

EXECUTIVE SUMMARY

Part 1 Context and Methodology

This State of the Environment Report is one of a series covering different sectors produced under the auspices of a Ministry of Environment and Tourism project entitled "Information and Communication Service for Sustainable Development in Namibia".

Within this context, the aim of this particular State of Environment Report is to support sustainable and responsive policy and strategy formulation, and implementation, by reviewing a comprehensive range of disciplines addressing the state of the country's agricultural and land resources. In addition, the report introduces a number of criteria for on-going environmental monitoring in terms of a number of sustainability indicators. An important key to the success of the State of the Environment Reporting initiative will be the effective communication of findings to various stakeholders so as to inform the national development process.

The report is structured around the so-called "pressure-state-response" conceptual framework, which has been adopted for all Namibian State of the Environment reporting. This aims at systematic coverage, from an holistic perspective, of sustainability issues. It is based on analysis of the relationships between human activity which puts pressure on natural resources, the changing state of the natural resource environment resulting from human activity, and human societal activity responding to this changed state, so as to maintain and restore its status as a provider of essential resources. Further, the report adopts a model for the response component of this framework which proposes that sustainable agriculture and land resource use is not only about appropriate technologies and management practices but also about supporting institutions and services which empower resource users to implement improved technologies and practices, and about an overall enabling policy and regulatory environment.

Part 2 Agriculture and Land Resources Utilisation in Namibia

This part of the report, covering the "pressure" component of the conceptual framework, describes key land tenure and land use issues, and agricultural production and land resource utilisation industries, and how these have developed over time. Activities are divided into the livestock and crop production, and the forest, wildlife and fisheries production and utilisation sub-sectors.

To set the scene the report commences with a brief account of the biophysical characteristics of Namibia land resources. It then looks at the contribution to Namibia's economy and society of the country's agriculture and renewable natural resources sector by considering its relationship to national development objectives and a number of macro-economic and socio-economic indicators. A careful reading of this section should throw light on the questions: to what extent are the agriculture and the renewable natural land resources sectors a potential route to economic growth and employment and a route out of poverty, and hence to what extent should society allocate resources to the development of which sectoral activities?

At the outset, the report addresses one of the fundamental determinants of agricultural and land management in Namibia, and hence a key national issue, that of land tenure. A historical perspective is adopted which reveals that land management under different customary tenure systems is both flexible and pragmatic. It challenges the widely-held perception that customary tenure systems do not provide sufficient tenurial security to motivate sustainable resource management, and notes the socio-economic benefits of broad-based access to land resources. It argues that future societal responses to the urgent political issue of land reform should be based on a sound analysis of the complex evidence, rather than on simplistic preconceptions. It is of concern that although new and forthcoming legislation covering conservancies, water points and forests recognises that an important incentive to communities to manage their land and natural resources sustainably is that they are able to make decisions on resource use, and to exclude people from using their resources, new land legislation makes no provision for land and natural resource users to obtain property rights on a community basis to these resources.

Land use in Namibia is determined by a combination of factors, not least those of land tenure systems, biophysical characteristics of land resources, and socio-economic characteristics of land users. The report looks at important features of historical and existing land management practices, under commercial, communal and state managed systems. Current land use patterns are described, and an analysis of land use trends, considering in particular issues of land under-utilisation and over-utilisation, is presented.

Given the preceding discussion of broad land tenure and land use patterns prevailing in Namibia, the report goes on to describe systematically the country's main agricultural production and resource utilisation activities. An account is given of the current status of the livestock and crop production (both rainfed and irrigated) sub-sectors, and the forest, freshwater fisheries and wildlife production and utilisation sub-sectors. This includes coverage of inputs, human activities and outputs, and an assessment of the importance of these activities to Namibia's economy and society at the national, regional and household levels. The ecological and geographical dimension of these activities is also addressed. Comprehensive and up-to-date information on agricultural resources utilisation is provided and future trends are suggested. Analysis of the consequences of the pressure on the environment which agricultural and land resource use represents is presented in the following part of the report.

Part 3 The Status of Natural Resources and Causes of Change

The report provides background information on the current agricultural and land resources environment, considering the physical, ecological and socio-economic characteristics of the natural resource base, and how these are changing over time.

The status of natural resources is discussed according to broadly defined land use types and resources: arable land, rangeland, forest land, groundwater and wetlands, and freshwater fisheries. Throughout, the focus is on the changing status of natural resources. This status is evaluated in terms of identified sustainability indicators, both biophysical and socio-economic.

Having described the changing status of natural resources, as far as existing information allows, the causes of change are then discussed. Causes of change are disaggregated and categorised as either proximate or ultimate causes. Proximate causes relate to resource management and mismanagement practices, while ultimate causes related to factors influencing the adoption of resources management practices, such as lack of environmental understanding, poverty and population growth, and policy failure, as well as natural factors such as climate change.

Sustainable use of **rangeland** resources depends on the maintenance of four fundamental ecosystem processes: the water cycle, mineral cycle, energy cycle, and community dynamics. Various threats to these and important related research initiatives are described. Biophysical and socio-economic indicators of rangeland degradation are noted. Proximate causes of rangeland degradation, including overgrazing, overstocking, non-flexible use of rangelands, as well as ultimate causes including weakly developed farmer institutions and farmer support services, and lack of technical knowledge, are identified.

The mere fact of low-input continuous cultivation of **arable soils** with high sand and low clay and silt contents and low and fragile soil organic matter contents, as well as high temperatures and infrequent but heavy rainfalls, implies that nutrient and organic matter loss is rapid. Maintenance of low but stable crop yields, however, suggests that soil nutrient equilibria also stabilise rapidly. The two major threats to such equilibria are the loss of biomass in the system, and structural damage and soil erosion. Wind erosion is identified as a significant problem in some areas greatly compounded by tree cutting, while inappropriate cultivation practices lead to problems of pulverisation and ploughpan formation.

Deforestation is proceeding at a rapid rate in areas of high population density. Use of wood for fuel, building material and so forth causes degradation of forest status, while clear-felling is required mainly for crop cultivation purposes. In both cases, it is not the utilisation of the forest resource *per se* that is at fault, but rather its unplanned nature and unsustainable levels.

Groundwater is of crucial concern to the agriculture sector. The report describes the country's main aquifers and important threats to their status as providers for agriculture. The greatest concerns are identified as aquifer depletion and pollution, as well as threats to environmental demand. The latter refers to the issue of failure of aquifers to continue providing for the processes and services essential for the maintenance of natural ecosystems, upon which agriculture in turn depends.

Wetlands, including ephemeral wetlands, provide essential support to some two thirds of the country's population that lives in close proximity to them. Having described the main perennial and ephemeral wetland systems, and their relationship to agricultural and other livelihood systems, the report identifies threats posed by, amongst others, population increases, changing tenure systems, increased sedentarisation of livestock and people, and inappropriate farming practices along the country's limited areas of wetland and river margins.

Freshwater fisheries resource have declined markedly due to overfishing resulting from unsustainable practices such as the use of dragnets and fine mesh gill nets for commercial exploitation purposes. Changes in ecosystems, including destruction of fishes' habitats, invasion of alien species, and reduced and inadequate floods are also degrading the status of fisheries resources.

It is concluded that, the environmental crises facing much of Namibia does threaten sustainability; but too often its extent has not been carefully analysed, and its causes have been mis-diagnosed. Also, to characterise all environmental change as degradation is unhelpful. Quantifying the value of degradation is really only possible with data on the long term nature of degradation which does not always exist currently. Sustainable development requires that an holistic view is taken. Where forests have been replaced by productive fields or grazing, or by roads and urban settlements, for instance, change cannot necessarily be referred to as degradation, except in a narrow sense. Further, much of what is sometimes characterised as resource degradation is often so only in the short-term. Changed resource-use practices coupled with rare climatic events (for instance, years of exceptionally high rainfall) can be expected to see a reversal of some processes of degradation over the longer term.

Much change, no matter how temporary, has socio-economic impacts. The benefits of changes in the status of natural resources tend to be reaped by the better-off minority, while an increasing number of poor people lose their access to these resources and consequently become resource-poorer. With a less productive resource base they currently have no way out of their poverty. This, it could be argued, is not the result of the change in the status of natural resources, but of the failure of the country's political economy to come to terms with that change.

It should be a general rule of thumb that traditional land use systems are as good a place to start to look for sustainability as any. These are usually dynamic and resilient, and they offer many practices that can be improved upon to assure sustainability in the face of increased population densities and other ultimate threats. It is important that we learn more about the status of our natural resources and the processes which threaten them so as to be able to manage them sustainably on an informed and rational basis. It is hoped that a description of resource status change, and the analysis of causal relationships with proximate and ultimate factors seen as responsible for these changes, will enable us to see more clearly how we can better manage our resources. It should help us to identify what actions we can take to deal with the problems that can upset the balance between productivity and sustainability that we should strive for in the management of our agricultural and land resources.

Part 4 The Role of Society and its Institutions

Developing sustainable agricultural and land use systems which are adapted to Namibia's marginal agricultural environment and arid, drought-prone climate requires inputs on a number of levels. These cannot be dealt with in isolation. Development interventions must look at all these levels in combination if their work is to be of real benefit.

This section of the report examines society's response to changing agricultural and land resource status in Namibia. It starts with a description of:

- (i) national policies, strategies and legislation;
- (ii) organisations (including those in the public sector, parastatals, non-governmental organisations, community-based organisations, and the private sector); and
- (iii) resource-conserving technologies and practices.

The report describes society's institutional set-up for responding to change, initially in the form of a catalogue of its numerous components, and a brief description of their respective aims focussing on sustainability objectives. Priority attention is given to certain components according to the degree of influence they are perceived to have on the issue of sustainable resource utilisation.

In describing the national policy and strategy framework, the report outlines a range of the key government policy statements directly relating to agricultural and land resource management. These include, amongst others, the Constitution of the Republic of Namibia, Namibia's First National Development Plan (NDP1), national land policy, agriculture and forestry policy, and environmental and water policy. Pertinent areas of policy contradiction, policy failure, policy gaps, lack of strategy, and strategy failure are identified and discussed.

It is concluded that the mere existence of government policy statements is of little significance as an indicator of societal response to environmental change. Instead, it is proposed that certain key policy statements are isolated, and the degree to which they are being implemented is considered in terms of the existence of strategies, budgets, and other specific implementation milestones. For example, in this report, the provision of research, extension and training support services to farmers has been selected as an indicator for future monitoring.

The report proceeds to discuss key legislation deemed to be of significance in terms of societal response to the changing state of the agricultural and land resources environment, and which aims to enhance sustainable agricultural and land resources management. It contains a review of relevant legislation being administered by the Ministry of Agriculture, Water and Rural Development, the Ministry of Lands, Resettlement and Rehabilitation, and the Ministry of Environment and Tourism.

It is noted that, as in the case of policy statements, the mere existence of legislation which aims to regulate and control resource use is of limited significance, particularly where the legal system and property rights are not well developed as in much of Namibia. In this case, it is increasingly recognised that improving sustainable resource use can be more effectively attained through the use of economic instruments and education, rather than attempting to control and regulate.

In assessing societal response to environmental change in terms of the organisations and institutions established to direct that response, the report considers a network of relevant actors. The report reviews the key governmental, parastatal, non-governmental, and community-based actors, as well as the coordinating and policy-making institutions, and the sectoral and co-operative mechanisms, all of which together aim to achieve the common objective of the sustainable management and utilisation of Namibia's natural resources. This review focuses on the assessment of the influence, potential and actual, of the institutions in question on the sustainability of resource utilisation.

Sustainable utilisation of agricultural and land resources in Namibia requires that resource users adopt appropriate, resource-conserving technologies and management practices. They must make the best use of the limited natural and other resources available to them in such a way as to ensure that those resources continue to be available to themselves, to future generations, and to their neighbours. Given the unpredictability of the rainfall (and other factors such as pestilence and floods), this requires technologies and practices which minimise the risk to the farmer of losing resources, be they natural resources such as grazing or soil fertility, or economic resources such as labour and other inputs, in the event of a poor season. At the same time new technologies should fulfill other socio-economic objectives including increasing productivity and income generation, and in the subsistence sector, decreasing labour requirements, particularly of women. Traditional strategies and "best practices" for sustainable resource utilisation should be encouraged, and used as the basis for improving the sustainability and productivity of farming other land use systems. Important areas of innovation currently being promoted in Namibia, which the report discusses, include: community-based natural resources management, various range management practices, crop cultivar and type diversification, improved cultivation technology, soil fertility management, agro-forestry, irrigation, and post-harvest technologies.

Part 5 Indicators for Monitoring the State of the Environment for Agriculture and Land Resources

To ensure the sustainability of development efforts, societies need to monitor environmental change and, on the basis of an understanding of environmental processes and causal relationships, reform those of its activities which impact negatively on sustainability, and reinforce those which impact positively.

State of the Environment indicators aim to increase public awareness of critical changes. They are a means of making often complex issues accessible to decision makers on both an individual and societal level. As such, this part of the report starts by emphasising the point that the process of identifying and institutionalising indicators is as important as the end product. The process is therefore recorded, and early ideas for indicators noted. Some of these may warrant revisiting in future as the capacity of monitoring systems develops. Ultimately, indicators were selected on the basis of the following criteria:

- (i) Degree of **relevance** to the main issues which determine the state of the environment.
- (ii) **Availability** and scientific **reliability** and acceptability of base-line data necessary to measure the indicator, and ease of acquisition and processing of data necessary to monitor the indicator in future.
- (iii) **Utility** of the indicator for decision makers in terms of it being understandable and its relevance agreeable to users.

Indicators with which to monitor changes to the environment due to agriculture and land use practices have been selected as follows:

INDICATOR 1: SECURITY OF TENURE

Security of tenure indicates the extent to which the users of land based resources feel secure in the use rights which they enjoy. It provides a proxy for incentives or disincentives to make medium- to long-term investment in natural resources enhancement or preservation. Assuming that viable technologies, access to appropriate inputs and extension advice, household labour and financial resources are available, tenure security is likely to contribute significantly to more sustainable land use practices. Data to measure this indicator will have to be obtained through regular surveys in different regions of the country.

INDICATOR 2: RANGELAND CONDITION INDEX

The Rangeland Condition Index is an indicator of the extent to which rangeland condition is improving or declining. Rangeland is measured as a condition score (percentage or index) in relation to the potential for that area. Four processes in the rangeland ecosystem are measured:

- a) Water cycle (soil surface condition)
- b) Mineral cycle (micro-organisms in soil)
- c) Energy flow (vigour, density, composition)
- d) Community dynamics (composition, ecological status, bush encroachment)

This indicator is most useful at the local level.

INDICATOR 3: SUSTAINABLE IRRIGATION DEVELOPMENT

This is a composite indicator including, initially:

- a) land area used for irrigated crop production. This shows the extent of investment in irrigation infrastructure, which may be considered a significant enhancement of natural resources available for agriculture and
- b) An assessment of progress towards the establishment of irrigation scheme management boards

giving users responsibility for large-scale irrigation scheme infrastructure. The presence of an irrigation board would indicate the likelihood that farmers are employing good irrigation management practices.

INDICATOR 4: FOREST AND CROP AREA CHANGE

This indicator measures changes in absolute and percentage terms in the area of land in the northern communal areas (a) with forest cover, (b) that has been cleared for cultivation, and (c) that is actually cultivated. This indicator of changing pressures on land resources will give an indication of the degree to which:

- forested areas are diminishing
- cleared land is increasing
- cultivated land is increasing
- cleared land is being used for cultivation

INDICATOR 5: MAINTENANCE OF THE HYDROLOGICAL FUNCTION OF WETLANDS

Water supply, both in terms of quantity and quality, whether below or above ground, needs to be maintained if the products and services provided by wetlands are to continue to play an important role in agricultural production in Namibia. Given the assumption that water quantity and quality determine to a large extent the products and services (in terms of agriculture) provided by wetlands, this indicator would provide a direct measure of a wetland systems ability to continue to supply those goods and services.

INDICATOR 6: PERCENTAGE GDP SPENT ON AGRICULTURE AND FOREST RESOURCES RESEARCH, EXTENSION AND TRAINING (RET).

This indicator measures the percentage of primary agricultural GDP and total GDP, and of GRN expenditure spent on agricultural and forest resources research, extension and training service provision. Its purpose is to monitor government expenditure on agricultural and forest resources-related RET, in comparison to other government services and in relation to the sector's contribution to GDP, and international norms. RET services are one of society's key means of facilitating its "response" to the changing status of natural resources, as well as in determining the nature of production "pressures" on the natural environment.

INDICATOR 7: POPULATION PRESSURE INDICATOR

The indicator on population pressure has been taken from the SOER on the Socio-Economic Environment in Namibia. (Urban Dynamics Africa, Trend Line 1999). This indicator consists of a number of variables: - population density, % population dependent on agriculture, % population using firewood for cooking and an aridity index, all of which directly affect agriculture and land use.