REPUBLIC OF KENYA

MINISTRY OF AGRICULTURE AND LIVESTOCK DEVELOPMENT

NATIONAL AGRICULTURAL LABORATORIES

KENYA SOIL SURVEY

ANNUAL REPORT
1983

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ANNUAL REPORT

OF

THE KENYA SOIL SURVEY, 1983

With the Compliments of the
Head, Kenya Soil Survey

ANNUAL REPORT OF THE KENYA SOIL SURVEY, 1983

C O N T E N T S

CONTENTS

CONTENTS

CONTENTS

PART I : GENERAL OVERVIEW

1.1 Summary of Technical Work

During the year approximately 200,000 hectares were surveyed in the Bondo (Siaya and South Nyanza Districts), Transmara-Kehancha area (Narok and South Nyanza Districts) and Malindi (Kilifi District) areas at reconnaissance level, while 8,616 hectares were surveyed in Evurore Catchment (Embu District) and Marimanti Research Station (Meru District) at semi-detailed level. At detailed level, about 970 hectares were covered in Kibuni Farm (Nyandarua District), Marimba Government Farm (Meru District), Perkerra Research Station (Baringo District), Riara Ridge (Kiambu District) and Chemeron Irrigation Scheme (Baringo District). Preliminary surveys (site evaluations) covering approximately 76,300 hectares were completed in the Lake Kenyatta Settlement Scheme (Lamu District), Magarini Land Settlement Scheme (Kilifi District), Kiangwachi Irrigation Scheme (Kirinyaga District), Kiamariga, New Mutaro Farm and Lari-Wendani area (Laikipia and Nakuru Districts), Nakwamoru area (Turkana District), Amaya, Chemeron, Eldume and Loiminang areas (Baringo District) and Machanga Soil Conservation Station (Embu District).

The Exploratory Soil Map of Kenya and the Agro-climatic Zone Map of Kenya (both at scale 1:1 million) were printed. These maps together with two other accompanying maps and report were received from The Netherlands. They were officially launched by the Minister for Agriculture of Kenya and the Dutch Minister for International Cooperation.

Collection of social-economic and agro-economic data, through the use of questionnaires, was completed for Bondo and Transmara-Kehancha areas. A total of 190 farmers were interviewed. On the basis of the data collected a provisional description of the land utilization types in the two areas was made. In response to the current District Focus for Rural Development, a present land use survey programme per district was started. This survey is aimed at providing an overview on the present utilization of the natural resources in the district. The present land use survey for Kilifi district was completed. Vegetation surveys were carried out in the Bondo area, National Youth Service Farm, Kirimun (Samburu District) and Transmara-Kehancha area.

On the climatology side several climatic chapters were compiled for various soil reports. A field experiment was started at NAL to investigate the effect of time of planting on the yield of two maize varieties (512 and 614).

As in the past years, the KSS laboratory continued with special analyses in support of the ongoing soil surveys. Work on the evaluation of different methods of determining CEC and exchangeable cations in different soils in Kenya was started. On the Cartography side many soil maps, text figures and base maps were compiled.

Five soil survey reports, five conference papers and one internal communication were published.

1.2 Kenya Soil Survey Project

The Kenya Soil Survey Project (KSSP) continued its activities within the framework of the Plan of Operations for the period 1982-1984. The Project contributed about KSh. 5,000,000. This contribution went towards payment of expatriate staff, fellowships, conferences, equipment and operational costs.

During the year, Mr A Weeda arrived on 4th March to fill the existing vacancy. Mr H M H Braun left the KSSP and his function as the Teamleader was taken over by Mr Weeda. A total of nine fellowships were granted as follows: , Six staff members went to the ITC for postgraduate course, two for MSc course at the Agricultural University, Wageningen, and one staff member participated in the IAC International Drainage course.

The Project replaced three Landrovers, purchased equipment for the Micromorphology laboratory and also purchased additional equipment for the Chemistry laboratory, Cartography and Reproduction section as well as field and camping equipment.

1.3 Staff and Training

Three Agricultural Officers (B K Waruru, M Kithome and J Wanjohi) were newly recruited. Messrs R E Njagi, J J Nuwamanya and B A O Okongo resigned from Government Service. Mr A Mgalla, a Technical Assistant was cross-transferred to Coast Agricultural Research Station, Mtwapa with Mr S Githinji. Mr H M H Braun left the Kenya Soil Survey Project in June 1983. Mr A Weeda joined KSSP on 4th March, 1983.

Messrs M M Gatahi, W N Wamicha, C K K Gachene and D N Mungai continued with the write up of their MSc thesis while at KSS. Messrs C K K Gachene and M M Gatahi defended their MSc thesis. Mr S M Wokabi successfully completed his MSc Course in Soil Science at the

University of Ghent. Mr P N Macharia also successfully completed a one year course on Rural Surveys at ITC, The Netherlands. Messrs W W Aore, P F Okoth, E M Muya and S N Wanjogu started their one year postgraduate training in Soil Survey at ITC, in January 1983 and successfully completed the course at the end of the year. Mr D M Olulo was admitted for a one year Cartography Course at ITC. Messrs R L M Kiome and P T Kamoni joined the MSc Course in Soil Science at the Agricultural University, Wageningen. Messrs Mwichabe Situma and D W Kilambya were admitted at ITC for a one year course in Rural Surveys and nine months' course on Integrated Surveys, respectively. Mr G O Mochiemo attended a four months' course on Land Drainage at IAC, The Netherlands. Mr A E Ekirapa was admitted at the University of Nairobi for a one year postgraduate course in Irrigation and Drainage.

Messrs J R Rachilo, F M Shitakha and F M Ndaraiya, followed a three weeks course on remote sensing for increased food production at the Regional Centre for Remote Sensing Facility at Nairobi. Mr F N Muchena attended a one week's Management Course on Management of Agricultural Organizations at Green Hills Hotel, Nyeri.

A refresher course for all members of KSS was organised for a two weeks period during the month of July. A few guest speakers were invited but most of the lectures were given by KSS staff members.

As mentioned in the annual report for 1982, a considerable number of staff members, particularly graduates of general sciences continued to serve on temporary terms of service. For the retention of these members of staff, who have been trained and are qualified to perform their jobs in the different fields of soil science, ways and means of motivating them through promotion must be looked into.

1.4 Finance

The Kenya Soil Survey continued to enjoy financial support in form of Technical Aid from the Netherlands (see chapter 1.2). New vehicles, field and camping equipment, laboratory equipment, drawing and reproduction equipment and books were bought through these funds.

The funds provided by the Kenya Government (under Development Vote) were adequate apart from the funds for Travelling and Accommodation Allowance and Transport Operating expenses. During the middle of March, all the expenses were temporarily suspended under instructions

from the Government. This meant that all the field activities had to be halted during this period.

From the sale of reports and maps KSS managed to raise a sum of Forty thousand three hundred and sixty seven (40,367/00) shillings.

1.5 Buildings

As reported in the Annual Report of 1982 the AAKI Contractor who was responsible for the construction of the KSS office extension, did not complete the outstanding works. However, during the course of the year some of the outstanding installations in the micromorphology laboratory were carried out making use of the Kenya Soil Survey Project funds. A grinding light-table was purchased.

The cutting/grinding machine was installed. A sink and a water heater for the same laboratory were bought and were awaiting installation.

Installation of extract fans and ducts in both the Soil Micromorphology and Soil Physics laboratories were still outstanding by the close of the year.

Large size developing sinks were installed in the dark room. Installation of the contact printing frame, which had already been acquired commenced and will be completed in 1984.

1.6 Collaboration with other Organizations

Cooperation established in previous years (see annual reports of 1980, 1981 and 1982) between the "Training in Pedology Project" (TPIP) of the Agricultural University, Wageningen, The Netherlands was continued. KSS continued to receive progress reports and completed survey reports from the Project. KSS received 500 copies of the printed soils report of the Kisii area from TPIP in exchange for the soil maps which had been printed by KSS.

Cooperation with the UNESCO-UNEP Integrated Project on Arid Lands was also continued. KSS received the soil map of the Mt. Kulal-Marsabit area for final drawing.

Close contacts were maintained with the following institutions and Projects: KREMU, Department of Soil Science, University of Nairobi, Survey of Kenya, Tana and Athi Rivers Development Authority, Lake Basin

Development Authority, Kerio Valley Development Authority, Irrigation and Drainage Branch and the ASAL Branch of the Ministry of Agriculture, Materials Branch of the Ministry of Transport and Communications, the National Irrigation Board, Regional Remote Sensing Facility, The Elgeyo Marakwet-West Pokot Study Team and the Wildlife Planning Unit of the Ministry of Tourism and Wildlife.

KSS also continued to cooperate with the Netherlands Soil Survey Institute and the other Sections of the National Agricultural Laboratories (NAL).

1.7 Conferences, Meetings and Internal Organization of KSS

The senior staff participated in several conferences, workshops, seminars and meetings. W N Wamicha attended a one week International Geological Conference held in Nairobi in January. He also attended a meeting on the Working Group on African Continental Sediments held in Cairo from 16th to 23rd October, 1983. Messrs H M H Braun and F N Muchena attended a one week Workshop on Small Scale Irrigation Development in Kenya held at Silver Springs Hotel, Nairobi from 14th to 18th February, 1983. F N Muchena attended the International Soil Museum (now ISRIC) Advisory Panel Meeting at Wageningen, The Netherlands from 13th to 18th June, 1983. Messrs M M Gatahi and A Weeda attended a Workshop on "Land Evaluation for Extensive Grazing" held in Addis Ababa from 31st October to 4th November, 1983. Messrs F N Muchena, C K K Gachene, J K Kanake and V W P van Engelen attended the 5th Meeting of the Eastern Africa Soil Correlation Committee held at Wad Medani, Sudan from 5th to 10th December, 1983. Messrs D N Mungai and P M Maingi attended several meetings of the National Cartographic Committee at Survey of Kenya. Messrs Muchena, Kibe and Rachilo attended several meetings at Survey of Kenya to discuss the Japanese Land Use Mapping in the area around Tana Delta. Messrs H M H Braun and A Weeda attended several meetings in the Netherlands Embassy while Mr Muchena attended several meetings at the Ministry of Agriculture Headquarters.

Internally many technical meetings were held with consultants and staff to discuss various aspects of the ongoing Soil Survey and supporting technical matters. The Soil Survey Advisory Committee meeting was held on 24th February, 1983. One general staff meeting was held.

The internal organization of the Kenya Soil Survey remained unchanged (see annual report of 1982). Several meetings were held with the Coordinators and Supervisors of the various Sections to discuss administrative and technical matters related to their units.

1.8 Visitors

Some 298 local and overseas visitors were received for discussions on various matters concerning soil survey and land use. They included persons of different walks of life such as farmers, professors, lecturers, economists, agronomists, consultants, planners, hydrologists etc.

Among the visitors received was the Minister for Agriculture, Hon Dr Munyua Waiyaki and the Dutch Minister for International Cooperation.

1.9 Publications of 1983

Detailed Soil Survey Report No. D31	Detailed Soil Survey of Riara Ridge (Kiambu District) by A Weeda and D N Mungai.
Semi-detailed Soil Survey Report No. S8	Soils and Vegetation of the National Youth Service Farm - Yatta (Machakos District) by C R K Njoroge and J J Nuwamanya.
Exploratory Soil Survey Report No. E1	The Exploratory Soil Map and Agro-climatic Zone Map of Kenya, Scale 1:1 million by W G Sombroek, H M H Braun and B J A van der Pouw.
Reconnaissance Soil Survey Report No. R4	Soils of the Kisii area (quarter degree sheet 130) by W G Wielemaker and H W Boxem.
Site Evaluation Report No. P65	An assessment of the irrigation suitability of the soils of the Amaya, Chemeron, Eldume and Loiminang areas (Baringo District) by V W P van Engelen.

Conference Paper No. C29	The role of soil surveys in irrigation development, by F N Muchena. Paper presented at the Workshop on Small Scale Irrigation in Kenya, Nairobi, 14-18 February, 1983.
Conference Paper No. C30	Properties, Management and Classification of Vertisols in Kenya by F N Muchena and C K K Gachene. Paper presented at the 5th Meeting of the East African Sub-committee for Soil Correlation and Land Evaluation, Wad Medani, Sudan, 5-10 December, 1983.
Conference Paper No. C31	Land qualities and Land characteristics relevant for major land utilization types - an assessment with Kenyan examples by M M Gatahi. Paper presented at the Workshop on Land Evaluation for Extensive Grazing, Addis Ababa, Ethiopia, 31st October to 4th November, 1983.
Conference Paper No. C32	Multiple and Compound land utilization types for rangeland evaluation. Some considerations using the Kenyan experience by A Weeda. Paper presented at the Workshop on Land Evaluation for Extensive Grazing, Addis Ababa, Ethiopia, 31/10 to 4/11/83.
Conference Paper No. C33	A calcified laterite in the Olooloo Plateau by W N Wamicha, R L M Kiome and P F Okoth. Paper presented at the 1st Conference on Continental Sediments in Africa, Cairo, Egypt, 16-23 October, 1983.
Internal Communication No. IC25	Guidelines to Soil Cartography by P M Maingi.

PART II : TECHNICAL WORK

2. FIELD SOIL SURVEYS

(F N Muchena, C K K Gachene, W N Wamicha, M M Gatahi, A Weeda V W van Engelen, J R Rachilo, J K Kanake, J M Kibe, P T Gicheru, C R K Njoroge, R L M Kiome, F M Shitakha, H C K Kinyanjui, D N Mungai, T Wachira, P M Waweru, P W Kimotho, P K Kimani, B G Mwangi, P M Mainga, J S Wataka, S Mwangi).

2.1 EXPLORATORY SOIL SURVEY

2.1.1 KSS/E1/73 Exploratory soil map and Agro-climatic zone map of Kenya, scale 1:1,000,000

As mentioned in the annual report for 1982 the printing of the Exploratory soil map of Kenya and the accompanying maps was completed. 4500 copies of the report No. E1 were received and officially launched by the Minister for Agriculture of Kenya and the Dutch Minister for International Cooperation.

The report No. E1, is available for sale at KSS at KSh. 250.00 each.

2.2 RECONNAISSANCE SOIL SURVEYS

2.2.1 KSS/R5/76: The Makueni area, sheet 163

(F N Muchena and C R K Njoroge)

As mentioned in the annual report of 1982, much effort was being put towards the finalization of the report. However, due to involvement of the main author (F N Muchena) with the administrative duties of the organisation, it was not possible to complete the write-up of the report as anticipated. By the end of the year, about 70% of the report had been written. A start was made with the ratings of the land qualities for the remaining chapter on land evaluation.

2.2.2 KSS/R6/76 The Amboseli-Kibwezi area, sheets 173, 174, 181 and 182

(L Touber, B J A van der Pouw and V W P van Engelen)

The editing of the report was finished in June 1983. Typing for off-set printing continued throughout the year and finished in November. Meanwhile all text figures were printed on document paper. The "Key for land Evaluation" was finished and drawn. The report will be published in 1984.

2.2.3 KSS/R7/75 The Tsavo area (Voi and Mtito Andei), Sheets 175, 176, 183, 184, 190, 191, 196 and 197

(W van Wijngaarden and V W P van Engelen)

The editing of the report continued throughout the year and covered mainly chapters 1, 2 and 3 (respectively on the environment, working methods and soils). In order to solve some technical problems several contacts were made with Mr van Wijngaarden at ITC, Holland. Text figures were prepared for fine drawing. A total of 11 were finalised. The editing will be continued and finalised in 1984.

2.2.4 KSS/R8/78 The Busia area, Sheet 101

(Michieka, D O and Rachilo, J R)

As mentioned in the annual report for 1982, the report writing continued. Soil mapping units and representative soil profiles were described and completed in draft. A technical meeting on the legend of the soil map was held and the final legend has now been stencilled. This together with the soil maps (scale 1:50,000) will forwarded to the drawing room for final drawing as soon as the maps are thoroughly checked for adequacy of details.

2.2.5 KSS/R9b/79 The Galole area, Sheet 14

(J M Kibe and H C K Kinyanjui)

The Galole survey is covered by the Survey of Kenya map sheet Nos. 155 and partly by sheet no. 144 in the northern part. This survey forms part of the systematic mapping of the whole country on reconnaissance level (scale 1:100,000) for multipurpose land use planning. During the year the draft soil map and legend were compiled. There has been little progress in the write up of the report because of the involvement of the authors in the write up of other reports.

2.2.6 KSS/R10/82 The Bondo area, Sheet 115

(C K K Gachene, P T Kamoni and P T Gicheru)

As mentioned in the annual report of 1982, this work is part of the systematic mapping of the whole country on reconnaissance level for multipurpose land use planning. Fieldwork continued and was completed by October. A field excursion trip was organised in November 1983.

A total of 660 augerholes and 78 profile pits were made and described. 36 soil mapping units were identified.

The compilation of the map, legend construction and the report write up will start in early 1984.

2.2.7 KSS/R11/80 The Kilifi area, Sheet 198

(Training Project in Pedology, Agricultural University, Wageningen in collaboration with KSS)

As mentioned in the annual report of 1982, the fieldwork for this sruvey had been completed by September 1982. However, the map compilation continued in 1983. Towards the close of the year, the final map and legend had been compiled and fair drawn. Colour separation and preparation of the map for printing will be continued in 1984.

2.2.8 KSS/R12/80 The Mt. Kulal-Marsabit area, Sheets 42, 43, 54 and 55

(A van Kekem)

The soil map was finalised and sent for colour-proofing to Stiboka (Wageningen, Holland). The description of the soil mapping units as well as some other minor parts of the report were handed over by the author before he left the country. Editing of these chapters was finished and modifications were discussed with the author. During the following months other chapters arrived and were edited. Comments from the author on proposed changes were also received. The editing will continue in 1984 and the map will be printed in the second half of that year.

2.2.9 KSS/R13/82 The Transmara-Kehancha area, Sheet 144

(W N Wamicha, P F Okoth, R L M Kiome and C R K Njoroge)

As mentioned in the annual report of 1981, the fieldwork was continued and completed in May 1983. Sixty (60) soil mapping units were delineated. These were distributed over 7 physiographic units:

(a) Soils of Hills and Minor Scarps - 3 units
(b) Soils of Plateaus - 5 units
(c) Soils of Footslopes - 5 units
(d) Soils of Uplands - 36 units
(e) Soils of Plains - 7 units
(f) Soils of Bottomlands - 4 units

Work on the preparation of the final field map and legend was started and will be continued during the year 1984.

2.2.10 KSS/R14/83 Malindi area, Sheets 192 and 193

(M M Gatahi, Ali M Ali and N M Achieng')

The Malindi survey area is covered by the Survey of Kenya quarter degree sheets 192 and 193/1, 3. The sheets cover Malindi sub-district of Kilifi district. This survey is part of the systematic mapping of the whole country on reconnaissance level (scale 1:100,000) for multipurpose land use planning. Field work started in October 1983, with the establishment of the survey camp at Kakoneni. Only two field trips were made to the area during which about fifty augerhole observations were made in sheets 192/1 and 2. Fieldwork will continue throughout 1984.

2.3 SEMI-DETAILED SOIL SURVEYS

2.3.1 KSS/S7/80 Semi-detailed soil survey of the Nyanza Sugar Belt Rehabilitation area (Kibos, Miwani and Kibigori areas)

(J R Rachilo, A M Ali and G Mochiemo)

The write up of the report was completed in draft and was submitted for editing. The soil maps and text figures, were sent to the drawing office for final drawing. The report will be published in 1984.

2.3.2 KSS/S8/80 Semi-detailed soil survey of the National Youth Service Farm, Yatta (Machakos District)

(C R K Njoroge and J J Nuwamanya)

The report was finalised and published. For details the reader is referred to the semi-detailed soil survey report no. S8.

2.3.3 KSS/S11/80 Semi-detailed soil survey of the proposed Rurii and Sagana Fish Culture Irrigation Scheme (Murang'a/Kirinyaga Districts

(J K Kanake)

As mentioned in the annual report of 1982, this survey was carried out in 1981, following a request from the Provincial Irrigation Unit (PIU), Central Province (Nyeri). The PIU work under the umbrella of the Irrigation and Drainage Branch (IDB) of the Ministry of Agriculture. They wanted

to find out the possibilities of developing the area for irrigated horticultural crops and paddy rice.

Immediately after completion of the fieldwork, a provisional soil map and summary report were prepared and sent to the Provincial Irrigation Officer in Nyeri for his necessary action. The write up of the main report and preparation of the final soil map were at an advanced stage at the close of the year.

2.3.4 KSS/S12/81 Semi-detailed soil survey of the areas north of Nyando Escarpment (Aldai Division, Nandi District).

(Rachilo, J R and Aore, W W)

Apart from a chapter on climate, the first draft of the report was completed. The soil map and other text figures were forwarded to the drawing room before the end of the year for final drawing. The final report will be published in 1984.

2.3.5 KSS/S13/82 Semi-detailed soil survey of the Wei-Wei Irrigation Scheme (West Pokot District)

(H C K Knyanjui)

As indicated in the annual report of 1982, the report should have been ready in 1983. All chapters except the land evaluation chapter were completed on time. The land evaluation chapter is being revised and should be ready in the early part of 1984.

2.3.6 KSS/S14/83 Semi-detailed soil survey of the Evurore Catchment Area (Embu District)

(C K K Gachene)

At the request of the Embu, Meru, Isiolo (EMI) Soil and Water Conservation Project, a semi-detailed soil survey was carried out in February 1983. The project is particularly interested in erosion hazard and soil and water conservation.

The total surface area of the catchment is 7,800 ha. A total of 206 augerholes and 12 profile pits were made and described. Most of the soils are susceptible to erosion and have a low organic matter content. Areas most affected by water erosion are those having deep soils. Shallow soils, unlike the deep soils, are characterised by gravelly, rocky and stony surface and thus are less vulnerable to water erosion.

Farm at the request of the Senior Maize Breeder of the National Agricultural Research Station, Kitale. The Ministry of Agriculture intends to use the farm for research development.

The farm which is situated on the eastern slopes of Mount Kenya covers an area of 73 hectares (182 acres). Our initial observations indicate that the survey area is "generally suitable" for high altitude maize varieties. However, the soils are the main limiting factor either due to steep and hilly topography, stoniness or both, which might make mechanised cultivation impossible. Only about one third (25 ha) of the total area would be classified as highly suitable for maize growing (high technology).

The report writing and soil map preparation are in progress.

2.4.6 KSS/D30/83 Detailed soil survey of the Perkerra Research Station - Marigat (Baringo District)

(S Mwangi)

This detailed soil survey was carried out at the request of the Officer-in-Charge of Perkerra Research Station. Fieldwork was carried out in March 1983.

Five soil mapping units were identified. The soils were adequately supplied with phosphorus, potassium, calcium and magnesium. However, these soils were low in Nitrogen and organic matter.

The officer-in-charge of the Station was supplied with a preliminary report outlining the description of the major soils in the Station.

Report write up and map compilation will be continued in 1984.

2.4.7 KSS/D31/83 Detailed soil survey of the HVA-site at Riara Ridge (Kiambu District)

(A Weeda and D N Mungai)

At the request of the HVA (Kenya Ltd), this detailed soil survey was carried out in June 1983 in order to advise the client on the suitability of the farm for Rose growing. The total area of the farm is about 16 ha but 4 ha were excluded in the planning phase of the soil survey due to excess slope.

The results of the investigation revealed that the farm has well drained, deep soils with good physical properties for plant growth including high moisture retention. The chemical characteristics are acceptable taking into account the estimated moderate fertilization requirement to suppress some deficiencies (to be established in detail according to plant requirements). On steeper slopes levelling will be done to facilitate intensive use without erosion problems. The Riara river water is suitable for supplementary irrigation.

The report was published and submitted to the client in July 1983.

2.4.8 KSS/D32/83 Detailed soil survey of the proposed Chemeron Irrigation Scheme (Baringo District)

(A M Ali, V W P van Engelen, A H Mgalla and P M Waweru)

A request to survey the proposed Chemeron Irrigation Scheme was received from the Hydraulic Engineer, Provincial Irrigation Unit, Rift Valley Province. The survey was carried out from 3rd to 22nd October, 1983. An area of approximately 800 hectares was covered.

Soils were sampled for survey, fertility and pF analysis.

Soil map preparation and legend construction were at an advanced stage at the close of the year.

2.5 SITE EVALUATIONS

2.5.1 KSS/P46/81 Soils of the Transmara Division (Narok District)

(W N Wamicha, R M Kiome, P F Okoth and C R K Njoroge)

As mentioned in the annual report of 1982, the write up of the report continued. By the close of the year, all chapters apart from land evaluation had been written.

2.5.2 KSS/P53/82 A preliminary evaluation of the soil conditions of South-western Kiambu District

(H M H Braun)

The draft report was completed and edited before the end of the year. The soil maps were sent to the drawing office for final drawing. The report will be published in 1984.

The areas were surveyed during a four day field trip in May 1983. Only augerhole observations were made. Special attention was given to pH and salinity of the soils. The Amaya area can be considered as suitable for surface irrigation. The Chemeron area might be suitable but more detailed information on sodicity/salinity and erosion is needed. The soils of the Eldume area are suitable for irrigation development while those of the Loiminang area are unsuitable due to their high salinity.

The report with one soil map were compiled in August and printed sometimes later.

2.5.9 KSS/P66/83 An assessement of the Irrigation suitability of the soils of the Kiamariga and New Mutaro farm and the Lari-Wendani area (Laikipia and Nakuru Districts)

(V W P van Engelen and F M Shitakha)

Following a request of the Provincial Irrigation Unit, Rift Valley, of the Ministry of Agriculture, investigations of the soil conditions of two farms (Kiamariga and New Mutaro) in Laikipia District and one area in Nakuru District (Lari-Wendani) were carried out in order to assess their suitability for small scale irrigation. All three areas cover about 100 ha along small rivers.

Fieldwork was carried out between 19th and 22nd September, 1983. Only augerhole observations were made with special emphasis on salinity and sodicity. The Kiamariga farm comprises imperfectly drained clay soils. Improved surface drainage might solve the waterlogging problems. The New Mutaro farm has well drained soils which are suitable for irrigation development. The soils of the Lari-Wendani area are also assumed to be suitable.

The report was compiled and printed in December.

2.5.10 KSS/P67/83 An assessment of the irrigation suitability of the soils of the Nakwamoru area (Turkana District)

(V W P van Engelen, F M Shitakha and S Wataka)

At the request of the FAO/NORAD project "Assistance to irrigated agriculture in Turkana/Pokot" irrigation suitability investigations were carried out on the soils of the Nakwamoru area for the Turkana Rehabilitation Project of the Ministry of Energy and Regional Development.

Fieldwork was executed between 14th and 25th November, 1983. A total of 65 augerhole observations and 5 profile pits were made in the survey area which measured about 750 ha. Soil samples for analysis at NAL were taken. Much attention was given to salinity/sodicity of the soils. Also some infiltration measurements were done. A provisional soil map with the suitability of the various soils was prepared and sent to FAO/TRP. The report with the final map will be published in the first half of 1984.

2.5.11 KSS/P68/83 Soil conditions of the proposed Kiangwachi Irrigation Scheme (Kirinyaga District)

(H C K Kinyanjui and J K Kanake)

The above proposed scheme was surveyed in October and November 1983 at site evaluation level. The area involved is found between rivers Ragati and Kanyiriri and stretches from the Sagana water treatment plant to Sagana town.

The soils of the area are developed on three geological materials viz.: granitoid gneiss, olivine basalts and Recent and Sub-recent alluvial deposits derived from unspecified volcanic rocks.

Soils developed on olivine basalts are the major soils of the area and cover over 90% of the whole proposed scheme. They are generally divided into well drained soils and the moderately to imperfectly drained soils. The well drained soils were found to be suitable for irrigation without any major improvements except where the slopes are too steep for farming. The other soils which are moderately to imperfectly drained could be suitable after considerable improvement measures are carried out.

2.6 MAP CORRELATION

(J R Rachilo and P T Gicheru)

Work on correlating (checking for adequacy and correctness of details) of all maps, text figures, cross sections etc produced by the Kenya Soil Survey before they are transmitted to the drawing room for final drawing was continued.

All maps, text figures etc indicated in chapter 6 on cartography in this annual report passed through the map correlators during the year 1983.

3. LAND EVALUATION

(M M Gatahi, C R K Njoroge, D W Kilambya, N M Achieng', J J Nuwamanya, P N Macharia, M Situma, F N Muchena, H Ochung')

3.1 GENERAL

(M M Gatahi)

Various aspects of land evaluation - the process of collecting and interpreting physical, socio-economic and agronomic data for various uses - continued in various survey areas throughout the year.

Collection of socio-economic and agronomic data, through questionnaires was completed for Bondo and Transmara survey areas. Analysis of these questionnaires was subsequently started. For the Transmara area, a provisional description of the land utilization types was made.

In response to the current District Focus for Rural Development, a present land use survey programme per district was started. This survey is aimed at providing an overview on the present utilization of the natural resources in the district. During this year, the present land use survey was completed for Kilifi district. Preparation of the present land use map was started. A similar survey was completed for Bondo Division in Siaya District.

Vegetation surveys were completed in Bondo, Busia-Siaya and Transmara survey areas. Tabulation of species and construction of legends for the vegetation maps was also started. Surveys were also carried out in other minor survey areas.

Land suitability classification in the areas where resource surveys had been completed continued throughout the year. For the Makueni area, ratings of land qualities was completed while in the Nyanza Sugar Belt a draft land evaluation chapter was compiled. Land evaluation chapters for various ongoing detailed surveys continued to be written throughout the year.

3.2 AGRICULTURAL QUESTIONNAIRES AND LAND UTILIZATION TYPES

(M M Gatahi, N M Achieng, C R K Njoroge, J J Nuwamanya and D W Kilambya)

Agricultural questionnaire surveys were completed for Bondo and Transmara survey areas.

In the Bondo survey area, the questionnaire survey was completed in September. A total of 190 farmers had been interviewed. Further, officers involved in the development of the area were interviewed. This survey showed that the main land use types were small scale, rainfed cultivation of maize, sorghum and millet, pulses, at low level of technology and subsistence oriented. Smallholder, rainfed cultivation of cotton at an intermediate level of technology was practised on commercial basis, however due to marketing problems farmers were reverting to subsistence LUTS.

Other land uses in this area include smallholder livestock production, and recently introduced are small scale irrigation cultivation cultivation of vegetables by 'women' groups. Non-agricultural land uses in the area include fishing (in Lake Victoria) and gold mining (small scale).

In the Transmara area, the questionnaire survey was completed in March. This survey shows that the main land utilization types are extensive grazing - low technology, group ranching - intermediate technology, small scale rainfed cultivation of tobacco, sugarcane and mixed farming - all at intermediate or low level of technology.

The land utilization types, forestry and wildlife conservation (tourism) occupy large sections in this area. Newly introduced also are the large scale cultivation of maize and wheat - both at an advanced level of technology.

Detailed description of land utilization types will be made after the analysis of the questionnaires which also started during the year.

3.3 PRESENT LAND USE SURVEY

(N M Achieng, P N Macharia, M M Gatahi, H Ochung')

A present land use survey programme per district was started this year to preceed the more detailed physical land resource surveys which take much more time to complete and report. During this year such a survey was completed for Kilifi District, Bondo Division in Siaya District and part of Mbita Division in South Nyanza District.

In Kilifi district, the present land use comprises of ranching (either private, co-operative, group or ADC owned) which covers about two thirds of the district; rainfed cultivation of cashew, coconuts, mangoes, maize, pineapples, cassava on small scale and few large scale

farms; large scale sisal production. Other uses include small scale irrigation schemes along the Sabaki river. These schemes grow cotton and vegetables. Some parts of the district are under forestry and tourism (marine parks and recreation beaches).

In Bondo survey area, the present land use comprises of rainfed, small scale mixed farming. The major crops include maize, sorghum, millet, pulses and cassava. Other minor crops are groundnuts, sweet potatoes, bananas and sugarcane. Cotton is also grown as cash crop. Minor irrigation projects are found mainly along the shores of Lake Victoria. Fishing and Fish Mongering are carried out by a great part of the population in this area.

In Mbita, land use patterns are similar to those in the Bondo area.

3.4 VEGETATION SURVEY

(P N Macharia, M Situma and H Ochung')

During the year, vegetation and land use surveys were carried out to provide information on the changes of vegetation due to different types of land use. Fieldwork was completed for the following areas:-

1) A reconnaissance vegetation and land use survey of Transmara Division (Narok District) was carried out early in the year.

2) A preliminary investigation of the vegetation of the National Youth Service Farm, Kirimun-Suguta-Lol Marmar (Samburu District). This was a site evaluation.

3) A reconnaissance vegetation and land use survey of Bondo sheet was carried out late in the year.

4) A reconnaissance vegetation survey of Busia sheet was also carried out late in the year.

During fieldwork, the following was noted from areas 3 and 4:

a) There has been an enormous depletion of the natural vegetation due to an increase on the pressure of the land. This is mainly due to an increase of the cultivated land since 1967 (year of aerial photographs) up to present. Cutting of woody vegetation for charcoal burning and other purposes has also contributed.

b) People are cultivating more near the swamps and this has led to a decrease in area of the swamps.

The preliminary data from these areas were worked and organized into tables and checklists. Plant species collected from the survey areas were pressed, mounted and kept in the KSS herbarium.

3.5 LAND SUITABILITY CLASSIFICATION

(C R K Njoroge, M M Gatahi, F N Muchena, J R Rachilo)

Land suitability classification continued for those areas whose resource surveys and compilation had been completed.

In Makueni, the rating of land qualities was completed while in the Nyanza Sugar Belt ratings were finalised and a provisional land suitability classification was made.

Towards the close of the year soils data was received from Transmara area and land suitability classification process will begin in the coming year.

Land suitability classifications were made for various detailed soil survey areas.

4. SOIL AND WATER MANAGEMENT

(D N Mungai, A E Ekirapa, G O Mochiemo, E M Muya, F M Ndaraiya, H C K Kinyanjui and H M H Braun)

4.1 SOIL PHYSICAL ASPECTS

(G O Mochiemo, A E Ekirapa, E N Kinyanjui and D K Kariithi)

A programme was started with the objective of training the technical staff in the soil and water management section in:

a) Field description of soil profiles

b) Carrying out infiltration and hydraulic conductivity measurements

c) Sampling the soils, particularly for pF, bulk density etc

d) Laboratory determination of texture, moisture retention and the interpretation of the data.

Two profile pits were made at NAL for the above purpose.

In the Soil Physics Laboratory, soil samples from Riara Ridge, Gituamba, Narok, Naivasha, Kibuni, NAL and Chemeron Irrigation Scheme, were analysed for moisture retention.

4.2 AGRO-CLIMATOLOGY

(F M Ndaraiya and D N Mungai)

Climate chapters were written for the following soil survey areas: Rurii Irrigation Scheme, Nandi escarpment, Transmara (site evaluation), Mwikya's Farm, Mburu's Farm, Marimba Research Station and Evurore Catchment.

4.3 MAIZE TRIAL AT NAL

(D N Mungai and H M H Braun)

A field experiment at NAL was started during the long rains with the object of finding the effect of time of planting on the yield of two maize varieties (512 and 614). The experimental lay-out was a randomized block design and the planting scheme was spread over 5 different planting dates.

Fertilizers (TSP and CAN) were applied at the recommended times and rates.

The collection of data related to: the approximate date of seed emergence and germination rates; weekly measurements of plant heights, soil moisture determination and weather elements. Soil samples were also collected for fertility analysis (to assess the residual effect of previous treatments in the experimental field).

Harvesting was completed in November 1983. The data will be analysed and the preliminary results released in a paper.

4.4 SOIL MICROMORPHOLOGY

(H C K Kinyanjui)

There was very little progress in this area. A few samples received from Wei-Wei Irrigation Scheme and two from Narok were impregnated before the fans in the fume cupboard were installed. The fumes however were affecting the neighbouring offices prompting the impregnation to be halted pending the fitting of fans or finding another place where fumes would not affect other officers.

5. LABORATORY INVESTIGATIONS

(N P Ochieng, J N Kariuki and J M Ng'ang'a)

5.1 GENERAL ACTIVITIES

The activities of the KSS Research Laboratory during the year were mainly confined to special analysis in support of the ongoing surveys. The special analysis carried out included CEC by NH_4OAc at pH 7.0, %C, $CaCo_3$, and gypsum ($CaSO_4.2H_2O$).

5.2 RESEARCH ACTIVITIES

During the year work on the evaluation of different methods of determining CEC and Exchangeable cations in different soils of Kenya was started. This work will be continued in 1984.

CARTOGRAPHY

(P M Maingi, J I Osiemo and L H Mikisi)

During the year the darkroom equipments were installed. These included large developing sinks and the contact frame which had been procured in 1981. Although there was shortage of staff, the cartographic section did a good job during the year.

The following maps, text figures and diagrams were completed:-

Reconnaissance soil maps

Ref. No.	Title	Scale	Report No.
82016	Reconnaissance soil map of the Mt. Kulal-Marsabit area.	1:100,000	R12
82017	Reconnaissance soil map of the Kilifi area	1:100,000	R11

Detailed soil maps

83054	Detailed soil map of HVA-area, Riara Ridge (Kiambu)	1:5,000	D31

Site evaluation soil maps

83019	Preliminary soil map of the Transmara Division (Narok District)	1:100,000	P46
83098	Preliminary soil map of the Irrigation and Drainage farm, Mwea (Kirinyaga District)	1:2,500	P54
83080	Preliminary soil map of the Amaya Scheme (Baringo District)	1:5,000	P65
83024	Base map for Tsavo climate text figures	1:900,000	R6
83025	Base map for Mt. Kulal-Marsabit text figures	1:1,000,000	R12
83021	Location of profile pits and augerings in the Transmara Division (Narok District)	1:100,000	P46
83029	Generalised geology of the Transmara	1:500,000	P46

Ref. No.	Title	Scale	Report No.
83056	Soil depth map of the Barwesa Irrigation Scheme modified from Provincial Irrigation Unit (Rift Valley Province).	1:10,000	D26

Miscellaneous text figures and diagrams

A total of 79 text figures and diagrams were drawn for various reports, scientific papers and thesis. Copies can be obtained from KSS Data Storage.

Printing and cyclostyling

In all six reports, and a total of 37 miscellaneous stencils for lecture notes, scientific papers etc were printed or cyclostyled during the year.

7. LIBRARY AND DATA STORAGE

(M O Aguno, B Kitonyo and T Odipo)

7.1 LIBRARY

(M O Aguno)

During the year the Library continued to receive new books, journals, newsletters and other articles. The new acquisitions were coded. New book shelves were acquired to accommodate the increasing volume of books.

7.2 DATA STORAGE

(B Kitonyo and T Odipo)

The Data Storage continued its routine activities of receiving and storing soil survey reports, aerial photographs, soil maps, topo-maps, etc throughout the year. Indexing and cataloguing of newly received maps, photographs etc continued.

The Data Storage also continued with the sale and dissemination of completed soils reports, maps and other information to the users.

The stock taking exercise which was started in 1982 was finalised.

F Kinuthia (Miss)	Sub-staff (Laboratory Attendant)
L Okoth (Mrs)	Sub-staff (Building Attendant)
J A Okumu (Mrs)	Sub-staff (Typist)
W E Thuku (Mrs)	Sub-staff (Building Attendant)
T E Odipo (Miss)	Sub-staff (Data Storage)
K W Kimani (Miss)	Sub-staff (Store Attendant)
M O Aguno	Sub-staff (Library)

DATA STORAGE

B N Kitonyo, Certificate in Agriculture	Technical Assistant
S M Githinji, Certificate in Agriculture	Technical Assistant - transferred from CARS, Mtwapa.