

Spotlight on Agriculture

No 41 February 2001

GOOD LAND HUSBANDRY STARTS HERE: INVENTORYING AND ASSESSING THE LAND RESOURCES OF NAMIBIA

The ability of land to produce is limited by climate, soil and landform conditions, and the use and management applied to the land.

Knowledge of land resource endowment and its potential is an essential prerequisite to planning for optimal land use and subsequent sound, sustainable agricultural and economic development. A systematically compiled inventory of the natural factors that determine agricultural production potential is thus needed to form the physical basis for planning agricultural development. To this end, staff from the Directorate Agricultural Research and Training is carrying out the **Agro-ecological Zoning (AEZ) Programme**.

AGRO-ECOLOGICAL ZONING IS THE DIVISION OF AN AREA OF LAND INTO SMALLER UNITS, WHICH HAVE SIMILAR CHARACTERISTICS RELATED TO LAND SUITABILITY, POTENTIAL PRODUCTION AND ENVIRONMENTAL IMPACT.

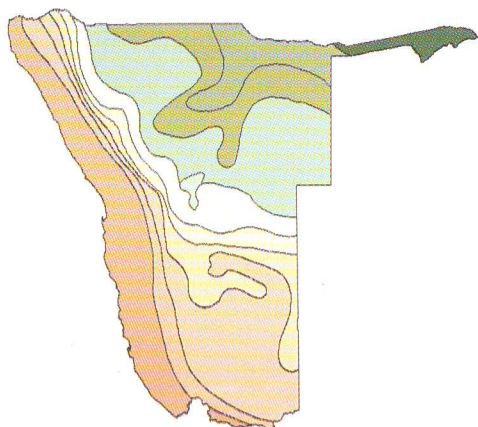
LAND HUSBANDRY IS THE CARE AND MANAGEMENT OF LAND FOR PRODUCTIVE PURPOSES IN ORDER TO SUSTAIN AND ENHANCE ITS PRODUCTIVE POTENTIAL. LAND HUSBANDRY AIMS PRIMARILY AT A SIGNIFICANT INCREASE IN YIELDS, AND THIS REQUIRES STABILIZATION OF THE ENVIRONMENT.

The AEZ Programme consists of a number of projects, all aimed at the collection, analysis, interpretation and dissemination of information on those natural resources of Namibia which have an impact on agricultural production. Apart from inventorying land resources, several tools (methodologies) are tested for measuring or estimating production potential under different land uses.

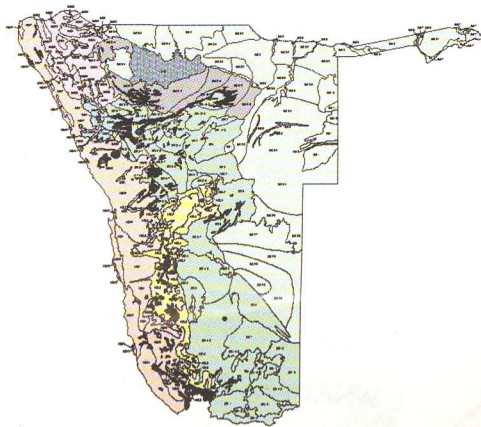
A few of the projects – some completed, some ongoing – are highlighted here:

Existing **natural resource data** are collected, evaluated and computerized. **Spatial data** are stored in, and processed with a **geographical information system (GIS)**. Use is mostly made of ReGIS[®] and ArcView[®] software, but on occasion also of IDRISI[®] and TNT-MIPS[®]. The latter is actually an image-digital satellite images and aerial photographs. **Alphanumeric data** are stored in Visual FoxPro[®] and MS-Access[®]. The GIS also contains information on **administrative boundaries** (e.g. the Namibian border, regions, magisterial districts and enumeration areas) and **infrastructure** (e.g. roads, towns, railways, airports). A very important data layer is the **Farm Database and Geobase** of Namibia. All title deed farms had been digitised (i.e. converted to digital format from paper maps) from the Office of the Surveyor-General's noting sheets. Additional information, such as farm name, number, owner etc. was added to the database whenever obtainable. The complete collection of data in digital format forms the **Namibian Agricultural Resources Information System, NARIS**. This is an ever-expanding source of agricultural resource data. It is currently available on CD-ROM, and will eventually be available on the ministerial web-site.

A GEOGRAPHICAL INFORMATION SYSTEM (GIS) IS A SYSTEM FOR CAPTURING, STORING, CHECKING, INTEGRATING, MANIPULATING, ANALYSING AND DISPLAYING DATA WHICH IS SPATIALLY REFERENCED TO THE EARTH.

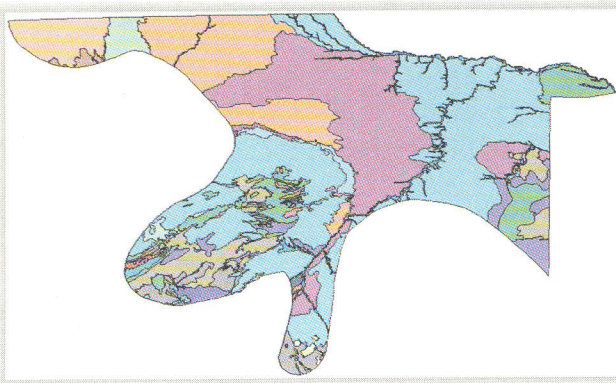


The Food and Agriculture Organisation (FAO) of the United Nations assisted the AEZ team in compiling a **Growing Period Zones Map** and **Preliminary Agro-Ecological Zones Map** of Namibia. These two maps and the accompanying digital **AEZ Database** are used extensively as basemaps for several land resource applications.



Good Land Husbandry starts here:
Inventorying and assessing the land resources of Namibia

Climate, especially rainfall in Namibia's case, is one of the main factors influencing agricultural production potential. An extensive database had been built up of daily and monthly rainfall figures from almost 300 rainfall stations, for periods in excess of 30 years. Two projects to analyse different aspects of Namibian **rainfall** were carried out for the AEZ Programme under contract by *Namibia Resource Consultants* and *Mr Louis Botha*. The applicability of different **drought indices** – such as rainfall percentiles and the Standardised Precipitation Index – to Namibian conditions are under investigation. A dedicated database, **AgroMet**, is used to store and handle agrometeorological data.



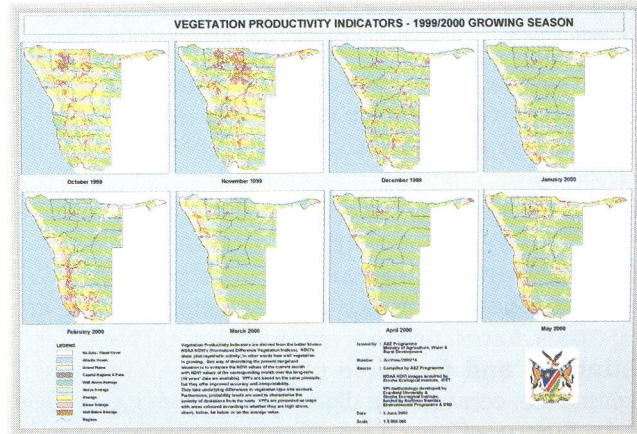
The lack of soil data prompted the **National Soil Survey**. Phase I, carried out with the *Institut Cartographique de Catalunya* of Barcelona, Spain, and with financial assistance from the Spanish Agency for International Co-operation, was recently completed. The project characterised, classified and mapped the major soil types of Namibia at 1:1 million scale. Some areas were also mapped at larger scales. Products will soon become available. Phase II of this project will continue for a number of years, to produce ever more accurate and more detailed soil maps of the country. With these newly acquired soil data, an **Erosion Hazard Map** of Namibia can be compiled in the near future. It can also be used as baseline data for **Landscape Ecological Risk Assessment, LERIS**, developed in Etosha by the *University of Regensburg* and *Etosha Ecological Institute*.

The **National Vegetation Survey** is carried out to revise and refine the old Giess vegetation map to 1:1 million scale and to classify and describe veld types. A further intention is to establish databases of vegetation and habitat data, and an inventory of species per veld type. Baseline information on species densities will be collected, and the information will form the basis for veld condition models. Some researchers within the Ministry collect other vegetation data that influence land productivity - for instance the extent and degree of bush encroachment and the presence of poisonous plants. These data will contribute significantly to assessments of land resource potential.

The **productivity of natural rangeland** is monitored at low resolution countrywide throughout the rainy season and compared with 'normal' or 'average' conditions. NOAA NDVI satellite images, acquired by *Etosha Ecological Institute*, are processed to **Vegetation Productivity Indicators** with a technique jointly developed by the institute and *Cranfield University*. A second, complementary project is **Seasonal Biomass Production Estimation Using**

NOAA NDVI Satellite Images. The latter is executed with technical assistance from the *Groupement pour le Développement de la Télédétection Aérospatiale* of Toulouse, France. Both projects are attempts to estimate the **productivity potential of land under extensive grazing**, on national scale.

The **potential productivity of land under dryland cropping** is modelled with **DSSAT[®]**, which can model growth and yield of sixteen crops. The models require the input of soil and climate data, crop phenological characteristics and information on management practices. The modelers have to adjust and attune the models with actual Namibian field data until realistic results are obtained for local conditions, after which results can be extrapolated within each agro-ecological zone.



Author: Marina E. Coetzee

Good Land Husbandry starts here: Inventorying and assessing the land resources of Namibia

Ultimately, the AEZ Programme wants to answer the following questions:

- WHAT WILL GROW WHERE?**
- HOW MUCH WILL IT YIELD?**
- WHAT ARE THE CONSTRAINTS?**
- WILL IT BE PROFITABLE?**
- WILL IT BE SUSTAINABLE?**
- HOW CAN WE IMPROVE THE SITUATION?**
- WHAT ARE THE RISKS TO THE ENVIRONMENT?**

By comprehending the scope, capabilities and limitations of Namibia's finite land resources, we can become and remain stewards rather than exploiters of land.