



REPUBLIC OF KENYA

MINISTRY OF AGRICULTURE—NATIONAL AGRICULTURAL LABORATORIES
KENYA SOIL SURVEY

GUIDELINES TO THE SOIL SURVEY
PROGRAMME OF WORK FOR 1979 - 1983

February, 1980

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1980.27GUIDELINES TO THE SOIL SURVEY PROGRAMME OF WORK FOR 1979-19831. INTRODUCTION

A "Guidelines to Soil Survey Programme of Work for 1977-1981" was compiled in 1977. However, with the current Development Plan extending from 1979 to 1983, it has been considered necessary to revise this guidelines in order to take into account the requirements of the Development Plan.

The purpose of a soil survey has been amply explained in the previous programmes of work (Kenya Soil Survey - proposed Programme of Work, July 1974 and the Guidelines to the Soil Survey Programme of Work for 1977-1981, March 1977). The medium and long term objective is explained in the Appendix to this paper. The main objective of the soil survey programme is to conduct soil and land inventories which produce information about the soil and land resources required for accelerated and sustained rural development while at the same time conserving the natural resources. Recognising the limitation of manpower and funds, the interruptions imposed by continued training of the staff and the varied soil survey activities that will need to be performed, carefully worked out yearly programmes of work will become very necessary.

Apart from forecasting the kind of projects that may come up during 1979-1983, the guidelines also by not outlining the priorities provide flexibility in the selection of the actual projects to be investigated. There is no doubt that in the course of the years some other important projects may emerge but these can be incorporated as the yearly programmes of work are considered. It is nevertheless hoped that the guidelines will facilitate the yearly deliberations of the Inter-ministerial Advisory Committee for Soil Survey as far as the selection of the priority areas for soil survey is concerned.

The extension of the Netherlands assisted Kenya Soil Survey Project by two years from January, 1980 has greatly boosted the capacity for soil survey. Four expatriate staff (one up to July, 1980 and another up to the end of 1980) will be available to undertake work and also to help in the training of Kenyan staff).

2. COUNTRY-WIDE EXPLORATORY SOIL SURVEY

This type of survey at scale 1:500,000 covers the whole of the country and shows the distribution of the major soils in a general way.

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The exploratory soil map forms a good basis for broad regional planning.

The exploratory soil map of the whole of the country is ready in draft at scale 1:500,000. This map will be published at scale 1:1,000,000. Owing to the demands for preliminary countrywide data on soils, the exploratory soil map will have to be ready within one year. It is therefore anticipated that one senior staff will devote full time to the exploratory survey to put the final touches to the map and map legend. It is expected that the preparation of the map for printing will commence by mid 1980. The printing of the map will be carried out at STIBOKA, The Netherlands.

The exploratory soil map will be printed in colour. There will also be an agro-climatic zone map at scale 1:1,000,000 and in colour. A black and white map at the same scale will be made. This map will serve for hand colouring of land suitability. Another black and white map will also be made showing the location of observations and the areas covered by other soil surveys. The exploratory soil map will be accompanied by an explanatory note indicating broad qualitative land suitabilities especially for arable crops and (gravity) irrigation development.

3. SYSTEMATIC RECONNAISSANCE SOIL SURVEYS

This type of survey constitutes the inventory proper of the soil and land resources of the country, to serve multipurpose land use planning. The systematic reconnaissance mapping of the whole country is being carried out at scale 1:100,000 for the medium and high potential parts of the country and at scale 1:250,000 for the semi-arid and arid parts of the country.

As recommended by the Second and Third Review Missions this long-term programme will continue with the average production of one map sheet per year (either 300,000 ha at scale 1:100,000 or 1,200,000 ha at scale 1:250,000).

Completed surveys or surveys with fieldwork completed at scale 1:100,000 are sheet 136 (Kindaruma area in Eastern Province), sheet 75 (Kapenguria area in Rift Valley Province), sheet 200-201-202 (Kwale area in Coast Province), sheet 130 (Kisii area in Nyanza Province) and sheet 163 (Makueni area in Eastern Province); provisional 1:100,000 mapping exists for the Nairobi-Thika-Machakos-Yatta area (DOS mapping of 1963; partly in Central, partly in Eastern Province). Completed surveys at scale 1:250,000 are sheets 173-174-181-182 (Amboseli-Kibwezi area; partly in Eastern Province, partly in Rift Valley Province), sheets 175-176-183-184 (Mtito Andei area, partly in Eastern Province, partly in Coast Province), sheets 190-191-196-197 (Voi area in Coast Province).

In execution at scale 1:100,000 is sheet 101 (Sega area, partly in Nyanza Province, partly in Western Province), sheet 155 (Bura East area in North Eastern Province), sheet 198 (Kilifi area in Coast Province). Parts of sheets 122, 123 and 137 (Meru-Kitui area in Eastern Province) are being surveyed at scale 1:250,000.

The completion of Sega area (sheet 101) will require half of 1980 (1 man-year plus supporting services by the Soil Management team). The Bura East survey (sheet 155) will be completed within the first half of the year (1980). The Kilifi area is being surveyed by the "Training in Pedology Project" of the Agricultural University, Wageningen, in close co-operation with the Kenya Soil Survey.

New reconnaissance soil survey areas will be tackled after completion of the on-going soil surveys. This is not foreseen before the second half of the year (1980). It is expected that they will be located in the medium potential areas (semi-arid areas) in accordance with the development strategy laid out in the 1979-1983 Development Plan. The selection of the priority areas will primarily be based on the development plans emanating from various ministries and Parastatal bodies such as TRDA, NIB, Lake Basin Authority and Kerio Valley Authority. Special consideration will also be given to areas which are under SRDP and IADP.

From survey's technical point of view, consideration will be given to the aspect of representativeness (extrapolation value) of the area for the major soil association/agro-climatic zones that have not yet been covered by previous reconnaissance soil surveys. Also the geographical distribution over the various provinces will be taken into account.

Taking into account the above criteria, THREE areas will be selected from the areas listed below for reconnaissance mapping at scale 1:100,000 during 1980 to 1983.

(a) Sheet 115 - Bondo area (Yimbo/Asembo/Rusinga/Uyoma; in Nyanza Province)

This area lies next to the Sega area (sheet 101) which is being mapped at reconnaissance level. The area is of medium agro-climatological potential and high population pressure around Lake Victoria. The area also covers parts of the Yala Swamp. For some parts of the sheet, already semi-detailed surveys and site evaluations exist. This information will be incorporated.

- (b) Sheet 180 - Lamu area (Milhoi/Mokowe/Mkunumbi/Lamu; in Coast Province)

This is an area representative of the medium potential area east of the Tana Delta. It includes the proposed extension of Lake Kenyatta Settlement Scheme and the Hindi-Magogoni Settlement Scheme.

- (c) Sheet 119 - Nakuru area (Menengai/Ol Joro Orok/Gilgil/Nakuru; partly in Rift Valley, partly in Central Province)

This is an area with soils derived from volcanic ash and lake deposits. It may be taken to be representative for the area of high to medium potential of the Rift Valley proper, with its transformation of traditional estate farming into small-holder/cooperative farming. For the Menengai-Solai area which forms part of the sheet, field data was collected by F.W. Collier in 1959 but these data were not published. These data will however be incorporated.

- (d) Sheet 131 - Sotik area (Chenagel/Tenwek/Chepalungu/Bomet; in Rift Valley Province)

This is an area with both Vertisols-Planosols and Nitosols-Andosols. It would be representative for areas of high agro-climatological potential, relatively low population pressure but high development prospects.

- (e) Sheet 135 - Muranga area (Muranga/Embu/Makuyu/Ithanga; partly in Eastern Province, partly in Central Province)

This is an area which lies west of the Kindaruma area and includes Mwea Irrigation Schemes. In the light of the Mwea Water Use Study and irrigation of red soils, a survey of this area would be required to assess the amount of irrigable land in the area.

- (f) Sheets 107, 108, 122, 189

These are areas involving IADP and SRDP and at the same time occur (at least partly) in the marginal areas.

ONE area will be selected from the following areas for a reconnaissance soil survey at scale 1:250,000 during 1981-1983:

- (a) Sheets 91-92-105-106 - Baringo-Rumuruti area (Nginyang/Churo/Lake Baringo/Mukutan, Sukuta Lol Marmar/Lake Kisima/Sukuta Mugie/Kirimuni, Ngelesa/Lariaka/Solai/Nyahururu, Rumuruti/Mukenya/Pesi Swamp/Ol Pejeta; in Rift Valley Province; a small portion in Central Province)

This area falls partly in the upper reaches of the Ewaso Ngiro catchment and also occurs east of Lake Baringo. The area is semi-arid and an inventory of the soil resources would be required to assess the development potential of the area.

- (b) Sheets 145-146-158-159 - Narok-Keekorok area (Mara Bridge/Lemek/Emati/Bardamet, Loita Plains/Narok/Majimoto/Olomoroci, Keekorok/Lenganishu, Naikarr/Naro Osura/Leniesigio/Entasekara; in Rift Valley Province)

This is an area partly with volcanic ash soils and has a potential for wheat growing. An inventory of the soil resources will be required to assess areas suitable for wheat growing and also to assess other development alternatives for the area.

It is expected that more detailed information on soils of some parts of the country will emanate from specific Technical Assistance projects or co-operating Agencies, some of which are already operating or which are envisaged to be amounted from time to time. The areas which may be catered for through such projects in the near future include the following:

- (a) Sheet 198 - Kilifi area (in Coast Province)

This soil survey is being carried out by the "Training in Pedology Project" of the Agricultural University, Wageningen in close co-operation with the Kenya Soil Survey.

- (b) Sheets 41-42-53-54 - Kulal-Marsabit area (partly in Rift Valley Province, partly in Eastern Province)

This soil survey will be carried out by UNEP-UNESCO arid lands Project.

- (c) Sheet 122/2 & 4, sheets 123 and 137 - Parts of Embu and Kitui;
(in Eastern Province)

This survey is being carried out by the two KSS soil surveyors attached to the Semi-arid Lands Pre-investment Project.

4. SEMI-DETAILED SOIL SURVEYS

This type of survey, at scales 1:20,000 and 1:50,000, normally concerns the mapping of soil and land of an area already earmarked for a particular kind of rural development.

The demand for this type of survey is increasing and KSS will have to reserve more manpower for it in future. However, it should be noted that in some cases this type of survey will form an integral part of feasibility studies such as large scale irrigation development, sugar cane development, etc. that are to be carried out by Consultant firms.

Although the semi-detailed surveys, particularly for feasibility studies will be tackled as the need arises, the following will require attention during 1979-1983:

- (a) Bura East area (North Eastern Province) - for large-scale irrigation development. 40,000 ha at scale 1:20,000 are involved. $1\frac{1}{2}$ man-years will be required.
- (b) Nandi Escarpment (Rift Valley Province) - for sugar cane development. About 15,000 ha at scale 1:25,000 are involved. 1 man-year will be required.
- (c) Nyanza sugar-belt areas adjacent to Kano Plains and Songhor survey areas - for sugar cane development. About 100,000 ha at scale 1:50,000 are involved. It will require 2 man-years.
- (d) National Youth Service Farm-Yatta - for farm planning and assessment of areas suitable for irrigated agriculture (mainly coffee). About 4,000 ha are involved. It will require 1 man-year.
- (e) Bukura Institute of Agriculture - for farm planning and development of horticultural crops. 240 ha are involved. It will require 6 man-months for a survey at scale 1:20,000.
- (f) Garissa Research Station - for research purposes. About 50,000 ha will probably be involved. This will require 2 man-years for a survey at scale 1:50,000.
- (g) Selected parts of Baringo District - for irrigation development and soil conservation. About 20,000 ha will be involved. It will require $1\frac{1}{2}$ man-years for a survey at scale 1:20,000.

- (h) Selected parts of Upper Kerio Valley and West Pokot - for cotton growing and/or irrigation development. About 40-50,000 ha may be involved. It will probably require 2 man-years for a survey or surveys at scale 1:20,000.
- (i) Selected parts of the Lake Basin - for irrigation and sugar cane development. Over 50,000 ha may be involved for surveys at scale 1:20,000. This will probably require 2-3 man-years.
- (j) Tana Delta area - for large scale irrigation development. About 30,000 ha may be involved. This will probably require $1\frac{1}{2}$ man-years for a survey at scale 1:20,000.

Where minor areas, the survey of which is of only local significance, are concerned the resulting maps will only be helioprinted and the report stencilled for limited distribution. However, for areas of sizeable expanse and where the results are expected to have application elsewhere the maps and the report may be printed for wider distribution.

5. DETAILED SOIL SURVEYS

This type of survey at scale 1:10,000 or larger is intended for farm planning at the project implementation stage. It is required for the terrains of Agricultural Research Stations to enable proper characterisation of sites for various agronomical trials. These soil surveys are also needed for the planning of tertiary network of irrigation and drainage channels in irrigation schemes.

Detailed soil surveys are man-power intensive type of surveys. The demand for detailed soil surveys is increasing in view of the growing development of irrigation schemes and growing interest in some "dambo" areas of western Kenya and Kisii area for paddy rice development. Some areas already identified as requiring detailed soil surveys are outlined below:

- (a) Kamleza/Kamoriyo Irrigation Scheme (Taita Taveta District) - for irrigation development. About 250 ha ^{are} involved. This will be surveyed at scale 1:5,000 and will require about three man-months.
- (b) Sandai area (Baringo District) - for irrigation development. 100-200 ha will be surveyed at scale 1:5,000. This will require two to three man-months.

- (c) Gafarsa area (Eastern Province) - for irrigation development. 200 ha will be involved for a survey at scale 1:5,000. It will require two man-months.
- (d) Loboi area (Baringo District) - for irrigation development. 50 ha are to be surveyed at scale 1:5,000. It will require two man-months.
- (e) Lomut area (West Pokot District) - for irrigation development. About 1,900 ha will be surveyed at scale 1:10,000. It will require six man-months.
- (f) Sigor area (West Pokot District) - for irrigation development. About 2,000 ha are involved. This will be surveyed at scale 1:10,000 and will require six man-months.
- (g) Akiriamet area (West Pokot District) - for rainfed agriculture. This area is located along the Wei-Wei river in the vicinity of the Morun confluence. The exact boundary of the survey area is not yet known but it will probably be surveyed at scale 1:10,000 and may require six man-months.
- (h) Extension of ADC Farm (Garissa District) - for irrigation development. About 3,000 ha may be involved and will be surveyed at scale 1:10,000. It will require nine man-months.
- (i) Tebere Block in Mwea - for irrigation of the red soils. About 100 ha will be involved for a survey at scale 1:5,000. It will require two man-months.
- (j) Salabani/Ndan area (Baringo District) - for irrigation development. 100 ha will be involved for a survey at scale 1:5,000. About one man-month will be required.

6. SITE EVALUATIONS

These are preliminary surveys carried out at varying scales for project identification. These ad hoc surveys have proved to be very useful and will continue to be carried out at the same pace as in previous years. Some of the requests already received are:

- (a) Narok Agricultural Development Project area - for wheat development. This will be surveyed at scale 1:100,000.
- (b) Masai Rural Development Centre, Ngong - for agricultural development. This will be surveyed at scale 1:10,000.

- (c) Mbooni area (Machakos District) - for growing horticultural crops (mainly citrus). This will be surveyed at scale 1:100,000.
- (d) Vanga Rice Schemes (Kwale District) - for rehabilitation of the rice schemes.
- (e) Barwesa Irrigation Scheme (Baringo District) - for rehabilitation of the scheme. This will be surveyed at scale 1:5,000.
- (f) Giriftu Pastoral Training Centre (Wajir District) - for determination of a suitable site for a research substation.
- (g) Selected areas in Nyanza Province - for rehabilitation of the on-going small scale rice schemes in the area.

7. ADVISORY SERVICE AND DOCUMENTATION

The following will be done:

- (a) Compilation of a "Guidelines to Soil Survey and Land Evaluation in Kenya". The manual will be finalized by mid 1980.
- (b) Systematic annotation and storage of original field and laboratory soil data.
- (c) Collection of field and laboratory data of soil surveys carried out by consultant firms within the country.
- (d) Organisation of yearly refresher courses.
- (e) Acquisition of books, maps and aerial photographs.

8. SUPPORTING TECHNICAL SERVICES

- land evaluation
- laboratory
- cartography
- agro-climatology, vegetation surveys and soil management

The programmes of work for these sections will be based on the needs of the survey areas as they are basically to support the fieldwork. These programmes of work will however be prepared at the beginning of every year.

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February, 1980

APPENDIX

LONG RANGE PROGRAMME OF WORK OF THE KENYA SOIL SURVEY

1. Programme of Soil Survey and Land Evaluation

The long term objective is to accomplish the following:

- 1.1. To produce, in printed form (in colour), an exploratory soil map of the whole country at scale 1:1,000,000 by the end of 1981. Published together with this exploratory soil map will be an agro-climatic zone map at scale 1:1,000,000 (in colour), a black and white soil map at the same scale for hand colouring of land suitability and a black and white map showing the location of observations and the areas covered by other soil surveys.

The period up to mid 1980 will be for finalization of the draft exploratory soil maps at scale 1:500,000 and the map legend. Compilation of the explanatory note to accompany the soil map will continue throughout 1980. To cater for urgent demands for countrywide preliminary soil data a draft legend and explanatory note will be mimeographed for restricted circulation during the first half of 1980.

- 1.2. To produce, each year, one printed soil map and its interpretations on a scale 1:100,000 or 1:250,000 covering 300,000 hectares or 1,200,000 hectares respectively. Three areas envisaged to be covered by reconnaissance soil survey at scale 1:100,000 by the year 1983, will be selected from the following:

Sheet 115: Bondo area (Yimbo/Asembo/Rusinga/Uyoma)

Sheet 180: Lamu area (Milhoi/Mokowe/Mkunumbi/Lamu)

Sheet 119: Nakuru area (Menengai/Ol Joro Orok/Gilgil/Nakuru)

Sheet 131: Sotik area (Chemagel/Tenwek/Chepalungu/Bomet)

Sheet 135: Muranga area (Muranga/Embu/Makuyu/Ithanga)

Sheets involving IADP and SRDP areas and at the same time occurring in marginal areas: These sheets include 107, 108, 122 and 189.

One area envisaged to be covered by reconnaissance soil survey at scale 1:250,000 by the year 1983 will be selected from the following:

Sheets 91-92-105-106: Baringo-Rumuruti area

Sheets 145-146-158-159: Narok-Keekorok area

- 1.3. To co-ordinate all soil surveys being carried out in the country by consultant firms and other organisations. This is to ensure that the standards set by the Kenya Soil Survey are followed during the execution of these surveys.

Within the above long-range survey programme, the yearly programmes which will also take into account the requests for semi-detailed and detailed soil surveys and pre-investment site evaluations will be designed with the advice of the Inter-ministerial Advisory Committee.

2. Programme on correlation of experimental data with site potential

The long-term objective is to build a soil Resource Data Bank for the country and also to determine the potential land productivity. The stages to be gone through in this programme are the following:

- 2.1. Collection of data on yields, rainfall, fertilizer usage, crop varieties, management practices, social structure and site characteristics in all on-going survey areas and research stations. This will include collection of past data in research stations.
- 2.2. Analysis of the data and correlation with the site characteristics.
- 2.3. Devising a system for storage and retrieval of the data collected.
- 2.4. Utilization of this data to improve on the criteria used in land evaluation for assessing land capability.

3. Programme on production of "Guidelines to soil survey and land evaluation in Kenya"

It is envisaged to produce guidelines to soil survey and land evaluation which are relevant to the Kenyan conditions. The guidelines will serve as a basic document for future workers in soil survey and land evaluation. It is aimed at ensuring uniform approach in methodology and high quality work. The draft of the guidelines will be available after mid 1980.

The stages to be followed in this programme include:-

- 3.1. Compilation of the first approximation of a "Guidelines to soil survey and land evaluation in Kenya" taking into account the already existing methodology and criteria.

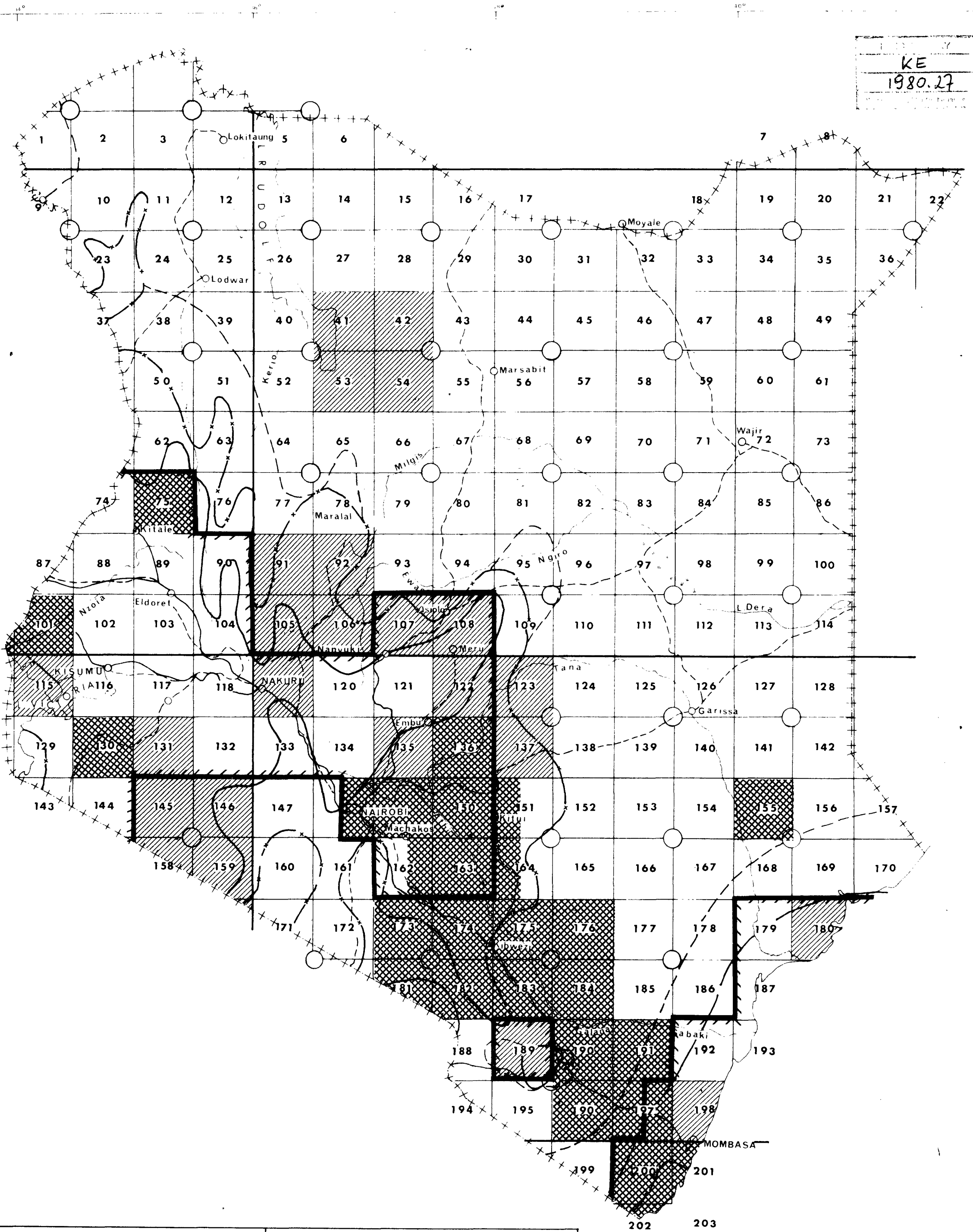
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- 3.2. Testing the applicability of the guidelines in different parts of the country and adjusting the criteria in the light of the experience gained in these areas.
- 3.3. Revision of the guidelines to incorporate any changes in approach and criteria. This will be carried out whenever necessary.

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KENYA SOIL SURVEY, PLAN OF WORK AND PROPOSED PRIORITIES

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~~~~~	Boundary of high-potential areas
-x-x-x-	Boundary of medium-potential areas
- - - - -	Boundary of areas with more than 20" Rainfall
-o-o-o-	Roads with towns
— — —	Railways
~~~~~	Rivers
	Boundary of 1:25,000 Mapping
55	Quarter-degree sheets (1:100,000)
○	Full-degree sheets (1:250,000)
▣	Completed reconnaissance survey areas
▨	Areas to be considered for reconnaissance survey during 1979-83

SCALE 1:300000