



## Report of a cooperation mission to the Kenya Soil Survey

September 1991

E.M.A. Smaling

## International Activities Report 18

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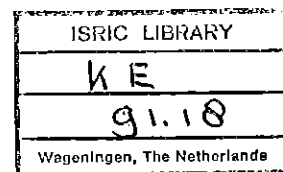
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## **Report of a cooperation mission to the KENYA SOIL SURVEY**

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**September 1991**

**E.M.A. Smaling**



**International Activities Report 18**

**THE WINAND STARING CENTRE, Wageningen (The Netherlands), 1991**

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The WINAND STARING CENTRE is continuing the research of: Institute for Land and Water Management Research (ICW), Institute for Pesticide Research, Environment Division (IOB), Dorschkamp Research Institute for Forestry and Landscape Planning, Division of Landscape Planning (LB), and Soil Survey Institute (STIBOKA).

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## SUMMARY

1. Since Kenya Soil Survey forms part of Kenya Agricultural Research Institute (KARI), its efficiency, morale and technical capability, and thus its workload, have considerably increased. The lines of communication between KARI, National Agricultural Research Laboratories (NARL), Kenya Soil Survey (KSS), the Royal Netherlands Embassy (RNE), the Netherlands Directorate-General for International Cooperation (DGIS) and the Winand Staring Centre (WSC) are well-defined and maintained in a good spirit.
2. By June 1991, the Inception Report was printed. This project document is a common effort of all parties, named under 1.
3. The larger part of the project funds for operational costs flow from the RNE, via KARI and NARL, to KSS. A constraint, so far, has been the ready availability of these funds when needed. At the end of the present mission, however, an agreement was reached to the effect that KARI will directly forward original vouchers to RNE for reimbursement, and send copies of the master vouchers to the Ministry of Research, Science and Technology and Treasury. This development can be regarded as a major break-through.
4. KARI will soon release Hfl. 60,000 out of its core funding for the further development of the Geographical Information System (GIS) at KSS. Given (i) the value the GIS has, in terms of scientific impact as well as public relations for KARI as a whole, and (ii) the vulnerability of the equipment to changing climatic conditions and dust, the need to have ready access to the funds is obvious. Out of the total Ksh. 816,000, Ksh. 512,800 will be used for the purchase of equipment and materials for the GIS room, while the balance of Ksh. 303,200 is earmarked for the pilot project, i.e. remaining resource inventory of part of the Kwale District.
5. KSS is allowed to charge for its services. Consequently, the old tariff system of 1981 has been revised and approved for gazetting. This includes the cost of surveys to be carried out by KSS, as opposed to the previous notice that was restricted to publications only. Seventy percent of the KSS earnings will remain in the section for re-investment.
6. The increased proficiency of staff in handling computer packages has resulted in and will further boost:
  - \* a well-organized and rapid storage of field data, and easy transfer to the GIS (DBase);
  - \* a rapid drafting of tables and graphs, as well as easy calculation of, for example, water balances, fertilizer requirements, land suitability assessments (Lotus);
  - \* a rapid drafting and editing of all survey and associated reports and papers (Wordperfect).

7. The Directorate of KARI shows a keen interest in the development of GIS. Various KARI centres and programs may benefit from it, as long as they have sufficiently inventoried their subject of interest. In the case of KSS, lots of inventory data are at hand to be entered and used, amongst others, to assist in land use planning at district and divisional level.
8. During the mission, KSS staff requirements were handed in at KARI Headquarters, according to the Centre Research Document of 1988. The list was later prioritized to include 2 BSc/MSc level-soil surveyors or land evaluation specialists, 1 agronomist, 1 soil chemist, 2 cartographic trainees, 1 technical officer, 3 technical assistants, 1 labtechnician, 2 typists and 1 driver.
9. The fieldwork for the soil survey and land evaluation of the Narok District is nearing completion. In the course of 1992, a report on soils, land use and land suitability of the entire district will be published.
10. The subject of the annual mid-year workshop was 'Land Evaluation for different users', conducted by PLU-member Dr H.Th. Riezebos of the University of Utrecht. The main outcome of the evaluation of the course was:
  - \* The Automated Land Evaluation System (ALES) will be developed for KSS, so as to perform rapid physical as well as economic land evaluations;
  - \* Research data on crop yields under different management systems and fertility levels, and on soil erosion, are needed to verify the outcome of ALES;
  - \* Quantitative systems should be employed in research work;
  - \* There should be more interplay between soil scientists and the agro-economist(s), in order to widen the scope and impact of land evaluation exercises.

## 1 INTRODUCTION

Between July 29 and August 24, 1991, Ir. E.M.A. Smaling of the Winand Staring Centre for Integrated Land, Soil and Water Research (WSC), 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 Netherlands Directorate for International Cooperation in the Ministry of Foreign Affairs (DGIS), and the Kenyan Government.

The cooperation between KSS and WSC is laid down in a Twinning Agreement and an Inception Report and supported in The Netherlands by a Project Liaison Unit (PLU). Reports of previous missions (February 1990, September 1990, March 1991) are available at KSS and at WSC, Department of International Cooperation.

Since Kenya Soil Survey forms part of KARI (1-7-1989), its efficiency, morale and technical capability, and partly as a result of that its workload, have considerably increased.

The 'twinning' approach, where permanent expatriate support has been replaced by 6-monthly visits of periods of 3 weeks by the liaison officer from The Netherlands, has until now been satisfactory. Communication between KARI, NARL, KSS, the Royal Netherlands Embassy (RNE) and the WSC is frequent and efficient. By June 1991, the final version of the Inception Report was printed and distributed among KARI (Deputy Director Crops, Soils and Water; Asst. Director Soils, Water and Other Resources), Centre Director NARL, RNE, DGIS and PLU members.

## 2 FINANCES

### 2.1 Kenyan funds

On handing in 6-monthly workplans, KSS is entitled to a contribution from the Government of Kenya (GoK) for that period under two vote heads, i.e. 'recurrent' and 'development'. The recurrent contribution for the period January - June 1991 was released to KSS by mid-May. Therefore, only a small fraction of these funds could be utilized before the end of the 1990/91 financial year. The least utilized line item was 'travelling and accommodation', as the months of May and June are generally too wet for fieldwork. The (still unknown) amount earmarked for KSS for July - December 1991 had not been received at the time of the mission.

During the last few years, the contribution from the development vote has been very low. Therefore, KSS should strive at earning more money through commissioned surveys in order not to keep relying on project input alone.

### 2.2 Netherlands funds

The approved budget for 1991 equals Dfl. 950,000/=-, as shown in Annex 4 of WSC International Activities Report 13 (March 1991). The funds are partly administered in The Netherlands (DGIS, WSC) and partly in Kenya (RNE, KARI, NARL, KSS).

#### 2.2.1 Project funds, Netherlands component

Project funds for personnel, training and equipment are readily available. In The Netherlands, WSC draws from a standing imprest of Hfl. 200,000/=-, provided by DGIS. In addition, expenditure in Kenya on these budget items is drawn from a local account at ABN Nairobi, to which money is transmitted by WSC when the need arises. Unlike previous years, which were marred by various organizational bottlenecks, the funds allocated for 1991 will be entirely spent.

#### 2.2.2 Project funds, Kenyan component

Funds for operational costs are partly supplied through WSC, but the bulk (85%) should flow from the RNE, via KARI Headquarters, to KSS. A constraint, so far, has been the ready availability of these funds when needed.

By December 1990, donor funds meant to cover operational expenditure at KSS were transmitted by the RNE to KARI Headquarters. Out of the total amount (Ksh. 500,000), Ksh. 368,350 was made available to KSS for January-March 1991. The remainder (Ksh. 131,650) was only transmitted by July (Table 1).

By August 1, no request for any new installment had reached RNE. In other words, the Hfl. 155,000 (approximately Ksh. 2,200,000), earmarked for operational costs 1991, can not be made available to KSS under the present accounting system. It would imply mainly that KSS vehicles remain unserviced and grounded and funds for fieldwork would not be available either. The WSC liaison officer had to step in several times to pay for operational expenditure, so as to keep KSS mobile.

Other cash flow-related bottlenecks are: no simultaneous depletion of the different line items, and occasional lack of funds for casual labour during fieldwork, which is paid by GoK. Also, in the recent past, RNE required simultaneous accounting by all Dutch-supported KARI activities. Since the Seed Quality Control project in Lanet was slow in surrendering imprest, it held up the cash flow in the other institutes. Moreover, KSS has a relatively high turnover of operational expenditure because of the many field trips.

**Table 1 Operational costs through Netherlands contribution: project year 1991**

Budgeted: via NL (WSC)	via K (RNE)
Hfl. 25,000	155,000
spent via ABN account when WSC officer is in Kenya	spent in four 3-monthly installments
	JAN-MCH      APR-JUN      JUL-SEP      OCT-DEC
DFI.	38,750      38,750      38,750      38,750
Ksh.	= 500,000      not utilized by August 1
	368,350      131,650
KARI → NARL	January      July

Cash flow moving too slowly is regarded as a major bottleneck, not only to KSS, but rather to the Netherlands support to KARI as a whole. A meeting on this urgent issue was held on 12/8/1991, with the presence of all KARI Deputy Directors, Assistant Directors for Livestock and for Soils, Water and Other Resources, NARL Centre Director, Ag. Head KSS and the WSC liaison officer.

The following possible solutions were discussed:

1. The Ag. Head KSS follows up the accounting within both NARL and KARI Headquarters, and liaises directly with the KARI Assistant Director for Soils, Water and Other Resources.
2. The agreement, reached earlier on with H. Hendrix, the immediate former First Secretary at RNE, to allow the Dutch-supported projects a certain standing imprest to stave off 'dry spells' in availability of operational funds, will be effectuated as follows: Ksh. 500,000 is transmitted via KARI Headquarters to KSS, being 25% of the budgeted annual total. On spending an amount of approximately Ksh. 300,000, invoices are prepared and submitted to RNE, who is then to issue a cheque covering the amount accounted for. Hence, KSS will have a continuous imprest of Ksh.

- 500,000 until the end of the project phase.
3. The possibility to find a short-cut in imprest surrender procedures deserves consideration. The sequence KSS - NARL - KARI Headquarters - Ministry of Research, Science and Technology - Treasury - RNE is rather bureaucratic and time-consuming, as too many accountants are involved. It is not clear who is answerable in case of imbalances, and if only one of them decides to sideline the job, the delays presently faced will definitely persist. If this happens within NARL or KARI Headquarters, it can still be followed-up rather easily. If, however, the invoices have been submitted to the Ministry or to Treasury, the process can not be controlled that easily any more.

At the end of the present mission, RNE and KARI had reached an agreement to send only copies of the master vouchers to the Ministry of Research and Treasury. KARI Headquarters will directly forward the original vouchers to RNE for reimbursement. The latter can be regarded as a major break-through.

### 2.3 Core funding for the Geographical Information System

By December 1990, RNE transferred an amount of Hfl. 60,000 to KARI, meant for the further development of the Geographical Information System (GIS) at KSS. Given (i) the value the GIS has, in terms of scientific impact as well as public relations for KARI as a whole, and (ii) the vulnerability of the equipment to changing climatic conditions and dust, the need to have ready access to the funds is obvious.

It was decided to have the funds released from KARI Headquarters to KSS in three equal portions. But after consultations on 12/8/1991, the Deputy Director for Finance, Planning and Administration agreed to release all the Hfl. 60,000 to KSS. The Ag. Head KSS subsequently prepared a schedule on how these funds would be spent. This was submitted to KARI Headquarters on 22/8/1991. Out of the total Ksh. 816,000, Ksh. 512,800 would be used for the purchase of equipment and materials for the GIS room (Table 2), while the balance of Ksh. 303,200 would be utilized for resource inventory of part of Kwale District, in anticipation of presentations to be held in November in Malawi (FAO East and Southern African Soil Correlation Meeting), and on 6/3/1992 during a seminar on applications of GIS in agricultural research and extension, to be organized by KARI/KSS.

### 2.4 Tariff system

Ever since KSS joined KARI, the workload has increased, notably on commissioned surveys, which are still not paid for in full. Last year, for example, surveys were done for the Small Scale Irrigation Project (SSIP), the Tana and Athi River Development Authority (TARDA) and the ICIPE farm. These were followed by some urgent surveys that had to be carried out on very short notice for non-paying clients, causing delay in report delivery to the paying clients. The Ag. Head KSS and WSC liaison officer even had to visit SSIP, convincing them to be clients of KSS again. This Dutch-supported

**Table 2 Requirements for the Geographic Information System's Room**

Item description	Quantity Required	Cost per Item	Total cost (KSh.512,802)
<b>Timber for Shelves, benches and cupboards, chairs, carpet and tables for the GIS room</b>			
Timber	assorted		35,000/=
Adjustable chair for digitizing table	1	4,500/=	4,500/=
Computer operator chairs	7	6,300/=	44,100/=
Worktable 73" * 37"	1	5,000/=	5,000/=
Standard computer tables	2	6,300/=	12,600/=
Carpet and accessories	1		17,000/=
Miscellaneous			10,000/=
Air conditioner	1	30,000/=	30,000/=
Automatic voltage regulator (160-260Volts)	2	3,000/=	6,000/=
Twin plugs (four out lets and cable)	6	800/=	4,800/=
<b>Pens for Calcomb Plotter</b>			
black	2	1,600/=	3,200/=
green	2	1,600/=	3,200/=
red	2	1,600/=	3,200/=
blue	2	1,600/=	3,200/=
<b>Other materials for Calcomb Plotter</b>			
Polyester film/Mylar calcomb printing paper	3	3,600/=	10,800/=
Vellum 1411 and E	3	3,300/=	9,744/=
Translucent	3	1,910/=	5,730/=
Embossed paper	5	3,800/=	19,000/=
Offset paper 92*64cm	3	2,680/=	8,040/=
Document paper 30"*10'	2	7,950/=	15,970/=
Lith developer A&B 9.5 litres	2	1,120/=	2,240/=
Fixer (20 litre cans)	2	2,600/=	5,200/=
Gestetner plates	3	4,771/=	14,313/=
<b>Materials for computers and printers</b>			
OKI Toner 400 (1 refill)	1	5,000/=	5,000/=
Print out paper for laser printer (reams)	3	4,200/=	12,600/=
Photocopying paper (reams)	10	300/=	3,000/=
Duplicating paper "	100	175/=	17,500/=
Computer printout paper 8.5*11" (boxes)	5	2,000/=	10,000/=
Computer printout paper 14*11" (boxes)	2	2,000/=	4,000/=
<b>Computer diskettes</b>			
Size 3.5" 3M trade mark (sets)	8	1,022/=	8,200/=
Size 5.25" "	10	700/=	7,000/=
<b>Printer Ribbons</b>			
Epson LQ 2550	10	900/=	9,000/=
Epson LQ 1500	15	500/=	7,500/=
IBM Quickwriter	15	500/=	7,500/=
Brother WP50	20	160/=	3,200/=
<b>Service contracts</b>			
Calcomb plotter	1		20,000/=
Digitizer	1		16,000/=
Computers	4	6,600/=	26,400/=
Printers	3	5,000/=	15,000/=
<b>Binding Tapes 1"</b>			
Red, blue and silver	5	1,035/=	5,175/=
<b>Binding Tapes 2"</b>			
Green, Yellow and light brown	5	1,485/=	7,425/=
<b>Ortho Films</b>			
Size 16" * 20" (box of 100 sheets)	1	7,365/=	7,365/=
Size 20" * 24" "	1	11,000/=	11,000/=
Size 24" * 200' (rolls)	1	10,000/=	10,000/=
Size 30" * 100' "	1	10,000/=	10,000/=
Striping film 30*40cm	1	6,500/=	6,500/=
Ammonia paper (rolls)	3	3,500/=	10,500/=

project could still provide much work for KSS in the foreseeable future and KSS should be enabled to execute such surveys and write reports in good time.

As laid down in the Science and Technology Act in the Law of Kenya, KARI is allowed to charge for its services, and so is KSS as one of its departments. Consequently, the old tariff system of 1981 has been revised and submitted to the 'Government Printer' for gazetting (Table 3). This includes the cost of surveys to be carried out by KSS, as opposed to the previous notice that was restricted to publications only. Seventy percent of the KSS earnings will remain in the section for re-investment. The NARL Centre Director will keep record of cheques received from different clients, so as to ensure that each NARL section receives its proper share.

### 3 EQUIPMENT

Procedures for the clearance of shipped and airlifted goods for KSS and the local procurement of vehicles are adequately dealt with by the KARI Senior Supplies Officer in-charge. At present, a shipment of goods is ready for transport in The Netherlands, including survey, cartographic and laboratory equipment and consumables, computer items, and car spares. Considerable delay was experienced in ordering, because many suppliers ask detailed questions about items that were not provided by the responsible officers. Each section within KSS will now receive a catalogue from the main suppliers in The Netherlands, and should in future list the requirements as comprehensive as possible.

Because of the persistent heavy workload at KSS, a portable PC was procured (Commodore C 286-LT) for use by a very limited number of officers. As the instrument is theft-prone, it will be kept in a lockable drawer to which only the Head KSS has access.

In 1991, project funds for the procurement of equipment have been used to the full extent and above. Therefore, the procurement of vehicles is postponed until 1992. KSS should think about its future requirements in this respect. The pros and cons of Landrovers (diesel or petrol) should be well compared with those of other terrain vehicles.

Requests to hire KSS camping equipment and vehicles for non-project work have been numerous in the recent past, whereby mostly KSS transport officers were approached directly. Such requests will from now on only be considered when put in writing, addressed to Ag. Head KSS, through the NARL Centre Director.

Because of technological developments at KSS, there is more equipment that needs maintenance. Most companies ask large sums of money for service contracts. From 1992 onwards, the habit of giving out service contracts should be reconsidered, as the amount of money involved tends to get out of hand. Insight Computers Ltd. charges fair prices and will be the sole agent for the service of computers and printers as per 1992.

During the next visit of the WSC liaison officer, an inventory will have been taken of all assets at KSS, specifying those procured through project funds.

**Table 3 Proposed new tariff system Kenya Soil Survey**

The following soil, soil and water management, vegetation and land use survey charges and prices of reports and maps have been proposed in respect of the work performed by the Kenya Soil Survey Section of the National Agricultural Research Laboratories, Kenya Agricultural Research Institute.

**Schedule of Fees**

<b>(1) Labour</b>	<b>Ksh.</b>
(a) Surveys (cost/manday)	
(i) Soil survey .....	2,300.00
(ii) Soil and Water management survey .....	1,900.00
(iii) Vegetation survey .....	1,300.00
(iv) Land Use survey .....	1,300.00
(v) Casual Labour [for (i) to (iv) above].....	400.00
(b) Report write-up (cost/manday) .....	800.00
(c) Cartography - map drawing (cost/manday) .....	600.00
(d) Consultancy (cost/visit) .....	1,000.00
<b>(2) Fuel (cost/km) .....</b>	<b>8.00</b>
<b>(3) Materials</b>	
(a) Surveys (cost/observation)	
(i) Soil survey .....	30.00
(ii) Soil and Water management survey .....	30.00
(iii) Vegetation survey .....	30.00
(iv) Land Use survey .....	30.00
(b) Report write-up (cost/page) .....	4.00
(c) Cartography - map drawing (cost/A4 size print)	
(i) Colour maps .....	2,000.00
(ii) Black and White maps .....	200.00
(d) Equipment (cost/day) .....	2,200.00
<b>(4) Reports and Maps (ready for sale)</b>	
	<b>Price per Copy</b>
	<b>Ksh.</b>
(a) E1 Report .....	350.00
(b) Other Reports	
No. of Pages	
0-10 .....	40.00
11-20 .....	60.00
21-40 .....	90.00
41-60 .....	120.00
61-80 .....	160.00
81-100 .....	200.00
more than 100 .....	1.50 cts
	per extra page

*Table 3 continued*

(c) Litho Printed Coloured Maps (A4 size).....	20.00
(d) Litho Printed Black and White Maps (A4 size) .....	15.00
(e) Thematic Maps (A4 size) .....	25.00
(f) Helioprint Copies (A4 size) .....	5.00
(g) Transluents (A4 size) .....	20.00

- NOTES:** (a) For Overheads; a percentage of 10% will be charged on total costs of a survey.
- (b) The Kenya Soil Survey, List of publications will be distributed free of charge.
- (c) The charges for soil, water and plant analyses are not included in the above schedule.
- (d) The charges and prices become effective from the date of publication of this notice in the Kenya Gazette.

Director  
Kenya Agricultural Research Institute

## 4 TRAINING

The training program for 1991, as spelled out in International Activities Report 13 (March 1991), has been complied with. By August/September, L. Mikisi left for a one-year training course on Cartography at Horsens Polytechnic in Denmark, H. Onyono left for ITC, The Netherlands (one-year Diploma Course Soil Survey), and H.C.K. Kinyanjui left for West Virginia University to start his two-years BSc. training in Soil Science.

W.N. Wamicha returned from Germany by July 1991 after a successful completion of his German-supported Ph.D. research on genesis and mineralogy of Greyzems in Transmara. In the same period, M.O. Aguno returned from Botswana University after successfully completing a Certificate Course on Library Studies. During the second half of 1991, P.N. Macharia (Vegetation Science) and S.N. Wanjogu (Soil Science) will complete their MSc. studies at the University of Nairobi and take up duties again at KSS.

S.M. Wokabi (Ph.D. ITC) and B.K. Waruru (MSc. Gent, Belgian funding) were in Kenya at the time of the mission to execute fieldwork for their respective studies. R.M. Kiome (Ph.D. East Anglia, ODA funding) returned to UK by early August to complete his thesis, which is scheduled for late 1992. Kiome's fieldwork was supposed to be paid from EEC funds, but due to slow bureaucratic procedures Kiome's efforts to collect field data for a number of seasons were almost jeopardized; hence, the fieldwork was paid from Dutch project funds.

During the rest of 1991, the emphasis is on short courses:

- \* soil physics and management (Ekirapa, Mare, Kibe, Kariithi) and soil analysis and data handling (Gachini; both in Wageningen, The Netherlands; Sep.-Dec. 1991), and visits to conferences and workshops:
- \* African Soil Science Society, Egypt (Muchena, Okoth, Gicheru; Nov. 1991);
- \* FAO correlation meeting for Eastern and Southern Africa, Malawi (Aore, on FAO funds, Kamoni, Maingi; Nov. 1991);
- \* East African Soil Science Society Meeting in Uganda (Rachilo, Ndaraya, Kimotho, Ochieng; Dec. 1991).

In 1992, the following tentative training program is foreseen:

-- starting:

- R. Rachilo (MSc. Soil Science of (Semi-)Arid Regions, Belgium; 2 years)
- J. Kibe (BSc. Soil Science, US, West Virginia, 2 years)
- J. Shitakha (BSc. Soil Science, US, West Virginia, 2 years)
- D. Kilambya (Postgraduate course on Development-oriented Research in Agriculture (ICRA), Wageningen, The Netherlands, 8 months)

-- continuing:

- S.M. Wokabi (Ph.D. Land Evaluation, ITC)
- H.C.K. Kinyanjui (BSc. Soil Science, US)
- N.M. Achieng (BSc. Soil Science, US)

-- returning:

B.K. Waruru (MSc. Soil Science of (Semi-)Arid Regions, Belgium)

C.R.K. Njoroge (BSc. Soil Science, US)

L. Mikisi (Cartography Diploma, Denmark)

H. Onyono (Diploma Soil Survey, ITC)

## 5 COMPUTER SECTION AND GIS

After a short but intensive computer training boom for some KSS staff at 'Insight Computers' in Nairobi, a start was made with on-the-job training for the other KSS officers. P.F. Okoth, in charge of the Computer Section, will train staff on Microcomputers and MS-Dos, W.W. Aore on database management (DBase IV), P.T. Kamoni on the uses of spreadsheets (Lotus), and D. Kilambya on wordprocessing (Wordperfect 5.1). The increased proficiency of these packages has already resulted in and will further boost:

- \* a well-organized and rapid storage of field data, and easy transfer to the GIS (DBase);
- \* a rapid drafting of tables and graphs, as well as easy calculation of, for example, water balances, fertilizer requirements, land suitability assessments (Lotus);
- \* a rapid drafting and editing of all survey and associated reports and papers (Wordperfect).

On GIS, good progress was made on the earlier proposed pilot project on Kwale District (details in International Activities Report 13). The objective of the pilot study is to offer a set of thematic land resource and land suitability maps to the KARI Regional Research Centre in Mtwapa, the Kwale District Development Committee and other interested parties in Coast Province and Kwale District. The land suitability maps take into account the present and potential land utilization types in the district.

Survey data collection on Kwale District were stored in the GIS (soil maps Kwale, Lunga-Lunga, Tsavo-Voi, Agro-climatic zones). Some additional fieldwork will be needed to complete the westernmost part of the district, which has only been mapped on an exploratory scale. The Automated Land Evaluation System, introduced during the 1991 mid-year workshop (see chapter 10), will be employed to perform a land suitability assessment for the district. A presentation of the results is foreseen during the FAO correlation meeting for Eastern and Southern Africa in Malawi (November, 1991). The theme of this meeting is 'automated data storage and retrieval'.

The GIS group (P. Kamoni, P. Kimotho and P. Maingi) also entered maps and associated data for a number of smaller surveys. The plotted maps were issued to the clients and serve at the same time as display materials to guests that visit the section. The room is spacious and suitable to house the GIS. However, airconditioning, voltage stabilizers and furniture are badly needed to raise the standards and protect vulnerable equipment such as the digitizer and the plotter.

The GIS staff feels "80% comfortable" on the Arc/DBase system. The look-up manuals are queried regularly, and some aspects remain moderately understood. Nonetheless, the achievements so far are laudable. The staff requested a two-weeks period of assistance by WSC staff on Arc/Info, so as to fully master the system. This can possibly be realized by early 1992.

The Director KARI showed a keen interest in the development of GIS in KARI. Various centres and programs may benefit from it, as long as they have sufficiently inventoried their subject of interest. In the case of KSS, lots of inventory data are at hand to be entered and used, amongst others, to assist in land use planning at district and divisional

level. A seminar is scheduled for 6/3/1992, at which agricultural scientists and donor agencies will be invited to presentations on the concepts and applications of GIS. KSS will then present its case study on the Kwale District.

## 6 CARTOGRAPHY AND LIBRARY

### 6.1 Cartography

Because of recent staff changes as well as technological developments, a meeting was convened with the Cartography section, Ag. Head KSS, and the WSC liaison officer. The organizational structure is now:

P. Maingi	Head, overall responsibility, focus on computer-assisted cartography
J. Osiemo	cartographer, focus on conventional cartography
L. Mikisi	ass. cartographer (training in Denmark: August 1991 - June 1992)
P. Oketch (Ms)	ass. cartographer/reproduction
J. Kibe	trainee ass. cartographer
J. Ondiek (Ms)	reproduction
D. Olulo	former Head, now project consultant (July 1991 - December 1992)

Equipment in the drawing room and in the dark room is well-maintained. The procurement of a Kroy lettersetting machine in 1990 now secures smooth map lettering and legend preparation. The very old printing press in the reproduction room will be replaced by the end of 1991, but kept on stand-by.

Complaints were raised on receiving too many rapid job requests from people speaking on behalf of Directors KARI and NARL. Such people should from now on be referred back to the Ag. Head KSS, before any job is accepted. The same holds for the excessive use of the photocopying machine by staff that does not belong to KSS.

### 6.2 Library

KSS librarian M.O. Aguno recently returned from Botswana after a successful completion of his certificate course at the University. Discussions were held on automation of searching and lending in the KSS Library. All books and journals will have to be indexed by author and subject. This may require some external assistance, which will be looked into by 1992. Meanwhile, the librarian started a thorough inventory of the present stocks.

## 7 STAFF REQUIREMENTS

During the mission, KSS staff requirements were handed in at KARI Headquarters, according to the Centre Research Document of 1988. At present, KARI can not recruit staff from outside, and therefore the list was prioritized to include 2 BSc/MSc level-soil surveyors or land evaluation specialists, 1 agronomist, 1 soil chemist, 2 cartographic trainees, 1 technical officer, 3 technical assistants, 1 labtechnician, 2 typists and 1 driver.

KSS definitely needs more staff. At present, a number of officers is overloaded and come to work at KSS each Saturday. Although this is commendable, it should not become a structural solution to the current staff problem.

Some officers have left KSS in the past few years, others retired. Each KARI Centre faces these setbacks. There are, however, two reasons why the situation at KSS might deserve special attention, i.e.,

- \* the development of the GIS needs the full attention of 3 staff members;
- \* with more officers, more chargeable work can be undertaken; hence, KSS will bring in more money for re-use by itself (70%) and by KARI at large (30%).

## 8 SURVEYS, REPORTS AND PUBLIC RELATIONS

### 8.1 Soil surveys

#### 8.1.1 Systematic surveys

The fieldwork for the soil survey and land evaluation of the Narok District will be completed by March 1992. After completion of the soil correlation, later during that year, a report on soils, land use and land suitability of the entire district will be published.

It is foreseen that the next reconnaissance survey will be conducted in the Murang'a District. Program leader will be S.N. Wanjogu, who has by then obtained his MSc. degree from the University of Nairobi (1992).

The reconnaissance survey of the area around Lodwar in Turkana District, in collaboration with UNESCO, has been completed. The results of the survey are meant to assist the Turkana Rangeland Environmental Monitoring Unit. This report will be published by early 1992.

#### 8.1.2 Ad-hoc surveys

Recent requests for soil surveys were received from the International Council for Research in Agro-Forestry, the University of Nairobi, the Bura Fuelwood Program, the Provincial Irrigation Unit Taita-Taveta, and the National Irrigation Board.

These organizations will pay for services to be rendered by KSS in full.

### 8.2 Reporting

#### 8.2.1 Reconnaissance surveys

At present, reports on the mapsheets of Makueni and Busia are nearing completion and will be printed towards the end of 1991. Some progress was made on the Bondo (Gicheru) and Transmara sheets (Okoth, Wamicha). No progress was, however, observed on the Malindi and Chuka sheets.

#### 8.2.2 Detailed surveys and site evaluations

After some years of little output due to reasons such as poor motivation, slow reporting, other duties, no transport, no project funds, no drivers, no clients, the year 1991 shows a tremendous increase in requests and, fortunately, also in **completed** reports.

At the time of the mission, the following reports were in an advanced stage:

Semi-detailed surveys: Bukura Agric. Training Centre, PIU Uasin Gishu, and 2 private farms;

Detailed surveys: ICIPE research station Mbita and Ungoye, TARDA Kiambere, Hodan Irrigation Scheme, and 6 private farms;

Site evaluations: Magarini settlement scheme, Jamhuri Park showground, Moi University farm, Kasarani Teachers College farm, GAT Transmara survey, and 6 private farms.

A visit was paid to the SSIP in the Ministry of Agriculture, who used to be a regular client of KSS. Due to extremely late delivery of relatively simple reports by KSS, the Project drifted towards expensive consultants. SSIP now issued a list of surveys foreseen in the near future, and KSS will plan and accomplish the required work within an agreed time frame.

#### 8.2.3 Conference report

P.F. Okoth was given the time-consuming duty of editing the papers presented during the International Workshop on Multi-purpose Use of Soil Survey Information, which was held in Nairobi in March 1989. The document should be ready by the end of 1991.

#### 8.3 Public relations

The KSS brochure, together with the Annual Report 1990 and the new List of Publications, grouped according to District, will be issued as one package to customers by the end of 1991. In the List of Publications, the new prices will be included, in accordance with the new tariff system (Table 3).

## 9 SOIL RESEARCH

The on-going research programs were listed in the previous mission report. In brief, they are:

1. Management of rainfed Vertisols in semi-arid areas of Kenya for increased production by smallholders (Dr F.N. Muchena, S.M. Wokabi)
2. Study of the influence of conservation and cultivation techniques on soil moisture and crop production in a semi-arid area (Lower Meru and Embu Districts; R.M. Kiome)
3. Maize productivity and yield gap analysis in three different agro-ecological zones in Central Kenya (S.M. Wokabi)

Kiome (2), before his departure to the UK, handed in a possible follow-up project, as his research sites are still fully equipped to continue monitoring of crop growth in relating to soil moisture. Wokabi (3) could make good use of these sites in determining yield levels under researcher-managed conditions. The WSC liaison officer spent two days in the field, to assist in sampling procedures and selection of satellite farmers in the vicinity of the trial sites. Scrutiny of information gathered in the Fertilizer Use Recommendation Project will be needed to come to a final selection of those trial sites. Dr A. Zinck, professor of soil science at ITC, The Netherlands, and a member of the KSS Project Liaison Unit, will visit Kenya by mid-September to supervise the Ph.D. work of Mr Wokabi.

During the period September-November 1991, a research project will take place in Taita-Taveta District, in cooperation with WSC and Wageningen University, Dep. Soil Science and Geology. The objective is to test heterogeneity of salinization in irrigated areas. With an electromagnetic device (EM38), earlier tested for similar reasons in Pakistan, rapid insight into salinization can be obtained. To check whether the readings really reflect salinity, soil samples need to be taken according to the tested grid, measuring moisture content and electrical conductivity in the field. The results will be published in an international journal.

In 1992, P.F. Okoth will receive financial and technical assistance from the project in a research project aimed at increased insight into the potential and vulnerability of the most common soils of Kenya's high and medium-potential agricultural lands. A detailed proposal needs to be drafted and discussed before embarking on any fieldwork.

Talks were held with two staff members of the Soil Science Department of the University of Nairobi (Mr J. Mbuvi, Mr C. Gachene, both former KSS staff) on possible cooperation in different fields of soil research. As the officers also pleaded for (Dutch) assistance in curriculum development, equipment and teaching, they were advised to draft a proposal of that nature and submit it to RNE for consideration.

## 10 WORKSHOP 'LAND EVALUATION'

The subject of the annual mid-year workshop (5-16 August, 1991) was 'Land Evaluation for different users'. The course was conducted by PLU-member Dr H.Th. Riezebos of the University of Utrecht, Department of Physical Geography. The program is given below.

- |      |                                                                                                                                                                                                  |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5-8  | Opening (KARI Ass. Dir. Horticultural Crops) and briefing on project matters (WSC liaison officer); Lecture: Introduction to Land Evaluation; Tutorials: Automated Land Evaluation System (ALES) |
| 6-8  | Lecture: Framework/Guidelines for Land Evaluation and the KSS system; ALES tutorials                                                                                                             |
| 7-8  | Matching ALES and KSS system + exercises; simple Lotus-driven water balance models                                                                                                               |
| 8-8  | Lectures: Spatial and Temporal Dynamics in Land Evaluation (E.M.A. Smaling); Maize Yield Gap Analysis in Embu/Meru (S.M. Wokabi); Matching ALES and KSS system + exercises                       |
| 9-8  | Lecture: Introduction to Quantitative Land Evaluation; Matching ALES and KSS system + exercises                                                                                                  |
| 12-8 | Lecture: Quantitative Land Evaluation; Discussion ALES system                                                                                                                                    |
| 13-8 | Lecture: Quantitative Land Evaluation; Exercises                                                                                                                                                 |
| 14-8 | Lecture: Focus on soil erosion (Universal Soil Loss Equation) and soil fertility (Fertility Capability Classification) + exercises                                                               |
| 15-8 | Lecture: Introduction to Geostatistics                                                                                                                                                           |
| 16-8 | Lecture: Geostatistics (continued); Course evaluation; Closing (Director NARL)                                                                                                                   |

KSS decided the time to be right to hold such a workshop. One reason was the fact that, due to training, GIS duties and retirements, the KSS Section 'Land Evaluation and Development' is grossly understaffed. Hence, officers from other KSS sections should become more conversant with the subject. So far, merely qualitative, parametric systems have been used, but as land gets scarcer all the time, the production potential of agricultural land has to be assessed in a more quantitative way. As shown in the program, different land evaluation systems were introduced and discussed in the course of the workshop, and exercises, both manual and computerized, were given. S.M. Wokabi, Head KSS, who recently started Ph.D. research on land evaluation, contributed to the workshop.

The main outcome of the evaluation of the course was:

- \* ALES will be developed for KSS, so as to perform rapid physical as well as economic land evaluations;
- \* Research data on crop yields under different management systems and fertility levels, and on soil erosion, are needed to verify the outcome of ALES; a lot of information is available as 'grey literature' at different Kenyan research centres;
- \* Other systems could be employed during research work (Wokabi);
- \* Geostatistics will be further worked out during the study on salinization in Taveta; results will be discussed in a mini-workshop on October 3 and 4, 1991;

- \* Soil scientists are too one-sided, in that they tend to look into their profile pits too much, while paying too little attention to the local context of the farmer; there should be more interplay between them and the agro-economist(s), in order to widen the scope and impact of land evaluation exercises.

## ITINERARY

29/7	23.50	Departure Amsterdam
30/7	9.00 14.00	Arrival Nairobi Meeting with Dr F.N. Muchena, Director NARL, and W.W. Aore, Ag. Head KSS
31/7	morning aftern.	Meeting with W.W. Aore, Ag. Head KSS Meeting with Dr B. Ngundo, Ass. Director Soil, Water and Other Resources
1/8	morning aftern.	Meeting with Dr C.G. Ndiritu, Director KARI Meeting KSS staff (S.M. Wokabi, Head KSS, and R.M. Kiome, both on PhD. study leave; GIS group); Dr F. Schnir (Fertilizer Use Recommendation Project (FURP))
2/8	morning aftern.	Visit to Field-day at KARI National Agricultural Research Centre, Muguga Meeting with KSS staff (trainees Kinyanjui, Onyono, Macharia; and Rachilo)
3+4/8		Arrival Dr H. Riezebos; preparations workshop
5/8	morning aftern.	Start of Workshop on Land Evaluation Briefing KSS staff on project matters Meeting with Dr C.G. Ndiritu, Director KARI, on possible GIS applications within and outside KARI
6/8	morning aftern.	Meeting with Dr R. Bos, First Secretary at Royal Neth. Embassy Meeting P. Okoth, KSS Field Survey, on work programme Workshop
7/8	morning aftern.	Meeting with KSS Soil and Water Management Section (Ekirapa, Mare, Kariithi, Kibe) and Soil Chemistry Section (Ochieng, Gachini) Meeting with Mr J.K. Rutto, KARI Deputy Director, Crop, Soil and Water Research Workshop; Briefing Dr Muchena on the National Agricultural Research Institute (INIA), Maputo, Mozambique
8/8	morning aftern.	Lecturing in Workshop: 'Spatial and Temporal Dynamics in Land Evaluation' Workshop

9/8	morning	Meeting with Mr Mwangi, Min. of Agriculture, Irrigation and Drainage Branch, Small Scale Irrigation Project; Meeting with KSS Cartography and Library staff; Meeting with KSS MSc. students at the University of Nairobi (Macharia, Wanjogu)
	aftern.	Workshop
10 + 11/8		report write-up, Meeting W.W. Aore
12/8	morning	Meeting with KARI Dep. Directors, Ass. Directors, NARL Centre Director, KSS Ag. Head
	aftern.	Editing KSS reports
13/8		Workshop; editing KSS reports
14/8		Workshop; Discussions W.W. Aore, P.N. Okoth, B.K. Waruru; Meeting with Mr J. Mbuvi and Mr C. Gachene (University of Nairobi)
15/8		Workshop; report write-up
16/8		Workshop; closing session
19/8	morning	Report write-up; meeting with Dr B.O. Mochoge and E. Tong'i (FURP), and with Mr Wen Ting-Tjiang (FAO)
	aftern.	Meeting at RNE (Mr A. Huitzing, Dr R. Bos, Mr J. Lubbers, Dutch staff related to KARI projects)
20/8	morning	Meeting Dr C.G. Ndiritu, Director KARI
	aftern.	Technical meeting KSS on Land Evaluation (follow-up of workshop)
21 + 22/8		Fieldwork with S.M. Wokabi (Embu District): Visits to FURP sites at Kavutiri, Gachoka and Embu; visits to KARI Centres at Embu and Mwea-Tebere; visit to research sites R.M. Kiome near Kiritiri
23/8	morning	Introduction C. Epker, student Wageningen University; Discussions S.M. Wokabi
	aftern.	Debriefing Dr Muchena; Wrap-up KSS (W.W. Aore); Happy hour
24/8		Report write-up
25/8	1.20	Departure Nairobi
	8.45	Arrival Amsterdam

Other contacts:

Drs. H. van Bremen

(UNESCO)

Ir P. Kiepe

(ICRAF)

Drs. M. Schomaker

(UNEP)

Dr J. Ingram

(Tropical Soil Biology and Fertility Programme (TSBF))

Dr P. Woomer

(TSBF)

# ANNEX. MONTHLY WORKPLAN FOR THE PERIOD AUGUST - DECEMBER 1991

MONTH	ACTIVITY	WHERE	BY WHOM
AUGUST	<u>LAND EVALUATION WORKSHOP</u> (5/8/91 - 16/8/91)	KSS	All KSS Technical Staff
	<u>WORKSHOP FOR I.D.B SENIOR STAFF</u>	A.I.C	Lectures given by Messrs.Gicheru, Rachilo, Kamoni, Ekirapa and Aore Demonstrations given by Messrs.Shitakha, Kibe and Kimotho
	<u>CLEARANCE OF BACKLOG OF WORK</u>	KSS	(Expected date of Completion)
	-TARDA REPORT (Kiambere)		Kibe and Shitakha - September 30th
	-SOWET FARM REPORT (Kitale)		Gicheru and Rachilo - September 30th
	-UNGOYE RESEARCH STATION FARM		Muya and Rachilo - September 30th
	-MAYA'S FARM (Kilifi)		Ndaraiya - September 30th
	-MAGARINI SETTLEMENT SCHEME (Kilifi)		Ekirapa - September 15th
	-POORLY DRAINED AREAS OF UASIN GISHU DISTRICT		Kimotho - September 15th
	-SOIL CONDITIONS OF MOI UNIVERSITY FARM (Uasin Gishu)		Kimotho - September 30th
SEPTEMBER	-MATHINA FARM		Aore - October 31st
	-BUKURA FARMERS TRAINING CENTRE FARM		Kibe, J.M - September 23rd
	-HODAN IRRIGATION SCHEME		Mare - September 23rd
	-GAT TRANSHARA SITE EVALUATION		Okoth - October 30th
	-SOILS OF THE TRANSHARA AREA		Wamicha - June 1992
	-NJORO MUTUKIANO FARM (Nakuru)		Kimotho - October 31st
	<u>SOIL CORRELATION OF TURKANA AREA</u> (28/08/91 - 02/09/91)	LODWAR	Aore, Wamicha, Muchena, van Bremen Two drivers and Casuals
	<u>SALINITY MONITORING RESEARCH</u> (28/8-11/9/91)	TAITA-TAVETA	Okoth, B.Mwangi, Wataka, One driver and Casuals
	<u>NAROK RECONNAISSANCE SURVEY</u> a). Soil mapping	NAROK	Aore, Shitakha, Kimani and Kariuki, C., One driver and Casuals
	b). Water management tests	NAROK	Mare and Ng'ethe and Two Casuals
	c). Land Use Survey	NAROK	Kilambya, One driver and One casual
	<u>NIB FARM AT MWEA-TEBERE</u> (09/09-21/09/91)	MWEA	Kamoni, Kimotho, One driver and Casuals
	<u>ICRAF EXPERIMENTAL FARM (MUGUGA)</u> Topo - mapping (16/09-28/09/91)	MUGUGA	Wataka, B.G. Mwangi, One driver and Casuals
	<u>SALINITY MONITORING RESEARCH</u> (in collaboration with Wageningen University; 18-25th)	TAITA-TAVETA	Okoth, Wataka, B.N. Gunn, One driver and Casuals
	<u>GEOGRAPHIC INFORMATION SYSTEM</u> Digitizing of Kwale-Lungalunga-Mombasa report viz. soils, vegetation, land use etc	KSS	Maingi, Kamoni and Kimotho
	<u>NAIROBI INTERNATIONAL ASK SHOW</u> Preparations for displays at KSS and the Show Ground	NAIROBI	Rachilo, Wamicha, Okoth, Maingi, Kamoni and One driver

OCTOBER	<u>NAROK RECONNAISSANCE SURVEY</u> a). Soil mapping	NAROK	Aore, Kimani, Waweru, Kariuki,C., Two drivers and Casuals
	b). Land Use survey		Kilambya, One driver and Casuals
	c). Water management tests		Mare, Nge'the, One driver and Casuals
	<u>ICRAF EXPERIMENTAL FARM (MUGUGA)</u> Soil mapping (01/10-05/10/91)	MUGUGA	Rachilo, Gicheru, One driver and Casuals
	<u>FAO/UNESCO LEGEND WORKSHOP</u> Profile pit location and characterization	CENTRAL KENYA	Okoth, Gicheru, Rachilo, one driver and casuals.
	<u>KWALE RECONNAISSANCE SURVEY</u> Soil mapping	KWALE	Kamoni, Kariuki,C., Kimotho, Wataka, B.Mwangi, Two drivers and Casuals
	<u>NAIROBI INTERNATIONAL ASK SHOW</u> Participation at the show ground	NAIROBI	Rachilo, Wamicha, Maingi, Kilambya, Okoth and One driver
	<u>SEMINAR IN GEOSTATISTICS</u> (3rd - 4th)	KSS	ALL KSS Technical Staff
NOVEMBER	<u>NAROK RECONNAISSANCE SURVEY</u> Soil mapping	NAROK	Shitakha, Kimani, Waweru, Kariuki,C., Two drivers and Casuals
	Land Use Survey		Kilambya, One driver and Casuals
	Soil and Water management tests		Mare, Ng'ethe and One driver
	<u>KWALE RECONNAISSANCE SURVEY</u> Soil mapping	KWALE	Kamoni, Kimotho, Waweru, Rachilo, Two drivers and Casuals
	<u>AFRICAN SOIL SCIENCE SOCIETY</u> <u>MEETING</u> Paper presentation and Excursion (3rd. - 10th Nov.)	EGYPT	Okoth, Gicheru and Muchena (KSSP Sponsored)
	<u>EASTERN AFRICAN SOIL CORRELATION</u> <u>AND LAND EVALUATION MEETING</u> (23rd Nov.- 4th December)	MALAWI	Aore, Kamoni and Maingi (Aore Sponsored by FAO while Kamoni and Maingi Sponsored by KSSP)
	<u>EAST AFRICAN SOIL SCIENCE</u> <u>SOCIETY MEETING</u> (1st. - 7th)	UGANDA	Rachilo, Ochieng', N.P., Ndaraiya, Kimotho and Thairu (Driver)
	<u>DRAFT REPORT WRITE UPS</u>	KSS	ALL KSS TECHNICAL STAFF
DECEMBER			