WATER RESEARCH COMMISSION

GEOGRAPHIC INFORMATION SYSTEMS (GIS) AND THE INTEGRATED ENVIRONMENTAL MANAGEMENT (IEM) PROCEDURE IN THE PLANNING AND MANAGEMENT OF WATER RESOURCES

EXECUTIVE SUMMARY

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INTRODUCTION

When this project was initiated 4 years ago it was originally envisaged that its main aim would be the linking and integration of the IEM procedure with GIS technology to determine management procedures that would deal with the impact on the environment resulting from change in the catchment basin.

As primary focus we selected the Sabie River as a case study to implement these procedures. At the time the Kruger National Park Rivers Research Programme was in its first phase of development. A whole range of individual research projects were initiated and directed by specialists in their fields of expertise from all over the country. The project was initially started in Afrikaans and the first data capture, Task 1A and 1B is therefore in Afrikaans.

During the next 3 years these projects developed individually towards their own goals and objectives. But at the same time the need was felt for a more lateral and integrated approach coordinating these research projects towards a common goal.

To achieve this Prof. Charles Breen was appointed to conduct an overview of all existing projects and programmes and to propose a second phase for the Kruger National Park Rivers Research Programme. The first phase of this programme was completed at the end of 1993. The resulting report proposed a revised and refocused programme incorporating three main subprogrammes under a common approach with similar philosophy and goals.

Prof. Willem van Riet was appointed to the Steering Committee of the Kruger National Parks Rivers Research Programme and assisted in the development of these proposals. As part of this Steering Committee he became aware of the similarity in the approach of this research and that of the second phase of the Kruger National Park Rivers Research Programme. This study was therefore adjusted to function in accordance with the guidelines proposed for the three main subprogrammes of the Kruger National Park Rivers Research Programme. These three subprogrammes are as follows:

Decision support system
Information systems development and management
Research development and management

The goal of this study was to provide decision makers across the spectrum of the public and private sectors including authoritative bodies, developers, planners, and interested and affected parties with a decision-support system based on environmental considerations in order to facilitate holistic and environmentally sound decision making, within the catchment basins of the Letaba and Sabie Rivers.

We are confident that the process followed and procedures developed during this project can be applied to other catchment basin studies. The method of compiling an ecological and social database, evaluating this data according to ecological, development, agricultural, and aesthetic values and combining these in a GIS can be applied to any other project. The obvious advantages of a digital database are strengthened by the fact that updating is possible for future changes and based on historic data, future predictions can be made with regard to flow rates, land use, etc.

AVAILABLE DATA AND FORMAT

A detailed database is available in ARC/INFO format. The data is stored on a series of 1.4 Mb disks. The project is divided into two sections, one handling the Sabie river data and the other handling the Letaba river data.

The Sabie river study was originally started in 1991 and the first two manuals were written in Afrikaans, as Task 1A and 1B. The Sabie river project was taken further and a new process developed on which the study is based. The Letaba river was also handled according to the new approach. This information is covered by Task 2 to Task 5. These tasks take us from the first steps of data acquisition to the final step of conclusions and recommendations.

The data and tasks are available from the GisLAB, University of Pretoria (012 342-2376), also from the Computing Centre for Water Research and limited extracts from the Department of Water Affairs and Forestry. Map print-outs are possible through GIS from original coverages, or pre-compiled maps are available when data is viewed through ARCVIEW. View files are these with the extension *.AV. Some sample maps can be seen in Appendix A of this report.

In this series the following are available:

WRC Report No 300/2/94	Gis and hydrological modelling: Users Manual
WRC Report No 300/3/94	Sabie river and Letaba river: Theoretical framework: Users manual
WRC Report No 300/4/94	Environmental atlas for the Sabie river catchment
WRC Report No 300/5/94	Environmental atlas for the Letaba river catchment

List of coverages:

Social Data	Ecological Data	
Study area	Temperature	Land use
Towns	Precipitation	Reservers
Roads	Evaporation	Irrigation
Power lines	Catchments	Pot irrigation
Population density	Rivers	Forestry
	Run-off	Proposed dams
	Sediment yield	
	Dams	
	Topography	
	Geomorphology	
	Geology	
	Land types	
	Vegetation	

The Letaba river data is supplied on disks 1 - 3 and the Sabie river on disks 1 - 4. The disk can be installed using the INSTALL command. (See installation procedure - Task 4 page 12). The data will be stored in LET001 and WNKSABIE directories respectively.

User feedback and involvement

The dataset can easily be updated through a structured update programme in order to reflect changes in input information as well as a means of correction of inaccuracies or faulty data. This task would be greatly assisted through user feedback and involvement, which in turn is dependent on a widespread utilisation of the ATLAS. Users are therefore encouraged to report faulty or inaccurate data to the University of Pretoria, Department Landscape Architecture (GisLAB) and if possible, provide useful data to be incorporated through updating.

Disclaimer and Warranty

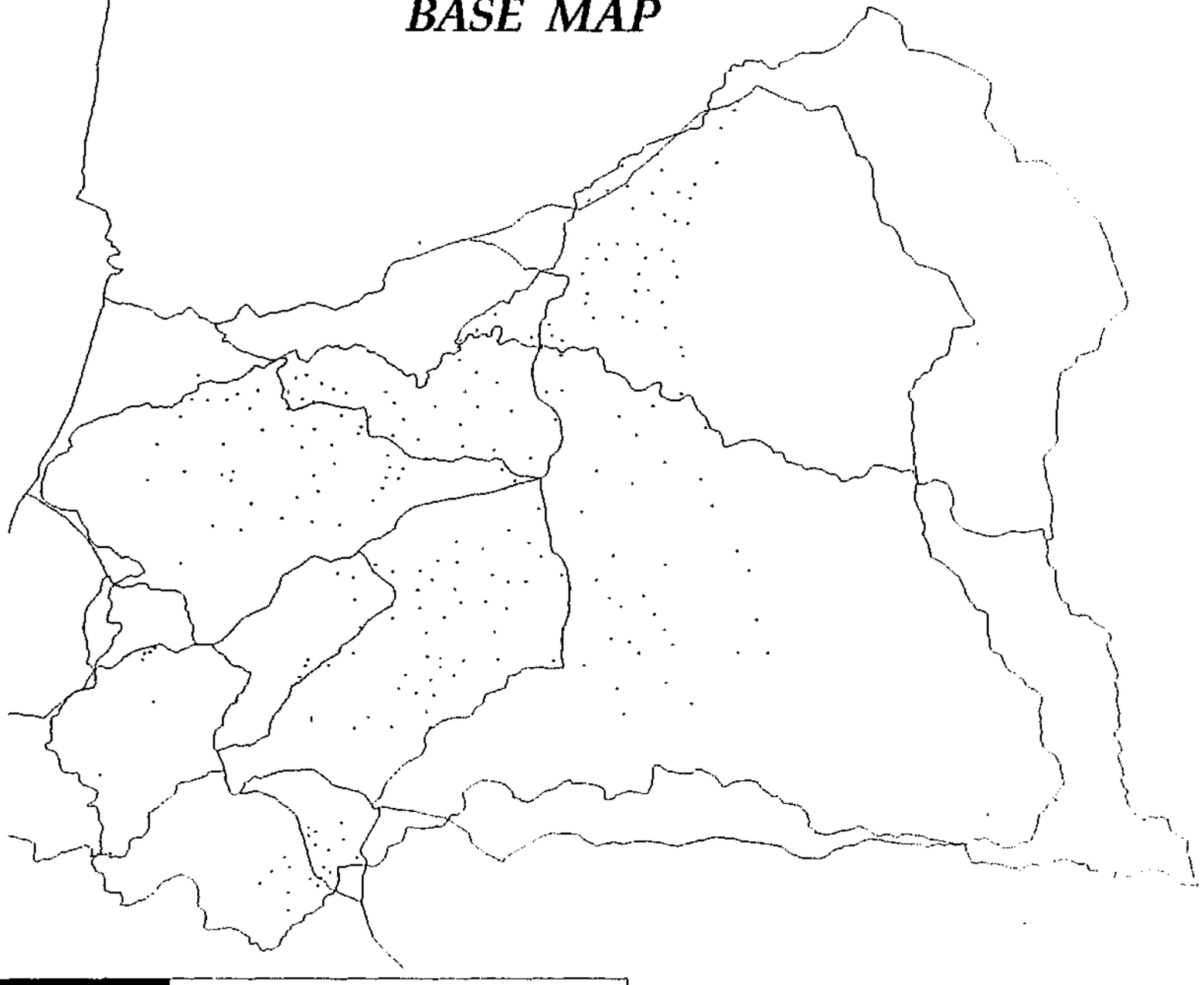
Neither the Department of Water Affairs and Forestry nor the University of Pretoria nor the Computing Centre for Water Research accepts any legal responsibility, direct or indirect, resulting from the use of ATLAS for any purpose whatsoever. The information contained in ATLAS has been collected as accurately as possible with due regard to the information capture scale, but errors may surface from time to time and will be corrected as part of a continuing update programme. Warranty of ATLAS data by the University of Pretoria, Department of Landscape Architecture, the Computing Centre for Water Research, and the Department of Water Affairs and Forestry will be limited to replacement of faulty computer media, provided that the user returns such media to the University of Pretoria, Department of Landscape Architecture for replacement.

APPENDIX A

SAMPLE MAPS FROM ARCVIEW

These maps are printed straight from ARCVIEW. Colours, text and general compositions can easily be changed. Output can also be done in colour with the correct printers. All maps are compiled in full colour.

LETABA RIVER CATCHMENT AREA
BASE MAP



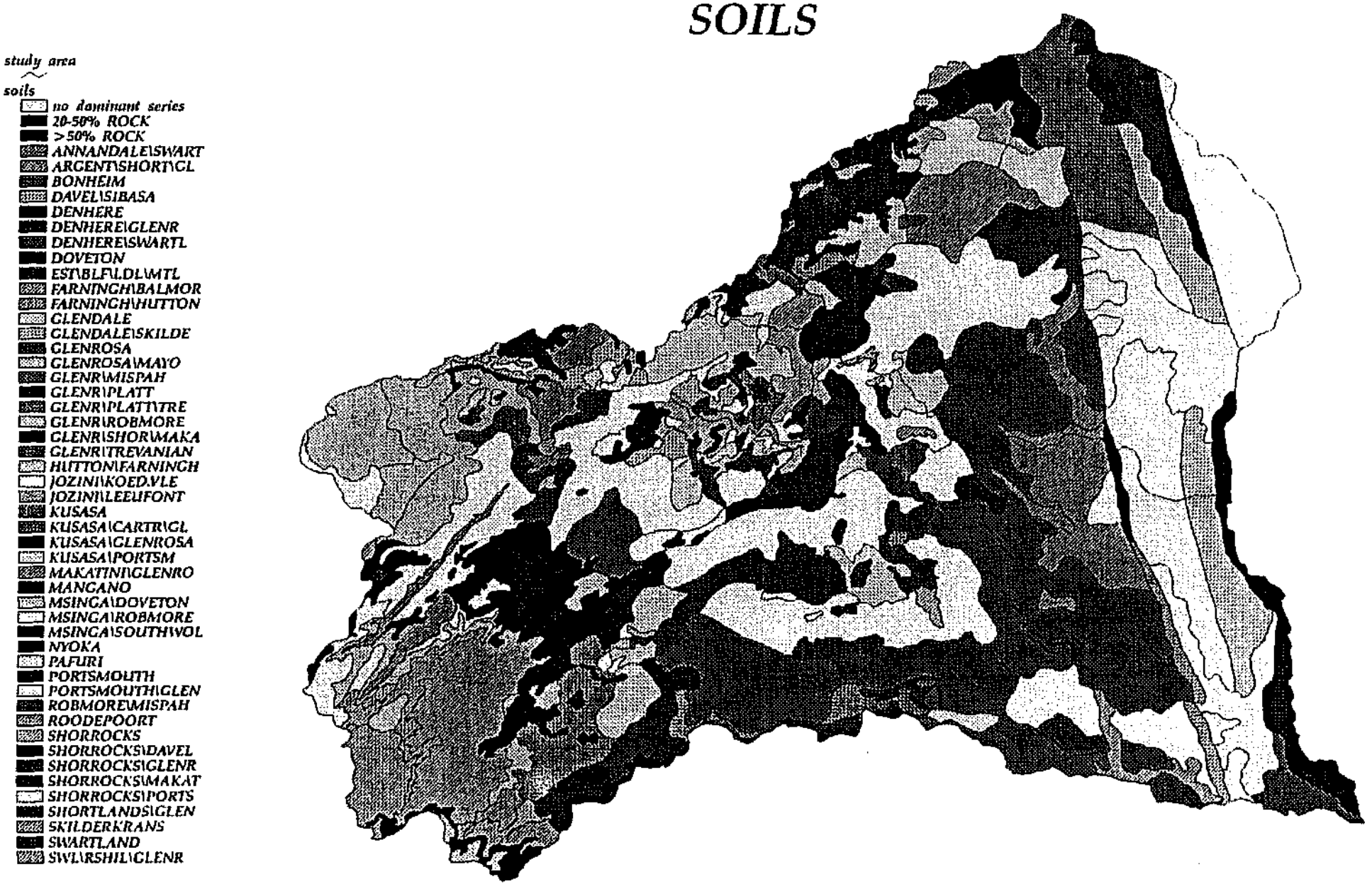
study area

roads

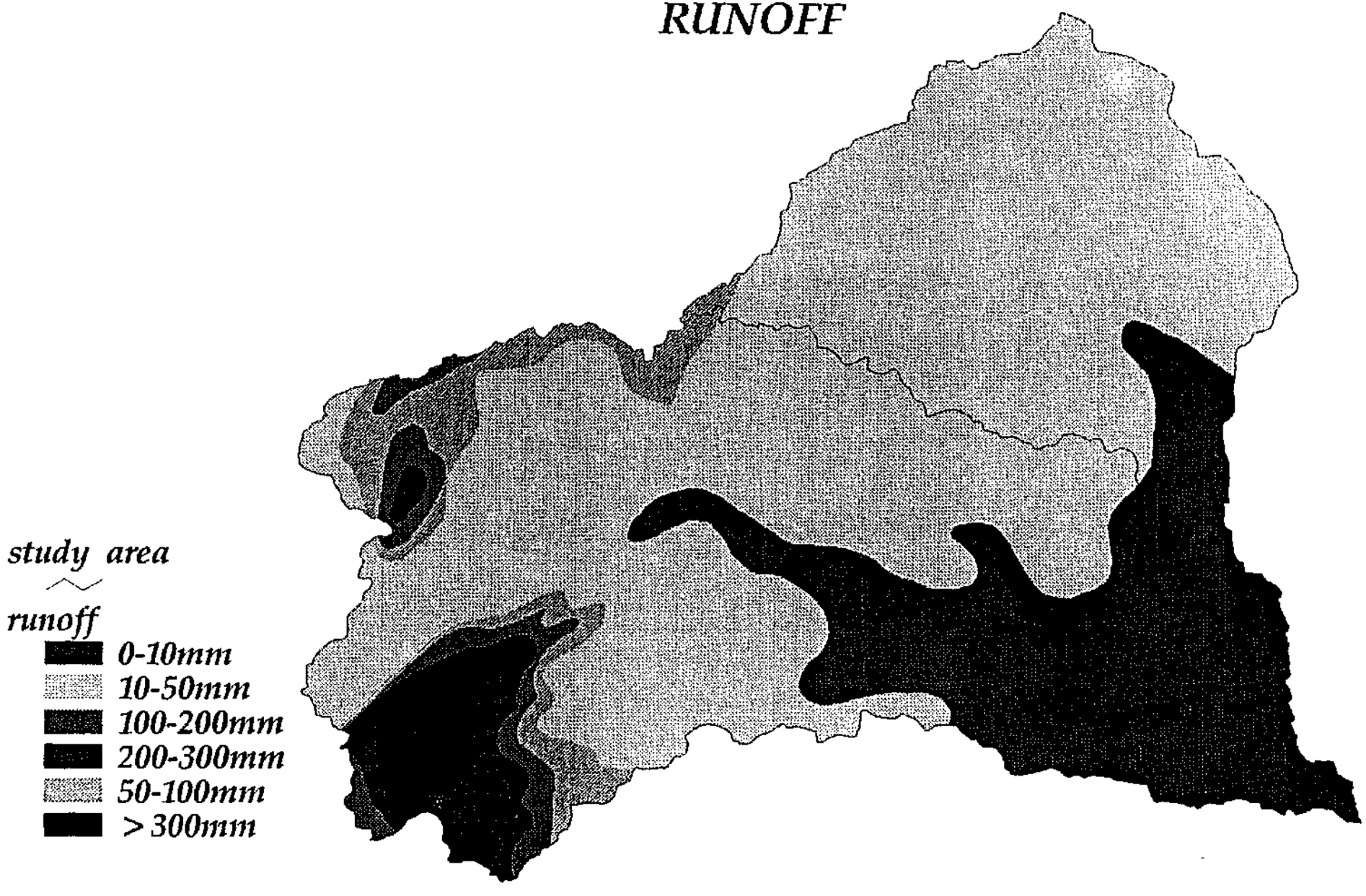
settlements

0 60000 120000

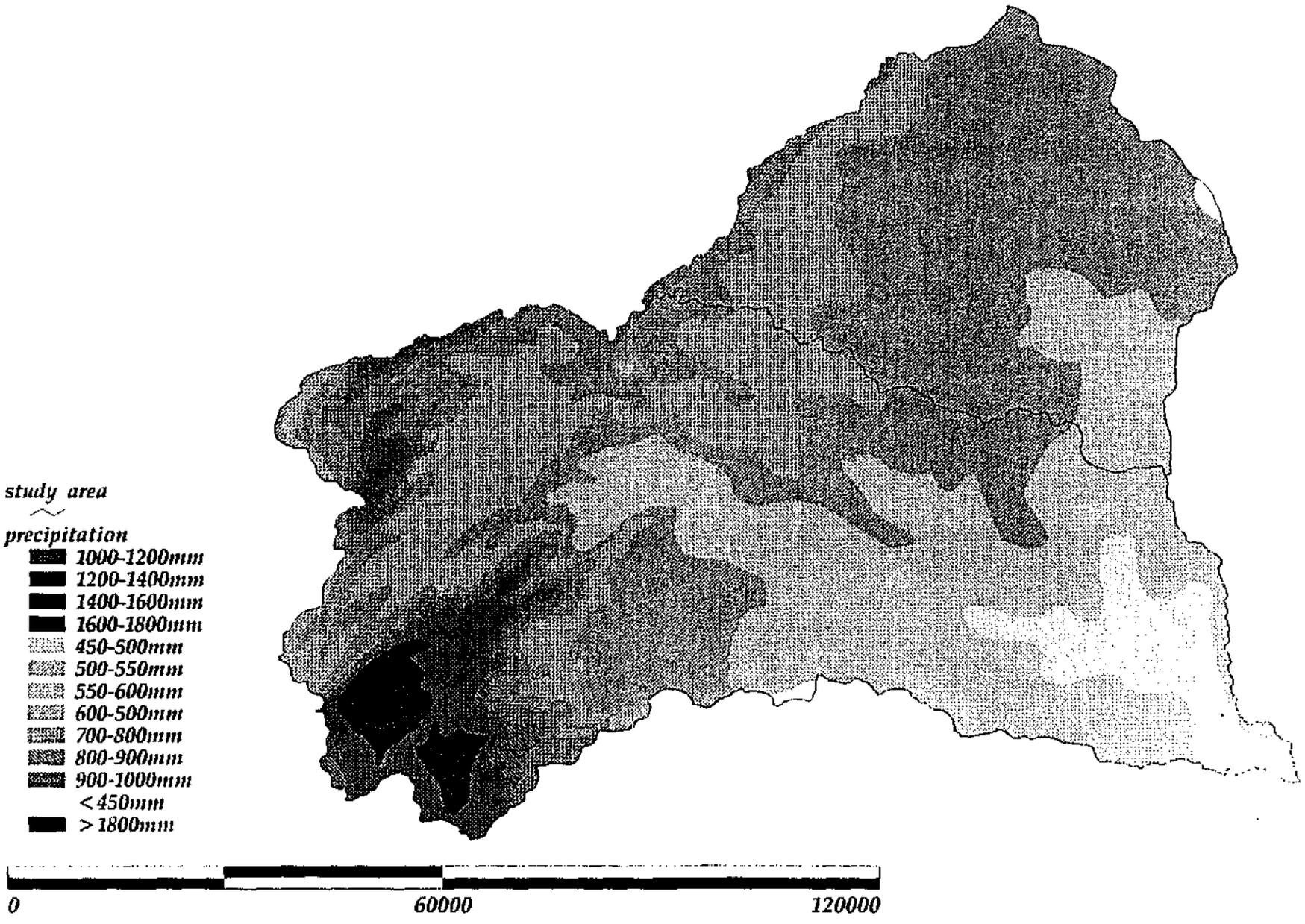
LETABA RIVER CATCHMENT AREA
SOILS



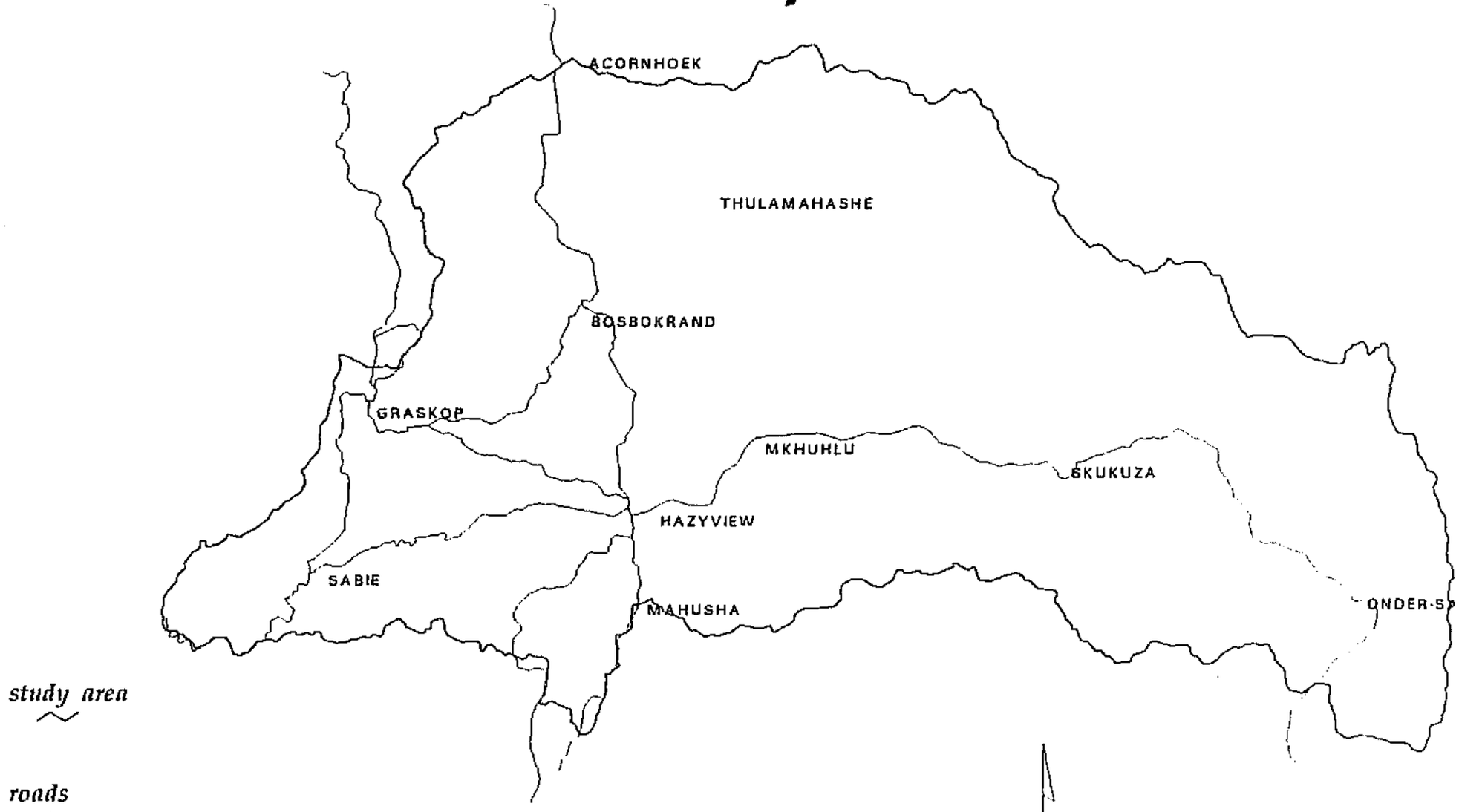
LETABA RIVER CATCHMENT AREA
RUNOFF



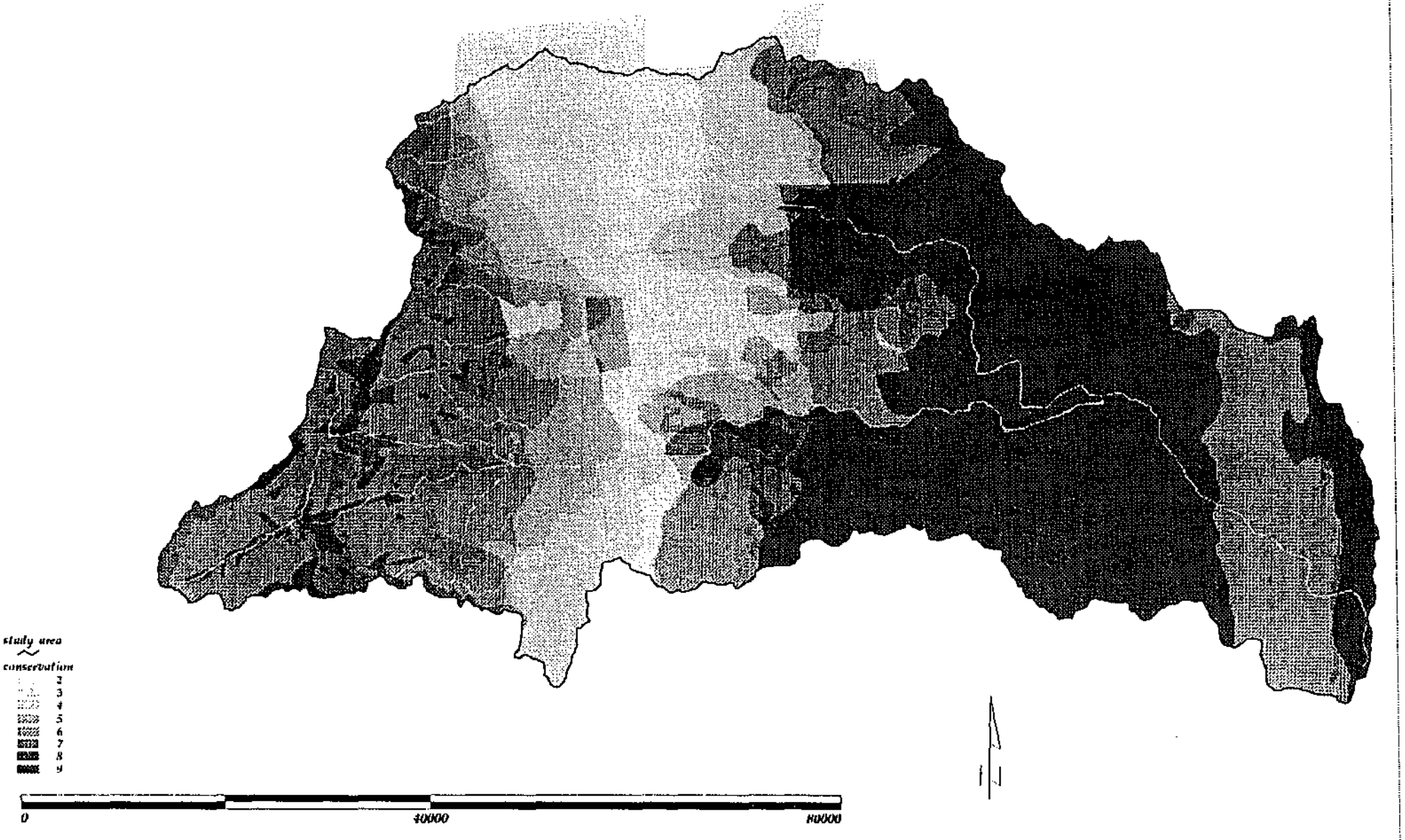
LETABA RIVER CATCHMENT AREA
PRECIPITATION



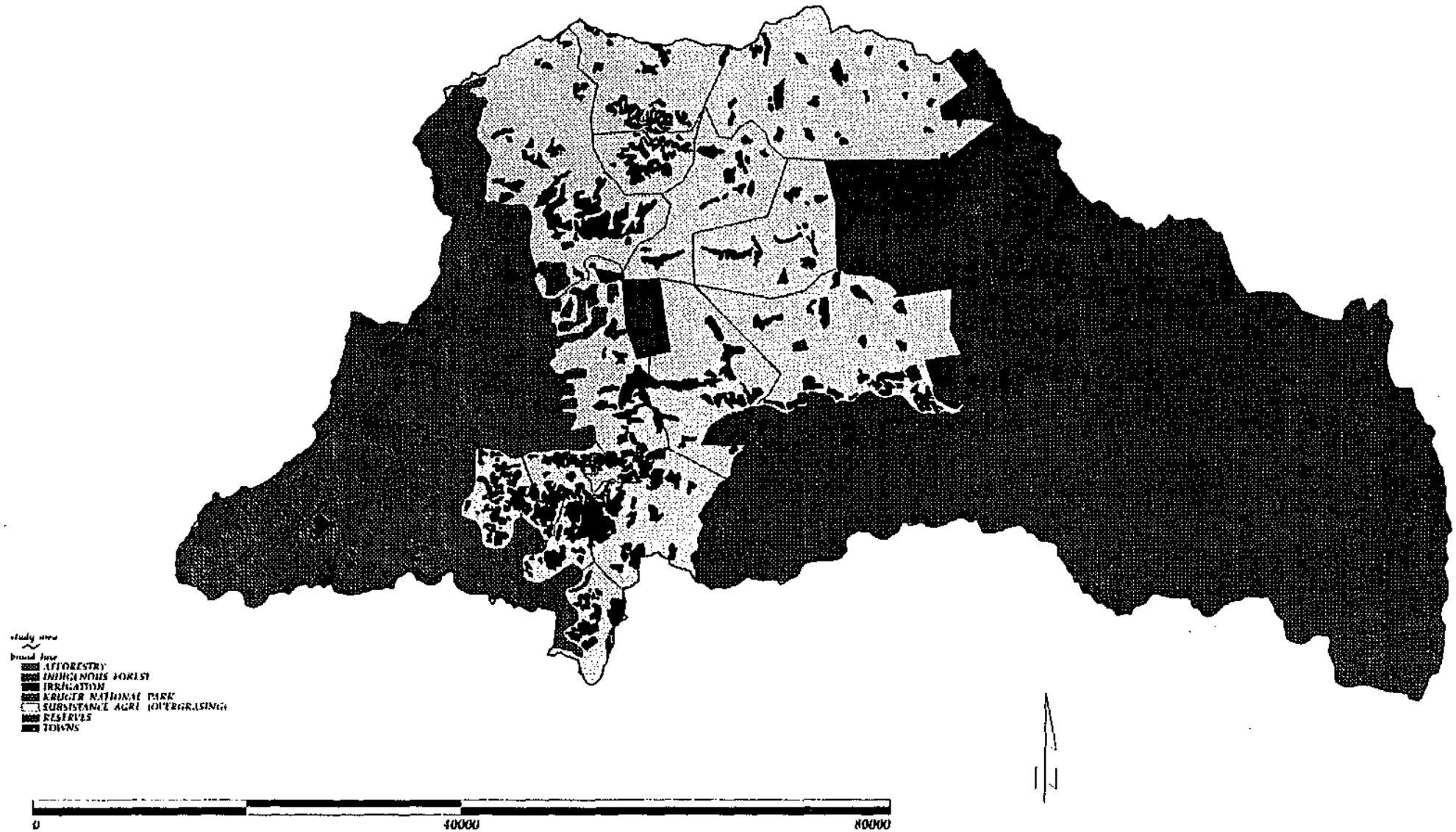
sabie river catchment area base map



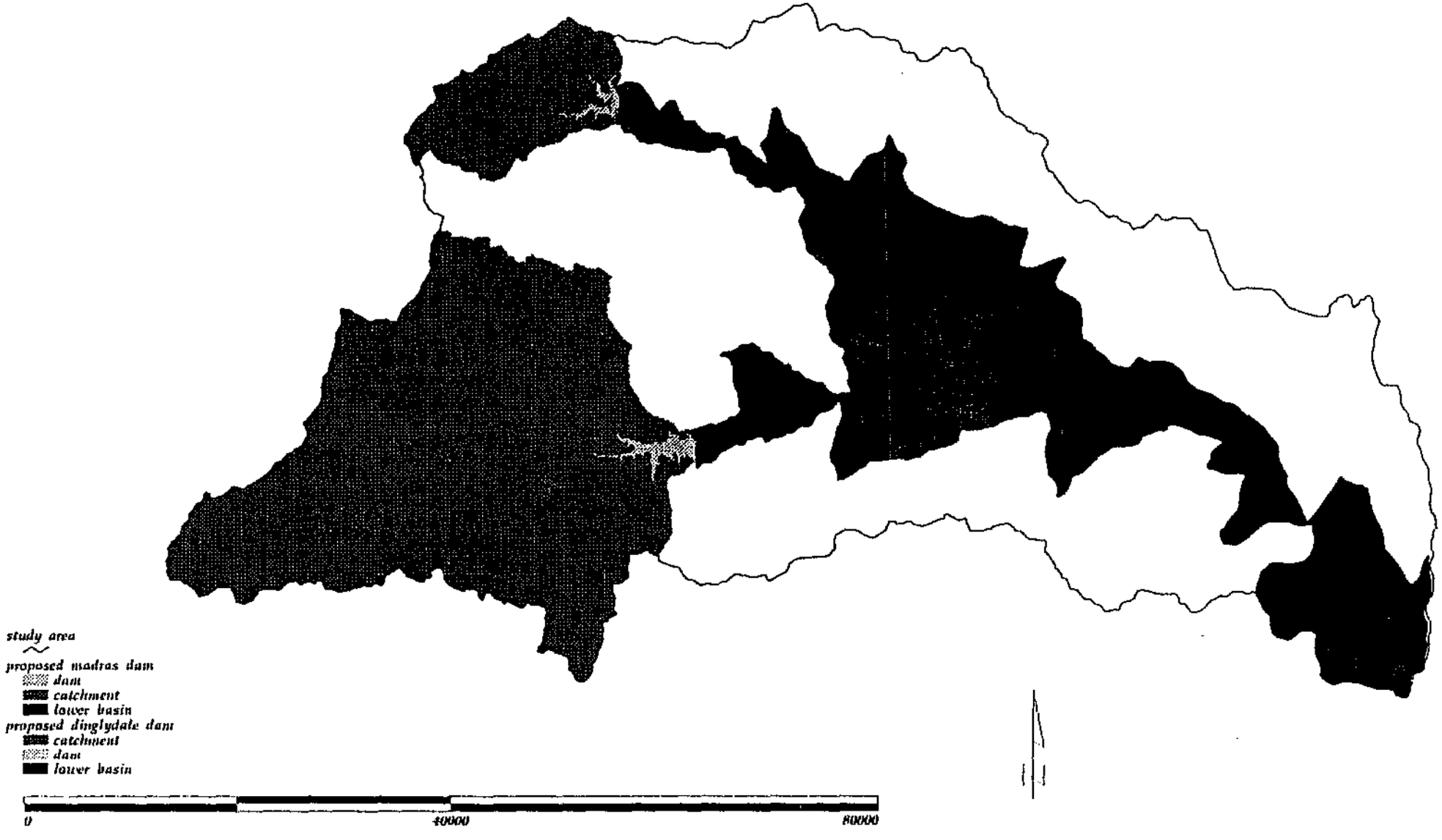
SABIE RIVER CATCHMENT AREA
PROPOSED CONSERVATION ZONES



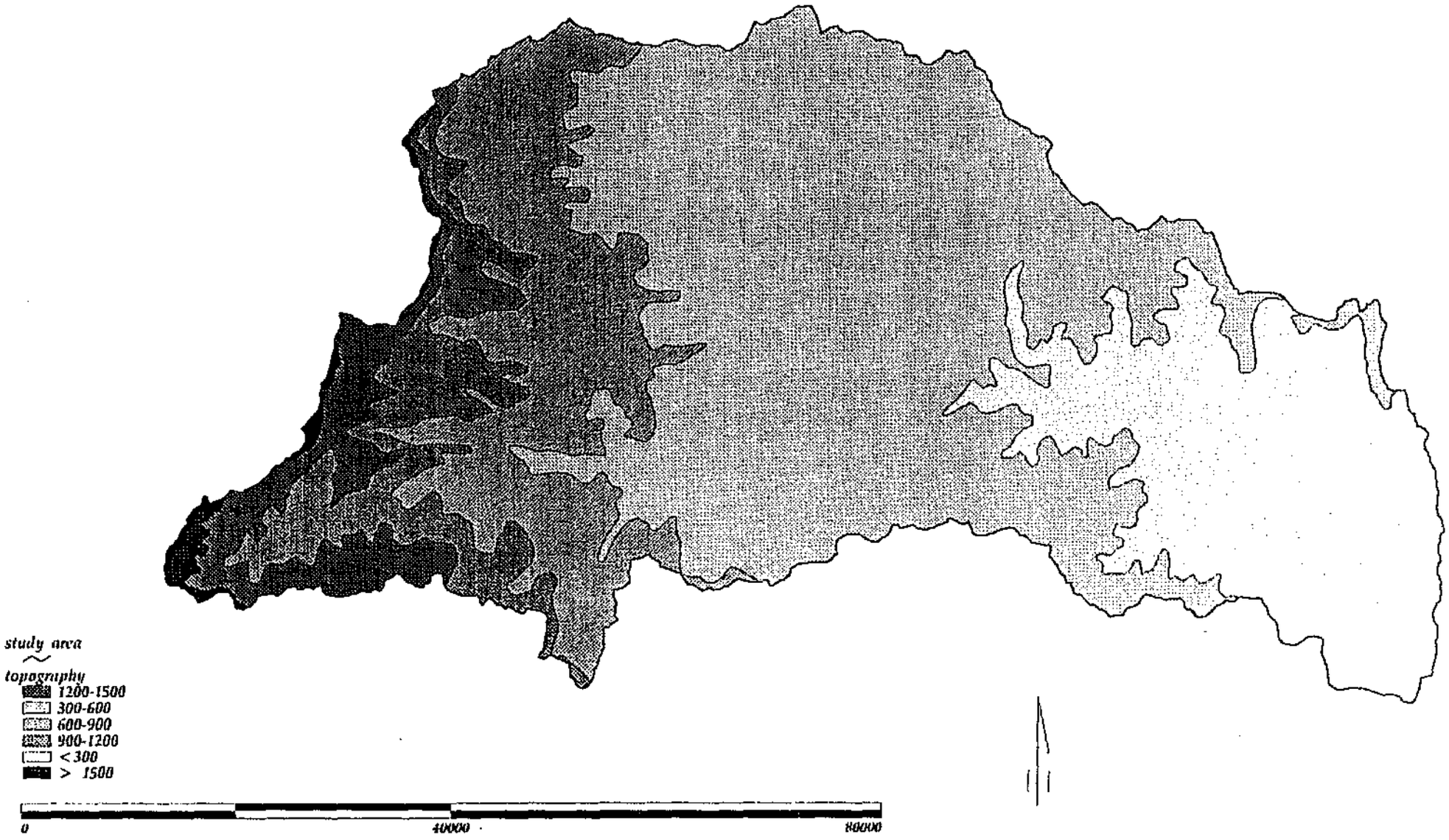
sabie river catchment area
land use



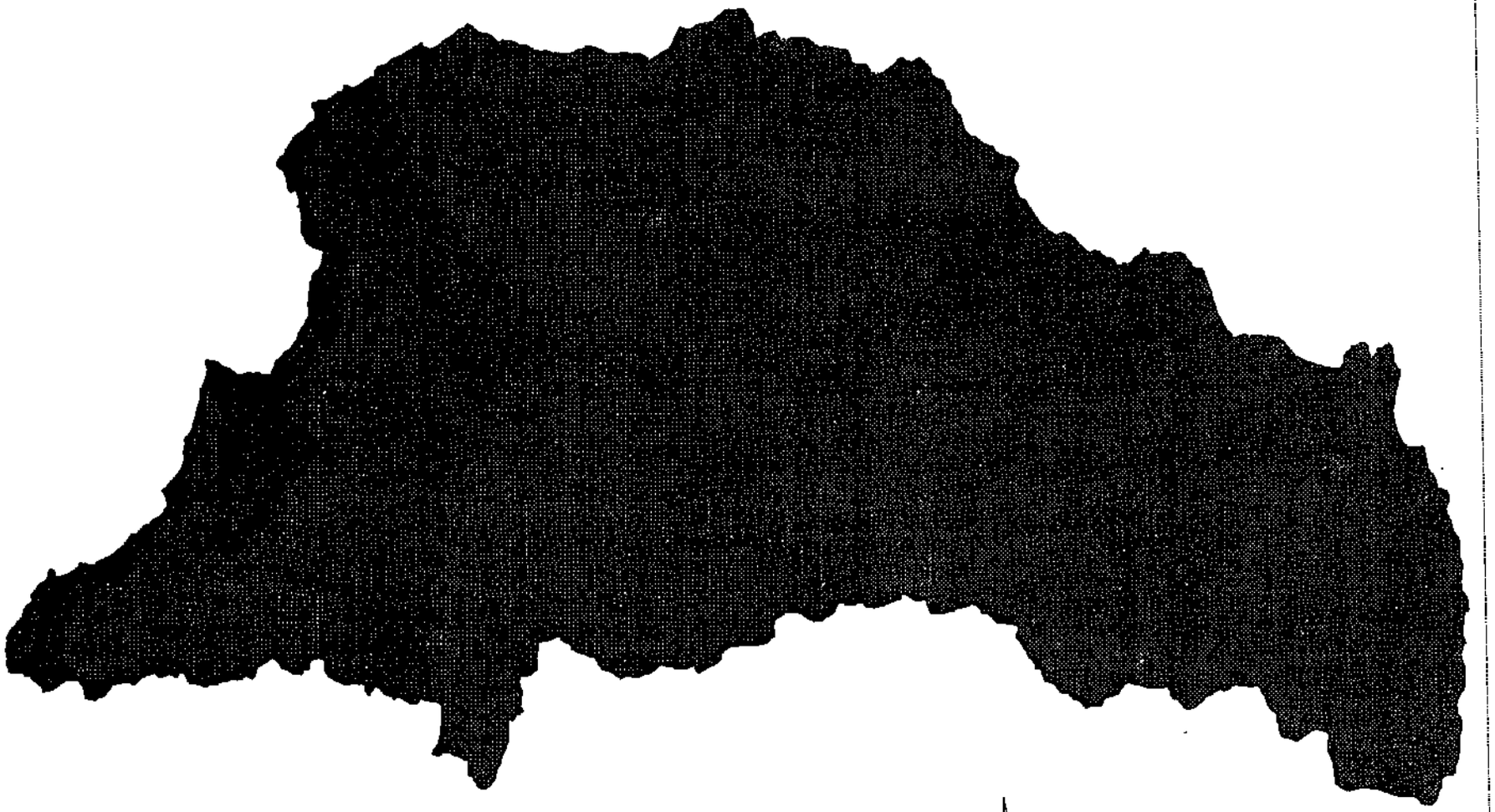
sabie river catchment area
proposed dam sites



sabie river catchment area topography



sabie river catchment area
precipitation



study area

precipitation

- 450 - 650
- 650 - 950
- 950 - 1300
- 1300 - 1500
- 1500 - 1800
- 1800 - 2000

0 40000 80000

sabie river catchment area
sedimentation