

SÉRIE TERRA E ÁGUA
DO INSTITUTO NACIONAL DE INVESTIGAÇÃO AGRONÓMICA

COMUNICAÇÃO No. 90b

SUMMARY OF NATURAL RESOURCES DATA
AVAILABLE AT THE LAND AND WATER DEPARTMENT

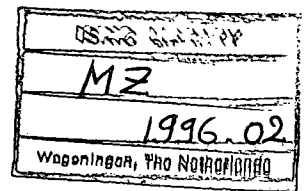
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ABBREVIATIONS

- CDI - Centro de Documentação e Informação (INIA)
DASP - Departamento de Agricultura e Sistemas de Produção
DDAP - Direcção Distrital de Agricultura e Pescas
DEA - Dir. de Economia Agrária
DINAGECA - Dir. Nacional de Geografia e Cadastro
DNA - Direcção Nacional de Águas (MOPH)
DPAP - Direcção Provincial de Agricultura e Pescas
DTA - Departamento de Terra e Água
FAEF - Faculdade de Agronomia e Engenharia Florestal (UEM)
FAO - Food and Agricultural Organization (of the United Nations)
FSSP - Food Security Strategy Programme
IIAM - Instituto de Investigação Agronómica de Moçambique
INAM - Instituto Nacional de Meteorologia
INIA - Instituto Nacional de Investigação Agronómica (MAP)
ISLARIAP - Institutional Support to Land Resources Inventory and Assessment Project
MAP - Ministério de Agricultura e Pescas
MICOA - Ministério para a Coordenação da Acção Ambiental
PPA - UNDP Preprogramme for the Agriculture in Mozambique
PRDSA - Programa de Reabilitação e Desenvolvimento dos Serviços Agrícolas
UEM - Universidade Eduardo Mondlane

ACRONYMS

- ALES - Automated Land Evaluation System
PET - Potential Evapotranspiration
GIS - Geographical Information Systems
ILWIS - Integrated Land and Watershed Management System (ITC)
LIMS - Laboratory Information Management System
SDB - Soils Data Base (FAO)

1. INTRODUCTION.

One of the tasks of the Land and Water Department (DTA) of INIA is the inventory and storage of natural resources data of Mozambique. The users of these data, individual persons, organizations and other institutes often do not know of the existence of the data. This report gives a summary of the existing natural resources data, their storage and possibilities to obtain them. This report also stays to disposal of people from outside DTA/INIA. 'Documento Interno No. 41' gives a complete and detailed summary of the databases of DTA/INIA.

On each database the following information is presented:

Responsible: person responsible at DTA/INIA.

Contents: data amount and description.

Possibilities: what are the possibilities within the database. For example: record searching and selecting.

Literature: what kind of literature is available at DTA/INIA

Availability: prices; data acquisition conditions.

2. SOIL / LAND EVALUATION DATA.

2.1. Soil database (FAO SDB program).

- Responsible: J. Mafalacusser / R.M. Westerink.
- Contents: ± 4500 soil profiles (descriptions in detail), most of them having analytical data.
- Possibilities: profile searching and selecting. For example: province, district, soil unit, one or more soil characteristics, geographical coordinates (latitude and longitude). (DBASEIV application).
- Literature: Comunicação No. 74 DTA/INIA.
- Availability: Price of one print (per profile) to be determined.

2.2. Map database.

- Responsible: J. Mafalacusser / R.M. Westerink
- Contents: data about ± 2800 maps of Mozambique (pedology, physiography, climate, agro-hydrology, land evaluation etc.). Most of these maps were published by DTA/INIA Maputo and IIAM Maputo
- Possibilities: searching maps per province, district, author, subject, latitude/longitude etc. (DBASE IV program).
- Literature: Documento Interno No. 39 DTA/INIA.
- Availability:
 - * Price of a map selection print: free of charge.
 - * Maps published by DTA are sold at the Section Cartography. Map prices: see Appendix 1 and P.J. Maciel, 1995 - *Caderno das publicações* (publication list).
 - * Other maps: consult the DTA/INIA library or CDI/INIA (making photocopies).
 - * Selections per province and at national scale are available in digital form (ASCII / WP 5.1 formats).

2.3. Soil Literature Database of Mozambique.

- Responsible: J. Mafalacusser / R.M. Westerink
- Contents: ± 2600 reports and articles about pedology, soil fertility, agro-hydrology, land-use etc., of which ± 1350 specifically deal with Mozambique. The others are of importance for DTA.
- Possibilities: Searching for literature per province, district, author, subject etc. (DBASE IV program).
- Literature: Documento Interno No. 40 DTA/INIA.
- Availability:
 - * Selections per province and at national scale are available in digital form (WP5.1 / ASCII formats).
 - * Price of a literature selection print: free of charge.
 - * The DTA publications are sold by the Section Cartography. For report prices: see P.J. Maciel, 1995 - *Caderno das publicações* (publication list).
 - * Other reports: consult the DTA/INIA library or CDI/INIA.

2.4. Soil survey locations.

- Responsible: P.J. Maciel
- Map Nr. 97018 (scale 1:4.000.000) represents the locations of soil surveys on the next levels:
 - explorative (scale 500.000 - 2.000.000)
 - reconnaissance (scale 100.000 - 250.000)
 - semi-detailed (scale 25.000 - 50.000)
 - detailed (scale 5.000 - 20.000).
- Literature: Comunicação No. 17 DTA/INIA - Each report mentioned in this publication has a code which indicates the area of a soil survey on map Nr. 97018.
- Availability: Maps published by DTA are sold by the Section Cartography. Map prices: see Appendix 1 and P.J. Maciel, 1995 - *Caderno das publicações* (publication list).

2.5. National Soil Map at scale 1:1.000.000

- Responsible: P. Maciel
- One sheet per province. Price per sheet (the legend is included the price): 10 US\$ (or equivalent in MT).
- Legend of the national soil map: Comunicação No. 73 DTA/INIA. Price: 40.000 MT (if bought without map sheets). The legend indicates the general suitability for agriculture of each soil unit.
- Diskette with the national soil map scala 1:1.000.000. Price per province: 30 US\$. Various digital formats (ILWIS / ARCINFO).

2.6. Soil maps of the Maputo province and the Southern part of the Gaza province (scale 1:50.000 e 1:250.000).

- Responsible: P. Maciel
- Scala 1:250.000: sheets 93/94, 95, 98/99, 100 and 102.
Price of each map: 120.000 MT
- Scala 1:50.000: sheets 1112-1114, 1127-1130, 1142-1145, 1155-1158, 1166-1170, 1175-1180 and 1182-1207.
Price of each map: 100.000 MT
- Legend: Soil maps of the Maputo and Gaza provinces scala 1:50.000 and 1:250.000.
Price: 30.000 MT.
- Literature: Comunicação No. 76 DTA/INIA (in preparation).

2.7. Erosion hazard map Mozambique.

- Scala 1:4.000.000. Price: 125.000 MT
- Literature: Comunicação No. 20. Price: 100.000 MT.

2.8. Digital map database.

- Responsible: J. Francisco
- Contents: Since 1991 over 100 analogue maps were converted into digital form (digitized) (ILWIS Geographical Information System (GIS) program).
- Literature: Documento Interno No. 33 DTA/INIA
- Availability: Various digital GIS formats (ARCINFO, ILWIS etc.). Prices: to be determined.

2.9. Soil surveys.

- Responsible: M. Vilanculos
- Possibilities: Soil surveys on request. The Pedology and Land Evaluation Section has the capacity to carry out soil surveys for areas for which more soil data are needed.
- Prices: see Appendix 2.

2.10. Land Evaluation.

- Responsible: M.R. Marques / J.M. Mafalacusser
- Possibilities:
 1. The *Mozambican Land Evaluation Model*, developed with ALES software, makes it possible to carry out automatic land evaluations for thirty crops each for high or low level inputs. Basic soil and climate data can be retrieved automatically from the soil database (SDB) and METEO database.
Using with the Geographical Information System (GIS) ILWIS it is possible to create suitability maps for specified crops based on the digital soil maps and the agro-climatic map (1:2.000.000).
- Literature: F. Beernaert, 1991 - *Manual de avaliação de terra*. Internal Document DTA/INIA

2. The model *LANCAPMO*, developed with ALES software, offers a "Land Capability Classification" for 18 major types of land-use. For example: silviculture, cattle-raising, 'Machongo agriculture, rainfed arable cultivation without using animal traction and rainfed arable cultivation using animal traction. The model was calibrated as part of the (soil) surveys of the Xai Xai and Mocuba districts in 1995 and 1996. But it available for use at national scale.

Literature: V. Lefebvre, 1997 (in preparation).

3. The FAO *ECOCROP* model (version 1996) offers crop requirement data for over 1700 different crops. It is possible to search for crops which can be grown in a certain area considering the specific climate and/or soil data of that area. It is also possible to search for crops which are suitable for a certain application (examples: cereals, crops for (erosion) protection of the shore)

Literature: see "help-menus" of the ECOCROP program.

An *evaluation at national level* (based on all the units of the national soil map 1:1.000.000 and data of 138 climate stations) was carried out for the three models. The results are available in Quattro Pro (windows 5) format. It is also possible to present the results by means of national maps or maps per province.

Literature: R.M. Westerink, 1997 (in preparation).

3. CLIMATIC DATA.

3.1. METEO database.

- Responsible: A. Biosse / J.D. Wijnhoud
- Contents:
 - * Synoptic data of 133 stations (average monthly data).
 - * Monthly precipitation data (per year) of \pm 100 stations.
- Literature:
 - * A.H. Kassam et al., 1981 - *Climatic databank and length of growing period analysis*. FAO/MOZ/75/011 Field document Nr. 33.
 - * Documento Interno No. 35 DTA/INIA.
- Availability: Various forms (tables, graphics, ASCII/Qpro/WP5 and other files).
Prices: to be determined.

3.2. SUIVI database.

- Responsible: A. Biosse / J.D. Wijnhoud
- Contents: daily/decade precipitation data of \pm 100 meteorological stations in Mozambique; synoptic (daily/decade) data of various stations.
- Literature: Documento Interno No. 35 DTA/INIA.
- Availability: Various forms (tables, graphics, ASCII/Qpro/WP5 and other files).
Prices: to be determined.

3.3. Other institutes.

- D.N.A.: Daily precipitation data of \pm 1260 stations (\pm 400 stations with over 20 years of records). See: *Mapa de localização das estações udométricas (DNA)* (Map with localization of the DNA rainfall stations)

- I.N.A.M.: Synoptic/rainfall data of \pm 200 stations. Part of this information was imported in the DTA METEO database.
- INIA / Agro-meteorology: Synoptic data of the 16 stations of INIA (INIA-Agrometeorologia).

4. AGRO-CLIMATIC DATA.

4.1. DTA/INIA agro-climatic databases.

- Responsible: M. Vilanculos / R.M. Westerink
- Maps:
 - * *General agro-climatic suitability for rainfed crop production in Mozambique*; 2 sheets on a scale 1:8.000.000; crops: maize, sorghum (mapira), millet (mexoeira), soja, peanut, cassava (mandioca), cotton and wheat. Price: 90.000 MT / sheet.
Literature: Comunicação No.28. Price: 100.000 MT.
 - * *Soil and climate resources inventory*; 1 sheet on scale 1:2.000.000. Price: 180.000 MT.
Literature: Comunicação No.21. Price: 62.500 MT.
- General literature:
 - * A.H. Kassam et al, 1982 - Field Documents FAO/MOZ/75/011 no. 32 - 37). Price of Field Document Nr. 37: 444.000 MT. (The other Field Documents can be copied).
- Length of growing period analysis for 133 meteorological stations in Mozambique.
See: Nota Técnica No. 76 DTA/INIA
- Suitability analysis per province and actual and potential production analysis: 8 crops (maize, sorghum, millet, soja, peanut, cassava, cotton and wheat).
See: Nota Técnica No. 70 DTA/INIA

4.2. Calculations with the FAOINDEX program

- Responsible: A. Langa / R.M. Westerink
- Description: The FAOINDEX program (Gommes, 1993) uses decade precipitation and PET input data. It also uses Water Holding Capacity and KCR data. The program results are calculations of a water balance indicating periods with crop water-stress. A strong relation exists between crop water satisfaction index and crop yields. A

100% value corresponds with optimal harvests. Values below 50 % correspond with very low harvests. Calculations for 35 stations spread out over the whole country were carried out.

- Literature: Comunicação No. 86 DTA/INIA; Langa (1997; in preparation)

5. SOIL FERTILITY DATA.

5.1. INIA/DTA Soil Fertility Database

- Responsible: A. Tembe
- Contents: 700 geo-referenced soil fertility trials executed in the country from 1937 to date, under specified climate, soil and crop management conditions, include data on yields; responses to fertility management interventions for 16 crops.
- Availability: On specific request only. The price of reports of the requested studies will depend on the amount and detail of information applied for (see appendix 2).
- Recommendations for N and P fertilizer use for annual food crops and cotton in Mozambique: A syntheses of all the mineral fertilizer trials executed in the country since 1937. The document provides in information on: yields without fertilizer-use, fertilizer responses, recommended amounts of nitrate and phosphate fertilizer and their economic viability for specific combinations of crop, soil, climate, season and water source (rainfed/irrigation). Price: to be determined

5.2. Soil Fertility Literature Database .

- Responsible: A. Tembe / J. Duzenta
- Contents: ± 1000 articles and reports on soil fertility subjects.
- Possibilities: searching and selecting soil fertility articles and publications using key words
- Availability: Photocopies of the scientific articles, prices to be determined individually (prices will depend on the number of copies and its costs; components: paper, copy machine, labour and value of book/article). For publications by the Soil Fertility Section and information on prices, the Cartography Section has to be contacted.

Appendix 1: Prices of DTA/INIA map copies (* 1000 MT)

Size	Photocopy	Ozalid	Sepia
A0	80	120	120
A1	60	90	90
A2	40	70	70
A3	20	50	50
A4	2	20	20

N.B. Prices might be revised.

Appendix 2: Basic costs of DTA/INIA (soil) surveys *)

Office:

B1	Technician (high level):	87.00 \$ p/day
B2	Technician (medium level):	54.00 \$ p/day
B3	Technician (basic level):	54.00 \$ p/day
B4	Costs of aerial photographs per photograph:	3.50 \$
B5	Costs of computers/printers etc.:	25.00 \$ p/day

Field:

	Technician (high level):	96.00 \$ p/day
	Technician (medium level):	60.00 \$ p/day
	Technician (basic level):	60.00 \$ p/day
	Worker:	2.00 \$ p/day
	Driver:	9.10 \$ p/day
	Depreciation field equipment:	20.00 \$ p/day

Laboratory:

	Chemical analyses and texture per sample:	16.40 \$
	Physical analyses per sample:	4.00 \$
	Water analyses:	4.20 \$

Basic chemical analyses: exchangeable bases (Ca, Mg, K, Na), H-exchangeable, Al-exchangeable, pH-KCl, pH-H₂O, C.E.(1:2,5), %-M.O., P-Olsen, N-Kjeldahl, CaCO₃.

Basic physical analyses: bulk density; pF 0 / 2.0 / 2.5 / 3.6 / 4.2

Other analyses: on request (A. Siteo).

*) Prices can be revised.

