



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

March 1991

E.M.A. Smaling

## International Activities Report 13

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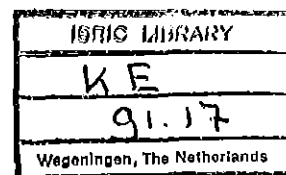
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**Report of a cooperation mission to the KENYA SOIL SURVEY**

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**March 1991**

**E.M.A. Smaling**



**International Activities Report 13**

**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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Project 8559

455wn/04.91

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## SUMMARY

1. The development of the Kenya Agricultural Research Institute (KARI) proceeds smoothly as far as programme development and priority setting are concerned. Financial troubles, however, have hampered full effectiveness of the institute so far. This has also adversely affected Kenya Soil Survey (KSS).
2. KSS moves well because of the availability of donor funds and the presence of a local account in Nairobi. The unpredictable transfer of Kenyan funds to KSS precludes proper work planning. Funds need to be present by early January, as it is the best time for fieldwork. At present, most systematic fieldwork activities are paid from donor funds, whereas this was never really meant to be the case. It is the intention of the donor to turn KSS into an a self-supporting institution. That stage will not be reached at all, when the present financial uncertainties remain.
3. Ever since KSS joined KARI, the workload has increased, notably on ad-hoc surveys, which are still not paid for in full. It is anticipated that the tariff system will be gazetted officially in the course of 1991, and from then onwards there should be no more free services rendered. At present, some ad-hoc surveys have to be carried out at very short notice for non-paying individuals. The author of this report is convinced that KSS can not afford this as long as local funds are scarce. It is reiterated that donor funds will not be made available for such jobs.
4. The staff situation further deteriorated in 1990. Two research officers left KSS. The recent installation of a geographic information system (GIS), which received full support from the KARI Directorate, requires the full commitment of three officers, but at the same time it underscores the need for recruitment of new staff.
5. The Inception Report was forwarded to KARI and the Royal Netherlands Embassy (RNE) in draft form. Comments will be included and the final document will be out by May 1991.
6. The annual mid-year workshop in 1991 will be on 'Land Evaluation for different users'. The course leader will be PLU-member Dr H.Th. Riezebos.
7. Between 4 and 15 March, 1991, Mr E. Sussenbach of the Dutch software company Logisterion BV conducted a successful on-the-job training course for 9 KSS officers, including 3 officers who went for pre-training in The Netherlands. An informal network of local users will be established to avoid duplication of efforts and to assist in case of troubles.
8. As a follow up to the GIS training course, a pilot project will be started on Kwale District. A set of thematic land resource and land suitability maps will be presented to the KARI Regional Research Centre in Mtwapa, the Kwale



District Development Committee and other interested parties in Coast Province and Kwale District.

9. Good progress is presently being made on the fieldwork of the soil survey and land evaluation of the Narok District. Together with the earlier surveyed Transmara area, a report will be prepared on soils, land use and land suitability of the entire district, using the GIS.
10. Although the backlog in (semi-)detailed surveys and site evaluations has been cleared, a considerable portion of work on reconnaissance surveys remains to be done. The expected progress before the arrival of a Mid-Term Review Mission in 1992 was discussed and individual workplans were handed in.
11. After having been out of circulation for 2 years, the Exploratory Soil Map of Kenya on a scale of 1 : 1 000 000 is for sale again.
12. KARI agreed to release HFl. 60,000/= out of Dutch core funding for the procurement and maintenance of the new GIS room. Since the costs of hardware, software and the course itself were paid in The Netherlands, the KARI allocation will be used for, amongst others, the procurement of tables, chairs, drawers, airconditioners, voltage stabilizers, electrical wiring system, diskettes, and for repairs.

## 1 INTRODUCTION

Between February 26 and March 19, 1991, Ir. E.M.A. Smaling of the Winand Staring Centre for Integrated Land, Soil and Water Research, Wageningen, The Netherlands (WSC), paid a working visit to the Kenya Soil Survey (KSS), Nairobi, Kenya. Since 1972, this institute is supported through a bilateral agreement between the Netherlands Directorate for International Cooperation in the Ministry of Foreign Affairs (DGIS), and the Kenya Agricultural Research Institute (KARI) in the Ministry of Research, Science and Technology.

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

## 2 KENYA SOIL SURVEY: ONE YEAR WITHIN KARI

Kenya Soil Survey is a department of the National Agricultural Research Laboratories (NARL), whereas NARL belongs to the group of 15 national research centres in KARI. All KARI research centres are listed in Annex 1. It is only since early 1990 that NARL forms part of KARI.

The development of KARI proceeds smoothly as far as programme development and priority setting is concerned. Financial troubles, however, have hampered full effectiveness of the institute so far. The progress in the development of KARI was evaluated during a joint Government of Kenya (GoK)/donor Mid-Term Review in June 1990. The highlights of the findings of this Review Mission, carried out under the auspices of the International Service for National Agricultural Research (ISNAR), are given in Annex 2.

One of the beneficial effects for KSS staff is the improvement of the basic scheme of service, although the improvement of secondary facilities such as medical insurance and retirement benefits has not yet been effectuated.

The financial troubles, clearly spelled out in the Mid-Term Review Mission report (Annex 2), also affect KSS, particularly with respect to GoK funds. Funds for the first half of 1991 had not reached KSS by 20-3-1991. By December 1990, donor funds for KSS, transferred by the Royal Netherlands Embassy (RNE) to KARI, amounted to KShs. 500,000/=, out of which only KShs. 368,350/= was handed over to KSS for the period January-March 1991. Next, there is the flow of donor funds through DGIS and WSC, which is not affected by financial constraints at KARI. Part of these funds are transferred to a local account in Nairobi, from which the WSC officer can draw while in Kenya. These funds are used to pay for local Training and Equipment, and for occasional trouble shooting.

The RNE also transferred an amount of 60,000 Dutch guilders to KARI, which is meant for the development of the Geographical Information System (GIS) at KSS. These funds were not immediately available when requested. The amount will now be broken down in detail and the request for its release to KSS will be forwarded again to the KARI Director of Finances.

It should be realized that KSS moves well because of the availability of donor funds and the presence of the local account. The totally unforeseeable transfer of GoK funds to NARL and KSS in particular, still precludes proper work planning. Funds need to be present by early January, as it is the best time of the year for fieldwork. At present, most systematic fieldwork activities are paid from donor funds, whereas this was never really meant to be the case. There are cases of KSS receiving GoK funds as late as May, when it is too wet for fieldwork. Nonetheless, the funds had to be accounted for within a month, and anything left unspent was to be returned to the parent ministry. As KSS is now part of a big research institute, it means that the need for proper work planning and implementation is of crucial importance, and funds

once earmarked should be made available on time. It is the intention of the donor to turn KSS into an a self-supporting institution. That stage will not be reached at all, when the present financial uncertainties remain.

In spite of the gloomy picture just painted as far as funds are concerned, it should be stressed that the encouragement and support from the KARI Directors and the NARL Centre Director is greatly appreciated. Now that KARI Headquarters has moved to the NARL compound, contacts are intensive and stimulating.

Ever since KSS joined KARI, the workload has increased, notably on ad-hoc surveys, which are still not paid for in full. It is anticipated that the tariff system will be gazetted officially in the course of 1991, and from then onwards there should be no more free services rendered. At present, some ad-hoc surveys have to be carried out at a short notice for non-paying individuals, draining KARI's financial resources. The author of this report is convinced that KSS can not afford this as long as local funds are scarce, whereas donor funds are not meant to support this trend.

The staff situation further deteriorated in 1990. Two research officers left KSS. The recent installation of a GIS, which received full support from the KARI Directorate, requires the full commitment of three officers, but at the same time it underscores the need for recruitment of new staff.

### 3 PROGRESS ON IMPLEMENTATION OF THE TWINNING ARRANGEMENT

#### 3.1 Inception report

The Inception Report was forwarded to KARI (Director Crops, Soils and Water; Ass. Director Soils, Water and Other Resources), NARL (Centre Director) and RNE in draft form, after having been discussed with DGIS officers and the PLU. Comments were received from the NARL Centre Director and the RNE. Once the comments from KARI Directorate have been received, the final document will be compiled and printed. This should be realized by May 1991.

#### 3.2 Annual report KSS

During the present mission, much attention was paid to the structure, contents and consistence of the KSS Annual Report for 1990. It should consist of

- a general part, including training activities, brief workshop and seminar reports (0.5-1 page), equipment procured, visitors received, cooperation with other organizations, participation in lectures, demonstrations, open days, shows, etc.; and
- a technical part, listing the work completed, continued and started during the reporting period; progress and results of the research subjects in briefs; progress and output on systematic surveys in concrete terms; ad-hoc services rendered, naming the affiliation of the client, and whether the services generated income; and
- the work planned for the next reporting period.

#### 3.3 Quarterly reporting

Quarterly reports should be brief, to-the-point statements on the most relevant events at KSS in a period of three months (maximum of 4 pages). They have to be submitted to NARL Centre Director, RNE and WSC within a month after the three months period is over. So far, four reports were written for 1990, but they were not completed in time. The contents of these reports still have to be reshaped somewhat. As they should serve purposes of monitoring and evaluation, there should be no petty details on local purchases in such reports.

#### 3.4 Lines of communication

Communication within the Twinning Arrangement proceeds smoothly. In The Netherlands, the WSC officer briefs the DGIS officer in charge of Kenya, discussing

the International Activity Reports, which are also sent to the Kenyan authorities, RNE and the PLU members.

In Kenya, the WSC officer discusses all matters of relevance to KSS with the First Secretary and the Head of administration at the RNE, and briefs and debriefs the KARI Director Crops, Soils and Water, the KARI Ass. Director Soils, Water and Other Resources, and the NARL Centre Director. At KSS, extensive discussions are held with the Head, whereas at least all research and technical staff members are met individually.

Clearing of shipped and air-lifted goods from The Netherlands has been taken care of quite smoothly by the KARI Senior Supplies Officer, who was assisted by RNE on duty-exemption documents.

### 3.5 Project Liaison Unit

The Project Liaison Unit has been established and held its first meeting on February 19, 1991. The members of the PLU are:

Ir C. Hellingman	International Agricultural Centre (IAC)
Ir H. Braun	International Institute for Land Reclamation and Improvement (ILRI)
Drs. V.W.P. van Engelen	International Soil Reference and Information Centre (ISRIC)
Prof. dr A. Zinck	International Institute for Aerospace Survey and Earth Sciences (ITC)
Ir R. Leyder	Larenstein Agricultural College, Deventer
Dr H. Th. Riezebos	University of Utrecht, Dep. of Physical Geography
Ir D. Legger	University of Wageningen, Dep. Soil Science and Geology
Drs. R.F. van de Weg	Winand Staring Centre for Integrated
Ir W. Andriesse	Land, Soil and Water Research (WSC)
Ir A.K. Bregt	
Ir E.M.A. Smaling (chairman)	

The first meeting was also attended by Mr S.M. Wokabi, Head Kenya Soil Survey, who is on study leave at ITC, Enschede. The minutes of the PLU meetings are sent to KARI Director Crops, Soils and Water, KARI Ass. Director Soils, Water and Other Resources, NARL Centre Director, Head KSS, RNE, DGIS and all PLU members. Meetings will be held prior to a visit by the representative of WSC, in charge of the Twinning Arrangement.

### 3.6 Land evaluation workshop

The annual mid-year workshop in 1991 will be on 'Land Evaluation for different users'. The course leader will be PLU-member Dr H.Th. Riezebos.

KSS decided the time to be right to hold such a workshop. 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. During the workshop, different land evaluation systems will be introduced and discussed, and exercises, both manual and computerized, will be given. Meanwhile, S.M. Wokabi, the Head of Kenya Soil Survey, started Ph.D. research on land evaluation (see also section 6). The current title is: Prediction of maize yield potentials according to different agro-ecological conditions in Central Kenya, making use of a geographic information system. Mr Wokabi will also contribute to the workshop.

## 4 GIS TRAINING COURSE AND FOLLOW-UP

### 4.1 Previous activities

KSS is ready for a geographic information system (GIS). This was the major conclusion of the in-house workshop held in August 1990 on this subject, during which KSS officers and PLU-member Ir A. Bregt (WSC) discussed whether KSS should have a GIS of its own and if so, what the pros and cons of various systems would be. The results of the workshop are laid down in Ir Bregt's mission report (WSC International Activities Report no.7) and in Ir Smaling's latest cooperation report (WSC International Activities Report no.9).

The first follow-up to this workshop was a three-months training for three KSS officers at ITC, Enschede. They returned with a more than basic knowledge on informatics and GIS. The officers concerned will be in charge of the system, once it has been established at KSS, i.e. one general manager (P.T. Kamoni MSc.), one database manager (P. Kimotho) and one cartographer (P. Maingi). Eight KSS officers followed short DBase training courses in Nairobi to familiarize with computerized storage and retrieval of land and soil information.

### 4.2 Training course Arc/DBase 4-15 March 1991

The recommendations by Ir Bregt were adhered to, leading to the procurement of hardware (digitizing table, multi-color plotter, two personal computers with 110 and 300 Mbyte storage capacity), and Arc/Info and DBase IV software. Between 4 and 15 March, 1991, Mr E. Sussenbach of the Dutch software company Logisterion BV conducted a successful on-the-job training course for 9 KSS officers, including the 3 officers who went for pre-training in The Netherlands (Aore, Okoth, Gicheru, Kilambya, Kamoni, Kimotho, Maingi, Ekirapa, Kinyanjui). During the course, all aspects of digitizing, arcplot, arcedit, map manipulation, overlaying of maps and final laying-out and colour-plotting were explained, demonstrated and then practised by the course participants.

The development of GIS at KSS is strongly supported by the KARI Director, who foresees KARI itself being an important client of the system in the future. A special demonstration was given to the KARI Directors as well as to the visiting KARI donor community. For this and future occasions, an easy-to-manage demo was made by the consultant, enabling KSS staff to show the capabilities of the system without having to waste time on operational aspects.

Other users in Nairobi of the same software are the UN Environmental Programme, the Regional Centre for Services in Survey, Mapping and Remote Sensing and the Department of Resource Surveys and Remote Sensing in the Ministry of Planning and National Development. Representatives of the three organizations were invited



to see the GIS configuration and discuss collaboration. An informal network of local users will be established to avoid duplication of efforts and to assist in case of troubles.

#### 4.3 Follow-up

As a follow up to the training course, a pilot project will be started. Objectives, activities and time schedule are listed below.

*Main objective:* offering 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 (Provincial Director of Agriculture, District Commissioner, District Agricultural Officer, District Extension Coordinator, District Crops Officer, Divisional Agric. Extension Officers), taking into account the prevalent and potential land utilization types in the district.

*Main contributors:* Kamoni, Kimotho, Maingi. Support: Okoth, Gicheru (soil survey), Kilambya (land evaluation), Ndaraya (agro-climate).

#### *Activities:*

1. Data collection on Kwale District (Kamoni, Kimotho, Maingi)  
Available information includes:
  - Kwale 1 : 100,000 map
  - Lunga-Lunga 1 : 100,000 map
  - Tsavo-Voi 1 : 250,000 map
  - Land utilization types study (C. de Jong)
  - Agro-climatic zones map (Jaetzold and Schmidt, 1982/3)
  - Maps of the Fertilizer Use Recommendation Project
2. Additional fieldwork. The westernmost part of the district has not been mapped at a reconnaissance level (Kimotho, Kimani)  
Discussions at the District Headquarters, collection of secondary information (Kamoni, Kilambya)
3. Digitizing information from available maps (Maingi)
4. Entering information on mapping units and representative profiles into the FAO Soils Data Base, with all functional land and soil properties in separate files (Kimotho)
5. Arcplot/Arcedit/Manipulation (Kamoni, Maingi, Okoth)
6. Lay-out and plotting of thematic resource maps (Maingi)
7. Identifying land utilization types (Kilambya)
8. Performing land suitability assessment (Kamoni, Kilambya)
9. Lay-out and plotting of land suitability maps (Maingi)
10. Writing an explanatory note (Kamoni et al.)
11. Presentation in Mombasa and Kwale to agricultural staff (KSS)

*Time frame:*

1-6: March-July 1991

Land Evaluation Workshop: August 1991

7-10: August-December 1991

11: February 1992

## 5 PROGRESS ON SOIL SURVEYS

### 5.1 Systematic surveys

Good progress is presently being made on the fieldwork of the soil survey and land evaluation of the Narok District. It is foreseen that by the end of 1991, the entire district will have been mapped on a 1 : 100,000 to 1 : 250,000 scale. Together with the earlier surveyed Transmara mapsheet, a report will be prepared on soils and land use and suitability of the entire district, using the geographic information system. Thematic maps on land properties relevant to proper planning of land use will be made with the help of the newly acquired multi-color plotter.

As soil survey information in Central Province on a district planning scale is scarce, it is foreseen that the next reconnaissance survey will be conducted in Murang'a District (1992).

In cooperation with the UN Regional Office for Science and Technology in Africa, a reconnaissance survey is being conducted of the area around Lodwar in Turkana District. The results of the survey are meant to assist the Turkana Rangeland Environmental Monitoring Unit. This study will be completed by June 1991.

### 5.2 Ad-hoc surveys

Requests from many different clients reach KSS. Among recent clients are the Tana and Athi River Development Authority, the International Centre for Insect Physiology and Entomology, the Kenya Woodfuel and AgroForestry Project, Provincial Irrigation Units, the Perkerra Regional Research Centre and the University of Nairobi.

The problem in dealing with the ad-hoc surveys is the unpredictable number of requests in a period of time (planning problem) and the fact that not all clients pay for the services (financial problem). An overview of all surveys completed, continued and started in 1990, is given in the Annual Report 1990, which will be issued by May 1991.

### 5.3 Reporting backlog

Although the backlog in (semi-)detailed surveys and site evaluations has been cleared, a considerable portion of work on the reconnaissance survey reports remains to be done. In future, this problem will be tackled differently. Data will be entered into the DBase system when the survey is still on-going. In this way, the data are at least accessible, even when a report has not yet been finalised.

At present, reports are pending on the mapsheets of Busia (to be printed in 1991), Bondo, Galole, Malindi, Transmara, Chuka and Makueni. The expected progress before the arrival of a Mid-Term Review Mission in 1992 was discussed with all the officers responsible for the backlog, and individual workplans were handed in (see below).

Planning of printing of maps and reports of reconnaissance reports and responsible officers:

Busia - report and map printed by December 1991 (map is available); **Rachilo**  
Bondo - final report draft and map printed by March 1992; **Gicheru**  
Galole - map printed by June 1992; **Kibe**  
Malindi - map printed by June 1992; **Osiemo**  
Transmara - report and map printed by June 1992; **Okoth**  
Chuka - report and map printed by December 1992; **Kiome**  
Makueni - report printed by June 1992 (map is available); **Muchena, Aore**

#### 5.4 Public relations

The completion of the KSS brochure faced delay, and had to be updated due to recent developments at KSS. It is still expected that it will be out by mid-1991.

After having been out of circulation for 2 years, the Exploratory Soil Map of Kenya on a scale of 1 : 1 000 000 is for sale again. Adjustments to the map were made by the Cartography section of the WSC.

A new KSS List of Publications will be available by mid-1991, in which reports are grouped according to District, so as to facilitate scrutiny by interested parties.

## 6 SOIL RESEARCH

The following research programmes are on-going:

1. Management of rainfed Vertisols in semi-arid areas of Kenya for increased production by smallholders  
Programme started in 1988 in Embu District, in cooperation with the International Board on Soil Research and Management (IBSRAM) and the KARI National Research Centre at Mwea-Tebere. Funding is provided by the European Communities. Responsible officer: Rachilo
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)  
Programme started in 1989, in cooperation with East Anglia University, UK. Funding: United Kingdom (ODA) and The Netherlands (DGIS, fieldwork expenditure only); Responsible officer: Kiome
3. Prediction of maize yield potentials according to different agro-ecological conditions in Central Kenya, making use of geographic information systems.  
Programme started in 1990, in cooperation with the Agric. Univ. Wageningen and ITC, Enschede. Funding: The Netherlands (DGIS); Responsible officer: Wokabi

Progress and achievements on the research programmes will be laid down in the KSS Annual Report for 1990.

The research approach for programme 3 is given in Annex 3. It focusses on so-called yield gap analysis. Potential and actual yields of crops tend to differ considerably. In a systematic manner, involving both application of simulation models, land evaluation as well as farming systems analysis, this research programme tries to unravel the causes of yield differences. Yield data are partly drawn from the Fertilizer Use Recommendation Project, which, like KSS, forms part of NARL.

## 7 FINANCES

The budget for 1991 (Netherlands component) is shown in Annex 4. Part of the allocation is administered from The Netherlands (N), part is handled by KARI HQ (K).

The biggest share of the funds that are administered through KARI are Operational Costs (line item 500). In December 1990, RNE transferred KShs. 500,000/= to KARI for KSS Operational Costs. Next, KShs. 368,350/= was made available to KSS, broken down as follows:

Transport operating expenses	160,000/=
Travel and accommodation	91,000/=
Stationery	45,000/=
Miscellaneous	17,350/=
Maintenance of plant	55,000/=
Casual labour during fieldwork	0/=

The total amount under line item 500 in Annex 4 is Hfl. 155,000/= (approximately KShs. 2,280,000). This implies that KSS should receive KShs. 570,000/= per three-months period in order to adequately square operational expenses. Hence, the KShs. 368,350/= received so far for the period January-March 1991, falls short of the budgetted amount.

The annual contribution from GoK had not been received by the time the present mission took effect. During the second half of 1990, the GoK contribution to KSS was a lowly KShs. 130,000/=, broken down as follows:

Casual labour	8,000/=
Transport operating expenses	60,000/=
Travel and accommodation	54,000/=
Laboratory	6,400/=
Miscellaneous	2,500/=
Stationery	0/=

For costs of telephone and postage, KSh. 7,500/= was earmarked, but this amount was never received.

Hfl.60,000/= was transferred from the RNE to KARI to assist in building up the GIS section. KARI agreed to use core funds for this development. It is expected that the funds will become available in bits during the next few months. As the total costs of the GIS hardware, software and installation and training (approximately Hfl. 120,000/=) were borne by the Netherlands-administered budget component, part of the Hfl. 60,000/= from KARI core funds may have to be rerouted for procurement of other equipment at KSS.

## 8 EQUIPMENT AND VEHICLES

### 8.1 Survey equipment

During 1990, a large amount of tents and camping material was procured. In 1991, only a limited number of items is needed (augers, soil infiltration measuring devices). The total requirement is HFl. 10,000/=.

### 8.2 Office equipment

KSS now owns 6 personal computers, 4 Compaq 386 and 2 Olivetti M24. Two new Brother typewriters, using WordPerfect were also bought in 1990, facilitating the administrative duties of the secretaries. The 1991 requirement for office equipment is HFl. 10,000/=. Servicing of office equipment is increasingly expensive, as more sensitive instruments come in. From mid-1991, all computers (6) and printers (3) will be serviced by Insight Computers Ltd., which has modest rates and also provides training in computer packages to KSS staff. The photocopier is still serviced by Ubix.

### 8.3 Laboratory equipment

A list of requirements was produced by the relevant officers (Ekirapa, Kinyanjui, Ochieng/Gachini). The instruments (phlame photometer, spectrophotometer), chemicals, and glassware needed amounts up to HFl. 60,000/=. During the mission, up to HFl. 5,000/= was spent on locally available chemicals.

### 8.4 Cartographic equipment

A list of requirements was produced by the relevant officers (Olulo, Maingi, Osiemo). The major investment will be a new printing press. Together with all other consumable items, the total amount needed is HFl. 55,000/=.

### 8.5 GIS equipment

KARI agreed to release HFl. 60,000/= out of Dutch core funding for the procurement and maintenance of the new GIS room. Since the costs of hardware, software and the course itself were paid through the DGIS/WSC vote, the KARI allocation can be used for the procurement of tables and chairs, drawers, an airconditioning system, voltage stabilizers, electrical wiring system, diskettes, other costs on computerization,

repair of one computer that was damaged due to a leaking water tank, and costs to be made during the Land Evaluation workshop in August 1991. A breakdown of intended spending will be handed over to KARI Director of Finances by late March 1991.

## 8.6 Library

Books and journals are well-kept in the KSS Library, which is still frequented by many researchers in all agricultural fields. KSS staff requested, the annual budget permitting, subscription to the international journals 'Soil Tillage Research' and 'Journal of Applied Meteorology'. On the return of the senior librarian, Mr M.O. Aguno, a start could be made with computerization of the library to facilitate both retrieval of publications and the lending system.

## 8.7 Vehicles

In 1990, two petrol-driven 110 Landrovers and one Peugeot 504 station wagon were purchased in Kenya. For the present year, the procurement of one landrover is foreseen. As the same holds for 1992, two landrovers will be procured towards the end of 1991. Due to persistent poor services rendered by CMC and Marshalls, KARI HQ agreed to have the entire KSS fleet serviced at Waithaka Diesel Workshop in Westlands. So far, their service has been quite satisfactory. An overview of the servicable KSS vehicles and year of purchase is shown below.

### **Landrovers (all long-wheel base)**

<i>Petrol</i>	<i>Diesel</i>
GK 98Y (1979)	GK J501 (1985)
GK 99Y (1979)	GK J502 (1985)
GK 486Y (1980)	
GK G544 (1983)	
GK G470 (1983)	
GK H348 (1985)	
KAA 963P (1990)	
KAA 964P (1990)	

### **Peugeots**

<i>504 station</i>	<i>404 Pickup</i>
GK 900S (1978)	GK F229 (1982)
GK 158Y (1979)	
KAA 360P (1990)	

### **Mitsubishi Canter**

GK F190 (1982)

**Goods trailers: 5**

**Water tanks: 5**



## 9 TRAINING 1991

During the present visit, the allocation for Training (HFl. 290,000/=) was earmarked as indicated below. Apart from degree training in The Netherlands, Kenya or elsewhere, funds are also set aside for the attendance of regional workshops and conferences, and short ad-hoc training sessions on particular subjects. UN allowances will be paid to KSS officers on such trips. They are encouraged to present papers, the quality of which has to be checked by NARL and KSS directorate. KSS staff was invited to send papers to be presented to WSC for comments. A brief account of the themes discussed and the final conclusions of the attended workshops should appear in the Annual Report.

### *Training programme 1991*

	Amount	Departure(D)/Return(R) and support RNE
<b>** Netherlands</b>		
S.M. Wokabi (ITC, Ph.D.)	15,000/=	April (R)
H. Onyono (ITC, Diploma Soils)	30,000/=	September (D) visa + US\$ 220
<b>** Kenya</b>		
R.M. Kiome (fieldwork, Ph.D.)	8,000/=	-
P.N. Macharia (Univ. Nairobi, MSc.)	15,000/=	October (R)
S.N. Wanjogu (Univ. Nairobi, MSc.)	10,000/=	October (R)
<b>** Elsewhere</b>		
B.K. Waruru (Belgium, MSc., 2nd year)	5,000/=	-
H.C.K. Kinyanjui (Belgium, MSc.)	30,000/=	October (D) + US\$ 220
J.R. Rachilo (Belgium, MSc.)	0/=	October (D) Belgian funds
C.R.K. Njoroge (US, BSc., 2nd year)	25,000/=	-
N.M. Achieng (US, BSc., 2nd year)	25,000/=	-
L. Mikisi (Denmark, Cartography)	30,000/=	December (D) + US\$ 220

**\*\* Short courses, workshops, congresses**

2 officers (Malawi, FAO meeting)	5,250/=	September (D/R) UN allow. + airtax
3 officers (Egypt, Afr. Soil Sc. Soc.)	9,250/=	December (D/R) UN allow. + airtax
4 officers (Uganda, East Afr. SSS)	7,500/=	Oct/Nov (D/R) UN allow. + airtax
J. Ndaraya (??, Workshop Climatology)	10,000/=	?
N. Gachini (Wag. Univ, S/Pl Analysis)	12,000/=	UN allow. + airtax Oct.(D)/Dec.(R) visa + US\$ 220/=
A. Ekirapa } E. Mare } J. Kibe } J. Kariithi }	40,000/=	Sept.(D)/Nov.(R) US\$ 220/= each + visa
(WSC, Soil Phys./Managem.) W.W. Aore	6,500/=	
(Narok, Research Project)		
5 officers	4,000/=	
(Nairobi, MS Dos, DBase)		
Hilda Wanjiku	2,000/=	
(Nairobi, Secr. College)		
Margaret Munguthi		500/=
(Nairobi, sewing course)		
<b>TOTAL:</b>	<b><u>290,000/=</u></b>	

## ITINERARY

25/2	22.50	Departure Amsterdam
26/2	9.00 14.00	Arrival Nairobi Meeting with Dr F.N. Muchena, Director NARL Brief meetings with KSS staff
27/2	morning  aftern.	Meeting with KSS Soil and Water Management staff (Ekirapa, Mare, Kariithi) Meeting with W.W. Aore, Ag. Head KSS -continued-
28/2	morning aftern.	-continued- Meeting with Dr H. Prestele (FURP) Meeting with MSc. students KSS (Wanjogu, Macharia)
1/3	morning  aftern.	Meeting with Dr B.W. Ngundo, KARI Ass. Director for Soils, Water and Other Resources Meetings with KSS Cartography staff (Olulo, Mikisi)
2/3		Meeting W.W. Aore (Ag. Head KSS)
4/3	morning  aftern.	Meeting W.W. Aore Meeting with Mr J.N. Miyogo, KARI Director of Finances and Planning Preparation GIS course Meeting W.W. Aore Meeting Prof. dr C. Kromm and Mr S.M. Nandwa (FURP)
5/3	morning aftern.	Royal Netherl. Embassy (Mr J. Lubbers) Preparation GIS course Meeting with Mr J.K. Rutto, KARI Director of Crops, Soils and Water Meeting with KSS Soil Chemistry staff (Ochieng, Gachini)
6/3		GIS training course
7/3		-continued-
8/3		-continued- Meeting with Dr C.G. Ndiritu, Director KARI Demonstration GIS to KARI Directors and Donors
9/3		Report write-up

11-12/3		GIS training course; report write-up
13/3	morning	Meeting with J. Ndaraiya (KSS Agro-climatologist)
		Meeting with Dr F. Schnir (FURP Chemist)
	aftern.	Meeting with Dr R. Bos and Drs L. Jacobs (RNE)
		Meeting with Dr J. Ingram and Dr P. Woomer (TSBF)
14/3		GIS training course; report write-up
15/3		Demonstration GIS to KARI and NARL staff
		Debriefing Mr Rutto, Dr Ngundo and Dr Muchena
		Discussion on GIS pilot project Siaya District
16-18/3		Visit to National Soil Service at the Agricultural Research Institute Mlingano (Tanga, Tanzania)
19/3		Wrap-up at KSS
	23.30	Departure Nairobi
20/3	6.00	Arrival Amsterdam

**Other contacts:**

Drs. H. van Bremen	(UNESCO ass. expert)
Ir P. Kiepe	(ICRAF)
Drs. M. Schomaker	(UNEP)
Dr J. Ingram	(TSBF)
Dr P. Woomer	(TSBF)
Dr J. Lynam	(Rockefeller Foundation)
Dr D.M. Daugherty	(USAID representative at KARI)

## ANNEX 1

### **KARI research centres**

#### *National Research Centres (NRC)*

1. Agricultural Research Laboratories - Kabete<sup>1</sup>
2. Agricultural Research Centre - Muguga
3. Veterinary Research Centre - Muguga<sup>1</sup>
4. Horticultural Research Centre - Thika
5. Range Research Centre - Kiboko
6. Dryland Farming Research Centre - Katumani
7. Animal Husbandry Research Centre - Naivasha<sup>1</sup>
8. Fibre Research Centre - Mwea-Tebere
9. Plant Breeding Research Centre - Njoro
10. Potato Research Centre - Tigoni
11. Pyrethrum Research Centre - Molo
12. Agricultural Research Centre - Kitale
13. Sugar Research Centre - Kibos
14. Seed Quality Research Centre - Lanet<sup>1</sup>
15. Arid Lands Research Centre - Marsabit

<sup>1</sup> supported by the Government of The Netherlands

#### *Regional Research Centres (RRC)*

1. Mtwapa
2. Embu
3. Kakamega
4. Garissa
5. Kisii
6. Perkerra
- 7-10. NRC's 2,6,9,12 have a dual role as RRC's

#### *Research subcentres (RS)*

1. Nyandarua RS - Ol Joro Orok
2. Kibos cotton RS
3. Lanet Beef RS
4. Mariakani Animal Production RS
5. Msabaha Agric. RS
6. Matuga Agric. RS
7. Trans Mara Veterinary RS
8. Bachuma Range RS
9. Chief Grader - Mombasa Port
10. Plant Quarantine Station - Muguga
11. National Seed Quality RS - Kitale

**Highlights GoK/donor Mid-Term Review Mission  
(ISNAR, June 1990)**

## Executive Summary

The Kenya National Agricultural Research Plan in 1986 proposed the establishment of a new, consolidated, semi-autonomous organization, the Kenya Agricultural Research Institute, closely linked to agricultural development ministries but with independent and flexible control of finances and operations. It was to rationalize and reduce the scatter of research stations, develop an integrated research programme prioritized in line with development objectives, and coordinate donor support for agricultural research within the guidelines of the plan.

Implementation support for an initial (5-year) time slice of a longer institution-building programme was provided in 1987/88 by the Government of Kenya and a consortium of donors, including ACIAR, CIDA, EEC, Germany, JICA, Netherlands, ODA, SIDA, UNDP/FAO, USAID, and World Bank. This was done through a composite project with parallel agreements with individual donors. Project implementation has been slower than planned: the mid-term review was requested to examine the continuing validity of the original concepts and assumptions for the project.

### Progress

Most of the original concepts were reliable, and much has been achieved. KARI has been established through the merger of various crops and livestock research institutions, and has a basically solid and suitable administrative structure. A network of research centres has been established which are either designated as National Research Centres (NRCs) with a mandate for national research programmes on commodities or factors, or as Regional Research Centres (RRCs) with responsibility for adaptive research, farming systems research, and research/extension linkages in specified agroecological zones. After a shaky start, the accounting system has been reorganized to operate on a computer basis and staff have been trained in its use. A revised scheme of service has been introduced for scientific staff and the training programme has kept to schedule on placing research staff in suitable postgraduate training courses.(ii)

### Unfulfilled Assumptions

However, the NARP was, in retrospect, extremely ambitious and optimistic, seeking as it did to move forward on many development fronts at the same time, fronts that involved substantial institutional changes. The achievable rates of change were probably all overestimated, even if conditions external to the research system had remained stable, as assumed. The creation of three new ministries and the subsequent uncertainties associated with the transfer of KARI between the Ministry of Agriculture and the Ministry of Research, Science and Technology were deeply disruptive to the research system as a whole and prevented KARI from concentrating on establishing the research system outlined in the NARP according to the prescribed timetable of the project.

An even more serious problem has been stability of funding. Instead of increasing as expected, operational funding has been reduced and not released to KARI at timely intervals in accordance with the seasonal nature of agricultural research. Cash flow problems have been extreme and have dominated most creative thinking. Unless and until substantial progress is made on this front, most other efforts to improve planning, management, and research productivity will be fruitless. Encouraging changes to improve financial health are underway.

The financial situation was exacerbated because anticipated donor funding for subprojects did not become available as rapidly as expected. This was partly due to donor uncertainty about the reliability of government funding for KARI, but also because the detailed short-term subprojects for necessary release of donor funds took much longer to develop from broad NARP guidelines than assumed.

### Incomplete Concepts

The delay in short-term programming was in part due to a shortcoming in the depth of analysis in the NARP. The framework for priority setting used for making decisions on long-term planning on commodities/factors and major constraints was not extended to cover decisions on short-term programmes and groups of experiments and studies. The necessary institutional arrangements for making decisions on experiments, studies, and short-term programmes are not clearly established yet, although the issue is being addressed urgently.

In addition, even on long-term planning, priorities in the NARP were expressed only as high, medium, and low, but not quantified in terms of the related allocation of available or likely resources (especially researcher time). This made subsequent short-term planning and programming very difficult, especially in trying to relate realistic programmes to likely budgets.

### Training and Conditions of Service

In the absence of a long-term research plan quantified in terms of needed research staff, it is difficult to develop a systematic postgraduate training plan. While numbers of researchers sent on training courses are satisfactory, the selection and choice of disciplines have been ad hoc rather than based on identified priority programmes.

Data on KARI's human resources are being compiled as part of a revised manpower management system, but are not yet available for planning appropriate technical and administrative support for researchers.

Terms and conditions of service have been improved for scientists (but not yet for support staff). However, procedures and appropriate

criteria for research staff evaluation and reward have not yet been developed. They can seriously influence the final design stage of experiments; criteria for good performance should closely reflect national objectives and expectations from research.

### Rationalization of Staff and Research Stations

Analysis for the NARP showed that operational funding\* per researcher had declined seriously over the years as staff increased. The NARP envisaged a substantial increase in recurrent funding so that operational funding would increase from 20% of the current funding (80% salaries) to 40% (60% salaries). Such a substantial increase in recurrent funding no longer appears probable, and to move towards an effective ratio of operating funds to salaries may require a rational reduction of staff.

The essential reorganization of the research station network from 46 stations to 15 NRCs and 10 RRCs proposed in the NARP has been accomplished. However, progress in rationalizing the rest of the original network has been limited. There has been some transfer of service functions to other ministries, but for the most part KARI remains responsible for the maintenance and upkeep of several substations. This is a considerable financial burden for KARI.

### Role of NRCs and RRCs

The mandates for NRCs have been assigned, a coordinating centre identified for each major commodity and production factor, and coordinators appointed. However, the roles of these coordinators with respect to those of the NRC directors have not been adequately clarified, and this has adversely affected some research programmes.

Two recent workshops have helped the RRCs to understand their regional roles and the approach to regional problems through farming systems research. However, few diagnostic surveys have been made to identify farmer constraints on which on-station and on-farm research could be based.

### Conclusions

The mid-term review team is convinced that, despite setbacks, the original philosophy of the NARP towards building an efficient and effective agricultural research system remains largely valid, and that, with some modifications and an expansion in the time frame, most of NARP's aims will be achieved. Continued donor support is an absolute necessity to ensure that the progress to date, which was achieved in the face of considerable difficulties, is consolidated in a manner which will lead to the successful conclusion of this phase of development.

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\* All recurrent funds less salaries and allowances



However, some substantial steps in organization and management are required. A summary of the main recommendations of the team follows (and other recommendations are included in the text).

## MAIN RECOMMENDATIONS

The team recommends that:

### 1. Finance

- a. Urgent measures be taken to improve the predictability, availability, and timely flow of funds from the Treasury to KARI. Revolving funds should be established immediately within KARI to help improve access to donor funds.
- b. Measures be taken within KARI to (1) control future indebtedness and (2) permit substantial decentralization of authority for payment to research centres.
- c. Efforts be intensified to improve financial management at the research centre level through training, timely information on availability of funds, and increased financial autonomy.

### 2. Programme Formulation

- a. KARI review the priority ratings between commodities in the NARP and reach hard decisions on relative allocations of resources (especially researcher time) as a quantitative base for subsequent suballocations to main constraints and sub-suballocations to short-term programmes.
- b. KARI decide, as a matter of urgency, on an institutional or organizational framework for programme formulation that will facilitate appropriate groups at the national, institute, and centre levels to reach authoritative decisions on programme content, using agreed procedures for priority setting that reflect national development objectives.
- c. A formal programme budgeting system be introduced that will link programme formulation closely to realistic budget expectations at research centres. The budgeting should include staff time as well as operating funds. Programme budgeting should also help in rationalization of resource allocation within KARI towards the target of a 60/40 share between personnel emoluments and operational expenses.

### 3. Human Resource Development and Management

- a. High priority be given to the development of a comprehensive training plan based on quantified manpower requirements in high-priority programmes.

- b. KARI develop urgently a clear and transparent staff evaluation system with criteria for rewards that are related closely to relevant research contributions to national development objectives.

4. Structure and Organization

- a. No major reorganization in the headquarters' structure be contemplated until present financial difficulties are well under control and firm decisions taken about procedures for research programme formulation.
- b. KARI plan its structure and organization in terms of a long-term sustainable research effort based on likely GOR funding, with donor funds supporting supplementary projects after the core institution is established.
- c. The cautious process of rationalization of research sites and staff numbers pursued by NARP continue to use mechanisms and opportunities which arise for transfer of assets and staff to more suitable roles in other institutions.

5. National and Regional Research Centres

- a. The role of national programme coordinators be limited to technical advisory work as envisaged in the NARP, and centre directors be responsible for ensuring that resources are allocated as available to meet agreed priorities in programme activities at centres.
- b. KARI interact with the Ministry of Agriculture to ensure that funds are included under the proposed Second National Extension Project to finance both planning and coordination at the national level of research/extension activities and the participation of research and extension staff in the various facets of adaptive and farming systems research at the RRC and District level.

The unanticipated delays and problems associated with the establishment of KARI has meant the original timetable must be extended. However, by the end of the first project phase, the research management should be fully installed, with quantitative priority setting completed at KARI and coordinated programme levels, and with short-term and annual programming procedures channeling programme elements into a systematic programme budgeting system, backed by an efficient and effective financial management system. It would be unrealistic to expect much new experimental research progress in the remaining part of the project, but the farming system approach should have been well established at RRCs, research-extension linkages improved with funds specifically budgeted to

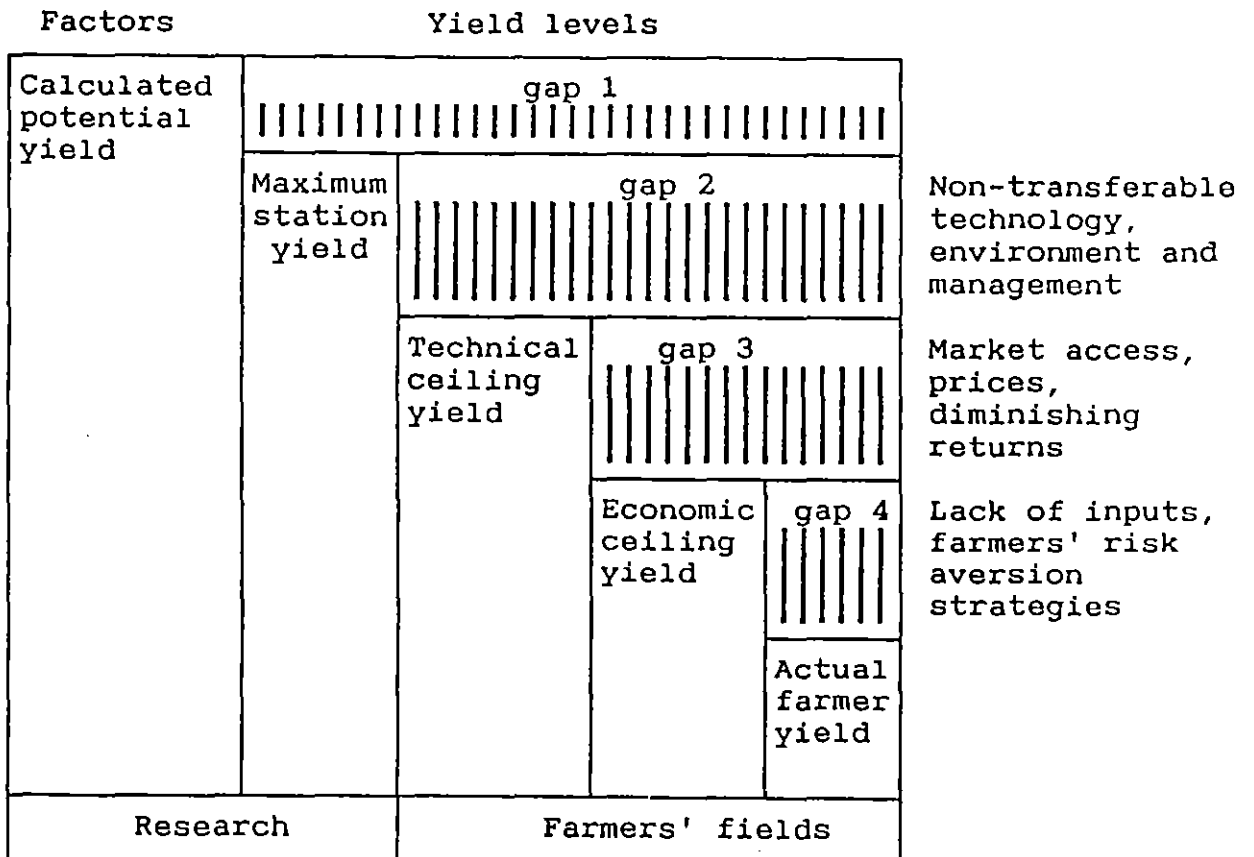
support linkage activities, and an increase in the flow of information to farmers should be apparent.

Several of the recommendations above imply timetables for implementation. It was not possible for the team to discuss these fully with KARI. However, it is recommended that the KARI Directorate and the Government of Kenya consider the main recommendations and, if these are approved, communicate estimates of completion dates to donor representatives as soon as possible.

ANNEX 3

**Research approach 'Prediction of maize yield potentials according to different agro-ecological conditions in Central Kenya, making use of geographical information systems' (S.M. Wokabi)**

A sequential approach will be implemented for the determination of yield levels. The calculated potential yield is based on genetic characteristics of the crop considered, temperature and radiation conditions at the respective sites where the crop is grown, and all other factors influencing yield being considered to be at their optimum. Maximum research yields are generally lower than the calculated potential yields because of local climate and soil constraints and/or soil and water management practices which are not optimal. The size of the gap between maximum research station yields and the actual farmer yields depends on the transferability of technologies developed at the research stations, the farm management, the socio-economic conditions and other biophysical conditions of the farmer's field which are often less favourable than those of the research station.



ANNEX 4

**Kenya Soil Survey/KARI: project budget 1991 (contribution Netherlands Government (in 000 HFL.)**

		N	K
200	<b>PERSONNEL COSTS</b>		
	211.4 Costs in the Netherlands	33.0	-
	211-215 Short missions	40.2	4.0
	270 Consultants	26.1	-
	<b>Subtotal</b>	<b>99.3</b>	<b>4.0</b>
400	<b>EQUIPMENT/INVESTMENTS</b>		
	421 Survey equipment	10.0	-
	423 Cartographic equipment	50.0	5.0
	424 Laboratory equipment	50.0	5.0
	425 Office equipment	90.0	5.0
	426 Library	10.0	-
	430 Vehicles	-	85.0
	480 Insurance, freight charges	10.0	-
	<b>Subtotal</b>	<b>220.0</b>	<b>100.0</b>
500	<b>OPERATIONAL COSTS</b>		
	520 Maintenance equipment	2.0	20.0
	530 Maintenance vehicles	10.0	65.0
	Fuel	5.0	25.0
	540 Stationery	3.0	20.0
	590 Travel, accommodation	5.0	25.0
	<b>Subtotal</b>	<b>25.0</b>	<b>155.0</b>
600	<b>TRAINING</b>		
	610 Netherlands	45.0	13.0
	620 Kenya	35.0	10.0
	640 Elsewhere	110.0	9.0
	690 Short courses, workshops, seminars, congresses	60.0	8.0
	<b>Subtotaal</b>	<b>250.0</b>	<b>40.0</b>
800	<b>CONTINGENCIES</b>	35.0	29.0
	<b>TOTAL</b>	<b>620.0</b>	<b>330.0</b>
	<b>GRAND TOTAL</b>		<b>950</b>