



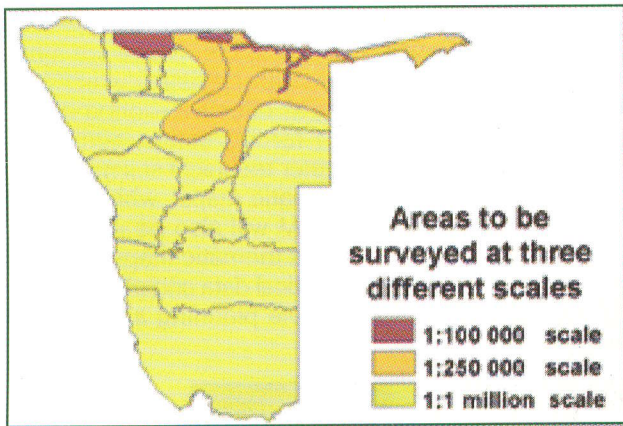
SPOTLIGHT on AGRICULTURE

Ministry of Agriculture,
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MAPPING the SOILS of NAMIBIA

The **lack of information on soils** has always been one of the most limiting factors in describing and interpreting agricultural resource information in Namibia. There is no soil map of the whole country available at a scale larger than 1:5 million.



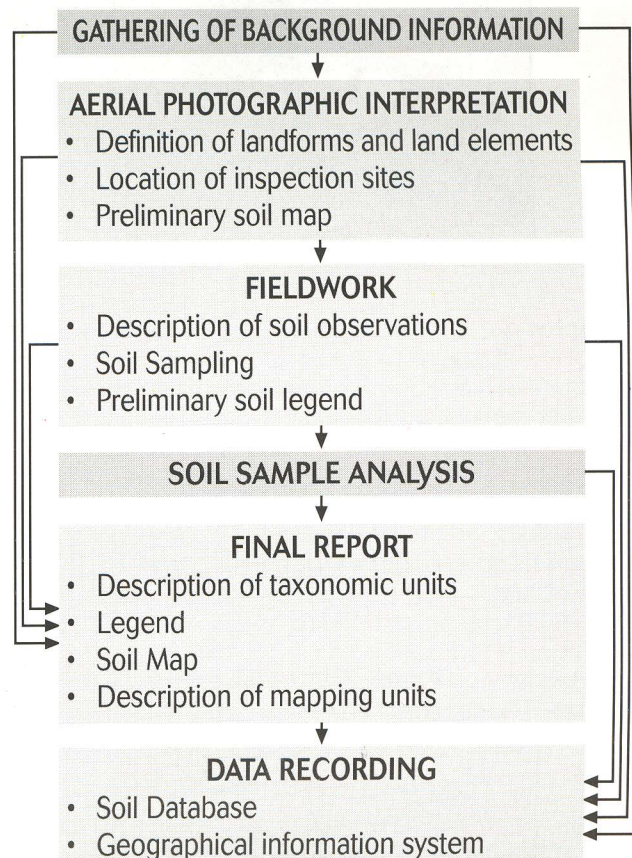
To address this problem, staff from the Agro-ecological Zoning Programme within the Directorate of Agricultural Research and Training have embarked upon a **National Soil Survey of Namibia**. They are supported financially and technically by the Spanish Agency for International Cooperation, through the Cartographic Institute of Catalonia. The project started in September 1998 and is due to finish in August 2000. This will not, however, be the end of soil surveying in Namibia, because the MAWRD staff will continue to improve the density of observations, to produce larger scale maps.



Interpretation of Aerial Photography

The main **objectives** are soil mapping of the whole country at a 1:1 million scale, mapping of the Kavango river terrace and the densely populated north central area at 1:100 000 scale and mapping of the three best growing period zones in the northeast at 1:250 000 scale.

The production of a soil map starts with the collection of all available **background information**, such as the geology, topography, vegetation and present land use of an area. Large-scale mapping (1:100 000) employs stereoscopic interpretation of aerial photographs for initial identification and delineation of large landscape and relief units, while small-scale mapping (1:250 000 and 1:1 million) makes use of Landsat TM satellite images taken in the dry season.



Flow-diagram of the soil survey methodology at 1:100 000 scale

For more information on the National Soil Survey, contact: The National Co-ordinator: Agro-Ecological Zoning Programme, Ministry of Agriculture, Water & Rural Development, Private Bag 13184, Windhoek, Tel 061-2087077, Fax 061-2087068, E-mail agricaez@mweb.com.na

Fieldwork consists of visual observations, digging and description of soil profile pits and soil augerings.

Typical surface characteristics which are described after **visual observation**, are topography, major landform, second level landform, land element, position of land element, slope of land element, land use, crops, human influence, vegetation, percentage grass cover, type and severity of erosion.

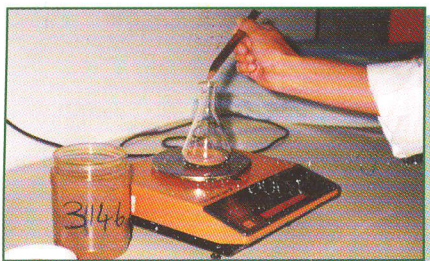
Soil profile pit locations are selected to cover all the landscape- and relief units identified during the interpretation of aerial photographs and satellite images. These pits are usually about 1m wide x 2m long x 1.5m deep. The depth can be less if there is a root-restrictive layer, e.g. parent rock, a cemented or an indurated layer, the water table. All soil horizons (layers) exposed in the side of such a pit are described comprehensively in terms of colour, mottling, rock fragments, structure and consistency, cutans, cementation, mineral nodules and concretions, root limitations, biological features and reaction with hydrochloric acid. These characteristics are recorded systematically on fieldforms. Soil samples are collected from all horizons and taken to the Agricultural Laboratory in Windhoek for chemical and physical analysis. To prevent injury to humans and animals and environmental defacement, the pits are filled in after being described.

Soil augerings are holes of \pm 8cm in diameter bored into the ground with a hand-held auger. The core of soil removed in this way can also be described, although in disturbed conditions, and this is also useful to confirm soil type boundaries on the map.

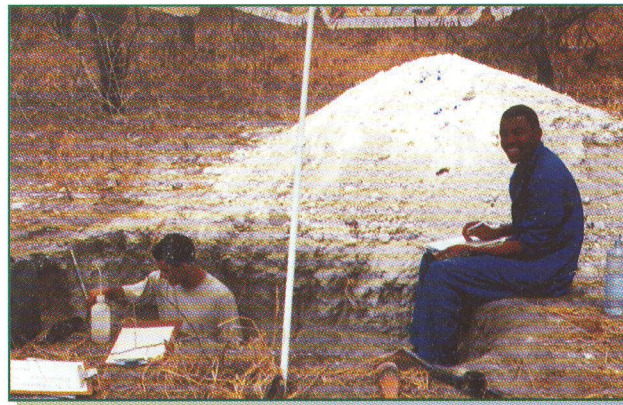


Soil Augering

Samples are analysed at the Agricultural Laboratory for pH (a measure of acidity or alkalinity), electrical conductivity (which gives an indication of the salt content), particle size distribution (percentages of sand, silt and clay), presence of calcium carbonate, organic carbon, cation exchange capacity (which indicates the nutrient holding capacity), exchangeable calcium, magnesium and potassium, available phosphorus, total nitrogen and calcium carbonate equivalent. In the case of highly acid soils, which are rare in Namibia, the acidity and aluminium are measured. In the case of salt affected (saline or sodic) soils, the electrical conductivity, pH and cation concentrations of the saturated paste extract are also determined.



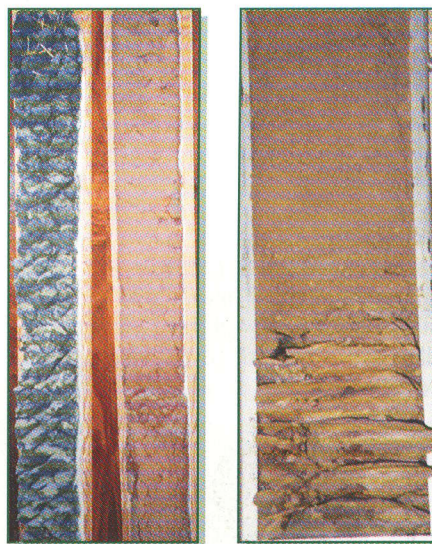
Soil Analysis



Describing a Soil Profile

The new World Reference Base is used as the primary **soil classification system**. Maps will include a correlation with the 1991 FAO/UNESCO Legend of the Soil Map of the World. Profile descriptions in the accompanying documents will contain, where possible, correlations with the 1991 version of the South African Classification System and the United States Department of Agriculture's Soil Taxonomy.

All information gathered in this way is stored in and processed with a geographical information system, using ArcView 3.1 software. This makes the generation of so-called thematic maps possible. These are maps of selected soil and land characteristics which can easily be interpreted, such as effective rooting depth, texture classes, nutrient / fertility status, and much more. In addition to the rather technical soil maps and far more user-friendly 'thematic maps', which will be printed on paper, a CD-ROM will also be produced. It will contain digital soil- and thematic maps, detailed soil profile descriptions, analytical data and photographs of Namibian soils - a valuable planning and training tool.



Soil Monoliths
left: University of Pretoria;
right: UNISA

If time and funds permit, a **soil monolith collection** of Namibian soils will be started. Soil monoliths are vertical cuts taken from the side of profile pits and preserved with resin, which can be exhibited to show what the different soil horizons of a soil type look like.

Initially the products of the National Soil Survey will mostly be used by planners, decision-makers and researchers, but eventually the benefits will also reach the individual farmer - the man who makes his living from the soil of Namibia.

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