing an average growth rate of 5% per annum (Central Statistics Office, 1994).

Namibia has a demographic profile typical of a developing country with a youthful population. As much as 42% of the population is under 15 years of age, while the over 65 year old age group represents less than 5% of the population (Central Statistics Office, 1994).

Namibia is a multi-cultural country with a diverse ethnic composition.

The main population groups and their relative sizes are:

- Ovambo (50%);
- Kavango (9%);
- Herero (8%);
- Damara (8%);
- European origin (6%);
- Nama (5%);
- other (14%).

Literacy rates are low. Less than 40% of the adult population is literate (Central Statistics Office, 1994).

2.1.6 Economy

'Namibia's economy is almost totally reliant on natural resources, both renewable and non-renewable.'

(Brown, 1992:v)

Namibia's economy has shown growth since independence in 1990. The annual real GDP growth rates in the period 1981 to 1989 averaged 1.0%. In the period 1990 to 1994, this average had risen to 3.5%. Growth estimates for 1996 onwards are expected to be in the region of 3%. (Dewdney, 1996)

From these figures it would seem that the fears regarding the ability of Namibia's economy to support the growing population are unfounded. The concern, however, arises in relation to the long term sustainability of the economy, given its present form and the rate of environmental degradation.

Growth in the economy is, at present, still very much dependent on the government sector and the mining sector. The mining sector, in turn, entirely dependent on a non-renewable resource base.

Other significant sectors are also highly dependent on natural resources - albeit renewable resources - these are agriculture, fisheries and wildlife based tourism. The economy, therefore, is very much a resource based economy - significantly dependent on a healthy environment.

(Lange, 1997; Dewdney, 1996)

(See Figure 2.3)

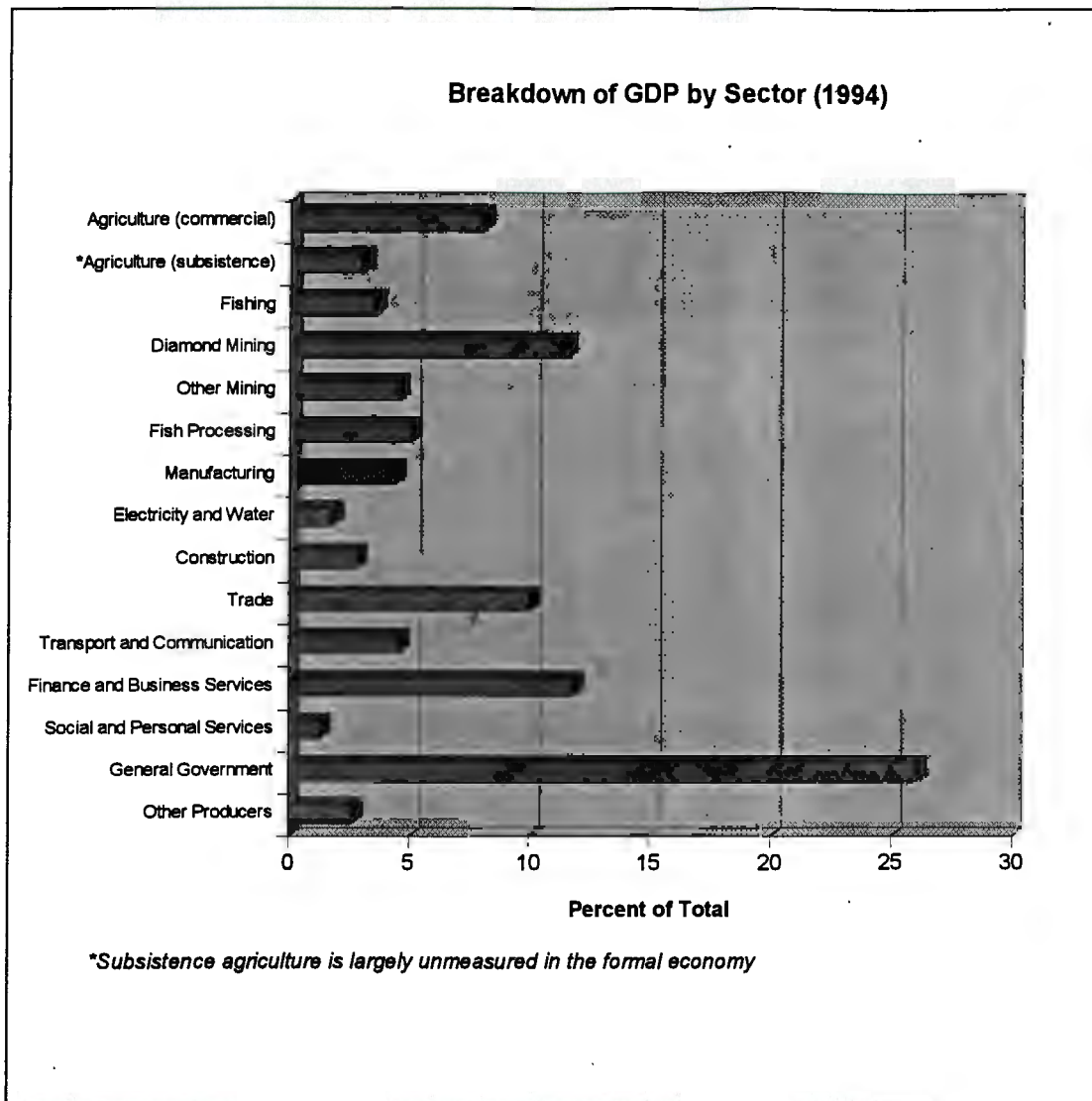


Figure 2.3: Breakdown of GDP by sector (adapted from Dewdney, 1996)

Gross Domestic Product was US\$ 2,927 million (N\$10 394 million) in 1994 which correlated to an average annual per capita income of US\$1,865 (Central Statistics Office, 1995). However, there is gross inequality in the distribution of wealth. In 1993, for example, the poorest 55% of the population earned 3% of the national income while the most affluent 5% earned 71% of the income (World Bank, 1991, cited in Ashley *et al*, 1994).

The livelihood of the vast majority of the population is supported by the agricultural sector - including commercial livestock ranching and subsistence farming. The majority of Namibians are directly dependent on subsistence agriculture and biological production. The rural population, which forms nearly 70% of the total population, rely directly on their immediate environment and renewable resources to meet their basic needs (Brown, 1992).

Thus, not only is the economy as a whole highly dependent on natural resources but the majority of Namibians' livelihoods are based on subsistence production and are directly dependent on the ecological resource base and health of the environment.

Another important characteristic of the economy is the prominence of the informal sector. Only one third of the economically active population is employed in the formal sector (NPC, 1995). The size and contribution of the informal sector is largely unmeasured, but unemployment figures are in the region of 20%, suggesting that a significant proportion of the population is involved in informal sector economic activity.

In conclusion, four relevant key trends and issues may be highlighted:

1. Economic growth as a result of mining sector development is finite and growth in the renewable natural resources based sectors is limited (Dewdney, 1996). It has been recommended, therefore, that Namibia needs to diversify economic activity (Dewdney, 1996) and informal sector development may contribute to this end.
2. The informal sector, including subsistence farming, is very significant in the livelihoods of a large proportion of the population and is also likely to be an area of economic growth and activity (Tarr, pers. comm.).
3. Development and activities to promote economic growth need to be directed so that they benefit the vast majority of Namibians in rural areas and in the lower income bracket - to achieve equity in the distribution of wealth and access to resources.
4. As most Namibians are directly and significantly dependent on the renewable natural resource base and ecological production, Namibia has to take decisive and pro-active measures to protect this resource base and ensure its sustainable use (Brown, 1992).

2.1.7 Land tenure and land-use

To further the sketch of Namibia thus far presented, it is necessary to discuss the land tenure system and land use practices. Land tenure is also a fundamental issue for natural resource management.

Namibia inherited a land tenure system from its colonial era which was largely dictated by apartheid policies.

Presently land is essentially divided into privately owned commercial farmland (44%), state owned communal land (41%), fourteen state owned protected areas (13%) and areas reserved for diamond mining (2%) (Dewdney, 1996).

The commercial farmland comprises about 6300 farms belonging, under freehold title, to approximately 4 200 farmers - less than 1% of the population (Dewdney, 1996). Livestock ranching, predominantly of cattle and sheep, and

increasingly game farming, are the main farming activities as the climate is generally too dry for arable use. Farms average over 7000 hectares in size and farming activity is of a commercial nature using local, regional and international markets (Ashley *et al*, 1994).

In South West Africa communal farmland was state owned but set aside for the exclusive use of 'native' population groups. This system has been carried over since Independence. The majority of Namibians (67%) live on communal land and have only usufruct rights. Land allocation follows customary law. (Dewdney, 1996)

Traditionally, people followed good rains and grazing with their livestock herds. This was especially true in southern areas where rains are more variable. With the dispossession of land and creation of homelands, usually in the more marginal areas, these traditional land-use practices have had to change or be modified.

In communal areas livestock farming predominates, but subsistence crops are also produced. Livestock farming is mostly of a subsistence nature but also fulfils other social functions such as an indicator of status, a store of wealth and as an integral part of many customs and traditions (Ashley *et al*, 1994).

The 'land issue' is obviously an area of much debate and, indeed, an area under the process of reform. The 'Outline of a National Land Policy' (GRN, 1997), a draft document, has proposed several different tenure systems in communal areas. Freehold titles are not considered suitable in communal areas. Leasehold title and customary grants are two proposed systems. Leases would be in the region of 50 years and will be secure, transferable, inheritable, renewable and mortgageable. Customary grants would be secure and inheritable but not limited in time. Transfer of grants would need the permission of the Regional Land Board.

The present lack of secure tenure is clearly an obstacle to sustainable management and a contributing factor to land degradation. There is little incentive for long term planning and sustainable resource management and this is compounded by the fact that communities are unable to control access to, and use of, their resource base and have no means of redress in this situation. Natural resource tenure, including land tenure, must be a key area of reform (Dewdney, 1996).

It is in this unresolved and changing context of land tenure and tenure of natural resources that an environmental management system for boreholes must be able to function.

Desertification presents with varying symptoms of degradation linked to varying pressures on the land and varying local environments. These 'faces' of desertification may include:

Soil Degradation

Overgrazing, characterised by excessive trampling and consumption of vegetation may result in decreased soil quality, loss of vegetation cover and increased vulnerability to wind and water erosion. This may lead to further loss of topsoils, loss of seed banks and thus, a further decrease in soil quality.

Bush Encroachment

Bush encroachment is another characteristic of desertification in Namibia. As a result of overutilisation, mis-management of grazing or other environmental pressures, there is an increase in the proportion of inedible and non-useful woody plant species relative to the grass component. The net result is decreased land productivity.

Other facets of desertification include deforestation through increased harvesting of wood, declining quality and availability of water supplies, salinization of irrigated land, proliferation of invasive plant species and growth and encroachment of mobile sand dunes.

(Seely *et al*, 1994; Brown, 1992; ENGE0, 1997)

Not only is desertification likely to be a factor contributing to global climatic change (Adger and Brown, 1994; Brown, 1992) but it is costly to Namibia as a country and compromises individuals' ability to sustain themselves on the land in communal areas.

Desertification not only affects the environment but it impacts negatively on people's living standards, public health, nutrition and livelihoods. The cost of desertification to communal farmers in Namibia has been estimated to be in excess of N\$ 100 million per year (US\$ 22 million) and the cost to commercial farmers through lost beef production is of a similar magnitude (Quan *et al*, 1994).

Desertification and its contributory factors are thus of high concern to Namibia and a complex social, economic, political and environmental issue.

2.2.2 The environment and human pressure on resources

A sine qua non of desertification is the effect of human pressure on the environment. Human pressure on the environment is the result of a variety of human activities which affect different aspects of the environment. This section briefly highlights the status of, and pressures on resources in rural areas - the rural areas representing the vast majority of the population.

It aims to provide an understanding of human pressure on resources in rural Namibia. Information is based on research discussion papers produced by the DEA in Windhoek (Ashley *et al*, 1995; Ashley, 1994).

Fertile soils and crops

There is a scarcity of land suitable for cultivation. In the northern territories nearly all the arable land is already used. People are being forced to use more marginal land which is more easily degraded. Practices such as crop rotation and allowing land to lie fallow are also, therefore, becoming limited with the scarcity of land. These factors tend to lead to overuse of land, land degradation and overall to a loss of productivity. Crop yields have fallen and per capita household incomes have consequently fallen.

Forests and deforestation

Only 20% of Namibia is classed as woodland but at least 80% of the country supports trees and woody shrubs.

These play a vital ecological role. Among many functions they protect watersheds, support biodiversity, facilitate groundwater recharge and stabilise soils. They are also useful to people in rural areas as a source of fuel wood, building materials for houses and fencing, food, medicines and many other amenities.

Dramatic deforestation has occurred in the northern areas. Evidence for this is presented by historical accounts of forested areas which have disappeared over the last century, satellite imagery and the fact that rural people find themselves having to walk or travel further afield to collect firewood and other forest products. Along the Okavango River about 70% of riparian forest has been lost in the last century.

Hardwoods, most durable for building and suitable as fuel wood, are diminishing resulting in relatively higher quantities of other less suitable woods being harvested for the same purpose.

Wetlands degradation

Wetlands also fulfil key ecological functions, are usually highly productive and sustain biodiversity. They not only represent many useful resources from fish as a food source to reeds for thatching, but are also involved in groundwater recharge processes and regeneration of soils through seasonal flooding. Wetlands are under pressure from increased grazing, clearance of vegetation, increased abstraction of water, over fishing and siltation from poor upstream land management practices. This has been associated with declining productivity of local ecosystems.

Wildlife

Wildlife in communal areas has shown dramatic decline, especially in northern territories. In areas such as Owambo large mammals have virtually disappeared in the last 50 years. This is an area which used to support zebra, elephants, oryx, springbok and a herd of 25 000 wildebeest. These population declines are mostly as a result of habitat loss, hunting and fencing. Until recently there have been no incentives or legal mechanisms for local people to benefit from these herds and manage them sustainably as game is state property.

Water resources

Due to population growth and increased economic activity, Namibian water consumption is in excess of what may be sustainably harnessed from the 3% of total rainfall which enters surface and groundwater systems. Groundwater provides about 57% of the water demand, perennial border rivers about 23%, and surface reservoirs 20%.

There are indicators that in many areas water tables are dropping. This may be due to unsustainable abstraction rates, decreased recharge due to disturbance of infiltration mechanisms and increased surface abstraction.

Namibia is, consequently, looking further afield to schemes such as the Eastern National Water Carrier (ENWC) to provide access to more water. The ENWC is an extensive pipeline and canal system linking dams and high yielding boreholes in the north, eastern and central areas. In the process of development, a controversial extension to this system will enable the abstraction of water from the Okavango River - upstream from the Okavango swamps.

Grazing and productivity of rangeland

Livestock ranching, the dominant farming activity in this arid environment, requires vast areas of land and flexible farming strategies which include grazing rotation and destocking in response to dry periods.

Traditionally such flexibility was achieved through the practice of transhumance - especially in the dryer central and southern areas. Pastoralists would follow rains and grazing with their cattle. Even where communities were more sedentary, cattle would be moved to better areas in response to local climatic and seasonal variations - allowing intensively grazed areas to recover.

These practices have largely been lost and replaced by more sedentary and unsustainable practices.

The reasons for this include:

- land enclosure and confinement to 'homelands' under colonial and apartheid policies;
- increase in the numbers of livestock;
- increase in human population;
- trend to more sedentary lifestyles often promoted by the installation of fixed water points;
- seasonal grazing areas have become available as all year round grazing areas through the installation of new water points;
- provision of water in periods of drought allows livestock to use areas more intensely than would normally be allowed by the level of available grazing determined by a drought.

Land degradation and the results of overgrazing are often the result of livestock numbers being maintained at a level above the carrying capacity of the land, given the existing management techniques and inflexibility to respond to drought cycles and other variations in grazing availability.

The end result may be a decrease in the productivity of the land, characterised by loss of productive grasslands as perennials are replaced by annuals, bush encroachment, spread of invasive plants, loss of vegetation and soil degradation, trampling and compaction of soils and/or soil erosion.

In conclusion, these pressures and trends which all lead to a decline in productivity and contribute to desertification are serious issues for Namibia and Namibians. This is especially so, considering the dependence of livelihoods and the economy on renewable resources and land productivity. The role of boreholes in contributing to these pressures on the environment and cycles of land degradation is significant.

2.3 Provision of boreholes and the environment

The provision of boreholes is a development activity which in the context of communal areas in Namibia has the potential to result in significant environmental impacts. This is a view which was found to be well documented by research (ENGEO, 1997).

From the preceding discussion it is clear that boreholes, especially if accompanied by poor land management practices, can be mediators of environmental degradation and desertification.

Boreholes can impact on the environment in a number of different ways. Negative impacts are largely mediated through increased sedentarisation, overstocking, loss of seasonal grazing and loss of other flexible farming strategies. Thus a cycle of land degradation is entered.

Vegetation cover is lost, vegetation composition changes with the development of bush encroachment and/or loss of perennial grasses and an increase in less productive annuals. Soils, made more susceptible through trampling, compaction and vegetation loss, become prone to erosion and with erosion lose nutrients and dormant seed content. The result is a loss of productivity and decreasing carrying capacity. Ecosystems and rangelands become much more susceptible to climatic stresses such as periods of drought - and have less ability to regenerate. (See Figure 2.4)

Thus, paradoxically, by increasing water availability by providing water points, the land may become less productive and the people which it supports may become more vulnerable to the ravages of drought.

Boreholes can also artificially raise the perceived carrying capacity of the land. Thus more livestock may be sustained in an area of grazing where normally the absence of surface water would prohibit this. In the past livestock have only been able to be grazed in areas where there is surface water for them to drink. This usually implied good and recent rains and thus, healthy and productive grassland and vegetation. With the provision of boreholes, livestock can be grazed in areas where vegetation has not received rain and is most vulnerable. Thus, the provision of a borehole decouples the link between the accessibility of grazing to cattle and productive status of rangelands.

Other impacts of boreholes to be considered are the lowering of water tables and reduction in groundwater quality where water is abstracted at a rate higher than the recharge rates. This may be aggravated by soil compaction, soil degradation and changes in vegetation cover affecting infiltration rates.

Conversely, however, it is possible that if boreholes are correctly managed they may have positive impacts on the land. For example, a borehole can open access to a seasonal grazing area which can be used on a sustainable basis if given periods to remain fallow.

Other positive aspects could be enhanced with a management plan for grazing. This would include such factors as grazing rotation, using some areas on a seasonal basis and limiting stock numbers to ensure long term productivity.

As droughts are often characterised by not so much a shortage of water but a shortage of grazing, destocking in response to drought cycles would often be more appropriate than providing more water.

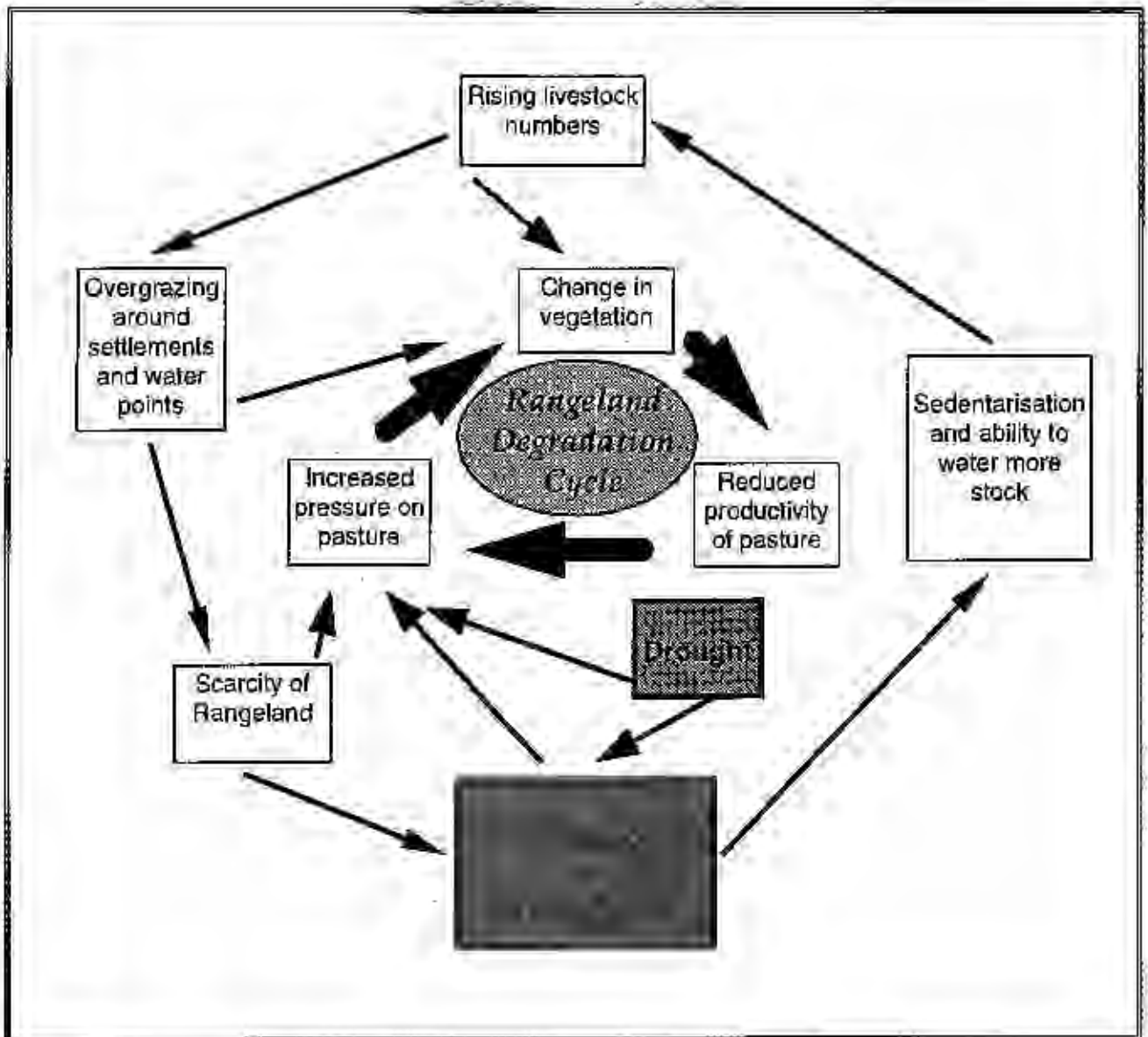


Figure 2.4: Schematic presentation of the role of drought, artificial waterpoints and other factors involved in rangeland degradation (Adapted from Ashley, 1994)

It is clear that rangeland degradation is a multi-factorial problem and depends on a range of factors operating synergistically. Provision of a waterpoint, however, may often act as a catalyst or key trigger in this process of degradation, especially in the context of poor land management practices and the many other social and economic compounding variables typical of communal areas.

2.4 Drought and drought relief programmes

'There are no hermetically sealed compartments separating emergency relief from development.'

(Reilly, 1992:342)

The central issue in the ENGEO baseline report was the provision of boreholes in communal areas as part of an extensive drought relief programme in 1992 and 1993, as well as a drought relief programme in 1996. However, it became clear in the course of research, that there is little distinction between those boreholes provided as emergency drought relief measures, and those provided as part of routine, ongoing rural water supply development (ENGEO, 1997).

In fact, the proclamation of drought - a political decision (Koch, pers. comm.) - merely provided impetus to ongoing rural water supply development. Most significantly the declaration of drought by the State President enabled Namibia to obtain foreign funding and aid to contribute to this emergency provision of boreholes. Therefore, the advantage in declaring drought was that foreign funding was harnessed and sequestered into the ongoing rural water supply development programme under the banner of 'emergency drought relief' (ENGEO, 1997).

Drought in an arid country such as Namibia is not amenable to a simple, all inclusive definition. It is not an absolute concept as prolonged periods of low rainfall and rainfall which is highly variable over time and variable in terms of spatial distribution are the norm. It is of note that Namibia declared a nationwide drought in 1992/3, while neighbouring Botswana which possibly experienced the same vagaries in climate, did not declare drought or seek foreign aid (Binding, pers. comm.).

This is an enormous topic in itself and will not be explored in any depth, suffice as to highlight the following points:

- Drought is not an absolute concept in an arid country such as Namibia;
- Declaration of drought is a political decision, albeit advised by scientific surveillance and other evidence;
- In terms of environmental assessment and management in the provision of boreholes, there is no conceptual or fundamental difference between boreholes provided under the banner of 'emergency drought relief' and those provided as ongoing rural water supply development.

(ENGEO, 1997)

Thus, for the purposes of this dissertation, no significant distinction is made between 'emergency' boreholes and those provided as routine rural water supply development.

2.5 Commitment to environmental protection and sustainability

Namibia clearly recognises the benefits of maintaining a healthy and productive environment. This need is strongly emphasised by the dependence of the economy and most people's livelihoods on environmental integrity. Consequently, Namibia has given high profile recognition and priority to wise resource use and sustainability:

'The state shall actively promote and maintain the welfare of people by adopting, inter alia, policies aimed at the following:

... maintenance of ecosystems, essential ecological processes and the biological diversity of Namibia and utilisation of living natural resources on a sustainable basis for the benefit of all Namibians, both present and future...'

(Article 95(1) of the Constitution of the Republic of Namibia)

The Government of Namibia has produced several documents and policy directives in accordance with this environmental policy directive in the constitution.

Namibia's Green Plan - Environment and Development (Brown, 1992) is a comprehensive policy draft document which aims to 'secure for present and future generations a safe and healthy environment and a prosperous economy.' Its primary aim is one of sustainable development and environmental protection through wise environmental management.

Inter alia, it highlights the aims of protecting the integrity of the resource base, preserving biodiversity and preserving unique areas. It also stresses the importance of reducing poverty, stabilising population growth, promoting education, health care and social upliftment. It is a far reaching document and optimistic that sustainability can be achieved, but will require innovative policies on such issues as sustainable livestock ranching, agriculture and water use. It also calls for new approaches to assessing economic growth such as natural resource accounting and quality of life accounting. The MET has also drafted policies promoting the protection of biodiversity (MET, 1994^a) and promoting sustainable land use planning (MET, 1994^b).

There is, therefore, significant political will and support even at a constitutional level for initiatives and mechanisms which would contribute towards sustainable development in Namibia - a country which can not afford to compromise its fragile resource base and environment through environmentally unsound development.

2.6 Boreholes and sustainability

Only 50% of the population in Namibia have access to safe drinking water (NPC, 1995). Access to a safe and adequate water supply is a fundamental human need. Water is necessary for livelihoods and economic activity in rural areas. Quantity and quality of available water are strongly correlated to standards of living and improved health indicators (Hardoy *et al*, 1990). It is thus, a vital development activity.

However, any positive effects gained by providing boreholes may be negated by the loss of productivity and ability of people to support themselves on the land if borehole provision results in an overall negative effect as described above. Thus borehole provision may not be sustainable. When the cumulative effects of all the boreholes in rural Namibia are considered, it can be argued that borehole provision has widespread negative environmental impacts which contribute to land degradation and desertification. Borehole provision can, therefore, jeopardise livelihoods and result in significant economic loss to the country.

To reconcile these two factors and achieve sustainable development is the challenge for government, planners, policy-makers, communities and the environmental professional.

Since 1970 with the introduction of NEPA, Environmental Impact Assessment (EIA) has been developed as the instrument or process to protect the environment from impacts of development. EIA has been developed and adapted and is now a formal part of development planning in most countries and development institutions (Preston *et al*, 1994; Sadler, 1996).

However, it will be argued that environmental assessment practice and legislation have developed around, and remained focused on large projects with obvious environmental impacts. Smaller, low budget projects, such as boreholes, which when considered in isolation appear to have relatively minimal local environmental impacts, have been largely ignored by EIA methods. Consequently, most EIA approaches are inappropriate in application to this type of development. EIA is also ill-equipped to be effective in a context such as that of rural Namibia.

3. EIA and Sustainable Development

On the 1st January 1970, President Nixon signed the National Environmental Policy Act (NEPA) into force. Although public environmental concern had been growing over the preceding decade and the basic concepts of environmental impact assessment (EIA) had been formulated, NEPA is widely considered as the formal beginning of environmental impact assessment. Since NEPA, EIA procedure, has been adopted by, and included in the legislation, of most industrialised countries (Preston *et al*, 1994) and is a formal process to aid decision-making in more than one hundred countries world-wide (Sadler, 1996).

It is well recognised that the causes for environmental degradation are legion. Likewise potential solutions are complex, of a multi-disciplinary nature and involve initiatives targeted at all levels of human endeavour from international trade conventions, national policy and legislation and basic economic structures to individual development projects (UNCED, 1992).

However, it is a self-evident truth that the environmental impacts of individual development projects are a significant contributor to environmental degradation. Thus, environmental impact assessment, since its official inauguration in 1970, has been given centre stage in addressing environmental degradation caused by development initiatives. Environmental impact assessment with its role of protecting the environment in development is, therefore, seen as a key or core mechanism for achieving sustainable development (Abaza, 1995; Sadler, 1996).

UNEP identifies EIA as 'one of the most valuable tools for sound environmental management' (Abaza, 1995:25). EIA has evolved from merely a tool for impact prediction and environmental protection, to a development tool which aspires to the popular discourse of sustainable development. UNEP, as requested by the United Nations Conference on Environment and Development in 1992 (UNCED, 1992), promotes the 'further development and promotion of the widest possible use of environmental impact assessment' so that it can attain its full potential as an 'instrument for sustainable development' (Abaza, 1995:26). This is echoed in the findings of the 'International Study of the Effectiveness of Environmental Assessment':

'The world in which EA operates today is very different from the one in which the process was introduced...The challenge to EA practitioners and managers is to sharpen and position EA as a sustainability mechanism for the 21st century.'

(Sadler, 1996:v)

Thus EIA has been promoted, and continues to be promoted, as a key mechanism to halt environmental degradation and for attaining sustainable development (Sadler, 1996).

However, it is contended that the standard practice of EIA has a significant, but limited role to play in attaining sustainable development. Although it has proven useful in assessing and planning development so that development is more environmentally sound, it has several weaknesses which limit its value as a comprehensive tool for sustainable development.

It is contended that EIA is not universally applicable to all types of development projects, in all development contexts and in all countries - particularly as these vary in the developing world. It is important to recognise these shortfalls so that EIA can be strengthened, modified and made more effective. Recognition of the shortcomings of EIA may also allow complementary environmental assessment and management approaches to be developed which can perhaps better address issues of sustainable development in specific local contexts.

On reviewing the usefulness of EIA in the context of the subject of this dissertation - the context of the dilemma of sustainable development for boreholes in Namibia, EIA has four basic shortcomings:

1. Standard EIA procedure is not always suitable for the context of developing countries (Sadler, 1996; Fuggle, 1995).
2. A systematic weakness of EIA is the implementation of the information attained in the EIA process in ongoing environmental management, monitoring and auditing of the project (Sadler, 1996).
3. EIA is inappropriate for community development projects, development in the informal and semi-formal sector or small-scale, low budget development. This is the type of development which is of increasing importance in developing countries like Namibia (Tarr, pers. comm.).
4. EIA, by not adequately addressing small projects with environmental impacts, does not address the cumulative effects of such small-scale development.

Each of these four issues is examined.

3.1 EIA and developing countries

EIA was designed and evolved in the developed world in response to the need to initiate environmental protection in the face of seemingly unchecked industrial and infrastructural development.

The context in which EIA was designed to function is one of a first world democracy. There are several characteristics of such a context that are crucial for the success of EIA and which may not always be found in developing countries such as Namibia.

These include:

- an informed citizenry;
- a high literacy rate;
- significant public involvement in government;
- decentralised government and decentralised decision-making;
- adequate financial, administrative and personnel resources;
- well developed and effective legislative support for EIA;
- a wealth of relevant expertise;
- a public that is relatively affluent - the majority has its basic needs met.

(Preston *et al*, 1994; Fuggle, 1995)

The International Study of the Effectiveness of Environmental Assessment identified similar factors which constitute a 'supportive culture' for application of EIA. Again, these factors may be lacking or limited in a developing country.

'This culture is founded on several interrelated conditions:

- *mandate (for EA) provided by law/administrative regulation*
- *basic procedural and methodological infrastructure*
- *political commitment as demonstrated by the use of EA results*
- *common understanding of process aims, requirements and benefits*
- *provision of sufficient funding to get the job done*
- *adequate institutional and technical capacity*
- *up-to-date information and data in a form suitable for processing many screening decisions.'*

(Sadler, 1996:19)

These points will not be further elaborated at this stage. However, two factors stand out on this latter list: that concerning adequate funding and that concerning adequate technical and institutional capacity to implement EIA. These appear to be major constraints on applying EIA to small development activities such as borehole provision.

In chapter 6 the process of Integrated Environmental Management (IEM) is examined as it evolved in South Africa. IEM was developed in full cognisance of the differences between developed and developing countries and the implication of this in terms of EIA. IEM, therefore, is examined because of its relevance as a process which interprets and implements EIA in the context of the constraints and realities of a developing country. Furthermore, Namibian EIA procedure draws on IEM and was developed in consultation with IEM experts from South Africa.

3.2 EIA and environmental management

From the recent 'International Study of the Effectiveness of Environmental Assessment' - the purpose of which was to assess the effectiveness of EIA after 25 years of implementation - it emerged that a 'systematic weakness' of EIA was a lack of efficacy in the implementation of EIA findings beyond the EIA and decision phase of a project. Thus there is a weakness in including EIA findings in ongoing environmental management, monitoring and auditing (Sadler, 1996). The study concluded that EIA had succeeded in allowing

decision-makers to reach better decisions in terms of development and the environment. However, mechanisms, structures and methods for the findings of EIA to be implemented in all subsequent stages of the project were usually weak or absent. This may be attributed to the understanding of EIA as essentially a predictive exercise - a conceptualisation of EIA which has been criticised as being limited and narrow (Hill, 1996).

Thus, a shortcoming of EIA is that its scope of influence seems to weaken after the EIA process is completed and a decision concerning the implementation of the project has been reached. The wealth of knowledge gained in the EIA process is not adequately transferred, beyond the decision stage, into later operational stages of the project in the form of effective environmental management plans and measures for operation.

This is an issue which will be addressed in chapters 6, 7, 8 and 9 which examine aspects of effective mechanisms of environmental management. As most of the impacts of boreholes relate to how they are managed (ENGE0, 1997), the environmental assessment and management mechanism for boreholes in rural Namibia should give this weakness recognition and incorporate mechanisms to include environmental assessment information into an appropriate framework of environmental management for boreholes.

3.3 EIA and small-scale development projects

Generally speaking, EIA has been designed for larger projects usually of an industrial or infrastructural nature. While EIA is, therefore, well suited to larger industrial and infrastructural projects, there is a risk that EIA process does not always adequately include informal sector development, small-scale projects or community development projects. For logistical and financial reasons many EIA processes allow smaller projects, with apparently insignificant environmental impacts, to pass through an approval process without full EIA. Consequently, many smaller projects do not undergo environmental assessment.

For example, in Ontario, it has been estimated that 90% of development proposals are officially exempt from EIA, about 10% undergo a preliminary environmental assessment and only about 1% undergo full environmental assessment (Doyle, 1994, cited in Sadler, 1996). Thus, in adopting an administrative and procedural system that is logistically feasible and efficiently screens out small projects with minimal impact, 90% of development projects do not undergo EIA. It would be interesting to compare the total cumulative impacts of the 1% of large projects which do receive full EIA to the total cumulative impacts of the 90% of projects which do not undergo any form of EIA.

It is possible to suggest, therefore, that due to the project-specific nature of EIA and EIA procedural constraints, small development projects may make an unmeasured but significant collective contribution to environmental degradation.

In the developing world, growth in the informal sector and employment in the informal sector are becoming increasingly significant. Large scale development projects and macro-economic development initiatives have largely failed in developing countries and generally speaking economies are increasingly being driven by the informal sector (Reilly, 1992). As was noted in chapter 2, this is a significant trend in Namibia and an increasing number of people are being employed in the informal sector.

For several reasons this is a difficult or refractory sector to guide in terms of EIA. The informal sector is not subject, to the same degree as the formal sector, to local and international trade pressures, consumer pressures and legislative requirements in terms of environmental performance. Informal sector initiatives generally have insufficient resources in terms of finance, administrative capacity and personnel to consider environmental issues in their activities. Implementation of environmental assessment for informal sector and small-scale development could jeopardise the viability of such developments (Tarr, pers. comm.). Thus, although the informal sector is responsible for an increasing amount of economic activity in a country such as Namibia, it seems more difficult to include standards for environmental performance into this sector (Tarr, pers. comm.). There is, therefore, also less economic incentive for environmental consultants to become involved in this sector.

This is an issue which will be addressed in chapter 9, where the pro-forma environmental contract system is reviewed for its success as a mechanism for attaining a standard of environmental performance in an informal or semi-formal sector activity.

3.4 EIA and cumulative effects

Given the possible cumulative effects of small projects and the typical trend where about 90% of projects are exempt from EIA as their impacts do not warrant a full investigation, it is argued that EIA, with its large project bias, is missing a significant proportion of the total environmental impact of development. In purely simplistic and Cartesian terms, each small project which is totally exempt from EIA need only have, on average, an impact on the environment which is about one hundredth that of the large project which does undergo EIA, to have an environmental impact that is as significant when totalled with all the other small project developments. Grappling with the issue of cumulative environmental impacts has been a difficult task for environmental assessment. This is marked in the literature by a confusing array of approaches to assessing and managing the cumulative effects of development (Damman *et al*, 1995).

The definition of 'cumulative effect' is also vague and differs with different described mechanisms of action of cumulative impacts. One definition provided defines a cumulative impact as an impact which is not significant in itself but significant when added to other similar actions (DEA, 1992).

The DEA range of documents describes cumulative impacts in terms of varying mechanisms which result in cumulative impacts (DEA, 1992). These are presented in Table 3.1 and it is suggested that many of these mechanisms may apply to boreholes and desertification in rural Namibia.

Type of cumulative impact	Main characteristics	Examples in context of boreholes in rural Namibia
Time and space crowding	Frequent and repetitive impacts on a single environmental medium. High density of impacts on a single environmental medium	Trampling of soil by cattle Overgrazing Overlap of zones of impact of individual boreholes Multiple boreholes abstracting from one aquifer system
Compounding effects	Synergistic effects arising from multiple sources and activities	Many different types of human pressure on the environment contributing to desertification
Extended boundaries	Impacts resulting some distance from source	Abstraction affecting distant aquifers and recharge rates
Indirect effects	Secondary impact resulting from a primary development activity	Influx of people on to marginal land where boreholes are provided
Patchiness effects	Fragmentation of ecosystems	Fencing around boreholes and overlapping zones of impact of boreholes

Table 3.1: Definition of cumulative impacts in terms of mechanism of operation (adapted from DEA, 1992)

This is one representation in understanding cumulative impacts. It is clear from the literature that definition and understanding of cumulative impacts and their relevance to environmental assessment will remain contentious issues (Rees, 1995).

Two points, however, are clear in the literature:

1. Cumulative impacts are important and have a significant insidious effect in environmental degradation (Odum, 1982; Rees, 1995).
2. EIA does not usually adequately consider cumulative effects in impact assessment (M^c Cold and Holman, 1995; Sadler, 1996; Burris and Canter, 1997).

One reason why cumulative impacts are difficult to incorporate into environmental assessment of projects is that cumulative impacts tend to operate at a level or scale which is larger than the individual project and, therefore, beyond the scope of the EIA defined by the project. Thus, one trend to address the issue of cumulative impacts and strongly promoted by the International Study of the Effectiveness of Environmental Assessment, is the use of Strategic Environmental Assessment (SEA). Initiatives such as these which aim at EIA for policies and programmes are recommended for being more successful in addressing the effects of cumulative impacts (Sadler, 1996; DEA, 1992).

It is argued, however, that for the wider approach adopted by SEA to be successful, it will, nevertheless, still require better environmental assessment and management at the individual project level. Furthermore, SEA removes the locus of decision away from the community level and is, therefore, on its own, not a suitable approach to environmental assessment and management. While SEA may provide useful input, the level of assessment and management should be kept at the local community level. This is a point which is thoroughly elaborated and discussed in chapter 5 where the importance of local control and local planning are highlighted as prerequisites for sustainable development.

Although it is unlikely to be the complete answer to addressing cumulative effects of small projects, better environmental assessment and management of small projects is undoubtedly a significant component in attaining this goal. This represents a unique challenge for a developing country with limited resources, especially considering that many small projects do not undergo EIA even in developed countries.

3.5 Conclusion

These are key shortfalls of EIA which are relevant to the subject of environmental assessment and management of boreholes in rural Namibia. It is argued, from the above discussion, that conventional EIA approaches will not be a useful tool in attaining sustainable development in respect of borehole provision in rural Namibia.

However, there is strong support for environmental assessment and management of boreholes. It is suggested, therefore, and discussed in the next chapter, that there is indeed a need to devise a workable approach to achieve this goal.

4. Motivation for a New Model of Environmental Assessment and Management

'It is considered necessary that a formal process of environmental assessment for borehole provision programmes should be developed. This would be a process of environmental assessment, possibly based on existing environmental assessment procedures, but designed specifically for borehole provision programmes.'

(ENGE0, 1997:181)

Namibia has been identified as containing 'dryland at risk of desertification' (Cardy, 1994). As boreholes contribute to desertification, it is of the utmost importance that this issue is addressed. Developing environmental assessment and management procedures for boreholes, therefore, has significant national and international support.

In the dilemma of addressing the global issue of desertification, the UNEP has stated:

'.....we plan to work with affected countries...the administrative challenges of implementing a truly 'bottom-up approach' are formidable: how it will be done is not yet clear, but we shall be actively encouraging important initiatives in this direction'.

(Cardy, 1994:15)

Namibia has 42 000 boreholes of which approximately 6000 are in communal areas (Simmonds, pers. comm.). In 1990, only 50% of people in rural communities had adequate access to safe water (NPC, 1995). Rural water supply development, as a major development initiative, aims to raise this proportion to 80% by 2010 (NPC, 1995). Given the potential cumulative environmental impacts of all these new boreholes, it is not surprising that this issue is one of national concern. Consequently, within Namibia, there is strong support for environmental assessment to be applied to boreholes. Arising out of the concern for the dire economic and livelihood impacts of borehole provision, there have been well motivated calls for environmental assessment and management for boreholes.

However, little progress has been made in this regard, primarily because conventional EIA practices and methods - the environmental management tools available - are not suitable or effective in this context and are definitely not easily applied to boreholes as a development project.

This chapter argues that, given

1. the strong support for environmental assessment for boreholes;
2. the failure thus far in Namibia to implement appropriate environmental assessment and management programmes for boreholes;
3. the characteristics of borehole provision as a development activity and its rural context;
4. the likely non-suitability of conventional EIA in attaining sustainable development in this context and the difficulty in applying EIA to boreholes,

there is justification for the advancement of a new model for this purpose and appropriate for this context.

This will be a model that will be able to meet the challenges of sustainable development in the provision of boreholes in the communal areas of Namibia.

4.1 Calls for environmental assessment and management of boreholes

The DEA, in Namibia, has recognised the problem of environmental degradation associated with borehole provision. It is recognised that ill-planned provision of boreholes may cause erosion of the resource base on which people depend. For degradation of the resource base in rural areas to be prevented, the DEA recommends, *inter alia*, that it is necessary to:

'develop local management of boreholes and grazing for livestock; ensure new boreholes are in the context of a land/grazing management plan.'

(Ashley et al, 1995:8)

Other researchers have made recommendations in a similar vein:

'...careful planning of water points with the education of its inhabitantsmay encourage sustainable utilisation and development.'

(EEAN, 1994, iii)

The ENGEO baseline report was very clear in stating the utmost importance of submitting each borehole provision programme to a process of environmental appraisal (ENGEO, 1997:175). It also stated, as a prerequisite before a borehole is installed, that there must be a 'clear understanding of the need for management of natural resources' (ENGEO, 1997:177). This is further emphasised in the executive summary:

'From the study it is clear that boreholes can be significant determinants of, and influences on, the social, economic and biophysical environment. Therefore, considering the range of possible environmental impacts and implications of borehole provision, the primary recommendation arising from

this study is that borehole provision must be subject to a process of environmental assessment and holistic environmental planning and management.'

(ENGE0, 1997:vii)

There is a clear mandate for national implementation of EIA for boreholes:

'Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority.'

Principle 17 - Rio Declaration on Environment and Development
(UNCED, 1992)

The Department of Water Affairs (DWA), has also committed itself to environmentally sound development in terms of borehole provision:

'Environmental management programmes based on proper environmental impact assessments are also a commitment of the Department to identify problems, to avoid unnecessary conflict between development and conservation requirements as well as to ensure well balanced water and infrastructure development.'

(DWA, 1991:20)

However, given this commitment to sustainable development, the DWA has made little progress to date in implementing environmental assessment and management for boreholes (Koch, pers. comm.). While some of the larger water supply infrastructure schemes may undergo EIA, this is not the case in the provision of boreholes in most communal areas in Namibia.

4.2 Failure to implement EIA

Given this concern for the environmental impacts of boreholes, it would at first appear surprising that EIA has not been implemented in borehole provision programmes. Other mechanisms to achieve better environmental performance, such as legislation and policy incentives, have also not addressed this issue with any degree of significance or success. To date, there is no routine EIA undertaken for the provision of boreholes in communal areas in Namibia (Koch, pers. comm.).

However, in a break from previous policy where the state was responsible for financing, maintaining and operating rural waterpoints, the DRWS is at present phasing in a programme that will devolve these management responsibilities of boreholes to local user communities (ENGE0, 1997). Contained in this new approach, and stated as a local management responsibility, is the imperative to adopt environmentally sound management practices.

'Communities shall get control over the resources within the area of jurisdiction and shall use these resources as a resource management tool to assure sustainable and environmentally sound resource development.' (sic)
(DRWS, 1996:6/4)

However, thus far, other than recommending a 'grazing tariff' to prevent overgrazing, no guidelines have appeared which provide more information as to exactly how environmentally sound management for boreholes will be implemented (DRWS, 1996). It remains at present a stated goal - and only that.

The emphasis of these changes is borehole management not environmental management of boreholes, *per se*. Nevertheless, the DRWS is now also promoting community management of boreholes which could be a significant step towards appropriate environmental management.

It is argued that the obstacle to implementation of EIA in this respect, is EIA itself and its incompatibility with this context. For reasons discussed in the preceding chapter, EIA is not suitable for the task at hand and indeed it is doubtful whether it would achieve the desired results.

4.3 Features of boreholes which necessitate the development of a unique model

The dilemma of borehole provision in communal areas in Namibia presents a problem which EIA, or other environmental control mechanisms such as legislation or environmental tariffs, are not equipped to resolve. This is because the development activity of providing a borehole is unique and vastly different from the type of development activity for which EIA and these conventional methods were designed.

The specific characteristics of borehole provision which make it incompatible with conventional EIA and environmental strategies include the following:

A borehole is a small-scale, low budget development

The cost of drilling a borehole varies from about N\$ 40 000 to N\$ 120 000 depending on its depth. Cost of installation of the borehole varies from N\$17 000 to N\$ 60 000 depending on the type of pump and infrastructure used. (See Appendix 6.)

The average borehole, therefore, costs approximately N\$ 100 000 (US\$ 22 000). A general rule-of-thumb is that EIA should total about 1% or less of total project cost (Sadler, 1996). This would allow about US\$ 200 to be available for an environmental impact assessment and formulation of an environmental management plan for a borehole.

To employ an environmental consultant to undertake an environmental assessment and formulate a management plan

for each borehole as an individual project would arguably be too expensive relative to the cost of providing this water point. This would be especially true if the consultant were to employ the spectrum of experts necessary to address the multi-disciplinary nature of the problem. EIA follow up requirements such as monitoring and auditing are also expensive. Expense is significant and given as a common reason for the frequent neglect of these factors in environmental assessment and management (Sadler, 1996).

From the cost point of view, therefore, conventional EIA for a borehole seems impracticable.

Administrative logistics of EIA for individual boreholes

Other than the expense involved in executing an EIA for individual borehole projects or even clusters of boreholes, there would be logistical difficulties in administration and review of EIA's for each project. An impossibly high administrative burden would be incurred, given the limited personnel resources available. This would further increase the cost of EIA's for individual boreholes.

Boreholes are a necessary and basic development activity

Boreholes provide water. In Namibia, where only 50% of the rural population have access to safe water, borehole provision is a vital development activity. EIA must, therefore, not impede such a vital development activity. EIA, in its standard form emphasises stopping projects on the grounds of environmental concern. In this situation it must be recognised that EIA has to take a different approach. There are no realistic alternatives to water provision and it must go ahead. EIA must be adapted from its original brief, therefore, of stopping projects, to an overriding purpose of making such development projects acceptable in terms of environmental considerations.

Boreholes are an extremely common development activity

As stated in the opening of this chapter, there are about 42 000 boreholes in Namibia, of which about 6000 are in communal areas. The DWA aims to increase those who have access to safe water from 50% to 80% of the population. Given projected population growth, this commitment represents a massive increase in service. As there are, in many communal areas, no alternatives to borehole provision, this increase in service also represents a massive increase in the number of boreholes supplied in communal areas.

Cumulative environmental impacts

It has been well established that individual boreholes may have significant negative environmental effects (ENGEO, 1997). The cumulative effects of many boreholes in the planned rural water supply development initiative could be devastating. As many of the mechanisms of cumulative environmental impacts are relevant to boreholes (see Table 3.1), collectively, numerous boreholes in communal areas could have a significant cumulative impact.

Each locality is unique

Given the diversity of local conditions, 'totalising' approaches to borehole control such as legislation or grazing tariffs are not appropriate for environmental management of boreholes. It is not possible to provide universal guidelines on the specifics of borehole management as each local situation is unique. Nevertheless, similar issues may arise with the management of individual boreholes.

Community and the commons

Possibly the most important characteristic which distinguishes boreholes from the type of development for which EIA has been designed, is that boreholes are provided in communal areas to access a common property resource - groundwater. It is, therefore, a community based development, taking place within the context of communal land tenure and communal resource use. It is not a private or corporate development activity which is amenable to the EIA process.

4.4 Conclusion

Sustainable use of natural resources is essential (Ashley, 1996), but exactly how to achieve this in respect of borehole provision seems to be a persistent obstacle. Not even the ENGEO baseline report, which aimed to resolve this dilemma, produced a specific or convincing solution.

In conclusion, boreholes represent a problem in terms of environmental degradation, but they are necessary development activities. Consequently, there have been many calls for environmental assessment and management for boreholes. It is an expectation underpinned and supported by the Namibian constitution and government. EIA, given its own nature and weaknesses, and considering the unique characteristics of borehole provision in communal areas in Namibia, is unlikely to be suitable for the task.

Many more boreholes are to be sited and installed in communal areas in Namibia in the next two decades. This could have a significant effect on Namibia's environment, and consequently the economy, livelihoods and quality of life. It is expedient, therefore, that this issue is addressed. It is for these reasons that this dissertation is justified in approaching the task of

developing a new, workable and effective model for environmental assessment and management of boreholes in communal areas in Namibia.

Furthermore, the timing for implementing a model such as this is ideal, as the DRWS implements far-reaching changes and promotes community management of the technical and financial aspects of communal area boreholes.

5. Sustainable Development for Rural Namibia

The preceding four chapters outlined the context of environmental assessment and management for boreholes. It has been established that there is a need for a mechanism of environmental assessment and management that can resolve the 'sustainable development dilemma' implicit in the provision of boreholes. To develop this model it is, therefore, necessary in the first instance, to refine the concept of sustainable development.

This chapter explores the concept of sustainable development and unravels some of the complexities and implications contained in the term. It attempts to facilitate an interpretation of sustainable development relevant to the context of rural communities and local resource management.

The line of argument is that sustainable development can only be achieved through incorporation of local knowledge and local control into resource management. To achieve this there needs to be effective and meaningful community participation in planning and management. Effective participation can only be achieved through mechanisms which include co-management of natural resources - empowerment of local communities through conditional devolution of power and rights to communities.

This chapter establishes the ideological targets and concepts of sustainable development. The understanding of sustainable development which emerges from this chapter, and its implications, will be used as a yardstick by which four different approaches to various aspects of environmental assessment and management are analysed and evaluated, in the following four chapters. Those aspects and components of the four approaches analysed which are compatible with, and support the concepts of sustainable development which emerge in this chapter, will be integrated into the synthesis of the model.

Thus, the discussion in this chapter is important in determining the basic principles, ideals and values on which a model for environmental assessment and management for boreholes in Namibia can be based.

In the development of discussion in this chapter, no apologies are made for generalisations, as the chapter aims to discuss the topic of sustainable development in general terms, in order to highlight broad trends and themes in understanding sustainable development. Thus, statements are made with this intent and in the awareness of the limitations of generalising.

5.1 Sustainability and sustainable development

The ENGEO baseline report found that many aspects regarding the provision of boreholes in drought relief programmes were unsustainable and contributed to environmental degradation and desertification (ENGEO, 1997).

As boreholes are an inevitable aspect of future drought relief and ongoing rural water supply development (ENGEO, 1997), questions arise as to how

this development activity may be performed in a sustainable manner. What principles must be applied in the method and conditions of borehole provision to promote sustainability? The model or mechanism of environmental management for boreholes needs to be structured to achieve sustainability and incorporate the concepts implicit in sustainability.

An appropriate starting point for an analysis of sustainability and development is the 'Brundtland Report'. The brief of the Brundtland Commission was 'to re-examine the critical issues of environment and development and to formulate innovative, concrete and realistic proposals to deal with them.' (WCED, 1987)

The main achievement of the Brundtland report was to crystallise and disseminate the concept of 'sustainable development' (Grubb *et al*, 1993). The commission generated the acclaimed definition of sustainable development:

'Sustainable development is development which meets the needs of the present without compromising the ability of future generations to meet their own needs.'

(WCED, 1987)

Sustainability and sustainable development are well recognised as terms which lack precise definition and may be used in many ways, to suite different purposes. Indeed, much of the appeal and power of the term 'sustainable development' rests in its ambiguity and vagueness. Ambiguity exists concerning what is to be sustained - is it the resource base itself, livelihoods and economy, levels of production or levels of consumption? (Redclift, 1992; Meams, 1995)

Sustainable development has been defined in terms of economics - preserving natural capital, preserving total natural and human-made capital and sustained economic growth. It has been defined in terms of biological criteria - conservation of biodiversity, conservation of renewable resources and maintenance of life support systems. It has been defined in terms of social criteria - social justice, equity in distribution of wealth, political power and alleviation of poverty.

The definition of the Brundtland report, however, succeeds in enlarging the concept of sustainable development to include factors beyond a unitarian approach such as that of economics or conservation. By placing the emphasis on the ability of people to meet their needs, it broadens the scope to include not only the economic and biophysical aspects of sustainability, but also the political, social, spiritual and cultural dimensions of sustainability (Redclift, 1992). In so doing, however, it does adopt an anthropocentric approach to the definition.

5.1.1 Principles of sustainability

Sustainability is, therefore, a complex, multi-dimensional notion and development which is sustainable must be able to integrate consideration of a range of social, biophysical, economic and technical aspects into the process.

Colchester (1994) argues that the needs of future generations are unknowable and that the future value of species and ecosystems to future generations is also unknowable. Thus, even an anthropocentric definition of sustainability must imply that total biological and other natural assets are not reduced in the long term, as well as imply that sustainability involves maintaining economic activity and meeting cultural and other social needs.

In the context of rural communities, therefore, sustainability implies the conservation of fauna and flora as well as the conservation of ecosystem functions and biophysical attributes such as soil quality, hydrological cycles, water quality and land productivity. As the livelihoods of people in rural areas are dependent on these natural resources today, sustainability implies that, given that the future is unknown, future generations must at least have the same resource base to meet the needs of their livelihoods - whatever those needs will be.

However, many definitions of sustainability have focused on the maintenance of biodiversity and natural capital and have neglected the social and political pre-requisites in the attainment of sustainability (Colchester, 1994). Sustainability implies a change in economic systems, change in approaches to development and a change in the manner in which natural resources are used and managed. Implicit in the concept of sustainability are the concepts of equity and social justice - intragenerationally and intergenerationally. Furthermore, without the fulfilment of the development and economic needs of local people, they may be forced to extract from the environment more than is sustainable.

'Most of the world's environmental threats ... are by-products of affluence. But poverty drives ecological deterioration when desperate people overexploit their resource base, sacrificing the future to salvage the present.'

(Durning, 1990:144, cited in Reilly, 1992)

Given the dependence of the Namibian economy on its resource base and especially the direct dependence of rural people on natural renewable resources, it would seem correct that sustainable development in Namibia must prioritise environmental protection. In the context of rural Namibia, because of the direct and immediate link between environmental integrity and quality of life (Brown, 1992), sustainable development is likely to take the form of activities which prioritise restoration and wise stewardship of renewable resources. Sustainable development initiatives should better equip communities to protect this resource base and to sustainably benefit from it.

Thus, in reviewing this holistic, non-unitarian approach to sustainability, it can be argued that achieving sustainability within human activities requires the successful integration in planning of consideration of the full spectrum of aspects that comprise the total human habitat and environment.

The constituents of sustainability may be categorised, therefore, as those needed to achieve:

- social sustainability;
- economic sustainability;
- biophysical sustainability;
- technical sustainability.

Social sustainability includes ensuring social self determination, alleviating poverty, equity, promotion of local control over resources, definition of rights over resources and land, capacity building and empowerment of local communities. Social sustainability also implies respect for tradition, cultural heritage, religion, indigenous knowledge, customary practices and spiritual needs of communities.

Economic sustainability includes attaining economic self sufficiency, meeting basic livelihood needs and wise use and maintenance of the resource base on which economic activity is based. Implicit in economic sustainability is maintenance of the resource base.

Biophysical sustainability necessitates the effective and efficient use of natural resources within the limits of carrying capacity or productivity of natural systems, maintenance of ecosystem integrity and biodiversity and restoration of the earth's vital processes.

Technical sustainability in the context of rural development is encapsulated in the concept of 'appropriate technology'. This is technology which is suitable for the task in terms of the physical environment in which it operates, its cost of installation, operation and maintenance, expertise available for maintenance and operation and impact on the environment.

Sustainability, therefore, transcends the whole political, social and economic spectrum and affects all aspects of development.

(Hill and Bowen, 1996; Jacobson *et al*, 1995; ENGEO, 1997; Sadler, 1996)

5.1.2 Defining development

The term 'sustainable development' is now entrenched in development discourse. However, what constitutes development is fortunately receiving much scrutiny - not least by local communities (Singh and Titi, 1995). Development theorists and practitioners have not easily been able to formulate concepts and definitions of development alternative to that of 'modernisation' (*ibid.*).

There is a need, especially in the context of this dissertation, to re-think and reformulate concepts of sustainability, development and poverty alleviation (Singh and Titi, 1995).

In the context of communal rural Namibia, the word 'development' in the term 'sustainable development' is inappropriate unless modified in meaning and connotation. It implies, by connotation and historical association, application of the ideals and values of the western capitalist developmental paradigm. Development becomes characterised by economic growth, infrastructural development and intensive resource use. From the point of view of indigenous people in developing countries, development has often been characterised by the appropriation of resources (Colchester, 1994) and privatisation of common property. This is a process which has been coined by the phrase 'enclosure of the commons' (Ecologist, 1993).

The western approach and understanding of development has created two significant problems in the developing world. Firstly, it has widened the gap between rich and poor and thus, left a trail of social degradation in its path. Secondly, it has resulted in environmental damage unparalleled in human history (Seabrook, 1993).

While this may well be a legitimate understanding of development, it must be recognised that it arises out of a particular world view and paradigm, and is not necessarily appropriate or acceptable to indigenous people of developing countries - people such as Namibians in communal areas.

The term 'development' must be redefined to maintain credibility in its use in the concept of sustainable development.

If the concept of development, 'is to have any credibility at all, we must speak to the social, spiritual, cultural, economic, political and cosmological aspects and needs of local people' (Dei, 1995:147). Singh and Titi (1995) point out that there is 'increasing dissatisfaction with the limitations of purely secular and uni-disciplinary conventional economic, environment and development approaches' (Singh and Titi, 1995:19). They argue that development and sustainability in development is achieved through community empowerment. This empowerment is multi-faceted. It is not just socio-economic, technological and political empowerment but also cultural and spiritual empowerment. This allows communities to define the ideological basis and therefore, the outer form of development.

In the context of rural communities, the 'development' agenda should, therefore, be defined by local people and local communities (Dei, 1995). While economic self sufficiency is likely to be a priority, it is argued that 'development' activities will also include an emphasis on tradition, indigenous knowledge, culture, religion and on activities that prioritise wise use of the resource base - not necessarily in a 'modern', scientific approach or based on short term financial gains.

The definition of development, in sustainable development, needs to be open to the fact that sustainability is a multi-faceted concept. Likewise, therefore, development needs to address the full spectrum of human need and it needs to do this in a way defined by, and acceptable to the community. Thus, development needs to be 'home-grown' - arise out of the community and be the initiative of the community.

Development which does not do this, is not likely to be sustainable and perhaps should not be termed development. Development which is disarticulated from addressing the full range of human need - as defined by the community - is not sustainable development. It may be, as is often the case, better termed 'modernisation' or 'industrialisation' or 'increased economic activity'.

5.1.3 Sustainable development

Therefore, given the complexity of notions contained in the term 'sustainable development' and the difficulty, or inappropriateness, of defining the meaning of development for rural communities, it is suggested that an approach to sustainable development be based on four basic and well-recognised sustainability principles:

Principles of Sustainability

- 1. Basic needs of local communities must be met;**
- 2. Natural resources should be subject to local control;**
- 3. Local communities must have the decisive voice in planning;**
- 4. Local communities should represent themselves in and through their own institutions.**

(Colchester, 1994)

These concepts, succinctly presented as four basic principles by Colchester, are well established and well supported themes in the literature on sustainable development.

Vivian (1992) establishes three foundations for sustainable development: local participation, local empowerment and local resource management. Singh and Titi (1995) view sustainable development as the community defined product that it is achieved through community empowerment.

These are themes which are highlighted and emphasised in Agenda 21 (UNCED, 1992). Chapter 3, dealing with poverty, places emphasis on meeting people's basic needs, social upliftment, participation of communities and a 'bottom-up' approach to development. Chapter 26 calls for respect for indigenous communities and their knowledge. It calls for the 'enhancement of capacity building for indigenous people' and for their empowerment by strengthening their role in local resource management.

By adopting these principles, therefore, it is not necessary to define the exact form or outward appearance that sustainable development should take. This approach devolves the definition of development and the development agenda to local communities. It therefore, encourages a locally accurate and holistic definition of sustainable development by allowing it to be defined by local needs and aspirations, as well as by the more obvious sustainability criteria already discussed.

5.1.4 The ENGEO baseline report and sustainable development

The report found that, from its perspective, the provision of boreholes, as a development activity in rural areas in Namibia 'did not give enough consideration to aspects of sustainability' (ENGEO, 1997:170).

In terms of the biophysical environment, provision of boreholes was, in some cases, unsustainable. On occasion, boreholes resulted in unmonitored groundwater exploitation, increased pressure on rangelands, overgrazing, soil degradation and loss of adaptive farming practices. In terms of social sustainability criteria, borehole provision did not generally perform well. Rights over resources were not well defined and people were not empowered to maintain, manage and be responsible for the waterpoint. Borehole provision programmes were not usually cognisant of the social structures and practices into which a borehole was placed. Criticisms in terms of economic sustainability related to overall loss in productivity due to land degradation, as well as to the more immediate economic implications of operating and maintaining boreholes. Appropriate technology was highlighted as a key factor for economic sustainability. For example, in some areas, given the capital expenditure, maintenance costs, repair costs and likelihood of damage by elephants, those boreholes fitted with solar powered pumps proved to be the most cost effective and could, therefore, be described as an appropriate technology (ENGEO, 1997).

5.1.5 Sustainable development and environmental management

The final 'product' in terms of sustainability is influenced by a myriad of decisions and constraints at different levels and in different sectors, and therefore presents itself as a complex problem. However, it is argued that the key, which will unlock the path towards sustainability in borehole supply in rural areas, will be the implementation of an environmental management system for boreholes which incorporates the four sustainability principles highlighted by Colchester. This will empower people in all related aspects and ramifications of resource management - including empowerment to define the development agenda.

It is argued, therefore, that from the point of view of an outsider in the process of designing a model for sustainable development of boreholes, it is

inappropriate for the model to assume, either explicitly or implicitly, a particular view on what defines development. To overcome this potential impasse and promote genuinely sustainable development, the locus of power to define development within the model, needs to be transferred to the community. Thus, a locally appropriate and locally supported concept of development may be obtained.

5.2 Local people and indigenous knowledge

'First indigenous people are the sole guardians of vast, little disturbed habitats that modern societies depend on more than they may realise - to regulate water cycles, maintain the stability of the climate and provide valuable plants, animals and genes. Their homelands may harbour more endangered plant and animal species than all the world's nature reserves. Second, they possess, in their ecological knowledge, an asset of incalculable value: a map to the biological diversity of the earth on which all life depends. Encoded in indigenous, languages, customs and practices may be as much understanding of nature as is stored in the libraries of modern science.'

(Durning, 1992:6-7)

Although this quote may contain a slightly condescending tone, it indicates a significant change in development thinking.

The role of indigenous people in the attainment of sustainable development has been repeatedly emphasised. Agenda 21 devotes an entire chapter (chapter 26) to highlighting the role and the importance of the knowledge base held by indigenous people. Agenda 21 prioritises the empowerment of indigenous people and the importance of indigenous knowledge in local resource management. (UNCED, 1992)

Indigenous communities often have a long history and relationship with the land. An appreciation for sustainable resource use has been gained, often by necessity, over generations of dependency on these natural resources. Natural resource management may be effected through a range of traditional customs, laws, practices and/or religious observance (Van Der Zwaag, 1995; UNCED, 1992).

It would be naive or simplistic to argue that indigenous people inevitably have a more sophisticated conservation ethic. It is easy to romanticise the environmental ethos of indigenous communities. While indigenous knowledge may have often synchronised with the environment in the past, there is also a possibility that it can be detrimental to the environment and may have changed with the many shifts in politics, demographics and economics which have influenced these communities (Reilly, 1992).

Notwithstanding the fact that successful indigenous resource management systems may not be ubiquitous, several good reasons exist for this emphasis on the importance of indigenous and 'local' knowledge.

The first, and most compelling reason, is that indigenous communities have often had a long history of successful local resource management. Resource management requires an in-depth knowledge of the local environment, conditions and ecosystem. Indigenous people often have extensive knowledge of local wildlife, local ecosystems and adaptive farming strategies appropriate for the local environment which they have accumulated over many generations, through trial and error and intimate association with the land.

Most of the world's biodiversity and the fate of many ecosystems is in the hands of indigenous rural communities. In the final analysis, the custodians of biodiversity are often the local communities. There are approximately 8000 protected land areas in the world (Western and Wright, 1994). These represent merely 4% of the earth's surface (*ibid.*). A significant proportion of the earth's natural resources, especially in terms of biodiversity, are, therefore, in the *de facto* management of rural and indigenous people.

As indigenous people are the *de facto* managers of most of the earth's resources, their role is pivotal in sustainable management and should not be undermined by ill-advised, externally imposed projects, policies or legislation which compromise the efficacy of sustainable local resource management.

From the pragmatic point of view, indigenous people or local people are often in the best position to oversee the implementation of practices and laws which promote sustainable development. Furthermore indigenous people and local communities are, as in Namibia, often directly dependent on the resource base and, therefore, have a significant vested interest in the maintenance of environmental integrity through the implementation of sustainable practices.

Because of these factors, resource management plans should be designed by local people or at least be compatible with the traditional practices of those people who will, in the final analysis, determine their success or failure.

If the implementation of sustainable development is not cognisant of, sensitive to, or perhaps entirely based on the practices, traditions and knowledge of local and indigenous people it is unlikely to be embraced by those who will determine its success or failure.

Finally and as discussed previously, is the relevance and understanding that indigenous knowledge brings to development and sustainable development. The development agenda has always been dogged with debate concerning the definition of development. Much of the problem stems from the fact that development is very much a western concept and although the development project has changed substantially over the years, it remains in danger of imposing foreign ideals, values and objectives onto local people and cultures.

However, giving indigenous people and indigenous knowledge a pivotal position in the local development agenda, legitimises indigenous knowledge systems and, therefore, empowers these communities to define their own

needs and aspirations in terms of development and what form development should assume (Singh and Titi, 1995; Dei, 1995). In many ways this would enable indigenous people to 'reclaim the commons'.

In the past, indigenous knowledge has often been ignored and deemed unscientific. Foreign 'experts' frequently devalue local knowledge (Redclift, 1992). The result is that local people may often feel disempowered by the foreign expert, imposed development programmes and national policies and laws that do not take cognisance of indigenous knowledge and local aspirations.

Ironically, in many instances outside 'scientific' knowledge and research may be of little relevance to the livelihoods of local communities and local conditions. Solutions to environmental problems are unlikely to be found in 'internationally defined environmental technologies' and a 'grand crusade of environmental protection,' but more likely to be found in the arena of local communities and local knowledge, as communities struggle with contextually specific environmental and livelihood issues (Amanor, 1994).

The growing awareness of the importance of indigenous, traditional and local knowledge has allowed communities to appreciate their own knowledge base (Harsch, 1995). Consequently, communities are often in a position now to choose between modern and traditional knowledge. The result in many cases has been that communities are able to mix both forms of knowledge, thus combining a legacy of experience on the land with opportunities and insights provided by western science (*ibid.*).

Thus, for example, if communities were in a position to decide on the siting of boreholes, they could contract in the expertise of geohydrologists as they deemed necessary. The result could be an optimum outcome obtained from an integration of an in-depth knowledge of local conditions and needs, and the services of the science of geohydrology. The definition of optimum might not be unifactorial, such as the best geohydrological siting, but may be multifactorial - a siting that best fits the array of community needs, local conditions and geohydrological considerations.

However, before such integration of knowledge with resource management occurs, the appropriate framework for meaningful participation and empowerment of local communities in resource planning and management must first be in place (Vivian, 1992).

5.3 Community participation

In view of the foregoing discussion, the effective participation of local and indigenous communities could be described as vital to successful and sustainable local resource management.

'Indigenous people and their communities, and other local communities, have a vital role in environmental management and development because of their

knowledge and traditional practices. States should recognise and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.'

Principle 22 - Rio Declaration on Environment and Development
(UNCED, 1992)

Community participation is now well recognised as vital to achieving sustainable development. Participation is a tool for empowerment and the establishment of democratic structures which are necessary for sustainable development. This view is supported by the 'African Charter for Popular Participation in Development' which was adopted by the Arusha Conference in Tanzania - a conference convened by the United Nations. This charter identifies the prime reason for Africa's economic, social and environmental decline as the lack of democracy and participation in decision-making (Singh and Titi, 1995). Participation, therefore, is a key to facilitating development which is environmentally, socially and economically sustainable (Singh and Titi, 1995).

What is not yet clear, is exactly what form this participation should take (Ghai and Vivian, 1992). Furthermore the literature on sustainable development and participation is dominated by debate concerning people's lack of participation in environmental problems, rather than emphasising local knowledge and local initiatives as the solutions to environmental problems (Ghai and Vivian, 1992).

Thus, community participation, as implied in the term 'participation', has been an 'add-on' - an opportunity allowing communities to be involved in the development process. This type of participation has occurred rather than a participation where communities define the process itself, and other actors are the participators in the community defined process.

Thus development workers and development projects may sideline indigenous knowledge to a participatory role in the externally defined project (Redclift, 1992) - a state which is not empowering or an optimum level of participation. The locus of control for the development project and the definition of development remains external to the affected community.

World Conservation strategy for the 1990's, contends that local communities should be able to define their own sustainable development strategy. They should be able to express their own needs and aspirations, and formulate a plan to achieve their community defined social, economic and environmental objectives (IUCN, 1989, cited in Redclift, 1992). This extends the definition of community involvement, in line with the development of this discussion, from mere participation to community self-determination.

5.4 Community co-management of communal resources

In the context of communal land tenure and communal resources, community co-management is, therefore, increasingly being seen as the method of choice to achieve full and significant community participation and, thus, the effective inclusion of local and indigenous knowledge into resource management.

There is a trend in development thinking to decentralise power and devolve responsibilities to communities. It allows communities to 'reclaim the commons' and regain what was lost in colonialisation. In so doing, community organisation and capacity should be strengthened (UNCED, 1992). This is reinforced in Agenda 21 by the pervasive theme of adopting a 'bottom-up' approach to development planning. In contrast to the centralised, 'top-down' approach, which is seldom cognisant of local knowledge and diversity of local conditions, a 'bottom-up' approach allows communities to have a much greater sway in resource decisions and resource management practices which directly affect them.

'Not all bottom-up projects based on community participation succeed, but almost all top-down projects that exclude community involvement fail.'

(Strum, 1994:513)

5.4.1 Locus of control

Historically, in regard to communal resources, there have been two modes of resource management defined by the locus of control - local-level resource management and government-level resource management (Berkes, 1995).

Local-level resource management is well established and has been the usual mode of resource management for millennia. These resource management systems may be based on traditions, custom, religious practice, social mores or simply practices and knowledge gained from trial and error.

As discussed previously, there are good pragmatic reasons for local resource management:

- local people are familiar with local conditions;
- local people have a deep appreciation for the social, economic, ecological and cultural context of management;
- local people are the *de facto* custodians of areas which, in developing countries, are often beyond the effective reach of government administration;
- local people have a vested interest - often as important as their very livelihood - in the success of local resource management.

(Berkes, 1995; Metcalfe, 1994)

Government-level resource management, on the other hand, has only been widespread since the middle of the twentieth century (Berkes, 1995).

Government-level resource management, on the other hand, has only been widespread since the middle of the twentieth century (Berkes, 1995). Government systems tend to be monolithic and totalising in approach. There is a tendency to use 'universal scientific' information and management regimes and apply these across the board to all local contexts, giving no cognisance to local diversity. The result is often a management regime inappropriate for the local conditions and the displacement of successful local management systems along with the diversity and adaptability inherent in these systems (Zazueta, 1995).

Moreover, powerful state and private development interests may also act to weaken or displace indigenous resource management schemes (Ghai, 1994). This has also been termed 'enclosure of the commons' as a result of what could be viewed as colonisation by the western economic and developmental paradigm (Ecologist, 1993).

Furthermore, centralised, 'scientific' approaches are also less likely to be open to learning from the local level systems of resource management and local knowledge base (Berkes, 1995). The overall result, therefore, may be a net loss of local knowledge.

5.4.2 Community co-management

Nevertheless, government in the contemporary state orientated political order, does also undoubtedly have responsibilities to promote national interests, ensure equity between resource users and ensure sustainable use of resources for the benefit of the nation as a whole.

Community co-management is not a rigidly defined term, but essentially denotes the sharing of power and responsibility for management between the government and the community through various levels of integration of the local-level and the government-level of management.

This may range, however, from tokenism on the part of the government, to full empowerment of the community to make decisions and be partners in the management team. Figure 5.1 describes several levels of community involvement as rungs of a ladder.

It is contended on the basis of the foregoing discussion, that co-management is only effective where there is significant and meaningful devolution of power as defined by level 7 on this ladder of participation - '*Community control and partnership.*'

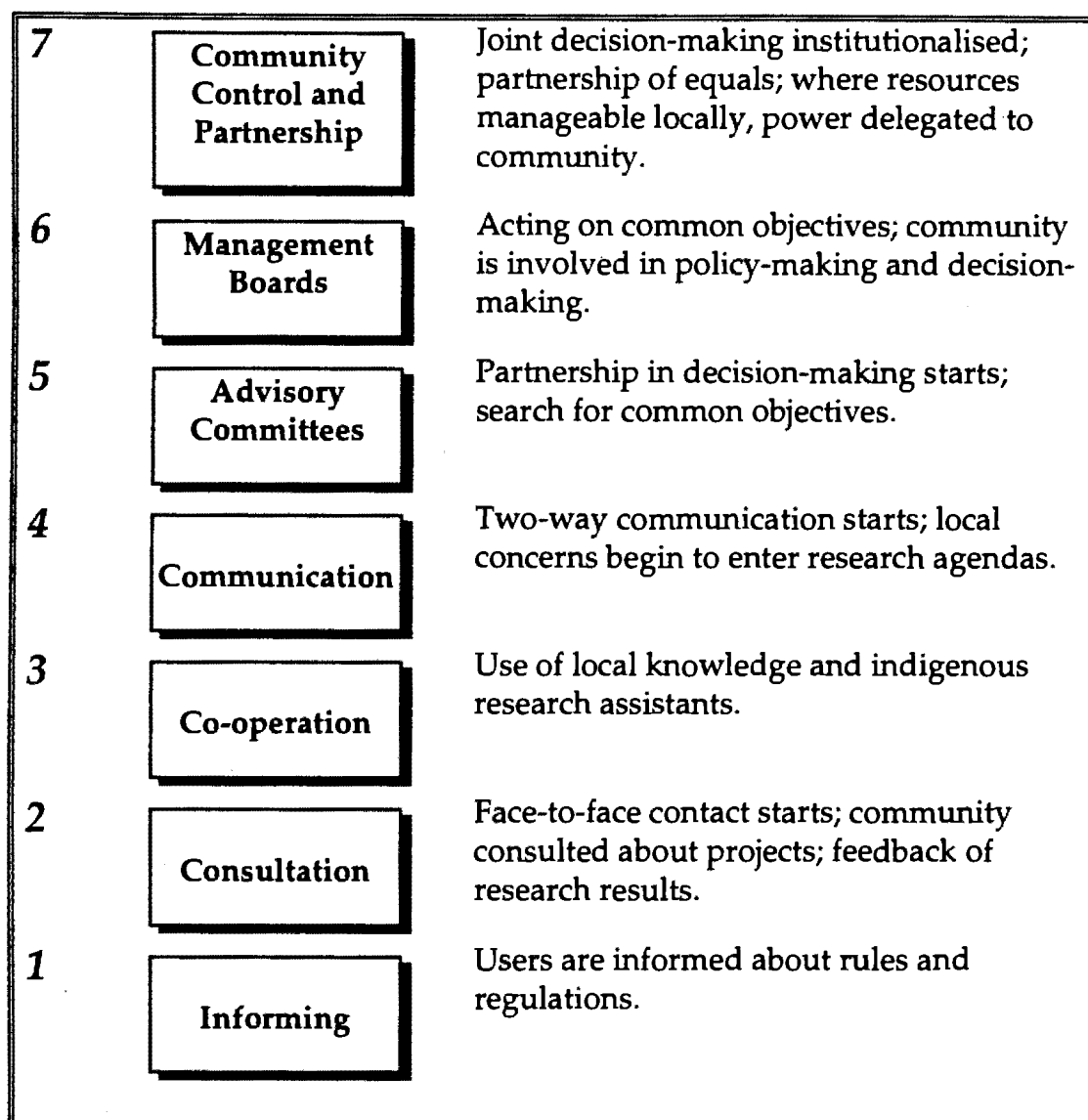


Figure 5.1: Levels of community involvement leading to co-management (source: Berkes, George and Preston, 1991, cited in Berkes, 1995)

Effective community co-management requires effective government participation in the process of development and resource management.

The role of the government is to ensure that national legislation and policies work to facilitate and not frustrate local resource management schemes.

In co-management it is recognised that government and community are partners in resource management. The partnership is characterised by a mutual dependence - each party needs the other and each party has a valuable contribution to make to the partnership.

Government is dependent on local-level management for:

- including an understanding of local needs, aspirations and conditions in management decisions;
- including indigenous and local knowledge in the information base informing management;
- day to day custodianship of resources and implementation of environmental management plans;
- day to day resource and environmental monitoring.

Local management systems need government as a partner because:

- local management systems need to be enabled by legislation;
- government is in a position to see the 'bigger picture' of national issues - be they economic needs and trends, environmental problems such as desertification or other elements which have a bearing on local activity;
- government has the responsibility of co-ordinating with other national interests and other citizens' interests;
- national policy will influence local management - government needs to be informed by local-level management so that national policy can be designed to assist and not frustrate local initiatives;
- local-level management may benefit from input of scientific knowledge as much as government needs the input of local knowledge.

Thus co-management is a resolution of the conflict which may arise where the two levels of management meet. The outcome is mutually beneficial and can result in a more effective management system and one which is more appropriate and sustainable.

Co-management is also political - it in many ways addresses imbalance of power between central government and local communities. It may also provide better economic returns through improved management of the resource and, therefore, a degree of economic autonomy for local communities - depending on the nature and extent of the resources involved.

The exact level of local management may be variable. The trend, according to the subsidiarity principle of sustainable development, is to be as local as possible - the smallest unit of proprietorship (Metcalf, 1994; Dommen, 1993). However, it must be recognised that the 'most local institution' may not always be ideal and this must be judged according to the nature of the resource and the aims of resource management (Westem and Wright, 1994). The 'local-level' may, therefore, be a household where the resource is, for example a borehole. It may range through village level to a larger community level, or to a local district level where the resource is a wide ranging wildlife population.

Local resource management should be based on and strengthen these existing community level organisations and institutions rather than create new ones (Western and Wright, 1994).

Wright summarises the notion of co-management:

'Governments may retain some rights or demand responsibilities when devolving tenurial rights. Co-management limitations balance the immediate needs of resource owners with the longer term societal interest in maintenance of resources. Co-management should be introduced with procedural safeguards and remain subject to periodic review.'

(Western and Wright, 1994:528)

In elaborating the concept of co-management of natural resources and the concept of sustainable development, several terms which have arisen thus far, and additional concepts, should be explored further.

5.5 Subsidiarity principle

In support of the foregoing discussion, and promoting the devolution of management rights and responsibilities to local communities, is the subsidiarity principle of sustainable development. The subsidiarity principle has become an important concept in sustainable development literature and practice (Dommen, 1993).

The essence of the subsidiarity principle is that management decisions should be taken at the lowest, most local level possible. In co-management systems this has been referred to as the 'smallest unit of proprietorship' (Metcalf, 1994).

It is a principle which is rooted in the European Community and underpinned by the Treaty of Maastricht. It suggests that better political decisions are taken if they are taken 'closer' to the individual citizen. Not only is this more compatible with the democratic process, but it is also, arguably, more efficient and effective than where decision-making is centralised (Bothe, 1993).

The subsidiarity principle is one which is increasingly being recognised as an important concept in sustainable development (Dommen, 1993). It is supported by the Rio declaration. Principle 10 of the Rio declaration states that 'environmental issues are best handled with the participation of all citizens, at the relevant level' (UNCED, 1992).

The community co-management approach is in accord with this principle by devolving the locus of control and management to the community level.

5.6 Equity

Sustainable development implies equity and social justice. It not only addresses the question of the needs of future generations, and in so doing addresses the question of intergenerational equity but also challenges structures and systems which unevenly distribute costs and benefits of development activity.

Development, in the conventional use of the term, is seldom a fair and equitable process benefiting all individuals and sectors equally. Conventional development activities which contribute to raised living standards, better education and health may also entrench inequality, result in unequal distribution of benefits, polarise communities along an axis of wealth, marginalise communities and impoverish communities, thus, contributing to environmental degradation and an unsustainable socio-economic environment (Seabrook, 1993; Ghai, 1994; Colchester, 1994; Gadgil and Guha, 1994). Furthermore, in this context, development is often characterised by appropriation of resources (Colchester, 1994).

The attainment of sustainability in development is, thus, intimately linked with social justice and equity. This is increasingly clear as sustainable development is broadly defined to address the whole spectrum of social, economic, political and spiritual needs of a community, rather than one aspect such as sustainable economic growth. The prerequisites of equity and social justice are axiomatic in such an inclusive and holistic conceptualisation of sustainable development.

Many of the complexities involved in the term 'sustainable development' centre on issues of equity. Equity in sustainability addresses such issues as rights of access to resources, access to employment, livelihoods based on fair resource use, property rights, political power and the level of empowerment of local communities to access, use and manage resources (Ghai, 1994).

Equity, therefore, is multi-faceted and like the term 'sustainable development' includes many conventional sectors - economic and financial equity, social equity, political equity and equity of power, gender equity, equity in access to information, equity of opportunity and intergenerational equity - to list a few.

While many governments and development projects may genuinely aim for equity and social justice in development, the policies and mechanisms to achieve equity are difficult to implement (Singh and Titi, 1995).

It is suggested that as sustainability and equity are so intimately related, the attainment of equity, like sustainability, will most likely be achieved through adoption of the previously discussed principles of community empowerment - empowerment to define and implement a locally accurate concept of development. As with sustainable development, community empowerment may be the key to implement the concepts and praxis of equity.

As those in power tend to promote self interest and thus, decrease equity, empowerment of those historically disempowered is likely to level the playing fields and contribute towards equity. Empowerment, therefore is a long slow process of communities, households and individuals building up self respect, trusting in their own ability and developing new skills (Titi and Singh, 1995).

Equity is, therefore, intimately entwined in the definition of development if development is conceptualised in a manner which highlights improvement or 'betterment'.

5.7 Informed decision-making

Informed decision-making at first appears to be an objective term - a means to attain objectivity in decision-making. However, informed decision-making has often been a concept emphasised in environmental assessment and management models. This has usually implied the full use and application of scientific and economic expertise to the environmental issue in question. To a lesser extent it has included the social and political sciences, and to a lesser extent than that, the voice of the public. Thus the 'objective decision' has already been determined by the type of knowledge which has been sought to create the information base. It should be recognised, in this respect, that EIA is not objective and that it merely presents the logical conclusion of the knowledge and developmental paradigm on which it is based (Beattie, 1995).

In the model of community co-management which devolves the locus of power and decision-making to the community, informed decision-making is re-defined. The starting point is not scientific expertise but local knowledge, and appreciation of the complexities of the local social, economic and biophysical environment. Expert knowledge is community knowledge and scientific expertise may be drawn into the equation to provide the database for informed decision-making. Decision in co-management, like any decision in EIA, may not be objective. It does not, however, purport objectivity. It is subjective - but based on a community determined bias and with community objectives as an emphasis.

5.8 Broad definition of environment

From the foregoing discussion on sustainable development, it is evident that the definition of 'environment' can not be limited to one or a few aspects such as the physical environment or biophysical environment. It is increasingly clear that 'environment', in the framework of sustainable development, must embrace a definition that is inclusive of the total human environment. Chapter 8 of Agenda 21 states that the artificial separation or compartmentalisation of economic, social and biophysical issues is an obstacle for sustainable development (UNCED, 1992).

In coherence with the foregoing discussion, the term environment must be assumed to mean the 'total human habitat' or the sum total of the full spectrum of biophysical, social, cultural, political, spiritual, economic and material attributes that affect human existence.

The advantage of the themes developing in this chapter, is that it is not necessary for the outsider to determine what environment should mean. The best definition is one that is pursued by the community. By giving the community the power to define the development agenda and to define the understanding of the environment, it is suggested that the most suitable context for sustainable development is established.

5.9 Macro-coherency and micro-coherency

Utting (Utting, 1994) describes two fundamental problems with integrating environment and development. Firstly, the difficulty in locating environmental protection initiatives in the broader development framework and, secondly, the difficulty in integrating environmental protection with the priorities, aspirations, needs and rights of local people. Utting characterises these two problems in development and environmental management as 'macro-coherency' and 'micro-coherency' - representing the overall project of development and environment and local level needs, respectively.

It is argued that through full participation and empowerment of local people to define the development agenda and manage resources according to local needs and knowledge, a more sustainable use of resources would result. Not only would a locally accurate and appropriate definition of development and a system of resource management be more attainable, but there would be a local motivation and self interest to implement the system.

Utting, however, also warns against 'romanticising the possibilities for empowerment and participation, given the constraints arising from inegalitarian local structures, co-optation, and on-going opposition by powerful vested interests' (Utting, 1994:257).

This highlights the need for the role of national government in local resource management. This role is not one of prescriptive, 'top-down' administration but one of empowerment of local structures, guidance in terms of overall objectives and national objectives and referee or auditor of local management. Thus, the model of co-management and partnership in resource management would appear to be an ideal articulation of government-level and local-level management. The co-management framework capitalises on the strengths of each party and compensates for the weaknesses and limitations of each party.

This concept of macro-coherency and micro-coherency in co-management is depicted in Figure 5.2.

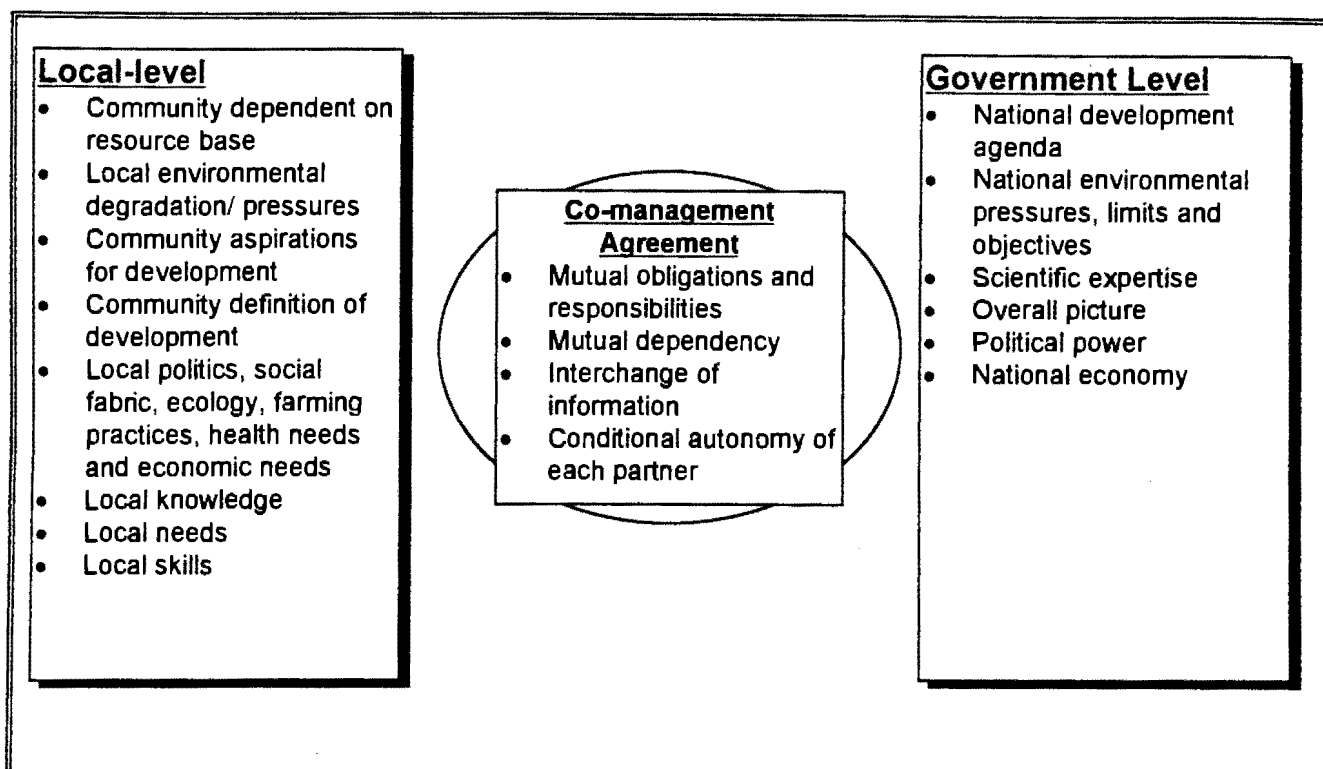


Figure 5.2: Micro-coherency, macro-coherency and articulation between local-level management and government-level management through a co-management agreement

Co-management of resources, therefore, has the potential to achieve three objectives:

1. coherency of resource management, environmental protection and development at the local level;
2. coherency at the macro-level of national environmental and development objectives;
3. a dynamic, constructive, fair, mutually acceptable and beneficial articulation between the local-level and the national level - a link which harmonises local management with national policy and planning, and *vice versa*.

It is contended, therefore, that community co-management is an effective mechanism to achieve this macro-coherency and micro-coherency by fulfilling and co-ordinating local and national development and environmental objectives.

5.10 Conclusion

'The environment is where we live; and development is what we all do. The two are inseparable.'

(WCED, 1987:xi)

Although these words of Gro Brundtland in *Our Common Future* were written primarily in the context of first world development, they may be re-interpreted in the light of the foregoing discussion and the development context of rural Namibia.

In communal areas in Namibia, environment is not only where people live but it is on what they depend for their livelihoods and very existence. Development is what the community chooses to do. It is not the imposition of an externally defined development programme but the self-motivated, locally-defined activities of the community. The attainment of sustainable development in this context is possible through respect for the sustainable development criteria.

The co-management framework encapsulates the four sustainable development principles outlined by Colchester and, therefore, creates a supportive climate for sustainable development.

- 1. Basic needs of local communities must be met;**
- 2. Natural resources should be subject to local control;**
- 3. Local communities must have a decisive voice in planning;**
- 4. Local communities should represent themselves in and through their own institutions.**

(Colchester, 1994).

Co-management inevitably includes a broad definition of environment - as defined by local conceptualisation and dependency on the environment. Co-management resolves to some extent the dilemma of development and its definition. It allows an opportunity for a holistic and locally appropriate definition of development by prioritising the community conceptualisation of what constitutes 'betterment'.

Co-management addresses the questions of equity through devolution of power to the local level and oversight of power at the local level. Co-management allows for use, preservation and implementation of local knowledge as well as the benefits of scientific knowledge.

Most importantly, co-management reclaims the development agenda from foreign interests and places it in the hands of a consensus between local community and national government. It redefines who plays the lead roles in development and conservation and who are the 'add-on' participators.

It has been stated (Ecologist, 1993) that causes of accelerating environmental degradation include the pervasive economic and political regimes which

continually 'enclose the commons'. This refers to the process where local people are denied control over, and use of, their own resources, as land and resources are privatised, 'developed' and exploited. It is a process which further and further removes the locus of control and decision-making away from the local community. In addressing this issue, and in the interests of development which is genuinely development and truly sustainable, it is necessary for local communities to regain this locus of control and implant it firmly within the community.

In Namibia, the CBNRM programme is implementing co-management for the resource of wildlife. It is contended that a co-management system would be central to a successful model to manage the resource of groundwater. This would perhaps, eventually contribute to a suitable community co-management system for all natural resources.

6. Integrated Environmental Management (IEM) in South Africa

This chapter examines the process of environmental assessment and management in South Africa - a process called Integrated Environmental Management (IEM).

IEM, which was formulated in the context of a developing country, has unique aspects and approaches which make it a valuable tool for EIA in the developing world. IEM, therefore, contains important principles and conceptual underpinnings that are of direct relevance to the task of designing a model for environmental assessment and management of small projects in the developing world. The strengths and weaknesses of IEM and its applicability to the sustainable development dilemma of boreholes in rural Namibia will be discussed in the light of the discussion of sustainable development in the preceding chapter.

The first part of the chapter provides a overview of IEM based on information from several sources (Fuggle, 1995; Fuggle and Rabie, 1994; DEA, 1992; Sowman *et al*, 1995).

The second part of the chapter presents a critique of IEM in the context of this dissertation.

6.1 Relevance of IEM to the model

As discussed previously, EIA developed in the context of developed countries, in response to environmental issues and challenges in a developed country. EIA was exported to developing countries and this was noted as a problem in that EIA was not always suitable for the environmental and developmental context of developing countries.

South Africa, however, did not simply import existing EIA procedure but developed its own environmental assessment process, *ab initio*. IEM should, therefore, provide insights in surmounting the problems associated with applying EIA to the environmental issues and context of the developing world.

IEM is a useful starting point, therefore, to begin to understand the complexities involved in EIA, development and environmental protection in developing countries.

Furthermore, Namibia EIA policy and process was developed in close consultation with IEM experts from South Africa (Glazewski and Tarr, 1996). Understanding IEM, therefore, is important to understanding EIA policy and process in Namibia.

6.2 History of IEM

South Africa developed its EIA procedures at a time in its history when it was, in many ways, isolated from the mainstream of international thought. Furthermore, due to sanctions it was spared the imposition of EIA procedures from industrialised countries as was frequently implicit in foreign development funding. It was forced, therefore, to develop its own indigenous EIA procedure from first principles, and not merely transplant an EIA process from a first world context. Thus, IEM procedure claims to be specifically designed around the needs, constraints, realities and political discourse of a developing country - South Africa (Fuggle, 1995).

Fuggle (1995) lists some of the features, difficulties and constraints of the context in which IEM developed - characteristics which are common to many developing countries.

The overriding feature which set South Africa apart from developed countries was that it was a non-democratic society. Thus, EIA practice could not simply be adopted, *in toto*, as it assumes principles of democracy such as representative government, freedom of expression, access to information and accountability of decision-makers to the public. Furthermore, South African society was traditionally highly authoritative and decisions of leaders and other authorities were not easily or willingly questioned. Consequently, the public was not significantly involved in governance and under apartheid policy, the vast majority of the public were totally excluded from the decision-making process. It is also suggested that decisions followed a technocratic bias with little input from the social sciences. (Fuggle, 1995)

To compound this picture, South Africa, like most developing countries, has a low literacy rate which further disempowers and potentially excludes from decision-making a large proportion of the population. This would make standard EIA procedures, which generally rely on an informed, literate, participatory public, an unsuitable proposition.

Lastly, while EIA in developed countries may be primarily aimed at stopping development with negative environmental impacts it may be argued that in a developing country where a significant proportion of the population are still trying to meet basic needs, the emphasis must be different. Development is seen as essential and vital to stimulate economic growth, alleviate poverty and raise standards of education, health and living. As poverty is posed as a main contributor to environmental degradation, environmental protection cannot be achieved in isolation from development activities. This is a basic premise of IEM.

A central tenet of IEM, therefore, is that development needs to be encouraged and prevail, but also be guided in terms of environmental considerations.

'The starting point for IEM is not environmental protection per se but regulated environmental use to meet set goals. This is a different point of departure from that of the industrialised world. The implication is that from the outset the purpose of environmental assessment carried out within IEM is to enhance plans or projects, to suggest ways in which environmental effects can be mitigated, and to ensure that no person or group is worse off after completion of the plan or project than they were before it was initiated. IEM seeks to modify and improve activities, it does not set out to stop them.'

(Fuggle, 1995:6)

6.3 Conceptual underpinnings and principles of IEM

IEM, therefore, differs in ideological and practical approach from most EIA procedures of developed countries. Many of the principles of IEM are being increasingly represented in EIA procedure as it is adapted and modified to be relevant to developing countries. However, these conceptual underpinnings and principles have been central to IEM, *ab initio*, since it was formulated in the late 1980's.

Environmental management suitable for a developing country

'The starting point for IEM is not environmental protection per se but regulated environmental use to meet set goals.'

(Fuggle, 1995:6)

IEM is not primarily designed to stop development as development is viewed as important, not only from the social aspect of improving quality of life and attaining social upliftment, but also as a means of preventing environmental degradation which may be associated with poverty and disempowerment.

The primary aim of IEM, therefore, is to assist, guide and direct development by choosing the best development alternatives, mitigating negative environmental impacts and enhancing positive environmental impacts, so that all parties involved can benefit from development and with the least possible detriment to the environment. The environment is not romanticised, but is viewed as an exploitable resource which must be used and managed.

IEM, thus, endeavours to address and resolve the tensions between development and environmental protection, recognising the need for both in the context of a developing country.

Enhancement of positive and mitigation of negative impacts

In addressing the tensions between environmental protection and development, IEM does not set out to stop the development project, but to allow it to be implemented in an environmentally sound manner. To achieve this, IEM aims not only to mitigate the negative impacts of development, but to capitalise on its positive impacts and enhance these to achieve a better outcome.

A holistic approach

IEM recognises that development, and consequently, impact assessment are activities that, because of their nature, can not be analysed and evaluated in a reductionist or sectoral manner. Development affects all facets of the biophysical and human environment and thus, must be planned in a holistic manner. This necessitates a multi-disciplinary forum for environmental assessment.

A broad definition of the term 'Environment'

Given the above point, the term 'environment' is used in a broad, inclusive sense. In IEM the term 'environment' refers to the 'total human habitat'. This endorses a holistic and inclusive approach to environmental assessment which embraces all aspects of the human environment: the biophysical, ecological, economic, historical, cultural, spiritual and social environment.

Informed decision-making

IEM emphasises the importance of a full understanding of all the implications of a decision on the environment. This can only be achieved through the combination of full public participation and specialist input in the process. Thus, all issues of public concern may be addressed, and the public may have access to, or highlight the need for, relevant specialist studies. All of this will contribute to the decision-making process. By including public involvement and specialist studies, IEM aims to attain a well-informed decision as a product of the process.

Public participation

Not only are better decisions produced with the input and assistance of the public, but decisions are likely to be more acceptable to the public who have 'ownership' of the process and contribute to the end decision, rather than having decisions made for them and being excluded from the decision-making process. The sense of 'ownership' is enhanced by the degree of influence the public may have in the actual planning and design stage of a project. Public opinion is, therefore, not limited to a reactionary protest role.

Empowering communities

IEM developed in a context where the majority of the population were fighting for democratic rights - for their voice to be heard. IEM, therefore, aims to be a means of empowerment by allowing full citizen participation in the decision-making process. It aims to empower people by being inclusive and making sure all voices are heard. The style of public participation is one of active engagement of those interested and affected parties. Public participation techniques must ensure the public - and all sectors of the public - are heard. Given the history and context of South Africa, this necessitates actively

overcoming logistical, political, educational, economic and social impediments to full public participation.

Recognition of the capacity of the public to exercise choice

Likewise, in response to the perception that South Africa was largely an authoritarian society, IEM recognises the capacity of the public to exercise choice and to play an important role in decision-making where these decisions affect them. It thus specifically promotes democratic principles and enhances democratic decision-making.

Capacity building

However, in a society with low levels of literacy, often limited access to education and historically largely unaccustomed to challenging authority and being involved and consulted in decision-making, it is recognised that a significant part of the IEM process itself includes capacity building and the development of skills so that those affected are able to meaningfully participate in the process.

Methods of public participation and procedures of EIA, used in developed countries with high levels of literacy and a population familiar with and able to use the democratic process to direct elected leaders, are often inappropriate in this context. Thus, IEM does not only have to modify methods to ensure full public participation, but also has to play a role in contributing towards people's ability to participate, be heard and see their concerns given appropriate democratic consideration.

Access to information

To achieve the above in a society which was non-democratic, IEM committed itself to freedom of access to information. In deliberate reaction to a system of governance which denied free access to information, IEM emphasised access to information as part of the environmental assessment process. Although, this aspect has changed with political changes in South Africa, IEM still highlights the need for free access to information.

Accountability for decisions and transparency of the decision process

Thus in many ways, IEM was formed as a useful process contributing to the development of democracy and responsible government. It was, therefore, particularly important for IEM to require decision-makers to be accountable to the public for decisions. Consequently, the process now used is open and transparent and decision-makers are required to be accountable for decisions and keep records of decision for public scrutiny.

Democratic regard for individual rights and obligations

In its commitment to democracy, IEM emphasises the need to uphold those rights of individuals and corporations that exist in a democracy. These would include, *inter alia*, development rights, mineral rights, abstraction rights and also rights of society to a healthy and safe environment. Thus, it is often involved in the process of conflict resolution where there is conflict of such rights.

A 'cradle to grave' process

IEM is a flexible, interactive process which guides and modifies a development proposal from 'cradle to grave'. It is pro-active in influencing the development of a proposal from early project design rather than being reactive - attempting to stop or modify the finished product before implementation.

Consideration of alternatives

IEM requires due consideration to be given to all reasonable alternatives. This is an aspect that must be considered from the beginning of project design in order that the whole assessment process may be streamlined. Although IEM is primarily designed to achieve development in the best environmental manner possible, the 'no go' alternative is also to be considered in the process.

Applicable to policies, programmes and projects

IEM is formulated as a process which can be applied to the policy and programme level and not only the individual project level. It is contended that many environmental issues such as dealing with cumulative impacts are best managed at policy level. DEA guidelines suggest that all plans, policies and projects are subject to the IEM procedure (DEA, 1992).

These are the principles on which IEM is based. They present a significant departure from conventional environmental assessment approaches as IEM addresses the priorities and obstacles of environmental assessment in a developing country. Thus, IEM claims to be tailor-made for the environment and development context of South Africa (Fuggle, 1995).

Although South Africa has become a democratic country and has officially instated many of the principles of democracy in recent years, many of these difficulties and constraints in EIA, discussed above, are still realities in South Africa and arguably, represent many of the characteristics of other developing countries (Fuggle, 1995).

6.4 The IEM process

The IEM procedure has been developed to incorporate the above principles and is summarised in Figure 6.1. It allows for all proposals to be formally assessed with respect to their potential environmental impacts and modified accordingly.

The procedure is divided into three stages:

1. Develop and Assess Proposal
2. Decision
3. Implementation

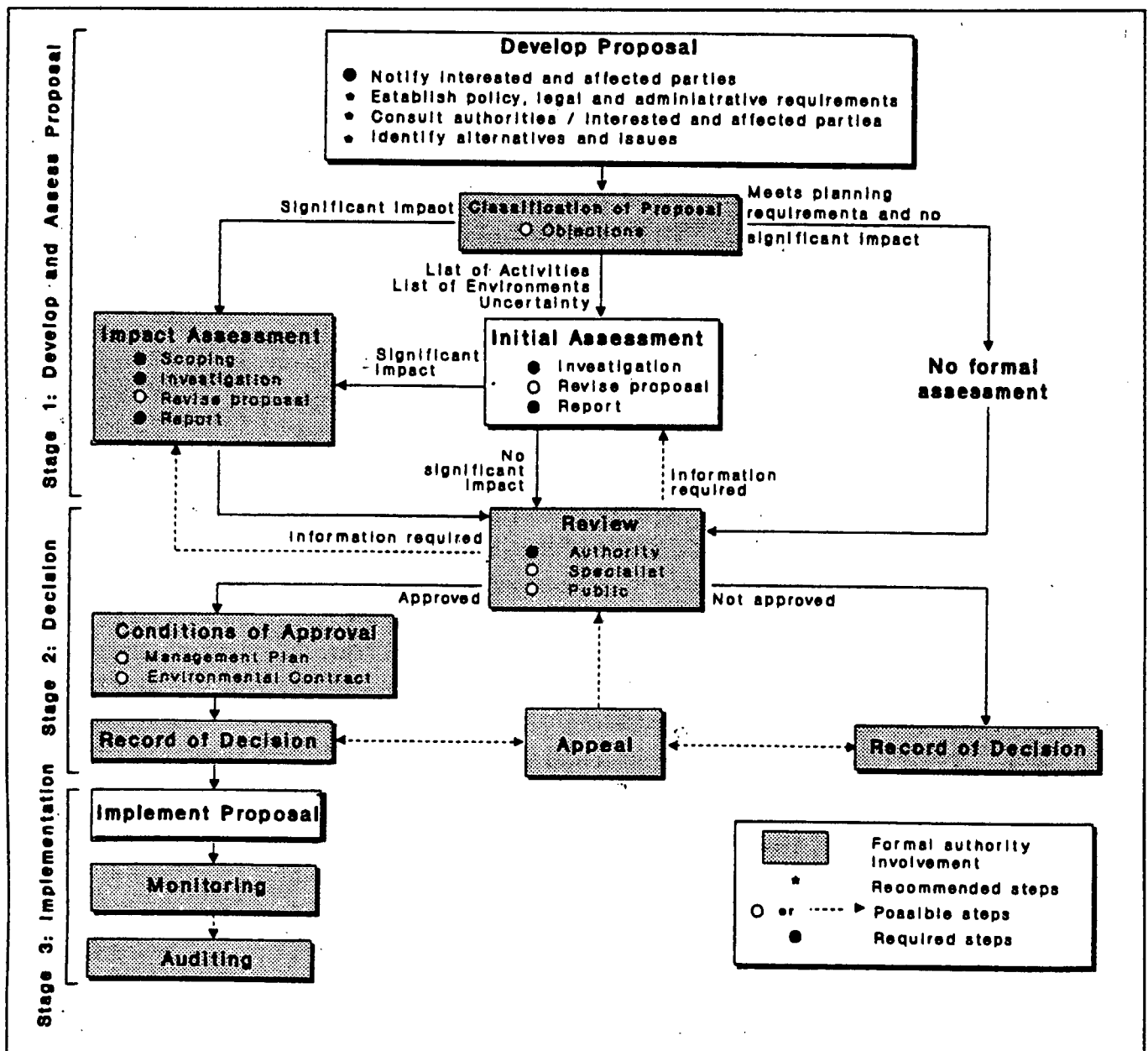


Figure 6.1: Schematic of the IEM procedure (reproduced from DEA, 1992)

6.4.1 'Develop and Assess Proposal'

IEM principles and environmental considerations direct the proposal from the planning stage rather than being applied retrospectively to a completed project proposal.

Right from the beginning IEM requires interested and affected parties (I&AP's) to be notified and recommends the environmental issues, impacts, mitigatory measures and alternatives be considered. The next step in this stage is classification of the proposal in consultation with the relevant authority. The proposal may fall into one of three categories:

- No formal assessment is required;
- An initial assessment is required;
- Full impact assessment is required.

'No formal assessment'

In the case where a proposal is not deemed to have significant environmental impacts, it may proceed for authority review. The DEA has published a '*Checklist of environmental characteristics*' to aid this decision. (See Table 6.1.)

The review authority may approve the proposal or request further information from an 'Initial Assessment'.

'Initial assessment'

If there is uncertainty as to whether a proposal will have significant impacts or further information is required, an initial assessment is undertaken. Likewise, if no significant impacts are expected but the proposal is a 'listed activity' or is proposed for a 'listed environment', an initial assessment is required. The purpose of the initial assessment is to provide just enough information to decide whether the proposal may be approved or proceed as it stands or whether it should undergo a full impact assessment. The proposal may be revised and modified at this stage so that a full assessment becomes unnecessary or it may be approved on certain conditions such as the adherence to an environmental management plan and/or environmental contract.

Thus a proposal with minimal environmental implications may be conditionally approved after minimal investigation provided that there is a system and structure for environmental management.

'Impact Assessment'

If it is obvious that the proposal will have significant impacts on the environment then a full EIA process is undertaken. Environmental assessment in the style of IEM involves a *scoping* phase which, through consultation with relevant authorities, the public and specialists will identify the issues and alternatives which should be investigated. The aim of scoping is thus to focus and streamline the investigation stage of the EIA. The *investigation* is thus directed by the scoping phase and will provide the

decision making authority with relevant information on positive and negative impacts, mitigatory measures and possible alternatives. The proposal may be revised in the process or design alternatives considered. The investigation will produce a *report* for the decision-making authority and for the public - the I & AP's.

6.4.2 'Decision Stage'

Decision will involve a relevant authority but will also be open to public and specialist review. The proposal may be refused, approved, need more investigation and information, need modifications before approval and/or be approved on certain conditions. As discussed earlier approval may require an *environmental management plan* and/or an *environmental contract*.

An *environmental management plan* may take many forms but will contain information such as how negative impacts will be mitigated, positive impacts maximised and enhanced, rehabilitation plans and environmental monitoring programmes implemented. The management plan may apply to all phases of construction, commissioning, operation and decommissioning.

An *environmental contract* may provide for financial penalties and bonuses for compliance and non-compliance with conditions of approval or conditions stipulated by the management plan.

These mechanisms which may be considered as environmental conditionalities of the project are crucial as they are a 'link' or channel which transfers the wisdom gained in the environmental assessment stage to environmental management of the project.

6.4.3 'Implementation'

The final stage is that of implementation of the project. This includes the implementation of the management plan and the environmental contract if these were conditions of approval. It may also include monitoring of certain environmental parameters or activities of the development. IEM also makes provision for periodic auditing of activities to check compliance and improve environmental performance where possible. IEM process, therefore, has a reasonably developed aspect of environmental management 'after decision'.

6.5 Discussion

6.5.1 'No Formal Assessment'

In structuring the process so that it is more streamlined and does not create an unnecessary administrative burden and incur unnecessary expense, a route for 'no formal assessment' has been defined.

If the proposal meets planning requirements and fulfils the standards of the '*List of environmental characteristics*' then the proposal may be forwarded directly for review. Review by authority will determine if the project may proceed or if it needs further investigation.

Thus, there is provision made for efficiently and effectively assessing small, low budget projects with no significant environmental impacts. This is an important facility of the process in the context of a developing country.

<p>1. Could the proposed development have a significant impact on, or be constrained by, any of the following?</p> <ul style="list-style-type: none"> a) Physical characteristics of the site and its surroundings b) Ecological characteristics of the site and its surroundings c) Current and potential land-use and landscape character d) Cultural resources e) Socio-economic characteristics of the affected public f) Infrastructure services g) Social and community services and facilities h) Levels of present and future environmental pollution i) Risk and hazard j) Health and safety k) Cumulative and synergistic effects
<p>2. Could the proposed development be modified to significantly enhance the positive aspects of points a - k above?</p>
<p>3. Finally, in the light of the foregoing questions, a judgement should be made as to how well the proposed development meets the following criteria:</p> <ul style="list-style-type: none"> a) Will the proposed development be efficient when all social costs are taken into account? b) Will the proposed development be fair in the way different groups and individuals are affected? c) Will the proposed development be sustainable and in the interests of future generations?

Table 6.1: Summary list of environmental characteristics
(reproduced from DEA, 1992)

6.5.2 IEM and the implementation phase

EIA has essentially been formulated to be a predictive exercise to allow decision-makers to reach better decisions. As such, environmental assessment has been successful over the last 25 years (Sadler, 1996). However, a key systematic weakness of EIA has been the failure of the information gained from the EIA process to be used beyond the decision phase and inform project implementation (Sadler, 1996).

In contrast to this, IEM emphasises the 'cradle to grave' approach to environmental assessment and management. Through the use of environmental contracts and environmental management plans as conditions of approval, it has achieved a degree of 'carry over' beyond the decision. This has been increasingly the case with more recent large scale projects in South Africa (Hill and Soboil, 1996).

However, even with IEM, disproportionately low emphasis on the management phase is noted in IEM guideline documents, with most of the emphasis being placed on the environmental assessment and 'pre-decision' stage (Hill, 1996).

6.6 Discussion and appraisal in terms of sustainable development and boreholes in Namibia

This section aims to review briefly the potential application of IEM to the issue of sustainable development and boreholes in Namibia. Significant by its absence in the literature on IEM, is penetrating critical analysis of the procedure. Given this paucity in the literature IEM is critiqued here from the perspective of the theoretical overview of chapters 4 and 5 and in its potential applicability to the context for which it was designed - addressing the environmental and development issues of a developing country. This should include the huge informal sector and community development sector which are typical of a developing country.

6.6.1 Overall philosophy of IEM

IEM marks a significant departure from EIA in terms of its overall approach to environment and development. It advocates that in its context of operation, development is necessary. It may, therefore, be viewed as a procedure which is able to address the tensions between environment and development and contribute towards the attainment of sustainable development.

However, it is suggested that the paradigm of approach of IEM is the dominant western developmental paradigm. Development is conceptualised as primarily technological and infrastructural progress, towards modernisation, resulting in social upliftment and alleviation of poverty. Thus, IEM is not only a naive product of its context of development but also the product of an interpretation of an appropriate development response to this context - a response based very much on the development values and ideals

of the western world, if not on the environmental and conservation attitudes and ideals of the western world.

This interpretation of development is not objective and is determined by prevailing political and economic discourse and structures. While this may be an appropriate, and perfectly justified, interpretation of development, it must be recognised as being based on a particular paradigm of thinking. This is an important insight into understanding the philosophy and logic of the IEM process. By participating in the IEM process, therefore, interested and affected parties are consenting to this worldview of development and thus may be condoning a predetermined type of outcome or a limited spectrum of outcomes compatible with this development paradigm.

In the context of locally appropriate sustainable development in rural Namibia, application of IEM, *per se*, may impose an external development agenda and ethic on to local communities. In terms of the discussion in chapter 5, the approach of IEM is for this reason, not fully compatible with sustainable development in communal areas in Namibia.

6.6.2 Principles of IEM and sustainable development

Having stated this, however, IEM does make significant breaks from conventional EIA and promotes many principles compatible with sustainable development.

In the interests of democratic decision-making, community empowerment and informed decision-making, IEM emphasises public participation. This is a strength of IEM as it recognises the need for pro-active initiatives to attain public participation in this context. It therefore provides communities with the opportunity to influence the planning and design of projects. In this way it appreciates the value of local or indigenous knowledge in the process and is not dominated by 'expert' or specialist knowledge.

However, in practice, meaningful public involvement in IEM has often been found to be limited. Public involvement practitioners are often not well trained and, contrary to the pro-active and 'joint planning' ideology of IEM, use limited techniques for public involvement. The result is that public participation remains at the low levels of the 'ladder of participation' - that of informing and consulting the public (Fowkes, 1996).

This may be because public participation is just that - participation in a process which has largely predetermined goals. Communities and the public are co-opted into a process where the fundamental development issues are already defined. Although IEM may empower people to participate and allow their opinions to be heard and considered in decision-making, it does not empower them to define the central issues at stake - in particular the power to define the nature of development and progress. This may be a false form of empowerment as it, in the name of public participation, only allows the public to determine more peripheral issues such as choice between project

alternatives, forms of impact mitigation and highlighting specific environmental issues. In a country like South Africa with a relatively weak ecological conscience, this may not amount to a significant challenge to the dominant development agenda and thus limit progress to genuinely sustainable development. Furthermore, the IEM process is in the final analysis subject to a decision by an appropriate authority - thus, ultimately it is the decision maker who usurps the locus of control in the process.

IEM upholds the concept of equity as it aims to 'ensure that no person or group is worse off after a plan or project than they were before it was initiated' (Fuggle, 1995). It seeks equity in the distribution of benefits of development and equity in the distribution of the environmental and social costs of development. To some extent, albeit subject to the dominant development paradigm, equity and what constitutes an equitable outcome are defined and included into the project by the affected public through public involvement.

In terms of informed decision-making, IEM embraces a multi-disciplinary approach and thus aims to include the spectrum of scientific and other expertise into the process as well as public opinion. This is compatible with its emphasis on a holistic approach and a broad definition of the term environment. These are important and commendable concepts in terms of sustainable development. However, in the IEM model it may be suggested that they play a role subordinate to the developmental goal of IEM.

6.6.3 Process of IEM

It is suggested that the main target of IEM in terms of its design and current practice is larger scale projects - particularly industrial and infrastructural projects. However, the IEM process has made provision for the smaller projects and commendably, has generated a process where small-scale and low impact projects are not impeded by lengthy assessments and bureaucratic processes.

It would be interesting to examine how the IEM process might deal with the development of a borehole in a communal area in Namibia. As a small project it might be considered to pass under 'no formal assessment'. However, on checking the summary checklist of 'environmental characteristics' (Table 6.1), a borehole may have a significant impact on factors 1 (a)(b)(c)(d)(e)(f)(g)(k). In response to question 2, the development of a borehole could be modified significantly through management and in response to 3(c), boreholes are often not sustainable (ENGEO, 1997). Thus provision of a borehole may require further assessment and possibly a full IEM process.

Thus the IEM process, although purportedly designed for the needs of a developing country, would incur an environmental assessment investigation for each borehole development. This would likely place an impossible administrative and financial burden on borehole provision.

The solution which IEM provides is that consequent on the 'no formal assessment' and 'initial assessment' routes a project may be approved without a full impact assessment, but on condition of an adequate environmental management plan. Thus the IEM process is truncated, to produce a more streamlined, more easily administered process using a 'conditions of approval' technique.

While this would address some of the logistic difficulties in administration and expense in implementing IEM for each small project, it may compromise on quality of environmental management and detract from the information base on which the management plan is based. This would be so as it effectively shortcuts the environmental assessment stages of IEM. This would be acceptable where small projects do not have significant impacts but where small, low budget projects do have significant impacts but do not receive full environmental assessment because of financial and administrative constraints, this 'shortcut' is not acceptable.

This presents a challenge: how is a full environmental assessment and management system implemented for small, multiple projects where there are limited financial resources and limited administrative capacities?

6.7 Conclusions

For the context of sustainable development in rural Namibia, IEM is commendable in its aim to integrate environment and development. The environment is not romanticised, but is seen as a necessary resource. IEM aims to promote the democratic process in environmental assessment, and importantly, it aims to achieve environmental planning from the earliest conception stages of a project. It aims to compensate for some of the weaknesses of EIA as a merely predictive exercise by using an environmental contract or requiring an environmental management plan as a method to ensure ongoing environmental management.

6.7.1 Locus of power

In relation to the context of development in communal areas, the core criticism of IEM is the issue of the locus of power in the process. IEM supports a development agenda external to the community. From the outset the community role is one of participation and reaction to an external project. This is contrary to the principles of sustainable development thus far developed.

So while IEM commendably supports the need for development in a developing country, its failing is that it would not allow a community based definition of development. In this sense it may still perpetuate the inequalities that so often accompany western defined development (Seabrook, 1993).

This impasse could be resolved if the approach of IEM could be adopted into a system where it is subservient to the community definition of development and a community defined development process. The IEM process or environmental assessment facets of a development could be subordinate to the community determined goals of development and environmental management. By making this key reversal, from IEM being the vehicle of the development agenda, to IEM being subservient to the community development agenda, it could strengthen the progressive principles on which IEM is based and promote genuinely sustainable development.

6.7.2 Logistics

Given the constraints of developing countries, the logistics of applying IEM to each and every small community project with significant impacts would be impossible. Although designed and tailor-made for the needs and context of a developing country, it does not appear to be able to accommodate - without compromising on process quality - informal sector development, small-scale development with significant environmental impacts and community development projects with significant impacts.

This was discussed, in chapter 4, as a general weakness of EIA. IEM, even as a developing world formulation of environmental assessment and management, is an expensive and complex process to administer. It involves the expertise of an environmental consultant to administer the process, experts of various disciplines, extensive public involvement techniques and bureaucracy to contain the process. Even if these were scaled down with project size, it could still be argued that a developing country would just not have the administrative, personnel or financial resources for an IEM procedure for each and every community project which had significant environmental impacts.

The result would most likely be that even those projects which do have significant environmental impacts would be passed as 'no formal assessment required' or incur a cursory initial environmental assessment. Low budget projects may be granted approval conditional on an environmental management plan. However, without a thorough environmental impact assessment the basis for an environmental management plan may be weak. Thus, the quality of environmental assessment and management may well be compromised and lowered because of pressure on resources available for the process.

6.7.3 Management

With the example in question, a borehole, the significant environmental impacts are mostly a product of how the borehole is managed (ENGE0, 1997). IEM provides some basic techniques such as use of an environmental contract and/or environmental management plan to improve environmental management. However, as ongoing environmental management is an area where EIA is weak and where IEM also possibly has deficiencies, a model for

environmental assessment and management of boreholes would need to improve on this management aspect.

6.7.4 Implications for the model

The principles and processes of IEM need to be assimilated into an inexpensive and administratively efficient procedural mechanism which can address small projects and informal sector development. This would be possible through well developed and effective environmental management strategies which are based on a well researched information base.

A significant strength of a full scale IEM process is that it is able to build up a significant information base for decision-making. Through scoping, adopting a broad definition of environment, expert involvement, innovative public involvement and a holistic approach to environmental issues, it achieves sound environmental assessment in the difficulties of the context of a developing country.

Notwithstanding the above weaknesses of IEM, it has overcome many of the obstacles which would impede environmental assessment in a developing country. It thus can make a valuable contribution to environmental assessment and management in this context.

However, to attain the change in emphasis from a development orientated paradigm to one appropriate to rural Namibia, the process must allow the community to be the holder of the locus of power. Thus, in the final decision it will not be communities subject to the 'political will' of the decision-maker, but communities will be the decision-makers given the information provided by an IEM process. Nor would communities be subject to an external development agenda but would define the development agenda and the process of environmental assessment.

7. Environmental Management Systems

In the light of preceding chapters, it may seem contradictory to draw on the concept and practice of Environmental Management Systems (EMS) for the objectives of this dissertation. EMS have been developed very much in the context of the developed world and in the context of industry and business.

However, it is argued that EMS procedure has principles for environmental management which may be adapted and applied to rural development programmes. Furthermore, where EIA and even IEM are weak on the implementation phase of a project, EMS provide a dynamic and thorough approach to managing the environmental effects of activities involved in industry and business.

It has also been suggested (Hill, 1996) that IEM and EMS may be synthesised to form a more comprehensive 'cradle to grave' (or conception to decommissioning) approach to environmental management. This concept of an initial IEM process followed by, and informing an EMS is useful and will be reviewed in terms of its potential application to the 'model'.

7.1 Overview of EMS

EMS may be defined as:

'the organisational structure, responsibilities, practices, procedures, processes and resources for determining and implementing environmental policy.'

(British Standard Institute, 1994:6, cited in Netherwood, 1996).

EMS have their origins in the developed world. In contrast to EIA which is designed for new projects, EMS are for existing operations. EMS provide an industry or company with the mechanism and structure to improve its environmental performance through better management of its activities.

The evolution of EMS has been characterised by a plethora of different approaches and standards of performance. There have, therefore, been several initiatives to attain standardisation of EMS - these, *inter alia*, include (Starkey, 1996):

- British Standard for Environmental Management Systems (BS 7750);
- The Irish Standard (IS 310);
- The European Eco-management and Audit Scheme (EMAS);
- The Canadian Standards Association Standard (CSA Z750).

ISO 14 000, which has been drafted by the International Organisation for Standardisation (ISO), has been designed to replace or incorporate previous systems as the international specification for EMS. ISO 14 000 is very

similar to CSA Z750 and compatible with the European standards and, therefore, could become a globally recognised system (Starkey, 1996).

At present the decision for a company to implement an EMS such as ISO 14 000 is voluntary. However, for a variety of reasons including pressure from consumers, trade partners, shareholders and the public, as well as in the hope of pre-empting legislative requirements, many companies are implementing EMS.

The objective of EMS certification, such as ISO 14 000, therefore, is to promote sustainable development in the corporate world. EMS provides the comprehensive management structures, mechanisms and checks that enable an environmental policy to be implemented and ensure that all activities associated with an operation are reviewed and improved in terms of the environmental policy.

7.2 ISO 14 000

ISO 14 000 has two important basic concepts. Firstly, it is a voluntary system. Secondly, it is not an absolute standard and certification does not require absolute environmental standards to be met, but does require the effective implementation of the system which in itself should result in continual improvement in environmental performance.

There are five basic principles underpinning ISO 14 000 (cited in Starkey, 1996):

Principle 1	An organisation should focus on what needs to be done - it should ensure commitment to EMS and define its policy.
Principle 2	An organisation should formulate a plan to fulfil its environmental policy.
Principle 3	For effective implementation, an organisation should develop the capabilities and support mechanisms necessary to achieve its environmental policy, objectives and targets.
Principle 4	An organisation should measure, monitor and evaluate its environmental performance.
Principle 5	An organisation should review and continually improve its environmental management system, with the objective of improving its overall environmental performance.

Table 7.1: Summary of basic principles underpinning ISO 14 000 (adapted from Starkey, 1996)

Underpinning these principles is the Deming Cycle - a process management tool on which ISO 14 000 is based. The Deming Cycle was devised by Dr W. Edwards Deming for quality management systems. The concept of review and continual improvement is central to this approach (Starkey, 1996).

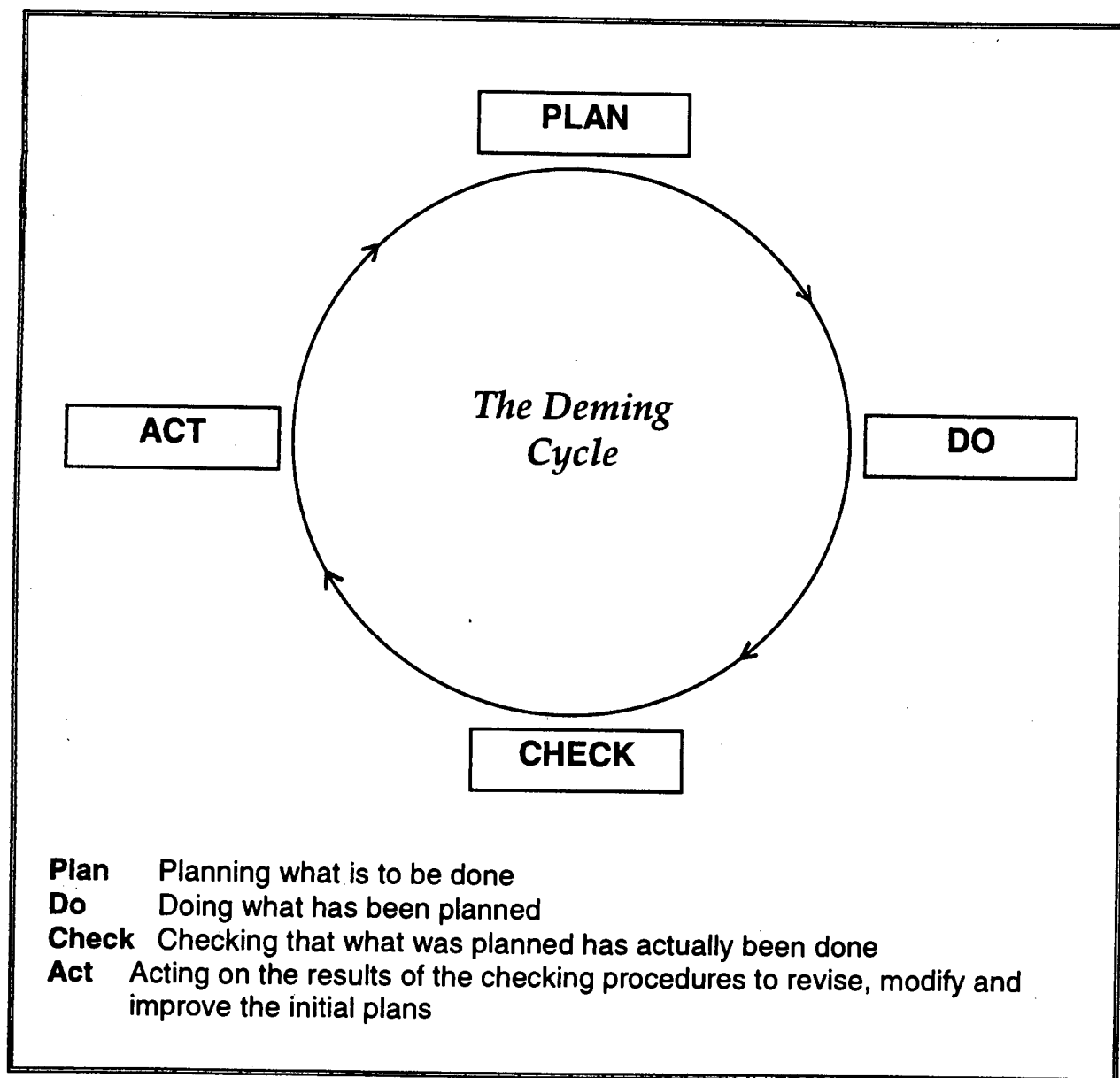


Figure 7.1: The Deming Cycle on which ISO 14 000 is based (adapted from Starkey, 1996)

The Deming Cycle is a dynamic management cycle which is based on a feedback system to allow continuous revision and improvement. This has been translated into the ISO 14 000 system which establishes the mechanisms of management and allows these to be reviewed and revised in the advocacy of continual improvement. Figure 7.2 summarises this approach to EMS according to ISO 14 000.

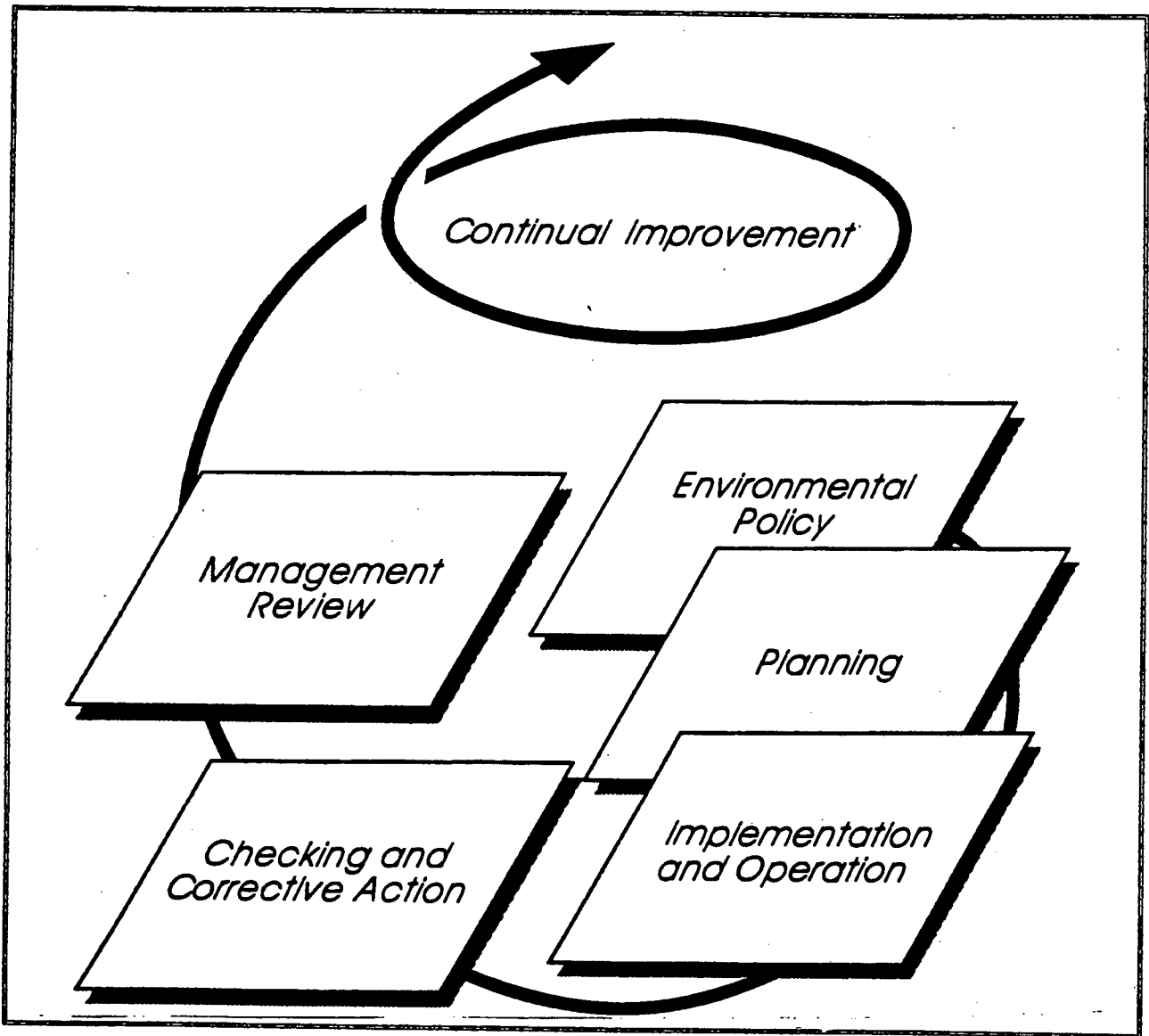


Figure 7.2: Schematic presentation of ISO 14 001 - Specification for Management - showing importance of concept of continual improvement (reproduced from ISO, 1996)

Figure 7.2 outlines all the stages involved in EMS. In reviewing this process, there are noted to be four key requirements for an effective EMS (Hill and Soboil, 1996):

- 1. An Environmental Policy**
- 2. Organisational Structure**
- 3. An Environmental Management Programme**
- 4. Environmental Audit**

Environmental Policy

The first and most important step is the formulation of an environmental policy which declares the environmental intentions, environmental commitments and desired level of environmental performance of the company. It should be revisable and commit itself to continual improvement.

Organisational Structure

The second key requirement is the establishment of organisational structure. This involves allocating responsibility and determining lines of communication and decision. It includes provision of adequate personnel and administrative resources to implement the plans and policy .

Environmental Management Programme (EMP)

The environmental management programme establishes the environmental objectives and targets to be met in the fulfilment of the policy. The EMP considers all activities and aspects of the operation and details procedures for controlling, measuring, monitoring and recording environmental performance. It also details contingency plans and emergency plans.

Environmental Review and/or Audit

Environmental review and audit is the last component which checks how well the company's environmental performance in practice has measured up to the plan and policy. It is the crucial 'link' which feeds back to establish the cycle of continuous improvement by informing modifications to policy and the management programme. It includes periodic external audit for certification purposes.

(Hill and Soboil, 1996; Brophy, 1996; ISO, 1996)

Thus the essence of EMS can be captured in the closed loop feedback system of the Deming Cycle. The cycle has different stages which use different tools to achieve set goals and objectives. The emphasis is on a dynamic and revisable approach which continually updates itself and fine tunes itself to achieve better environmental performance results. It is a self-perpetuating cycle which operates locally - within the corporation. The only

facet of the system which is external to the corporation concerned is the periodic external audit.

It is, therefore, a system which, in support of the subsidiarity principle of sustainable development, delegates the responsibility for environmental management and performance to the 'local' level or smallest unit of proprietorship - the company or factory. Direct external influence is infrequent but present as a necessary periodic audit. However, the impetus to maintain the performance of the internal system is achieved by the need to comply with the market demands of the corporate environment as well as by the sense of corporate environmental responsibility.

7.3 Continual improvement

A fundamental and basic notion in EMS certification is that the system is not judged and measured by its actual environmental results, *per se*. This is the prerogative of the internal management structure. The external judgement of the system and certification is based on appropriate implementation of the system and the successful implementation of an environmental policy, executed through an environmental management plan, checked by review and resulting in continual improvement. This is the basis of certification and this is a key point for assessing and auditing an environmental management system.

7.4 IEMS

EIA is for new projects and EMS are for existing ones. However, the International Study of the Effectiveness of Environmental Assessment (Sadler, 1996) highlights that EIA has been used essentially as a predictive exercise and that a systematic weakness of EIA is the lack of follow up mechanisms to ensure sound environmental management in all subsequent stages of a project. Hill (1996) argues that this limited view of EIA, as merely a predictive exercise is widespread and stands in contrast to IEM which aims to achieve sound environmental management in all stages of a project - including design and management .

However, Hill (1996) also notes that IEM, even with its emphasis on environmental management, gives disproportionately little detail and emphasis to Stage 3 of the IEM process - the stage of 'Implementation'. The IEM guideline documents published by the DEAT in South Africa reflect this imbalance of emphasis.

Given that these guidelines provide comprehensive detail on the planning, design and assessment stages but are weak on environmental management, Hill argues that EMS, with its forte being environmental management of operational stages of a project, can well complement IEM. The merger of IEM and EMS would provide a comprehensive environmental assessment and management process for all stages of the project.

A significant achievement of IEM is to integrate the EIA of a project right back into the planning and design phase rather than view it as a *post hoc* environmental check. EMS now would be able to ensure that sound environmental management continues beyond the decision and implementation stage. The synthesis of IEM with EMS may be achieved by integrating EMS into stage 3 of IEM. Hill envisages IEM giving rise to an EMS for each phase of implementation of a proposal - that is the construction phase, the commissioning phase, the operational phase and the decommissioning phase. Thus the management components of IEM are strengthened and have more structure.

A term suggested to express the merger of IEM and EMS is IEMS - 'Integrated Environmental Management Systems' (Hill, 1996).

The IEM process, therefore, determines the key issues for the EMS. The existence of an EMS and aspects of an EMS may be required in the conditions of approval. This is a key concept which needs to be highlighted in considering the relevance of IEMS. IEMS has essentially two aspects:

1. IEM is an EIA based stage determining design, planning, assessment of a project and informing and determining later management phases through a 'contract' or conditions of approval. It is usually executed by external consultants, includes the public, undergoes external review and external, independent approval.
2. EMS is informed by the IEM phase and subject to the conditions of approval or contract. EMS, therefore, is the implementation, through a practical management system, of the wisdom gained by the IEM stage. EMS procedure, however, is an environmental management tool which is mostly internal to the company other than the periodic external audit.

These two components of IEMS are presented in Figure 7.3.

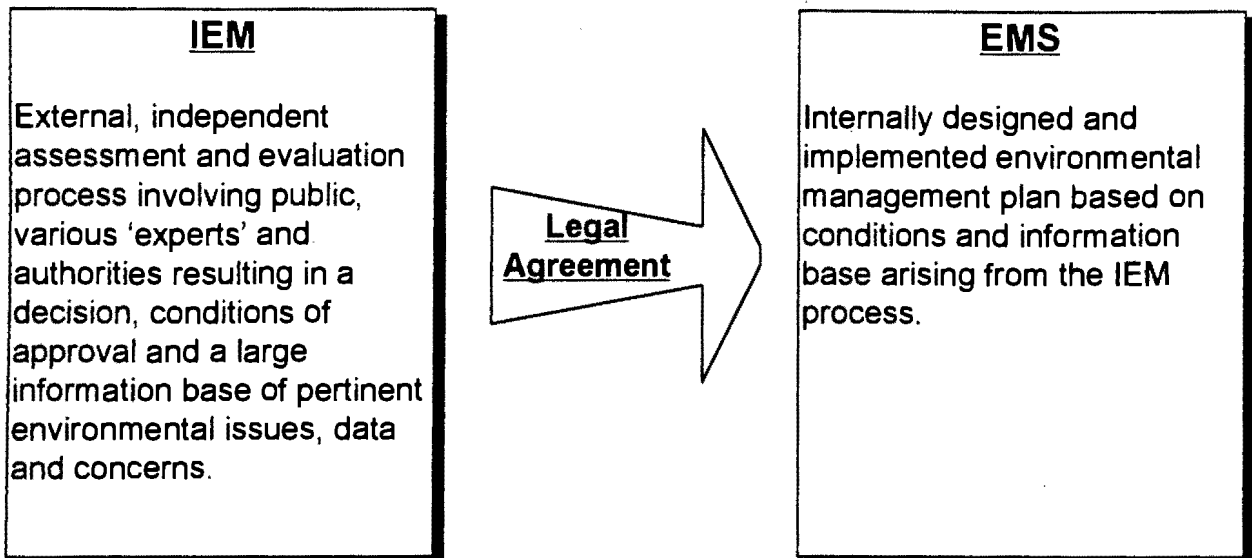


Figure 7.3: Two-stage concept showing articulation of IEM with EMS in IEMS

Figure 7.3 represents the central conclusion of the discussion on IEM and EMS and is a key concept that will be modified for inclusion into the 'model'.

7.5 Discussion and appraisal

Further to this concept of IEMS which has been presented and will be explored further as it is applied in the model, EMS provides concepts and principles for the model in terms of sustainable development and organisational and structural aspects of environmental management.

7.5.1 EMS and sustainable development

EMS is a locally based environmental management system. As such it supports many of the principles of sustainable development which were developed in chapter 5.

The goals, targets and nature of environmental management are defined and determined from within the corporation. This empowerment to define the environmental management system results in ownership over the process and places local management in a position of accountability for its performance.

As a locally designed and implemented system, it capitalises on 'local' knowledge. The environmental management system is not imposed from

outside by consultants who would not be able to appreciate the complexities of the corporation and its activities as well as those who work in the corporation.

Although outside consultants may assist - in a partnership role - the design, implementation and review of the environmental management system is 'local'. This is, therefore, also supportive of the subsidiarity principle as the team taking the decisions concerning environmental management is at the local level and directly affected by the decisions. That is, the locus of decision-making is not removed from the day to day working of the management system.

The reason for the appeal and success of EMS is arguably that the overall result of these factors is a more efficient, better designed and better implemented environmental management system.

7.5.2 Management procedure

In addition to the philosophy and principles of sustainable development which support EMS - or rather, make the concept of EMS an effective sustainable development tool, EMS provide procedural, organisational and structural guidelines for local management.

In this respect there are four important and relevant points:

1. An EMS requires organisational structure in order to function and be effective;
2. An EMS requires a policy and an environmental management plan to implement this policy;
3. An EMS incorporates the Deming Cycle and therefore, is a self-auditing, dynamic system which is able to constantly review performance and update itself accordingly;
4. This local management system is subject to periodic external audit and review.

In conclusion, therefore, EMS are a state-of-the-art approach to environmental management in the context of a first world corporate environment. Where EIA has been used mostly as a predictive exercise, the forte of an EMS is environmental management which is eloquent and effective and sophisticated yet not complicated.

8. CAMPFIRE and CBNRM - Community Based Conservation

'We must tap the deep understanding for the environment which is inscribed in the experience of those whose lives and well-being depend on it. Active involvement of communities in managing their environment must be the order of the day.'

- Nelson Mandela
(Mandela, 1995:5)

A growing trend throughout the developing world and also in Africa is the increasing level of involvement of local communities in management of natural resources (Harsch, 1995). This is manifest in the increasing number of initiatives which aim to achieve development objectives through environmental and conservation programmes that are managed by local communities and which harness indigenous knowledge.

In the past rural communities have been disempowered by factors such as colonial policies, laws which alienated people from the land and traditional land use practices, 'top-down' approaches to development projects, aid programmes designed and administered by foreign outside 'experts' and preservationist approaches to conservation (Western and Wright, 1994). As governments, aid agencies, NGO's and communities themselves have begun to realise that indigenous communities have sustainably lived on and used the land for many generations, and that community involvement and management is essential for the success of development projects, there has been a trend in conservation initiatives to devolve responsibility for management of natural resources to local communities. Many such initiatives have met with promising results (Western and Wright, 1994).

This chapter proposes that environmental and development objectives can only be achieved through programmes which integrate sound environmental management with development. Programmes which promote meaningful community participation, harness indigenous knowledge and devolve responsibility for management to local communities are likely to be more successful.

Many such examples of community management of natural resources exist, however, two initiatives in community based conservation will be discussed.

Firstly, the CAMPFIRE project in Zimbabwe will be discussed because it has been widely used as a model for community conservation in Africa. Secondly, the CBNRM programme which is gaining momentum in Namibia will be reviewed. These two examples, along with similar programmes in the developing world, provide useful principles and concepts for environmental management.

8.1 Conservation and development

Historically, conservation and development in Africa, as in most of the world have often been irreconcilable ideologies. Conservation, often being preservationist, tended to view development as a threat to its objectives. On the other hand, the development world often viewed conservation as elitist, of value only to those already privileged and prioritising of a few animal species over the needs of poor, local, rural communities who often suffered the cost or opportunity cost of conservation but did not stand to benefit from conservation (Western and Wright, 1994).

More recently, development initiatives have begun to realise that the health and prosperity of rural communities is dependent on a healthy environment and have consequently recognised the importance of environmental protection in development. Similarly, environmental initiatives have begun to realise that most of the earth's biodiversity and attributes pertaining to environmental health and integrity are in the hands of rural communities and that economic impoverishment often contributes to environmental degradation. It is, therefore, becoming increasingly clear that conservation or environmental protection and development are mutually dependent and have to work in unison if either is to be successful (Western and Wright, 1994).

There are an increasing number of 'success stories' where conservation and development initiatives have been integrated. It is useful to outline the road that lead to this approach to conservation and development.

Western and Wright (1994) identify three 'precipitating factors' which contributed to the present support for community-based conservation as an approach which can achieve the dual goals of socio-economic upliftment and conservation of natural resources.

The first factor was the growing awareness in the developed world of the threat to the environment as a result of growing populations, environmentally damaging technologies and agricultural practices, use of pesticides, unprecedented levels of chemical production and consumerism. Publications such as Rachel Carson's *Silent Spring* in 1962 and the Erlichs' *Population Bomb* in 1968 raised public awareness and concern for the environment. Events such as Earth Day in 1970, the passing of NEPA in 1970, and the United Nations Conference on the Global Environment in Stockholm in 1972 reflected this concern. With this increase in 'environmental awareness', attention also became focused on environmental protection in developing countries. However, conservation initiatives in third world countries were mostly aimed at high profile species and habitats. They largely ignored, and were unable to address the plight of poor rural communities who often had to bear the costs of conservation initiatives without deriving any tangible benefit.

The second precipitating factor was the 'grassroots' movement in development which was gaining momentum and support. In reaction to the lack of success of centrally planned, capital intensive and grandiose

development projects, the grassroots approach to development focused on small-scale community projects, local aspirations and community participation. Importantly, this approach began to recognise the dependence of rural communities on the environment - the local resource base. 'Grassroots' development, despite many setbacks and failures along the way, has matured into a well respected development ideology.

The third factor was the human rights and indigenous peoples movement which highlighted the plight of rural and disenfranchised people. It sought to redress the inequalities that exist between developed and developing countries, 'north and south', rich and poor. The call for social justice for the disempowered, the disenfranchised and ethnic minorities, by necessity, often focused on resources, resource use, resource property rights and environmental quality and health.

Convergence of conservation thinking and development thinking thus began to occur with the awareness that the socio-economic plight of rural and poor communities in the developing world was often intimately linked to the state of the environment.

8.2 CAMPFIRE in Zimbabwe

CAMPFIRE, in Zimbabwe, has been acclaimed as a model for community based conservation in Africa. It has inspired similar approaches in other countries, including Namibia, and will, therefore, be briefly reviewed to gain an insight into principles which may contribute to a model for community based environmental management of a natural resource.

8.2.1 CAMPFIRE - an outline

CAMPFIRE is an acronym for the Communal Areas Management Programme For Indigenous Resources. In CAMPFIRE projects, communities have been granted conditional rights of use and exploitation of wildlife in communal areas.

As a relatively recent initiative, the first CAMPFIRE project having been established in 1989, CAMPFIRE projects are proving to be an economically viable land use alternative - especially in areas of marginal land where game fare better than cattle. Income is derived from hunting, tourism and game harvesting. Local, democratically elected committees are responsible for game management - making decisions regarding sustainable yields, how game will be used and distribution of profits (Metcalf, 1994).

Thus every CAMPFIRE project is unique, as although the CAMPFIRE principles and conditions apply to each project, its details of design are determined by local people according to their needs, aspirations and knowledge.

8.2.2 A brief history of CAMPFIRE

Metcalf (1994) outlines the history of CAMPFIRE and its context - a socio-political and historical context sharing many common features with Namibia.

In pre-colonial times all land in Zimbabwe was communally owned. Today, similarly to Namibia, there are three systems of land tenure: communal land, private land and state owned land.

Colonial policy towards wildlife was very much one of protectionism. Wildlife was state property - or 'royal game' - and, therefore, there was little economic incentive to invest in wildlife or protect wildlife habitat. However, although this policy prioritised preservation of wildlife, it was eventually recognised to be a threat to wildlife by detracting from the economic potential of wildlife use. Game only had an aesthetic value to farmers and the economy. This placed increasing pressure on game stocks as they could not compete with livestock farming as a profitable form of land-use. Tsetse fly eradication programmes exacerbated this land pressure by allowing areas where bovine trypanosomiasis had previously precluded livestock ranching to be opened to livestock. Wildlife was at risk, therefore, of being reduced to a limited number of protected areas and ecosystems.

In 1975 the Parks and Wildlife Act (GOZ, 1975) gave commercial farmers on private land the right to commercially exploit wildlife on their land. This provided commercial and economic incentives to manage and responsibly use wildlife stocks in co-operation with National Parks. Wildlife now had utility and consequently, has developed into a thriving industry on private land.

However, as much of Zimbabwe's wildlife is essentially in the hands of rural communities in communal areas who, like farmers on private land, base decisions determining land use on financial considerations. Wildlife also needed to achieve utility in these areas if it were to compete with livestock farming and other land-uses.

CAMPFIRE policy eventually provided the legislative, institutional and financial prerequisites for communities in communal areas to turn to wildlife as a source of subsistence and income.

There were a few abortive attempts to apply the 1975 Act to communal areas. However, it was only in the 1980's that the CAMPFIRE document was drafted. The first local council in a communal area to receive rights to use wildlife, in the context of a CAMPFIRE project, was Nyaminyami in 1989.

Since then several other CAMPFIRE projects have been established - many of them showing viable returns on wildlife as a land-use.

8.2.3 Principles and objectives of CAMPFIRE

A district council may embark on game utilisation initiatives only once it receives authorisation to do so from National Parks. However, for National Parks to grant this authority it must first be satisfied that:

1. the district council has the capacity to manage and utilise game sustainably and wisely;
2. it will conform to CAMPFIRE principles and National Parks guidelines regarding the setting of sustainable quotas and the distribution of benefits to the community.

National Parks may revoke wildlife use rights where there is a breach of these conditions.

CAMPFIRE objectives can be summarised in four points:

- *'to initiate a program for the long term development, management, and sustainable utilisation of natural resources in the communal areas;*
- *to achieve management of resources by placing custody and responsibility with the resident communities;*
- *to allow communities to benefit directly from the exploitation of natural resources within communal areas;*
- *to establish the administrative and institutional structures necessary to make the programme work.'*

(Martin, 1986:12, cited in Metcalfe, 1994)

Metcalfe (1994) also presents principles which have been developed by CAMPFIRE proponents to guide the individual CAMPFIRE projects. These include:

- *'Effective management of wildlife is best achieved by giving it focused value for those who live with it;*
- *The unit of proprietorship should be the unit of production, management and benefit;*
- *The unit of proprietorship should be as small as practicable within the ecological and socio-political constraints.'*

(Murphree, 1993:6, cited in Metcalfe, 1994)

People in communal areas, therefore, now have the option to organise appropriate management structures and use wildlife as a renewable resource. This achieves ecological objectives and development objectives.

While CAMPFIRE only applies to wildlife in communal areas at present, it is the intention of CAMPFIRE to extend to include community management of all natural resources in communal areas so that resource management may be executed in a holistic manner (Metcalfe, 1994).

8.3 CBNRM in Namibia

Since independence Namibia has pioneered its own community-based wildlife management programme. The Ministry of Environment and Tourism in Namibia has initiated a programme which promotes the sustainable use of wildlife in communal areas - Community Based Natural Resource Management or CBNRM.

8.3.1 Background to CBNRM

The context and development of CBNRM is in many ways similar to that of CAMPFIRE in Zimbabwe:

- land is subject to three tenure systems - communal land, commercial land and state owned land which is not communal land;
- other than game in large game reserves, much wildlife is present on commercial and communal lands outside reserves;
- all game was owned by the state;
- there is an urgent need for rural upliftment and development programmes in communal areas which are also often poorly suited to livestock ranching;
- livestock ranching has historically out-competed game as a land-use because game has had minimal commercial value outside protected areas;
- wildlife in communal areas is under pressure from poaching and livestock ranching.

As in Zimbabwe, the right to exploit wildlife as a resource was first obtained by commercial farmers on private land. This became possible in the context of a conservancy. A conservancy is defined as a group of commercial farms which have pooled their resources in order to conserve and use wildlife sustainably. Conservancies have been in operation for more than 25 years (Jones, pers. comm.). Through tenure over wildlife, private farmers have been able to derive financial benefit which has provided an economic incentive for sustainable use and therefore, conservation of wildlife.

Not only has this achieved the ecological objectives of protecting and increasing wildlife stocks and natural habitat - with now more than 70% of Namibia's wildlife held on commercial farms - but it has also made a significant contribution to the economy (MET, 1995). At present it contributes about N\$60 million to GNP (Jones, pers. comm.).

Until recently the right to exploit wildlife as a resource was a privilege not available to farmers on communal land. Communal farmers were thus alienated from this resource base and from traditional practices of wildlife use and related resource management. Communal farmers, therefore, had no incentive to protect this resource. Furthermore, besides not having access to the benefits of this resource, communities were asked to bear the cost of preservation such as crop damage by elephants, livestock loss to predators such as lion and hyaena and personal safety risks implicit in preservation of

such animals. This scenario has not been conducive to the maintenance of wildlife in communal areas and numbers have been rapidly declining through displacement of habitat and poaching (MET, 1995).

Devolving rights over natural resources to communities in communal areas is a complicated process as it involves many unresolved issues, such as that of land tenure, and has many political ramifications. However, the MET, being the line ministry responsible for wildlife, has the authority to grant rights of wildlife use to communities in communal areas. The MET has forged forward with a progressive, well researched and carefully structured system where communities can become involved with the management of wildlife in communal areas and benefit from it as a resource. It is hoped that as this wisdom is borne out in practice, other line ministries will follow suite and devolve to communities, rights of use over the natural resources for which they are responsible (Jones, pers. comm.). This would enable communities to plan and manage resources in a more holistic and integrative manner.

8.3.2 Process and structure of CBNRM

The MET has, by means of the CBNRM programme, created a process where communities in communal areas can now organise to form a conservancy. Legislation was passed in 1996 which allowed for the establishment of conservancies on communal land through the policy and principles of the CBNRM programme (NPC, 1995). There are several prerequisites and conditions required by the MET from the community before it can register a conservancy which becomes a legally constituted body. (See Appendix 5.) These prerequisites are based on the principles of sustainability, equity and community management and include:

- clear definition of the membership of the conservancy - no person may be excluded on grounds of race, ethnicity or gender;
- the formation of a competent management committee which is representative of the community according to a representation system acceptable to the community;
- the formulation of a constitution which must include principles of sustainable management and define a set of rules as to how the conservancy will operate;
- satisfaction that the management committee has the capacity to manage funds, is fully accountable for funds and decisions and has a policy or plan for the equitable distribution of funds in the community;
- the assurance that the community has the capacity to set its own sustainable yield quotas;
- the knowledge that the conservancy has well defined physical boundaries which have been negotiated with neighbouring communities and conservancies.

(MET, 1996; Jones, pers. comm.)

The conservancy is a legally constituted body and according to the amended legislation has legal rights which include rights to:

- *'use and benefit from wildlife on communal land in accordance with the conservancy policy;*
- *propose recommendations for quotas for wildlife utilisation and, in consultation with the MET, decide on the form of utilisation;*
- *enter into agreements with private companies and establish tourism facilities within the conservancy boundaries;*
- *have ownership over huntable game on conservancies;*
- *apply for permits to use protected and specially protected game;*
- *conduct trophy hunting and to buy and sell game.'*

(MET, 1996:4)

There is no stipulation on the type of economic activity in which the conservancy may engage - only that it be legal and sustainable. Economic use of wildlife may include direct consumptive use, eco-tourism ventures, hunting concessions and selling of live game. Proceeds and profits may be used and distributed as deemed fit by the community whether this be as cash dividends to members, investment in community projects or re-investment in conservancy projects - as long as the criteria of equity and accountability are met.

8.3.3 Future scope of CBNRM

To date only a few conservancies in communal areas have been registered and these are in their embryonic stages. There are obstacles to be overcome such as planning the sustainable management of one resource, wildlife, when communities do not have tenure of other basic resources such as water and land.

However, there is a great deal of optimism about the gains which can be made through conservancies to both community upliftment and wildlife conservation (MET, 1995; Jones, pers. comm.). It has been recommended that the CBNRM concept be adapted to form a more general model of community land management through a body such as a community land trust (Fuller and Turner, 1995). Thus, there is a definite trend in thinking in Namibia to devolve management of natural resources to local community structures. It is a trend which supports a model for local environmental assessment and management of boreholes.

8.4 Community based management of resources - towards sustainable development

This chapter has briefly outlined two community-based natural resource management programmes which integrate development and conservation objectives. According to the definition of community co-management previously discussed in chapter 5, both of these may be described as community co-management systems.

CAMPFIRE is well established and most projects have been very successful (Metcalf, 1994). In Namibia conservancies on commercial land have long been established and successful, while CBNRM promises to revolutionise conservation in communal areas in Namibia, bring economic benefit to rural areas and very importantly help diversify economic activity in these areas. Both CBNRM and CAMPFIRE are at present limited to the sustainable use of one natural resource - wildlife. However, both envisage extending community management to other natural resources (Jones, pers. comm.; Metcalfe, 1994).

Although CAMPFIRE and CBNRM only relate to wildlife use, at this stage, there are several points of direct relevance to a model involving community management of a natural resource. Implicit in CBNRM, CAMPFIRE and other community-based conservation and development programmes are trends which represent a growing awareness and implementation of the principles of sustainable development.

These key concepts and principles are briefly highlighted next.

8.4.1 Principles of sustainable development in CBNRM and CAMPFIRE

CBNRM and CAMPFIRE are in many ways 'state-of-the-art' projects in terms of sustainable development. Biodiversity and other natural resources are protected through conservation of species, including threatened species, and through conservation of habitat and natural ecosystems. Development is achieved through new economic activity and income sources which can lead to investment in the community, financial independence and social upliftment.

8.4.1.1 Community co-management of resources

The CAMPFIRE project in Zimbabwe has demonstrated the immense potential of community co-management systems. Considering that all previous government campaigns for conservation in communal areas this century in Zimbabwe have failed (Metcalf, 1994), CAMPFIRE appears to be an extremely promising model for conservation in Africa. No previous project gave local communities the legal authority, financial incentives or role in management as does CAMPFIRE. The key to CAMPFIRE's success is that local communities are likely to effect sustainable resource management if

they are given genuine and meaningful proprietorship of the resource. This is achieved through the co-management structure.

Important in CAMPFIRE, is the recognition of the ability of the community and value of community involvement in management of the resource. Where in the past community participation has been encouraged, community co-management raises the significance of community participation on the 'ladder of participation', from tokenism to partnership.

8.4.1.2 Rights and responsibilities in community co-management

CAMPFIRE and the Namibian CBNRM programme, clearly outline the rights and responsibilities of both partners in the co-management framework. This relationship is formalised in a legal agreement and empowered by legislation.

For example, in CBNRM a community has the rights to wildlife use, to design the plan for sustainable use and to financial gain through associated enterprise. It has the responsibility of planning and operating for sustainability, equitable distribution of profit, fund management and economic success.

The government has the responsibility for providing advice, capacity building and oversight to ensure conservancy objectives and national interests are compatible and fulfilled. They also have the right to remove wildlife use rights if the conditions of the conservancy agreement, that is the conditions of co-management, are not upheld.

These rights and responsibilities on both sides are formalised by legislation and legal agreement. However, the spirit in which CBNRM and CAMPFIRE are implemented is one of co-operation as both parties ought to benefit from the partnership.

8.4.1.3 Community autonomy and empowerment to define development

The community has autonomy in its decision-making. It may enlist outside expertise and engage in contracts with 'external' companies, but the final say - the locus of control - in all management decisions and associated development initiatives rests within the community.

Thus, the community is granted the right to define the development agenda. Within the broad conditions of the co-management agreement, the exact form and nature of resource-use activities and development associated with use of this resource will be defined by the community. The community may choose a range of mechanisms to use the resource and initiate a range of community development projects from benefits of resource use. This avoids the previously mentioned flaws of an externally motivated and funded development programme. With this internally motivated and funded development programme, the community has full ownership of the process, full empowerment to define the process and associated development. They are also responsible for the process and development activities.

8.4.1.4 Conditional devolution of rights over natural resource use and planning

Autonomy does not imply complete free rein. The devolution of rights over the natural resource and the granting of autonomy over its management are conditional. Thus although the community has the power to define the nature of development and resource use, it is obliged to work within the framework of its co-management agreement. Community management decisions have to meet certain broad criteria, such as sustainability, equity and accountability, if the community wants to retain the privilege of management and continue to benefit from the natural resource.

8.4.1.5 The subsidiarity principle

The concept of community-based management of natural resources is a good example of the subsidiarity principle promoting sustainable development. Management decisions are taken at the lowest possible level and as close to the individual as possible. This allows better participation of each individual in the process as well as allowing flexibility to accommodate the diversity of local environments - the local environment understood in the broadest and fullest sense of the word.

8.4.1.6 Scope for use of indigenous knowledge

The co-management programmes allow communities to draw on their own expertise. The development and implementation of the local management plan in terms of resource use, distribution of benefits and nature of resultant development is inevitably fully cognisant of local knowledge and imperatives. It therefore, is likely to be acceptable to the community and this should increase its chances of success.

8.4.1.7 Scope for use of 'outside' expertise

The community is also free, as a legally constituted body, to enlist outside expertise if it deems this necessary. This is a very different approach from previous development methods which often imposed foreign expertise onto indigenous communities. External expertise and assistance may be contracted in and allowed to 'participate' and contribute to community defined aims and objectives.

8.4.1.8 Capacity building

The devolution of rights of resource use facilitates capacity building in a range of fields. These will include management skills, marketing skills, accounting ability as well as technical expertise in managing game herds and rangeland. The co-operative framework of co-management would appear to be an ideal context for capacity building.

8.4.1.9 Community entrepreneurship and diversification of economic activity

Communities can determine the exact form of resource use and management. The range of opportunities for economic activity are numerous. These range from subsistence use of game, hunting concessions, trade in wildlife and wildlife products to tourism ventures. Tourism provides opportunity for a range of related industries including provision of campsites and lodges, safaris and craft markets. This allows for the much needed diversification of economic activity in communal areas.

8.4.1.10 Equity

Funds may be invested, used and distributed in any way provided that it is fair to all members of the conservancy. CBNRM stipulates equity as a condition of the agreement which devolves rights to the community. Equity as portrayed in this context refers predominantly to the distribution of financial or material benefits. However, with the emphasis of CBNRM on representivity, community consensus and non-exclusivity it implies an equity in power and therefore, ability to influence decisions and practice. Equity in the co-management system, therefore, has the potential to extend beyond purely economic terms.

8.4.2 Conditions of the co-management agreement

As described above, government has the authority to devolve the rights of use and management over a natural resource and has done so on certain conditions. This has resulted in a co-management system which is a type of environmental management system. In the light of the previous chapter on EMS, therefore, it is useful to consider the successful management principles and management structure in this application. There are indeed similarities between this community co-management and EMS.

CBNRM and CAMPFIRE also provide a clear understanding of the conditional nature of the co-management agreement.

8.4.2.1 Breach

Breach of conditions of rights of wildlife use may result in the loss of the privilege of utilisation of wildlife.

8.4.2.2 Constitution and management plan

The CBNRM programme insists on the formulation of a constitution which outlines the goals and objectives of the conservancy and establishes the principles on which the conservancy is based. The management plan describes the rules which will govern decisions as well as the specific activities of resource management.

8.4.2.3 Structural organisation

Both CBNRM and CAMPFIRE require a management committee or district committee which represents and manages the conservancy. This is important in terms of defining accountability, establishing lines of communication, negotiating contracts and other related activities.

8.4.2.4 Representivity of management

In CAMPFIRE management councils are democratically elected, while in CBNRM the management committee may be democratically elected or established in a manner acceptable to the community - the only criteria being that it is representative of the community.

8.4.2.5 Inclusivity

CBNRM policy specifically states that no-one may be excluded on grounds of race, gender or ethnicity. The conservancy is geographically defined and membership criteria have to be acceptable to the community. For example, members could be all adult persons within the geographical area of the conservancy.

8.4.2.6 Accountability

The conservancy is accountable for its actions, legal contracts, management of game and handling and distribution of funds.

8.4.2.7 Sustainable use

Sustainable use is the key condition on which the rights of use are granted. The community is responsible for ensuring that wildlife is used on a sustainable basis and for the monitoring of game herds.

8.4.3 Wider context of CBNRM

A successful community based project can not successfully function in a vacuum. Reasonable and rational decisions within the conservancy management will be determined by national policies and market forces. Thus, where possible national policies and market forces need to be facilitators of decisions which are in the interests of sustainable development.

8.4.3.1 Co-operative policies

Policies at a national and regional level have to work in unison with conservancy objectives. Thus, for example, as CBNRM in Namibia may depend largely on tourism, the state should adopt policies that promote tourism and especially eco-tourism.

8.4.3.2 Economic incentives

Likewise, national and regional policies, subsidy schemes and markets need to reinforce economic incentives for maintaining the viability of wildlife as an industry in communal areas. The entire impetus for the viability of these programmes is the economic value of wildlife utilisation as a land-use alternative. Any actions which erode this market incentive jeopardise the whole programme and its benefits to conservation and development. Conversely, actions which increase this incentive promote conservation and development through these programmes. Thus within the free-market system the state should be aware of its own actions - for example, the effect on conservancies of government subsidies and easy loans for cattle farming.

8.4.3.3 Empowering legislation

Most importantly and not to be overlooked is the creation of empowering legislation to underpin the whole process.

8.4.4 Relevance of CBNRM and CAMPFIRE

Community-based resource management programmes are exemplary models of development through community co-management. The locus of decision-making and management is placed firmly within the domain of the community.

This optimum result is obtained by allowing a locally-adapted, locally-appropriate, flexible, effective and environmentally sound management system articulate with, and be accountable to, central government and national objectives.

These community co-management programmes implement the four basic principles of sustainable development defined by Colchester and reviewed in chapter 5:

1. **Basic needs of local communities must be met;**
2. **Natural resources should be subject to local control;**
3. **Local communities must have the decisive voice in planning;**
4. **Local communities should represent themselves in and through their own institutions.**

(Colchester, 1994)

The success of CAMPFIRE and projects like CAMPFIRE vindicates and supports these principles.

8.5 Community based management of boreholes

In concluding this chapter on community-based management it is relevant to note the revolutionary changes that are in the process of design and implementation within the Directorate of Rural Water Supply (DRWS) - a directorate of the DWA - in Namibia. In recognition of the advantages of

community-based management the DRWS is designing, workshopping and implementing a 'strategy in which the community takes responsibility for their rural water supply' (DRWS, 1996:6/7).

The DRWS now recognises that community based management is necessary to promote the sustainability of the DRWS rural water supply development programme (DRWS, 1996). Consequently, it recommends the gradual phasing in of community management of boreholes and the establishment of partnership between local users and government (DRWS, 1996).

'Where possible, it should be left to the community itself to decide on internal priorities and division of responsibilities. It is recommended that community ownership and management of facilities should be adopted as the strategy of choice for the water supply and sanitation sector in the communal rural areas'
(DRWS, 1996:5/4)

Until recently the provision and maintenance of water supply in rural areas, which in most cases means the siting, drilling, installation, operation and maintenance of a borehole, has been the responsibility of the state. Funding has been provided either directly from government or from donors. The capital cost - the cost of siting, drilling and installation of an average borehole is in the region of US\$ 20 000, while operation and maintenance costs vary with the type of installation - diesel, solar, wind or hand pump. (See Appendix 6.)

However, due to increasing pressure on the DWA to meet urban and rural demands, the DWA is phasing in the implementation of a policy which devolves the responsibility for, and cost of waterpoints, to local communities. The Water and Sanitation Policy (WASP), adopted in 21 September 1993, is based on the following principles:

- Essential water supply and sanitation services should become available and affordable to all Namibians at a cost which is affordable to the country as a whole;
- Equitable water supply development will be achieved through the combined efforts of the beneficiaries and government - based on the principles of community participation and mutual responsibility;
- Beneficiaries will contribute to the costs of services - this should be at an increasing rate for provision of water above what is deemed essential for basic needs;
- Communities will have the right to determine what level of service is acceptable to them. This should be within the limits of the resource and with due regard for the environment;
- Development and utilisation of Namibia's water resources should be environmentally sustainable.

(DWA, 1993; ENGE0, 1997)

In implementing this policy, the DRWS has been facilitating the development of local structures and capacity to enable communities to manage and

operate local waterpoints. Over a period of five years, from 1st April 1997, cost recovery for operation and maintenance of water points will be phased in. Full capital cost recovery is expected to be phased in over the next fifteen years (Koch, pers. comm.; ENGE0, 1997).

Thus the DWA is also engaged in a process of devolution of management rights and responsibilities to local user communities. The principles of economic and environmental sustainability, community participation and partnership are again common themes.

However, the emphasis in the DWA policy has been on technical and financial management of waterpoints, not environmental management. Although the DWA commits itself to environmental sustainability, environmental management and environmental assessment, no mechanism or detail has been formulated on how this should be achieved in practice.

9. Environmental Assessment and Management in Namibia

Before independence environmental administration in Namibia was predominantly concerned with conservation and wildlife management. After independence the new government, in keeping with world trends and with the realisation that conservation was only a part of environmental administration, created a new directorate - the Directorate of Environmental Affairs (DEA). The DEA was given the responsibility for the promotion of sustainability in development and protection of Namibia's environment and environmental resources (Glazewski and Tarr, 1996).

Namibian environmental assessment policy and procedure was developed in consultation with IEM experts from South Africa (Glazewski and Tarr, 1996). It is not surprising, therefore, that there are many similarities with IEM in South Africa.

However, Namibia has pioneered and formalised a unique 'fast track' system for implementing environmental management for small-scale, semi-formal mineral prospecting operations. This approach is apparently unique in the world (Tarr, pers. comm.) and provides useful concepts and innovations in procedure which, arguably, could be the key for streamlined, inexpensive, sound and effective environmental management for small, low budget and informal and semi-formal developments.

This chapter highlights useful concepts and mechanisms found in Namibia's environmental assessment policy and procedures which may be included into a model for environmental management of boreholes. It also intends to sketch the administrative context in which the model will operate in Namibia.

9.1 Environmental assessment policy and procedure in Namibia

Namibia has committed itself to sustainable development, stating in its environmental assessment policy that the ideology of sustainable development should underpin all policies, programmes and projects.

The policy states that EIA's are a key tool through which to implement such principles. However, it also commits itself to pursuing an 'active administrative and legislative programme' to promote and achieve sound environmental management (DEA, 1995).

There are several points of note in the policy which are of relevance to following discussion and for the formulation of the model (DEA, 1995):

- The policy makes provision for the creation of an inter-sectoral board - the 'Environmental Board' - to administer the environmental assessment process. It also provides for the appointment of an 'Environmental Commissioner' who would report to this board.
- The policy not only aims to achieve better environmental decisions in development through the environmental assessment process, but it also emphasises implementation through environmental management. This is achieved by the proponent having to enter into a contract with the government - a 'binding agreement based on the procedures and recommendations contained in the EIA report.'
- A list of activities and list of areas will determine when an EIA is required. However, the Commissioner and/or Environmental Board may require an EIA for any project at their discretion. The policy allows for a 'No Formal Assessment' route where, in the judgement of the Environmental Board and/or Commissioner, there are unlikely to be significant impacts.
- The cost of EIA's should be borne by the proponent.
- The EIA for the development proposal is required to consider cumulative and secondary effects within the region.

Thus EIA in Namibia is still in an early formative phase. At present EIA is not a legislative requirement except for mining development and operations as determined by the Minerals (Prospecting and Mining) Act of 1992 (GRN, 1992). A comprehensive Environmental Management Act is in the process of draft and will extend the legislative scope of requirement for EIA. Except for EIA for mining, therefore, EIA is performed on a voluntary basis.

EIA in Namibia has, also, endeavoured to be broad in its approach by proposing to apply EIA procedure not only to individual projects, but to policies, programmes and plans. Thus, as with SEA, Namibia intends to incorporate EIA into the earliest levels of strategic planning. To date, however, most EA's have been limited to the project level (Glazewski and Tarr, 1996). Programmes such as 'Drought Relief' and Rural Water Supply Development have usually not been subject to EIA procedures in their planning (Glazewski and Tarr, 1996; Koch, pers. comm.).

Another challenge facing EIA in Namibia, is that EIA in its present format is 'not effective, or cannot be applied, to the informal sector' (Glazewski and Tarr, 1996). Considering that the informal sector of the economy is growing and a significant contributor to employment, it represents an important sector in which to promote principles and practice of sustainable development.

There is, therefore, an increasing need and aspiration for a more streamlined system for small and informal sector development (Tarr, pers. comm.).

For a variety of reasons, including lack of corporate responsibility or accountability, lack of investor responsibility or accountability and lack of market pressure to attain higher environmental standards, the informal sector is also the most difficult to guide and control in terms of environmental protection. Informal sector development and activities also tend to be economically marginal. Requiring a full, expensive EIA for such informal development initiatives could compromise the viability of this much needed economic development and diversification (Tarr, pers. comm.).

However, faced with the challenge of preventing environmental degradation caused by semi-formal sector prospecting and mining, the DEA has developed and pioneered an efficient, and inexpensive 'fast-track' system to incorporate environmental management strategies into these low-budget operations. This appears to be a unique innovation and although it has only been in effect for 18 months, it has shown immense potential as an effective environmental management system for this semi-formal sector (Tarr, pers. comm.).

9.2 The 'fast-track' system for mineral prospecting operations

In early 1996 the Namibian government granted twenty-five concessions along the northern banks of the Orange River to informal diamond prospectors (Glazewski and Tarr, 1996). These are low budget, economically marginal operations. However, being economically marginal does not imply that they are environmentally benign. Prospecting involves activities such as digging trenches and pits and building tracks - activities which in themselves and through related human activities can have significant environmental impacts in a fragile desert ecosystem.

In cognisance of the fact that these proposed prospecting operations were economically marginal, that environmental protection is important and that these small, informal sector operations are important for the Namibian economy, Cabinet requested that a 'fast-track' and inexpensive environmental assessment system be designed and implemented for this purpose. Full scale EIA would be impossible to implement as not only did the operators have limited financial resources but administration of EIA's for each and every operation would place an increasing administrative burden on government personnel resources as more concessions were granted and EIA's required review.

The solution which Mr Tarr of the DEA proposed and implemented was a streamlined 'fast-track' system which makes use of a pro-forma environmental contract to ensure that prospecting operations are managed in an environmentally responsible way.

This system has been implemented, enabled by legislation and is now integral to the process of obtaining a prospecting permit.

9.2.1 The process of 'fast-track' environmental assessment and management

The 'fast-track' process is summarised in Figures 9.1 and 9.2.

When a company, or individual applies to the Ministry of Mines and Energy (MME) for a prospecting licence they are provided with the:

1. **'Pro-Forma Environmental Contract'** and
2. **'Appendix A'** (the 'Environmental Questionnaire').

The proponent fills in and signs these documents and submits them to the MET (specifically the DEA) for review. If the MET is satisfied with the proposed environmental management of activities, it is approved.

The environmental management proposals detailed by the proponent in 'Appendix A' are rewritten by the MET in the form of a 'Letter of Conditions' of approval which together with the pro-forma environmental contract form the complete contract between the prospector on the one hand, and the government of Namibia, represented by both the MET and MME, on the other.

The proponent will then receive 'Environmental Clearance' to begin prospecting and have fulfilled the environmental requirements of the prospecting licence issued by the MME.

As required by the pro-forma environmental contract a bi-annual environmental report on the prospector's environmental performance is submitted by the prospector to the DEA. The pro-forma environmental contract also makes provision for periodic inspection of sites and activities by the DEA - a form of environmental audit. The prospector may lose the prospecting licence if there is a breach of contract. However, the emphasis from the DEA is on co-operation and assistance to help prospectors achieve environmental ideals, rather than on policing and penalties.

If prospecting reveals viable mineral deposits, the application for a mining licence will, nevertheless, require a full environmental assessment as would normally be required.

These components of the 'fast-track' process are now individually discussed.

A comparison of the process followed by (a) small-scale semi-formal prospecting and (b) formal prospecting and mining, with regards to Environmental Assessments, Environmental Contracts and Environmental Reporting.

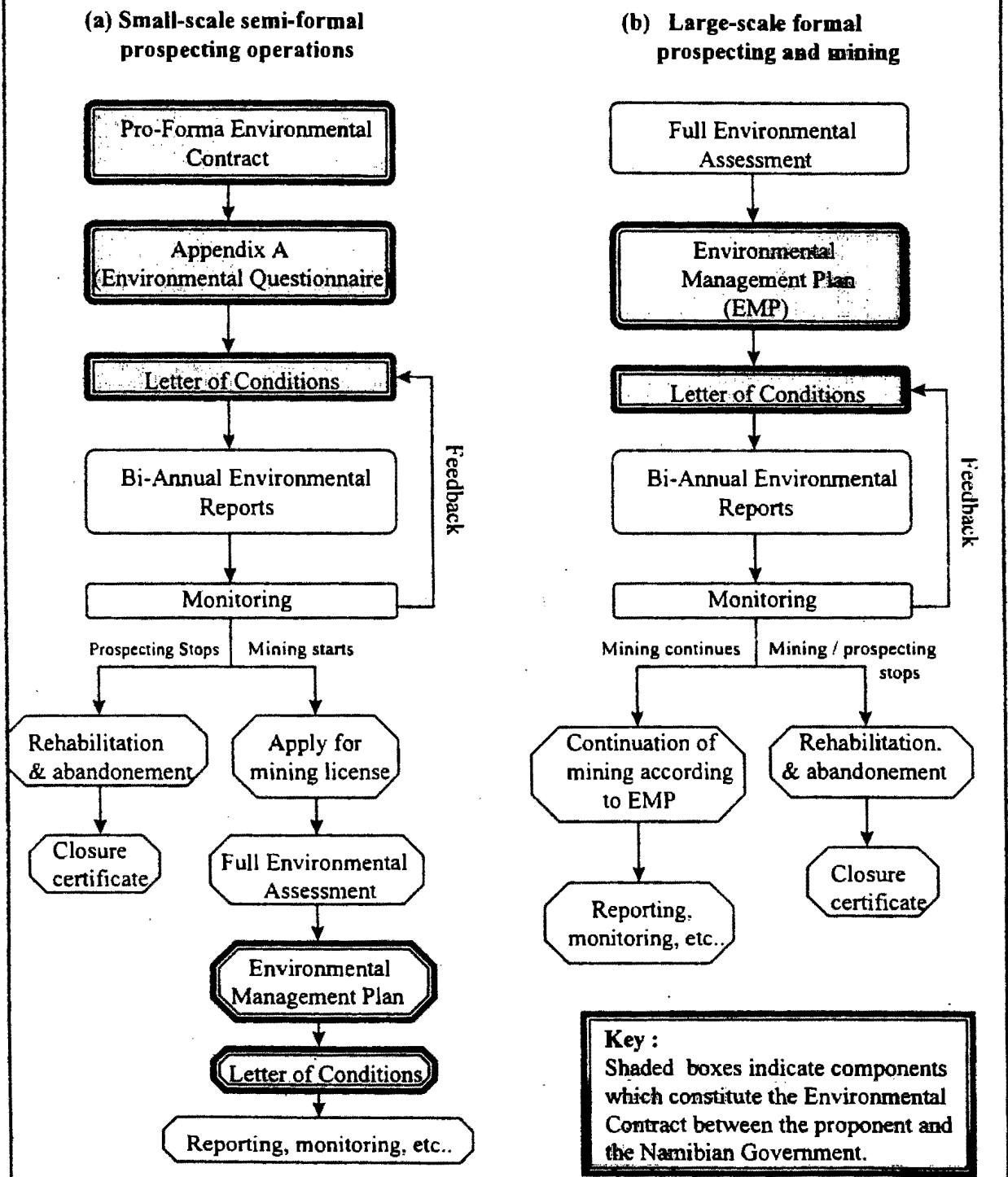


Figure 9.1: The 'fast-track' process for small-scale semi-formal prospecting operations compared to the full EIA procedure for mining (reproduced from Glazewski and Tarr, 1996)

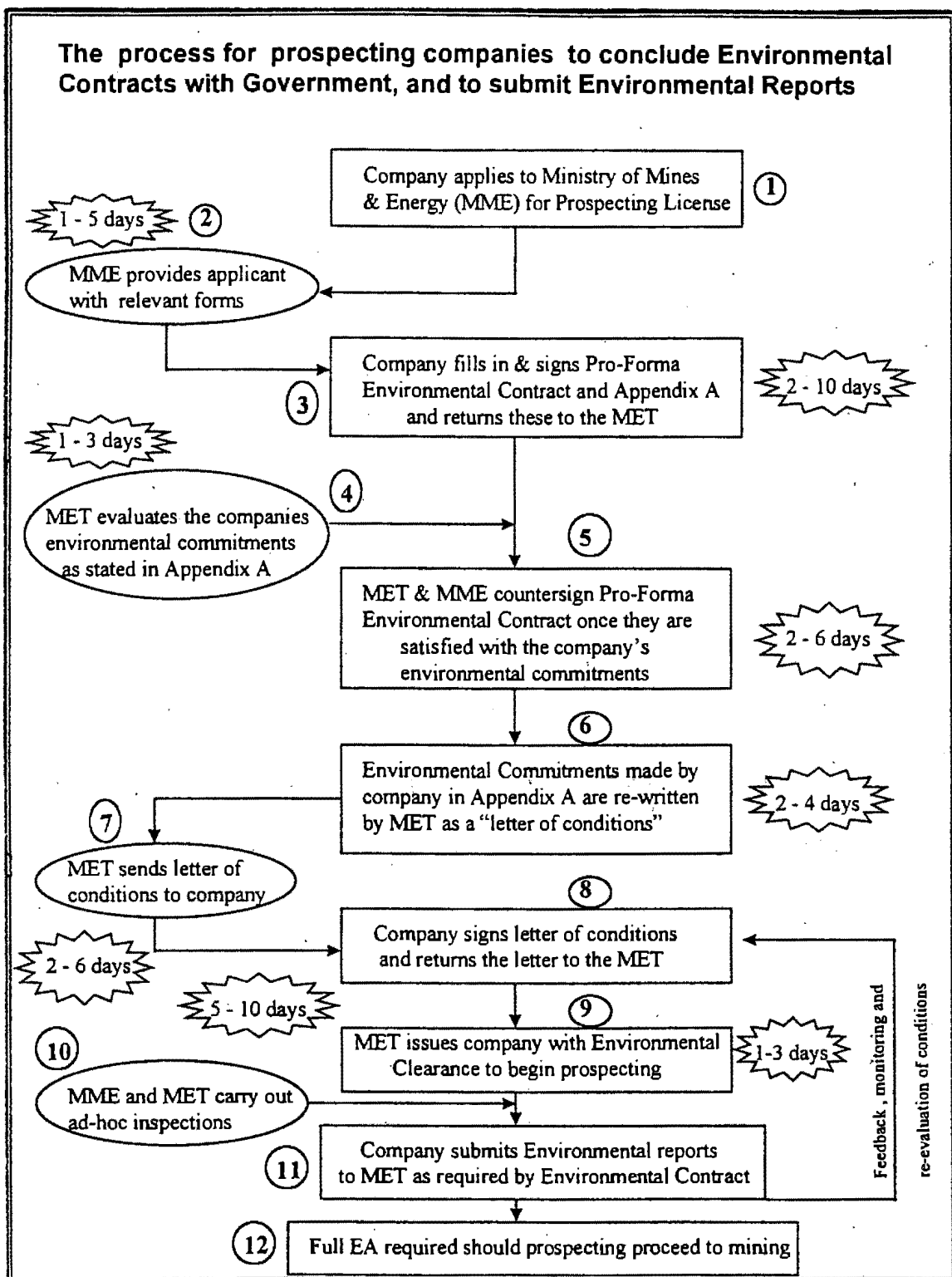


Figure 9.2: A step-by-step illustration of the simple and potentially quick process for prospecting companies to gain environmental clearance for operation. (Reproduction of an information supplement provided by the MME and DEA for potential prospectors applying for prospecting licences.)

9.2.2 The 'pro-forma environmental contract'

The 'pro-forma environmental contract' is the basic document of the contract between the government and the prospector. It is a two and a half page document detailing the general environmental obligations and responsibilities of the prospecting company and liabilities in the event of breach. It does not detail the specific activities of the prospector or an environmental management plan for the operation. A copy of the pro-forma environmental contract is to be found in Appendix 1.

In summary, the pro-forma environmental contract requires the prospector to recognise that prospecting operations and related activities may have negative effects on the environment and that the prospector must take 'every practicable step necessary to ensure mitigation of such impacts' in order to reduce environmental damage to a minimum (section 2.2).

In the event of breach of the environmental obligations the prospector may be held liable for appropriate rehabilitation of the affected environment. Furthermore, the government may restore the damage itself and recover these costs from the prospector and/or claim compensation for environmental damage from the prospector (section 2.4).

The pro-forma environmental contract also details the prospector's obligations in terms of bi-annual environmental reports and for maintaining records of environmental performance.

9.2.3 'Appendix A' (the 'environmental questionnaire')

In terms of the pro-forma environmental contract and in order to obtain environmental clearance for prospecting, the prospector must detail environmental commitments as required by Appendix A.

Appendix A (the 'environmental questionnaire') is the flexible and more open ended part of the contract. It allows the proponent opportunity to develop and detail his/her own environmental management plan. It, therefore, contains the specifics of environmental management proposals, as determined by the prospector, for one particular operation and site.

The goal of the environmental questionnaire is threefold:

1. to gather information about the prospecting operation;
2. to encourage the prospector to estimate the environmental effects of activities and specify commitments on key environmental issues in the management of prospecting activities;
3. to provide the basis for environmental conditions for the operation.

(Tarr, pers. comm.).

The 'Environmental Questionnaire' requests, *inter alia*:

- A description and particulars of the existing condition of the site. (It is in the proponent's interest to document and detail this as carefully as possible. Many sites are not pristine land and may have sustained environmental damage from previous prospecting activity for which the proponent would not wish to be held accountable.)
- An estimate of the environmental impacts and effect that the proposed activity will have on the environment.
- Details of the proposed measures to minimise or prevent environmental damage from all activities associated with the operation. (The management plan is formulated, therefore, around activities that may have environmental effect such as abstraction of water and disposal of garbage.)

Specifically, the environmental questionnaire requires information and environmental commitments in respect of the following aspects:

1. pollution and waste management;
2. vehicles and earthmoving equipment and the activities for which these would be used;
3. building of roads and access;
4. water usage, conservation and prevention of pollution;
5. protection of fauna and flora;
6. social issues - specifically interaction with local communities and tourists;
7. site rehabilitation.

A copy of the environmental questionnaire is to be found in Appendix 2.

9.2.4 The 'letter of conditions'

After the proponent has completed the environmental questionnaire, it is submitted to the DEA and if satisfactory, it is rewritten as the 'Letter of Conditions' - a legally binding component of the contract.

Thus far, it has been the experience of the DEA that, although the DEA in writing the letter of conditions from the environmental questionnaire reserves the right to add to the commitments and environmental targets stipulated by the prospector, this has not usually been necessary. To the credit of this system, the prospector in most cases describes a level of environmental performance for the operation which is, in the opinion of the DEA, adequate or even higher than expected (Tarr, pers. comm.).

These environmental commitments and management plans which are formulated by the prospector himself from the prospector's knowledge of the site and 'expert' knowledge of proposed activities will, therefore, govern environmental management of the operation through the letter of conditions.

9.2.5 The complete environmental contract

There are, therefore, three documents which constitute the complete environmental contract between the prospector and the Namibian government:

1. the **pro-forma environmental contract** which defines the scope of contractual agreement, sets the general conditions of the agreement and defines the rights and responsibilities of each party;
2. the **environmental questionnaire** which requires the prospector to detail commitments to environmental protection and proposed environmental management plans for specific activities;
3. the formal **letter of conditions** which presents these environmental commitments in the letter of conditions of approval.

9.2.6 Bi-annual reports

An 'environmental report' which must be submitted by the proponent twice a year is also in a simple pro-forma format.

A map recording activities and developments must be submitted with the report. The prospector is encouraged to submit any other useful information such as relevant photographs or relevant documentation.

The report has ten sections summarised in Table 9.1 on the following page.

A copy of the pro-forma environmental report is to be found in Appendix 3.

A	Company Details and Reporting Period	Provides details on the company, the site and the report period.
B	Pollution and Waste	Requests details on garbage disposal and sanitation.
C	Vehicles and Earthmoving Equipment	Requests details on the type and amount of machinery on-site.
D	Roads and Tracks	Requests details on new roads and rehabilitation of unused roads and tracks.
E	Trenches and Pits	Requests information on the scale and nature of excavations and rehabilitation of excavated areas.
F	Infrastructural Developments	Requests description of new buildings and other infrastructure - both permanent and temporary.
G	Boreholes, Sample Holes or other Drilling	Requests basic details on drilling - the purpose, methods used and scale and depths of drilling.
H	Water	Requests information on total amount of water used, water sources and estimation of how much water was used for the various activities.
I	Protection of Fauna and Flora	Records damage to fauna or flora including collection of wood.
J	Relations with Neighbours, Officials and/or General Public	Requests information on any conflict with interested and affected parties. These may range from allegations of stock theft, complaints of noise, complaints of pollution or damage to property. It also inquires how such conflicts were resolved or if they remain unresolved.

Table 9.1: A synopsis of the scope of the environmental report in the 'fast-track' environmental assessment and management system for prospecting in Namibia

Reporting is entirely the responsibility of the prospector. Information provided will not necessarily be checked. In the spirit of co-operation the prospector is required to be forthright in areas where the operation is not meeting his/her own set environmental targets or standards. The prospector will be required to provide reasons for shortcomings so that these areas are highlighted and difficulties resolved where possible.

9.2.7 Monitoring and auditing

Provision is made for monitoring and auditing. The prospector is required by virtue of the letter of conditions and the need to submit environmental reports, to monitor the environmental effects of activities. The DEA is entitled to periodically inspect the sites to determine if the stated level of environmental performance is being achieved and reported accurately.

9.2.8 Status to date

This 'fast-track' system was implemented eighteen months ago along the northern banks of the Orange River in southern Namibia. Although the system is, therefore, still in its early stages, the results are very promising (Tarr, pers. comm.).

It appears that the 'fast-track' system is able to implement effective, self-motivated, local environmental management without incurring excessive expense or bureaucratic delays in the process. It has been found that the partnership system between prospector and government has promoted a spirit of co-operation and also, willingness, from both contractual parties, to attain better environmental performance. The result is therefore, more satisfying than what may have been achieved by prescriptive environmental legislation or 'top-down' control (Tarr, pers. comm.).

9.2.9 Summary discussion on the 'fast-track' system for prospecting

This method of 'fast-track' environmental planning and management is innovative and holds immense promise.

The environmental contract could be described as a 'bottom-up negotiated agreement' (Tarr, pers. comm.). It allows the proponent to determine the details of environmental management and the level of environmental performance. The environmental commitments are, therefore, self-motivated and fully cognisant of the scope of prospecting activities, the capacities of the prospector and the diversity of the local environment.

The responsibilities for, and design of environmental management are conditionally devolved to the prospector. This allows the prospector to set his own targets and allows for a flexibility of approach to each operation.

Environmental management is, therefore, not 'top-down', prescriptive and 'centrally' determined.

However, environmental management is not neglected or left entirely to the discretion of the prospector. A type of partnership and co-operation is established by the contract. This combination of central authority and local management is able to produce a synergistic partnership. Local management has the guidance of, and is accountable to, government authority. Government authority has the advantage of a locally appropriate and locally implemented environmental management plan which requires minimal input from government in its oversight.

Not only is this able to engender a co-operative rather than confrontational relationship, but it provides the opportunity to continually improve the quality of local management through feedback, consultation and reporting. In so doing, it promotes individual ideas, creativity and motivation in solving local environmental problems regarding prospecting operations.

An important advantage is that it raises a wider awareness of environmental protection and requires the prospector and those involved in the prospecting activity to be accountable for environmental protection.

Most importantly the system is cheap and efficient to administer, does not incur excessive delays and bureaucracy and, therefore, does not represent an insurmountable obstacle for small operators to overcome. It, therefore, is able to support much needed small-scale economic enterprise without compromising on environmental protection.

9.3 Discussion and appraisal in terms of sustainable development for boreholes

9.3.1 Co-management - towards sustainable development

The pro-forma environmental contract implements a type of co-management system. In this co-management system each party has legally defined rights and responsibilities. The prospector gains prospecting rights but has the responsibility to devise and implement an environmental management plan and report on environmental performance. The government has the responsibility to audit environmental performance, provide advice and administer the system. It also has a wider responsibility to the environment and Namibian citizens both in terms of environmental protection and the potential economic benefits of prospecting.

Each party is of benefit to the other. Of note is the value of environmental management at the local level. Although the prospector is unlikely to have 'indigenous knowledge' at his/her disposal, he/she does have 'local' knowledge. He/she would likely have more insight into local conditions, difficulties and opportunities as regards environmental management. The

prospector is, therefore, in the best position to determine the details of the environmental management plan. The prospector is also obviously the key role player in implementation of the plan and, because of the contract, has vested interest in implementation of sound environmental management. The result is a locally defined, motivated and implemented environmental management system which articulates well with central government and national interest.

Thus the 'fast-track' concept succeeds in easily and elegantly implementing a co-management system through a pro-forma environmental contract. The success shown thus far with the system reinforces the usefulness of co-management in the context of small-scale development.

This is arguably a significant contribution towards identifying mechanisms which promote sustainable development. It supports the sustainable development principles of co-management or partnership and use of local knowledge and local expertise in local environmental management. It promotes the subsidiarity principle of sustainable development in that the key management decisions are taken at the most local level possible.

9.3.2 Overcoming procedural weaknesses of EIA

The 'fast-track' system overcomes two key weaknesses in the existing EIA procedure.

Firstly, it overcomes the logistic difficulties, expenses and administrative obstacles in applying environmental assessment and achieving adequate environmental performance from each and every small operation. Secondly, the emphasis of the system is one of environmental management. While EIA has been weak on environmental management, this system allows a framework for an effective local environmental management system (or EMS) which remains accountable to an authority.

9.3.3 A potential weakness of the 'fast-track' system

A possible weakness of this system is that the environmental assessment stage is not elaborate or comprehensive. Environmental assessments are not performed for each operation. The DEA made use of a limited information base for the drafting of the pro-forma environmental contract and determining the scope of the environmental questionnaire.

'... limited biophysical baseline data on the area, occasional reports and publications, aerial photographs and local knowledge were used to identify the main issues and areas which would most likely be impacted.'

(Tarr, pers. comm.)

Thus the information base on which the system is designed and founded is not comprehensive. It may have been beneficial if an extensive environmental

investigation had been undertaken to tease out and consolidate the information base for the system. This would not be an investigation into the environmental impacts of a specific operation but a general investigation determining the scope and nature of possible impacts from prospecting activities.

This would be used to develop guidelines and sound options for environmental management plans for prospecting. It would be an information resource which both the government party and the prospector could use to improve environmental performance.

10. From Analysis to Synthesis - building the Model

On the basis of preceding discussion, this chapter develops a model for environmental assessment and management of boreholes and similar type small-scale community development.

In this chapter the concepts, processes and principles which have been discussed in the preceding four chapters and identified as useful for sustainable development regarding boreholes in rural Namibia are further examined. These various aspects are reformulated and synthesised into a model for environmental assessment and management of boreholes in communal areas of Namibia.

The three key determinants which guide this synthesis and reformulation of principles, processes and concepts into a model are:

1. the understanding of sustainable development attained in chapter 5;
2. the understanding of the logistical, administrative and financial constraints of a developing country and the limits of conventional EIA operating in this context;
3. the understanding of the need for emphasis of environmental management in EIA.

In this chapter only the concepts, processes and mechanisms of the model will be presented. In chapter 11, the model and its application to boreholes in communal areas in Namibia will be elaborated and illustrated - using the information gained from fieldwork, literature searches and the ENGEO baseline report.

10.1 Characteristics of boreholes as a development activity type

The purpose of the model is to provide an environmental assessment and management system for boreholes. However, it is intended that the model which is produced may be applied, with appropriate modification where necessary, to other similar small-scale community development projects. Therefore, although borehole provision is the development which is in mind in this discussion, the language used deliberately aims not to limit thinking only to boreholes.

Thus it is important to briefly review the characteristics of boreholes which make them a suitable subject for the model. Many other small-scale community or informal development activities may be characterised by these traits and, therefore, also be amenable to the model.

In Namibia, boreholes as a development activity type may be described by the following characteristics:

1. boreholes are small-scale, low budget development activities;
2. boreholes are a necessary and basic development activity;
3. boreholes are an extremely common development activity;
4. boreholes have significant environmental impacts which may be of regional or national significance on the cumulative scale;
5. provision of each borehole is an individual project, in an unique locality with unique environmental impacts;
6. borehole provision in communal areas is in the context of a communal land tenure system and accesses a common property resource.

10.2 Key objectives of the model

Boreholes are development projects which, given their potential for contributing to environmental degradation, should require EIA (ENGEO, 1997). Boreholes also provide a basic human need - water. Furthermore, implicit in the provision of a borehole is the concept of a natural resource - groundwater which, in accordance with the sustainability principles should be managed by the local user community who should be empowered to do so.

In the pursuance of sustainable development, therefore, a model for environmental management of development such as borehole provision must integrate aspects of EIA and community management of a natural resource.

The review of IEM, EMS, CAMPFIRE/CBNRM and pro-forma environmental contracts, as well the sustainable development discussion in chapter 5, has highlighted many of the potentials for environmental assessment and management, its pros and cons and techniques of its application in various contexts.

It is from this base that the targets and objectives of an appropriate environmental assessment and management model are presented in summary form in Table 10.1.

These evolving objectives will further direct the synthesis of the model.

Objectives of the Model

Overall objectives	<ol style="list-style-type: none"> 1. Effective model of environmental assessment and management which is able to promote sustainable development for small, low budget community developments such as the provision of a borehole; 2. Environmental assessment and management must not impede the development (e.g. provision of water) but must function to enhance positive impacts and mitigate negative impacts through appropriate environmental management.
Key ideological objectives	<ol style="list-style-type: none"> 1. Promotion of sustainable development through community co-management given the full meaning and implications of these terms imparted by previous discussion; 2. Informed decision-making and management; 3. Local autonomy and flexibility to give scope to and recognise the importance of the diversity of locally appropriate structures and management; 4. Recognition of heterogeneity of local communities, needs and conditions; 5. Macro- and micro-coherency in environment and development; 6. Pro-active, positive, creative and co-operative environmental management.
Key process objectives	<ol style="list-style-type: none"> 1. Provision made for a comprehensive EIA process; 2. A practical and effective mechanism for implementing EIA findings in ongoing environmental management; 3. Obtaining a synthesis or integration of environmental assessment and environmental management in the process; 4. A process which is user-friendly, streamlined, easy to implement and allows efficient environmental monitoring and auditing of the development; 5. A dynamic process which can include review and continual improvement; 6. A process which can functionally articulate local management with broader national concerns and policy; 7. A process that is adaptable to a variety of low budget community development projects; 8. A process which achieves meaningful community involvement.
Key objectives regarding structures	<ol style="list-style-type: none"> 1. Use of existing community and government structures; 2. Unit of proprietorship should be smallest possible effective unit - the subsidiarity principle of sustainable development; 3. Coherence with other existing 'structures' such as government policy, legislation, development initiative and trends and environmental initiatives and trends.
Key administrative objectives	<ol style="list-style-type: none"> 1. Simplicity in terms of implementation and administration; 2. A process that is inexpensive to implement and administer and that does not jeopardise or limit economically marginal projects by requiring unrealistic expenses in terms of EIA; 3. An environmental management system not excessively demanding of, or burdensome to personnel and administrative resources.

Table 10.1: Summary of main objectives for the model

10.3 Key elements for inclusion into the model

In the light of the discussion of the previous chapters and the need to crystallise the argument and highlight key components for the formulation of an environmental assessment and management system for boreholes in rural areas of Namibia, Tables 10.2 to 10.7 present a summary of progress.

They present a summary evaluation of the four established approaches to various environmental assessment and management practices:

- 1. IEM;**
- 2. EMS;**
- 3. CAMPFIRE/CBNRM;**
- 4. The 'fast-track' process for prospecting.**

The hypothetical concept of **IEMS** has also been included for the value of its contribution.

<i>IEM - summary of relevance</i>	
Innovations and key merits	<ul style="list-style-type: none"> • Recognition of the need in the developing world to integrate development with sound environmental stewardship; • Environment not romanticised but seen as resource available for utilisation; • Use of environmental assessment as a vehicle of democracy, capacity building and empowerment; • Emphasis on informed decision-making based on expert and public knowledge from participation; • 'Cradle to grave' approach in project management; • Intended for programmes as well as projects.
Potentially useful aspects of process, methods and techniques	<ul style="list-style-type: none"> • EIA integrated into a system more appropriate for developing world; • Independent, external EIA team; • Pro-active techniques of public participation; • Use of environmental contract and/or conditions of approval to articulate and transfer the information base attained in IEM to the implementation phase.
Weaknesses or reasons for not being appropriate in terms of the model	<ul style="list-style-type: none"> • Conceptualisation of development is based in a 'western developmentalist paradigm' - an external definition of development; • This conceptualisation of development dominates and defines the process; • Process largely developed around and appropriate to larger development projects - especially industrial projects; • Administration of IEM process is time, resource and personnel intensive; • Meaningful public participation may be limited and weak in practice.
Key elements for possible inclusion into the model	<ul style="list-style-type: none"> • Using an external team, relevant experts, public input and review processes and as a programme-level process can create information base for environmental impact assessment and management.

Table 10.2: A summary of the relevance and potential contributions to the model of IEM

EMS - summary of relevance	
Innovations and key merits	<ul style="list-style-type: none"> • Internal or 'local' design of details of EMS but based on given standardised system and process; • Internal design allows full use of 'local' knowledge and resources with all the advantages regarding understanding of 'local' conditions and 'local' vested interest in implementation and success; • Internally implemented, reviewed and improved system; • Deming cycle of feedback to inform evaluation and allow continual improvement; • Certification is not on environmental results, <i>per se</i>, but judged on the implementation and integrity of the management system.
Potentially useful aspects of process, methods and techniques	<ul style="list-style-type: none"> • Establishing policy as starting point; • Requirement for an environmental management plan to state environmental targets and objectives and means of attaining these; • Emphasis on need for organisational structure; • An internally-motivated and 'policed' system.
Weaknesses or reasons for not being appropriate in terms of the model	<ul style="list-style-type: none"> • Based almost entirely in the developed world corporate environment; • Assumes reasonable corporate capacity in terms of management and implementation; • No specific information base for corporation to utilise in designing EMS details; • Driven by, and basis of 'policing' through market, trade and consumer pressures - and in some cases legislation or impending legislation.
Key elements for possible inclusion into the model	<ul style="list-style-type: none"> • A locally appropriate management system designed and implemented by those in best position to do so; • Success is not attainment of environmental results, <i>per se</i>, but implementation of system to achieve these results.

Table 10.3: A summary of the relevance and potential contributions to the model of EMS

<i>EMS - summary of relevance</i>	
Innovations and key merits	<ul style="list-style-type: none"> • By integrating IEM and EMS in a manner which exploits their complementary strengths and compensates weaknesses in the other, an environmental assessment, implementation and management system may potentially be achieved in a synergy which achieves a system more powerful than the sum of the parts.
Potentially useful aspects of process, methods and techniques	<ul style="list-style-type: none"> • External assessment, information gathering, analysis and evaluation stage; • An informed internal EMS stage which may capitalise on, and be driven and directed by the IEM phase - that is, a specific information base for the EMS process; • Use of environmental contract/ legal agreement to formalise this articulation.
Weaknesses or reasons for not being appropriate in terms of the model	<ul style="list-style-type: none"> • Fusing an IEM process with an EMS for each phase of construction, commissioning, operation and decommissioning may become an unwieldy process and expensive in terms of personnel, time and financial resources; • Logistically inappropriate for the model.
Key elements for possible inclusion into the model	<ul style="list-style-type: none"> • Integration of IEM and EMS: a baseline IEM process which not only integrates with the EMS stage by providing an information base to guide and inform the EMS but also guarantees this by use of a legal contract.

Table 10.4: A summary of the relevance and potential contributions to the model of the IEMS concept

CBNRM / CAMPFIRE - summary of relevance	
Innovations and key merits	<ul style="list-style-type: none"> • Proven success of community co-management of resources; • Conditional community autonomy in resource management; • Devolution of rights, power and responsibilities to local level; • Incorporates principles conducive to sustainable development; • Community empowerment to define nature of development and locally appropriate definition of development; • Constructive synthesis of local and external knowledge; • Synergistic and mutually beneficial partnership between community level and government level and between local needs and concerns and national needs and concerns - micro-coherency and macro-coherency; • Flexibility for development and resource management appropriate for, and cognisant of, the local social, economic, ecological, cultural and political diversity of conditions.
Potentially useful aspects of process, methods and techniques	<ul style="list-style-type: none"> • Enabled by legislation; • Legal agreement determining conditions of community management and rights and responsibilities of both parties; • Emphasis on community structures and organisation; • Fair government recourse in the event of breach.
Weaknesses or reasons for not being appropriate in terms of the model	<ul style="list-style-type: none"> • A community-based resource management project with no EIA aspect; • Impetus and momentum for the project at local level driven by potential for economic gain which may not be as relevant to some developments - like provision of a borehole.
Key elements for possible inclusion into the model	<ul style="list-style-type: none"> • Conditional devolution of rights of resource management to community resulting in community co-management and the full range of benefits, advantages and ramifications implied in the term and as regards promotion of sustainable development.

Table 10.5: A summary of the relevance and potential contributions to the model of CAMPFIRE / CBNRM

***'Fast-track' system for prospecting
- summary of relevance***

<p>Innovations and key merits</p>	<ul style="list-style-type: none"> • Pro-forma environmental contract; • Environmental questionnaire - an environmental management plan written by the proponent which is reworked as letter of conditions - as key mechanism to 'fast-track' the process and minimise costs and demands on administration and resource use; • An adaptation of 'community' or 'local-level' co-management; • 'Bottom-up' negotiated agreement on environmental management suitable and feasible for informal/ semi-formal sector; • Does not jeopardise economically marginal projects; • Attains commendable degree of co-operation and motivation to fulfil environmental conditions and attain environmental performance.
<p>Potentially useful aspects of process, methods and techniques</p>	<ul style="list-style-type: none"> • Pro-forma environmental contract; • Locally designed and implemented environmental management plan (environmental questionnaire); • Pro-forma environmental reporting; • Enabled by legislation; • Simple process for implementation.
<p>Weaknesses or reasons for not being appropriate in terms of the model</p>	<ul style="list-style-type: none"> • No comprehensive information base available on which to base pro-forma environmental contract and on which the proponent may base the environmental management plan; • Not designed for community resource management but semi-formal sector entrepreneurs.
<p>Key elements for possible inclusion into the model</p>	<ul style="list-style-type: none"> • Pro-forma environmental contract, environmental questionnaire and letter of conditions as efficient mechanism to implement locally designed environmental management plan and co-management system

Table 10.6: A summary of the relevance and potential contributions to the model of the 'fast-track' system for prospecting

10.4 Conceptual contributions to the model

IEM, EMS, CAMPFIRE / CBNRM and the 'fast-track' system for prospecting have all been proven or advanced as successful approaches - each with its specific focus, objectives and context of assessment and/or environmental management. Each of these has a key contribution which is a significant foundation for the model.

	Basic component of the model
IEM	Development of environmental impact assessment and management information base for decision-making and environmental management using external team, relevant experts, public input and review processes.
EMS	Internally ('locally') designed, motivated, implemented environmental management with internal review and periodic external audit - a locally appropriate environmental management system implemented by those in best position to do so.
CAMPFIRE/ CBNRM	Conditional devolution of rights of resource management to community resulting in community co-management and the full range of benefits, advantages, ramifications and implications for sustainable development implied in the term.
'Fast-Track' process	The pro-forma environmental contract, environmental questionnaire and letter of conditions as key to efficient mechanism to implement local environmental management plan and co-management system.
<p>The concept of IEMS has been forwarded as a hypothetical solution to improve environmental management after environmental impact assessment. This is a foundation concept for the model.</p>	
IEMS	Integration of IEM and EMS: a baseline IEM process which not only integrates with the EMS stage by providing an information base to guide and inform the EMS but also guarantees this by use of a legal contract.

Table 10.7: Summary table of key contributions which become basic components and concepts in the model

The IEMS process was previously represented by the following diagram:

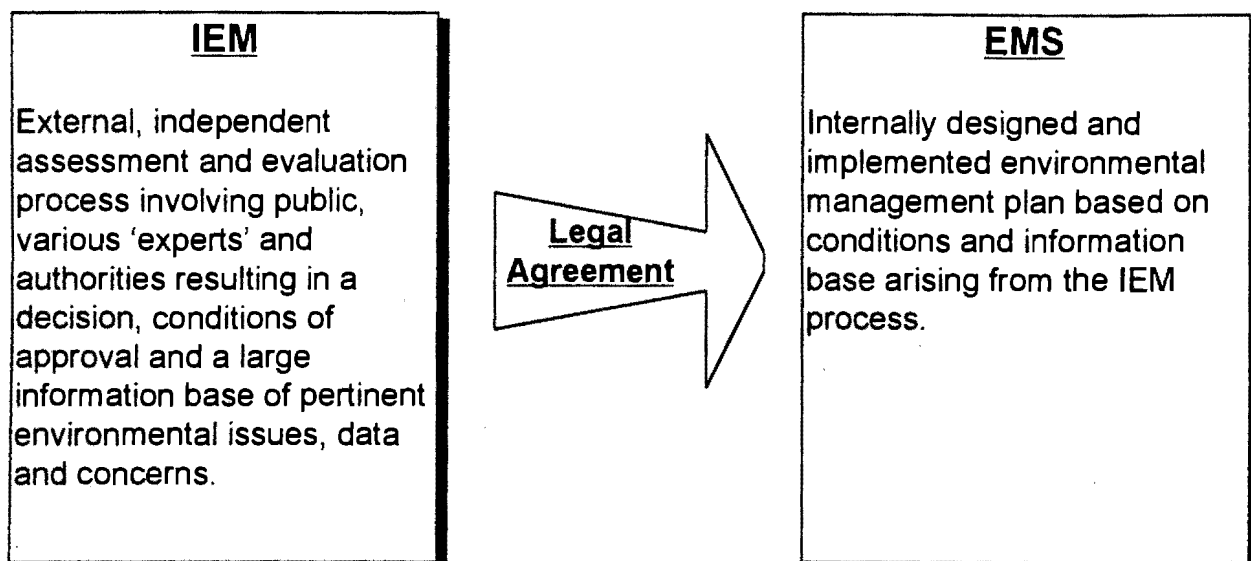


Figure 10.1: The IEMS proposal as the basis and starting point for the model

The IEMS proposition, as represented by the Figure 10.1, forms the basis of the model and a starting point for developing the model.

The IEMS process includes all aspects of sound 'cradle to grave' environmental management. It has the advantage of being based on IEM which has been formulated for environmental management in the developing world. IEM incorporates the beneficial aspects of guiding development, adopting a broad definition of environment, optimising integration of expert and public knowledge and concerns. The result is a comprehensive information base for decision-making.

The relative weakness of IEM - comprehensive, structured implementation of this information base - is compensated for by the integration of IEM with EMS allowing the information to be used to its full potential through a comprehensive and legally underpinned management system. It is on these strengths that it has been proposed as a process to achieve better environmental management. It is on these strengths that it is proposed as the basis of the model.

10.5 Synthesis of a model

To present the synthesis of the model, a simplified representation of IEMS - as a concept of a comprehensive process which fully addresses environmental assessment and environmental management - is used as a starting point.

An environmental assessment stage is implemented by means of an environmental management system - the process mediated by a legal agreement.

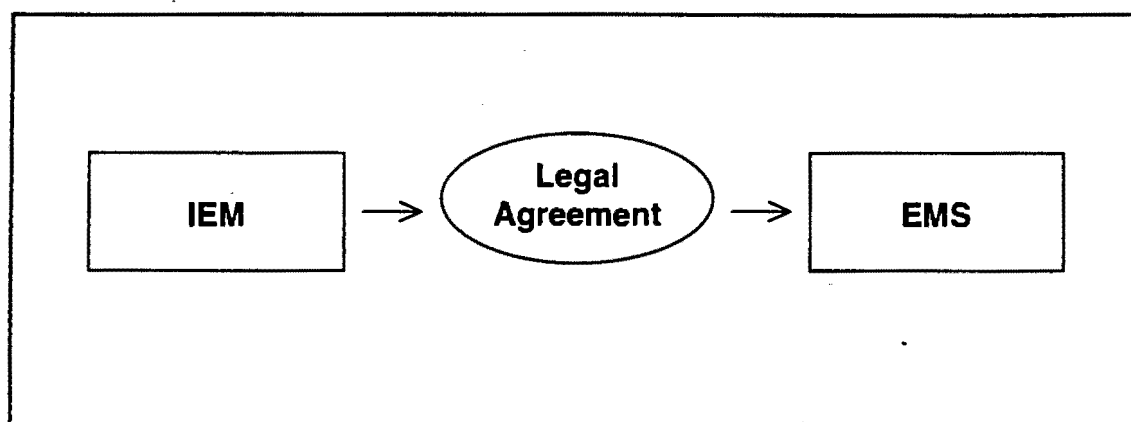


Figure 10.2: Schematic presentation of IEMS process

However, each of these components must be modified to be appropriate for the context of sustainable development for multiple small community projects - such as boreholes - in rural Namibia.

Thus the environmental assessment is modified to a single baseline '*generic environmental assessment*' of boreholes in communal areas in Namibia. This generic environmental assessment stage creates an appropriate information base.

This information base, in turn, informs the goals, structure and content of the legal agreement - which is modified into a *pro-forma environmental contract* appropriate for the context and for this purpose. Implicit in the *pro-forma environmental contract* is the mechanism of the environmental questionnaire and letter of conditions as described by the 'fast-track' system.

The *pro-forma environmental contract agreement* empowers and informs customised, locally-designed and locally-implemented environmental management plans and sets up a co-management system between the local community and the government. Thus the EMS of IEMS is modified to be a *co-management system*.

The diagram can be represented thus:

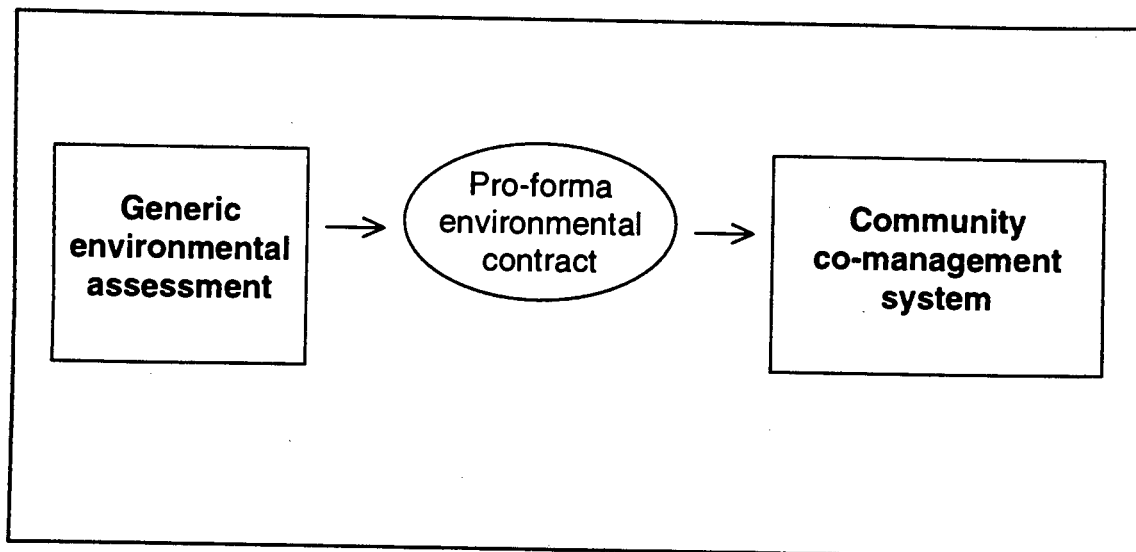


Figure 10.3: Adapting the components to the context

The pro-forma environmental contract does not only implement the information obtained from the generic environmental assessment and create the opportunity for this to be adapted to a locally-appropriate environmental management system, but it also forms the contractual basis for the partnership between government and local community.

Establishing co-management is indeed how it functions in its role in the 'fast-track' system by identifying mutual rights and responsibilities and defining reporting, monitoring and auditing requirements.

The co-management system is a partnership between government and local community. The pro-forma environmental contract provides the legal basis of this partnership.

These are the two key functions of the pro-forma environmental contract and are presented by the evolution of the diagram in Figure 10.4.

Figure 10.5 emphasises the components of the model beginning to function in a system.

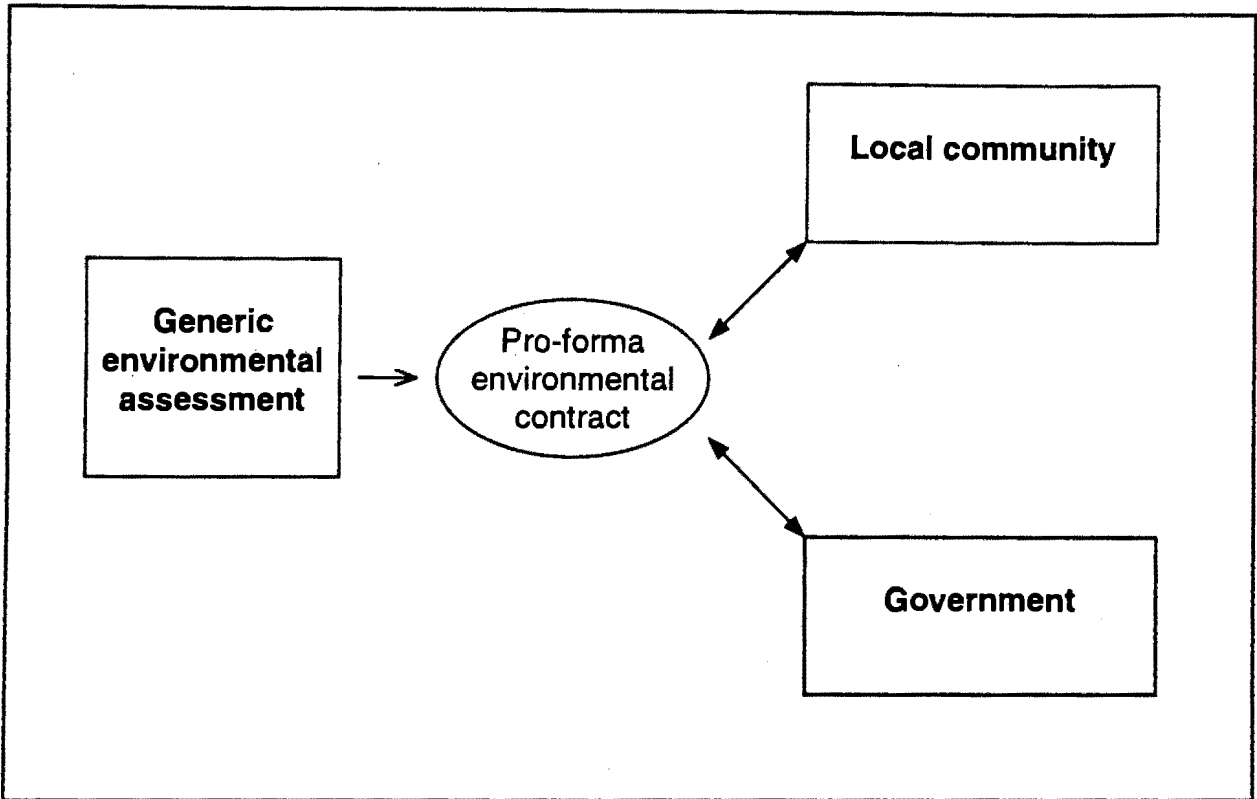


Figure 10.4: The additional role of the pro-forma environmental contract - defining the co-management relationship

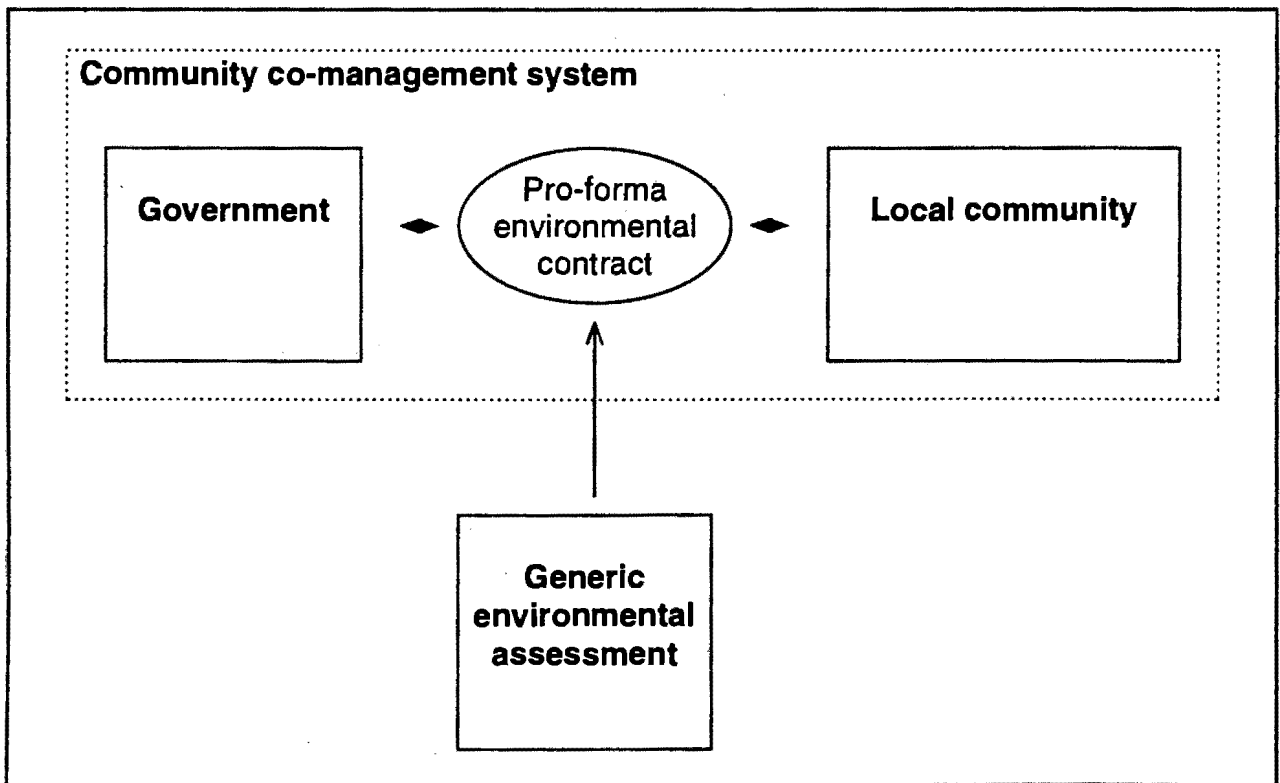


Figure 10.5: Emphasis of the system of co-management

Given the role of the generic environmental assessment in providing an information base for all aspects of the model the schematic diagram could finally be presented by Figure 10.6 which emphasises the information base as the basis of the co-management system in the model.

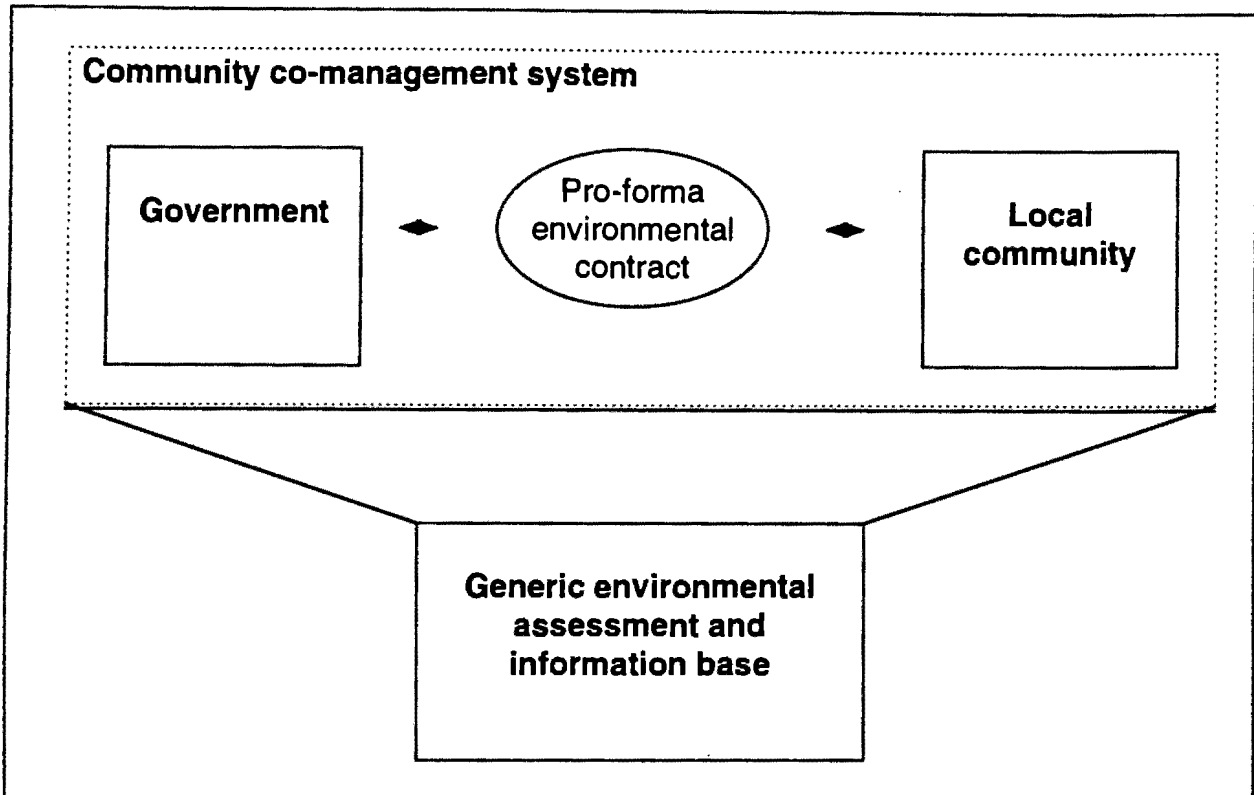


Figure 10.6: Schematic overview of the model showing roles and relations of basic components in a whole system

Thus the pro-forma environmental contract is the central mechanism which not only establishes and informs the local-level environmental management system but also by its nature, establishes the co-management relationship between the community and the government.

The result should be a co-management system where there is a locally designed and implemented environmental management system based on, and informed by the generic environmental assessment and working in co-operation with the government and national objectives. In the nature of co-management the pro-forma environmental contract will establish the rights and responsibilities of each party.

Only the basic components of the model are portrayed in Figure 10.6.

This schematic overview is elaborated in the course of this chapter.

10.6 A broad synopsis of the model

Therefore, there are three basic facets of the model:

1. A **'generic environmental assessment'**
2. A **'pro-forma environmental contract'**
3. A **'community co-management system'** involving:
 - conditionally autonomous local community management administering a locally appropriate environmental management system,
 - in partnership with government administration,
 - informed by and based on the generic environmental assessment.

In order to elaborate on and further describe the model, the process envisaged for the implementation of the model will be examined in detail.

This would have two broad stages:

- **A baseline, 'once-off' set-up stage**
- **An ongoing operational stage**

The **set-up stage** would include the initial generic assessment which establishes a baseline information resource. It contributes to the drafting of a suitable pro-forma environmental contract and environmental questionnaire as part of the pro-forma environmental contract. This phase would have the most external input and also entail the greater portion of the capital costs. Once this is achieved, however, the streamlined 'fast-track' system is ready to operate efficiently and inexpensively.

Once the information base is established and the pro-forma environmental contract and environmental questionnaire are drafted, the **operational stage** is streamlined. A community wanting a borehole would need to use the appropriate local structure as required by the pro-forma environmental contract. This community organisation, such as a local water committee, would by the pro-forma environmental contract enter into an agreement with the appropriate government structure. The pro-forma environmental contract will establish this legal co-management relationship and stipulate the conditions of borehole provision and the scope of environmental management.

The local community - given the information base and their own local expertise and knowledge - would draft the details of environmental management in completing the environmental questionnaire. The community's commitments to sound environmental management are, therefore, documented and become part of the conditions of approval.

measures and outline potential recommendations for sound environmental management. This information and these recommendations are presented in the awareness of the diversity of local conditions and diversity within projects of the same type.

It is of importance in the model to understand that, given this diversity of local conditions, the generic environmental assessment is not absolute or specific in terms of information provided but may give general and specific guidelines which may have varying degrees of applicability to a given local context and development.

It should, however, be able to highlight the key and common areas of environmental impact - such as overgrazing around a borehole - and where a locally appropriate management plan - such as a grazing rotation plan - would be beneficial or should be implemented.

Thus, although it may take the view of a whole programme - such as borehole provision programme - it is not a SEA or merely a programme level IEM as its concern is not the overall planning of water provision in rural areas or impact assessment of a particular borehole provision programme. Unlike a SEA, the generic environmental assessment, although able to take a broad mountain top view as well as study individual projects, still maintains its focus and locus of influence at the individual project level and at environmental management at the individual project level.

10.7.1.2 Relevance of IEM origins

The environmental assessment is an IEM based process. It is based on the basic principles of IEM given their successful application in a developing country. Therefore the generic environmental assessment should adhere to the following key IEM principles:

- Conceptualisation of environment suitable for a developing country - wise environmental use rather than environmental protection, *per se*;
- Adoption of a holistic approach to environmental problems and management;
- Broad definition of the term 'environment';
- Emphasis on importance of public participation and public knowledge and concern in the process;
- Consideration of alternatives;
- Informed decision-making.

There are, however, principles of IEM which can not be convincingly included into the generic environmental assessment stage of the model, but may be included in the overall implementation of the model and later stages. In fact later stages are better able to optimise these principles than the IEM process.

These include:

- A process which integrates with, and affects the design of the project. As generic environmental assessment is largely retrospective this does not occur. It does, however, have potential to influence design of future projects such as - in the case of boreholes - recommending the use of solar powered pumps as an economically more viable and more appropriate technology in the context of rural Namibia.
- The generic environmental assessment does not empower communities in the same way as IEM. The generic environmental assessment is a more passive information gathering process and it is not bound to one project, one area and one community. Therefore, the link between the generic environmental assessment and a specific community is at first tenuous. However, the later stages of the model which include co-management, are arguably a much more effective empowerment mechanism than can be achieved by IEM. Furthermore the concern that IEM denotes a predetermined development agenda is allayed as after this IEM type process provides the basic information, its implementation and the development agenda will be defined by the community within the context of community co-management.

10.7.1.3 A 'singular' event

The generic environmental assessment is a 'one-off' singular event. It produces the initial information base on which the pro-forma environmental contract and co-management system will operate. The function of the generic environmental assessment is to establish the initial information base and set up the system. It is not necessary to repeat the generic environmental assessment for each situation or programme.

In time it may become clear that there is a need for further investigation into a particular aspect or certain area and additional studies may be commissioned. However, the goal is to produce all the initially required information in a single, cost effective study.

The advantage of this approach is that it should be cost effective. Only one large scale environmental impact study is necessary. Regarding boreholes, for example, it will not be necessary to undertake an environmental assessment for each and every borehole project or borehole provision programme.

This is possible for two reasons. Firstly, the operational, dynamic co-management stage allows for experimentation, accommodation of new information, inclusion of information specific to certain less common scenarios, fine tuning of environmental management practice and modification and updating of the information base. The co-management

system is dynamic and will update itself as new knowledge is included from local, government and expert sources. Secondly, much of the information necessary for the environmental management of the borehole will be found in the local community where it is needed and will not need to be included in the initial information base.

A hypothetical example to explain these points - using boreholes as an example:

A particular community uses an innovative technique to conserve water. While this technique may not have featured in the generic environmental assessment, the concept of water conservation is likely to have been prioritised and requirements for it included in the pro-forma environmental contract and requested in the environmental questionnaire. The community, in adhering to the requirement for maximising water conservation opportunities, implements its own novel water conservation technique. Through reporting, auditing and interaction with the government level, knowledge of this technique may 'trickle' back and, if considered of general value, be added to the information base. Thus, it may become more widely used as it enters the body of common knowledge regarding conservation of water. The information base is, thus, positively modified.

10.7.1.4 An external and independent assessment

The generic environmental assessment is executed by an external and independent professional team. In this respect it is similar to an IEM process or the EIA in most processes.

As with any environmental assessment there may be vested interests - be they financial, political or otherwise. An independent, external assessment team is, therefore, mandatory in terms of credibility.

This is also particularly important in terms of the co-management system which eventually emanates from the generic assessment. The generic environmental assessment should be independent of either party that will be involved in the co-management system.

This is especially important as government is the most likely institution to undertake the assessment if it were not an external, independent team. If this were the case it may discredit the co-management partnership. Furthermore, government legislation, policies, structures and practice relevant to environmental management of the projects concerned should and will also be examined and critiqued in the scope of the generic environmental assessment.

10.7.1.5 Process

The process to be followed is based on standard IEM procedure.

An initial *scoping phase* would be useful to identify the key issues involved and focus the study. This would include the help of experts, literature, participation of stakeholders and fieldwork. Fieldwork would include consultation and discussion with the community and other local experts. Thus, as with IEM, participation would be emphasised and techniques of participation would be appropriate to the context.

This would be followed by the *investigation* - a more extensive and directed information and data gathering phase. Information and data would be analysed and evaluated as in a typical IEM process and culminate in a *report*.

The purpose and products of the report differ from a conventional IEM and it is for this reason that approaches and specific emphases would differ from IEM. The generic environmental assessment is guided and directed by the ultimate goals and purpose of the co-management system.

10.7.1.6 Purpose of generic environmental assessment

The purpose of the generic environmental assessment differs in many ways from a conventional IEM. IEM interacts with and modifies the project concerned and eventually through public involvement, consideration of alternatives and mitigation proposals for impacts, a decision is reached. The decision may result in conditions of approval and a management plan in project implementation.

The terms of reference for a generic environmental assessment need to go beyond a conventional environmental assessment. Although an environmental assessment or IEM may determine the content of an environmental management plan, the generic environmental assessment needs to explore and determine many more aspects of the management system, policies and other influences that will affect operation of the management system.

Unlike IEM, the central focus of the generic environmental assessment is indeed the management system - its scope, content, feasibility and logistics of operation.

Thus, the generic environmental assessment must produce several products. The content and style of the generic environmental assessment will be directed by the need to attain these products.

10.7.2 Products of the generic environmental assessment

The generic environmental assessment is a fundamental basis of the model. This once-off investigation must attain several goals and yield certain products if it is to successfully instate the co-management system.

Product 1	Comprehensive information base.
Product 2	Recommendation and information regarding suitability and feasibility of community co-management through the use of a pro-forma environmental contract.
Product 3	Key recommendations and information for the pro-forma environmental contract.
Product 4	Key recommendations and information for environmental questionnaire - the basis of the environmental management plan.

Table 10.8: Summary of essential products of a generic environmental assessment

In summary, therefore, the generic environmental assessment results in a comprehensive information base which will, in the first instance, inform the structure, requirements and content of the pro-forma environmental contract and environmental questionnaire, and secondly provide information which can inform local-level management systems and ongoing environmental management at the individual project level.

In terms of decision-making, the generic environmental assessment is not primarily concerned with alternatives or whether or not the development activity should occur. It is aimed at providing information so that the development may proceed in the most environmentally sound manner possible. It must include alternatives at the level of alternative project designs and technologies but it is not primarily concerned with alternatives to the project type.

In producing these products, therefore, the generic environmental assessment is setting up the basis and mechanism for sound environmental management.

10.7.2.1 Product 1: Comprehensive information base

The generic environmental assessment needs to elicit information which is relevant to design, implementation and environmental management of the project and how this can be incorporated into the context of community co-management and the wider context of community co-management.

The content of the report emerging from the generic environmental assessment should include:

- **An overview of the relevant national context**
 This describes and evaluates the socio-political-economic framework in which the model will operate and in which the assessment of environmental impacts and environmental management options will be interpreted. In the case of boreholes in rural Namibia, for example, it explores issues from the national economy, political history, land tenure issues to present discourse and trends in development.
- **Information regarding broader environmental trends, pressures and issues in the country**
 In Namibia this would include information on phenomena such as desertification and drought and response to drought. It should cover information on environmental issues and pressures as well as Namibia's dependence on the environment.
- **Appreciation of environmental characteristics of local context**
 It is necessary for the generic environmental assessment to provide insight into the typical characteristics of the local context. Although local diversity is likely to be immense, typical trends and issues of the local environment can highlighted - environment is used here in the broad sense of the word.
- **Assessment of environmental impacts**
 This is a study of the nature and extent of the impacts on the environment resulting from the development activity. It could include an appraisal of direct, indirect and cumulative effects.
- **Management solutions for environmental impacts**
 This is an appraisal of possible mitigation measures for negative impacts and methods for the enhancement of positive impacts through environmental management. In the context of the model it is not intended to be detailed or definitive as the exact form of implementation will ultimately be at the discretion of the local community. It is, however, intended to provide guidelines and information relevant to environmental management for the activity concerned. The information obtained is, therefore, a resource for the drafting of specific environmental management plans.
- **Appropriate technology**
 Included in the information base should be information that will mould and assist the design of individual projects in terms of relevant environmental implications. This should include information on appropriate technology and the inclusion of sustainability criteria into design. For example, with boreholes it

would include an appraisal of different pump mechanisms and top structures in terms of financial sustainability, suitability to the local environment and environmental impact.

Again it is not prescriptive information but functions as a set of guidelines and an information base which is available as a resource in the drafting of specific environmental management plans.

- **Parameters for monitoring**

From the range of environmental data the generic environmental assessment should be able to contribute to community co-management by providing guidelines concerning monitoring of environmental parameters. This would include information such as identification and explanation of useful sustainability indicators which are suitable for environmental reporting in the community co-management system.

A parameter for monitoring overgrazing around boreholes, for example, may be the incidence of an invasive plant species.

- **Assessment of the context of the co-management system**

Local level management will make decisions that are rational in terms of the wider context. It is suggested that local management systems will not only be cognisant of the requirements of the pro-forma environmental contract and local traditional management systems, but also be determined by the wider economic and political context. It is expedient therefore, to understand how this wider context and the formulation of national policy affects local decisions in order that the requirements of the pro-forma environmental contract can be coherent with this context. The generic environmental assessment might recommend changes to national policy and/or modifications to local management systems to obtain this coherency.

- **Appraisal of organisational structures and capacity**

The successful implementation of the community co-management system will require the existence of organisational structure at the community and government level. The generic environmental assessment needs to assess and evaluate the existing community and government structures in terms of their suitability for adaptation to the community co-management system and recommend modifications where necessary.

10.7.2.2 Product 2: Suitability and feasibility information and recommendation

A key question which the generic environmental assessment must address is the suitability and feasibility of adopting a co-management approach through use of a pro-forma environmental contract.

The type of development for which this model is suited, is likely to be characterised by some or all the following criteria:

- Small-scale, low budget development;
- Commonly repeated type of development in communal areas or similar development context;
- Informal or semi-formal sector development;
- The project has significant environmental impacts in itself or in cumulation with repeated examples of the same development;
- Scope and structures exist for community management or 'local-level' management;
- Individual environmental assessment for each project of the same type is inappropriate in terms of expense, logistics and administration.

Investigating this issue will require information regarding the nature of development in question, environmental impacts of the development and the scope and extent of appropriate environmental management. It will also require an understanding of the context in which the system would operate and the knowledge of organisational structures at the government and community level. It should also include comment on the compatibility of this co-management system with other local and environmental initiatives such as CBNRM in the case of boreholes and natural resource management.

The final recommendation, however, will be a matter of judgement taking into account the range of information regarding the nature of the development, its socio-political context and an appreciation for the principles of community co-management and its application in this model.

10.7.2.3 Product 3: Key recommendations and information for pro-forma environmental contract

The pro-forma environmental contract is a basic component of the model. It is informed by the information obtained in the generic environmental assessment and thus, the generic environmental assessment should provide key information and make recommendations for the subsequent effective drafting and operation of the pro-forma environmental contract.

This will include information and recommendations consequent on the broad base of information and the analysis of the generic environmental assessment. Key areas of information where the generic environmental assessment should contribute to the pro-forma environmental contract are the following:

- legislative background and necessary legislative amendments;
- identification and appraisal of suitable contractual parties;
- basic obligations, rights and responsibilities of contractual parties;
- basic conditions of co-management;

- mechanisms of ensuring compliance;
- reporting;
- auditing.

10.7.2.4 Product 4: Key recommendations and information for the environmental questionnaire

The pro-forma environmental contract as described in the 'fast-track' process requires the proponent to fill out an environmental questionnaire which essentially allows the proponent to describe prospecting activity and to identify associated environmental issues and aspects and to make environmental commitments. Thus, it describes and becomes the environmental management plan. The environmental questionnaire is rewritten as a letter of conditions and forms part of the environmental contract.

While the environmental questionnaire in the 'fast-track' system is not based on an EIA, this model includes a comprehensive information base on which to formulate the environmental questionnaire. The environmental questionnaire would, therefore, highlight all the key areas of environmental impact regarding the activity and require the proponent to formulate an appropriate management plan to deal with each aspect.

The generic environmental assessment would have identified activities and aspects of the development which have significant environmental impact. These would form the framework and define the scope of the environmental questionnaire.

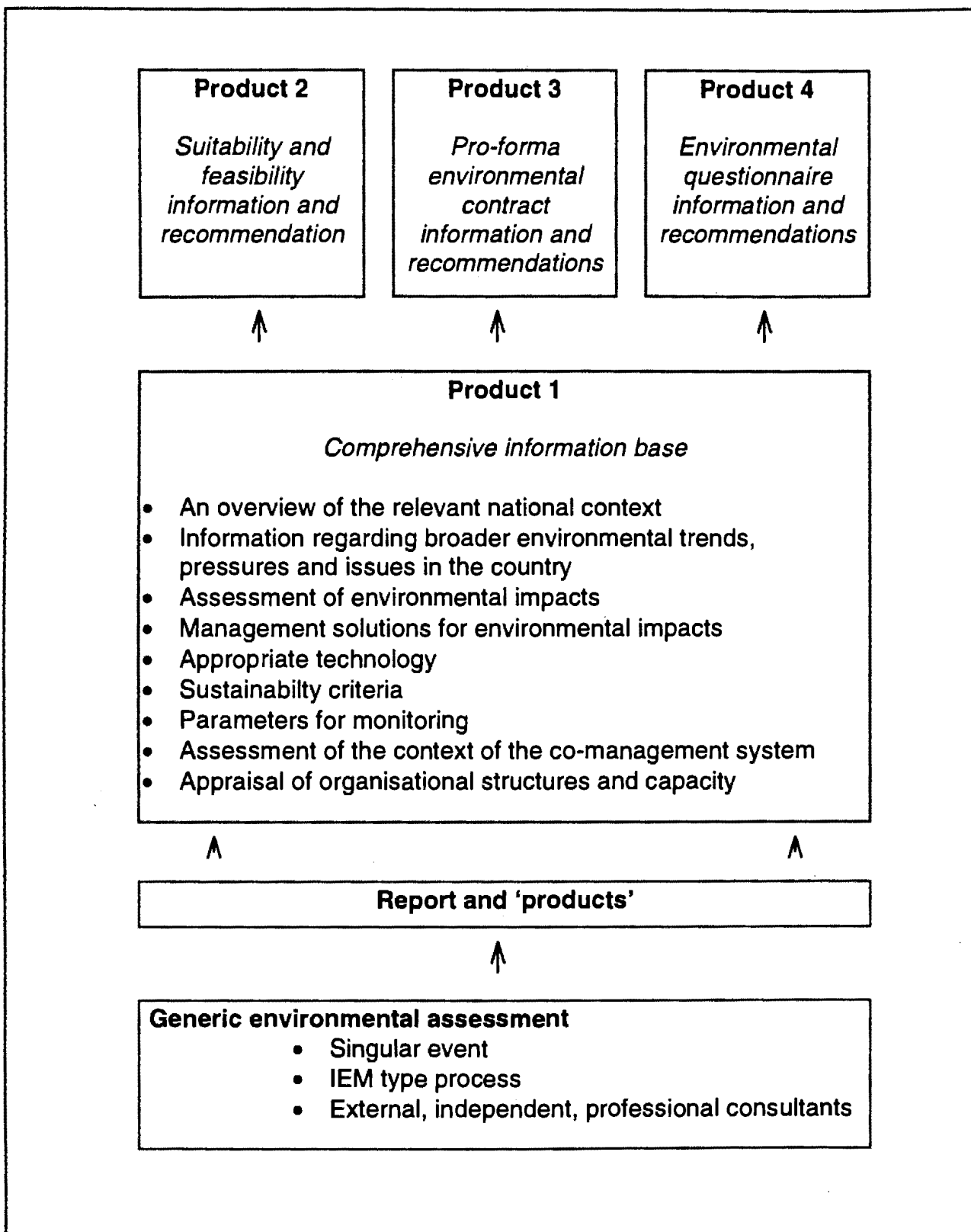


Figure 10.7: Summary of Phase 1 of 'Set-up Stage' - the generic environmental assessment and its products

Set-up: Phase 2

Review, refinement and formalisation

This phase could be steered by an independent environmental consultancy, a government department such as the DEA or by the office of the Environmental Commissioner in the National Planning Commission. It would be advisable for this phase to involve consultation with potentially affected communities and to be workshopped with relevant community organisations.

There are six components or aspects that need to be finalised in this phase:

1. the pro-forma environmental contract;
2. the environmental questionnaire;
3. formation of contractual parties;
4. enabling legislation;
5. definition and publication of process;
6. consolidation and accessibility of information base.

These are facets that can be addressed simultaneously and not necessarily sequentially as presented here.

10.7.3 Drafting the pro-forma environmental contract

The pro-forma environmental contract, as characterised by the 'fast-track' process for prospecting in Namibia, forms the key mechanism which enables effective and efficient implementation of the model. Once it is drafted and the process for a community to enter the co-management system is set up, the pro-forma environmental contract can act as a streamlined mechanism to implement community-based environmental management of boreholes.

The pro-forma environmental contract must establish the following aspects as a foundation for the co-management system:

1. Identification of contractual parties;
2. Overall objective or policy of system;
3. Describe and define the co-management relationship;
4. Define, stipulate and empower the local environmental management plan/system;
5. Describe reporting, monitoring and auditing requirements;
6. Determine recourse in the event of breach.

10.7.3.1 Identification of contractual parties

In the case of the prospecting pro-forma environmental contract the government of Namibia as represented by the MET and the Ministry of Mines and Energy (MME) is one party and the prospector is the other.

Guided by information from the baseline generic environmental assessment, the pro-forma environmental contract would instate suitable parties into the co-management system. The generic environmental assessment would have recommended appropriate community organisations on one hand and government structures on the other. These would preferably be existing structures. In the case of boreholes, for example the local water committees would be appropriate and existing structures to take on this portfolio as an additional aspect to that of financial and technical management of waterpoints.

In the case of boreholes, therefore, it could be the local water committee - as the proponent - on the one hand and the government of Namibia on the other. The government of Namibia may be represented by the DEA and the DWA. Due to the nature of boreholes as a rural activity it may be appropriate for the contract to be agreed between the local water committee and local extension branches of these two government departments.

10.7.3.2 Overall objectives and policy

The pro-forma environmental contract will stipulate a basic policy or principle by which an environmental management plan may be directed. In CBNRM this basic policy or condition is 'sustainability'. In the 'fast-track' process for prospecting it is 'ensuring negative environmental impacts of prospecting are mitigated'.

The basic policy objective and basic condition of devolution of responsibility and co-management could be, for example, 'sustainability through sound environmental management.'

As in EMS, this is a policy directive to guide following environmental management decisions, plans and measures.

Another basic foundation principle which must be included for its role in an environmental management system is the commitment to continual improvement. Thus performance of the local management is not measured by environmental results, per se, but by implementation of the management system. Given the complexity of environmental management and ecological dynamics, no community could guarantee environmental results, but they can guarantee genuine attempts through implementation of an appropriate environmental management plan.

Therefore, the performance of the environmental management plan, not the degree of compliance, is assessed by environmental results.

10.7.3.3 The co-management relationship

The contract needs to define the nature and scope of co-management. It therefore needs to address the following aspects:

- Definition and description of the obligations, rights and responsibilities of each party in terms of environmental management in respect of the development;
- Definition of the nature and scope of local-level environmental management;
- Definition of the nature and scope of involvement of the government party.

10.7.3.4 Provision for environmental management plan

The pro-forma environmental contract as the basis of the co-management agreement must make provision for the environmental questionnaire to become part of the co-management agreement, and to be rewritten as the letter of conditions - the environmental management plan.

10.7.3.5 Provision for reporting, monitoring and auditing

The pro-forma environmental contract must make provision for the requirement of environmental reports from the proponent. It must also require environmental monitoring and make provision for the process to be periodically audited, if desired, by the government party.

Provision must be made for the environmental contract and especially the environmental management plan component to be updated and modified in response to information from monitoring, reporting and auditing. This is important as it is a dynamic environmental management system that updates its objectives and environmental plans and measures in the pursuit of continual improvement.

10.7.3.6 Breach

The pro-forma environmental contract must allow for redress in the event of breach. In the case of the 'fast-track' system this included financial redress, redress through obligation of rehabilitation, and also the possibility of the loss of the prospecting licence.

The type and form of redress would obviously vary with the type of project. For some projects, such as provision of a borehole, this is more difficult as the water supplied by a borehole is a basic human need which cannot be denied. Breach could in these circumstances result in loss of subsidy or imposition of penalties. The generic environmental assessment would also be a guide as to the best mechanism for redress and to ensure compliance.

The mechanism to ensure compliance may be incentive driven rather than penalty driven.

The definition of breach should be defined. Breach is not the failure of a community to achieve the desired level of environmental performance, *per se*. Breach should be defined as the failure of the community to implement appropriate and practical measures as described in the environmental questionnaire. This is a concept underpinning EMS and is crucial for the success of this model and to maintain the intended 'spirit' of co-management.

10.7.4 Drafting the environmental questionnaire

Implicit in the pro-forma environmental contract is the environmental questionnaire.

The aim of the environmental questionnaire is for the proponent to commit to an environmental management plan. Within the whole context of the co-management system, as within the context of EMS, it is necessary to have this specific environmental management plan.

As directed by EMS an environmental management plan should:

- stipulate environmental objectives and targets;
- identify aspects and activities of operation that impact the environment;
- specify plans for attaining objectives and targets as they relate to these aspects and activities;
- detail contingency plans for potential unusual circumstances;
- detail mechanisms for monitoring and checking efficacy of the environmental management plan;
- describe the extent of environmental records which will be kept.

These points are illustrated in Table 10.9 on the following page.

	Example re boreholes
<ul style="list-style-type: none"> • Stipulate environmental objectives and targets. 	Prevention of desertification
<ul style="list-style-type: none"> • Identify aspects and activities of operation that impact the environment. 	Livestock ranching
<ul style="list-style-type: none"> • Specify plans for attaining objectives and targets as they relate to these aspects and activities. 	Rotation of grazing
<ul style="list-style-type: none"> • Detail contingency plans for potential unusual circumstances. 	Destocking in drought
<ul style="list-style-type: none"> • Detail mechanisms for monitoring and checking efficacy of the environmental management plan. 	Monitoring of abundance of perennial versus annual grass species
<ul style="list-style-type: none"> • Describe the extent of environmental records which will be kept. 	Borehole yields

Table 10.9: An illustration of the type of factors that may contribute to an environmental management plan for a borehole

The environmental management plan is detailed in the letter of conditions which is based on the environmental questionnaire. The information from the generic environmental assessment can be used to structure the environmental questionnaire so that this in turn produces an appropriate environmental management plan in the letter of conditions of approval.

The exact detail, depth and complexity of the environmental management plan should be proportional to the scale of activities and potential environmental impacts and in the context of the resources and capacity of those administering the plan. Thus a borehole which serves one family may have an extremely simple plan of grazing rotation and water conservation while a borehole which serves a village is likely to identify more aspects and activities associated with borehole use which can be modified by an environmental management plan.

10.7.5 Contractual parties - setting up

Once it has been decided which local and government organisations would be suitable for the co-management system these would need to be set up. The local community structure is likely to be pre-existing and would, in any case, be formalised for the purpose as it becomes necessary.

Appropriate government structures at regional and /or central level will need to be set in place before the system would run. Again this will likely use existing structures but now with an extended portfolio. Capacity and standards for assessing and approving local environmental management plans as 'letters of condition' would need to be established.

10.7.6 Enabling legislation

To empower the process it may be necessary to amend relevant legislation.

Legislative provision for the 'fast-track' process is found in section 48(4) of the Minerals (Prospecting and Mining) Act, 1992 (GRN, 1992).

In the case of CBNRM this was achieved in the Nature Conservation Ordinance Amendment Act of 1995 (GRN, 1995^a).

As with the 'fast-track' system legislation would make it a legal requirement to enter into a pro-forma environmental contract before the development can be approved. Legislation would also provide legal underpinning for the co-management system.

10.7.7 Consolidating, organising and presenting the information base

The generic environmental assessment would have provided a wealth of relevant information which can be used on an ongoing basis in the operation of the co-management system. It should also be possible to update and amend the information base as experience and additional information directs.

The information base should be available and accessible to all concerned. In particular, synopses of relevant information should be available to communities as they require information for complementing local environmental management strategies in the completion of the environmental questionnaire and formulation of environmental management plans. An important aspect of this stage, therefore, would be the organisation of information from the generic environmental assessment into a format useful and accessible to communities. This may involve the publication of appropriate booklets on environmental management of boreholes, environmental education programmes and courses for those involved, such as local water committee members.

As the system matures it is likely to integrate external 'expert' knowledge with local knowledge as it is applied and information is fed back through reporting and auditing.

Thus the information base should be dynamic, changing and continually collecting and diffusing information in a format accessible to those concerned.

10.7.8 Reporting and reporting format

The system of reporting needs to be defined. This must include definition of:

- report format;
- content of report;
- responsibility for report review;
- responsibility for feedback from reporting;
- responsibility for updating information base.

10.7.9 Definition and outline of process for operational stage

Based on information from the generic environmental assessment and the outcome of the second phase of the set-up stage, a process by which the system would operate can be outlined and published.

An equivalent process outline for the 'fast-track' system and for CBNRM are presented in Figure 9.2 and Appendix 5 respectively.

10.8 Operational stage

Once the core components of the model are in place and a process of implementation is finalised, legally empowered and published, the model is ready to function operationally.

10.8.1 Entering process

When a community, in assessing and planning its development needs, wants to undertake the development in question, for example a borehole, it would first establish the appropriate local community structure. It is most likely, according to the principles of the model, that this would be an existing community organisation like the local water committee, as in the case of boreholes.

The local community organisation would then follow the procedure of entering into the co-management agreement.

10.8.2 Implementation and establishing co-management

The community organisation would be legally required to obtain approval for the development activity and this would according to legislation require that the community, through the pro-forma environmental contract, enters into the co-management system.

By entering into this pro-forma environmental contract, the community is committing itself to the overall policy stipulated in the pro-forma environmental contract, for example sustainability. It is also committing itself to the co-management system and to formulating its own local environmental management plan and procedures, through completing the environmental questionnaire.

The pro-forma environmental contract requires that the representative community organisation, with the assistance of available information and from their own knowledge of local environmental conditions and needs, complete the environmental questionnaire. Thus it commits itself to various environmental goals, objectives and procedures.

The environmental questionnaire is assessed by the government party. Modifications may or may not be necessary. This is then rewritten by the government party as a letter of conditions of approval for the development. The environmental questionnaire together with the letter of conditions are in essence the environmental management plan. The proponent would then only be able to implement the project proposal according to the letter of conditions.

The letter of conditions is, therefore, determined by both the proponent and the government authority. It therefore represents a jointly created and formulated management plan.

The environment management plan as implicit in the letter of conditions forms a component in the overall environmental management system which involves both parties in ongoing implementation, monitoring, reporting, auditing and improvement.

10.8.3 Dynamics of ongoing operation of co-management

A complete environmental management system is now established which is a co-management system.

The community is now responsible for the local environmental management and operation of the project and is accountable to the policy and co-management requirements of the pro-forma environmental contract and the community-designed environmental management plan implicit in the letter of conditions.

The environmental management plan, as in EMS, details the goals and objectives of local environmental management.

The community, in terms of the pro-forma environmental contract, would be obliged to submit periodic (for example, six monthly) environmental reports. These could also be in pro-forma format. These would identify where environmental performance is being achieved and where it is not.

In aspects or areas where there is a sub-optimal level of environmental performance, reasons for this can be reviewed in consultation with government representatives who are obliged, in terms of the pro-forma environmental contract, to offer advice and assistance in their role in co-management. The government party is also, therefore, responsible for local environmental management in this type of environmental management system.

Reporting and interchange between the two parties thus offers feedback which assists the overall process and builds on the information database. This information becomes available through the government party and information base, to other communities with similar difficulties, successes or environmental dilemmas. Thus a system of feedback and continual improvement is implemented in the interchange between the parties of co-management in this environmental management system.

Continual improvement should not be synonymous with increased complexity. Improvement could mean a simplification in an environmental management plan to make it more efficient.

Finally, and importantly, provision must be made for the environmental contract to be modified as reporting and feedback reveal deficiencies and modifications are made.

11. The Model and Communal Area Boreholes in Namibia

The provision of boreholes in communal areas in Namibia is a dilemma of sustainable development. This chapter aims to illustrate how the proposed model may contribute towards a resolution of this tension between environment and development.

Using information from the ENGEO baseline report, literature and interviews the process of the model is described and elaborated, and the scope and content of draft documents are outlined. The ENGEO baseline report, although it was not performed as a generic environmental assessment, did produce similar information to what may be expected from a generic environmental assessment for boreholes. The ENGEO baseline report is, therefore, used as a basic source of information for the illustration of the model in this chapter. However, additional information from other sources will also be used.

The aim of the chapter is not to provide the details of a definitive environmental management system for boreholes in terms of the model. Rather, using appropriate available information, the aim is to provide insight into how the model would provide this definitive and detailed environmental management system for boreholes and how it would function in practice.

It should be made clear from the outset of this chapter, therefore, that this chapter is illustrative and not comprehensive or definitive. Thus, for example, where this chapter discusses environmental impacts of boreholes, it outlines only key examples of impacts. Likewise, where it outlines the content of an environmental questionnaire, this is not intended to be a definitive final version for implementation nor even a draft of contents, but it is presented to illustrate the general content, purpose and function of the environmental questionnaire in the model as the model is applied to the borehole dilemma.

Obviously, according to the requirements of the model, a great deal more research and consultation needs to occur before any definitive components, documents and structures could be proposed for discussion, revision and possible implementation. This is beyond the scope of this dissertation.

The application of the model to communal area boreholes in Namibia will be discussed and illustrated according to the stages of implementation. It will, therefore, be presented in three parts as previously outlined by the model:

- 1. Set-up stage - phase 1 - the generic environmental assessment;**
- 2. Set-up stage - phase 2 - review, refinement and formalisation;**
- 3. Operational stage.**

11.1 Set-up stage - phase 1

This first part involves the execution of the generic environmental assessment of boreholes in communal areas in Namibia. From this the four key 'products' are attained including the establishment of a comprehensive information base on which the later components of the model can be based.

11.1.1 Generic environmental assessment

The ENGEO baseline report was a singular, 'one-off' event executed by an external and independent team. The scope of the study included most of that which would be expected in a generic environmental assessment. The process of the study followed IEM principles of scoping and pro-active public involvement, but like a generic environmental assessment it was a retrospective study and not bound to one project.

Thus, although a 'generic environmental assessment' was not the expressed intent of the ENGEO baseline report, it contains most of the information needed to begin to sketch the nature and scope of environmental management for boreholes in communal areas in Namibia, as determined by the model. Therefore, for the purpose of illustration in this chapter it is used as a surrogate generic environmental assessment.

11.1.2 Products of the generic environmental assessment

In terms of the products required of the generic environmental assessment, the scope and detail of the ENGEO baseline report provides substantial information and provides an illustration of the type of approach a generic environmental assessment may adopt in the study of boreholes.

11.1.2.1 Product 1: Comprehensive information base

The ENGEO baseline report outlines national socio-political and economic issues relevant to the provision of boreholes. It reviewed the process by which boreholes are supplied. In case studies, research engaged with local communities to develop an understanding of the local biophysical, social and economic context in which boreholes were provided. It investigated and discussed environmental impacts of boreholes and management solutions.

The ENGEO baseline report, therefore, well illustrates the scope and nature of a generic environmental assessment and the IEM type of approach to environmental assessment.

It is not the intention here to review and analyse this information base as it is extensive. However, the contents of the information base will be sketched and key areas highlighted.

The scope of this information base and examples of application of information are presented for illustration in terms of the requirements of the model:

- **An overview of the relevant national context**
 At national level the ENGEO baseline report highlighted key relevant contextual issues. The report discussed relevant aspects of topics such as climate, geography, hydrology, national water resources development, politics, economy, health, demography and land tenure systems. It reviewed relevant government institutions, structures and process. This also includes a review of the relevant legislation and policy factors.
- **Information regarding broader environmental trends, pressures and issues in the country**
 The ENGEO baseline report reviewed Namibia's policy commitments to sustainable development, the status of environmental assessment and its application. It included discussion on the dependence of Namibia's people on the environment and the dependence of the economy on the environment.

Environmental trends, issues and pressures were researched. These include pressures on water resources and projections of future water demands. Specifically the problem of desertification was researched and its relevance to the provision of boreholes discussed. Environmental initiatives such as CBNRM and its relevance were researched and presented.
- **Local context**
 Using, *inter alia*, PRA techniques of research, the ENGEO baseline report developed an in-depth understanding of local social structures and function in two case study areas. This included human movement and settlement patterns, local social and economic 'networks', leadership structures and issues, relevant cultural aspects, access to resources, health issues and economic activities. Similarly information concerning the biophysical environment was collected and analysed.
- **Assessment of environmental impacts**
 This topic is vast and complex. A generic environmental assessment is unable to identify and describe all impacts and potential impacts resulting from borehole provision. Indeed this is not necessary because operational stages of the model will allow for an increasingly comprehensive information base in this regard. However, the generic environmental assessment is likely to adequately identify common and important environmental impacts and environmental issues. For the purposes of illustration, key areas of impact and specific environmental impacts identified by the ENGEO baseline report are briefly summarised in Table 11.1.

Category	Aspect	Brief outline of impact
Biophysical	Soil/land	Soil degradation from overgrazing and trampling may result in erosion by wind and water and loss of top soils and seed banks.
	Vegetation	Increased grazing pressures may lead to loss of perennial grass species, denudation of edible scrub, bush encroachment and/or spread of invasive plant species.
	Land-use	Increased pressure on rangelands may result from changed land-use and settlement patterns and loss of seasonal transhumance practices. Relative overstocking may occur during periods of drought as 'artificial' water supply allows livestock numbers in excess of grazing capacity.
	Wildlife	There are potential positive impacts as provision of a borehole may free natural springs to be used by wild animals. However, increased land use, population, land degradation and fencing may impact negatively on wildlife.
	Water resources	Increased abstraction and lowering of water tables may have consequent ecological effects and effects on 'downstream' users. Lack of pump testing or imperfect pump testing resulted in many boreholes pumping beyond their sustainable yield.
Social	Settlement patterns	Provision of boreholes may result in changes to settlement patterns and size, possibility of permanent settlements on marginal land and loss of transhumance strategies and seasonal migrations.
	Access to resources	Difficulty controlling access to grazing and water resources in communal land tenure system is a significant problem.
Health	Water quality	In some cases water may pose health risks in terms of its quality. This may be due to its chemical content and/or bacterial contamination in storage and reticulation.
	Water quantity	Many boreholes were not able to meet the needs of user communities and, thus, limited the health and sanitation benefits of a safe and adequate water supply.
	Structures	Poorly designed infrastructure often allowed water to be contaminated, posed physical risks and on occasion provided sites for mosquito breeding and, thus, presented a malaria risk.
Economic	Economic activities	Availability of water and associated land use practices determine the economic productivity of the land and the ability of people to support themselves sustainably on the land.
	Ongoing costs	Various types of borehole pumps had vastly different installation, running and maintenance costs. These are expenses which will be borne by the user community.

Table 11.1: A summary of examples of typical environmental impacts associated with boreholes in communal areas in Namibia (ENGE0, 1997)

- **Management solutions for environmental impacts**

Together, traditional practices, the ENGEO baseline report and other documents present a range of environmental management strategies for boreholes in different situations, environmental challenges and problems, environmental contexts and environmental impacts.

These management strategies include:

- ◆ grazing rotation strategies which allow soil and vegetation time to regenerate;
- ◆ use of seasonal water points and seasonal grazing areas as a mechanism of grazing 'rotation';
- ◆ controlling numbers and composition of livestock herds to suit available grazing and browsing;
- ◆ transhumance patterns and practices;
- ◆ crop production techniques;
- ◆ crop rotation strategies;
- ◆ technology, practices and techniques to conserve water and decrease use and abstraction;
- ◆ systems and mechanisms to enhance recharge of aquifers such as small earth dams;
- ◆ better infrastructure to ensure a safe water supply and prevent water loss;
- ◆ mechanisms regarding access to water and grazing resources;
- ◆ destocking as an appropriate response to drought where there is a shortage of grazing and not necessarily a shortage of water.

(ENGEO, 1997; van der Merwe, pers. comm.; DRFN, 1993; Jacobson *et al*, 1995)

- **Appropriate technology**

In terms of an example of appropriate technology, the ENGEO baseline report recommended solar pumps as the most appropriate pump technology in many communal areas. Although solar pumps are more expensive to install, they are extremely inexpensive to operate, require minimal and relatively inexpensive maintenance, pump efficiently from depth, are well suited to the climate and produce no pollutants in terms of contaminating oils and gaseous emissions. Furthermore, unlike other top structures, they are not likely to be damaged by elephants where elephants are present. This was especially a problem with windmills, although certain earth or stone walls could provide some protection of windmill structures where necessary. If windmills are thus protected or in the absence of elephants, they are also recommended as suitable technology given their cost effectiveness.

- **Parameters for monitoring**

The generic environmental assessment should produce and discuss useful and simple guidelines for the monitoring of environmental parameters. These may include specific environmental indicators for various environmental parameters.

In the context of boreholes some examples of such indicators include:

- ◆ abundance of an indicator plant species such as an invasive plant;
- ◆ abundance of perennial grass species;
- ◆ degree of bush encroachment;
- ◆ time needed to collect firewood;
- ◆ signs and extent of soil erosion;
- ◆ pumping times as an indicator of aquifer yields and recharge rates.

(ENGEO, 1997; DRFN, 1993)

- **Assessment of the context of the co-management system**

The co-management system does not exist and function in a vacuum. Decisions in local management will be rational and logical and determined by wider contextual incentives and pressures (Ashley, 1996).

Thus, the generic environmental assessment must research and critique such issues and recommend changes where possible to facilitate the local management system.

An example of this is the range of incentives provided by the government to increase livestock numbers. These incentives which have often resulted in overstocking of rangelands, include subsidies, loans, free government extension services and drought relief (Ashley, 1996).

Such incentives are clearly at odds with a sustainable local environmental management plan. It is the task of the generic environmental assessment to identify and critique such discrepancies that may frustrate sound local environmental management.

On the other hand, a good example of how sustainable local environmental management may be facilitated by government policy and financial assistance is the use of incentives to promote destocking during in times of drought.

- **Appraisal of organisational structures and capacity**

The generic environmental assessment should identify the key local and government parties appropriate for the co-management system.

In terms of boreholes the most convenient local structures would be the local water committees. These are in the process of being formed as part of the initiative of the DWA to devolve financial and technical management responsibility for operating boreholes to local communities. (See chapter 8 (section 8.5).)

The generic environmental assessment should include information on the legal status of such bodies, their representivity, administrative and managerial capacity and suitability for environmental management of waterpoints. For example, some of the issues regarding local water committees highlighted in the ENGEO baseline report were that they were not representative, had no legal status or ability to enforce or regulate borehole use and were not appropriate to some situations such as where there was only one family or even one person using a borehole.

The generic environmental assessment would also examine the suitability and capacity of relevant government structures and make recommendations regarding in which departments and at which level responsibilities should rest. Different tasks may best be allocated to different levels in line ministries. For example, maintenance of the information base may be undertaken at a national central level while responsibilities for assisting communities with management for boreholes, review of reports and auditing may be undertaken at local or regional level within the line ministry.

Other relevant structures should also be examined. This may include such services as that provided by agricultural extension officers. Relevant contributions from agricultural extension officers may include ongoing information and assistance regarding livestock carrying capacities and grazing management strategies.

Thus the organisations and structures on the government side of the co-management system for boreholes may include and integrate various government directorates other than the DEA and DRWS.

Thus recommendations would be made in the generic environmental assessment as to the most appropriate local and government structures to contribute to the co-management system for boreholes.

11.1.2.2 Product 2: Suitability and feasibility information and recommendation

It is useful to highlight factors from the ENGEO baseline report which make boreholes suitable for this approach to environmental management. That is, they are small-scale, low budget development activities. They are common, and individually and collectively they have significant environmental impacts. They are a necessary development activity and are located within a communal land tenure system. Environmental assessment is not formally required for boreholes and is seldom undertaken even for larger borehole provision programmes.

In terms of feasibility the generic environmental assessment would review the institutional and administrative capacity of relevant role-players and make recommendations as to feasible administrative options. It would also need to include an assessment and recommendations regarding feasibility of implementing the system. This would need to take into account the extent of change needed to be made to legislation, policy, systems and structures as well as the political will to achieve this.

In the case of boreholes, there is significant political will and impetus from government departments such as the DEA and from organisations such as NAPCOD to see the implementation of some type of environmental management system for boreholes.

Conveniently, and potentially facilitating ease of implementation, many structures such as regional government offices and local water committees already exist.

Also favouring feasibility is the fact that the principles of the model are compatible with policy trends such as the initiative by the DWA to devolve borehole management to user communities. It is also compatible with the MET initiative of CBNRM in the trend towards devolution of resource management to communities. These are all factors which should increase its suitability and feasibility.

Lastly, an appraisal of economic feasibility should be performed. This would assess costs involved in establishing the system, its administration and possible financial aspects of running the system such as subsidy incentives for better environmental management of boreholes. It would analyse savings and reallocation of resources - for example, from providing incentives for increasing herd sizes to providing incentives for implementing the model and thus sustainable rangeland management. This would be a type of cost-benefit analysis.

11.1.2.3 Product 3: Key recommendations and information for the pro-forma environmental contract

The generic environmental assessment is in a well-informed position to make a proposition regarding the design of the pro-forma environmental contract and recommendations for its content and resultant aspects of co-management.

This set of recommendations from the generic environmental assessment would be used as a starting point to develop and finalise the pro-forma environmental contract in the next phase of the set-up stage.

In terms of boreholes, therefore, the generic environmental assessment would provide recommendations and information on the merits and demerits of the key aspects for inclusion into the pro-forma environmental contract.

This would include:

- Suitable amendments to legislation, such as the Namibian Water Act of 1995 (GRN, 1995^b), to enable a pro-forma environmental contract and management system for boreholes;
- Discussion and proposal of the most suitable composition of the contractual parties to the pro-forma environmental contract for boreholes;
- The most appropriate overall objective for the environmental management system;
- The rights and obligations of each party in the environmental management of boreholes;
- The scope of activities subject to the environmental management system as determined by the pro-forma environmental contract;
- Information on the most appropriate monitoring, reporting and auditing format, frequency and procedures;
- Information and recommendations regarding mechanisms to ensure compliance to the pro-forma environmental contract for boreholes.

11.1.2.4 Product 4: Key recommendations and information for the environmental questionnaire

The generic environmental assessment will identify the key areas of impact of boreholes and the key areas requiring appropriate environmental management. These are the aspects that will be drafted into the environmental questionnaire.

In borehole provision these key issues are likely to include the following:

- siting of borehole;
- type of installation;
- capacity of pump;
- storage infrastructure and water reticulation system;
- water conservation;

- grazing management;
- carrying capacity;
- crop rotation practices;
- response to drought;
- control of access to resources.

The scope and content of the pro-forma environmental contract, environmental questionnaire and other components of the model are further illustrated in the next section.

11.2 Set-up stage - phase 2

11.2.1 Drafting the pro-forma environmental contract

On the basis of information contained in the ENGEO baseline report, it is possible to illustrate the scope of an example pro-forma environmental contract for borehole management. Collectively, the components of the pro-forma environmental contract constitute the conditions of borehole proprietorship in the co-management agreement.

11.2.1.1 Contractual parties

The parties to the contract could be the:

Local Water Committee

on the one hand and the;

Government of Namibia

(as represented by the DRWS and DEA)

on the other.

11.2.1.2 Overall objective of the pro-forma environmental contract

As the pro-forma environmental contract forms the basis of an environmental management system it needs to establish the policy or overall objective of the environmental management system on which both parties may agree.

The policy objective could be:

'To achieve sustainable use of resources through continual improvement in management of boreholes, management of water provided by boreholes and associated land use practices.'

The policy, therefore, includes the concept of sustainability, commits the contractual parties to continual improvement and identifies the mechanism to achieve this - environmental management.

The notion of continual improvement, as in EMS, is an important part of the system and the key indicator of performance rather than actual environmental results. Implicit in this concept is the flexibility of the model to allow modifications and changes to environmental management plans. Provision for this flexibility and for modifications must be explicit in the pro-forma environmental contract.

11.2.1.3 The co-management relationship

In this respect, the pro-forma environmental contract needs to define the:

1. organisational structure of co-management;
2. rights and responsibilities of each party in co-management.

The organisational structure of the co-management system is implicit in the definition of rights and responsibilities, the nature and role of the environmental management plan and the description of monitoring, reporting and auditing procedures.

An illustrative list of rights and responsibilities of each party in the co-management system for environmental management of boreholes is presented below:

Local Water Committee

Rights:

1. To site, install and operate a community borehole;
2. To design and implement (through the mechanism of the environmental questionnaire and letter of conditions) the environmental management plan for the borehole;
3. To government assistance in terms of information for borehole management;
4. To represent the community on issues pertaining to borehole management;
5. To operate as a legally constituted body;
6. To contract services of organisations and consultants such as geohydrologists;
7. To collect and manage user fees.

Responsibilities:

1. To represent the community in all activities relating to borehole management;
2. To design an environmental management plan compatible with the overall policy objective and system of community co-management;
3. To implement, monitor and improve the environmental management plan;
4. To be accountable to the community and government party for environmental management;
5. To be accountable for fair and equitable management of funds;
6. To monitor environmental performance using suitable environmental indicators;
7. To submit reports to the government body regarding environmental performance in terms of the environmental management plan.

Government party**Rights:**

1. To draft the letter of conditions based on the environmental questionnaire and thus, stipulate final conditionalities of borehole provision;
2. To inspect borehole sites and to access and audit records;
3. To recourse in the event of non-compliance with the contract.

Responsibilities:

1. To ensure that adequate, appropriate and effective environmental management for the borehole will be implemented;
2. To ensure that the letter of conditions targets an adequate and appropriate level of environmental performance;
3. To provide accurate, useful and reliable information in a suitable format for communities to use in the design and implementation of the environmental management plan which is developed from the environmental questionnaire;
4. To update and make the information base accessible to all relevant parties;
5. To review borehole reports and provide advice in keeping with the overall policy objective of the co-management system for boreholes;
6. To audit environmental management of boreholes periodically.

11.2.1.4 Provision for the environmental management plan

The pro-forma environmental contract must make provision for the proponent to complete the environmental questionnaire and for this to become part of

the total environmental contract. It must also make provision for the government party to re-write and modify where necessary the contents of the environmental questionnaire as the letter of conditions of approval of the borehole development.

As in the 'fast-track' system for prospecting, it must, therefore, be clear that, in terms of this pro-forma environmental contract, three documents will constitute the final and complete contract between the two parties:

1. The pro-forma environmental contract.
2. The environmental questionnaire.
3. The letter of conditions of approval.

Provision should also be made for negotiation regarding the final letter of conditions of approval.

11.2.1.5 Provision for monitoring, reporting and auditing

The pro-forma environmental contract needs to formalise the requirements of monitoring, reporting and auditing.

Monitoring of environmental performance is the responsibility of the local water committee. Advice on simple and useful indicators of environmental parameters would be provided by the government party - based on the generic environmental assessment information. The details of monitoring would be defined by the proponent in the environmental questionnaire.

Likewise, the responsibility for periodic reports rests with the local water committee. The details concerning format, frequency and review of reports will also be detailed in the pro-forma environmental contract.

Provision must be made in the pro-forma environmental contract for the government party to audit local environmental management. Provision must be made for the government party to have access to the site and the record keeping of the local water committee.

11.2.1.6 Breach

In discussing and defining breach in the pro-forma environmental contract an important conceptual distinction must be made between failure of the management system to attain environmental results and failure of the local water committee to implement a practical and appropriate management system. Breach must be defined in terms of the latter. Given the complexity of environmental management and ecological dynamics, no community could guarantee environmental results but they could guarantee implementation of appropriate environmental management plans and measures.

This is a clear distinction in EMS. If this distinction is not clear it undermines the co-operative spirit of the co-management system, the openness of reporting, the concept of continual improvement and the process of learning by trial and error which facilitates the efficacy of the system.

The aim of the co-management system is that it functions in a co-operative, constructive and pro-active manner. However, it will be necessary to instate a mechanism to ensure compliance where the system regresses to the letter of the law.

In the 'fast-track' system for prospecting this is relatively simple as non-compliance with the conditions of approval can eventually lead to the rescission of the licence to prospect. However, if a community does not adhere to the letter of conditions of approval of a borehole development and fails to take reasonable steps to achieve an acceptable level of environmental performance, it would not be acceptable to close down a borehole. Apart from the fact that this type of action as a measure to ensure compliance is not in keeping with the principles and ideals of co-management or sustainable development, it would be unacceptable in terms of basic human rights. To close down a borehole which supplies water is denying people an extremely basic human need as well as a resource which is a basic prerequisite for most economic activities on the land.

The ultimate mechanism to ensure compliance may be a very debatable and contentious point. There are, in broad terms, two approaches to the problem - a punitive approach where compliance is lacking or an incentive driven approach where compliance exists.

Punitive approaches could include fines, taxes and tariffs. However, they are likely to be limited and ineffectual where there is no possibility of an ultimate deterrent such as closing down the borehole.

Incentive driven mechanisms to ensure compliance are possibly more successful and ethically more acceptable. They are also more compatible with the ideals of co-management and they provide the community with an added incentive to embrace the system and make it work. Incentive driven approaches to achieve compliance, therefore, may not only make the system more successful, but also make the proposition of community co-management more attractive to communities. Thus, it would move the emphasis away from the co-management system being a legal requirement for borehole provision, to the co-management system being an attractive proposition from the community point of view.

There is potentially a vast range of mechanisms for incentive driven approaches to promote the co-management system for boreholes and ensure compliance with conditions of approval. It is beyond the scope of this dissertation to provide a comprehensive analysis of these possible mechanisms, other than to state two points that originate in the ENGEO baseline report:

1. As drilling, installation, operation and maintenance of boreholes are soon to be funded entirely by the community and will place communities under significant financial pressure, incentive approaches could include the provision of subsidies for boreholes.
2. International funding for rural water development projects has been significant in the past and continues to be available (ENGEO, 1997). It might be possible to direct this funding into a fund to subsidise boreholes complying with the co-management system. This would be a good way to direct donor funding for borehole projects and ensure that resultant development is environmentally sound. Having a system such as this for environmentally sound development may even attract more donor funding.
3. It is possible that the co-management system as presented here be linked to the CBNRM programme or a system of community management of all natural resources (Fuller and Turner, 1995). Incentive structures may be determined differently in such an integrated system.

11.2.1.7 An important proviso

The co-management system is not intended to be static. Naturally, much learning by trial and error will occur. It is vitally important for the success of the co-management system for there to be a proviso for modifying terms of the contract and especially modifying or changing the environmental management plan as stated by the letter of conditions. As the system is new and environmental management for boreholes is new, both parties are likely to want to make changes to the total contract and this can be done on a basis of mutual consent.

11.2.2 Drafting the environmental questionnaire

The environmental questionnaire for boreholes may be similarly structured to that developed for the 'fast-track' system for prospecting. (See Appendix 2.)

An example of the contents and scope of the environmental questionnaire for boreholes is outlined on the following pages. This is based on the key areas of environmental impact and potential for environmental management as identified by the ENGEO baseline report and described in section 11.1.2.1 and Table 11.1.

The twelve points outlined below describe the possible scope and content of the environmental questionnaire for boreholes.

1. Introductory section

This would state the role of the environmental questionnaire in the environmental contract. The purpose of the environmental questionnaire, as the opportunity for the local water committee to design, in consultation with the community, its own management plan and state environmental commitments would be described. A process of accepting or negotiating modifications to the environmental questionnaire and its rewriting as a letter of conditions can be described.

2. Identification of the community, the local water committee and proposed site for the borehole

Basic information defining the development, the site of development and the user community should be included. This section could elicit a review of the environmental advantages of the proposed site as opposed to other possible sites. From the generic environmental assessment, basic environmental guidelines for siting should exist.

3. Installation

The important aspect to be described by the local water committee in this regard is its commitment to undertake appropriate pump tests to establish sustainable yield and to fit a borehole pump of appropriate capacity based on these tests and sustainable yield predictions.

4. Technical aspects and infrastructure

This could include the proposed pumping mechanism, layout of infrastructure, type of water storage infrastructure and reticulation.

The generic environmental assessment would have produced guidelines for these infrastructural components and appropriate technology. There should, therefore, be an information base discussing the merits and demerits of different options and stated preferences where these are clear.

For example, solar powered pumps were identified by the ENGEO baseline report as the most appropriate technology for this purpose in terms of their performance and efficiency, impact on the environment, likelihood of damage and cost benefits. Closed domestic water storage tanks and a closed reticulation system were preferred for their prevention of evaporative water loss and in terms of the health benefits of a cleaner water supply and decrease in mosquito breeding sites.

Thus if the proponent would prefer infrastructure different from that recommended by the generic environmental assessment, this should be supported by a clear motivation. If necessary this may entail

specific environmental management plans such as protection of a windmill by a stone wall to prevent damage by elephants.

5. Water Use

The proponent would be required to list the activities requiring water, expected uses for the water and expected daily total water abstraction from the borehole. This is a simple calculation based on the number of people and livestock using a borehole. The regional DRWS offices do these estimations on a regular basis when installing boreholes. For example, in Khorixas, estimating water needs is based on the assumption that a person requires 50 litres of water per day for drinking and domestic purposes, large livestock about 45 - 50 litres per day and small livestock about 5 - 10 litres per day. A certain margin of error in the favour of providing excess water is built into the calculation (van der Merwe, pers. comm.).

6. Water conservation

The proponent would be required to state commitments to water conservation and state specific plans on how this would be achieved given the range of proposed uses of water. Specific commitments or plans could include water saving measures such as:

- timeous repair of leaks;
- covering water stores to prevent evaporation;
- re-use of washing water for watering of crops;
- choice of crops which require less water;
- watering of crops in the evening;
- mulching.

Water conservation measures will include commitments to keep records of pump meter readings and to keep within the sustainable yield as determined by the pump test at installation.

7. Grazing management

The environmental questionnaire should require the proponent to present a grazing management plan. This would include systems of grazing rotation, seasonal grazing plans and destocking and restocking strategies in response to fluctuations of carrying capacity. It will also include other adaptive farming strategies. It would state commitments to protection of soil and vegetation and commitment to adhere to recommended stocking quotas and to recommendations regarding composition of livestock herds.

8. Crops

Where water is used for growing crops, the environmental questionnaire could require the proponent to adopt practices and techniques that improve soil quality, soil productivity and efficiency of water use.

These would, for example, include practices and techniques such as:

- crop rotation;
- mixed cropping;
- water efficient agricultural practices such dryland cropping practices or use of hand watering as well as measures to reduce evaporation and improve water retention in soils.

9. Response to drought

A clear finding of the ENGEO baseline report was that drought often did not result in a significant shortage of water, but a shortage of grazing.

The artificial provision of waterpoints complicated this scenario as it allowed livestock to remain on land where there had been no rain and, therefore, no good grazing. Thus waterpoints de-coupled the natural link between rains and accessibility to good grazing.

In order not to exacerbate the shortage of grazing during a drought, cause land degradation and ultimately desertification, it is often necessary to destock even if there is sufficient water for livestock (ENGEO, 1997). The environmental questionnaire should require the description of a destocking protocol or plan as an appropriate response to drought conditions.

10. Control of access

The environmental questionnaire should require the proponent to detail a plan to ensure control of access to water and grazing resources and also to ensure fair and equitable access to these resources.

11. Monitoring

The environmental questionnaire would require the monitoring of certain parameters. The generic environmental assessment would have researched the usefulness of key indicators for key areas of impact such as meter readings for water consumption, abundance of invasive plants for vegetation loss and soil degradation, erosion, livestock numbers, bush encroachment and abundance of perennial grasses - to list a few.

The environmental questionnaire could require monitoring of, for example, three key variables such as water consumption, livestock numbers and abundance of perennial grass species.

Choice of indicators and parameters for monitoring would vary from region to region and with local activities and conditions.

12. Reporting commitment

This is simply the commitment to record and keep information for reporting as required by the pro-forma environmental contract. Reporting would be in a pro-forma format - mirroring the categories and statements of the pro-forma environmental contract. This is further discussed in section 11.2.7.

This sketch of a suitable environmental questionnaire is not exhaustive, but illustrative of the type of aspects involved in the environmental questionnaire and how these would contribute to environmental management through the co-management system.

(Note: Technical management and financial management of boreholes are not included in the pro-forma environmental contract and the environmental questionnaire, as these responsibilities are already being devolved to local water committees by the DWA. However, in practice, the environmental management, technical and financial management could be integrated into one agreement.)

11.2.3 Contractual parties

This phase of the set-up stage will involve the definition and empowerment of the contractual parties for the purpose.

Several objectives will need to be achieved in this respect:

- dissemination of information regarding the co-management system;
- discussion and workshopping of issues of representivity;
- definition of party roles in the co-management system for boreholes;
- definition of the parties and their purpose;
- workshopping, with stakeholders, the content and scope of the co-management system and specifically the pro-forma environmental contract and the environmental questionnaire;
- dissemination of information regarding boreholes and the generic environmental assessment;
- capacity building where necessary (this is likely to be an ongoing process);
- legal definition of contractual parties.

11.2.4 Enabling legislation

Relevant amendments to legislation should take place in order that the co-management system has a legislative foundation.

Present legislation requires the DWA to be notified and an abstraction licence obtained before a borehole may be commissioned. It also requires the contractor to keep a journal of drilling - recording, *inter alia*, geological information, rock strata, water strikes and pump test results (ENGE0, 1997; GRN, 1995^b).

Amendments to legislation would provide for:

- a mechanism to ensure that the co-management system for boreholes is legally mandated;
- legislative underpinning of the process by which the co-management system for boreholes is entered and executed;
- definition of the legal status of the parties involved in the co-management system.

Amendments to other acts may be required. For example, legislation regarding foreign funding for rural water supply development would need to be drafted or amended if this is to be a component of incentive mechanisms in the model.

11.2.5 Organisation of the information base

The objective of the information base for boreholes is threefold:

1. To provide relevant information regarding the environment and boreholes on which the co-management system may be based;
2. To collect, integrate and disseminate information on an ongoing basis for borehole user communities to access and for other stakeholders to access as necessary;
3. To provide an information base for research - an additional but not a primary benefit.

To achieve these objectives the information base must initially organise the generic environmental assessment and present this information in an accessible and useful format for users such as local water committees.

On an ongoing basis it must be able to assimilate and organise information from monitoring, reporting and auditing. This information needs to be recorded, analysed and again made available to local water committees and communities for the continual improvement of borehole management in the co-management system. It is, therefore, an ongoing research tool as information accumulates from experience with environmental management in communities and it is an educational tool as this information is analysed and disseminated.

The sophistication of data may vary for different purposes. Mostly, it will involve the discovery and dissemination of simple concepts and techniques such as 'community X found that watering crops using a trickle system instead of channel irrigation resulted in considerable water saving and increased productivity - this becomes a recommended water saving technique'. It will also inevitably result in an extensive database and, therefore, create potential for sophisticated analytical research if desired.

In its role of dissemination of information, provision needs to be made for suitable educational programmes and materials. This could vary in format from booklets and radio programmes to training programmes run by water extension officers. Illustrated booklets such as the DRFN booklet series, '*Managing boreholes and grazing areas in Namibia*' (DRFN, 1993) are an excellent example of the type of information support that would be necessary for the co-management system.

11.2.6 Reporting and reporting format

Reporting is an important aspect of the system and channel of communication between both contractual parties. Although reporting does encourage accountability and formalises the checking process in the management system, the aim of reporting is not primarily policing but, in the

framework of co-management, it is to highlight problems and facilitate modifications to management systems and, therefore, to develop solutions.

Reporting is an important component to facilitate the flow, collection and dissemination of information.

Reporting and the context of the management system should be presented in such a way that communities feel confident in providing reliable information as any failings in environmental performance are not, *pers se*, a basis for penalty. Failings in environmental performance and environmental management plans are part of the learning process and essential to the concept of continual improvement. This approach should be clear in the reporting format.

Reporting is also in a pro-forma format. Reports can be worded in a style which will achieve this co-operative and frank relationship. For example, where abstraction exceeded planned amounts, the report could request a reason for this and possibly request a plan of action to be described to improve performance. It should also allow the opportunity for the local water committee to request assistance if it feels that it is not realistically possible to improve performance using feasible and acceptable measures.

Any modifications to the current environmental management plan as they occur in this manner become, on mutual agreement, a modification to the environmental management plan as it was originally stated in the letter of conditions.

11.2.7 Definition and outline of process for operational stage

The last component in the set-up stage is the definition and publication of the process which is to be set in motion by the model. The process describes how a community, in attaining environmental approval for a borehole, enters the co-management system. It also describes the ongoing processes of co-management.

This could be simply defined and presented by a diagram similar to that used for CBNRM or the 'fast-track' system. (See Appendix 5 and Figures 9.1 and 9.2)

Figure 11.1 represents an example of how the process may be summarised and presented.

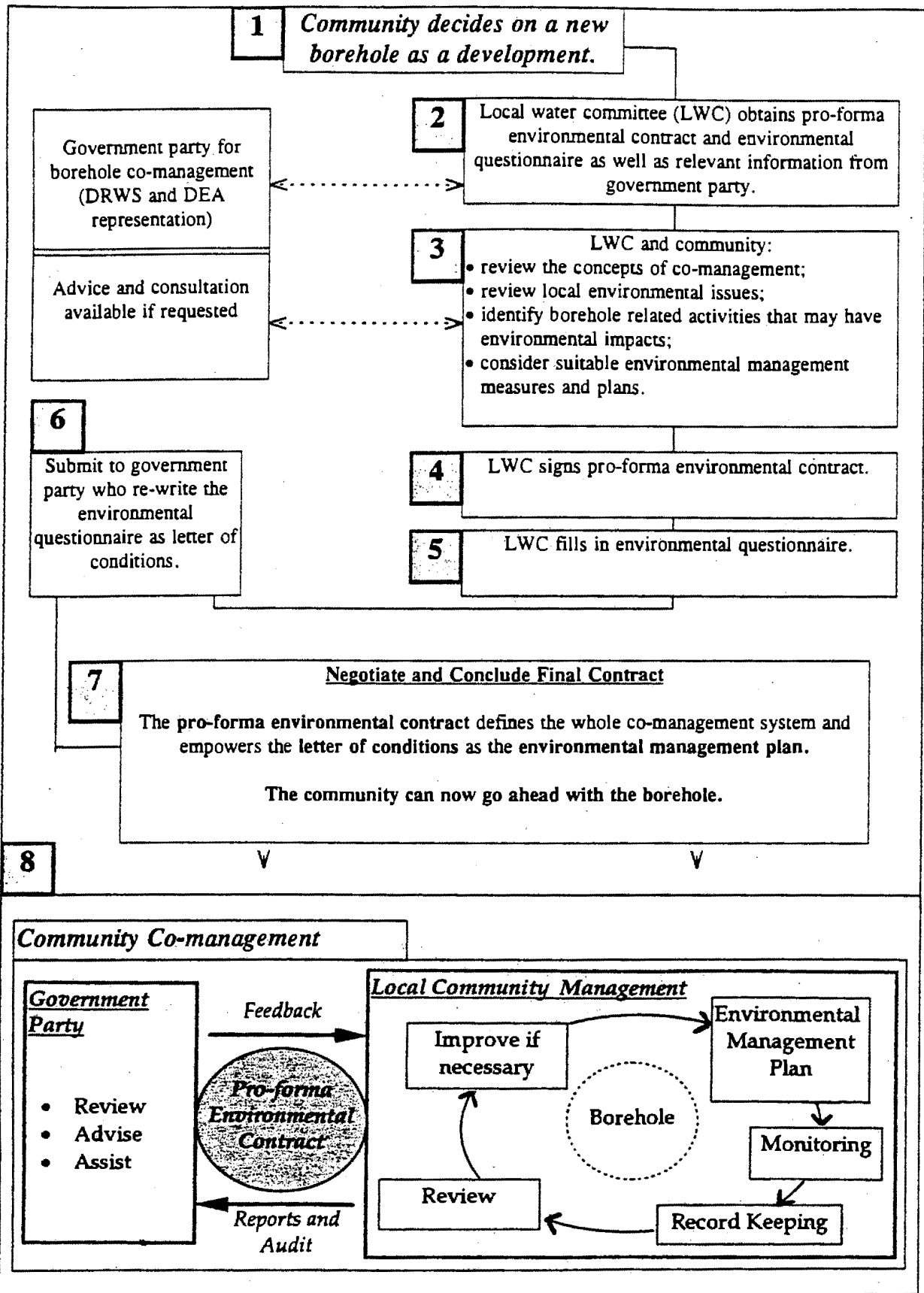


Figure 11.1: Process for a community to enter into the co-management system for boreholes and schematic summary of co-management system

11.3 Operational stage

Once the components, process and legal prerequisites of the system are established, it is a relatively streamlined and efficient procedure to operate and administer. This is particularly true when compared to the impossible alternative of undertaking an EIA and formulating an environmental management plan for each and every borehole.

The main reason for this is that the local community assumes most of the responsibility for assessing the local environmental conditions, devising an environmental management plan and implementing this plan on a day to day basis. The community also assumes responsibility for monitoring and improving environmental management measures.

11.3.1 Entering the process of co-management

Thus when a community decides to drill and install a borehole, it will undertake this task in the framework of co-management. This would either be a legal requirement or an incentive driven choice. The first step in the process would be to form the local water committee to represent the community - if one does not already exist.

The local water committee would then obtain the relevant documentation from, for example, the DRWS.

Initial documentation would include the:

1. Pro-forma environmental contract;
2. Environmental questionnaire.

Also available and supplied with these documents would be well presented, useful and comprehensive information about the co-management system, environmental issues and impacts related to boreholes and relevant environmental management ideas, options and strategies. This information would, therefore, include an array of alternative environmental management measures and recommendations that can contribute to the tailor-made environmental management plan.

With due consideration of this information, and in consultation with the government party and the community itself, the local water committee would enter the co-management system through the agreement of the pro-forma environmental contract.

Consequent on this step, the community, represented by the local water committee and having considered the environmental ramifications of a borehole in the local context, would complete the environmental questionnaire. The environmental questionnaire records the environmental

commitments and objectives of the community as well as the details of measures comprising the environmental management plan.

The completed environmental questionnaire is then reviewed by the government party which either approves it as it is and rewrites it as the letter of conditions of approval, or makes modifications and re-writes this as a letter of conditions of approval which may be accepted by the local water committee.

In the event that modifications are extensive and the local water committee is not satisfied with modifications on the commitments of the environmental questionnaire as they appear in the letter of conditions of approval, the conditions of approval may be re-negotiated with the government party. However, the final authority rests with the government party to determine the conditions of approval - the maintenance of a sound yet contextually appropriate level of environmental management being the responsibility of the government party.

The final contract between the local water committee and the state, therefore, consists of three components:

1. Pro-forma environmental contract;
2. Environmental questionnaire;
3. Letter of conditions of approval.

On receiving approval for the borehole development, the local water committee may proceed to site, install and operate the borehole according to these conditions of approval which, in effect, constitute the environmental management plan.

Also required by this environmental management plan is the monitoring of the stated environmental parameters using a selection of the simple environmental indicators. The local water committee, with its mandate of sound local environmental management, will be expected to keep records of monitoring and take appropriate corrective action as necessary.

Periodic reports will be submitted in a pro-forma format, and will be used to assess environmental performance and attainment of environmental objectives, to identify problems and successes in environmental management and to update the information base. Importantly, reporting provides the feedback necessary for review, analysis and continual improvement of the management system for this particular borehole. It also adds to the broader knowledge of effective environmental management for boreholes.

Periodic auditing of the local management system by the government party may take place at the discretion of the government party. This also serves to improve the knowledge base and increase understanding of the efficacy of the system, record keeping and reporting.

As experience and knowledge regarding environmental management of boreholes are gained in the co-management system, environmental management plans may be modified and this may be documented as mutually agreed amendments to the conditions of approval.

11.3.2 The product - co-management

Thus an efficient, dynamic, co-operative co-management system for environmental management of boreholes is shared between government and the local water committee.

Based on the Deming Cycle, it is an environmental management system which is able to detect, recognise, record and learn from failures and successes and, therefore, continually improve day to day environmental management of boreholes. Environmental results are not guaranteed in every case, but a sound environmental management system is guaranteed.

12. The Model - Review, Discussion and Conclusion

In concluding this dissertation, this final chapter presents a brief review of the model in terms of its synthesis, its innovation over standard EIA practices in providing a theoretical solution for environmental assessment and management for boreholes, and most importantly its potential performance in terms of the sustainable development dilemma of borehole provision presented at the outset of the dissertation.

Finally a brief sketch of some of the wider implications, ramifications and potential applications of the model is presented.

12.1 Review of the model as a synthesis

The model is reviewed in terms of IEM, EMS, CBNRM and CAMPFIRE and the 'fast-track' process for prospecting. This review highlights the fact that the model capitalises on relevant and valuable concepts, processes and techniques from each of these entities.

12.1.1 In terms of IEM

As is to be expected in a developing country, rural Namibians depend on the environment and its resources. Like IEM, the model does not romanticise the environment but views the environment as a resource for utilisation. Given the importance of these natural resources to livelihoods, local economies and national economies, the model promotes their use and associated land use and economic activity.

As with IEM, the model does not set out to stop the development of boreholes, but to guide development through consideration of design alternatives as well as enhancement of positive environmental impacts and mitigation of negative environmental impacts by means of an environmental management plan. Within the framework of the model a community can increase the benefit of the borehole. These positive effects, which the model promotes, include the advantages of a clean and safe water supply, increased land productivity, increased economic activity and consequently a potentially vast spectrum of socio-economic benefits (ENGEO, 1997).

IEM assumes a holistic approach to environment and development and embraces a broad and holistic definition of environment. Likewise, the generic environmental assessment and the components of the co-management agreement assume a broad definition of environment. This is further emphasised by the nature of the model which allows communities to define local environmental needs and priorities.

The model is possibly more holistic than IEM in its approach as it is able to include an appreciation for the philosophy of development and the ideological goals of integrating development, environment and local perception of the environment. Environment, as a term, is stretched to its limits and becomes able to include cultural, spiritual and philosophical aspects - those features that comprise the worldview of local communities. This is possible because of the scope for flexibility of the local components of the model and its cognisance of the diversity local environments - environment in the broad sense of the term.

While IEM approaches development with the unquestioned and implicit worldview of the development paradigm, the model is able to some extent to surrender this aspect of the 'whole environment' to local communities. Thus where IEM excludes implicit assumptions concerning the nature of development from debate, the model grants the definition of the nature and process of development to communities. It therefore, acts more as a guide, as so much of the process, from the decision to develop a borehole, to the management of the borehole, will be on community initiative - albeit within the relatively flexible and broad sustainability framework of co-management.

Like IEM, the model highlights participation of stakeholders.

In the generic environmental assessment phase the model employs IEM techniques to pro-actively engage and elicit public opinion and input from stakeholders. Like in IEM, this participation is on the 'rungs' of 'consultation and communication'.

In the second phase of the set-up stage, the model involves a more interactive approach of negotiation and joint partnership in thrashing out the final products. However, it is not until the operational stage that the participation is directly project specific and becomes true partnership.

It is possible to suggest that the model goes beyond even this level of participation to a point where the community has the key role and engages other participators - such as the geohydrologist or government extension officer - as secondary participating partners in its own development project.

Similarly, and originating in the principles of IEM, the model embraces and integrates public and expert opinion into the process. However, in the operational phases of the model, local communities are recognised as the experts in designing and implementing an environmental management plan for boreholes which is appropriate and suitable for the local context.

Thus the model devolves power and control to the local level. This is power and control which includes the decision to embark on the borehole development, the design of the development, the implementation of the development and associated activities and the power to design and control the specifics of the environmental management plan. The community empowerment principle of IEM is, therefore, fully developed in the model.

This makes the model a potentially useful tool for sustainable development in a developing country.

Where IEM may be relatively weak in implementation of findings in later stages of project management, the emphasis of the model is on management. The model elegantly articulates the phase of impact assessment with the operational phase which, although also involving impact assessment, emphasises environmental management. The whole process of the model, in all stages and phases, is consequently directed towards ongoing environmental management. Thus environmental management is potentially powerful as it is well-informed, locally implemented by a community with a vested interest in success, makes use of local expertise and is locally appropriate. It is therefore, potentially a powerful and articulate integration of environmental assessment with environmental management.

Furthermore, the process of environmental management occurs within a well structured environmental management system.

12.1.2 In terms of EMS

The environmental management strength of the model originates in its foundations in EMS.

The underpinning concept in EMS is the principle of the Deming Cycle in such a management system. The Deming Cycle describes a closed loop feedback system which starts with planning what is to be done, doing what has been planned, checking that what was planned has been done and acting on results of checking to modify and improve the initial plans. (See Figure 7.1).

EMS implements this process through four key requirements:

- drafting an environmental policy;
- defining organisational structure;
- defining and implementing an environmental management plan;
- review and audit of plan to feedback for continual improvement.

The model for environmental management of boreholes also defines such an environmental management system as it is adapted to the framework of co-management.

The process and principles of the Deming Cycle are implemented through the co-management system and through the organisational structures and channels of communication that are defined by the co-management agreement.

Policy is outlined in the pro-forma environmental contract. This determines the basis for the environmental management plan for boreholes and guides the management system. Organisational structure is clearly defined, but in the co-management system it includes both parties in the management cycle. The roles, rights and responsibilities of each party are clearly defined.

Both parties contribute to the environmental management plan for boreholes. The government party defines its scope and overall objective while the local water committee defines the details of the environmental management plan and implements it.

Both parties are involved in the review process - the local water committee through monitoring, keeping records and submitting reports, and the government party in reviewing reports and maintaining the information base. Modifications and changes to the environmental management plan to attain continual improvement are, therefore achieved. Thus the Deming Cycle or the cycle of continual improvement is completed in the environmental management system described by the model.

As with EMS, the performance of the local management system is gauged on how well environmental management is implemented rather than on environmental results, *per se*.

EMS is thus adapted from the first world corporate context to the context of a developing country. The primary weakness of EMS - that it has no specific information base on which to base management decisions - is addressed by the integration of an environmental assessment process and the EMS aspect in a coherent model.

Thus an efficient, dynamic, co-operative co-management system for environmental management of boreholes is shared between government and the local water committee.

Table 12.1 on the following page presents a summary comparison of environmental management in the co-management system of the model and EMS.

EMS	The environmental management system in the model as applied to boreholes
Requires commitment to an overall policy .	Commitment to overall policy is stated and legally binding in pro-forma environmental contract for boreholes which establishes the management system.
Requires well defined organisational structure .	Organisational structure is defined by pro-forma environmental contract in its establishment of co-management relationship, definition of rights and responsibilities of contractual parties and definition of channels of communication such as reporting.
Requires explicit environmental management plan with targets and objectives.	The environmental questionnaire completed by the local water committee results in the letter of conditions and thus, the environmental management plan component of the overall agreement between the parties. This details specific environmental objectives and targets.
Requires review and audit as processes of checking effectiveness of environmental management plan and management system as a whole.	Monitoring, record keeping and reporting contributes to the process of review. In the context of co-management review involves both parties. Periodic audit reinforces this system.
Through these components a dynamic management cycle - the Deming Cycle - aims for continual improvement .	The concept of the Deming Cycle is contained in the framework of co-management. Both parties contribute to the process of planning what is to be done, doing what has been planned, checking that what was planned has been done and acting on results to modify and improve the initial plans.
Certification based on satisfactory design and implementation of management system, not on environmental performance, <i>per se</i> .	Performance of management system based on satisfactory design and implementation of management system, not on environmental results <i>per se</i> .
Management system is locally designed and implemented.	Details of borehole management are locally designed and implemented.
No specific information base is available to inform the EMP and other components of the system.	Specific information base is available to contribute to local expertise in formulation of EMP and other components of the system.

Table 12.1: Comparison of the model for environmental assessment and management of boreholes and EMS

12.1.3 In terms of CAMPFIRE and CBNRM

Examination and inclusion of CBNRM and CAMPFIRE was based on the grounds that these systems of resource management embodied many of the principles of sustainable development. Furthermore, CAMPFIRE has been proven in practice.

These community-based conservation projects devolve rights and responsibilities of resource management to the local community level and use a co-management framework implementing conditional devolution of these rights. Both CBNRM and CAMPFIRE organise and empower communities to define and determine the development agenda, benefit from local resources and use resources on a sustainable basis.

12.1.3.1 Comparison of the model with CAMPFIRE and CBNRM

The model for environmental management of boreholes has many similarities with the CBNRM and CAMPFIRE. The principle similarity is conditional devolution of management responsibility within the co-management framework. A feature which is less well represented in the model is the strongly incentive driven motivation for implementation.

A comparison of the model with CBNRM is presented in Table 12.2 on the following page.

12.1.3.2 Convergence with CBNRM

The model for environmental management of boreholes converges with the trends of community management in Namibia as embodied by the CBNRM process and the DWA initiative of community management of waterpoints in rural areas.

Not only is the model in keeping with these trends of devolving responsibility to communities but it also highlights the possibility that the scope of community management or co-management be extended to a more holistic approach of resource management.

This would contribute to the concept presented by Fuller and Turner (1995) of a community management board. Such a local community board, in the framework of co-management and with a more holistic mandate than management of a single resource could be a powerful instrument of sustainable development.

CBNRM	Model as applied to boreholes
Conditional devolution to the local community of rights of use and management of the natural resource of wildlife - a co-management system.	Borehole provision and management is directed by the conditions of the co-management agreement which is defined by pro-forma environmental contract.
Government defines conditions of local management. These conditions include sustainability, equity and the representivity of the management committee.	The scope and overall objectives of environmental management for boreholes are defined by the government party.
Community autonomy , empowerment to define local development agenda and employ local knowledge.	Community autonomy and empowerment. The local water committee has autonomy to define the development agenda and define the content of the environmental management plan.
Enabled by legislation and defined by a legal agreement.	The co-management system is enabled by legislation and the specifics of co-management are defined by the components of the environmental contract.
Accountability of local management committee to community and to government.	Local water committee is accountable for environmental management of boreholes.
Promotes coherency between local development and conservation issues and national development and conservation issues.	Promotes coherency between local needs for development and environmental protection and national concerns regarding the need for development and protection of the environment.
Government recourse in the event of breach.	Mechanism for recourse in the event of breach. This would possibly be an incentive based mechanism.
Suitable for the context of communal land tenure system.	Designed for the context of communal land tenure system.
Conservancy committee is legally constituted body.	Local water committee has legal definition and can act as a legally constituted body.

Table 12.2: Comparison of CBNRM and the model for environmental management of boreholes

12.1.4 In terms of the 'fast-track' system for prospecting

The outstanding feature of the 'fast-track' system is administrative elegance. It is able to achieve sound environmental management, through a 'bottom-up' negotiated contract within the framework of a simple, and efficient co-management type of system.

It manages to instate a co-management system - with all its implicit advantages for sustainable development - which is logistically and administratively practical and feasible. This is achieved through a process compatible with the principles of co-management and which is administratively streamlined and inexpensive so that it does not jeopardise the viability of economically marginal projects.

The key to its success is the mechanism of elegant process techniques. Therefore, these have been integrated into the model and include:

- a pro-forma environmental contract for co-management of boreholes;
- use of an environmental questionnaire as a mechanism to guide the formulation of an environmental management plan but also to allow full scope for inclusion of local knowledge and appreciation of local diversity;
- the mechanism of using a letter of conditions to implement the environmental questionnaire as an environmental management plan;
- a pro-forma format for reporting which is able to act not only as a checking mechanism but also as a mechanism for review and feedback to improve performance.

These efficient process techniques overcome most of the financial and logistical obstacles that are associated with EIA in the developing world.

12.2 EIA

This dissertation, in chapter 3, highlighted the shortfalls of conventional EIA processes. This was done in order to highlight the need for this model of environmental management for boreholes and also to direct this process of formulating the model so that the model would address these shortfalls.

It would now be useful to reflect on how well the model may perform in addressing these shortfalls.

Chapter 3 identified four key shortfalls of conventional EIA. These were:

1. **EIA and developing countries**
Conventional EIA procedure is not always suitable for the context of a developing country.
2. **EIA and environmental management**
A systematic weakness of EIA is the poor implementation of the information gained in the EIA process in ongoing environmental management, monitoring and auditing of the project.
3. **EIA and small-scale development projects**
EIA is inappropriate for community development projects, the informal and semi-formal sector or small-scale, low budget development.
4. **EIA and cumulative effects**
Consequently, EIA does not address the cumulative effects of such small-scale development.

The model for the environmental assessment and management of boreholes has been designed specifically to address these problems.

12.2.1 The model and the context of a developing country

Chapter 3 (section 3.1) discussed the characteristics of a developed country which underpin and facilitate the EIA process. As many or most of these characteristics may be less well represented in a developing country such as Namibia, the model was developed with regard for this type of context. Thus, it draws significantly on the 'indigenous' approaches of IEM, CBNRM and the 'fast-track' system which are appropriate for the context of a developing country.

There is always a danger that as EIA becomes more sophisticated and broad in its attempt to address complex sustainable development issues and issues such as cumulative impact assessment, it becomes more complex and more difficult to implement (Sadler, 1996). In the context of a developing country complex and sophisticated approaches, although they may be more comprehensive, may be beyond the financial, technical and personnel resources of the country.

Given the importance of small-scale projects and community development in the context of a developing country, the model aims not to jeopardise such development by imposing cumbersome or costly environmental management procedures. This model may be able to implement sound environmental management for boreholes without immensely complex technical and administrative burdens. The result is that such a project does, therefore,

become subject to an environmental assessment and management process rather than being ignored or neglected.

There are three key reasons for this strength of the model:

1. The process is streamlined, efficient, simple and easy to administer;
2. It requires minimal expertise;
3. Most of the work, responsibility and administrative burden for assessing the local environment, designing environmental management plans, implementing and reviewing these plans and providing expert input rests with the local community who are ideally placed to undertake these tasks.

12.2.2 The model and environmental management

Most of the impacts of borehole provision result from decisions regarding their ongoing management (ENGEO, 1997). In contrast to the weakness of EIA in implementing environmental management beyond the decision phase (Sadler, 1996) and the relatively weak emphasis of implementation in IEM guideline documents (Hill, 1996), this model is primarily concerned with ongoing environmental management.

The primary purpose of the environmental assessment stage is to inform the design and ongoing process of environmental management of boreholes. The environmental assessment stage is well integrated into a sophisticated but simple environmental management system.

In contrast to EIA, environmental management in the model - the implementation of the generic environmental assessment process - is highly emphasised, well developed, appropriate for the context, sensitive to the diversity of local conditions and implemented on a day to day basis by people who designed much of the scope and details of the environmental management plan and have a vested interest in its success.

12.2.3 The model and small-scale development projects

The model is designed specifically for the limitations and characteristics of a small project.

Small projects are generally on a low budget, tend to be economically marginal and would be jeopardised by expensive or time consuming environmental procedures. Consequently, the model does not incur expense for the proponent, does not incur significant time delays and requires minimal bureaucratic involvement. Once the system is set up, it does not require experts or consultants to operate. Most of the work is performed by the community itself and not a paid consultancy.

Small projects are common in the informal and community development sectors in a country such as Namibia. They are also important to strengthen

and diversify the local and national economy. The model is suitable for these aspects as it promotes development and promotes financial independence in communities. This would be reinforced by the better environmental management which should result in more benefit from each borehole project.

12.2.4 The model and cumulative impacts of small-scale development projects

The main concern of a small project such as provision of a borehole and its propensity to evade environmental assessment and management is that although its own direct environmental impacts may be local and not highly significant its cumulative impacts are significant. The model in recognition that the impacts of a borehole are potentially significant, especially on the cumulative scale, provides a process for such a project to benefit from a thorough environmental assessment process and be subject to sound environmental management.

In Namibia, given the number of boreholes in communal areas and the number of boreholes expected to be provided in communal areas over the next few decades, the cumulative effects could be highly significant. As a contributor, through various mechanisms, to environmental degradation and desertification, boreholes represent a significant potential environmental problem in terms of - among others - loss of productivity, decline of economy in communal areas and loss to the national economy.

Although improved local environmental management of boreholes by implementation of the model may not resolve these problems entirely, it could be an improvement in environmental management and progress towards sustainable development.

It would also complement, facilitate and possibly underpin a wider approach to the problem as may be considered by a SEA.

12.3 Sustainable development

The most crucial test of the model as it is applied to boreholes is that it is a process which is compatible with and embraces the principles of sustainability. This was a primary aim of the dissertation. Thus performance of the model in terms of the discussion on sustainable development should be reviewed.

environmental contract requires the overall condition of sustainable management or sound environmental management, while the requirement of the environmental management plan does define and guide the scope of activities associated with use of the water point.

However, the conditions of devolution are not likely to be contentious or likely to negatively affect local control in the use of water resources and the consequent potential for local development. On the contrary the conditions attached to this devolution of control are designed to maximise overall benefit to the community - both directly through improved water supplies, health, food security and returns on investment in the land, and indirectly through combating wider environmental problems, such as desertification which affects the economy and all Namibians

The model, in the co-management system, thus promotes a high level of local community autonomy over resource use.

12.3.3 Local communities must have the decisive voice in planning

Similarly, the model enables communities to have a high degree of autonomy over planning. This is not only empowerment to define the development agenda but to define the nature of development and the nature or resource use.

The model places the locus of power to define the development agenda in the domain of the community. Thus, no external development agenda is imposed on the community. From the beginning the development project - a borehole - is initiated, motivated and controlled by the community. The only imposition from an external source is the imposition of the conditionalities of co-management as applied by government. The impetus for the project remains with the community. The details of design, installation, commissioning and operating the borehole and designing and implementing environmental management rest with the community.

If an attractive incentive driven approach to promoting the model and ensuring compliance can be successfully implemented, accession to the co-management system may not need to be compulsory. This would further increase the autonomy and choices of communities in regard to development planning.

12.3.4 Local communities should represent themselves in and through their own institutions

The model requires that communities are represented for this purpose through the existing structures of local water committees. While these are not traditional community institutions, the manner in which the local water committees are constituted allows communities to decide on their

composition. Thus, traditional structures and institutions may be used in the formation of local water committees.

However, the local water committees are formed by local people and, therefore, represent the knowledge, needs and aspirations of the local community - regardless of whether they are *ad hoc* committees formed by democratic election or are existing institutions which are given this responsibility. Thus, it is a community based and community constituted committee that represents the community in co-management of boreholes.

12.4 The sustainable development dilemma with boreholes in Namibia

The provision of boreholes is a basic development need, but the provision of boreholes can cause environmental degradation and desertification and detract from the productivity of the land and quality of life.

The model for boreholes has the potential to begin to address this dilemma of sustainable development. Not only does it provide a comprehensive system and framework for environmental assessment and management for boreholes, but it is founded on and promotes sustainability criteria. In so doing it allows communities to define the nature and extent of development within certain broad conditions that are compatible with the sustainability criteria.

12.5 Changing perspectives

This community orientation of development and the development model may have significant ramifications in development thinking.

It signifies a decreasing role for foreign development agencies and external funding. It reasserts the ability and resources of local communities and democratically elected government to manage environmental resources and benefit from these resources in a sustainable manner. The key role-players in the sustainable development playing field are indigenous and/or local to the country and are not dictated to by foreign interest and conditions on development.

The role for NGO's and foreign involvement becomes secondary to the local system which calls the development tune. These actors may be enrolled on a contractual basis as deemed necessary locally. For example, a consortium of local water committees may contract in the services of a geohydrologist or of a NGO that specialises in a relevant field such as agricultural advice services.

This increasing emphasis on the ability and opportunity for local people to call the development tune would, therefore, relegate foreign involvement with all its implications to a secondary participatory role. This would seem appropriate in terms of the sustainability criteria.

12.6 Limitations and the next step

This dissertation represents a proposition aimed at resolving the borehole sustainable development dilemma. While there have been many calls for better environmental management for boreholes and the role of boreholes in desertification is well established, relatively minimal research has been undertaken to increase the understanding of the impact of boreholes on the environment. That research which has been performed was found to address the borehole issue from various sectoral points of view - such as an ecological approach. Until recently no substantial work has been undertaken to address the provision of boreholes from a comprehensive and holistic point of view which examines the problem from a central policy and planning level right down to individual environmental impacts at a borehole in a rural area. The ENGEO baseline report seems to have been the first research initiative with this dedicated aim.

Therefore the understanding of the environmental impacts of boreholes and more importantly a holistic understanding of the whole context and ramifications of borehole provision is embryonic. This dissertation, consequently, can not be definitive or authoritative but is able to outline this model as a proposition which could contribute towards the goal of a simple, efficient, effective and user-friendly system which helps promote sustainability in borehole provision. It is therefore, a possible initial step in a lengthy process involving research, review and consultation and negotiation with stakeholders.

However, the model comes at an appropriate time in terms of general development trends and trends in Namibia. These include the philosophy promoted by CBNRM and, more importantly, the significant innovations in the DRWS which are promoting community management of waterpoints. In further developing and modifying the model these points of convergence would need to be key areas of attention.

12.7 Potential for wider applicability

The model has been discussed as a model for environmental assessment and management of boreholes. The language and approach used has been cognisant of the possibility that the model could also apply to other informal or semi-formal development projects and particularly to other community development projects. The basic concepts and ideas of the model would easily be modified for other applications.

However, the basic concept of the model - a well-researched and informed pro-forma environmental contract to provide a co-management framework for the implementation of small projects - could be even more broadly applied. This could be an approach which is useful in developed countries as well. For example, where pesticides are a contentious environmental problem in many

developed countries, the model could be used to apply better environmental management. A farmer would have conditional approval to use a particular pesticide. This conditional approval would be based on a pro-forma environmental contract and an environmental questionnaire implementing an environmental management plan for a specific pesticide use.

12.8 Conclusion

This model provides a mechanism which is a potential key to unlocking the complexities of achieving the goals of sustainable development in developing countries as it has the potential to achieve coherency between the broader development and environmental agenda and needs and the local-level needs and aspirations.

It achieves this by integrating a thorough environmental impact assessment with a structured environmental management system. The environmental management system is implemented within a community co-management framework. The mechanisms and process techniques to achieve this are simple and efficient.

These factors promote the model as a environmental assessment and management system suitable to resolve the sustainable development dilemma of providing boreholes in communal areas in Namibia.

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List of Interviews

Name	Title/Organisation	Date
Mr C. Castens	Senior Foreman - Mechanical Maintenance and Repair. DRWS Regional Office, Khorixas.	4-7 Feb. 1997
Mr B. Jones	DEA, Windhoek.	21 Nov. 1996 30 Jan. 1997 21 Feb. 1997
Mr H. Koch	Director of Rural Water Supply. DRWS Division, DWA, Windhoek.	21 Nov. 1996 29 Jan. 1997 21 Feb. 1997
Mr S. Samupofu	Regional Head, South Kunene. DRWS Regional Office, Khorixas.	4-7 Feb. 1997
Dr A. Simmonds	Managing Director. Interconsult Namibia (Pty) Ltd, Windhoek.	21 Nov. 1996
Mr P. Stander	Etosha Ecological Unit, Etosha.	15 Feb. 1997
Mr P. Tarr	DEA, Windhoek.	Several between Nov. 1996 and Feb. 1997
Mr J.C. van der Merwe	DRWS, Khorixas.	4-7 Feb. 1997

PRO-FORMA ENVIRONMENTAL CONTRACT

WHEREAS the applicant Prospecting Company referred to below, has been notified under section 48(4) of the Minerals (prospecting and Mining) Act, 1992 that the Minister of Mines and Energy is prepared to grant the applicant a prospecting licence subject to certain terms and conditions and;

WHEREAS such terms and conditions include the condition precedent that the applicant enters into an Environmental Contract with the Government of Namibia;

IT is hereby agreed as follows:

1. PARTIES.

The parties to this contract are: -----
(hereinafter referred to as the "Prospecting Company") being the holder of Exclusive

Prospecting Licence no -----

on the one hand, and

THE GOVERNMENT OF NAMIBIA

(hereinafter referred to as "the Government")

duly represented by:

the MINISTRY OF ENVIRONMENT & TOURISM (MET)
and the MINISTRY OF MINES & ENERGY (MME)

on the other.

2. GENERAL OBLIGATIONS.

- 2.1 The provisions contained in this contract are in addition to and do not detract from any obligations which the Prospecting Company may have under the Minerals (Prospecting and Mining) Act, 1992 (the Act).
- 2.2 The Prospecting Company recognises that its prospecting operations may have significant impacts on the environment. Accordingly the Prospecting Company undertakes that during the course of its operations it will take every practicable step necessary to ensure the mitigation of such impacts. In doing so it will liaise with the MET and MME as provided for in 3.3 and 4 below.

- 2.3 In particular the Prospecting Company will undertake necessary and adequate steps to ensure that environmental damage is reduced to a minimum and prevented insofar as is practicable.
- 2.4 Should the Prospecting Company not carry out its environmental obligations it shall be liable for the environmental damage which may result. In this regard the Government reserves the right to:
- 2.4.1 demand at any time financial or other guarantees to restore the environment or mitigate environmental damage which has, or which may occur, as a result of the Prospecting Company's activities;
 - 2.4.2 itself undertake such mitigatory or restorative measures and to recover the costs thereof from the Prospecting Company
 - 2.4.3 claim compensation for environmental damage which may have been brought about by the Prospecting Company's activities.
- 2.5 The Prospecting Company shall on completion of its operations, ensure that the impact on the environment is minimised and that every reasonable and practicable step is undertaken to ensure that the environment is left in a reasonable state. The provisions of clause 2.4 apply mutatis mutandis to environmental damage evident after prospecting operations have been completed.
- 2.6 The Prospecting Company acknowledges that should it apply for mining licence in consequence of its prospecting operations, it will have to comply with Namibia's National Environmental Assessment Policy (Directorate of Environmental Affairs, Jan, 1995) and that this will entail the carrying out of an Environmental Assessment (EA).

3. THE ENVIRONMENTAL QUESTIONNAIRE

- 3.1 In accordance with section s.68(f) of the Act, which provides that an application for an exclusive prospecting licence shall contain particulars of the existing condition of the environment, an estimate of the effect which the proposed prospecting operations may have, and the proposed steps to be taken to prevent or minimise such effect, the Prospecting Company has completed the attached Environmental Questionnaire marked Appendix A.
- 3.2 The Prospecting Company acknowledges that once the MET has determined that the information furnished in the Questionnaire is satisfactory, it will form part of this contract.
- 3.3 The Prospecting Company warrants that the information contained in the Questionnaire is to the best of its knowledge and belief true and correct and that it will notify the Government of any material changes therein. Should there be such material changes, the Government reserves the right to re-negotiate the terms and conditions of this agreement.

4. COMPLIANCE AND NOTIFICATION

- 4.1 The Prospecting Company acknowledges that the quarterly report which it is obliged to furnish to the MME (the office of the Mining Commissioner provided for in the s.48(4) notice will include a bi-annual environmental report on the prescribed form available from the MET.
- 4.2 The Prospecting Company acknowledges that officials from the MME and/or the MET may at any time conduct a compliance and/or performance inspection of its prospecting operations.
- 4.3 The Prospecting Company will keep records of its environmental performance and make these available to the officials referred to in 4.2.

SIGNED AT WINDHOEK on this day of 199

For the Prospecting Company:
(duly authorised thereto)

For the Government of Namibia:

(Permanent Secretary, MET)

and

(Permanent Secretary, MME)

Appendix 2

Sample of the Environmental Questionnaire for Prospecting in Namibia

**(Referred to as 'Appendix A' by the
Pro-Forma Environmental Contract
for Prospecting in Namibia)**

ENVIRONMENTAL QUESTIONNAIRE FOR PROSPECTING IN NAMIBIA

BEING APPENDIX A TO THE ENVIRONMENTAL CONTRACT

1. Background information

- 1.1 Companies applying for a prospecting license must complete this questionnaire.
- 1.2 The answers provided in this questionnaire shall be regarded as commitments made by the company, and will become part of the **Environmental Contract** between the prospecting company and the Government of the Republic of Namibia, duly represented by the Ministry of Environment and Tourism (MET).
- 1.3 On completion of this questionnaire by the prospecting company, the MET will either accept / reject / request further information regarding the environmental commitments made therein. The MET reserves the right to add further conditions as appropriate.
- 1.4 Once agreed to by all parties concerned, the completed questionnaire shall form part of the **Environmental Contract**, and shall form the basis of future monitoring, reporting and compliance inspections.
- 1.5 A flow-chart is attached as a simple explanation of the components of the **Environmental Contract**, and the process which needs to be followed in order for the **Environmental Contract** to be concluded.

2. Company details

2.1 Name of Company :

2.2 Name of Chief Executive Officer

2.3 Postal Address :

3. COMPANY'S ENVIRONMENTAL COMMITMENTS :

3.1 Pollution and Waste

3.1.1 Do you intend using any toxic or hazardous substances? Yes No

3.1.2 If "yes" above, list the substances you intend using and their purpose

Substance	Purpose
1.	
2.	
3.	
4.	
5.	

3.1.3 If "yes" for (3.1.1), explain how you will handle, store and dispose of such substances?

Handling of substance	Storage of substance	Disposal of substance
1.		
2.		
3.		
4.		
5.		

3.1.4 Describe how normal litter will be disposed (e.g. Kitchen spoils, cans, bottles, paper, vehicle oil, etc.)

3.1.5 Describe what Industrial Waste will be generated and how this will be disposed (e.g. old machinery, vehicles, building rubble, batteries, paint, thinners, etc.)

3.2.3 State how you intend controlling the movement of vehicles and machinery in order to minimise environmental damage ?

3.2.4 Indicate which routes will be used by vehicles to gain access to your site and clearly state any intentions to create new roads or tracks (both to your site and within your site).

3.2.4 Do you intend doing any blasting during your prospecting operation ?

Yes No Unsure

3.2.5 If "yes" above, explain how you intend minimising environmental impacts, including the safety of human and animal life ?

3.5 Relations with neighbouring communities and/or the general public

3.5.1 Are there any local communities living as neighbours in or near your prospecting area?
Yes No Unsure

3.5.2 If "yes", explain where such communities live and describe their economic activities.

3.5.3 If "yes" in (3.5.1) describe how you intend avoiding possible conflicts with them, and what you will do to ensure a good relationship with such communities.

3.5.4 Will your prospecting activities restrict public access to formerly accessible areas?
(e.g. tourists, 4x4 clubs, farmers, etc.)
Yes No Unsure

3.5 Historical, archaeological and cultural heritage

(e.g. Rock art, graves, monuments, fossils, sacred sites, historical buildings, etc.)

3.5.1 Are there any historical, archaeological or culturally important sites within your prospecting area ?
(tick one box)

Yes
No
Unsure

3.5.2 If "yes" above, please describe these briefly

3.5.3 If such sites are known, how will you avoid damaging them ? :

3.5.4 If such sites are discovered after you have begun your prospecting operation, would you accept new conditions to this contract so that they can be properly protected ?

Yes No Unsure

3.6 Rehabilitation

3.6.1 Have you provided financial resources for rehabilitating trenches and pits, etc. once prospecting is over?

Yes
No

3.6.2 If "yes", above, in what form and how many N\$?

--

3.6.3 If "yes" for (3.6.1), provide details of where such funds are lodged and under what circumstances they can be accessed

Appendix 3

Sample of the Pro-Forma Environmental Report for Prospecting in Namibia

ENVIRONMENTAL REPORT (ER)

INSTRUCTIONS :

1. An Environmental Report shall be submitted to the Ministry of Environment and Tourism (MET) by the following dates each year :-
30 June; 31 December,
2. This form shall be the minimum reporting format. Prospecting Companies are expected to attach a map of their prospecting area to this report. Prospecting Companies are welcome to attach any other information they like, such as copies of new agreements, letters of explanation, aerial photographs, or anything else of interest.
3. The map shall be used to indicate the following :
 - * areas where prospecting has taken place,
 - * roads or tracks made and/or used,
 - * houses and other infrastructure erected,
 - * excavations or other scars which have been rehabilitated,
 - * conflict areas, etc....
4. It is recommended (but not compulsory) that Prospecting Companies attach photographs to their report which visually illustrate the activities described in their report.
5. Failure to submit an Environmental Report shall constitute a breach of the Environmental Contract, which could result in steps taken against the Prospecting Company.
6. All information contained in the Environmental Report shall be treated as confidential.
7. The Prospecting Company shall ensure that all the information recorded in the Environmental Report is, to their best knowledge, accurate and correct.

Completed Environmental Reports should be sent to :

**The Permanent Secretary
Ministry of Environment and Tourism
Private Bag 13306
Windhoek**

For Attention : Mr Peter Tarr

A. COMPANY DETAILS AND REPORTING PERIOD :

Name of Company

Address of Company

Telephone & Fax number

Name of person compiling report

Reference number of prospecting area / block / license

Geographical location of area / block / license

This report is for the period of : (tick the relevant box and fill in the year)

 January - June 19 July - December 19

Other (please specify)

B. POLLUTION AND WASTE

Has all domestic refuse (eg. Household waste, bottles, tins, paper, plastic, etc) been removed from the prospecting area ?

yes no

If "yes" above, specify the site where such refuse has been deposited :

How often is refuse removed to the site mentioned above ? :

every week	<input type="checkbox"/>
every two weeks	<input type="checkbox"/>
every three weeks	<input type="checkbox"/>
once a month	<input type="checkbox"/>
at irregular intervals	<input type="checkbox"/>

If refuse has not been removed, where has it been dumped ?

As far as litter is concerned, would you describe your prospecting area as :

Very clean Reasonably clean Filthy

If your prospecting area is littered with refuse, please indicate how you intend cleaning it up :

Are toilets provided for all staff employed by the prospecting company : yes no If "yes" above, are they : Flush toilets Chemical Toilets Pit Latrines Other If chemical toilets are used, how are old chemicals disposed of : Deposited in evaporation ponds
Deposited in a municipal refuse dump Buried on site Other (specify)

C. VEHICLES AND EARTHMOVING EQUIPMENT

Indicate the types and number of vehicles and earthmoving equipment used on site during the reporting period (tick box in front of the category of vehicles used and then fill in the next boxes to indicate numbers)

- | | | |
|--|-------------------|---|
| <input type="checkbox"/> Pick-up trucks ("bakkies"), either 2x4 or 4x4 | : How many in use | <input type="checkbox"/> <input type="checkbox"/> |
| <input type="checkbox"/> Lorries / trucks between 5 - 10 ton capacity | : How many in use | <input type="checkbox"/> <input type="checkbox"/> |
| <input type="checkbox"/> Lorries / trucks larger than 10 ton capacity | : How many in use | <input type="checkbox"/> <input type="checkbox"/> |
| <input type="checkbox"/> Bulldozer of any size | : How many in use | <input type="checkbox"/> <input type="checkbox"/> |
| <input type="checkbox"/> Road Grader of any size | : How many in use | <input type="checkbox"/> <input type="checkbox"/> |
| <input type="checkbox"/> Front-end loader of any size | : How many in use | <input type="checkbox"/> <input type="checkbox"/> |
| <input type="checkbox"/> Drilling machine of any type | : How many in use | <input type="checkbox"/> <input type="checkbox"/> |
| <input type="checkbox"/> Other (specify) | : How many in use | <input type="checkbox"/> <input type="checkbox"/> |

D. ROADS AND TRACKS (In addition to ticking the following boxes, please draw roads/tracks made on an accompanying map in blue ink. Roads which have been rehabilitated (ie. restored to their natural state) can be scratched out in red pen.

Have new roads or tracks been made during the reporting period? yes no

If "yes" above how long are these (in kilometres)? Km

If "yes" above are these still in use? yes no

If "no" above have any of these roads or tracks been rehabilitated? yes no

If "yes" above, how have you done such rehabilitation?: Ripping Raking sweeping
Other (specify)

If road / track rehabilitation has taken place, how many kilometres of roads or tracks have been rehabilitated? kilometres

E. TRENCHES OR PITS: If new trenches or pits were made in the site / area during the reporting period, please indicate these by ticking the appropriate boxes AND by means of illustrating them on the same map described above. New pits or trenches made, should be numbered and drawn as a CIRCLE in blue ink, while pits or trenches which were rehabilitated during the reporting period should be scratched out in RED ink.

Have new trenches or pits been excavated in your area during the reporting period? yes no

If "yes" above, what are their approximate sizes or dimensions? (in metres)

1. Trench / pit No.1 : Size / dimensions : Cubic metres or length x breadth x depth
2. Trench / pit No.2 : Size / dimensions : Cubic metres or length x breadth x depth
3. Trench / pit No.3 : Size / dimensions : Cubic metres or length x breadth x depth
4. Trench / pit No.4 : Size / dimensions : Cubic metres or length x breadth x depth
5.
6.

Were any holes/trenches rehabilitated during this period of reporting? yes (show on map) no

I. PROTECTION OF FAUNA AND FLORA

Please answer the following questions by ticking the appropriate boxes :

Question :	Yes	No	Unsure
Were any mammals, birds, reptiles or fish killed or wounded (purposefully or accidentally) in the prospecting site or area ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were any plants (excluding grasses) picked, damaged or removed ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Was there any wood collecting in the area ?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

J. RELATIONS WITH NEIGHBOURS, OFFICIALS AND/OR THE GENERAL PUBLIC

Were there any conflicts with neighbours, land-owners, Government Officials or the public during this period ? Yes No

If "yes" above, what was the nature of these conflicts ? (tick boxes to provide answers)

- People entered the prospecting area without permission or prior arrangement
- Complaints about reduced access to water or other resources
- Complaints about danger posed to livestock or wildlife
- Allegations about stock-theft or poaching
- Complaints about vehicle or equipment movement on access roads / tracks
- Complaints about litter or other types of pollution (eg. Noise, dust, etc.)
- Complaints about the activities / actions of company staff
- Allegations that the Company was not adhering to contracts / agreements
- Allegations that the Company damaged property or installations
- Allegations that gates were left open or unlocked
- Other (specify).....

If conflicts arose, indicate how these were resolved ? (tick boxes)

- Verbal agreement after discussions.....
- Written agreement by special contract.....
- Instructions to company staff to avoid conflicts.....
- Company rectified its mistakes and undertook to avoid future wrong-doing..
- Court action or other third party arbitration.....
- Other (specify)
- The conflicts remain unsolved.....

Any other comments or information :

.....

.....

.....

.....

See next page for more space for "additional comments".....

Additional comments continued

A large rectangular area with a solid border, containing 20 horizontal dotted lines for writing.

**I declare that the information provided in this Environmental Report is,
to the best of my knowledge, accurate and correct.**

.....
Prospecting Company

.....
Date

Appendix 4

Nature Conservation Ordinance Amendment Act, 1995

**(Legislative Amendments to Enable
Conservancies in Communal Areas
in Namibia within the CBNRM
Programme)**

"Non consumptive use" shall mean use not entailing the permanent removal of individual members of a wildlife population and shall include use for recreational, educational, research, cultural, aesthetic or related purposes.

"Minister" means the Minister of Environment and Tourism

"Wildlife Council" means an authority registered by the Minister under section 28B

Amendment of section 14
of Ordinance 4 of 1975.

2. Section 14 of the Nature Conservation Ordinance, 1975, is hereby amended by the insertion of the following subsections 14(3) and 14(4) after subsection 14(2):

(3) The Minister may, subject to section 28A, declare an area in a communal area, excluding proclaimed conservation areas, to be a conservancy to enable inhabitants of such conservancy to derive benefits from the management and consumptive and non consumptive utilisation of wildlife in such conservancy.

(4) The Minister may designate a Wildlife Council, for an area designated by him or her as provided in section 28B, and falling within a communal area, excluding proclaimed conservation areas, and areas registered as Conservancies under section 28A, to enable inhabitants of such area to derive benefits from the management and consumptive and non consumptive utilisation of wildlife in such area.

Amendment of section 28
of Ordinance 4 of 1975.

3. Section 28 of the Nature Conservation Ordinance, 1975, is hereby amended by the substitution for paragraph (a) of subsection 1 of the following paragraph:

(a) "Subject to the provisions of chapter IV and to section 28A and 28B no person shall, without the written permission of the [Cabinet] Minister hunt any huntable game, huntable game bird or exotic game or any other wild animal on any land including communal land owned by the [Government of the Territory or a representative authority] Government of Namibia.

Insertion of section 28A in
Ordinance 4 of 1975 -
Conservancies.

4. The following section is hereby inserted in the principal Ordinance after section 28:

28A (1) The Minister may, at the request of a community inhabiting a communal area or portion thereof, register an area to be a Conservancy, provided that he or she is satisfied that:

- (a) a conservancy committee has been established which is representative of the community residing in the conservancy and includes one or more representatives or nominees of the traditional authority, whether established in terms of section 2 of the Traditional Authorities Act 17 of 1995, or otherwise, in conformity with section 10(2)(c) of that Act;
- (b) such conservancy committee has a constitution displaying a commitment to, and strategy for, the sustainable management and utilisation of wildlife within the conservancy;
- (c) such conservancy committee has the ability to effectively manage the income and funds of the conservancy and has an appropriate method for the equitable distribution of benefits to the members of such conservancy derived from consumptive and/or non-consumptive use of wildlife;
- (d) the conservancy committee has duly applied for registration of the conservancy in a format prescribed by regulations;
- (e) the geographic area of the conservancy has been sufficiently identified by way of its physical boundaries taking into account the views of the Regional Council.

(2) Subject to the provisions of subsection (3), and subject to quotas agreed to by the Minister, a conservancy committee shall have responsibilities for, and rights to, consumptive and non-consumptive management and sustainable use of wildlife resources, on behalf of the members of a conservancy, including hunting and trophy hunting rights, rights to revenues and other benefits allocated to or generated from such management and use, as well as the right to enter into agreements and to retain, manage and distribute its funds and assets.

(3) The provisions of Chapter III of the Nature Conservation Ordinance, 4 of 1975, insofar as they apply to owners or lessees of land, but excluding provisions regarding fencing, shall *mutatis mutandis* apply to Conservancies and Conservancy Committees.

(4) Should the Minister at any time be of the opinion that the conditions under which a conservancy was declared in terms of subsection (1) are not being met, he or she may vary or impose such further conditions regarding such conservancy or rescind his or her registration of the conservancy, provided that

(z) the conditions relating to the establishment, registration, constitution and procedures applicable to Conservancies and Conservancy Committees under section 28A;

(b) by the addition of the following sub-paragraph after paragraph (z)

(aa) the conditions relating to the establishment, registration, and procedures applicable to Wildlife Councils under section 28B;

Short title.

8. This Act shall be called the Nature Conservation Ordinance Amendment Act, 1995.

representations are invited from the conservancy committee concerned by notice of not less than 30 days prior to such imposition, variation or rescission.

Insertion of section 28B in
Ordinance 4 of 1975 -
Wildlife Councils.

5. The following section is hereby inserted in the principal Ordinance after section 28A:

28B (1) The Minister may, after consultation with the communities concerned, register Wildlife Councils in respect of communal lands or designated portions thereof, excluding privately owned measured farms, proclaimed conservation areas, and areas designated as conservancies under section 28A.

(2) The functions and duties of a Wildlife Council shall be to manage on a sustainable basis, and to co-ordinate the consumptive and non-consumptive utilisation of wildlife in the designated area, including revenues and other benefits allocated to, or generated from, such management, not falling within conservation areas or conservancies referred to in section 28A and subject to quotas agreed to by the Minister and the provisions of the Nature Conservation Ordinance, 4 of 1975.

(3) The provisions of Chapter III of the Nature Conservation Ordinance, 4 of 1975, insofar as they apply to owners or lessees of land, but excluding provisions regarding fencing, shall *mutatis mutandis* apply to Wildlife Councils.

(4) Should the Minister at any time be of the opinion that the conditions under which a Wildlife Council was declared in terms of subsection (1) are not being met, he or she may vary or impose such further conditions regarding such conservancy or rescind his or her declaration of the Wildlife Council, provided that representations are invited from the Wildlife Council concerned by notice of not less than 30 days prior to such imposition, variation or rescission.

Amendment of section 29
of Ordinance 4 of 1975.

6. Section 29 of the Nature Conservation Ordinance, 1975, is hereby amended by the insertion of the following subsection 29(3) after subsection 29(2):

(3) A Conservancy Committee or a Wildlife Council, shall be the owner of all huntable game, huntable game birds and exotic game in a conservancy, or area under the jurisdiction of Wildlife Council, as the case may be, as long as such huntable game, huntable game birds and exotic game are lawfully on such conservancy or area under the jurisdiction of such Wildlife Council.

Amendment of section 84
of Ordinance 4 of 1975.

7. Section 84 of the Nature Conservation Ordinance, 1975, is hereby amended:-

(a) by the addition of the following sub-paragraph after paragraph (y):

Appendix 5

Steps in Conservancy Formation

STEPS IN CONSERVANCY FORMATION

Once a community has decided it wishes to firm a conservancy, the following steps must be taken:

1 Obtain information and application forms from MET

2 Define Membership
noone may be excluded on grounds of ethnicity or gender

3 Elect conservancy committee
must represent community

4 Define Boundaries
dialogue with other communities, regional councils etc

5 Develop Constitution
objectives of conservancy, rules for operation, management etc.

6 Develop plan for equitable distribution of funds
equitable means fair, not equal

7 Before submitting the application to the MET, CHECK the following:

- ✓ Is the committee representative of the community?
- ✓ Is a list of names of the committee attached to the application?
- ✓ Has a proper constitution been developed and attached?
- ✓ Does the constitution provide for sustainable management?
- ✓ Can the committee manage funds adequately?
- ✓ Has the committee developed a plan for the equitable distribution of benefits?
- ✓ Have boundaries been identified and agreed upon?
- ✓ Are you sure that the area is not subject to lease, or is in a game park?

If the answer to any of these questions is NO, then the application is not ready to be submitted.

Once the answer to all of the questions is YES, then the application can be submitted to your nearest MET office. It will then be sent to the Minister of Environment and Tourism for Approval.

Appendix 6

Capital Expenditure of Borehole Drilling and Installation

	Components	Price (N\$)	Total (N\$)
Diesel Installation	Diesel engine and pump	35 000	
	Storage tanks, trough, basin	20 000	55 000
Solar Installation	Solar equipment and pump	40 000	
	Storage tanks, trough, basin	20 000	60 000
Windmill Installation	Windmill structure / pump	25 000	
	Storage tanks, trough, basin	20 000	45 000
Borehole Drilling	Boreholes < 50 metres depth		40 000
	Boreholes 50 - 100 metres depth		80 000
	Boreholes > 100 metres depth		120 000

(source: DRWS, 1996)