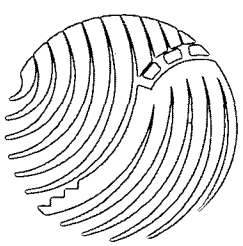
Agricultural Research Department
The Winand Staring Centre for Integrated Land, Soil and Water Research

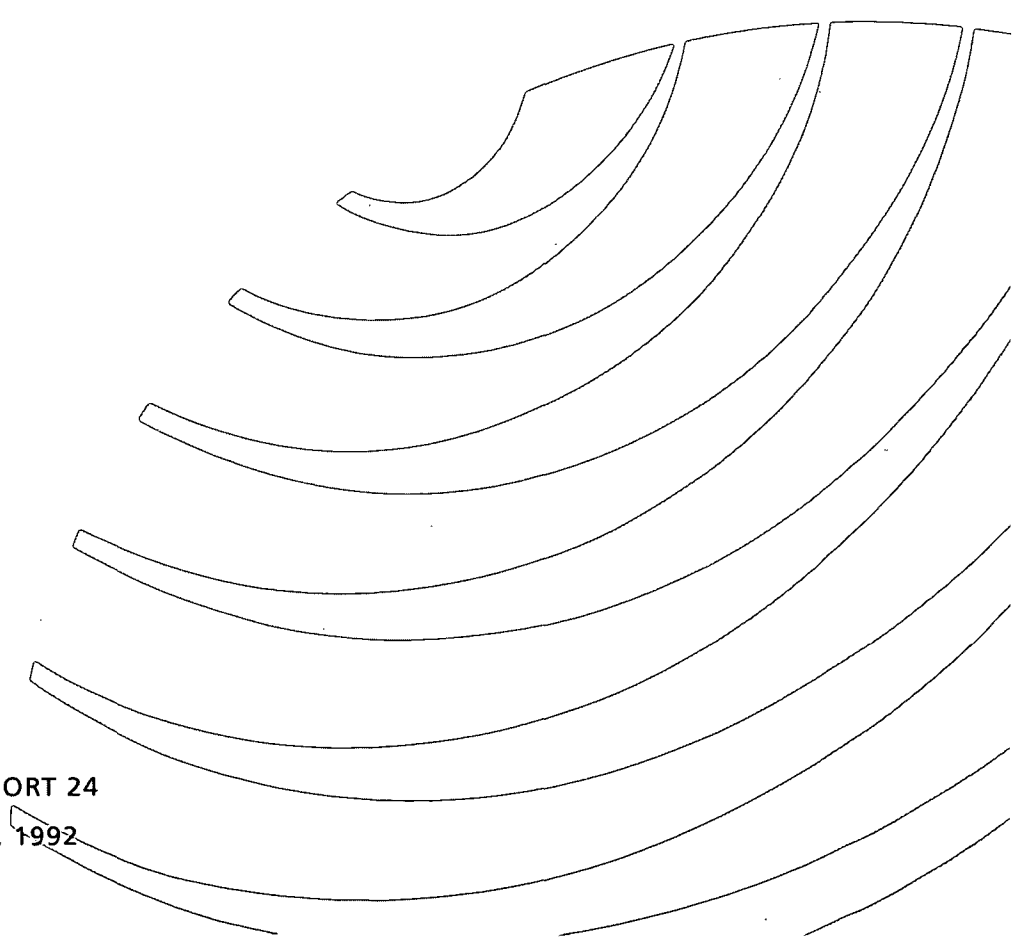
# Report on a cooperation mission to the Kenya Soil Survey

October 1992

E.M.A. Smaling

sc-dlo







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Report of a cooperation mission to the Kenya Soil Survey

# Report of a cooperation mission to the Kenya Soil Survey

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**International Activities Report 24**

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CONTENTS

SUMMARY


1 Netherlands support to the National Agricultural Research Programme, Phase I (NARP-I) was evaluated in May 1992. From the draft evaluation report, one can read that the achievements of Kenya Soil Survey (KSS) were well-appreciated by the mission members.
2 Kenya Agricultural Research Institute (KARI) has started working on a NARP-II document. The Ag. Head KSS and DLO Winand Staring Centre (SC-DLO) liaison officer spent time on the chapters related to soil survey and land evaluation, paying the necessary attention to the regional and multi-disciplinary focus in natural resource assessment and land use planning, which has been advocated in the course of NARP-I. The findings of the evaluation mission and the NARP-II document will constitute the basis for future cooperation between KARI and RNE.
3 The seminar on the use of geographic information systems (GIS) in agriculture, livestock, range, and natural resource management (March 1992) provided a lot of good publicity to KARI. The Director, National Agricultural Research Laboratories (NARL) and KSS staff members featured in two television programmes, explaining the importance of resource surveys, and the value added of a data base management system and GIS.
4 A second seminar was held in Mombasa on 'Use of natural resource information for land use planning and conservation at provincial, district and divisional level' (September 1992). The Kwale District has been selected as a pilot study, as KSS had information on a scale of 1 : 100,000 available for the entire district. During the workshop, agricultural staff on the spot informed KSS on the kind of information required and how it should be presented in order to make it 'digestable' to people in the field, who are not familiar with soil scientific jargon. KSS will issue a report on the workshop before the end of the year.
5 The mid-year workshop was on 'Soil and Water Management and Conservation', intended to strengthen and provide more guidance to the KSS staff at large, and more in particular to officers of the Soil and Water Management Section. The workshop was conducted by Dr J. Gichuki of the University of Nairobi, Department of Agricultural Engineering, and was highly appreciated by all participants, because of its well-selected blend of both theoretical and very practical topics.
6 The conversion of quarter degree mapsheets to district maps was completed for the Kwale and Kisii/Nyamira Districts. Soil maps of the districts Trans Nzoia and Laikipia are already available as such, and need some updating before entering the information into the computerized data base. The surveys in the Narok and Murang'a Districts are presently carried out on a district basis.
7 The GIS group still experiences several problems in further developing the system. The FAO Soils Data Base does not function properly, and needs to be linked to the GIS and to the Automated Land Evaluation System (ALES). Recommendations from a support mission earlier in 1992 have not yet been followed up, and the anticipated further establishment of ALES has not come into being either. Further outside support may be needed, which could possibly be provided alongside the envisaged Soils and Terrain Digital Database project.

8 The issue raised during the previous mission on increased efficiency and complementarity as to the different laboratories at NARL resurfaced. It was decided to draft a terms of reference for a mission that should investigate this matter, as soon as it becomes clear how the extra office and laboratory space that will become available in 1993 is subdivided among NARL sections.

9 The staff situation at KSS is still a source of grave concern. The incidence of haphazard activities, which require immediate availability of KSS staff can not continue without recruitment of new staff. The GIS workshop report (March 1992), for example, had to be shelved as the officer concerned was suddenly seconded to two other projects. KSS will not gain credibility if the report fails to be printed this year. The workplan 1993 will clearly spell out the duties and time schedule of each officer, as the present staff situation at KSS does not allow for many unanticipated jobs.

# 1 INTRODUCTION

Between September 6 and 27, 1992, Ir E.M.A. Smaling of DLO Winand Staring Centre for Integrated Land, Soil and Water Research (SC-DLO), Wageningen, The Netherlands, paid a working visit to the Kenya Soil Survey (KSS), Nairobi, Kenya. KSS is a section of the National Agricultural Research Laboratories (NARL), which belongs to the group of 15 national research centres in the Kenya Agricultural Research Institute (KARI), in the Ministry of Research, Science and Technology.

Since 1972, KSS is supported through a bilateral agreement between the Government of Kenya (GoK) and the Netherlands Directorate General for International Cooperation in the Netherlands Ministry of Foreign Affairs (DGIS). The cooperation between KSS and SC-DLO is laid down in a Twinning Agreement and an Inception Report, and is supported in The Netherlands by a Project Liaison Unit (PLU). The present phase of support coincides with the first phase of the KARI National Agricultural Research Programme (NARP-I). Reports of previous missions (September 1991, March 1992) are available at KSS and at SC-DLO, Department of International Cooperation.

# 2 PROGRESS AT KSS (MARCH - SEPTEMBER 1992)

## 2.1 Soil survey and land evaluation

### 2.1.1 Reconnaissance soil surveys

- The Busia report (Rachilo) and the Makueni report (Muchena, Njoroge and Aore) have been finalized and will be printed before the end of 1992.
- The Lodwar report, written in collaboration with UNESCO (Van Bremen and Kinyanjui) has been sent to different parties for comments; the maps are presently drawn at the cartography section.
- The Bondo report (Gicheru) and the Chuka report (Kiome) are in an advanced stage, and must be finalized before the end of the present project phase. Map compilation has almost been completed.
- The Transmara report (Wamicha and Okoth) is held up by the fact that the first author left KSS with all the information, and promised to finalize it. As no deadline was given, it is not very likely that any output is soon to be expected. It is suggested that Okoth finishes this report as the sole author. Meanwhile, cartography consultant Olulo has prepared the map of the area, which is due for proofprinting.
- The Malindi report (Gatahi and Njoroge) is far from ready. Even a draft map was never drawn as there was no agreement yet on a legend. As the first author has left KSS, the work should be taken up by the second, who will return from BSc. training by the end of 1992. He should receive assistance from a second staff member, and priority should be given to entering of profile and map unit data into the data base system, and the compilation of a map. As such, the Kwale, Kilifi and Malindi maps can be joined to provide 1 : 100,000 scale natural resource information for almost the entire coastal strip. Data on the Kwale District have been entered into the geographic information system (GIS), and digitized topography of the Kilifi District can be obtained from ILRAD.
- The Narok District survey (Aore) will be finalized in March 1993, when a correlation trip is envisaged. Collected data will be entered in the data base instantly, as they will be needed in an ASAL land use planning activity, which is elaborated in Chapter 5.3.
- The Murang'a District survey (Wanjogu, Waruru, Macharia) will commence in October/November 1992.

The conversion of quarter degree mapsheets to district maps was completed for Kwale and Kisii/Nyamira Districts (the latter at SC-DLO). Soil maps of the districts Trans Nzoia and Laikipia are already available as such, and may only need a bit of updating before entering the information into the data base management system. The surveys in the Narok and Murang'a Districts are carried out on a district basis.

### 2.1.2 (Semi)detailed surveys and site evaluations

The backlog on (semi)detailed reports and site evaluations has been cleared entirely, including long-pending work on the Magarini settlement scheme, the Marimanti area, the poorly drained areas of Uasin Gishu District, Bukura Institute of Agriculture, and the Transmara site evaluation. More recent assignments comprise commissioned surveys for ICRAF, KEFRI, TARDA, ICIPE, University of Nairobi, NIB, and the Netherlands-supported Small-scale irrigation project.

The haphazard requests for surveys by influential individuals has fortunately been halted somehow. It has proved to be a nuisance to staff members, who occasionally feel harrassed; moreover, such surveys are no challenge whatsoever, KSS does not generate any funds from them, and they interfere with the regular work programme. In addition, most of the individuals referred to want GIS-based colour-plotted maps, which is unnecessary, expensive, time-consuming and interfering with the strict working schedule of the already overloaded GIS group. In an active organization such as KSS, staff motivation should be cherished.

## 2.2 Geographic information systems

The two-days seminar held in Nairobi on the use of GIS in agriculture, livestock and range management, and natural resource management (March 1992) provided a lot of publicity to KARI, NARL, and KSS. The Director NARL and KSS staff members featured in two television programmes, explaining the importance of resource surveys, and the value added of a data base management system and GIS.

During the present mission, a second seminar was held in Mombasa on the use of natural resource information in land use planning at provincial, district and divisional level (Chapter 4). Meanwhile, soils, climate and land use in the Kisii and Nyamira Districts were digitized at SC-DLO, and copies were sent to KSS for further processing. A seminar in the area is foreseen in March 1993.

The GIS group (Kamoni, Maingi, Kimotho) still experiences several problems in further developing the system. The FAO Soils Data Base does not function properly, and needs to be linked to the GIS and to the Automated Land Evaluation System (ALES). Recommendations by P. Lentjes (SC-DLO) have not yet been followed up, and the anticipated further establishment of ALES has not come into being either.

## 2.3 Other matters

In June 1992, Ir J.M.L. Jansen, SC-DLO Deputy Director, paid a one-week familiarization visit to KSS. Next to a series of visits within KARI and KSS, and to other institutions in Nairobi, such as UNEP and the Regional Centre for Services in Surveying, Mapping and Remote Sensing, he joined the Ag. Head of KSS, W. Aore,

During the reporting period, KSS participated in the annual provincial agricultural shows of Central, Nyanza and Eastern Province. At the time of reporting, preparations were underway for participation in the Nairobi show. At the request of the Director KARI, the GIS will feature prominently. Thematic maps and a complete digitized soil map of Kwale District will be on display. By late November, KSS will be present in Kakamega, at the agricultural show for Western Province.
KSS staff member Okoth was seconded to a presidential commission to investigate the problems experienced in the running of the large-scale irrigation scheme at Bura, Tana River District.

The issue raised during the previous mission on increased efficiency and complementarity as to the different laboratories at NARL resurfaced during a meeting with the Director NARL and the Acting Head, KSS. It was decided to draft a terms of reference for a mission that should investigate this matter as soon as it becomes clear how the extra space that will become available is subdivided among NARL sections. Apart from the space presently occupied by KARI Headquarters (due for their new offices in Loresho by early 1993), new administration blocks are under construction for NARL Headquarters and its plant pathology section (EEC-funded).

The annual meeting of the East African Soil Science Society will be held in Nakuru (November 1992). Two KSS staff members are involved in the preparation of an excursion in the Nakuru District, also involving sites of the Fertilizer Use Recommendation Project (FURP).

In October 1993, the bi-annual FAO soil correlation meeting for East and Southern Africa will be held in Kenya. Preparations are already underway for the excursion, which leads the participants around Mount Kenya. KSS research work in Embu District will be in the limelight, and so will some of the FURP sites. Degraded areas in the Laikipia and Nyeri Districts, to which KSS staff members Wanjogu and Gicheru devoted their MSc. theses, will be visited too.

# 3 MID-YEAR WORKSHOP: SOIL AND WATER MANAGEMENT AND CONSERVATION

Workshops on various topics of interest to KSS staff are held once every year at the KSS premises. The mid-year workshop for 1992 was on 'Soil and Water Management and Conservation', intended to strengthen and provide more guidance to the KSS staff at large, and more in particular to officers of the Soil and Water Management Section, and the NARL sections 'Chemistry' and 'Irrigation and Drainage Research (IDR)'. The workshop, held between September 8 and 17, was conducted by Dr J. Gichuki of the University of Nairobi, Department of Agricultural Engineering. The course programme is given in Annex 1.

The course was very highly valued by all participants, as it included both theoretical and very practical topics. It also included a field excursion to the department's research sites at Kabete (September 9). Dr Gichuki brought in some of his graduates to handle specific topics. It was remarkable to note that even soil and water management specialists have problems in interpreting soil maps. In addition, they found that KSS was putting too much emphasis on some aspects of soil survey (soil classification and aggregated ways of display, culminating in difficult codings such as UIr2p, PA3m2, etc.), and too little on quantitative aspects such as soil physical properties, soil water flow and balances, which are relevant for the researcher's purposes.

It was interesting to note that university staff clearly operates with a research perspective, often but not always of an applied nature and often one-dimensional, whereas KSS is still much more into surveys and qualitative indications of land suitability, providing the geographical reference for activities such as land use planning. The latter seems more superficial, but is often sufficient for a particular purpose, and can make research work more meaningful because of its spatial component. There is ample opportunity to learn from each other, and also in that sense the workshop was extremely fruitful.

# 4 KWALE DISTRICT WORKSHOP

On September 23 and 24, a workshop was held in Mombasa with the title: 'Use of natural resource information for land use planning and conservation at provincial, district and divisional level'.

The reason to hold the workshop was that KSS has, through the years, collected a great deal of information on climate, soils, landforms, vegetation and land use. This has all been put in reports and on maps. As hard-copy maps with specific, and aggregated soils information are not easy to understand for people from other agricultural, animal and environmental sciences, their use has been too restricted. Since KSS has acquired and operationalized a GIS, the information can be stored systematically. It can be retrieved at will, and this implies that in principle any particular problem can be addressed. For example, to determine which areas in a district can realize maize yields of 1000 kg per ha without the use of fertilizers, single layer files indicating land characteristics such as 'moisture storage capacity', 'nitrogen availability' and 'phosphorus availability' can be combined, so that the areas to be considered are indicated. Data obtained in the FURP can be used to make the classification even more quantitative.

The Kwale District has been selected as a pilot study, as KSS had information on a scale of 1 : 100 000 available for the entire district. This scale is suitable for planning at a district level, but may not yet be detailed enough to cope with spatial variability at the divisional level and below. Not all determinants for land use planning are collected by KSS, as it is basically a soil survey organization, with little involvement in socio-economic factors, and not as well-equipped to monitor land use as for example the Department of Resource Surveys and Remote Sensing in the Ministry of Planning and National Development (DRSRS). Therefore, KARI/KSS wants to step up interaction with provincial, district and divisional staff to see how it can better address issues of land use planning at those different organizational levels. The KARI Regional Research Centre in Mtwapa will play a linking role in this set-up.

During the workshop, agricultural staff on the spot informed KSS on the kind of information required and how it should be presented in order to make it 'digestable' to people in the field, who are not familiar with soil scientific jargon. Invited for this seminar were: Provincial Planning Officer (PPO) and the Provincial Directors of Agriculture (PDA) and Livestock Production with their staff, the District Development Officer, and the District Agricultural and Livestock Production Officers with their staff, district officers in charge of forestry and wildlife, all District Agricultural Officers from the other districts in Coast Province, and staff from the KARI Regional Research Centre in Mtwapa and Research Subcentres in Matuga and Mariakani. The programme is given in Annex 2.

The PDA and PPO addressed the group and emphasized the need to bridge gaps between research, extension and farmer, to take farmer's experience serious, and to do away with blanket fertilizer recommendations. Duplication of efforts was

denounced, as too many donor organizations call on provincial and district officers, asking for the same sort of information. This becomes a nuisance to the officers concerned. The establishment of District Information Centres (DIC) may improve this situation.

Next, the unsuccessful dissemination of the KSS reconnaissance soil reports was mentioned. The DAO Kwale claimed that the maps have been in the offices for all those years, but they should have been introduced through workshops, excursion and follow-up feedback sessions. One of the heads of the four divisions in Kwale District described his kind of work as 'shock absorber' between farmer and district/province. He works a lot at the field level and is closest to the day-to-day operations of farmers. Information on district maps will not always be good enough to solve their particular problems.

KSS will issue a report on the workshop before the end of the year, which will be discussed in the next meeting of the Project Liaison Unit.

# 5 RESEARCH PROJECTS

## 5.1 PhD. projects KSS staff

Kiome is in the final stages of his PhD. research at East Anglia University, Norwich, UK. His topic is 'The effect of soil and moisture conservation measures on soil moisture and crop production; a case study in the semi-arid areas of Embu and Meru Districts'. Kiome is supervised by Michael Stocking, an expert in land degradation assessment on the African continent. The defense of the thesis is expected to take place during the first half of 1993.

Wokabi is in the process of harvesting the 1992 long rainy season crop in Embu. He focuses on quantifying differences in maize yield under researcher and farmer's management. The sites are in three adjacent agro-ecological zones on the slopes of Mount Kenya. A geostatistical study on differences in soil properties at the field level was completed. Between May and August 1992, Wokabi paid a working visit to ITC and the University of Gent to discuss his work with supervisors (Prof. Zinck, Prof. van Ranst). During that visit, progress was made on several thesis chapters and statistical analysis.

## 5.2 Athi-Sabaki-Galana project

The research proposal for the EEC-funded STD-3 programme (Life Sciences and Technologies for Developing Countries) will be submitted by November 1992. The project proposal, 'Environmental degradation along the Athi-Galana-Sabaki river basin and its impact on food production', was outlined in the previous mission report, i.e. International Activities Report 21.

Participants are Moi University (Eldoret), Kenya Soil Survey (Nairobi), Kenya Marine and Fisheries Research Institute (Mtwapa), University of Amsterdam (The Netherlands), SC-DLO (The Netherlands), and East Anglia University (UK).

## 5.3 Natural resources and needs assessment for land use planning and sustainable rural development in the Narok and Laikipia Districts

This project proposes (i) to implement a methodology for natural resources and needs assessment for land use planning, (ii) to develop and strengthen the capacity for land use planning for the selected districts, (iii) to strengthen the capacity for data collection and analysis needed for sustainable rural development, and (iv) to strengthen the capacity for dissemination of natural resources and socio-economic information.

The initiative was taken by the Royal Netherlands Embassy in Nairobi (RNE), who wishes to integrate experience from various projects (WRAP, KSS, DIC Kakamega). A fact-finding meeting on this possible project was held in The Hague (DGIS) by March 30, 1992. Other participants are TNO, who implemented WRAP, and the University of Utrecht who guided the establishment of the DIC Kakamega.

The project will most likely form part of the already on-going and Netherlands-sponsored ASAL programme. A second meeting is scheduled for November 2, 1992 to formulate activities. RNE envisages a 3-6 months inception phase to establish project modalities, and to investigate previous work. Next to Narok, RNE intends to include the Laikipia District in this land use planning programme. No long-term expatriate input is envisaged, but rather short-term backstopping visits, while sub-contracting local counterparts such as KSS, and departments in the Ministries of Planning and National Development, Water Development, Regional Development, and ASAL. The almost completed reconnaissance survey of the Narok District will form an important physical basis for this project. The Laikipia District has been surveyed in the past.

## 5.4 Other research projects

The UNEP/ISRIC-supported SOTER project (Soils and Terrain Digital Database) may get off the ground in 1993, although by the time of the mission, KSS had not been informed on its apparently anticipated participation. Two KSS research officers (Gicheru, Njoroge) can possibly be part-time involved in this project, which aims at the compilation of a 1 : 1,000,000 data base of land resources in the country. Next to the existing Exploratory Soil Map, information obtained from 1982 onwards can be incorporated. The project was initially submitted for funding to RNE, but UNEP suddenly acquired funding out of the Finnish trust fund component. The main objective of the project is to enter natural resource information into a national data base, preparing it for (flexible) use by different decision-makers, mainly at the national level. Earlier work by FAO on the same scale should be taken into account.

KSS staff member Okoth was seconded to a KARI-CIMMYT maize data base project. Although interesting, it again goes at the expense of regular KSS work, such as the proceedings of the GIS seminar held in March. These proceedings were promised to be issued by June/July, and several participants and other interested parties have already been asking for them. Instead, Okoth is now generalizing the Exploratory Soil Map to link maize-growing areas with soil classification orders. To the author, it seems that there is some duplication going on between this project and FURP. All agro-ecological units for the rainfed agricultural districts have been indicated on maps during FURP, on a district scale. Lastly, the CIMMYT data base occupies almost all the memory capacity of one of the high-powered personal computers in the GIS room.

## 5.5 Structuring research at KSS

In order to put more emphasis on the soil research aspects at KSS, Kiome will be given the duty to develop and supervise a KSS research workplan, that includes on-going and proposed research by all sections. It further involves the extraction from his PhD. thesis of one or two articles, fit for publication in a scientific journal, lecturing KSS staff on soil moisture measurement and conservation techniques, and on simulation modelling, and writing a manual for KSS on simulation modelling and quantitative approaches in land evaluation. Kiome may also provide assistance to the Soil Physics section in improving their research capability, cashing in on their newly obtained knowledge during the ad-hoc training at the SC-DLO in 1991. The latter support by Kiome includes a plan on a more efficient spatial arrangement of the equipment, purchase of new equipment for research on soil and water management, and description of research topics, preferably conducted in the context of an on-going reconnaissance survey.

# 6 EQUIPMENT AND VEHICLES

## 6.1 Stock taking

Stock-taking was still not finished at the time of the mission. It is anticipated that in the course of 1993, a final report will be published on the present project phase, in which all assets of KSS, acquired with project support, will be listed.

At the request of RNE, all details on the vehicles presently in use at KSS were supplied. Some of these are used by other sections of NARL, and a few of the old ones have been grounded. It should be looked into, whether these vehicles can be sold, now that KSS is part of largely autonomous organization. At this time, 10 KSS Landrovers (6 petrol, 4 diesel) and 3 KSS Peugeots (including one pick-up) are on the road. The number matches well with the present number of drivers available at KSS. Each driver has one vehicle for which he is responsible.

## 6.2 Equipment

A large shipment of project goods arrived in March 1992. Included was a powerful voltage stabilizer, which serves the GIS group very well in maintaining a constant voltage level at power fluctuations and failures. The equipment in the GIS unit is highly vulnerable to such events, and moreover, the plotter stops its jobs as soon as a power cut is experienced, and does not resume its work when power is back. This consumes time, pens, and goes at the expense of the durability of the system. Next to the voltage stabilizer, the GIS room was further equiped with cupboards, drawers, and large wooden tables.

To enhance efficiency, the computer room was reorganized in a square arrangement, with the two matrix printers in the centre. Three new PC's will be procured in 1993. The two older Olivetti's will be taken to the library and data storage sections. At present, these PCs are hardly used as compared to the faster Compaq 386s computers.

A large printing press was procured, which was installed and is serviced by a local company. It greatly improved both quality and quantity of the report output.

Equipment procured in 1991 for the Soil Physics and Chemistry sections had largely been installed and put to use. Some instruments did not function as expected. Complaints were filed with the respective companies. In both laboratories, a problem of space and manpower was observed, which will be addressed in a near-future mission on laboratory efficiency (Section 2.3).

Discussions were held with staff of the cartography, reproduction and soil chemistry sections on general management and equipment.

## 6.3 Vehicles

In 1992, two Diesel Landrovers were procured at Cooper Motors (CMC), Nairobi: KAC 568G and KAC 569G. KSS officers complained about the quality of the bodywork, which they suspect was partly obtained from other worn-out vehicles. The two petrol-driven landrovers bought at CMC in 1990, have a problem of excessive fuel consumption. One vehicle consumes not less than one liter on every 3.8 km, which is exorbitant. Car servicing at CMC was stopped last year, due to persistent disappointments as to the quality of work. At present, Westland's Waithaka Diesel Shop services the KSS fleet in a more than satisfactory way.

For 1993, procurement of a Peugeot station car was envisaged, but this is shelved to a possible next phase of the Twinning Agreement. It was included in the budget, but since it is a final project year, other priorities not envisaged at the inception of this project phase will be honoured first (e.g. purchase of personal computers; workshops on GIS in the districts).

# 7 WORKPLAN AND BUDGET 1993

## 7.1 Workplan

The workplan 1993 will be drafted in October, and finally handed in to DGIS, RNE and KARI by November, when Aore pays a visit to The Netherlands. His journey will be paid by ITC, which organizes a workshop for heads of soil survey organizations in developing countries (November 23-25).

The workplan will this time clearly spell out the duties and time schedule of each officer, as the staff situation at KSS does not allow for many unanticipated jobs, such as presently experienced with CIMMYT and soon with SOTER.
Included in the 1993 workplan will be:

- the reconnaissance soil, vegetation and land use survey of the Murang'a District (Wanjogu, Waruru, Macharia, Kimani, Onyono),
- finalizing the Narok District survey, and correlation excursions in March 1993 (Aore),
- finalizing the Bondo reconnaissance report (Gicheru), the Chuka report (Kiome), and the Transmara report (Okoth),
- start to the UNEP/ISRIC-sponsored SOTER project (Gicheru, Njoroge),
- start of national soil reference collection with support from ISRIC (Waruru), -- implementing changes in laboratory management and physical structure, and start of research activities in soil and water management, supported by equipment and staff form SC-DLO (Ekirapa, Mare, Kariithi),
- development of quantitative land evaluation and ALES, based on research data obtained from different research stations and on-farm trials (Kilambya, Kamoni, Achieng, Nyangesa),
- automated retrieval system for the KSS library and data storage (Aguno, Odipo). The GIS group (Kamoni, Maingi, Kimotho) may require support from outside, which could be provided alongside the UNEP/ISRIC-initiated SOTER project. Possibly two students from the University of Wageningen, familiar with Arc/Info, could assist in this respect. The group also called for another support mission, such as the ones held by Sussenbach (Logisterion) and Lentjes (SC-DLO) in the recent past. Matters of urgency are now the finalizing of the Kwale pilot study, and installing and further working out of the Kisii/Nyamira study.

## 7.2 Budget

Real expenditure in 1992 is hard to estimate, as the contract between DGIS and SC-DLO had to be adjusted. Contrary to initial belief, a small percentage of the donor funds is flowing through RNE and KARI, and a relatively large percentage through SC-DLO.

The flow of funds from RNE to KARI and then to KSS was extensively reviewed by the mid-term evaluation mission (Netherlands support to NARP-I), and it was decided to open a separate account for KSS, to which an initial standing imprest will be transmitted. On return of invoices to RNE (through KARI), the account will be replenished. Such a structure was advocated in previous mission reports, although the separate account was not suggested by then. At the time of the present mission, a total of KSh. 1,320,000/- had been transmitted to KSS. The total allocation on the votes 'equipment' and 'operational costs' being HFl. 145,000/-, it seems that the 1992 allocation will once again not be spent entirely. This can be carried over to the 1993 budget, but since that is a final project year, any such situation at the end of 1993 will imply that funds unspent are 'lost', as it is no common practice to transfer leftovers to a next project phase.

GoK contribution for the second half of 1992 amounted to KSh. 120,600/-, of which two-third goes into transport and operating costs, and travel and accommodation allowances. This amount takes care of one good field trip for a reconnaissance survey, provided that the funds are made available during the fieldwork-friendly months of the year.

KSS income out of the tariff system is estimated to come to KSh. 250,000/- for 1992. This may seem modest, but it is the first full year of funds generation since the inception of the new tariff system and should therefore be appreciated as an important financial step ahead. It is expected that the revenues will increase during the following years (more GIS products sold).

The core funding, spent by KARI on the development of the GIS, has been spent almost completely now. Out of the originally allocated KSh. 816,000/-, an approximate 10% is still to be spent (on an airconditioner and curtains for the computer room).

# 8 TRAINING PROGRAMME AND STAFF REQUIREMENTS 1993

## 8.1 Training in 1992

In 1992, the following officers finished their training:

| | |
|---|---|
| Kilambya | ICRA course Wageningen |
| Waruru | Univ. Gent - MSc. (soil science, with emphasis on (semi-)arid regions, on Belgian scholarship; expected back by October 1992) |
| Macharia | Univ. Nairobi - MSc. (vegetation science) |
| Wanjogu | Univ. Nairobi - MSc. (soil science) |
| Njoroge | Univ. West Virginia - BSc. (soil science; expected back by December 1992) |
| Onyono | ITC - Diploma Soil Survey |
| Mikisi | Horsens Polytechnic, Denmark - Diploma Cartography |

The following officers left for training during the year:

| | |
|---|---|
| Rachilo | Univ. Gent - MSc. (soil science, with emphasis on (semi-)arid regions) |
| Kibe | Univ. West Virginia - BSc. (soil science) |
| Shitakha | Univ. West Virginia - BSc. (soil science) |

## 8.2 Training projections

| | |
|---|---|
| Aore | regular visit to SC-DLO on project affairs; write-up for a new project phase and preparation of the Narok District land use planning activities (see 5.3) |
| Okoth | 3 months remote sensing as a preparation for research project Athi River (SC-DLO, see 5.2); finalizing Transmara report and IWOMUSSI proceedings (Jan-March) |
| Gachini | 1.5 year MSc. Soil and Water, Univ. Wageningen |
| Kariuki? | 1 year Diploma Soil Survey, ITC |
| Agevi? | 3 years, Polytechnic Nairobi |
| Karuga | 1 year, secretarial training |
| ..... | short courses (Insight computers) |
| ..... | seminar in Kisii (interaction KSS/district agricultural staff) |
| ..... | meeting of the East African Soil Science Society, Tanzania |
| Oketch | 1 year photo-lithography or cartography course |
| | |
| Wokabi | ITC/Univ. Gent - PhD. (full year) |
| Rachilo | Univ. Gent - MSc. (full year) |
| Achieng | Univ. West Virginia (Jan-May) |
| Kinyanjui | Univ. West Virginia (full year) |
| Kibe | Univ. West Virginia (full year) |
| Shitakha | Univ. West Virginia (full year) |

8.3 In-house training/missions

- Mid-year workshop on the role of soil survey and research in land use planning (Luning??, 2 weeks)
- Mission to investigate how efficiency and complementarity of the laboratories at NARL can be increased (PLU, 2 weeks)
- 'Twinning Agreement' visits SC-DLO in March (coinciding with soil correlation trip to Narok and seminar in Kisii) and October (coinciding with the FAO bi-annual soil correlation meeting for East and Southern Africa; SC-DLO, 2 * 3 weeks)
- Refresher course GIS, in combination with the start of the SOTER project, for the GIS team, and Gicheru/Njoroge; introduction Kisii District digitized (Logisterion or SC-DLO, 2 weeks; UNEP/ISRIC, 2 weeks?)
- Preparation for National Soil Reference Collection (ISRIC, 2 weeks?).

8.4 Staff requirements

The staff situation at KSS is still a source of grave concern. After the departure of several senior officers in 1988-1990, Dr Wamicha, who had just returned from a PhD. project in Germany that took him almost 6 years, has left for the University of Nairobi. Since the thesis was written in German, and did not particularly benefit the work of KSS that much, it virtually implies that Dr Wamicha has not been of any benefit to KSS for the past 7 years or so, though on the pay-roll. He has now left without completing the Transmara reconnaissance soil survey report, as opposed to earlier agreements. The incidence of haphazard activities, which require immediate availability of KSS staff in other projects, such as presently experienced in the CIMMYT maize data base project, can not continue without recruitment of new staff. The GIS workshop report (March 1992), for example, had to be shelved as the officer concerned was suddenly seconded to the CIMMYT project, as well as to the Bura irrigation scheme committee. KSS will not gain credibility if the report fails to be printed this year. The proceedings of the 'IWOMUSSI' workshop, held in 1989 (!), undergo the same fate. They have been 'almost ready' for over one year now, but will remain so if different donors keep parachuting new activities without paying the slightest attention to local manpower constraints.

Recently, a technical assistant from Ol Joro Orok research station (Ngugi) was transferred to join KSS. Meanwhile, technical assistant Mureithi retired in July.

# 9 OTHER MATTERS

## 9.1 NARP-II preparations (1994-1998)

Netherlands support to NARP-I was evaluated in May 1992. The final report of the mission is expected soon. From the draft document, one can read that the achievements of KSS during Phase IV were well-appreciated by the mission members.

Under the chairmanship of Dr F.N. Muchena, Director NARL, a KARI group worked one week on a first draft NARP-II document. The Ag. Head KSS and the SC-DLO liaison officer spent some time on the chapters related to soil survey and land evaluation. The regional and multi-disciplinary focus in natural resource assessment and land use planning, which has been advocated in the course of NARP-I, received due attention in the document. The findings of the evaluation mission and the NARP-II document will constitute the basis for future cooperation between KARI and RNE.

In the course of 1992, possible Netherlands support to IDR was discussed in NARL donor meetings, but it was not given a proper follow-up by the head of the IDR section yet. Possibly, some support can be included in case KSS is supported during NARP-II. Several IDR officers have been attending the KSS workshops and have been involved in research activities, such as the determination of salinization and its spatial variability in the 'notorious' Kimirogo scheme in Taveta (Sijali, Okoth, October 1991). The IDR section should clearly show the proposed and existing links with the Irrigation and Drainage Branch in the Ministry of Agriculture, and with NIB.

## 9.2 Netherlands support to soil survey in Uganda

Dr R. Bos and Mr N. Visser, after a visit to Uganda, recommended support to a soil survey and land evaluation branch in the Kawanda Research Institute, near Kampala. Earlier relevant documents encompass: 'A suggested national soils policy for Uganda' (FAO/UNEP, 1992) and a project proposal, drafted by a group of Ugandan agronomists and soil scientists. The latter document was handed over to Mrs N. Linssen (RNE) in March 1992 by Mr A. Kintunkwonka, Deputy Director Kawanda Research Institute, in the presence of the author of this report.

Preliminary talks on possible Netherlands support to Ugandan soil survey and research were held between representatives of SC-DLO and Ugandan soil scientists A. Kintunkwonka (Kawanda RI) and Prof. J. Zake (Makerere University), in view of the fact that in 1989, Uganda was added to the 'Programme Region East Africa' of the Netherlands Ministry of Development Cooperation. Next to Kenya, SC-DLO is also involved in a soil survey institutional development project in Tanzania (National Soil Service Project, Tanga). Moreover, links between Tanzanian, Kenyan and Ugandan soil scientists are already strong, thanks to the East African Soil Science Society. Concrete formulation of support is envisaged by November 1992, just before

the annual meeting of the East African Soil Science Society in Nakuru.

### 9.3 Netherlands support to DRSRS (Ministry of Planning and National Development)

The Department of Resource Surveys and Remote Sensing in the Ministry of Planning and National Development will start a Netherlands-supported project on Land Degradation Assessment and Mapping, in cooperation with UNEP. In view of the anticipated start of the SOTER project, collaboration between the two projects should be mutually beneficial.

ACRONYMS

| | |
|---|---|
| ALES | Automated Land Evaluation System |
| ASAL | Arid and Semi-arid Lands |
| CIMMYT | International Centre for the Improvement of Maize and Wheat, Mexico |
| DAO | District Agricultural Officer |
| DDO | District Development Officer |
| DGIS | Directorate General for International Cooperation, The Hague |
| DIC | District Information Centre |
| DRSRS | Department of Resource Surveys and Remote Sensing |
| EEC | European Communities |
| FAO | United Nations Food and Agriculture Organization |
| FURP | Fertilizer Use Recommendation Project (section in NARL) |
| GIS | Geographical Information System |
| ICIPE | International Centre for Insect Physiology and Entomology |
| ICRA | International Course on Development-oriented Research in Agriculture |
| ICRAF | International Centre for Research in Agro-Forestry |
| IDR | Irrigation and Drainage Research (section in NARL) |
| ILRAD | International Laboratory for Research on Animal Diseases |
| ISRIC | International Soil Reference and Information Centre |
| ITC | International Institute for Aerospace Surveys and Earth Sciences |
| IWOMUSSI | International Workshop on Multipurpose Use of Soil Survey Information |
| KARI | Kenya Agricultural Research Institute |
| KEFRI | Kenya Forestry Research Institute |
| KSS | Kenya Soil Survey (section of NARL) |
| NARL | National Agricultural Research Laboratories |
| NARP | National Agricultural Research Programme |
| NIB | National Irrigation Board |
| PDA | Provincial Director of Agriculture |
| PLU | Project Liaison Unit |
| PPO | Provincial Planning Officer |
| RNE | Royal Netherlands Embassy |
| SC-DLO | Winand Staring Centre for Integrated Land, Soil and Water Research |
| SOTER | Soils and Terrain Digital Database |
| SWMC | Soil and Water Management and Conservation |
| TARDA | Tana and Athi River Development Authority |
| TNO | Institute of Applied Geoscience |
| TSBF | Tropical Soil Biology and Fertility Programme |
| UNEP | United Nations Environmental Programme |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| WRAP | Water Resources Assessment Project |
| WVU | West Virginia University |

ITINERARY

| | | |
|---|---|---|
| 05-09 | 14.00h | Departure Amsterdam, KL 595 |
| 06-09 | 02.00h | Arrival Nairobi |
| 07-09 | | Discussions W.W. Aore; Meeting with Dr Gichuki, University of Nairobi, Dep. Agricultural Engineering |
| 08-09 | morning | Start of Soil and Water Management and Conservation (SWMC) course (Dr Gichuki and staff) |
| | afternoon | Meeting M. Rusch (RNE); meeting FURP staff (Dr Heinzmann, Dr Schnir) |
| 09-09 | | Excursion to University of Nairobi, Kabete campus, Dep. Agric. Engineering: trials on drainage, soil conservation, agro-forestry, water harvesting |
| 10-09 | morning | Attending SWMC course |
| | afternoon | Travel to Mombasa |
| 11-09 | morning | Meeting PDA and PPO Coast Province; Meeting with Director KARI Regional Research Centre, Mtwapa |
| | afternoon | Meeting with DDO and staff of DAO, Kwale District |
| 12-09 | | Travel to Nairobi |
| 14-09 | morning | Meeting Dr F.N. Muchena, Director NARL; attending SWMC course |
| | afternoon | Preparations Kwale District workshop |
| 15-09 | | Attending SWMC course; preparations Kwale seminar; assistance to write-up of NARP-II |
| 16-09 | | Visit to research trials S.M. Wokabi, head KSS, in the Embu District |
| | evening | Meeting Ir I. Duchhart, Univ. Wageningen |
| 17-09 | morning | Meeting Dr R. Bos, First Secretary RNE; meeting A. Huitzing, Chef de Poste RNE |
| | afternoon | Closing session SWMC course; presentations by KSS staff |
| | evening | Meeting Dr P. Seward, TSBF Coordinator |
| 18-09 | morning | Meeting Mr J.K. Rutto, Dep. Director KARI, in charge of Crops, Soils and Water, meeting FURP staff (G. Ayaga, S. Nandwa); preparations Kwale District workshop with GIS group |
| | afternoon | Discussions with KSS staff |
| 21-09 | morning | Preparations Kwale District workshop |
| | afternoon | Discussions with KSS staff; round-up with Aore |
| 22-09 | morning | Preparations Kwale District workshop |
| | afternoon | Travel to Mombasa |
| 23/24-09 | | Kwale District workshop, Mombasa |
| 25-09 | | Finalizing workshop; report write-up |
| 26-09 | morning | Travel to Nairobi |
| | afternoon | Round-up with Aore |
| 27-09 | 03.30h | Departure Nairobi, KL 596 |
| | 09.30h | Arrival Amsterdam |

## ANNEX 1 COURSE PROGRAMME 'SOIL AND WATER MANAGEMENT AND CONSERVATION'

| SESSION | COURSE OBJECTIVES |
|---|---|
| Session 1 | 1. Assess the background of the participants and their learning objectives.<br>2. Introduce technical, social and economic issues of soil and water management. |
| Session 2 | 1. To acquaint the participants with soil and water management research activities going on at the University of Nairobi.<br>2. To acquaint the participants with field equipments and structures required for proper soil and water management |
| Session 3 | 1. Review the concept of soil water balance, soil water content and soil water use.<br>2. Demonstrate soil moisture measuring techniques. |
| Session 4 | 1. Review the concept of soil water movement.<br>2. Demonstrate techniques for measuring soil water movement. |
| Session 5 | 1. Review salinity control strategies.<br>2. To identify how soil survey information can be incorporated into the salinity control programmes. |
| Session 6 | 1. Review irrigation and drainage issues<br>2. To identify how soil survey information can be incorporated into irrigation and drainage programmes. |
| Session 7 | 1. Review national soil and water conservation strategies.<br>2. To identify how soil survey information can be incorporated into the soil and water conservation programmes. |
| Session 8 | 1. Review national water harvesting strategies.<br>2. To identify how soil survey information can be incorporated into the water harvesting programmes. |

COURSE PROGRAMME - WEEK 1

| DAY/DATE | TIME | SUBJECT | RESOURCE PERSON |
|---|---|---|---|
| **DAY 1** | **SESSION 1: INTRODUCTION** | | |
| TEU. 8.9.92 | 09:00-10:30 | General introduction | |
| | 10:30-11:00 | Tea break | |
| | 11:00-12:30 | Soil and water resource degradation | |
| | 12:30-14:00 | Lunch break | |
| | 14:00-16:30 | Reversing degradation of soil and water resources | |
| **DAY 2** | **SESSION 2: FIELD TRIPS** | | |
| WED. 9.9.92 | 09:00-11:00 | Steepland conservation research site | |
| | 11:00-12:30 | Water harvesting site | |
| | 13:00-14:00 | Lunch break | |
| | 14:00-16:30 | Drainage project site | |
| **DAY 3** | **SESSION 3: SOIL WATER BALANCE** | | |
| THU.10.9.92 | 09:00-10:30 | Soil water balance I | |
| | 10:30-11:00 | Tea break | |
| | 11:00-12:30 | Soil water balance II | |
| | 12:30-14:00 | Lunch break | |
| | 14:00-16:30 | Practicals | |
| **DAY 4.** | **SESSION 4: SOIL WATER MOVEMENT** | | |
| FRI.11.9.92 | 09:00-10:30 | Soil water movement I | |
| | 10:30-11:00 | Tea break | |
| | 11:00-12:30 | Soil water movement II | |
| | 12:30-14:00 | Lunch break | |
| | 14:00-16:30 | Practicals | |

COURSE PROGRAMME - WEEK 2

| DAY/DATE | TIME | SUBJECT | RESOURCE PERSON |
|---|---|---|---|
| **DAY 5** | **SESSION 5: SALINITY AND DRAINAGE** | | |
| MON.14.9.92 | 09:00-10:30 | | |
| | 10:30-11:00 | Tea break | |
| | 11:00-12:30 | | |
| | 12:30-14:00 | Lunch break | |
| | 14:00-16:30 | Discussions | |
| **DAY 6** | **SESSION 6: IRRIGATION AND DRAINAGE** | | |
| TEU.15.9.92 | 09:00-10:30 | | |
| | 10:30-11:00 | Tea break | |
| | 11:00-12:30 | | |
| | 13:00-14:00 | Lunch break | |
| | 14:00-16:30 | Discussions | |
| **DAY 7** | **SESSION 7: SOIL CONSEVATION** | | |
| WED.16.9.92 | 09:00-10:30 | | |
| | 10:30-11:00 | Tea break | |
| | 11:00-12:30 | | |
| | 12:30-14:00 | Lunch break | |
| | 14:00-16:30 | Discussions | |
| **DAY 8** | **SESSION 8: WATER HARVESTING** | | |
| THU.11.9.92 | 09:00-10:30 | | |
| | 10:30-11:00 | Tea break | |
| | 11:00-12:30 | Discussions | |
| | 12:30-14:00 | Lunch break | |
| | 14:00-16:30 | Closing ceremony | |

ANNEX 2 KWALE DISTRICT WORKSHOP PROGRAMME

**PROGRAMME - KWALE DISTRICT WORKSHOP**

**WEDNESDAY 23rd SEPTEMBER**

| | |
|---|---|
| 08.30 - 09.30 | Registration of participants |
| SESSION - I | Chairman: Mr. W.K. Malinga<br>Rapporteurs: Mr. M. Kamau<br>Mr. A.E. Ekirapa<br>Mr. S.N. Wanjogu |
| 09.30 - 09.40 | General information by the organizers |
| 09.40 - 09.45 | Head, Kenya Soil Survey to introduce the Provincial Director of Agriculture, Coast Province |
| 09.45 - 10.00 | Opening speech by the Provincial Director of Agriculture, Coast Province |
| 10.00 - 10.15 | An address by the Provincial Planning Officer, Coast Province |
| 10.15 - 10.45 | The Status of Soil Survey in Kenya: the past, the present and the future<br>(W.W. Aore) |
| 10.45 - 11.15 | Possible Uses of GIS in Soil Survey<br>(P.F. Okoth) |
| 11.15 - 11.45 | COFFEE / TEA BREAK |
| 11.45 - 12.15 | Land Evaluation and GIS<br>(E.M. Smaling) |
| 12.15 - 12.45 | Farming Systems Analysis and GIS<br>(D.W. Kilambya) |
| 12.45 - 02.00 | LUNCH BREAK |
| 02.00 - 02.30 | Vegetation and Range Management in GIS<br>(P.N. Macharia) |
| 02.30 - 03.00 | Fertilizer Use and Recommendations in GIS<br>(G.O. Ayaga) |
| 03.00 - 03.30 | COFFEE / TEA BREAK |
| 03.30 - 05.00 | GIS Demonstration of Kwale District |

**THURSDAY 24th SEPTEMBER**

| | |
|---|---|
| SESSION II | Chairman: F.N. Muchena (Dr.)<br>Rapporteurs: Mr. P.F. Okoth<br>Mrs.L. Munga |
| 09.00 - 09.15 | An address by the District Development Officer, Kwale District |
| 09.15 - 09.30 | An address by the Centre Director, KARI Regional Research Centre, Mtwapa |
| 09.30 - 10.00 | Presentation from KARI Regional Research Centre, Mtwapa |
| 10.00 - 10.30 | Presentation from Provincial Agricultural Office, Coast Province |
| 10.30 - 11.00 | COFFEE / TEA BREAK |
| 11.00 - 11.30 | Presentation from District Agricultural Office, Kwale |
| 11.30 - 12.00 | Presentation from District Livestock Office, Kwale |
| 12.00 - 12.30 | Presentation from (One) Divisional Agricultural Office, Kwale |
| 12.30 - 01.45 | LUNCH BREAK |
| 01.45 - 03.00 | Discussions session I. increased interaction between KARI and the extension staff of MoA, MoLD, MoENR. Conclusions and Recommendations<br><br>Chairman: Assistant Director, Range Research - KARI.<br>Rapporteurs: Mr. J.E. Jamoza<br>Mr. P.T. Gicheru |
| 03.00 - 03.30 | COFFEE / TEA BREAK |
| 03.30 - 04.30 | Discussions Session II. use of GIS in planning issues at provincial and district level. Conclusions and Recommendations<br><br>Chairman: Provincial Planning Officer - Coast Province<br>Rapporteurs: Mr. M. Gichuki<br>Mr. D. Kilambya |
| 04.30 - 04.45 | Closing address: Deputy Director, Crops, Soil and Water - KARI |

COAST NEWS

# Extension staff advised

By NATION Correspondent

The Agricultural extension staff should update themselves with the recent research findings and disseminate the information to the farmer, the Coast Provincial Director of Agriculture, Mr J. O. Onyimbo, said yesterday.

He was opening a two-day seminar for the staff at the Oceanic Hotel in Mombasa.

It was organised by the Kenya Soil Survey in conjuction with the Kenya Agricultural Research Institute (KARI) with the assistance of the Netherlands Government.

Mr Onyimbo recommended that more research be carried out in order to assess the residual effect of fertiliser application.

He said that only five per cent of Coast Province was arable while the remaining more than 85 per cent was Arid and semi-arid. There was, therefore need to intensify investigations on land resources in order to manage all scarce arable and arid lands effectively".

The director praised KARI for its pilot scheme in Kwale. He proposed the extension of similar work to other areas