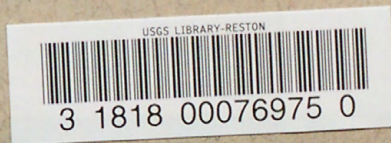


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PROJECT REPORT
NATIONAL CENTER INVESTIGATIONS
(IR) NC-32



EAST AFRICA SEMINAR/WORKSHOP TRIP REPORT

Office of International Geology
U. S. Geological Survey
Reston, Virginia

U. S. Geological Survey
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EAST AFRICA SEMINAR/WORKSHOP TRIP REPORT

By

Morris Deutsch
Research Coordinator/Hydrology
U. S. Geological Survey, EROS Program

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1974

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East Africa Seminar/Workshop Trip Report

By Morris Deutsch

Research Coordinator/Hydrology

U. S. Geological Survey, EROS Program

INTRODUCTION

I arrived in Nairobi, Kenya, on October 26, 1973, to plan and make final arrangements for a remote-sensing Seminar/Workshop (S/W) and to inspect facilities and equipment available for the S/W in Kenya. My visit to Nairobi was sponsored by the Agency for International Development (AID) of the U. S. Department of State under Participating Agency Service Agreement TA (IC) 02-72. I travelled via Pan American Airways from New York City with Mr. Merrill Conitz of AID, which provided an excellent opportunity to discuss plans, ideas, equipment requirements, and other aspects of the proposed S/W. Mr. Conitz had previously served as a professor in the Department of Surveying and Photogrammetry at the University of Nairobi for 2 years and hence was able to provide considerable insight into the resources and educational situation in Kenya.

Upon arrival on October 26th, we visited with Mr. A. B. Cahusac of the National Environment Secretariat of the Kenya Ministry of Natural Resources. During the following weekend and a national holiday, Mr. Cahusac made arrangements for an ad hoc committee of officials of the Kenya Government and University of Nairobi to meet with Mr. Conitz and me on Tuesday, October 30, 1973, for preliminary discussions on S/W objectives, scope, facilities, curriculum, and related matters. Our activities are described below chronologically for the period October 30 to November 6, 1973.

ACTIVITIES RELATED TO S/W PLANNING

October 30, 1973. -- A preliminary meeting was held in the conference room of the Ministry of Natural Resources attended by Kenya Government and University of Nairobi officials. (Attachment A is a copy of the minutes of that meeting prepared by Mr. A. B. Cahusac, Secretary to the Ministry of Natural Resources.) Dr. Onyango Omino, Permanent Secretary, and Chairman of the Ministry of Natural Resources, presided over the meeting. In summary, the following guidelines were determined for conduct of the S/W:

- * The S/W will be oriented toward applications of remote sensing to the resources and environmental problems of East Africa.

- * Maximum use will be made of African data.

- * Academic lectures in physics, optics, and related subjects will be kept to a minimum.

- * Emphasis is to be on the Earth Resources Technology Satellite (ERTS), but other systems of remote sensing are to be covered.

- * An overview of remote sensing is to be presented at the start of S/W for decision making and policy-level observers.

- * Each S/W participant will be provided with ERTS data and specially prepared data products applicable for his country or disciplinary area of interest. Insofar as possible he will actively participate in the data-processing procedures.

- * Provision of background for employing remote-sensing technology in on-going programs.

October 31, 1973: -- We visited the Department of Botany and Plant Sciences at the University of Nairobi where we met with Drs. R. Robins and E. Zamierowski. Dr. P. Jarman of the Kenya Game Department also attended. The distribution and density of livestock and wildlife were discussed. Potential applications of remotely sensed data were suggested by Conitz and me for spatial assessment of land use and seasonal distribution of vegetation. The importance of game and livestock to the economy of Kenya and East Africa was discussed, along with the importance of timely and accurate analysis of range conditions. Problems of correlation of field observations with remotely sensed data were also discussed. It was decided that a field trip demonstrating and making ground-truth measurements for a variety of disciplinary applications would be desirable.

Data-processing techniques were also discussed. I stated that the S/W would cover only optical data processing because of time and fund limitations. We agreed, however, to devote a limited time at the Seminar to covering concepts of processing ERTS computer-compatible tapes. The University of Nairobi owns a 16K-ICL-1900 computer.

October 31, 1973: -- Conitz and I along with Neil McClymonds of the USGS/Water Resources Division who was invited to accompany us, met with Dr. T. R. Warmer of the Kenya Ministry of Agriculture, Department of Water,

Range Management Division. Dr. Warmer discussed the ongoing survey of the Tana River Basin and suggested that the Tana Basin Development Authority be involved in the S/W. Mr. McClymonds (WRD), is currently working in the area immediately to the north, and has expressed a willingness to assist the staff insofar as possible. On my return to Washington, I contacted George C. Taylor, Jr., Chief of the Office of International Activities (WRD, USGS), to request McClymonds' assistance on a proposed "ground truth" exercise for the Tana Basin and the coastal zone. Mr. Taylor agreed to my request.

Dr. Warmer stressed the need for practical applications to demonstrate the value of remote sensing to policy-making officials. He was particularly interested in knowing how remote sensing could be applied to agricultural development and for determining crop production and rangeland resources. He mentioned also the need for predicting rainfall events employing satellite data. To fill this need will require that the S/W touch on a description of the meteorological satellite program of the National Oceanographic and Atmospheric Administration. Dr. Warmer suggested also that the Kenya National Council for Service and Technology be involved, including a Dr. Martin of UNESCO, Nairobi.

November 1, 1973.--We met with Dr. J. Walsh, Chief Geologist of the Geological Survey of Kenya and Mr. D. Korori of the Kenya Water Development Department. Dr. Walsh stated that his interests were 99 percent oriented to practical applications:

- * How can ERTS data assist in geologic mapping.
- * Can it be used to improve accuracy.
- * Can it provide a basis for better detail.
- * Can it assist in interpretation.

I explained that spectrally enhanced ERTS data could be enlarged to the scale at which he was mapping (1:125,000), and described how it could be used as a basis for new geologic image maps. Dr. Walsh agreed to serve as a co-instructor with the U. S. staff member who would instruct in geology. He would describe the significance of the image maps and its applicability to geologic mapping and mineral-resource appraisals in Kenya.

Mr. Korori stated his need for instruction in aircraft remote sensing. His areas of interest to which ERTS data might be applied are coastal environment, Quaternary sediments, basement complex, volcanics, and run off contributing to the upper Tana River basin from snowpack melt on Mount Kenya.

In the afternoon we met with Dr. Somebroeck from a Netherlands-financed International Training Commission project. Dr. Somebroeck was particularly interested in application of ERTS imagery in preparing soil maps of drier areas of Kenya. Mr. N. Nyandat, Project Co-manager of the Kenya Soil Survey Project, stated the desirability of using ERTS data to aid in preparation of soils, vegetation, and ecological zone maps.

In response to my suggestion for employing relatively inexpensive enhancements of optically processed multispectral data, Dr. Somebroeck and Mr. Nyandat proposed preparation of a display of ERTS scene 1191-07115 (orbit 2657, 30 Jan. 73) in a variety of spectral color renditions. Other targets of interest are in the Wajir-Merti area along the Uaso Ng'iro River:

scene 1190-07054 (orbit 2643, 29 Jan. 73)

and a scene over Ethiopia:

scenes 1190-07045 (orbit 2643, 29 Jan. 73)

1153-07003 (orbit 2127, 23 Dec. 72)

Dr. Somebroeck stated that a land system map could have been done in one tenth the time, by using color-enhanced ERTS imagery. I subsequently obtained 1:250,000-scale vegetation maps of Western Kenya to use as a basis for preparation of vegetation image maps at that scale.

November 2, 1973.--We met with Mr. D. Omondi of the Survey of Kenya, Mr. Omondi agreed to loan two light tables; a third table will be supplied by the University of Nairobi. He also agreed to supply transparencies of maps as needed. After a staff of instructors has been selected, a list of transparencies will be requested of Mr. Omondi in order that a set of black and white planimetric single-band image maps can be prepared at a scale of 1:1,000,000. Mr. Omondi agreed to conduct a demonstration of mosaicking and image-map preparation at the Survey of Kenya for the participants in the S/W. An appropriate visit will be scheduled for the participants. Only single-band black-and-white data will be employed for this process.

Later the same day we visited the Kenyatta Conference Center (fig. 1) and made arrangements for use of the facilities for the first two days of the Seminar. Observers, including policy and decision-level officials, will be invited to attend the first two days of the S/W. Space reservations were made with Miss Mary Gichuru (tel. 32383) of the Kenyatta Conference Center.

Miss Gichuru agreed to the erection of poster and equipment displays in the lobby during March 20-23. No charge will be made for space occupied by the display. A meeting of the United Nations Governing Council for Environmental Programs will be in session during the week of March 17, and delegates from as many as 58 nations will be on hand as potential viewers.

November 5, 1973.--We met with Dr. William Barnes, Head of the Department of Surveying and Photogrammetry, to examine facilities available at the University of Nairobi and the dates they will be available. Dr. Barnes informed us that the Faculty Board of Examiners meet during the period March 9-21. It was decided to reconvene the S/W at the University on Saturday, March 23, as the facilities are adequate and can be obtained at no cost. The dates for the S/W were proposed as follows and subsequently approved by the ad hoc committee:

Opening sessions at the Kenyatta Conference Center: Thursday and Friday, March 21 and 22.

Reconvene at the University of Nairobi: March 23 (Saturday) through April 3 (Wednesday).

Three concurrent field trips: Friday and Saturday, March 29 and 30.

This schedule would have the advantage of tending to limit high-level observers to the first two days at the Kenyatta Center and the bulk of the workshop sessions to the participants.

Conitz and I inspected facilities at the University and determined that:

- ** Rooms 402, 403, and 404 of the American Wing of the Faculty of Engineering Building would be used for concurrent workshops, and that joint lectures would be held in Room 403.
- ** Transformers to convert current to 230V are available. (Cycle specifications for each piece of equipment need to be determined.)
- ** The University of Nairobi will provide for blacking out windows to allow for projection of slides, movies, etc.
- ** Only one ancient 3 1/4 X 4-inch lantern slide projector is available. At least one, or preferably two, should be brought along.

November 6, 1973. --I met with Mr. Zulfiquar Ahamed Mehar, proprietor of PHOTOMURAL, a local commercial photographic laboratory whose address is P.O. Box 45259, Nairobi (Phone 558534 or 24027). Mr. Mehar stated that PHOTOMURAL has capacity to copy photographically images from screens of multi-spectral viewers or color densitometers, and to reproduce false color prints or transparencies on a 24-hour basis. I proposed that the staff of the S/W, especially Dr. George Rabchevsky (whose services were subsequently obtained), could provide technical direction and suggest the types of film and amount and size of photographic paper needed. Mr. Mehar would need to order the supplies from sources in London as far in advance of the S/W as possible, preferably 90 days. Mr. Mehar also agreed to take groups of 10 participants each through his color laboratory for demonstrations of false-color reproduction and enlargement processes if we are able to implement this important phase of the S/W. His stated--and obvious--interest in the S/W was to develop a capability for photographic processing of ERTS imagery in East Africa, which should eventually prove beneficial to all countries in Africa that may actually implement their on-going programs with remote-sensing technology. Following discussions with all the above-mentioned officials (and others) representing Government of Kenya agencies and the University of Nairobi, a rough draft of a tentative agenda was submitted to the ad hoc committee set up by the National Environment Secretariat (see attachment B). Following this meeting a tentative agenda (attachment C) was drafted, following the guideline criteria listed below:

- * Workshop aspects will be emphasized, with special effort made to generate data products useful for each participant.

The Kenyatta Conference Centre

Nairobi is a city which is as remarkable for its bright modern architecture as it is for the flowers and trees which have earned it the name of "Africa's Garden City".

But no other building in Nairobi—or anywhere else in East Africa, for that matter—can compare for architectural magnificence, impressiveness and sheer size with the Kenyatta Conference Centre, which now dominates the Nairobi skyline.

£2 MILLION

Costing two million pounds to construct, this complex consists of the huge dome of the Conference Hall, dominated by the 32 floors of the 347 feet tower, on top of which is a helipad. Eventually there will be a revolving restaurant which will afford an unrivalled view of Nairobi. Of equal importance in this day and age is underground parking for 180 cars.

BARAZA

The main conference hall is designed in amphitheatre-form as a gesture to the traditional *baraza* so typical of African society. But there is nothing traditional about the equipment with which it is fitted, which includes simultaneous language interpretation facilities, an electronic voting system, closed-circuit link-up with built in video-recording, and a individual radiocall system.

The Conference Centre will serve as the venue for all the most important national and international conferences and congresses to be held in Kenya. It has seating for over 3,000 delegates, several smaller committee rooms, an exhibition hall, vast lobbies and the most modern and up-to-date press facilities to be found in Africa.

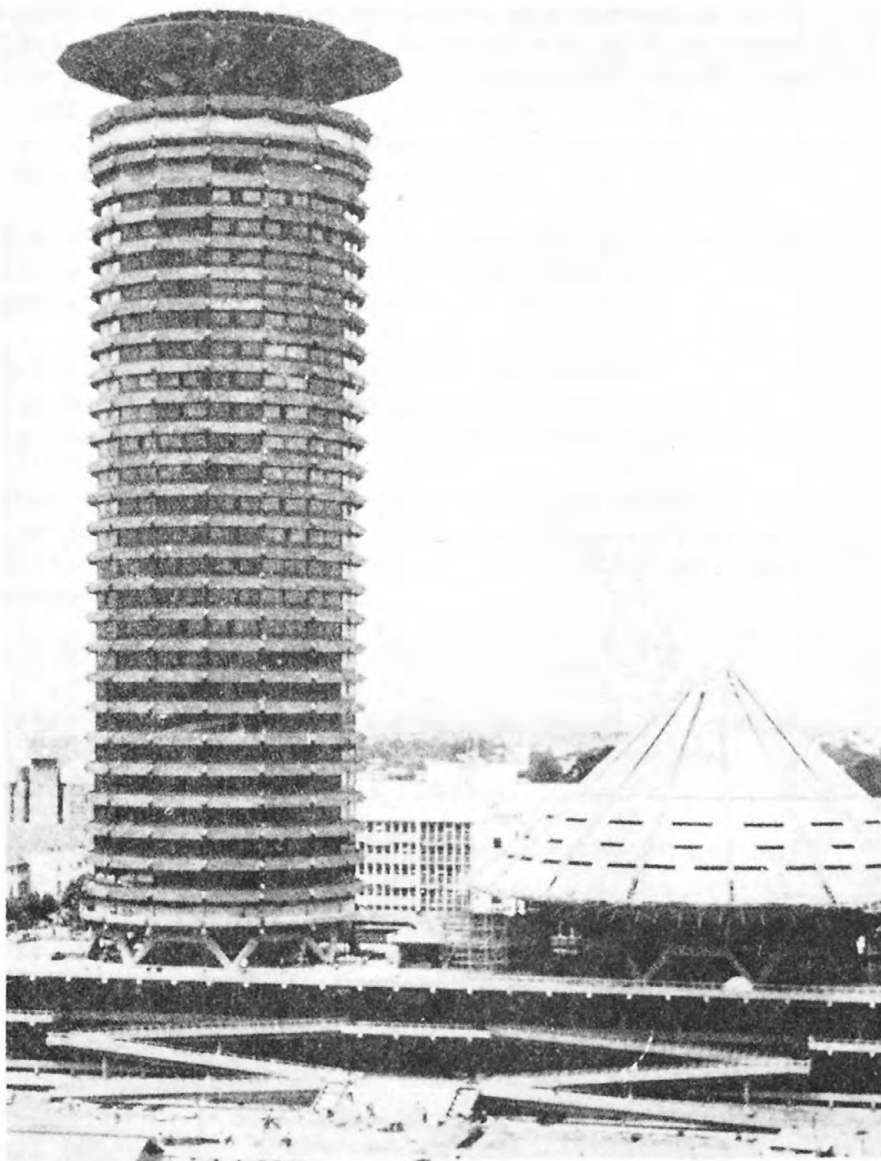


Figure 1. The Kenyatta Conference Center

- * Workshops will be oriented to resource and environmental problems.
- * Lectures and discussions will be concerned primarily with present state-of-the-art remote sensing capabilities that can be employed on problems addressed by the participants.
- * African data from ERTS and other platforms as available will be used in preference to examples from the U. S. and elsewhere.
- * If feasible, three concurrent field trips will be conducted on March 29 and 30, with emphasis on ground-truth measurements and spatial extrapolation of point data employing pre-processed ERTS images. Principal, but not exclusive, disciplines to be covered on each trip were proposed as follows: a. Rangeland, agriculture, soils, and vegetation. b. Hydrology, and water resources, coastal zone environment, wetlands, and environmental monitoring. c. Geology, physiography, land and mineral resources.
- * Special attention will be given to implementing on-going resource and environmental projects of the participants with techniques described or demonstrated at the workshops.
- * Insofar as possible, thematic image maps at the same scale as locally used line maps will be generated locally for purposes of demonstrating the utility of ERTS data and local capabilities.

The tentative agenda drafted to reflect the above is included herewith as attachment C. This will be further adjusted and expanded in detail after the staff has been assembled, relevant data obtained, and preliminary data products generated for transport to Nairobi.

RESULTS

As a result of the activities described above, we have arranged to conduct a remote-sensing training Seminar/Workshop in Nairobi, Kenya; the Kenya Government and University of Nairobi will act as hosts.

Facilities of the Kenyatta Conference Center and the University of Nairobi will be available for lectures, displays, and workshops during the period March 21 to April 3, 1974. One or two participants will be invited from Tanzania, Somalia, Ethiopia, Sudan, Zambia, Malawi, Botswana, Lesotho, Ghana, Nigeria, Liberia, Swaziland, Burundi, Uganda, Malagasy Republic, and Central African Republic. Together with participants from the host country, Kenya, enrollment of full-time participants will be limited to 30. All materials and lectures will be in English and no translation facilities will be available. It is expected that the USGS will provide three instructors to cover the disciplines of Agriculture (range management, forestry, soils), Hydrology (coastal, ecology, environmental monitoring) and Geology (physiography, land and mineral resources). They will be joined by the Chief Geologist of the Geological Survey of Kenya and members of his staff.

For details see Attachment C.

27/46/01/Vol II

National Environment Secretariat
 Ministry of Natural Resources
 P. O. Box 30126
NAIROBI

MINUTES OF A MEETING HELD AT 2:30 P. M. ON THE
 30TH OCTOBER 1973 IN THE CONFERENCE ROOM,
9TH FLOOR, JOGOO HOUSE

<u>Present:</u>	Mr. J. H. O. Omino	- Permanent Secretary, Ministry of Natural Resources (Chairman)
	Mr. M. Conitz	- USAID
	Mr. M. Deutsch	- USGS
	Dr. T. M. Wormer	- Ministry of Agriculture
	Dr. J. Walsh	- Mines and Geological Department
	Dr. R. Robins	- University of Nairobi
	Prof. R. Olembo	- University of Nairobi
	Dr. E. Zamierowski	- University of Nairobi
	Prof. R. B. Contant	- University of Nairobi
	Dr. P. Jarman	- Game Department
	Mr. D. Omondi	- Survey of Kenya
	Mr. D. M. Kirori	- Water Development Division
	Mr. J. N. Gunning	- USAID
	Mr. Neal McClymond	- Water Development Department
	Mr. A. B. Cahusac	- Ministry of Natural Resources (Secretary)
<u>Absent:</u>	Dr. D. M. Gwynne	- c/o Range Management Division
	Fr. G. K. Muhoho	- Ministry of Foreign Affairs
	Mr. J. W. Yaa	- Ministry of Finance & Planning

SUBJECT: REMOTE SENSING SEMINAR

Mr. Omino opened the meeting by stating that this was a preliminary meeting for the benefit of the two visitors from the USA to enable them to make their proposals and answer questions. He anticipated that no decisions could be taken at this meeting as further discussions will be held with individual officers to establish the requirements of

different branches of the Government. He went on to make it clear that the Kenya Government did not consider the proposal to hold a remote sensing seminar in Nairobi in 1974 to be a substitute for the technical assistance requested from USAID earlier this year by the Ministry. Mr. Conitz then outlined the origin of the proposal and indicated that since Kenya expressed an interest in acquiring further expertise in the field of remote sensing and since USAID was able to respond to requests of this sort only in the form of seminars or specific research projects in the field of remote sensing, USAID had taken the opportunity to propose the Seminar which was now under discussion. He indicated that the Seminar would probably be held in the first 3-4 months of 1974 and would include some dozen African English-speaking countries.

He then went on to explain that since the ERTS program was an experimental one, funds allocated to the program must be devoted to experimental purposes and furthermore, that it would be premature at this stage to develop facilities, such as data acquisition stations, which might be incompatible with a fully operational remote sensing program.

As part of the response to Kenya's original request, he considered that the forthcoming cost/benefit study which would be carried out by the University of Michigan's Environmental Research Institute (ERIM) would go some way to supplying the type of information which would be required for the purpose of national planning in the field of remote sensing. A three-man team would be coming to Kenya on December 2nd and would probably spend about one week here analysing the results of studies carried out on ERTS data so far as well as other potential benefits. Kenya would be one of four countries which would be studied under this program and he felt that the results of the study would be of considerable value in forming an appraisal of the value of remote sensing data for national planning and monitoring purposes.

He then informed the meeting that there would be a second project connected with ERTS data which the USAID/Census Bureau project is aimed to study the possibilities of carrying out human population censuses using land use criteria based on ERTS data for indicating population densities; again Kenya would be one of three countries selected worldwide for this evaluation and the team would come here provided sufficient interest was evinced in Kenya for the project. He expected that a certain amount of equipment would be brought into Kenya to carry out the project and anticipated that this would be made available for local use.

The meeting agreed that there was no doubt that a Seminar on remote sensing would be most welcome but that it should be considered as completely separate from the original request for technical assistance. On the question of the content of the course it was agreed that remote sensing would cover all forms of the technology including aerial photography. In fact, both ERTS data and aerial photography from the East African region will be used during the Seminar as study material and it was anticipated that, providing equipment could be made available by the manufacturers, sophisticated equipment and techniques could be employed during the Seminar.

In answer to a question regarding Skylab, Mr. Deutsch stated that although images from this satellite were of great interest individually, they could not compare in value with ERTS data as Skylab was not on a polar orbit and much of the sensing carried out was non-repetitive and limited to very specific targets. In addition, data from Skylab was not available until the end of the mission, sometimes as long as 56 days.

In response to another question on cheap methods of employing ERTS data, Mr. Deutsch stated that he hoped that the Seminar would indicate the full capability of ERTS data when utilized by such systems as optical data processing, color analytical viewing and spectral delineation to produce thematic maps. In this way the fullest potential of the technology would be demonstrated so that users could determine the type of approach which they wish to employ in carrying out an analysis of ERTS data.

One questioner indicated that he hoped that a real workshop, in the sense of actually carrying out the various operations in the use of ERTS data, would be established, and Mr. Deutsch indicated that this was very much the approach which they would employ. In fact, he would be bringing Kenya data for study and analysis to the Seminar so that processed imagery would be available and would be the basis for some of the field work to be carried out. He added that he hoped that a number of co-instructors could be recruited from the participating countries in order to assist the teaching staff at the Seminar to extract the maximum interpretation from the material available.

It was agreed that Mr. Conitz and Mr. Deutsch would carry out a number of visits to various key Ministries and the University in order to familiarize themselves with the special viewpoints of potential ERTS users and participants in the Seminar.

There being no further business the meeting ended at 3:20 p.m.

14th November, 1973

27/46/01/Vol II

National Environment Secretariat
 Ministry of Natural Resources
 P. O. Box 30126
NAIROBI

MINUTES OF A MEETING HELD ON THE 6TH NOVEMBER 1973

AT 9:00 A. M. IN THE CONFERENCE ROOM, 9TH FLOOR,

JOGOO HOUSE

<u>Present:</u>	Dr. R. S. Odingo	- University of Nairobi (Chairman)
	Mr. M. Deutsch	- USGS
	Mr. M. Conitz	- USAID
	Dr. J. Walsh	- Mines & Geological Department
	Dr. T. M. Wormer	- Ministry of Agriculture
	Dr. E. Zamierowski	- University of Nairobi
	Dr. D. D. C. Don-Nanjira	- Ministry of Foreign Affairs
	Prof. R. B. Contant	- University of Nairobi
	Mr. A. D. Mendonca	- Ministry of Natural Resources
	Mr. A. B. Cahusac	- Ministry of Natural Resources (Secretary)
 <u>Absent:</u>	Mr. J. W. Yaa	- Ministry of Finance & Planning
	Mr. P. P. Anyumba	- Survey of Kenya
	Prof. R. J. Olembo	- University of Nairobi
	Mr. A. Cullen	- Ministry of Foreign Affairs
	Mr. J. N. Gunning	- USAID
	Mr. D. Omondi	- Survey of Kenya
	Mr. P. Jarman	- Game Department
	Mr. D. M. Kirori	- Water Development Department
	Dr. R. G. Robins	- University of Nairobi
	Prof. S. H. Ominde	- University of Nairobi
	Mr. J. Davis	- Ministry of Finance & Planning
	Dr. D. M. Gwynne	- c/o Range Management Division

SUBJECT: REMOTE SENSING SEMINAR/WORKSHOPMin 1/73 General:

Dr. Odingo opened the meeting by asking Mr. Conitz to brief those who had not been present at the last meeting and to bring the rest of

the members of the committee up to date with regard to developments over the past week. He also requested a general philosophical justification for holding the proposed Seminar/Workshop and any other relevant details. Mr. Conitz then reiterated the theme of the Seminar/Workshop saying that it had been devised to assist those countries already interested in ERTS research as well as to provide the necessary technological background to those countries as yet only interested in the potentials of the technology. He indicated that the concept of a Workshop plus a Seminar had developed in discussions over the past week and as the program now stood the first two days would be essentially for those people involved in policy development and national strategy while the remainder of the two-week Seminar would be devoted to methods of application and interpretation most of which would be required by those people actually involved in handling ERTS data. He went on to indicate that his visits to individuals, departments, and ministries had resulted in a clear demonstration of the real interest and enthusiasm among many users and potential users in Kenya.

Min 2/73 Programme:

The proposed program, a copy of which was made available to those present, was then discussed in considerable detail and amended very considerably. In particular, concentration of the topics and addresses on the first two days was mooted by those present and the need for the time devoted to the Workshop on applications to be expanded by a whole day emphasized (a revised program based on these discussions is attached to these minutes).

Min 3/73 Invitations:

The countries to be invited were then discussed and it was agreed that the following should be included: Tanzania, Uganda, Somalia, Ethiopia, Sudan, Zambia, Malawi, Botswana, Lesotho, Ghana, Nigeria, Liberia, Swaziland (Burundi and Ruanda on the basis that they were omitted from the French-speaking Mali Seminar). In addition, observers from ECA, FAO and UNEP would be invited. The invitations would be sent by the Kenya Government as the host country and a draft letter of invitation was provided for the Secretary. It was pointed out that it would be important in the letter of invitation to indicate those national agencies which would be specifically interested in this particular technology and the survey departments, the ministries of natural resources and the national universities were particularly specified.

Min 4/73 Participation:

On the question of the number of participants it was agreed that a figure of about 30 people would be the maximum which could be satisfactorily dealt with in a course of this nature and it was anticipated that about 8-10 of these people would come from Kenya. However, in the two opening Seminar days it was anticipated that a much larger number

of participants would be invited and as senior members of, for instance, the Kenya Government, the United States Department of the Interior, and possibly NASA would be involved, it was considered fitting that the meeting in this period should be held in the Kenyatta Conference Centre. Facilities at this Centre had been inspected and had been found extremely suitable for the proposed Seminar. It was proposed that it would be desirable for a professor for an American University to prepare a suitable paper on the subject "inter-disciplinary remote sensing research requirements and goals." The paper should be prepared well in advance (by January if possible) and circulated to all the prospective participants in the Seminar. This would provide a good basis for panel discussions involving the academic participants at the Seminar.

Min 5/73 Costs:

On the question of costs it was agreed that Kenya would meet such local costs as the hiring of meeting facilities, projection equipment and incidental expenses. USAID would be responsible for providing the teaching staff and any equipment brought into Kenya from overseas. Participants would be expected to meet their own international travel and subsistence expenses while in Kenya and would also be responsible for local travel costs for any field work or tours. In view of the high cost of international travel it was suggested that USAID offices in the various countries might be informed of the forthcoming Seminar/Workshop and asked, where possible, to assist individuals who wish to attend the Seminar/Workshop but who might not be able to otherwise meet these costs.

Min 6/73 Organization:

It was agreed to set up a small local committee consisting of the Ministry of Foreign Affairs, Ministry of Finance & Planning, the University of Nairobi and the Ministry of Natural Resources. This committee would be responsible for ensuring coordination of all the planning needed for the Seminar/Workshop and would also approve such things as the invitation to be sent and handling of replies regarding participation etc.

Min 7/73 Sponsorship:

During discussions with the University authorities and Prof. J. M. Mungai, it was made known that the University would, in view of the training and academic nature of the Seminar/Workshop, be willing to co-sponsor this Seminar/Workshop with the Kenya Government. Provisional bookings had in fact been made with the Registrar of the University for holding the Seminar/Workshop in the lecture rooms and laboratories of the Department of Surveying and Photogrammetry.

There being no further business the meeting ended at 11:00 a.m.

15th November, 1973

Tentative Agenda*
EAST AFRICAN SEMINAR AND WORKSHOP
ON
REMOTE SENSING
OF
NATURAL RESOURCES AND ENVIRONMENT
NAIROBI, KENYA

March 21 - April 3, 1974

KENYATTA CONFERENCE CENTRE

Thursday, March 21

- a.m. (Remote Sensing Technology exhibits provided by NASA and USGS
may be viewed in the lobby)
- Registration and opening ceremonies
- Host Government's opening statement on Remote Sensing Seminar/
Workshop
- Response of the U. S. Government; Remote Sensing as a new
dimension in man's understanding of the earth (USDI Senior Scientist)
- p. m. Resource and environmental data needs (ECA, UNEP)
- Role of Remote Sensing in Resources Development and
Environmental Monitoring (International authority
on remote sensing)
- Banquet
Speaker to be arranged
Proposed topic: Africa as seen by the Astronauts (NASA)

Friday, March 22

- a.m. Overview of remote sensing of earth resources and environment:
Past, Present and Future (USGS Senior Scientist)
- Africa's Projected Applications of Remote Sensing Technology
and Benefit Potential (Permanent Secretary for
Natural Resources)

*Subject to modification pending invitation to speakers, designation of
staff and availability of equipment.

Friday, March 22 (continued)

- a.m. Results of the Remote Sensing Cost-Benefit Study as Related
to Africa (USAID)
- p.m. Panel Discussion of Interdisciplinary Remote Sensing
Research Requirements and Goals (University of Nairobi)
- NASA ERTS Movie
- USDI Movie on Geographic Applications Program

Saturday, March 23

- a.m. Orientation and Introduction to Workshop (Staff)
- Panel discussion on natural resources and environment problem
(Participants and Staff)

Sunday, March 24

Open

Monday, March 25

- a.m. Problem-oriented project planning in remote sensing (Staff)
- Spatial, spectral, and temporal analysis of remotely
sensed data (Staff)
- p.m. Aircraft and spacecraft remote sensing program including
NASA, USGS, and other Aircraft Programs; Gemini and
Apollo photography; ERTS and Skylab (Staff)
- Meteorological satellites (Kenya Met. Dept.)
- WORKSHOP: Demonstration of selected data processing equipment
- Diazo processor
 - Color additive viewer
 - Zoom transfer (Staff)

Tuesday, March 26

- a.m. Lectures and Panel Discussions* on applications in:
- Range Management
 - Hydrology
 - Agriculture

* Interdisciplinary aspects will be emphasized.

a.m. Forestry
 Geology
 Land Use
 Soils
 Coastal ecology
 Environmental changes (Staff and Kenya co-instructors)

WORKSHOP: Preparation of image maps and mozaics (Staff, University of Nairobi, and Kenya Survey)

a.m. Lectures and Panel Discussions (continued)

WORKSHOP: Multispectral data processing and enhancement;
temporal data processing (Staff)

a.m. Lectures and panel discussions (continued) (Staff)

Preparation for field trips

WORKSHOP: Demonstration of ground truth equipment and techniques

Concurrent field trips (sites to be selected by Kenya co-instructors)
as follows:

- a. Rangeland, agriculture, soils, and vegetation
- b. Hydrology and water resources, coastal zone environment, wetlands, and environmental monitoring
- c. Geology, physiography, land and mineral resources

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Sunday, March 31

Open

Monday, April 1

CONCURRENT WORKSHOPS: Extrapolation of features observed on field trip to ERTS imagery

Classification of thematic data by spectral characteristics

Conversion of multispectral imagery to thematic maps

DEMONSTRATION. Photographic processing of multispectral imagery

Tuesday, April 2

Concurrent workshops (continued)

Wednesday, April 3

a.m. Review of workshop results

Panel discussion: Projected implementation of remote sensing technology in Africa

p.m. Participants critique of Seminar and Workshop

Closing ceremonies

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