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REGIONAL REMOTE SENSING PROJECT
(USAID 698-0414)

FINAL EVALUATION REPORT

MARCH, 1984
REDSO/ESA

REGIONAL REMOTE SENSING FACILITY

A C R O N Y M S

AID/W.	-	Agency for International Development, Washington D.C. (headquarters)
AFR/RA	-	USAID African Regional Office activities
Centre	-	Regional Centre for Services in Surveying, Mapping and Remote Sensing, also called RCSSMRS
CIDA	-	Canadian International Development Agency
CSIRO	-	Commonwealth Scientific & Industrial Research Organization (Australia)
ESA	-	East and Southern Africa
Facility	-	Regional Remote Sensing Facility, also called RRSF
IDRC	-	International Development Research Centre
KREMU	-	Kenya Rangeland Ecological Monitoring Unit
LANDSAT	-	Land Satellite, photos, referring to images sent by satellite to earth stations
PACD	-	Project Assistance Completion Date
PIO/T	-	Project Implementation Order/Technical Assistance
P.S.	-	Permanent Secretary, Senior Ministerial Civil Service Rank
REDSO/ESA-	-	AID Regional Economic Development Services Organization, East and Southern Africa
RFP	-	Request for Proposal
SDC	-	Spectral Data Corporation (contractor)
UNECA	-	United Nations Economic Commission for Africa
UNEP	-	U.N. Environmental Program

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I. SUMMARY

The summary format, as per State (82) 81077, which is directed towards agriculture research and extension projects, is inappropriate for the evaluation of the Regional Remote Sensing Facility Project. The summary format, in the form of a list of questions, does not address many major project concerns in the institution building effort. Pertinent questions have been incorporated into sections of the evaluation. The framework used here is considered most useful and pertinent by the evaluation team, as it is designed for this particular exercise.

A. Current Status

The Regional Remote Sensing Facility (called the Facility or RRSF) is a department of the Regional Centre for Services in Surveying, Mapping and Remote Sensing (called the Centre or RCSSMRS). The Facility provides training programs in remote sensing and survey techniques, assistance with natural resource surveys, and products, photographs and images for users. The Facility serves member countries in East and Southern Africa, non-member countries in the region, organizations and individuals.

The Facility is directed by the senior staff of the Centre and its own senior staff. Policy direction is provided by a Governing Council of representatives from the U.N. Economic Commission for Africa. Staffing at the Facility consists of a director, three contract staff (from the AID funded contractor, Spectral Data Corporation or SDC), four professional staff, three technicians, and four clerical staff. Operations are housed in the Nairobi industrial area Ken Com House, rented and also occupied by the Centre.

The Facility is funded by both the Centre and by USAID. Centre funds derive principally from member country quotas, and meet rent, utilities and local staff salaries. AID funds provide operating expenses, technical assistance costs, some training costs and some capital costs. Additional support has been provided by the French (one technical assistance person) and by U.N. organizations in support of certain training courses. AID funding is due for termination on June 30, 1984, at which time funds totalling an estimated \$360,000 will not have been disbursed.

With the exception of member country support (it has decreased since June, 1982), all "countable objectives" laid out in the 1982 AID Project Amendment were met. Average monthly user assistance efforts totalled forty-seven, production from the photolab included monthly sales of Kshs 29,000, training programs had over 200 participants enrolled and over ten new natural resource surveys were initiated.

The RRSF facilities now include a complete photo lab, a growing library for books and periodicals, a comprehensive image library (14,600 prints plus world wide film rolls from NASA), interpretation equipment, furniture and office equipment, printing equipment, and vehicles. All appear to be in good working order, although some interpretation equipment is not in use due to a lack of space and personnel.

B. Major Issues

Significant progress has been made at the Facility in many areas. There is a growing sensitivity to the utility of remote sensing and surveying techniques as a planning tool. Many national natural resource surveys have been initiated. Large number of government and academic personnel have received training in surveying techniques. User services and products have been provided to a growing spectrum of institutions and individuals in the area. RRSF staff have received in-service training and some individuals have received long-term formal training.

Yet the long-term viability of the Facility and the Centre is still in doubt. Major issues and problems have not been addressed or resolved. These are listed in outline, generic form.

1. Organization and Staffing.

- a. There is poor communication among the senior staff of the Centre, UNECA, the Facility and AID.
- b. There are staff shortages of key personnel at the Facility (and the Centre).
- c. The Centre has no workplan and the Facility draft work plan is not complete, nor does it relate to the Centre's activities.

2. Production and Services.

- a. There is a very heavy reliance on expatriate assistance (contract personnel) and little local capability of providing special imagery or course organization.
- b. Numerous requests for services, especially assistance with natural resource surveys, have been tabled because of lack of resources (funds and personnel for the future).

3. Training.

- a. RRSF staff at the professional level have not had sufficient academic training.
- b. Training requests far exceed the Facility's current ability to accommodate proposed numbers of participants.
- c. Sensitivity to the value of remote sensing and other survey techniques as planning and programming tools is not great amongst high level government officials.

4. Facilities.

a. The RRSF does not have adequate space to carry out all tasks and use all equipment.

b. The purchase of an appropriate computer system would enhance the Facility's capabilities, but there are no trained personnel and the proposed system is entirely inadequate for the tasks described.

c. The library does not have adequate subscriptions to relevant periodicals and there are few resource documents and texts.

5. Budget and Funding.

a. The Centre does not receive member country financial support at a level adequate to fund all activities.

b. Facility funding is highly dependant on AID and that funding is currently scheduled for termination on June 30, 1984.

c. There are no known current sources to fund planned Facility activities.

6. USAID Project.

a. There have been significant difficulties in communication between Project participants (AID, Centre, Facility and UNECA).

b. The Centre has not provided adequate management or support to the Facility (or the Centre).

c. USAID has not provided assistance in a consistent, long-term mode.

d. No counterpart personnel for contractor staff have been recruited.

e. The RRSF is in severe jeopardy because of a lack of member country and donor support.

f. The Centre has not provided an overall work plan for the next decade. The draft RRSF work plan is incomplete and is not integrated with any Center work plan.

C. Conclusions and Recommendations

The evaluation team has concluded that the RRSF has made significant progress in the development of an institutional capacity for the provision of valuable services to East and Southern African countries.

These services have the potential of providing important information needed for national planning and policy formation in the use and protection of natural resources.

Continued support by AID and additional support by the development agencies in a multi-donor effort should be provided. Provision of such support should be contingent on improved management and an improved service capability of both the Centre and Facility. The evaluation team makes the following recommendations as possible means of improving management and services.

The recommendations are suggested as guidelines of possible means to improve the Centre, the Facility and the AID Project. It is urged that these recommendations be considered promptly, as assistance from AID is soon scheduled for termination. In outline form, the recommendations are now listed.

1. Relationships

a. The Centre and Facility Governing Councils must undertake a serious effort of promotion with member states and reorganize the system of quotas. Approaches should be made to non-member states in the region, through the highest governmental levels.

b. Leadership of the Governing Councils should be rotated amongst member country representatives. Representatives should be of ministerial rank.

c. The Centre must provide more support to the Facility; in accommodations, additional personnel recruitment (deputy director, satellite photo specialist, hydrologist and geologist), and active participation in both management and donor recruitment.

d. The Centre must fill its own vacant posts with qualified personnel. Centre and Facility work must be done in a complementary fashion, not in isolation.

2. Staff

a. Any AID funding remaining at June 30, 1984 should be utilized to support continued technical assistance from Dr. A. Falconer and Mr. R. Anderson while long-term multi-donor assistance is negotiated between the Centre, USAID, and other donors.

b. As mentioned above, additional staff are required at both the Centre and the Facility. Recruitment must be initiated immediately to enable the Facility and Centre full functional capability.

3. Production and Services

a. The Facility should re-examine its computer systems requirements and determine appropriate equipment and personnel needs. Then donor support should be found to help with staffing and procurement.

b. The Facility should determine its costs for various products and services. These costs should be charged to the clients. The charges should be differentiated between paid up member countries, member countries in arrears, non-member states, organizations/universities, and individuals. A formula should be derived for determining the charges to each category of client.

c. The Facility, in order to operate effectively, should be provided with adequate space for all equipment and personnel. The Centre should rent additional space during the construction of the headquarters.

d. The Facility should republish its newsletter, perhaps on a quarterly basis.

4. Training

a. The excellent courses/seminars that have been held, should be continued and, if possible, expanded to include courses in additional survey techniques.

b. A short-term seminar in the application of remote sensing to national natural resource planning for the Governing Council and influential member country officials should be held.

5. Finance

a. Both the Government Council and Centre must become more active in soliciting member country and donor support. The basic document for this effort should be a work plan of the Centre which incorporates the Facility work plan. This document should detail the proposed schedule of activities for the next decade.

b. As mentioned earlier, the Facility should begin charging users for the various products and services given.

6. USAID Project

a. The PACD should be extended for one year. During that year, AID should continue to fund the services of Dr. A. Falconer and Mr. R. Anderson and to fund basic operating expenses of the Facility. This support is contingent on Centre design of a multi-donor long-term support project (which AID may participate in) and its implementation.

b. Extended bridging assistance from AID is also contingent upon Centre recruitment of appropriate counterpart personnel to the SDC program manager and photo scientist and design of a Centre and Facility work plan.

c. It is recommended that AID provide interim funding, approximately \$350,000, to fund basic operating expenses during the extended PACD period.

d. Regular meetings, done monthly and adhering to an agreed agenda, must be held with the Centre Director and Deputy Director, the Facility Director, Deputy Director and Program Manager, and the REDSO/ESA Director and Project Manager.

e. AID should transfer title to the Facility all equipment purchased under the project and should endorse the reloading of NASA imagery and film rolls on loan to the Facility.

7. Other Donors

a. Based on an integrated, detailed work plan of the Centre and Facility activities for the next ten years, the Centre should solicit assistance from a broad group of donors. This effort should be done locally and at donor organization headquarters.

b. The initial promotion efforts by the Centre should be followed by a donor conference, with participation by both committed and non-committed donor groups.

II. CURRENT STATUS

Under this section of the evaluation, the Regional Remote Sensing Facility (RRSF) will be observed as it is at the present. Historical events will be mentioned only as they pertain to present circumstances. These observations, for the most part, will be factual and consist of statistical information and reporting. The evaluation team's perceptions and views on the status and future of the RRSF can be found in the following two sections. The current status is divided into the following categories; A. Organization and Staffing, B. Production and Services, C. Training, D. Facilities and Equipment, E. USAID Project, and F. Other Donors.

A. Organization and Staffing

1. Background - The Regional Remote Sensing Facility is nearly seven years old, and is now an integral part of the RCSSMKS. To understand its organization and staffing, it is necessary to retrace the origins, both of the Regional Centre as well as the Facility.

In the late fifties and early sixties the Conference of Ministers of the United Nations Economic Commission had, in a number of resolutions,

requested the Secretariat of ECA to convene regional cartographic conferences to discuss matters of mutual concern in the field of Cartography, and to identify areas where states members of the Commission could cooperate. The first Regional Cartographic Conference was held in Nairobi in September 1963. At that conference, the idea of setting up regional centres in the field of cartography was explored.

After refinement of ideas in subsequent meetings, a Meeting on "the Establishment of a Regional Centre for Services in Surveying and Mapping" was held in Nairobi from 16th to 20th September 1974. The government representatives at this meeting resolved that such a centre should be established. They approved its draft constitution and appointed an interim Technical Advisory Committee to carry out surveys in member states and to draw up a development plan pending the official accession to the constitution by at least five states. By 18th April, 1975, Kenya, Malawi, Somalia, Tanzania and Uganda had signed the instruments of accession and on that date, the Regional Centre for Services in Surveying and Mapping (the Centre) officially came into being. At the very first meeting of 1st August, 1975, it was decided that "the Centre should develop a nucleus for processing satellite imagery and be involved in experiments to keep alive the knowledge of satellite imagery."

It was with this resolution in mind that the representative of ECA, during the following month (September 1975), discussed with USAID the possibility of hosting AID's proposed Regional Remote Sensing Facility at the Centre. An agreement to this effect was signed between AID and the Centre on 2nd March 1977 and the first Director of the Regional Remote Sensing Facility (RRSF) was appointed, an AID direct-hire appointee who arrived in Nairobi in September 1977. The RRSF was incorporated as an integral department of the Centre in 1981 (the name was changed to Regional Centre for Services in Surveying, Mapping and Remote Sensing - RCSSMRS).

The Governing Council of the Centre consists of representatives of the contracting states chaired by the Executive Secretary of the U. N. Economic Commission for Africa and with the Director General of the Centre as Ex-Officio member and Secretary. As has been indicated above, the founder member states were five, out of the then potential membership of 12 states (the others being Botswana, Ethiopia, Lesotho, Madagascar, Mauritius, Swaziland and Zambia). Since then, the total potential membership has gone up to 17, with the addition of Angola, Comoros, Mozambique, Seychelles and Zimbabwe, all forming part of the ECA, Eastern and Southern African Region. Since the foundation of the Centre Comoros, Lesotho, Swaziland and Zambia have joined so that the total membership is now nine. It should be noted, however, that Sudan forms part of the AID Eastern and Southern African Region and therefore has been a regular

participant in RRSF activities. The Governing Council is the supreme policy making body for the Centre and discusses matters pertaining to RRSF.

Since 1974, the ECA, at the request of member states, has also been involved in promoting an overall African Remote Sensing Programme, which would consist of the installment of satellite receiving stations, as well as the promotion of training and user-assistance centres. An African Remote Sensing Council now exists under which a number of Regional Management Committees operate. The East and Southern African Regional Management Committee is, with the exception of the Chairman, almost identical in membership to the Governing Council of the Centre.

2. The Organization of the RCSSMRS

The Centre at present has five departments. These include: Administration and Common Services, Engineering, Geodesy, Mapping, and Remote Sensing.

a) The Administration and Common Services Department - The Administration and Common Services Department consists of a number of offices, including the Office of the Director-General, filled by a former Permanent Secretary for Tanzania, Mr. Bernard Sikilo. There is a provision for a Cartographic Consultant in his office (which is at present vacant). The Deputy Director is a former P.S. from Uganda, Mr. Sam Okec. The Chief Librarian is Mr. F.O. Pala, a former Director of Kenya Library Services. Further staff consist of an Administrative Officer, a Security/Protocol Officer, a Store Keeper, a Driver, a Registry Clerk, a Receptionist, a Telephone Operator, two Messengers, two Watchmen, four cleaners, and one Temporary Assistant. The Accounts Office is headed by Mr. C.V. Vernicos, who was seconded by ECA. He is assisted by two Accounts Clerks.

b) The Engineering Department - The Engineering Department is an operational division which carries out the servicing, repair, and calibration of geodetic and photogrammetric equipment both at the Centre's Workshop and to the member states cartographic institutions. During the years of assistance to the member states, repairs have been made on equipment with a replacement value of US\$9,435,820. The department has a provision for a Senior Engineer (the position is at present vacant). There are two electronic Engineers and one optical engineer, assisted by an optical technician. The two positions of junior optical technicians are vacant, whereas that of junior electronic technician is filled. The department has one driver and one office attendant.

c) The Geodesy Department - The Geodesy Department has a position for Senior Surveyor which is vacant. The two positions of Surveyor are filled. There are two field assistants, two technicians, one computer assistant and two positions for drivers (which are at the moment vacant). A project to assist in developments in Geodesy has been presented to UNDP under the regional projects programme. UNDP considers it as one of the priority programmes aimed at assisting the Centre. The budget is US \$740,000. UNDP has also financed the purchase of two MX 1502 Geociever Satellite Surveyors worth US\$100,000.

d) The Mapping Department - The Mapping Department is headed by a Cartographer assisted by a Cartographic Assistant and a Lithographic Assistant. IDRC (Canada) has provided US \$292,000 for fiscal year 1983/84 to assist with the photomapping project using landsat imagery. The components of the project are equipment, one Project Personnel (Mr. Adika from Ghana) and provision for group training.

e) The Remote Sensing Department

The Remote Sensing Department is headed by the Director, Dr. Victor Odenyo, a scientist who has had wide experience in Remote Sensing. USAID entered into agreement with Spectral Data Corporation to provide staffing and procurement services for RRSF. Currently, Spectral Data Corporation provides a Programme Manager - Dr. A. Falconer, a Photo Scientist - Mr. B. Anderson, and an Image Analyst Specialist - Mr. P. Gilruth. In addition, consultants come in periodically to assist with training. A French remote sensing expert, Mr. Pousse, is also working at the Facility. The RCSSMRS provides the services of Mr. J. Barasa (an image analyst specialist) who is in charge of the Browse File. Mr. L. Isawa, an expert on range management, joined in March 1982 as an applications specialist and was in charge of the User Assistance until he left for further training in the United States. Mr. J. Masembe, a photo specialist, joined in April 1981 as an applications specialist and was in charge of User Assistance until he left for further training, and Mr. S. Kalyango, an agriculturalist, is also on board and assists with training.

Apart from the above senior members of staff the RCSSMRS has also provided supporting staff. There are two laboratory assistants and one photo lab. technician. There is one browse clerk and one accounts clerk/typist. There is one Administrative assistant, one personnel secretary, and one driver. The post of Deputy Director has been provided for, but still remains vacant. No counterparts are yet available for contract staff. See Appendix A for further details.

3. Administrative Relationships

Overall policy directives emanate from the Centre's Governing Council. The Director-General is the Chief Executive of the Centre, and is assisted by the Director of Technical Coordination. The overall responsibility for running the RRSF lies with the Director of the Facility who reports to the Director General. The Agreement signed between USAID and RCSSMBS stipulated certain administrative responsibilities on the part of USAID or REDSO/ESA. REDSO/ESA has assigned a liaison officer, who monitors and assists the Facility in matters relating to AID.

B. Production and Services

The Regional Remote Sensing Facility has a firm mandate established from the inception. Program and targets include: training of personnel from ESA states, processing and interpreting photographs and imagery, maintaining a photo-library, awakening ESA in the uses of remote sensing, stimulating user-services and projects in the region, and keeping abreast of scientific/technological developments in the world, while maintaining links with and acquiring data from LANDSAT ground stations.

To carry out these activities the RRSF had to procure a minimum of equipment and software, some key personnel, working space and funds. The previous section discussed the current staffing pattern. This section deals with actual production and services.

Production and services consist of the following activities:

1. User Assistance - In response to the recommendation of the evaluation reports of both 1979 and 1981, the RRSF ensure the effective capability of the photo-laboratory and the browse files, to enhance user-assistance. In the period 1/4/1982 to 30/6/1983, the number of requests for user-assistance increased considerably. The total of 709 visits in 15 months gives 47.26 per month as the level of user services since September, 1982.

The categories of users included government ministries and departments (more than 15 from Uganda, Kenya, Zambia, Rwanda, Zimbabwe, Djibouti, Tanzania, Ethiopia), U.N. Agencies and international organizations (8 of them - UNEP, UNESCO, IDRC, Council for Human Ecology, UNDP, CSIRO, REDSO/ESA AND USAID Somalia), African and overseas universities (over twenty), and numerous embassies, charities and commercial/industrial organizations.

Although the work flow was not constant, image interpretation equipment was used on an average of three hours daily, while the photo-laboratory processed "custom-ordered" images for users. For a more complete list of equipment see Appendix B.

2. Natural Resource Surveys - The RRSF had a target of four tasks for the period reviewed, completed and valued at \$300,000. (excluding cost of in-country logistics to member states). Many significant projects have been evaluated and technically assisted by the RRSF. These projects include soil mapping in Zambia (to facilitate loan assistance from World Bank); the Highland Reclamation in Ethiopia; the wood-fuel energy project in the Sudan; and the forest maps of Kenya, Uganda, Tanzania and Swaziland. These are described in Appendix F.

The number of projects for which advice and involvement of RRSF staff are needed are fast increasing. Countries which have requested assistance include; Sudan, Somalia, Zambia, Tanzania, Swaziland and Lesotho. Details are also described in Appendix F.

3. Product Sales - Product values in 1983 increased 50% over 1982, to a level of Kshs 448,100. Sales increased 100%, to Kshs 352,050 in 1983. Photolab materials, consisting of prints, products, and slides, are listed by monthly productions since 1982 in Appendix D. Monthly sales averages were in excess of Kshs 29,000.

C. Training and Educational Activities.

"Training" is the provision of technical expertise to scientists, technicians and university lecturers who thereafter apply the knowledge directly in the performance of their duties. "Educational Activities" refer to the general awakening of decision makers, civil servants and the general population in ESA to the nature and benefits to be derived from remote sensing technology.

1. Training - The goals and purposes of training activities vary. Usually training courses are packaged according to the needs of particular groups of students. Those courses conducted in the period April, 1981-December, 1983 uncluded teaching with remote sensing (for staff from ESA Universities and Colleges) and remote sensing for geologists, hydrologists, cartographers, natural resource scientists, highway engineers and agriculturists.

In the period since September, 1982, the target of people to be trained was only 120, but a total of 245 participants were actually trained. For further detail, refer to Appendix C. In that period, 775 were nominated by client states, of whom only about 1/3 could be selected and trained.

2. Education and Regional Sensitisation of ESA - RRSF appears to have succeeded in breaking through to the average member of the scientific community at the Universities of East Africa in environmental sciences. Success has been less great with scientists working in Government Ministries and parastatal bodies. Communication within the universities is much closer and more intimate than with Government Ministries and research institutes. Nonetheless, the degree of space-awakening (in remote sensing) so far achieved in each of the 18 countries of ESA is growing, recognizing that until RRSF arrived, ESA was virtually ignorant about remote sensing technology.

D. Facilities and Equipment

1. The Library - The growth of the RCSSMRS Library has been slow due to lack of funds. However; the Library now has close to 1000 books, and periodicals of 30 different titles including three specific titles on Remote Sensing. In addition, the Facility itself has developed a library of remote sensing and resource publications which are valuable to course participants and individuals working on projects.

2. User Services - A User Service Section has been established in the Facility where users and potential users can view products of previous projects, select Landsat images from browse files and check available photography and resource maps. Additionally the users can utilise materials and equipment in accomplishing specific projects. Remote sensing and image products found in the Facility are valued at close to 30 million dollars. In particular the Facility has:

(1) Comprehensive image Library with over 14,600 reproducibles available for the 555 scene centres in the region.

(2) A browse file with some 7000 reference prints available, and

(3) A NASA loan of 5000 canisters of film rolls covering the whole world.

In addition the Facility has interpretation equipment which includes the following: zoom transferscope, colour - additive viewers (2), scanning zoom stereoscope, mirror stereoscopes, scale-change projector, overhead projector (mapping quality), visual markers, and sketch masters.

3. Photo Laboratory - A photo laboratory for custom photographic products, including Landsat colour composites, black and white

enlargements, transparencies, and slides is found in the Facility (the November 1983 cover of Journal of Photogrammetry and Remote Sensing features a Landsat composite of Kenya provided by this laboratory). In particular, the photo laboratory can provide image reproduction services supplying colour and/or black and white images of scales from 1:100,00 to 1:3,369,000. Customized colour combinations, scaled enlargements and mosaics are provided to order for project work. Photo sizes from 35mm slides to 1m x 1m prints are available in black and white and colour. The lab is equipped to utilize 6 colour processes and is the only such in the region:

Maps and photographs can be printed together and photo proofs of the experimental maps can also be produced in the photo lab which is equipped for colour separation work (and half toning for black and white only).

4. Other Support Service/Equipment - Other Support

Services/equipment includes a Multilith 1815 offset printing machine and support, Cromalin colour proof system, Diazo reproduction system A4 size, Sunray/Uzolid copier (40" width), and spiral binder with parch and slide copier.

The members of the Facility also give advice, assist in project design and also provide image interpretation assistance.

E. USAID Project

It is assumed that readers are familiar with the personal Remote Sensing Facility Project (698-0414), a regionally funded activity that was initiated in 1977, through reading the Project paper (1977), the more recent Project Amendment (August 1982) and numerous (four) evaluations. Only a short synopsis of project highlights of a background nature will be provided in this section, as the major concern and emphasis is with current status of the Project.

1. Background - The original Remote Sensing Project (931-1166) had as its purpose the provision of satellite data and related resource technologies available to African resource managers and development planners through training in utilization of appropriate technologies. The Project was authorized in June, 1977, with a budget of \$1,066,000. USAID provided a direct-hired Project Manager. In March of 1979, a new Project Paper was written and the current Regional Remote Sensing Project (698-0414) was authorized. Total funding was \$2,364,000 and the Project Assistance Completion Date extended to February, 1983. By February, 1982, total funding had been increased to \$3,656,000. A Project

Amendment was enacted, increasing the funding level by \$1,182,000 and extending the PACD to June 30, 1984. The purpose of the project was expanded from the original 1977 version with the following: "The purpose is.... to utilize the existing pool of trained personnel and interest in remote sensing applications by undertaking project support activities in various client states."

2. Current Status - Besides the achievement of the project purposes as stated, certain project "countable objectives" were laid out in the Project Amendment. These highlight certain quantifiable verifiers in the major activities of the Facility, namely in training, user-initiated project activities, natural resources surveys, production of imagery and photography, as well as member (client) funding participation. These figures provide statistical information, but do not provide quality assessments. Such assessments will be provided in the following section of the evaluation, entitled Perceptions and Problems. Under this subsection USAID project activities will be divided into Management, Production Project Services, User Services, Training and Financial status. It should be noted that there is little differentiation between project activities and activities of the Remote Sensing Facility as a whole and previous sub-sections have reviewed the current status in some detail. Therefore, quantifiable indicators of progress will be listed and any observations on the areas as they pertain specifically to the USAID Project will be pointed out.

a. Management - Management and administration of the Project is the purview of the RRSF Manager, the USAID Project Officer and the contract personnel hired under the Project. Because of the curtailment of services of the previous AID direct-hire RRSF Manager, it was expected that the USAID Project Officer would be more involved than before in project management. This has taken place, but in a less formal manner than recommended in the evaluation of August, 1981. Meetings have been held infrequently and AID has had a total of three Project Officers as liaison personnel since 1980. Quarterly reports have not been submitted on a regular basis, either by the Facility or the contractor. There have been no regular meetings or communications between the management personnel of the Centre and of the Remote Sensing Facility. There are no project counterpart personnel (to contract staff) yet recruited.

b. Production - The net product value produced in 1982 was Shs 288,930. In 1983 the product value used internally or externally had increased to Shs 448,100 (see Appendix E). Prints, products and slides were all supplied in greater numbers in 1983. Invoices for photolab materials totalled Shs 179,032 in 1982 and Shs 352,050 in 1983. For 1983 this averaged Shs 29,340 per month. The Project Amendment set a target of Shs 20,000 in sales (billings) per month. That has been exceeded by some Shs 9,340 per month (30% above target).

c. Project Services - Natural resource surveys that have been assisted by the RRSF with their staff and materials total well over 30 discrete activities. These are listed in Appendix B. They can be grouped as geological mapping, rangeland mapping, and various analysis of these. At the present time the Facility is involved with soil mapping in Zambia, a highland reclamation project in Ethiopia, forestry mapping in Kenya, Uganda, Tanzania, and Sudan, and resource mapping in Swaziland.

d. User Services - The Project Amendment requested the monitoring of user contacts (as a countable objective), with a target of 45 user contacts per month by the end of the Project. In the last 15 months (to December, 1983) there have been over 700 visits. This averages 47 per month. The users have come from a great variety of institutions. Appendix B lists some of the more prominent organizations that have used the Facility.

e. Training - Training of RRSF staff has taken place, both on-the-job and overseas. At present one staff member is undergoing a M. S. program in the USA. Training programs run by the RRSF have been held since 1979. Appendix C lists all training programs since Project inception. Since the Project Amendment, ten different courses or seminars have been given. These ranged from 10 days to four weeks in length. A total of 204 participants have been enrolled and completed these courses. This is better than double (100 was the target figure) the "countable objective" stated in the Project Amendment.

f. Financial Status - Appendix G provides details on the financial status of the Project. Total funding under the RRSF (698-0414) is \$3,772,000 in obligations. Disbursements to date total U. S. \$2,920,924. Invoices since the last disbursement total U. S. \$76,535. Assuming that these invoices are correct, the undisbursed funds for the Project total \$851,076. Assuming that only operating expenses (less advance) and contract expenses are funded at historical levels plus 10% (\$22,000 per month operating expenses and \$40,000 per month contract costs) for the remainder of the Project period, from January through June 1984, then undisbursed funds would total \$446,541. If funds are spent on the building being tendered by RCSSMRS, if local consultants are hired and if a computer is purchased, then undisbursed funds would total some \$250,000.

F. Other Donors

Expressions of interest, as well as assistance, have been made by a number of parties from the donor community. These include the following:

1. Government of Australia - The GOA has provided consultants to the Facility for certain seminars, three in total over the last two years. They have been provided through the Development Assistance Bureau and the Commonwealth Scientific and Industrial Research Organization (CSIRO). These organizations have expressed an interest in exchange training activities and the possible provision of long term technical assistance.

2. Government of Holland - Through the Dutch International Training Centre (ITC), numerous EA and SA individual country government personnel have been trained in remote sensing and airphoto interpretations. The two-year training program has been given through scholarships or tuition paid. Although no Facility staff have taken courses, the Dutch have expressed a willingness to accept applications for scholarships from the Centre or Facility. Also the ITC has mentioned possible collaboration on short and long-term training using Centre and ITC facilities.

3. Government of Canada - Through the Canadian International Development Agency (CIDA), there have been expressions of interest in providing Centre personnel with training in geodesy (measurement) and possible procurement of computer systems (hardware and software) for the Facility. It is not known if such equipment would be donated or sold.

4. FAO and UNESCO - FAO has provided funds for one Facility training seminar. Both organizations have indicated a willingness to fund further training seminars. This course, incidentally, cost roughly \$350 per student per week in direct costs.

5. International Development Research Centre - Largely supported by Canada, the IDRC is currently funding a Centre programme performing an experimental mapping mosaic. It is possible that the IDRC would be interested in supporting Facility activities as well.

6. Government of France - The French have funded the direct costs of one complete Facility training seminar and a portion of the costs of two additional seminars. They have provided one technical expert to the Facility, seconded from KREMU. One scholarship is offered to the Facility, for a one-year post graduate course. The French have also expressed an interest in supplying computer hardware to the Facility.

7. UNDP - The United Nations Development Programme has earmarked a grant of \$750,00 for the RRSF. Procedural problems have delayed grant implementation and the Facility hopes these will soon be overcome. Also a request for \$700,000 to assist with building construction has been made through the U.N. Economic Commission for Africa. No response has yet been received.

8. Sweden - The Swedish International Development Agency (SIDA) has expressed some interest in funding pilot projects in agriculture and water resources, as well as with the building of the Centre facilities. More follow-up effort is required.

9. Norway - The Norwegian Agency for Development (NORAD) has indicated interest in formulating a comprehensive hydrographic survey program of the Kenyan coast and lakes. NORAD has funded a feasibility study, which is now under study.

10. Great Britain - The British, through the Directorate of Overseas Surveys, have provided short-term consultants to the Centre. Work in photo mapping using satellite imagery is planned for the near term.

11. EEC - The Regional Management Committee (whose members also make up the Council of the Centre) of the African Remote Sensing Council has requested the EEC to assist in the establishment of the Nairobi Satellite Receiving Station and the related developments. EEC has agreed, and as a first step has provided \$500,000 for a consultancy to carry out a full feasibility study. The study should be completed by the first quarter of 1984.

12. ADB - The African Development Bank has been requested to provide US \$400,000 towards the cost of the headquarters building construction. This is still under consideration.

13. Japan - A request has been sent by the Centre to the Government of Japan for assistance in the expansion of the photo lab. The request was for two project staff to assist particularly with the processing of NASA acquisitions. Part of the request was also for a contribution towards the construction of the headquarters building.

III. PERCEPTIONS AND PROBLEMS

This section follows the status report on the RRSF and covers the evaluation team's judgement of major strengths and weaknesses, as well as the problem areas of concern. Overall we find the RRSF to be a valuable institution for the development of the region, worthy of strong support from the members and from the donor community. As a service organization, the RRSF can be an important resource to government planners, policy-makers, and development program implementers. Yet the RRSF is not without problems. The following sub-sections will delineate the evaluation team's perceptions of problems and strengths. The headings are: Program Goals and Purposes, Organizational Structure, Production and Services, Training and Educational Activities, Budget and Facilities, Funding and USAID Project.

A. Program Goals and Purposes

The main goals and assumptions of the Project and for the Facility are still the following:

(a) That improved data would improve accuracy of resource assessment and efficiency of agricultural and resource management, and that this management would improve lives of the ESA population;

(b) That, through AID and member countries participation and through knowledge of value of RRSF and assistance available at RRSF, ESA would adapt remote sensing to practical projects which would improve productivity in agriculture and other areas of resource development, by using facilities and services at RRSF.

(c) That AID-donor assistance for training, hardware and consumable commodities, and LANDSAT imagery would remain throughout the Project life, and that RRSF would be able to utilize additional equipment, trainable personnel would be available and satellite data flow would continue;

(d) That the Centre would continue to provide space, accounting facilities and personnel; while participating countries supplied sufficient funds and personnel to maintain the desired level of support to the Centre;

(e) That short- and medium-term training and seminars would be available provided states would release personnel;

(f) That products from RRSF would be well distributed throughout the participating countries, while reproductive and analysis of imagery would be in high demand; and

(g) That a fully operational RRSF, providing user-assistance to the states and AID missions would be available to satisfy requests for assistance, while a well-stocked image library is maintained.

The RRSF has been established to transfer remote sensing technology to all nations in East and Southern Africa for the fostering of a better management and understanding of natural resources. The ultimate aim of the knowledge gained and improved management is the upgrading of the standard of living of the rural poor. The achievement of these goals can be assisted through the provision of a high standard of service and management inputs required for decision-making in the areas of forestry (fuel supply and building materials), hydrology (water for agriculture and households), soil surveys (exploitation of land most effectively), soil conservation, crop monitoring, and mineral resources utilization.

These goals and purposes are fundamentally identical to those of the USAID RRSF project, which will be discussed in III F. They do not include, however, a clear stipulation that the Facility should strive towards independence and self-sufficiency of operations, without donor support in funds and personnel. At present, the Facility would have to greatly limit the scope of operations if donor support was withdrawn. Also, the RRSF goals do not include, as one of the purposes, assistance in the entire region. At present there are only nine member states out of a possible eighteen. Other RRSF purposes, as listed on page 16 of the ten year Work Plan (Appendix H), appear appropriate and relevant. The provision of data maps through the mapping and monitoring of natural resources, particularly forests, water, agriculture land, and range land can serve as fundamental tools for national planning and programming. Regardless of the design of the RRSF program, which will largely depend on available donor inputs, the broad goals and purposes are appropriate for the region and for the potential capabilities of the RRSF.

B. Organization and Staffing

(a) Background - The original agreement signed on 2nd March, 1977, between USAID and the Regional Centre for Services in Surveying and Mapping, concerning the establishment of a Regional Remote Sensing User Assistance Facility, spelt out the responsibilities of the Centre as well as those of AID, both having administrative implications. The Centre was to provide space, utilities and custodial services for requisite offices, laboratory, library and files; it was to assist in arranging for duty free entry of equipment and supplies for the Facility into Kenya and other countries of the contracting parties; it was to provide access to and use of the Centre's photo laboratory by remote sensing personnel, and also access to the Centre's conference facilities and other support activities; it was to provide adequate insurance for equipment and furniture located in the buildings, as well as procure for the Facility such equipment and supplies as may be required by it.

As for AID, its responsibilities included: provision of the services of and payment of certain salaries, housing allowance, travel, insurance and any other related expenses for up to four professional staff, short term consultants, and support staff attached to the Facility; it was to reimburse the Centre for all authorized procurement done on behalf of the Facility, and also to reimburse it for a proportionate share of the cost of utilities, custodial services and insurance for equipment and furniture; it was to provide remote sensing equipment, reference material, film library, landsat imagery browse file, and such other equipment as the parties deemed necessary, for the Centre's photo laboratory for enlarging and printing landsat imagery; it was to negotiate the procurement of equipment and supplies for the Facility in

the United States and arrange for and finance their transportation to the site of the Centre; and it was to maintain all equipment provided and update browse file and film library as new imagery become available.

The administrative provision for implementing these activities was stated in Article IV(a) of the agreement... "the work of the Facility will be undertaken in close conjunction with that of the Centre so that, to the maximum extent practicable, the work of each will be supportive of the other, and to this end it is agreed that there will be continuing consultation between the Director-General of the Centre and AID personnel at the time responsible for the operation of the Facility." An AID direct hire appointee arrived in Nairobi in September, 1977, "wearing two hats". He was both a project manager as well as the Facility Director.

Meanwhile USAID entered into agreement with Spectral Data Corporation (SCD) to provide professional staff members, and Dr. Falconer and Mr. Hart arrived in August, 1978. Four months after their arrival SCD was named as procurement agent for the Facility, an action which was precipitated by delays in procurement and by the need for guidance on the selection of photo lab equipment that would include recently developed innovations and processes.

Within the first year of the project, responsibilities for administration lay with the Centre, the AID direct hire appointee (who, as indicated above, had two major areas of responsibility) and the SDC. The first evaluation, carried out in December, 1978, noted difficulties in host institution management as well as weaknesses in AID arrangements. The evaluation was followed by a new project paper in March, 1979, and a new Grant Agreement signed on 10th July, 1979. In Washington, D.C. the Project 931-1166 was moved from DS/ST to AFR/RA and acquired a new number 698-0141. Probably because of this changeover, the second evaluation was carried out barely 4 months after the first one.

The early changes brought about some confusion. The Spectral Data Corporation had been granted a contract after proper tender procedures. When SDC had already stationed its personnel at the Centre in Nairobi, a new project paper was written. The contractor was legally and regularly allowed to continue with the amended project, yet it later appeared that there may have been some irregularity in not allowing contractor competition. Frequent evaluations, as well as revisions of contract, did not help to clarify the position, which did become irksome later on. The Evaluation Team was made to understand that there could be no further non-competitive contracting with Spectral Data Corporation which has been providing to KWSF (through REDSO) professional/technical personnel and services.

The Grant agreement of 10th July, 1978, described the AID administration of the Facility. "The project was to be implemented by REDSO/ESA which would provide all the necessary legal, administrative and monitoring inputs." It was, however, decided to separate the two functions of the Director, so that the incumbent would devote all his time to actual technical supervision and to concentrate on the recruitment and training of counterpart staff. The role of project manager (REDSO "monitor") would be filled by another REDSO staff member, to whom the incumbent would report. The Facility would therefore be operated on a day to day basis by the incumbent AID direct-hire staff member as director, assisted by a four-man team of contracted technicians. The Grant agreement foresaw the Centre giving further administrative support as outlined in the agreement of 2nd March, 1977.

The evaluation of March and April, 1979, had earlier made more detailed recommendations concerning the issue of administration and staffing. It was considered urgent that "an African counterpart Facility Director and three other professional counterparts be recruited as soon as possible." It was recommended that the RRSF issue monthly reports to REDSO, that biweekly meetings amongst REDSO, Facility and Mapping Centre personnel and SDC contract staff be held, and that regular planning and budget meetings be held at three month intervals.

The two functions of the Director were separated without much improvement in the situation. As for the Counterpart Director, the position had already been advertised in December 1978. Dr. Victor Odenyo was identified for appointment, but circumstances made it difficult to offer him the position immediately. He was subsequently hired by FAO in Addis Ababa. The position was not re-advertised until 2 1/2 years later. On July 10th, 1981 two candidates were interviewed and one selected and an offer made. It was anticipated that the successful candidate would be on the job by January 1982, but he eventually turned down the job after several weeks of suspense. Another year elapsed before Dr. Odenyo came on board (13th March, 1983). It is unfortunate that it took five years to get Dr. Odenyo on board.

As for other counterpart staff, the first appointee, Mr. John Barasa, joined the RRSF on December, 1980. The second, Mr. Luka Isawa, joined in March 1981, the third, Mr. Joseph Maseembe, in April 1981. Thus the three positions recommended to be filled by the evaluation team in April 1979 had been filled by April 1981. A fourth position has since been filled by Mr. Kalyango.

The present stage in the development of RRSF staffing is critically important. It involves the effective replacement of the AID-sponsored personnel from SDC. The Facility does have a Director, but the Deputy

Director position that would entail programming has not yet been advertised. Of the four other persons that have been appointed since 1982, one is in training in the United States and will be away until September, 1984. Arrangements are being made for two others also to go overseas for further training. It is not known if they will still be working at the Facility in June, 1984. There is an urgent need to see how these gaps in staffing can be filled. Otherwise the high standards that the SDC staff have attained and that the users in the member states have come to expect will be lowered to the detriment of the purposes for which the RRSF was created. The RRSF will have to decrease its user services and project participation. Additionally, the selected counterpart to the photo scientist is not capable of performing all photo lab tasks. Training will not resolve the problem of his inadequacies. Counterpart positions for Deputy Director (Program Manager) and photo scientist have thus not yet been filled.

A second problem relates to the recommendations made by the 1979 Evaluation Team on administration. We have no evidence that regular meetings amongst REDSO, Facility, Mapping Centre personnel, and SDC contract staff are held. Indeed our impression is that there are considerable gaps in information between the various groups, a lack of communication which has had a deleterious effect on the administration of the project. The 1980 and 1981 Evaluations both also comment on poor communication between REDSO/ESA and the Centre/RRSF complex.

During the past seven years, some mistakes were made by individual incumbents in the Centre, RRSF or REDSO, mistakes which have left behind some dissatisfaction in REDSO, RRSF and the Centre, especially in the areas of management and effective cooperation. Without belabouring the reader, only those difficulties that are currently being experienced will be noted.

The major problem seems to be a severe lack of communication at various levels. There is very little communication, collaboration and support between the ECA, governing councils and the Centre. The ECA has played almost no role in the Centre's operation and has not been a positive factor in difficulties with funding and relations with member and non-member states. The governing councils, both of the Centre and the Facility, have not been active in programming, policy or promotion. Periodic meetings are held, with no concrete results being achieved.

Even more serious is the lack of communication, collaboration and support between the Centre and the Facility. It is felt that the major responsibility for these shortfalls lies with the senior staff of the Centre, who have the mandate to direct and assist the Facility. No

regular meetings are held. The evaluation team was aware of numerous occasions in which the Centre acted without any discussions with the Facility management, on matters directly concerning policy and operations of the Facility. Facility management was unaware that site construction had been initiated. Responses to letters were sent to REDSO/ESA without Facility management awareness, letters which required Facility actions. These are clear indications of improper management and poor communications between the Facility (a Department of the Centre) and the Centre.

Additionally, REDSO/ESA has not insisted on, as it should, periodic meetings and reports as laid out in the Project Amendment. This shortcoming and lack of interest has weakened the Project effort and created certain misconceptions that could have been easily avoided.

Authorized in June 1977, as Project 931-1166, RRSF had an initial project life of 3-1/2 years. The first evaluation, December 1978, already found problems of poor management, limited support from member States of ESA and negligible support from other donors. Therefore, among other things, that evaluation recommended a close liaison between REDSO/ESA and the Facility, that all contracts be signed with approval of REDSO/ESA, wherever possible and that there be regular monthly progress reports.

Subsequently the amended project paper (690-0414) came out in March 1979. The amended project paper made provisions for authorization and obligation of grants, approval of the financial ceiling during the project funding life and highlighted central developmental issues. In particular, the Amended Project Paper drew attention the following issues as requiring special review during the Project life: viability of the Centre and its ability to give the necessary financial support; demonstrable regional support by governments; progress by RRSF; and progressive assumption by the Centre of an increasing percentage of operating costs of RRSF. These have been central issues in all subsequent evaluations. The Evaluation Team found a state of crisis in the development of RRSF. This crisis needs careful elucidation in its many facets, so that what is in jeopardy may be clearly visualized.

On the one hand, REDSO/ESA was consistently of the opinion that the management of the Centre and RRSF was well aware (or ought to have been well aware) at the beginning of this, the latest, extension of the life of the Project that, by 30th June 1984, the Project would be terminated. On the other hand, the management of the Centre and RRSF had been convinced that the position of AID (through REDSO/ESA) had not been definitive and final. They were convinced and, until recently, they had believed that AID would be amenable to negotiation at this critical

transition period, for a further term of tangible support. This gulf of understanding separating the two sides on the situation was an ominous sign for the smooth transition in RRSF.

The SDC professionals have built such a critical and detailed knowledge of remote-sensing interpretation of resources and of personal responses from the ESA states that are highly significant to harness for rapid application of the technology. Their departure, along with AID support, will severely weaken RRSF's ability to provide services at the level achieved in 1983.

D. Production and Services

The Facility has made tremendous strides in the provision of quality products, user services and natural resource surveys in the last two years. In all areas the level and amount of assistance has better than doubled during the 1980's. Much of the credit can be directly attributed to the technical assistance personnel provided by SDC, namely Allan Falconer and Bob Anderson. Under the program management of Mr. Falconer, training programs have expanded in number, scope and participant levels. He has been instrumental in getting excellent lecturers and appropriate participants. Perhaps even more impressive have been the number of natural resource survey activities that have been initiated and coordinated under his direction. Since 1982, thirteen new activities have been initiated. Mr. Anderson, in the photo lab, must be credited with awakening much enthusiasm for the Facility. The quality of prints, slides and images has been of the highest professional calibre and has helped to promote the Facility as an institution with a capability of quality workmanship. These two individuals have been well supported by technical staff from the Facility.

Yet neither TA person has trained a counterpart and the capabilities of the Facility in production and services are closely tied to their input. Demand for products and services will undoubtedly decline when the Facility no longer has their input in operations.

User-Assistance. The number of requests for user assistance increased beyond the set target, which was 45 user contacts per month by the end of the amendment period. The total realized figure was 709 visits in 15 months. This rapid growth in number include government ministries, parastatal bodies, U.N. agencies and international organizations (e.g., USAID Somalia, REDSO/ESA, IDRC and CSIRO), Africa and overseas universities, embassies, charities and commercial/industrial organizations.

Beside user-assisted advice and design, users value that RRSF trains personnel on local environments, and at very low costs. For some institutions (e.g. KREMU) RRSF services for baseline mapping and monitoring over large areas is an invaluable service to resource management.

The number of requests is high and growing. But numbers alone are an insufficient indicator of the effectiveness of user assistance. It is desirable to know how far advice from RRSF produced practical results for application in the production of goods and services. Both in user-assistance advice and in project assessment and design, the aim is to improve resource inventory, assessment, management and monitoring. Effective use of remote sensing will lead to an increasing demand from ESA for such services as RRSF can provide.

Project Activities. In the period under review, many significant projects have been evaluated and technically-assisted by RRSF. These projects include Zambia's soil mapping project (to facilitate a loan from World Bank), the Highland Reclamation Project in Ethiopia; the forest maps of Kenya, Uganda, Tanzania and Sudan and Swaziland, and others. The number of projects for which advice and involvement of RRSF staff is sought is fast growing. Some of these include; Sudan Roseires Project, Somalia Juba River Valley Project, Zambia national soils mapping, Tanzania technician training and continued forestry mapping, Swaziland forestry survey, Lesotho erosion and forestry study and training programs for Indian Ocean states. For further details, see Appendix F.

While UNDP and UNEP have used the services of RRSF and the Centre, and while national institutions like Kenya's KREMU already are aware of the facilities at RRSF, there is significant scope for dissemination of information on RRSF among potential institutional customers of RRSF in East and Southern Africa.

The RRSF has now become an operational reality. It needs a stable period to consolidate effectiveness in the fields already achieved, so that the services it has rendered and can render to ESA may be appreciated and applied. Any destabilisation of the present capabilities for effective service is likely to prove detrimental for the confidence of users, the potential use of resources and the national populace, whose welfare the Project was intended to improve. So far, the project has not demonstrably improved national planning, but with the on-going and prospective investments, RRSF can contribute to the well-being of the people:

D. Training and Educational Activities

1. Training. In terms of numbers, distribution among states and long-term courses, training has been very successful. And while sample surveys of past students give very favourable ratings to the training they underwent, these alone are not accurate indices of effectiveness of the training program. In the Universities of Nairobi, Khartoum, Makerere, Dar es salaam, Addis Ababa and Madagascar, among others, there are already effective applications of remote sensing teaching and research in environmental sciences. From practically every country, there is a practical project and user-assistance request. Thus, it is not unreasonable to believe that the training is effectively being applied. One, however, would desire to learn how widespread is the application by trainees of remote sensing. It would be desirable to receive reports from the persons in charge of the institutions to which these trainees returned, and how productive their training has become.

There are a number of indices that sensitisation has made some impression. They include: the number of students nominated are three times as many as can be trained, the breadth of disciplines from which they come shows the variety of activities to which the technology has been introduced, and students come from practically every country of ESA. Also, through the U.N. agencies (whose sponsorship of students covers areas beyond ESA), RRSF has influence throughout Africa; and one has no doubt that the Nairobi Centre is the most dynamic Facility in Africa. User-assistance and requests for project planning come from all over ESA. Universities in ESA already teach practical environmental courses with remote-sensed data. At UNISPACE 82 and at other important international meetings, delegates from ESA countries (who received their introduction to remote sensing at RRSF) have left no doubt of the ESA region's commitment, firm grasp of and prospective application of the technology.

Together with RRSF, the Centre has many related technical Departments with which RRSF has attempted to establish professional and technical cooperation that enhances the capability of the Centre (as a whole) and RRSF (in particular) as instruments for effective resource development. For instance, cartography and mapping, photogrammetry, remote sensing and geodesy have some projects in which the disciplines cooperate. This existence of several mutually-enhancing Departments in the Centre is beneficial to RRSF. Full integration has not taken place though, as much more could be done between RRSF, mapping, aerial photography, and ground survey work.

E. Facilities

1. Headquarters building - RRSF, as part of the Centre, has operated from rented premises for seven years. The space is now cramped and the lack of its own building has hurt the Centre's ability to grow. The Centre is now actively engaged in seeking funding from member states for the construction of the headquarters building, the plans of which have been approved and tender for the construction awarded. Requests have also been sent to other donors for assistance. Ground for the building foundation was broken in February, 1984.

The evaluation team have been informed of proposals that the RRSF should utilize some of the UNEP buildings that are now being evacuated. However, the operations of the RRSF should be closely allied to and synchronized with the activities of the other departments of the Centre that it would be detrimental if RRSF is moved to UNEP quarters. Indeed, the long term interests of ESA member states will probably not be served if such a move were to be effected.

2. Computer - The need for a computer to perform various tasks has been recognized and the Project Paper Amendment of August 31, 1982, made provision for \$60,000 to purchase one. An RFP for an image analysis microcomputer was recently advertised in the Journal of Photogrammetric Engineering and Remote Sensing (November 1983). The computer would be utilized for image enhancement, teaching image analysis by computer, demonstration purposes, and for a rapid retrieval of data from the browse file. These are seen as worthwhile uses of such a resource.

The purchase of a computer would provide a new program approach and thrust for RRSF since special training would be required for the use of mini and micro-computers. Additionally much development work would be needed in accomplishing the new goals. Users could send classifications and analysis results on special disks to RRSF for specific products from map printers, photo images for displays, interaction with other resource dates, and similar products which would not otherwise be available to them. Computer capability would also allow the RRSF to construct digital geographic data bases for the region. Maps from a country on road locations, forest inventories, topography, streams and drainage patterns, etc, could be digitized and stored on separate geographic information system (GIS) tapes or disks for each country. The cartography mapping section of the Centre could be an excellent cooperator in these efforts.

With future satellite systems, more channels of data would be available, therefore there is a need for processing different bands of information for different uses. The number of combinations would not be

possible by photographic techniques which are currently supplies form the four bands of landsat data. Additionally the computer could provide the possibility of overlaying digital landsat data from one date with that of another date in order to provide temporal information. The change detection analysis could be accomplished much more rapidly not only in map form but also in statistical form as well.

The review committee feels that the proposed computer system is inadequate, as the description is for a much larger, more sophisticated computer system. It is puzzling why the Center would consider an RFP at this time when they have no staff to operate such a system. This is contrary to what is stated in the RFP which says "one staff scientist at the Facility be responsible for the system and be available to work with the selected contractor in installing and testing the systems".

Without AID's support and qualified contractors at the Facility, it is unlikely that a computer system can be used at the Facility at this time. In fact, it would add to the problems and frustrations that would be incurred. The university of Missouri recently installed a mini computer system that will accomplish the tasks required in the RFP. This system of Geographic Resources Centre at the University of Missouri cost over \$230,000 and it has recently determined that an additional \$50,000 is needed to purchase another disk drive needed for geometric correction of the data and for additional display units because of the current demands. Incidentally, the Geographic Resource Centre has 7 full time employees and 12 graduate students to operate this equipment.

The advertisement referred to above has also recently been examined by a computer expert who has criticized various aspects of it. It would appear prudent, while recognizing the urgent need of a computer, that a re-examination of the whole question be carried out.

3. The Library - The Centre's library is small and limited, particularly in the acquisition of books and periodicals. Much more could be done to get organizations and even individuals to donate books and back periodicals to the Centre's library. The library has made a good start on providing resource materials, but material must be kept up to date and subscriptions to periodicals obtained.

4. User Services - User services consist of providing technical assistance and imagery to individuals and institutions wishing to utilize various photo images and data collected. The facilities available are impressive. The total holdings of reproducibles now exceeds 15,600 items for the 555 scene centres in the region. All of the 16 countries (not counting the Indian Ocean Islands, which are represented by 73 scenes) are covered substantially with black and white 4 band positive sets, B&W multiband negative sets, and browse file units.

The user services section has been visited and utilized, on a monthly basis, at a calculated level of 47.6 times per month. In addition to this, professional staff from the Facility provided advice and project planning assistance in many areas. Included among these were the soils mapping project in Zambia, cartographic work in Kenya, highland rehabilitation work in Ethiopia, and forest mapping in Tanzania and Uganda. Major users included more than 15 government departments (from Uganda, Kenya, Zambia, Rwanda, Zimbabwe, Djibouti, Tanzania, Ethiopia); 8 UN Agencies/International Organizations (UNEP, UNESCO, IDRC, Council for Human Ecology, UNDP, USAID, REDSO/EA, CSIRO), and Universities (Stockholm, Khartoum, Nairobi, Bern, Ball State Indiana, Dar es Salaam, Zambia, Zimbabwe, Oxford, Bujumbura, Cambridge, Makerere, Trinity College Dublin, and Minnesota.) Other notable users were: private companies -7, bilateral technical assistance teams -1, embassies-2, foreign organizations-2, and local organizations-1, interpretation equipment was used on an average of 3 hours per day, although the flow of work fluctuated widely. The photo lab engaged part of its time in special processing of images for the users.

Users also receive, as appropriate, some training in natural resources assessments and imagery interpretation. For some institutions, RRSF Services for baseline mapping and monitoring over large areas can be a valuable service to resource management.

It is clear that interest has been generated in the use of the Facility. It is noted that not all the people who should be charged for the services have been so charged. It is recognized that in trying initially to promote the services it was necessary to go slow in billing users. Time has now come for these services to be paid for on a realistic basis. The old adage that "one appreciates what one pays for" is relevant here. The Facility should also increase its involvement in project work which again should be paid for.

It is suggested that one way to encourage member states to pay their quotas to the Centre is to introduce a two-tier system of payment for services rendered by the Centre. Those member states that have paid their contributions to the budget of the Centre would pay for the actual cost of the activity/article provided. Those states who have not contributed to the Centre would pay the full value of the product or service, including amortization plus some profit margin. Efforts should also be made to devise a more efficient system for the collection of moneys already billed.

If the Facility is to increase its involvement in project work, which it should, there will be need to expand in two areas equipment and

staffing. The kind of equipment required will be those that can measure areas, compare maps and photographs, and generally assist in the assessment of natural resources. A computer will also be needed. As to staffing, a hydrologist and geologist are urgently required, as well as counterparts to technical assistance personnel.

The Facility needs to reopen communication with its users by re-establishing the newsletter. The newsletter has not been published for over 18 months now. It is seen as important for communicating information about training courses, new projects, new products, and other items of interest.

5. Photo Laboratory - The establishment of the photo lab has had a chequered history, and that history is presented here to illustrate some of the difficulties that AID/W, REDSO/ESA and the RRSF have had to face in developing the RRSF.

As early as July/August 1977, a photo-lab expert was tentatively identified. It was not until April 1978 that a PIO/T was prepared for REDSO for approval. On June 13th 1978 the request for the expert was turned down by the Embassy and REDSO on the grounds of personnel ceiling limitations. On 23rd June, 1978, a proposal was made to offer the expert a local contract with possible conversion to a direct hire/AID position later. On 2nd August, 1978 Mr. Senykoff (the photo lab expert) accepted contract terms and arrived in Nairobi in September 1978, a year after he had been identified. Meanwhile, two members of the contract team from Spectral Data Corporation team (Dr. Falconer and Mr. Hart) had arrived in August, 1978. In October, 1978, Mr. Senykoff received word of the death of his father and left on an emergency leave. Mr. Senykoff terminated his contract on 9 December, 1978, and left for the USA.

On December 21st, 1978 SDC was named as procurement agent for the Facility. This action was precipitated by delays in procurement and by the need for guidance on selection of photo lab equipment that would include recently developed equipment and processes.

In June 1979, the Facility resumed the recruitment of photo-lab specialist. By September, 1979 REDSO advised that a new PIO/T for a SDC photo lab specialist was signed and forwarded to AID/W. This was followed by a revision of the contract with SDC to provide for a photographic engineer (for 12 months). The contract was signed on 26th November, 1979. Bob Anderson was recruited by SDC in December and arrived in Nairobi on 30th January, 1980. It took one year to get Senykoff, who stayed only for two months, and another year to get Bob Anderson, who was contracted for only one year.

On 5th January, 1981, another contract revision was entered into with SDC which increased the time period for the photographic engineer from 12 to 24 months. A year later (9th February, 1982) there was yet another contract revision increasing the contract of the photographic engineer from 24 months to 38 months, giving the engineer yet another year with presumably two months of leave.

This history is recalled to demonstrate some of the staffing difficulties of the photo lab in the activities of the Facility. It is hoped that future contracts will be sufficiently long to give the staff time to adjust and contribute tangibly in their sphere of competence. It is an added credit to Bob Anderson that in two years he has brought the photo lab to a position of excellence, processing first class products, thus assisting tangibly in training and the case of the Photo lab illustrates another facet of the predicament in which the Facility and AID have sometimes round themselves. We understand that since the first signing of the contract between AID and SDC in 1978, the contract itself has been amended 19 times. This must have taken quite a bit of time in terms of paperwork and manpower deployment, apart from the possibility of generating a certain psychological exasperation with the project.

F. Budget and Funding

At present, funding for the RRSF is provided through the USAID Project, through the Centre, and sales of products. Some additional support comes from the Government of France, in the provision of one technical person, and has come from donors who sponsored particular courses and activities. The revised RRSF Ten Year Work Plan (Appendix H) contains an illustrative budget, with annual funding requirements for major expense categories. It does not show the RRSF generating any revenue per se, but requiring inputs from the Centre and the donor community.

The illustrative ten year work plan budget shows the RCSSMRS as the provider of funds for local staff salaries, accommodations and a portion of the core programme. Surprisingly, member states are not shown as directly funding any activities. It would be expected that member states would fund at least some portion of capital equipment, natural resources operating costs, overseas training, and local seminars/training. Certain categories of expenses show no impact of inflation (items 5 through 9) and others show 5%. Yet the categories and activities listed are required for effective operation of the Facility and the magnitude of expense appears appropriate. For the RRSF to carry out the program as envisioned in the Work Plan, the budget is a fair estimate of financial requirements.

The Facility does require some improvement in the record-keeping of its finances, which now appears to be done by contract personnel. There have been no recent cost analyses for production of photo lab outputs, nor have cost analyses been done of various other services (such as seminars, natural resource surveys, equipment use, user support, etc...). This is a weaknesses that should be rectified.

Funding from the USAID Project, its disposition and allocation, will be discussed in the following section (III G).

The level of contributions by member states has been very poor, but for a series of rather involved reasons. Some of those reasons are outlined below. Fiscal problems in East and Southern Africa weakened the ability of nations to support the Centre and Facility. Availability of funds has lessened by:

1. poor agricultural production because of drought and consequent need to purchase food abroad,
2. poor trade balances for primary products and a weakened balance of payments position because of increased imports prices (oil, consumables, equipment),
3. lack of communication between ECA-RCSSMRS and the nations of the region, and
4. political disruptions within and between nations in the region.

The policy-makers and management personnel in most member states have little understanding or exposure to the RRSF and the outputs that could be used. As the determiners of funding levels, the budget programmers are important to the Centre and determine whether or not contributions are made. Four member countries (Comoros, Lesotho, Malawi and Somalia) have made no contributions. The levels of arrears are very high, now at \$5,424,995, and have been steadily increasing, at least since 1981. The non-contributing states' quotas total over 57% of the arrears (\$3,115,028). Malawi and Somalia are original members and have made no payments whatsoever.

The Facility has not charged users for many of the services given. Natural resource surveys, some production materials, and many training expenses have been paid for using USAID grant funds. This is reasonable, given the Facility's stage of development, but when USAID funds are spent, the participants and users will be required to meet a portion of expenses.

According to the Facility Work Plan budget, shown on Page 51 of Appendix II, member countries (via the RCSSMRS) will supply \$5,607,335 or an average of \$560,735 per annum. Member state contributions to the Centre totalled \$4,638,410 from 1977 through 1983. For the seven years, this averaged \$662,630. Assuming that 50% of this amount is available to fund the Facility salaries, accommodations and some core programme activities, there is a shortfall of \$229,420 per annum. Doubling this, the Centre and Facility would require additional member contributions of \$460,000 per year. Therefore member contributions will have to total some \$1,000,000 per annum to fund the budgeted portion of RRSE activities and additional funds for operations of the Centre as a whole.

The donor community, according to the work plan budget, will be asked to fund activities costing a total of \$16,462,826 or roughly \$1,650,000 per year on average. If member countries paid for building construction, natural resource project operating costs and the corresponding contingency (a total of \$4,042,250), donor annual support would total roughly \$1,246,000. If five donors contributed equally, annual support would total some \$250,000 each.

Without this level of support, \$1,404,000 from member states and \$1,250,000 from the donor community, the Centre will not be able to operate fully and the Facility will also be forced to curtail some operations. This level of funding has not been achieved in the past, and at the present, the prognosis in the near term is very poor that funding support at these levels can be obtained.

G. USAID Project

The current USAID Project is scheduled for termination on June 30, 1984. All "countable objectives" expressed on page 19 of the Project Amendment, with the exception of significant increases in client contributions to the Centre, have already been met (February, 1984) and exceeded.

User contacts have increased to an average of 47 per month (target 45). People trained in local seminars have totalled 204 (target 100). Products sold have averaged Shs. 29,340 in the twelve months of 1983 (target Shs. 20,000 per month). The value of the assistance given by the Facility for natural resource surveys of various kinds cannot be easily quantified. It is roughly estimated that one-third of all staff time is spent assisting with natural resource survey activities (called "EXTRA team tasks" in the Project amendment). Overall costs from August, 1982 include contractor costs (\$621,472), local costs (est. \$320,000),

and Centre salary support (est. \$350,000). The total is an estimated \$1,290,000. At one-third of this total, the value of services, facilities and commodities provided for natural resource survey activities totals \$430,000. This exceeds the targeted figure of \$300,000. During the last eighteen months, thirteen major survey tasks have been initiated.

Client contributions, from June, 1981 to March, 1982, totalled \$785,000. In the 21 months since then, arrears have increased by over \$2,000,000 and payments have been less than \$1,000,000. Payments have actually decreased, although the Centre management has stated that major contributions are soon forthcoming.

The "countable objectives" are of little evaluative significance unless they are combined with a qualitative assessment of user services, training, production, and natural resource surveys. Mere numbers give no indication of the impact or significance of the work performed by the Facility. The previous sections have all looked at the technical quality of the various tasks being performed. Overall, the evaluation team has found the Facility output to be of a very high quality, the services to be of great value to users and natural resource survey teams, and the training programs to be effective, relevant and very well received. Major problems have also been encountered. These include: communication difficulties, poor management of the Centre, inadequate facilities, shortage of qualified staff, lack of training for staff, and a heavy dependence on a single donor organization. All of these problem areas have been identified and explained. This section, USAID Project, looks at those areas directly related to AID administration and the Facility. The problem areas, as well as strengths of the Facility already mentioned, are of utmost importance. This section, however, will review the relationships of USAID (Washington), REDSO/ESA, the Centre, and the Facility, as well as the structure of the Project itself. The reasons these elements are being looked at somewhat separately from the functional areas of the Facility are to avoid repetition, to avoid tying the existence of the Facility solely to the AID project, and to isolate administrative and Project concerns from Facility operational concerns.

In this light, there are few strengths to be pointed out. Yet those few have been very important to the successes achieved so far. The evaluation team feels that the following measures are significant and have improved the Project;

1. AID removal of the direct-hire AID employee as Project Director and assistance with replacement by a qualified African.

2. AID selection of excellent contract personnel and continued support of them.

3. AID extensions of Project assistance beyond programmed termination dates.

4. REDSO/ESA promotion of RRSF services and products within the ESA region, as well as utilization of those same services and products.

These efforts by USAID are juxtaposed with several major Project weaknesses and problems. In brief, they are:

1. Counterpart personnel for contract staff have not been hired,

2. USAID intentions and requirements have not been fully communicated to the Centre and Facility,

3. Overall USAID assistance to the Facility has been piecemeal, using a very short time frame,

4. The RCSSMRS management has not provided the required support to the Facility,

5. The RCSSMRS management has not served as an advocate, nor shown any initiative on behalf of the Facility, and

6. The entire work of the RRSF is in severe jeopardy because of a lack of member country and donor support.

7. The RCSSMRS has not provided an overall work plan for the next decade (the RRSF has, but this does not relate to the Center as a whole).

A fuller explanation of each of these concerns follows. The causes of these states of affairs will not receive great attention, unless they concern the basic structure of the Project.

1. Counterpart Personnel - For the Project to make permanent progress in institution building, the Facility must be fully staffed by permanent, qualified personnel. No counterpart personnel to the program manager (deputy director) and the photo-scientist have been hired, or even advertised for. Until such people are employed, the program manager and photo-scientist cannot train senior staff. These contract personnel will continue to perform line functions. Given their short tenure, this will have no lasting impact on the institution (although the short-term effect has been very good and RRSF technicians have received training).

2. USAID intentions - USAID has been unwilling to make a long-term commitment of resources to the Remote Sensing Project. Although funding has been provided since 1977, it has been doled out on a nearly annual basis. The Project has been extended in a very piecemeal fashion. Institutional development activities, which involve training and technical assistance, generally require a long time frame for goal achievement. This Project is no exception and AID commitments should be long-term and clear-cut.

The Facility and Centre has, understandably, been confused about the commitment of AID to the Project. AID assistance has been provided with certain provisos for continuation, including the last Project Amendment. The Centre and Facility have not understood the adamancy of the current position of AID, since past examples of AID behaviour have provided little indication of clear cut requirements.

3. The management of the KCSSMRS has not been highly supportive of the Facility. This shortfall in support has been demonstrated by the lack of interest in RRSF activities by senior management, the lack of action on behalf of the Facility when it has been required, little communication with senior Facility staff, little integration of Centre work with that of the Facility, and little effort to solicit donor and ECA support for the Facility. This poor leadership and management has weakened both the Centre and Facility.

Examples of this lack in interest abound. The management does not hold periodic meetings on activities and coordination with senior staff of the Facility. Letters sent to AID, dealing with the Facility, have not been seen by senior Facility staff prior to sending. Visits to member countries have not included Facility staff participation. There has been no Centre effort to recruit needed counterpart staff.

4. Lack of member country and donor support - The Facility (and Centre) are faced with an impending crisis. The Financial Section outlines funding requirements, both present and future. Member support has been at a level of about 60% of the requirements. Donor support has been haphazard. Major support has only come from AID (and this may soon be terminated). The management has not made an appropriate, concerted effort to solicit support. No long term donor assistance is forthcoming.

5. Lack of Workplans - An essential tool for Centre promotion, for determining progress made, and for guiding work efforts is the design of a detailed work plan. The Centre has no detailed work plan, either for the next year or next decade. The Facility has drafted a work plan, but it is not yet complete nor integrated with work plans of the Centre. It

is essential that integrated work plans be formulated (by the senior staff) and that they become the guides for the activities of all the Departments.

The following section includes recommendations based on the problems identified. These recommendations are made to be considered by the Facility, Center, AID, and Governing Council.

IV - ISSUES AND RECOMMENDATIONS

The recommendations are suggested as guidelines and ideas for the improvement of the Centre, Facility and AID Project. They should not be viewed as blueprints for action. The senior staff of the institutions concerned are the people best equipped to determine the most appropriate course of action which will lead to a stronger, more responsive institution. We do urge that these recommendations be considered promptly, as there is sufficient urgency in the current circumstances. The section has been divided into the categories; relationships, staff, production and services, training, finance, USAID Project and other donors.

A. Relationships

1. Host Organization and RRSF - As has been indicated above, USAID, conscious of the value of Remote Sensing in the development of the Third World, had decided to set up a Remote Sensing User Assistance Facility for the ESA region. A host institution was found in the newly created Regional Centre for Services in Surveying and Mapping based in Nairobi and an agreement was entered into between AID and the Centre.

The Project Paper Amendment of August 31, 1982, stated: "The only significant issue covering the project paper amendment is concern over the long term viability of the host organization." This concern has been expressed regularly since the Project Paper of March, 1979, which also raised the issue of viability of the Host Institution and whether the participating governments were contributing their share of the financial responsibility for the Centre. The present Evaluation Team had this concern expressed to them during their interviews with various members of REDSO/ESA.

To evaluate the relationships that have evolved over the years between the Centre and RRSF and to address the concerns expressed above, it is necessary to point out that at the beginning the User Assistance Facility was a USAID idea and a USAID project, conceived with the conviction that this would be an effective way of rendering assistance to

the countries of ESA in their development. USAID would provide the key elements for the project (such as personnel, including support staff and equipment). It was going to reimburse the Centre for all authorized procurement done on behalf of the Facility, and also to reimburse it for a proportionate share of the cost of utilities, custodial services, and insurance for equipment and furniture. There was an understanding that the Centre had to begin the preparation, particularly in the development of professional staff, for taking over at least the core costs of the project. Since Remote Sensing would contribute to the professional activities of other departments of the Centre and vice versa, effective management and fiscal responsibility of the Facility would also imply an all around healthy development of the Centre. And since the Centre belongs to the contracting states, the measure of its health will be the extent to which the governments give financial support to its budgets. The Centre, though its management, has continued to view the RRSF as an AID phenomena and has not taken the management leadership role of integrating Facility operations with those of the other Centre Departments.

2. Member States Support to RRSF - The original contracting states were five, out of the then potential membership of 12. The current potential membership is 17, (and if one includes Sudan, 18). The present membership of the Centre is 9, which is only 50% of the potential membership. Several attempts have been made to sensitize the member states who have not joined the Centre through visits by the Director General and a representative of the Economic Commission for Africa. On one or two occasions, a representative from one of the contracting states has joined the party. These visits have not had the desired effect.

It is recommended that, now the Centre has something to offer in terms of services to the member states i.e. engineering, services, and services in training, user assistance and project work, the Governing Council should re-examine how it can persuade other potential member states to join. A serious effort of promotion must be undertaken if the Centre is to survive.

Kenya, the host country, as a gesture of goodwill, originally donated 6 hectares piece of land for the Centre to build its headquarters. Kenya also made an ex-gratia payment of two million shillings (US\$ 250,000) to get the Centre started. This enabled the Governing Council to appoint the Director-General and also to rent an office space of about 10,000 square feet. Yet other member states have not met their quotas in support of the Centre and arrears are in excess of \$5.4 million. Annual contributions from members are required for an estimated \$1.4 million per annum. If the Centre is to be viable, required support must be given by the member states. The member states have allegedly shown that the

Centre is of some importance to them, from the act of deliberate accession by states to the instruments establishing it and the decisions of the Governing Council itself composed of representatives of member states. Perhaps one way of overcoming governmental non-support is to require that the representatives of member states to the Governing Council be persons of Cabinet Minister level. They would see that Centre funding be addressed in their respective national budgets. It is recommended that the Governing Council consider this possibility.

In line with what is happening in other regional organizations, it may be appropriate for leadership in the Governing Council to move from ECA to the member states themselves. It is recommended that the Governing Council consider the desirability of electing the Chairman and the Vice Chairman of the Governing Council from amongst its ministerial members on a rotating basis of say two years. The advantages of this change are likely to be many, both in terms of dealing with member and potential member states, as well as in dealing with donors.

3. RCSSHS Support of RRSF - The Centre, since the inception of the Facility, has contributed the rental of space and funds towards the modification of some of the facilities. This accommodation is now cramped to the extent that some of the Facility equipment is laying unpacked and not being put to the use for which it was purchased. We have been informed that tenders have already been opened for the construction of the headquarters building, half of which will be used by the RRSF. The preparation of tender documents, we understand, was done in consultation with all the parties concerned i.e. REDSO/ESA, The Centre and RRSF. Their opening and adjudication, however, was not attended to by all the parties concerned. We consider that effective construction will require regular consultation with all the parties concerned and we recommend that REDSO/ESA and the Director of the Facility be regularly represented in the headquarters building committee.

Meanwhile, every effort should be made to obtain sufficient funding for construction of the buildings of the Centre. Action has already been taken with regards to contracting states by sending special appeals to Heads of States or Prime Ministers. Requests also made to external donors should also be vigorously followed up.

The Centre will take some time to be constructed. Meanwhile, the cramped nature of the present accommodation should be alleviated if the momentum already achieved by the Facility in terms of training, user assistance and project implementation is to be maintained. It is recommended that the Governing Council consider renting temporary accommodation either in the same building or in nearby buildings, to be used during the interim period before moving to the new site.

The Centre has taken the first step in providing management for the RRSF; as a Director of the Facility has been appointed. To consolidate this step, it is recommended that the post of Deputy Director of the Facility, already established, be filled.

The long term planning of the RRSF and the recruitment of donors should involve the active participation of the Director General and the Director of Technical Coordination. As a department of the Centre, we are convinced that the RRSF has contributed the major share of the good image of the RCSSMRS. We therefore recommend that RRSF officers and the RCSSMRS officers should regularly meet under the chairmanship of the Director General to discuss progress and to formulate plans for the future.

Some progress has been made towards Centre assumption of the running costs of the RRSF. The salaries of all the local staff have now been taken over by the Centre, but a great deal of the core costs are charged to USAID. The RCSSMRS has computed what they have contributed in cash and in kind to the RRSF. This comes to \$950,000, which is approximately 20% of the AID contribution or approximately 17% of the total project costs. It is recommended that the Governing Council of RCSSMRS discuss ways of assuming responsibility for the core costs of the RRSF.

The RRSF can contribute to the activities in the other departments of the Centre only to the extent that those departments are effectively manned and therefore engaging in meaningful activities. We have already pointed out vacancies in the various departments of Engineering and Geodesy that are unfilled. We recommend that urgent steps be taken to fill these two posts and that consideration be given to filling the other vacant posts as well.

It has been apparent from reports of earlier evaluations, and from what we ourselves have seen, that communication between all the parties concerned has not been optimum. Some of the reasons lie in the original autonomy of the RRSF. Yet the RRSF is now an integral department of the Centre. The Director-General should recognize this and cause regular consultative meetings between himself, the Director of Technical Co-ordination and the Director of RRSF, so that all parties are aware of what is going on. The Director of the Facility must keep the Director-General informed of all pertinent events. There will be need for the Director General to meet with the Director of REDSO/ESA to discuss the project, at least while the Project continues.

B. Staff

The fourth Evaluation stated, "The future of Remote Sensing in Africa will depend to a large extent on the next steps to be taken for the Nairobi Centre". That Evaluation report was followed by a new project paper amendment which extended the life of the project for another 16 months to June 30th 1984. It is now less than four months to the project assistance completion date (PACD). The highly qualified SDC staff have done a magnificent job. Yet there are poor prospects for a smooth transition without damage to the standards that have been attained in training, in user assistance and in project implementation.

The incumbent director appears qualified and competent. The position of the Deputy Director is not yet filled. Mr. Isavwa is already away on training overseas, and arrangements have been made for John Barasa also to go for further training. Noody will therefore be available to look after the User Assistance Section and Browse File. It has already been mentioned that the present counterpart photo specialist is much more at home in aerial photography and we understand a decision has been taken to shift him to that area, and to recruit a new counterpart photo lab specialist. Again, this has not yet taken place. Furthermore, with the new responsibilities of financing the headquarters building, the Centre would be hard put to finance other core activities. The Facility which USAID has successfully built up and which is beginning to effectively transfer remote sensing technology to member states will be severely damaged. We therefore recommend that any USAID funding remaining at 30th June 1984 be utilized by USAID to fund continued technical assistance while long term arrangements are negotiated between the Centre, USAID and other donors. To this end we further recommend that a donors conference be organized after due preparation, including the finalization of an overall development plan.

We are conscious of the tremendous amount of regional knowledge that the SDC staff have built over the years. They have also made valuable contacts in member states. It will probably be difficult to find within the short span of time and recruit experts with similar knowledge and experience to go on a job for a temporary period. We recommend that consideration be given by USAID to find ways of retaining at least two of the SDC staff without necessarily renewing the SDC contract.

As stated earlier, additional staff are required at the Centre. The Facility, besides the Deputy Director/Program Manager and landsat photo specialist counterpart requirements, also needs the services of a geologist and hydrologist. At some point in time a computer operator specialized in imagery analysis will be required. It is recommended that job descriptions be drafted and the recruitment process initiated for people in all these categories.

C. Production and Services

The difficulties in production and services lie mainly in the inability of the Facility to meet all the demands made by member states. The competency to produce and to serve has been demonstrated clearly, but the volume of work and the capability of local staff is not totally adequate. The reasons for this are again; lack of personnel, lack of space, a need for additional equipment (computer system, copiers), funding requirements for operations, and lack of support in some respects from the Centre.

Overall recommendations have been mentioned. The Principal concern lies with the shortage of qualified personnel. As mentioned in the previous section, the need for counterparts as program manager (or deputy director), photo scientist, geologist, and hydrologist are perhaps paramount. Without personnel, the provision of products and services will be less than that demanded, and of a limited quality.

With additional personnel, the Facility can consider providing further assistance in the performance of various natural resource surveys. As shown in Appendix F, numerous requests for services (and products as adjuncts to those services) have been made, but the Facility does not have the personnel and resources to help with all these activities. The Centre, which could also assist with many of these efforts (since the needs go far beyond simple landsat analysis), does not have the capability to participate as fully as could be wished.

With the required personnel, an expansion of production and services can be considered. This expansion will not be significantly greater than current output, but should be able to continue at current levels for many years. To make the assistance more effective, the installation and operation of a computer system, as described in Section III E 2, will be an asset. An expansion in services, to broaden the information base with aerial photography and ground surveys (ground truth), is considered a logical progression. These services, which should be supplied by the Centre, would necessitate significant improvements and changes within the Centre itself. The Facility could not be expected to provide these services itself, but should be expected to assist the Centre and work jointly in the assistance effort.

Therefore, our overall recommendations for production and services are tied to those of staffing, organization, funding, and facilities. We recommend:

1. that the Centre initiate recruiting efforts for counterpart personnel and additional technical personnel, as well as personnel needed by the Centre to assist with aerial photography and ground survey work,

2. that the Facility procure a computer system for image enhancement and data retrieval,

3. that the Facility charge users actual costs for both products and services, based on carefully done cost analyses, and

4. that the Centre provide the Facility with the space needed to provide maximum levels of products and services.

5. that the Facility renew publication of its newsletter, perhaps on a quarterly basis.

D. Training

Training needs, both within the Facility and by clients/users, are closely tied to the services that the Facility can provide. The procurement of staff and their skill level will determine in-house training needs for the Facility. It is likely that new personnel will require some formal training beyond what can be provided on the job. Training demands from member countries and other users have been very large (applicants have historically outnumbered training participants by a ratio of three to one) and the fulfillment of demands have been dependent on donor assistance and member country support. Less formal training demands, where assistance in natural resource survey efforts have required major Facility technical personnel participation, should not be overlooked.

Our only recommendation on training efforts, beyond the continuation of the excellent programs that have been carried out, is that the Facility make sure that seminars are held in areas of current importance for the region and that subject matter is applied to practical needs. In this context, we recommend that a short-term training seminar be held for Governing Council members and influential member country officials, in the application of remote sensing to national planning and national natural resource programming.

E. Finance

We have already mentioned the major concerns with funding and the financial position of the Facility and the Center. In terms of the overall Centre's finance, we have recommended that the Governing Council take a more active role in procuring funds from member countries. The Centre must also solicit funds from donor organizations in support of all its departments. Such solicitations should be based on concrete work plans, which delineate the program and projects the Centre will be undertaking.

For the Facility itself, funding at a level in excess of \$3,000,000 per annum is required over the next ten years, as detailed in the Ten Year Work Plan (Appendix II). This is shown as being provided one-quarter by the Centre and three-quarters by donors. To obtain this funding level, the Facility and Centre will have to make a concerted effort at promotion with the member countries and donor community. Efforts directed at member countries have been recommended.

It is recommended that the Facility, through the Centre, utilize a revised work plan as the basic document for circulation to the donor community and solicit long-term support for the activities described in that work plan. When individual donors have given commitments for support, it is recommended that a donor meeting be held with committed donors and other potential donors, to solicit further assistance from them.

It is recommended that the Facility carry out detailed cost analyses of the various production, training and service activities. Where the Facility considers it appropriate, the cost analyses should be used as the bases for making charges to users for various production, service and training exercises. The funds received should be used by the Facility to support their activities. A regular schedule of charges, for paid-up member country clients, delinquent member country clients and private organizations/individuals, should be used for billings. A system for billing and collection procedures should be devised.

F. USAID Project

The USAID Project has made excellent progress in many areas. There is a growing sensitivity to the utility of remote sensing as a planning tool in the region. Many natural resource survey projects have been initiated. Large numbers of people have received training in different surveying techniques. User services and products have been provided to governments and organizations interested in development activities. Certain RRSF staff have received training, either long-term or on the job in nature.

Yet the Project has encountered major difficulties as well. These include: lack of counterparts and full staffing, little long term planning, piecemeal AID assistance, little member country support, and poor Center management. The AID Project currently has a PACD of 30 June, 1984. Therefore, the recommendations are made with some urgency attached. If they are seen as being in the best interests of AID, the Centre and the Facility, then prompt action is required from those organizations.

1. It is recommended that AID consider the provision of bridging funds to the Facility, for the procurement of the services of Mr. Falconer and Mr. Anderson and for the payment of operating expenses. This would require an extension of the PACD for one year and an additional estimate of \$250,000. During this bridging period, the Facility and Centre are expected to design and implement long-term work plans, which are used to solicit donor support for activities. AID is encouraged to consider participation in a multi-donor assistance effort to the Centre and Facility, of a long-term nature extending over five to ten years.

If AID does not provide funding during an interim period and if the services of Mr. Falconer and Mr. Anderson are not procured, the short-term prognosis for the Facility is very bleak. It is unlikely that new initiatives in training or natural resource surveys will be undertaken. The quality and quantity of output in products and pictures will decline, as will demand for user services. Much of the progress made to date will be lost, in a loss of user confidence, in reduced Facility visibility, and a decrease in the services being offered.

Incidentally, to complete the on-going long-term training of the forester (Mr. L. Isavwa), the PACD will have to be extended at least three months. Mr. Isavwa is studying in Colorado under the Project auspices and his funding will have to be extended until the studies are completed.

2. It is recommended that future AID assistance be provided, for institutional development of the Facility, on a long-term basis. The piecemeal effort that has been made, with numerous short time frame extensions, is not conducive to good planning or resource management. AID should make a long-term commitment, with recognized benchmarks and "cut-off" points, but with the clear understanding that assistance (in collaboration with other donors) will be provided over a long period of time if sufficient progress is being made.

3. It is recommended that AID/REDSO insist on regular monthly meetings between AID personnel and senior staff of the Centre and Facility. Participation by members of the Governing Council would also be highly beneficial. These meetings, chaired by the RCSSMRC Director, should have a clear agenda, with tasks to be performed by various participants, and lucid directions being provided.

4. It is recommended that AID require, prior to any bridging assistance, detailed work plans from both the Centre and the Facility (a draft work plan has been done by the Facility) and that these long-term work plans clearly lay out the programs to be undertaken. The work plans

must include the design of the multidonor assistance effort and the means of obtaining donor support for that effort.

5. It is recommended that USAID insist on immediate Centre initiation of recruitment efforts for program manager and photo scientist counterparts. Such an initiation should be mandatory before the PACD is extended and bridging funds procured.

6. It is recommended that AID transfer title to all equipment purchased through the Project to the Regional Kenote Sensing Facility and that AID endorse the reloaning by NASA of all imagery and film rolls previously on loan to the Facility. This recommendation is based on the assumption that AID will continue to provide assistance to the KRBF through a multi-donor long-term assistance effort.

6. Other Donors

Under the recommendations on Finance, it was suggested that donors be solicited for long-term support by both the Centre and the Facility. These solicitations should be made for concrete activities, as illustrated in detailed ten year work plans. Solicitations should be made by senior staff, in formal meetings where the work plans are given to the donor. These meetings with individual donors should be followed up, with further meetings, with letters and with enquiries at different levels. The local (Nairobi) level is sufficient for initiation, but this must be followed up at the headquarters, either by visits or correspondence as is considered appropriate. When positive support from a number of donors is assured, the Centre and Facility should consider convening a donor conference with committed and uncommitted donors. Further solicitations would be made at that time, along with explanations of the entire program.

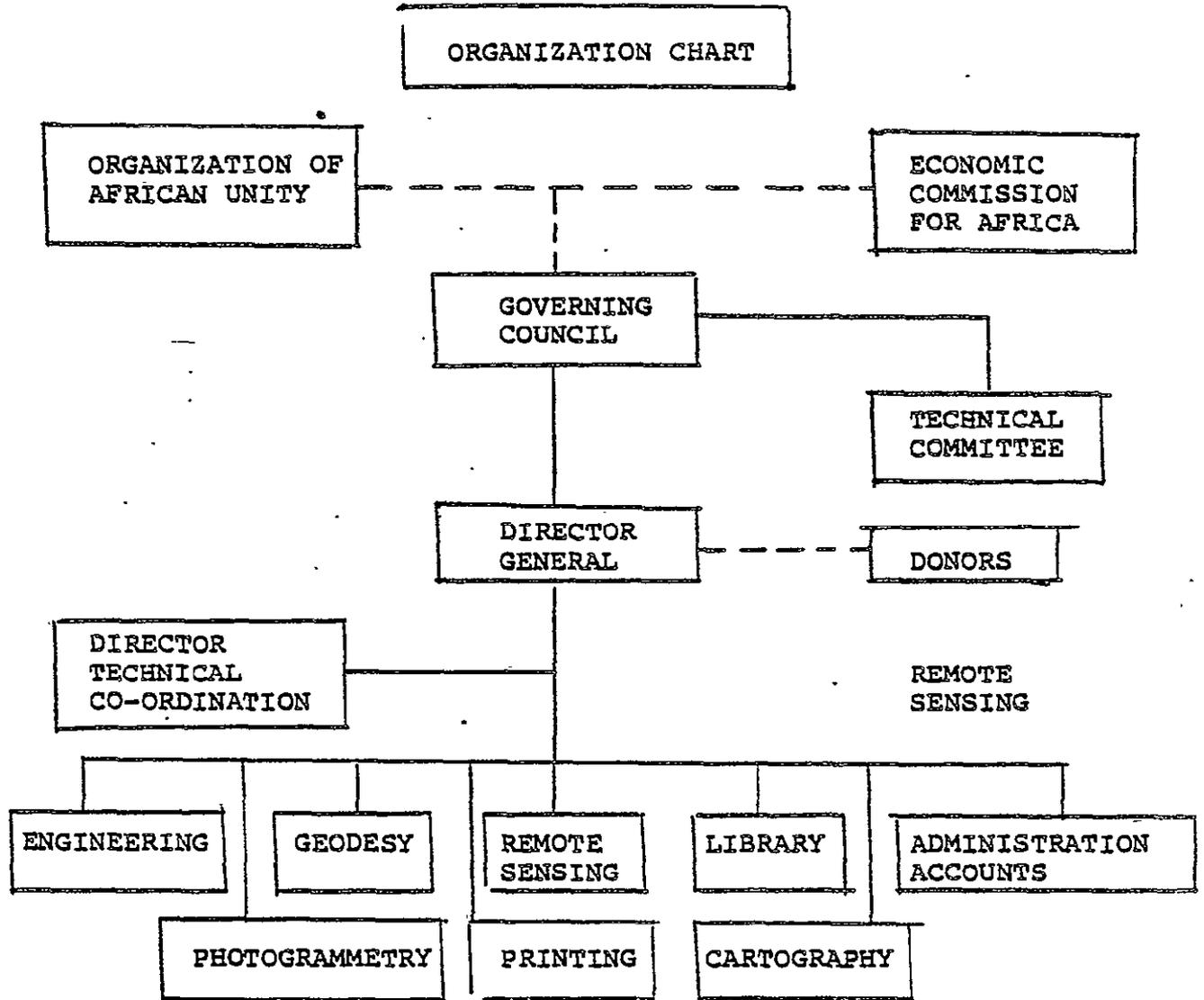
The poor success with donors by the Facility and Centre, we feel, is caused by the lack of concrete plans for activities to be supported, the lack of follow-up with potential donors, and the poor presentation of the Centre and the Facility. These causes of poor donor response can be overcome with a conscientious effort and with achievable and appropriate work plans.

As the donors and their support are essential for the viability of the Centre and the Facility, every effort should be made to supply those donors with the information they require to make the decision to support the activities. A wide base of support is also important, as a dependence on one donor, which has been the case, is risky and unnecessary. The donor community, when aware of the work that has and can be accomplished by the Centre and Facility, and when shown how they can support that work, will be most interested in using their resources to help continue the progress and growth of production and services.

A P P E N D I C E S

- A. Organization Chart and Job Description
- B. User Contacts and services
- C. Training Activities
- D. Interviews
- E. Product Sales
- F. Other Services
- G. Financial Statements
- H. RRSF Work Plan

Appendix A



SCHEDULE OF DUTIES AT REGIONAL REMOTE SENSING FACILITY

<u>Position</u>	<u>Responsibilities</u>
Director (Dr. V.A.O. Odenyo)	In over all charge of the Department of Remote Sensing. Answerable to the Director General of the Regional Centre for Services in Surveying, Mapping and Remote Sensing for full and gainful employment of personnel and equipment in the department. The Director will liaise with USAID in the development of the remote sensing programme and be responsible for the preparation of the budget for the Department and proper control of the Department's expenditures.
Programme Manager (Dr. A. Falconer)	Responsible to the Director for the programme of formal and or on-the-job training courses and project support work. The programme manager shall ensure that
<u>Position</u>	<u>Responsibilities</u>
	all undertaken in accordance with sound remote sensing techniques and principles. The Programme Manager shall advise when necessary which consultants should be engaged for either training courses or project support work.
	In the event of the Director being absent from the duty station, the Director General may designate the Programme Manager to take charge of the Facility.
Application Specialists (Mr. P.T. Gilruth) (Mr. S.N.K. Kalyango) (Mr. L. Isavwa) (Mr. M. Pousse)	To undertake the execution of projects using remotely sensed data. In performing this function, application specialists may either work individually, collectively or as counterparts to consultants. In the event of working in collaboration with consultants,

Position

Responsibilities

application specialists will be regarded as undergoing on-the-job training in the application of remotely sensed data in whatever field they happen to be working. In the performance of their duty, application specialists will be answerable to Director, but through the Programme Manager. Application specialists will also assist with training.

Photo Scientist
(Mr. R. Anderson)

Responsible to the Director through the Programme Manager for the operations in the photographic laboratory. The photo scientists shall make available to all approved users photographic reproductions in colour or in black and white of Landsat imagery or aerial photograph as shall be requested. He shall advise the

Position

Responsibilities

Director on the materials required for the smooth operation of the photographic laboratory and shall conduct on-the-job training for suitably qualified persons from the Centre or member states.

Officer-in-Charge
User Assistance
Services

(Mr. J.B. Alusa)

Responsible to the Director through Programme Manager for the and archiving of all remotely sensed data covering the sub-region of Africa falling within the Facility's and the Centre's terms of reference. The Officer-in-Charge shall also be responsible for ensuring the proper use and maintenance of all equipment used in the analysis of remote sensing data. When users require information on available data, the officer-in-charge shall supply such information. He shall

Position

Responsibilities

receive, process and pass on to the
photo scientist requests for
photographic reproductions of
remotely sensed data

1 Administrative Assistant

2 Secretaries

1 Driver

3 Photo Lab. Technicians

3 Browse file Clerks

CONTACTS AND SERVICES

(Since June, 1962)

1. Geologic Mapping

Uganda - Ministry of Lands and Survey
Eastern Kenya - Mines and Geology Dept.
Geothermal Energy Exploration - Institute Supérieure
des Etudes et de Recherches
*Geological Mapping of Kenya and Uganda - UNESCO
*Uganda Geologic Studies - Makerere University

2. Rangeland Mapping

*Kenya - Kenya Rangeland Ecological Monitoring Unit
(KREMU)
Zimbabwe - Marongora National Park, National Parks
*Masai - Mara Rangeland Analysis - Commonwealth
Scientific and Industrial Research Organization
(CSIRO)

3. Forest Mapping

Rwanda - Karisoke Research Center
*Tanzania - Map Country's Forest, Forestry Department
Forest Studies of Aberdare Mtns. Univ. of Stockholm,
Sweden
Uganda Forestry Survey - Makerere University
*Ethiopia - Forestry Mapping

4. Soil Mapping

*Soil Map of Kenya - Soil Dept., Ministry of
Agriculture
*Zambia - Kasempa Soil Mapping Project, Ministry of
Agriculture
Kenya - Soil Erosion, Upper Tana Catchment
Kenya - Soil Erosion Studies, Eastern L. Turkana,
Ministry of Lands and Settlement

5. Land Use Mapping

*Kenya - Cartographic Mapping - Council for Human
Ecology
Land Use and Seismic Investigations - University of
Nairobi

*Kora Natural Reserve Study - University of Oxford,
UNEP
Highway Engineering Project - Sir Alexander Gibb
Engineers
Highway Engineering Projects - East African
Engineering Consultants
Highway Engineering Projects - Worconsult Engineers
Highway Engineering Projects - Scott Wilson
Kirkpatrick Engineers
*Rural Integrated Development Projects, Tanzania -
Ecosystems Ltd.
*Turkana Rural Development Project, Kenya -
Ecosystems Ltd.
Lake Basin Integrated Development Projects -
Ecosystems Ltd.
*Route Planning, Turkana District, Kenya - BBC, London
Integrated Rural Development, Narok District - Mwengi
International Consultants

6. Vegetative Analysis

Southern Tsavo - Ministry of Tourism and Wildlife,
Kenya

UNEP - Biomass Analysis of Africa

Ecology of National Parks of Uganda - UNDP

*Sudan - Biomass Study, Forestry Admin.

*Major KRSF natural resource survey efforts,
involving considerably staff time and use of
facilities/equipment.

Appendix C

T R A I N I N G
S U M M A R Y

	Govt.	Univ.	Participants		Total
			Univ./	Private	
1. 13-16 March 1979 - Seminar on Vegetation					23
2. 19-23 March 1979 - Soil and Vegetation Mapping					17
3. 26-30 March 1979 - Remote Sensing Seminar - Dar					50
4. 10-12 April 1979 - Remote Sensing Seminar in Swaziland					25
5. 23 April-11 May 1979 - Hydrology	10		UN 1		17
6. 14-30 May 1979 - Cartography and Surveying	16	2	UN 1		19
7. 28 May-15 June 1979 - Soil Vegetation (Agric. Applications)					20
8. 13-20 Nov. 1979 - Forestry/Range Services	18	3	1/1		23
9. 4-22 Feb. 1980 - Agriculture and Land-use	21	2			23
10. 8-19 Sept. 1980 - Teaching with Remote Sensing Data	4	18			22
11. 13-24 Oct. 1980 - Mineral Exploration	8	1			9
12. 24 Nov-12 Dec 1980 - Remote Sensing for Transportation	15	4			19
13. 9-27 March 1981 - Cartography & Map Revision	26	2	1/0		29
14. 21 Sept-9 Oct 1981 - Agriculture & Land Use Planning	24	2	0/2		28
15. 15-26 March 1982 - Natural Resources Extended Training	24	2			26
16. 23 Aug-3 Sept 1982 - Teaching with Remote Sensing Data	14	6			20
17. 27 Sept-15 Oct 1982 - Geological Interpretation of Remote Sensed Data	18	6			24
18. 25 Oct-5 Nov 1982 - Remote Sensing in Hydrology Extended Course (March 3-8 1983)	12	1			13
19. 17 Jan-4 Feb 1983 - Sponsor France bases Physiques de la Teledetection	11	2			13

	Govt.	Participants		Total
		Univ.	Un/ Private	
20.9-27 May 1983 - Cartography with Remote-Sensed Data - Long Course (13-17 Feb. 1984)				32
21.31 Oct.-18 Nov. 1983 - Remote Sensing for Mangrove Management (Sponsor Australia)	26			26
22.25 July-12 Aug. 1983 - Teaching with Remotely Sensed Data				
23.1-9 Sept. 1983 - Remote Sensing for Kenya Highway Engineers				
24.19 Sept.-7 Oct. 1983 - La Teledetection pour la prospection geologique Cosponsor UNESCO				
25.28 Nov.-16 Dec. 1983 - Remote Sensing for increasing food production				

REGIONAL REMOTE SENSING FACILITY

(Consultants supplied by donors other than USAID are identified (a) Australia (b) Britain (c) France (d) United Nations)

Nairobi Information Seminar
March 13-16, 1979 at Main Campus, University of Nairobi.

Consultants/Speakers: Dr. Gary Petersen, Pen. State Univ. USA.
Dr. Don Moore, South Dakota State Univ. USA

Vegetation and Soils March 19-23, 1979

Consultants: Dr. Gary Petersen, Pen. State Univ., USA
Dr. Don Moore, South Dakota State Univ. USA

Participants: Kenya - 13

Information Seminar, Dar es Salaam, Tanzania - March 28-30, 1979

Consultants: Dr. Gary Petersen, Pen. State Univ. USA
Dr. Don Moore, South Dakota State Univ. USA

Information Seminar, Mbabane, Swaziland, April 10-12, 1979

Consultants: Dr. W. Smith, Spectral Data Corporation U.S.A.
Dr. B.N. Haack, Ball State University, USA

Facility: A. Falconer

Hydrology Short Course, April 23 - May 11, 1979

Consultants: Prof. Paul Bock, University of Connecticut,
Storrs, Connecticut, USA
Mr. Morris Deutsch, USGS/EROS, Reston, Virginia,
USA
Dr. William Smith, Vice President, Spectral Data
Corp. Virginia, USA

Participants: Kenya - 7
Tanzania - 3
Sudan - 2
Lesotho - 3
Swaziland - 1
Ethiopia - 1

Cartography Short Course, May 14-30, 1979

Consultants: Mr. Alden Colvocoresses, USGS, Virginia, USA
Mr. Alden Wadsworth, USGS, Virginia, USA

Participants: Kenya - 5
Swaziland - 4
Botswana - 1
Zambia - 3
Burundi - 1
Ethiopia - 1

Agricultural Application of Remote Sensing Course in Botswana,
May 29-June 15, 1979

Consultants: Dr. Paul Sock, Univ. of Connecticut
Dr. F. Westin, South Dakota State University
Mr. Eric Stonner

Participants: 30 from the Ministry of Agriculture, Botswana

Forestry/Range Remote Sensing Short Course November 13-30, 1979

Consultants: Dr. M. Carnegie, USGS, ERSO Data Center,
Sioux Falls, South Dakota, USA
Dr. Joseph Ulliman, University of Idaho, Moscow,
Idaho, USA

Participants: Kenya - 11
Tanzania - 4
Sudan - 3
Rwanda - 1
Swaziland - 1
Uganda - 1
Somalia - 1
Botswana - 1

Teaching With Remotely Sensing Data, Dar es Salaam, Tanzania
December 10-14, 1979

Consultants: A. Falconer, Regional Remote Sensing Facility,
Nairobi
T. Hart, Regional Remote Sensing Facility,
Nairobi

Participants: 28 staff and students from the University of
Dar es Salaam and government agencies

Agriculture and Land Use Short Course, February 4-22, 1980

Consultants: Prof. Fredrick C. Westin, South Dakota State
Univ Brookings, S.D. USA
Dr. Meng L. Thung, Ithaca, N.Y., USA
Mr. Paul Cook, US Dept. of Agriculture, 2025
Washington, D.C. USA

Participants: Kenya - 3
Sudan - 4
Tanzania - 9
Ethiopia - 1
Burundi - 1

Information Seminar in Kampala, Uganda, March 4-6, 1980

Facility Staff: M. W. Conitz
A. Falconer

Regional Planning Course in Dar es Salaam/Mbeya, Tanzania
June 4-28, 1980

Consultants: Dr. C. Welby, University of S. Carolina
Dr. H. Thung, Geodata Systems International
Dr. P. Mika, Spectral Data Corp. USA
Facility: A. Falconer

Teaching with Remotely Sensed Data, September 8-18, 1980

Facility: A. Falconer
T. Hart

Participants: Kenya - 6
Uganda - 6
Tanzania - 4
Sudan - 5
Botswana - 1

Geology Workshop, October 13-24, 1980

Consultants: Doug Carter, USGS EROS Programme, Reston
Virginia, USA
Larry Rowan, USGS, Reson, Virginia, USA
Andrew Stancioff, ERTS Zaire, Kinshasa, Zaire

Participants: Kenya - 5
Tanzania - 1
Ethiopia - 1
Sudan - 1

Mozambique	-	2
Tunisia	-	1

Remote Sensing for Transportation Engineers
November 24-December 12, 1980

Consultants: Dr. Harold Rib, Federal Highway Admin,
Washington, D.C. 20590
Mr. P.J. Beaven, TRRL, Crowthorne, Berkshire,
UK (b)
Mr. C.J. Lawrance, TRRL, Crowthorne, Berkshire,
UK (b)

Participants:	Kenya	-	4
	Tanzania	-	5
	Uganda	-	3
	Liberia	-	2
	Malawi	-	2
	Ethiopia	-	2
	Zimbabwe	-	1

Cartography using Remotely Sensed Data, March 9-27, 1981

Consultants: Al Warren, USGS, Reston Virginia, USA
L. Bryant, U.K. Directorate of Overseas Surveys
(b)

Participants:	Kenya	-	6
	Tanzania	-	9
	Uganda	-	4
	Ethiopia	-	1
	Sudan	-	2
	Swaziland	-	2
	Mozambique	-	3
	Zambia	-	2

Agriculture and Land Use Short course, Sept. 21-Oct. 9, 1981

Consultants: Dr. Peter Laut, CSIRO, Canberra, Australia (a)
Dr. Victor Odenyo, FAO/UNDP, Addis Ababa,
Ethiopia (u)
Mr. A. Blair-Rains, Land Resources Development
Centre, Surbiton, Surrey, U.S. (b)
Dr. M.D. Gwynne, UNEP-GEMS, Nairobi, Kenya (u)
Mr. J.C. Rivereau, KREMU, Nairobi, Kenya (f)
Mr. S. Kanani, Survey of Kenya, Nairobi, Kenya
Ato Sultan Tilimo, FAO/UNDP, Addis Ababa,
Ethiopia (u)

Participants: Kenya - 14
 Tanzania - 5
 Uganda - 2
 Zimbabwe - 5
 Ethiopia - 1
 Lesotho - 1

Natural Resources Extended Training, March 15-26 and
 Aug. 8-12, 1982

Consultants: Mr. William H. Wigton, U.S. Dept. of
 Agriculture, Washington, D.C. USA
 Ms. Diana L. Rebel, Las Vegas, Nevada, USA

Participants: Kenya - 19
 Tanzania - 6
 Sudan - 1

Teaching With Remotely Sensed Data Aug. 23-Sept. 3, 1982

Consultant: Dr. Robert K. Holz, Univ. of Texas at Austin,
 USA

Participants: Kenya - 7
 Tanzania - 8
 Uganda - 3
 Sudan - 1
 Botswana - 1

Regional Workshop on Geological Interpretation of Remotely
 Sensed Data, Sept. 27-Oct. 15, 1982 (Joint UNESCO/RSE Course

Consultants: Dr. William Smith, Spectral Data Corp., USA
 Dr. Brian Hackman, Dept. of Mines & Geology,
 Nairobi (b)
 Dr. Charles Elachi, JPL, Pasadena California,
 USA
 Dr. A. Johnson, Geosurveys Intl. Nairobi
 Dr. E.P. Wright, Inst. of Geological Sciences
 U.K. (b)
 Dr. Heng Thung, ASAL Project, Nairobi
 Mr. R. Missotten, UNESCO/ROSTA, Nairobi (u)

Participants: Kenya - 8
 Burundi - 2
 Sierra Leone - 1
 Kwanda - 1
 Botswana - 1

Zambia	-	2
Zimbabwe	-	1
Nigeria	-	1
Liberia	-	1
Madagascar	-	1
Sudan	-	1
Uganda	-	2
Rep. of Guinea	-	1

Remote Sensing in Hydrology Extended Training, Oct. 25-Nov. 5, 1982 and March 3-18, 1983

Consultants: Mr. Morris Deutsch, Falls Church Virginia, USA
Mr. Donald R. Wiesnet, Vienna, Virginia, USA

Participants:	Kenya	-	10
	Sudan	-	3

Basis Physique de la Teledetection (Technical Basis of Remote Sensing Course - in French) Jan. 17-Feb. 4, 1983

Consultants: Mr. M.G. Saint, CNES, Toulouse, France (f)
Mr. Jean Meyer-Roux (f)
Mr. S. Bruzzi (f)
Mr. M. Fea (f)

Participants:	Burundi	-	4
	Comoros	-	1
	Madagascar	-	2
	Rwanda	-	6

Cartography Extended Training, May 9-27, 1983 and Feb. 13-17, 1984

Consultants: Mr. Al Warren, USGS, Reston, Virginia, USA
Mr. Don Luman, Northern Illinois Univ. USA

Participants:	Kenya	-	13
	Tanzania	-	8
	Uganda	-	3
	Ethiopia	-	1
	Sudan	-	3
	Swaziland	-	1
	Zambia	-	2
	Botswana	-	1

Teaching with Remotely Sensed Data, July 15-Aug. 12, 1983

Consultant: Dr. Robert Holz, Univ. of Texas, Austin, Texas, USA

Participants: Kenya - 10
Tanzania - 7
Uganda - 4
Sudan - 3

Remote Sensing for Kenyan Highway Engineers, Sept. 1-9, 1983

Consultant: Mr. C. Lawrence, TRRL, U.K. (b)

Participants: 12 from Kenya Ministry of Transport and Telecommunications, Nairobi, Kenya

Workshop on Geological Interpretation of Remotely Sensed Data in French, Sept. 19-Oct. 7, 1983 (Joint Course RRSE/UNESCO)

Consultants: Dr. Charles Elachi, JPL, California, USA
Dr. Brian Hackman, Mines & Geology Dept. Nairobi (b)
Mme. A. Perrier, KREMU, Nairobi (f)
Dr. Guy Weecksteen, Bureau de Recherche Geol. & M., France (f)
Mr. Robert Missotten, UNESCO (u)

Participants: Burundi - 3
Zaire - 1
Guinea - 1
Tchad - 1
Gabon - 1
Senegal - 2
Niger - 1
Ivory Coast - 1
Central - 1

Rangelands Extended Training Oct. 31-Nov. 18, 1983 and March 19-March 30, 1984

Consultant: Dr. Peter Laut of CSIRO, Canberra City, Australia (a)

Participants: Kenya - 7
Tanzania - 18
Uganda - 1

Regional Training Course on Remote Sensing to Assist in
Improving Food Production (Joint course FAO/UNEP/UNEP/UNEP)
Dec. 16, 1983

Consultants: Chris Johansen, Univ. of Missouri, USA (u)
F. van der Laan, FAO Rome (u)
C. Travaglia, FAO Rome (u)

Participants:

Kenya	-	4
Tanzania	-	4
Lesotho	-	1
Swaziland	-	1
Malawi	-	2
Sudan	-	3
Ethiopia	-	2
Zambia	-	2
Zimbabwe	-	1
Burundi	-	1
Somali	-	1

List of Persons Interviewed:

1. Mr. Sam Oweo, Director of Technical Coordination, RCSSMRS.
2. Dr. Victor Odenyo, Director RRSF
3. Dr. Allan Falconer, Programme Manager RRSF
4. Dr. M.D. Gwynne, Deputy Director, UNEP, Nairobi
5. Mr. Metcalf, Director, UNDP Nairobi and
6. Mrs. Wilkins (also of UNDP Office).
7. Mr. Jim Graham, Project Officer, REDSO/ESA
8. Mr. B.A. Sikilo, Director General RCSSMRS
9. Dr. Helmut Epp and
10. Mr. Kufwafwa, KERNU
11. Mr. Peter Bloom, Deputy Director, REDSO/ESA
12. Dr. John Gaudet, Environmental Advisor, REDSO/ESA
13. Mr. J.W. Koehring, Director, REDSO/ESA
14. Mr. Val Mahan, RRSF Project Officer based in Washington
15. Informal discussions with students on a remote sensing course to improve agricultural production, sponsored by FAO. Students came from Ethiopia, Kenya, Lesotho, Malawi, Somalia, Sudan, Swaziland, Tanzania, Uganda and Zambia

Appendix E

PHOTO LAB. PRODUCTION
 Monthly production and value, internal and external

	JAN, 1982	FEB, 1982	MAR, 1982	APR, 1982	MAY, 1982	JUNE, 1982
PRODUCTS FOR FACILITY (INTERNAL)	61 cibachrome 6 slides 104 B&W pictures 49 B&W prints 4 internegatives	3 cibachrome 28 slides 6 B&W pictures	243 B&W prints 9 internegatives 75 positives 2 mosaics 10 B&W products	32 cibachrome 7 duplicate slides 9 scene mosaic	44 cibachrome 64 slides 8 B&W prints 1 B&W mosaic	66 color prints 5 B&W prints 5 FCC dups. 150 slides
	N/A	N/A	N/A	Shs. 10,765	N/A	N/A
PRODUCTS FOR USERS (EXTERNAL)	N/A	11 cibachrome 6 FCC Duplicates 7 B&W prints	13 cibachrome 14 B&W prints 6 B&W products	25 cibachrome 2 B&W prints 1 composite	63 cibachrome 5 Lg B&W prints 26 slides 17 FCC dups. 9 film products	93 color prints 104 B&W prints 1 Lg. B&W print 5 FCC dups. 20 slides 10 film products
BILLING	18,953	3,878	2,510	Shs.17,440	Shs. 3,634	25,175
USER PRODUCT VALUE	18,953**	3,878	2,510	Shs.25,285	3,634	26,675
TOTAL VALUE	Shs.11,320*	Shs.7,730	Shs.42,500	Shs.23,860	Shs.48,620	Shs.53,245

* Taken from photo lab figures

** Taken from accounting book figures

PHOTO LAB PRODUCTION
Monthly production and value, internal and user

	JULY, 1982	AUG, 1982	SEPT, 1982	OCT, 1982	NOV, 1982	DEC, 1982
PRODUCTS FOR FACILITY (INTERNAL)	8 color prints 1 lg color print 241 B&W prints 2 FCC color dups. 2 PLCC composites 6 B&W products	62 color prints 4 lg color prints 4 B&W prints 2 FCC color dups. 4 B&W products 7 NASA imageries	68 color prints 10 lg color prints 13 FCC dups. 73 B&W prints 2 B&W prints 1050 slides	10 lg color prints 67 color prints 4 lg B&W prints 831 B&W prints 27 slides 2 B&W products 1 aerial mosaic	6 lg color prints 65 color prints 2 lg B&W prints 11 B&W prints 5 color composites 860 slides 21 film products	19 color prints 2 lg color prints 2 lg B&W prints 42 B&W prints 5 color composites 12 film products 30 slides
VALUE	N/A	N/A	N/A	N/A	N/A	N/A
PRODUCTS FOR USERS (EXTERNAL)	6 color prints 2 lg color prints 2 B&W prints 6 lg B&W prints 10 FCC dups. 1 PLCC composites	12 color prints 3 FCC dups. 20 slides	3 lg color prints 20 color prints 2 FCC dups. 5 B&W prints 42 slides	1 lg color print 20 color prints 1 lg B&W print 28 B&W prints 1 B&W product	27 color prints 10 lg B&W prints 40 B&W prints 2 film products 13 slides	2 lg color prints 32 color prints 95 B&W prints 5 film products 19 slides
(BILLING) VALUE	5,535	4,700	7,625	5,880	27,637	56,065
USER VALUE	6,510	4,800	41,640	6,390	28,120	56,265
TOTAL VALUE	\$12,045	9,500	49,265	12,270	55,757	112,330

PHOTO LAB PRODUCTION

	JAN, 1983	FEB, 1983	MAR, 1983	APR, 1983	MAY, 1983	JUNE, 1983
PRODUCTS FOR FACILITY (INTERNAL)	21 color prints 80 B&W prints 3 film products	9 lg color prints 42 color prints 45 film products 50 slides	8 lg color prints 50 color prints 24 B&W prints 33 film products 546 flides	5 lg color prints 2 color prints 2 B&W prints 1 film product 11 slides	2 lg color prints 22 color prints 1 lg B&W print 6 B&W prints 87 film products 100 slides	2 lg color prints 30 color prints 49 B&W prints 3 film products
VALUE	N/A	N/A	N/A	N/A	N/A	N/A
PRODUCTS FOR USERS (EXTERNAL)	144 B&W prints 2 slides	5 lg color prints 4 color prints 9 lg B&W prints 8 film products 5 slides	20 lg color prints 28 color prints 19 lg B&W prints 34 B&W prints 3 film products	11 lg color prints 55 color prints 4 film products 2 slides	1 lg color print 64 color prints 3 B&W prints 17 film products	19 lg color prints 23 color prints 1 B&W print 15 film products
BILLING	22,190	11,555	6,685	16,990	24,935	13,590
USER VALUE	22,190	13,595	6,685	16,990	41,655	14,370
TOTAL VALUE	Shs.23,040	Shs.48,240	Shs.74,000	Shs.33,640	Shs.62,825	Shs.47,360

PHOTO LAB PRODUCTION

	JULY, 1983	AUG, 1983	SEPT, 1983	OCT, 1983	NOV, 1983	DEC, 1983
PRODUCTS FOR FACILITY (INTERNAL)	178 color prints 1 lg B&W print 40 B&W prints 116 slides	57 color prints 1 lg B&W print 35 B&W prints 4142 slides 42 film products	49 color prints 1 lg B&W print 1 film product	14 lg color prints 59 color prints 350 B&W prints 8 film products	12 lg color prints 54 color prints 1 lg B&W print 98 B&W prints 32 film products 27. slides	85 color prints 431 B&W prints 22 film products 351 slides
VALUE	N/A	N/A	N/A	N/A	N/A	N/A
PRODUCTS FOR USERS (EXTERNAL)	16 lg color prints 10 lg B&W prints 28 B&W prints 10 film products 3 slides	29 color prints 1 B&W print 10 film products	1 lg color print 70 color prints 44 B&W prints 1 film product	11 lg color prints 23 color prints 8 B&W prints 55 film products 3 slides	4 lg color prints 26 B&W prints 30 B&W prints 24 film products	13 log color prints 23 color prints 4 lg B&W prints 8 B&W prints 28 film products 9 slides
BILLING	53,501	4,175	106,893	23,876	29,690	37,970
USER VALUE	62,711	12,510	115,073	23,876	30,840	37,970
TOTAL VALUE	Shs.64,160	110,400	53,950	81,015	64,495	84,975

Project Activity

In response to demands from countries in the region various project activities have taken place. Generally these have been supported by the facility and have involved staff members in their established position in government agencies. Other projects have taken place on a more formal basis.

Zambia Soils Project

The Government of Zambia has a World Bank financed agricultural development project. This required soil surveys of areas in the northern part of western Zambia. The area was large and the task of mapping from aerial photographs and conventional ground survey was large and exceeded the time available. A \$40,000 contract with RCSSMRS to undertake a satellite data preparation and interpretation was agreed. A further contribution was provided from USAID/RKSF funds and deposit from RCSSMKS budget activity. One soil science consultant (Dr. Ta Liang) was supplied under the SDC contract with RKSF, the Agricultural advisor (soils) Stephen Kalyango visited Zambia, and staff of the soil Survey of Zambia visited Nairobi. A further consultant, Dr. Ray Louis has returned (RCSSMKS funds) and the soil map completed by collaborative work with the field survey team. Stephen Kalyango spent several weeks in the field with Soil Survey team as did Dr. Ta Liang and Dr. Louis. Soil Survey staff spent time in Nairobi in the centre and a soil map was completed to the satisfaction of all within the first year of contract operation. The map has subsequently been edited and prepared for publication. The result has been an excellent demonstration of the utility of satellite remote sensing data in assisting the rapid compilation of a reconnaissance soil map of a large area.

Potential Project

Discussions about the possibility of preparing a soils map of the whole of Zambia in this way have been initiated by the Zambia soils survey.

Tanzania Forest Mapping

After attendance at several of our short courses, Mr. L. Okello of the Forestry Department, Ministry of Natural Resources, Dar-es-Salaam, returned with a proposal that he apply remote sensing techniques to his work as inventory officer. After some discussion he was advised to proceed with a 1:2,000,000 scale map showing the apparent standing forest (as interpreted from satellite remote

sensing images) of the country. This was achieved in a period of some six months.

The support offered through KRSF included provision of accommodation and a per diem allowance whilst he worked with the images to select sample sites for fieldwork. He accompanied Mr. Okello to a series of sample sites selected by using the satellite images. This six week period of fieldwork was supported by KRSF budget contributing allowances and the Range Rover. KCSSNRS provided L. Isavia's salary and the government of Tanzania provided Mr. Okello's salary and the necessary petrol and support for the vehicle in Tanzania.

The result is that in a period of slightly more than one year a new map of apparent standing forest reserves and general land use has been compiled and is now with KCSSNRS cartographers to be prepared for printing. It is the first time in more than a decade that such a map has been prepared. Mr. Okello has planned further activity and hopes to prepare more detailed interpretations at 1:250,000 scale of individual forest areas.

Kenya

Similar work was done for Kenya in the 1979/80 period with Rhinehardt Doute (French technical assistance to KKEIU) and Nicholas Uchanda preparing a map of the apparent standing forest in Kenya. This was prepared from KRSF data in KRSF laboratory space and subsequently published as a report by KKEIU who did their own ground and air survey work in confirmation of the image interpretation.

Uganda

Mr. Carrallo of the Government of Uganda Forestry Department also visited the facility in 1982 and prepared a rapid reconnaissance map of the Uganda standing forest in a 3 week period. The facility was not involved in the subsequent fieldwork but copies of the maps have been kept (photographs of the originals) and we understand the work was successful.

Sudan

Hanafi Obeid, of the Inventory Division, Sudan Forestry Administration participated in our Natural Resources extended training course and as part of his involvement designed and implemented a rapid assessment of standing vegetation in the Sudan. The resulting delineations of cover type were then assessed in terms of their charcoal and fuelwood yield and estimates calculated for the Sudan energy assessment project. Some field support was given

for this activity and the consultant for the course Mr. W. Winton visited Malawi in the field in August 1981 at Lilongwe. His work was successful.

We understand that the project was successful and a detailed map or final report has been provided to him.

Ethiopia

As an exercise in image interpretation and administration of the use of satellite remote sensing Luka Isavwa began an interpretation of the satellite images of Ethiopia and mapped woodland resources. The interpretation is complete and the Government of Ethiopia is in correspondence with us about plans for Luka to work with one of the Ethiopian forestry officers and do the necessary ground work to refine the map for publication. The completion materials are with RRSF.

Potential Projects

Zambia

The Surveyor-General of Zambia recently visited RRSF for discussions about a project which would prepare a rapid assessment of standing forest in Zambia. It seems that \$20M in forestry project money from donors is not released because the planning has been halted by a lack of basic information which a rapid survey could produce.

Discussions between the Surveyor-General and the Forestry department should lead to further discussions with RRSF.

Tanzania

We currently have requests for on-the-job training for Tanzania photographic technicians and continued project work in forestry this will not proceed until the project future is clarified.

Swaziland

The Forestry department of Swaziland wishes to undertake rapid assessment of standing forest and begin an inventory project in the near future. An RRSF staff member will visit Swaziland in the near future to assist with this work.

Lesotho

Requests from Lesotho for projects addressing soil erosion and forestry have been made informally and an official follow-up is expected.

Indian Ocean

Oceanographers from Mauritius, Seychelles, Comoros, Malagasy and the coastal countries of Somalia, Kenya, Tanzania and Mozambique have complained that they receive too little support from international agencies. As a result of this discussions with French agencies resulted in the possibility of an oceanographic research vessel being made available as a floating classroom and laboratory for a ten day activity between Djibouti and Reunion. Plans for this are currently shelved because of uncertainties about the project future but a remote sensing for oceanographers course is intended if budget and support permits.

Tanzania

A French government agency has written to request collaboration and co-operation in the presentation of a rural water supply training course to be held in Dar-es-Salaam in September/October, 1984. Our initial reaction is positive but the project future is uncertain

Sudan

Additional work on the Roseires watershed project may be done, time and staff permitting. Requests have been made, but the current workload prohibits assistance from the Facility just now.

Somalia

The Juba River Valley Project, now in the planning stages, will require major assistance in cartography, remote sensing of natural resources, aerial photography and ground surveys. It is probable that a portion of this work will be done by contracted personnel, who will utilize services and equipment of the Facility.

Appendix G

1975 - 31 December 1983 (amounts in U.S. dollars)

<u>Country/Donor</u>	<u>Received/Obligated</u>	<u>Rec 1975/83</u>	<u>Outstanding</u>
Comoro	-	294,683	294,683
Kenya	1,985,295	2,353,719	368,424
Lesotho	-	294,684	294,684
Malawi	0	1,272,858	1,272,858
Somalia	-	1,252,802	1,252,802
Swaziland	22,473	294,683	272,205
Tanzania	1,517,489	1,987,201	469,712
Uganda	1,089,992	1,723,406	633,414
Zambia	23,156	589,369	566,213
USAID	4,758,000	4,758,000	-
IDRC	86,063	245,833	159,770
UNDP	101,108	746,000	644,892
TOTAL	<u>9,583,581</u>	<u>15,813,238</u>	<u>6,299,657</u>

NOTE: The amounts shown against USAID is the value of the project being financed. The project, unless renewed, is due to end on 30/6/1984.

The support by the host country, Kenya, is clearly shown. The Grants receivable from UNDP and IDRC are up to the end of the Project (i.e. 1986 and 1985 respectively). The obligation and receipts in respect of the two above Grantors represent up to the end of 1983.

CONTRACT COSTS - IN \$U.S.

	JUNE 1982	JULY 1982	AUG 1982	SEPT 1982	OCT 1982	NOV 1982	DEC 1982	JAN 1983	FEB 1983
Salaries and wages	\$ 7,478	7,330	8,055	7,802	9,527	7,997	7,737	9,440	8,124
field overhead	5,249	5,146	5,655	5,477	6,859	5,758	5,571	6,608	5,687
consultants	1,904	1,400	6,052	1,456	-	7,089	(57)	-	-
equip and supplies	133	3,487	212	1,820	25	6,164	27	79	419
all other	9,755	19,631	36,462	15,388	35,141	23,747	5,988	13,370	16,769
TOTAL	\$ 24,519	36,994	56,436	31,951	51,552	50,755	19,266	29,497	30,999
	MAR 1983	APR 1983	MAY 1983	JUNE 1983	JULY 1983	AUG 1983	SEPT 1983	OCT 1983	NOV 1983
Salaries and wages	8,124	10,155	8,124	6,492	10,816	8,244	7,167	8,606	7,546
field overhead	5,687	7,108	5,687	4,544	7,571	5,771	5,017	6,024	5,282
consultants	7,089	-	-	2,600	(700)	-	-	3,840	3,540
equip and supplies	-	-	-	-	-	-	3,840	3,540	-
all other	7,037	5,789	28,454	6,046	49,025	21,158	21,411	11,303	8,536
TOTAL	\$27,937	23,052	44,865	16,382	67,412	54,962	40,288	29,693	21,274

Actual Expenditure By Line Item in K.Shs, January to December, 1982

	Jan.82	Feb.82	Mar.82	Apr.82	May 82	June 82	July 82	Aug.82	Sept.82	Oct.02	Nov.82	Dec.82
1. Administration	53,359.65	170,976.40	72,363.60	66,202.55	65,913.40	36,047.25	51,972.65	97,047.00	122,719.40	92,082.10	29,214.55	76,443.88
2. Training	13,908.80	5,049.30	59,809.10	61,200.10	130,580.00	4,672.00	-	88,486.00	153,711.80	212,602.95	32,214.60	55,624.10
3. User Services	5,067.65	194.00	12,171.65	3,133.45	45,424.20	93,548.20	1,950.40	22,404.55	7,769.60	128.00	9,000.00	5,019.25
4. Photolab	7,800.00	31,685.00	21,253.60	22,584.20	1,575.00	-	420.00	4,251.00	18,887.25	4,815.00	1,166.80	4,265.95
5. Projects	-	5,430.00	3,289.35	27,661.00	8,642.85	2,000.00	10,714.75	3,502.10	1,636.05	-	-	12,616.35
	<u>80,136.10</u>	<u>213,334.70</u>	<u>168,887.30</u>	<u>180,781.30</u>	<u>252,135.60</u>	<u>137,067.45</u>	<u>65,058.80</u>	<u>215,690.65</u>	<u>304,724.10</u>	<u>309,628.05</u>	<u>71,595.95</u>	<u>153,969.53</u>

Actual Expenditure By Line Item in K.Shs. January to December, 1983

	Jan.83	Feb.83	Mar.83	Apr.83	May 83	June 83	July 83	Aug.83	Sept.83	Oct.83	Nov.83	Dec.83
1. Administration	20,756.45	176,079.95	86,129.70	62,255.30	31,946.05	56,273.50	27,871.35	113,140.20	101,180.40	168,580.40	26,559.45	95,855.60
2. Training	6,600.00	43,929.60	36,970.70	51,245.55	61,289.05	188,810.79	190,621.00	204,992.30	48,668.65	124,751.80	184,273.80	284,975.00
3. User Services	6,777.20	23,820.00	42,433.00	3,470.00	6,862.50	2,314.75	12,797.85	5,900.00	17,573.40	3,035.00	78,371.15	2,895.00
4. Photolab	7,050.00	120.00	2,633.50	10,465.40	2,880.00	7,219.50	1,634.00	120.00	-	6,566.95	67,946.45	1,321.70
5. Projects	76,680.00	-	33,634.00	-	-	4,598.40	18,930.25	-	70,980.00	84,400.00	2,400.00	1,800.00
	<u>117,863.65</u>	<u>283,949.55</u>	<u>200,800.90</u>	<u>27,436.25</u>	<u>102,977.60</u>	<u>259,216.94</u>	<u>251,854.45</u>	<u>324,152.50</u>	<u>238,402.45</u>	<u>387,334.15</u>	<u>359,550.85</u>	<u>386,847.30</u>

MACS-PD7A

USAID / REDSO/EA

DATE: 02/09/84

COMPREHENSIVE PIPELINE REPORT BY PROJECT
AS OF 01/31/84

REPORT PAGE NO.: 308
MISSION PAGE NO.: 21

OPTION NO.: 0

OFFICE CODE: 500
PROJECT NO.: 5960414.00

OFFICE NAME: REDSO/EA
PROJECT TITLE: REMOTE SENSING

PROJECT OFFICER: JAMES GRAHM

ELEM. NO.	ELEM. NAME	BUDGET PLAN CODE/	OBLIGATED/	COMMITTED	DISBURSED	UNLIQUIDATED	ACCRUED	UNEXPENDED
REQ. NO	SERIAL NO.	EA83886.0656	EA83886			OBLIGATION		OBLIGATION
ELEMENT NO. : 1	ELEMENT NAME: TECHNICAL ASSISTANCE		1,745,854	1,745,854	1,444,201	301,653	0	301,653
PIOT623-0414-3-90004	0790009 GOAA-79-21623-AG17 FUNDS FOR TRAINING UNDER S-D-		380,000	350,000	360,000	0	0	0
PIOT693-0414-3-00004	0500010 GOAA-80-21623-AG17 NEGOTIATIVE PHOTOGRAPHIC ENGINEER		265,000	265,000	265,000	0	0	0
AID-DSAN-C-0033	2310005 GOAA-81-21623-AG17 TO INCREASE EARMARKED FOR CON		60,000	50,000	60,000	0	0	0
AID-DSAN-C-0033	0820007 GOAA-82-21623-AG12 AMENDMENT NO 3 OF 1982		1,060,854	1,060,854	759,201	301,653	0	301,653
UNEARMARKED BALANCE			0	0	0	0	0	0
EARMARKED TOTALS >>>			1,745,854					
ELEMENT NO. : 3	ELEMENT NAME: CONSULTANTS		81,979	81,979	73,231	8,698	0	8,698
PIOT623-0414-3-90006	0790006 GOAA-79-21623-AG17 3-SHORT-TERM-CONF-IC-1166		50,000	50,000	48,059	1,941	0	1,941
PIOT623-0414-3-90009	0790007 GOAA-79-21623-AG17 PROF DAVID EVALUATION LEADER		9,700	9,700	9,700	0	0	0
PASA/AG/STB-1224-6-63	0810009 GOAA-81-21623-AG17 WILL WILSTON TRAINING IN NGR		22,279	22,279	15,522	6,757	0	6,757
UNEARMARKED BALANCE			0	0	0	0	0	0
EARMARKED TOTALS >>>			81,979					
ELEMENT NO. : 5	ELEMENT NAME: LOCAL HIRE SECRETARIAL/TECHNIC		1,632,210	1,258,990	1,195,606	436,604	0	436,604
GR-0414-1-907	0790005 GOAA-79-21623-AG17 TO SUPPORT REMOTE-S PROJECT		305,468	305,468	305,466	0	0	0
698-0414-PIL-1	0830009 GOAA-80-21623-AG17 AMENDMENT 1 OF AG-0414-707PIL		500	500	500	0	0	0
GR-0414-1-907	0830006 GOAA-80-21623-AG17 IMPLEMENTATION LETTER NO-5		188,000	188,000	186,000	0	0	0
PO-698-0414-0002	0310002 GOAA-81-21623-AG17 REMOTE SENSING FUNDS FOR FY81		421,022	421,022	421,022	0	0	0

PAC3-P07A

USAID / REDSO/EA

DATE 8 02/08/84

OPTION NO.: 0

COMPREHENSIVE PIPELINE REPORT BY PROJECT AS OF 01/31/84

REPORT PAGE NO.: 309
MISSION PAGE NO.: 22

OFFICE CODE: -500

OFFICE NAME: REDSO/EA

PROJECT NO.: 598J414.00

PROJECT TITLE: REMOTE SENSING

PROJECT OFFICER: JAMES GRAHM

ELEMENT NO. :	MARK	BUDGET PLAN CODE/	OBLIGATED/	COMMITTED	DISHURRED	UNLIQUIDATED	ACCRUED	UNEXPENDED
MARK	MARK	MARK	MARK	MARK	MARK	MARK	MARK	MARK
MARK	MARK	MARK	MARK	MARK	MARK	MARK	MARK	MARK
5	LOCAL HIRE SECRETARIAL&TECHNIC		1,632,280	1,258,990	1,195,606	436,006	0	436,004
699-0414-PIL-18	2540163 GDAA-82-21623-AG12 EVALUATION TEAM AMEN PIL-09		4,896	4,896	0	4,896	0	4,896
IMPLEMENT LETTER-7	6220312 GDAA-82-21623-AG12 REMOTE SENSING 9-31 TO 6-17-84		330,000	330,000	278,616	51,384	0	51,334
PO-043-0414-0-00-4007	640106 GDAA-82-21623-AG12 JOSEPH P. BORN, DU-44 E/TEAM		3,752	3,752	0	3,752	0	3,752
PO-023-0414-0-00-4009	6540104 GDAA-82-21623-AG12 CHRISTIAN J JOHANSEN E/TEAM		3,352	3,352	0	3,352	0	3,352
PO-023-0414-0-00-4008	640105 GDAA-82-21623-AG12 DAVID P S WASSARD E/TEAM		2,000	2,000	2,000	0	0	0
UNMARKED BALANCE			373,220	0	0	373,220	0	373,220
MARKED TOTALS > > >			1,258,990					
6	COMMONCITELS		215,199	145,199	129,229	85,970	0	85,970
PIJ023-0414-0-0003	6790010 GDAA-79-21623-AG17 PREPARATION OF PD USGEOLOGICAL		12,000	12,000	12,000	0	0	0
PIJ/C-070-0414-0-00003	6820011 GDAA-80-21623-AG17 FUNDS TO PURCHASE SATELLITE		71,000	71,000	71,000	0	0	0
PO-070-0414-0-00003	6810010 GDAA-81-21623-AG17 ADDITIONAL TO SUPPORT R-S-PRO		45,000	45,000	29,030	15,970	0	15,970
PO-070-0414-0-00003	6810011 GDAA-81-21623-AG17 ADDITIONAL TO SUPPORT R-S-PRO		17,199	17,199	17,199	0	0	0
PIJ/C-070-0414-0-00001	6820145 GDAA-82-21623-AG12 DELIV OF CENTRAL PROCESSOR		70,000	0	0	70,000	0	70,000
UNMARKED BALANCE			0	0	0	0	0	0
MARKED TOTALS > > >			215,199					
7	TRAINING		96,758	96,576	70,607	18,151	0	18,151

MACS-P07A

USAID / REDSO/EA

DATE IS 02/09/94

OPTION NO.: 0

COMPREHENSIVE PIPELINE-REPORT-BY-PROJECT
AS OF 01/31/94

REPORT PAGE NO.: 319

MISSION PAGE NO.: 23

OFFICE CODE: 500
PROJECT NO.: 098J414.03OFFICE-NAME: REDSO/EA
PROJECT TITLE: REMOTE SENSING

PROJECT OFFICER: JAMES GRANH

EARMARK NO. NO	EARMARK SYLL. NO.	BUDGET PLAN CODE/ BBSYARS_DESC.	OBLIGATED/ EARMARSED	COMMITTED	DISBURSED	UNLIQUIDATED OBLIGATION	ACCRUED	UNEXPENDED OBLIGATION
ELEMENT NO.: 7 ELEMENTAL NO.:	7 TRAINING		96,750	94,574	78,607	18,151	0	18,151
PIOP623-0414-20005	0790011	GDAA-79-21623-AG17 SAGANA KAMANI	12,832	12,832	12,832	0	0	0
PIOP623-0414-1-20010	0320002	GDAA-02-21623-AG12 DR VICTOR A O JOENYO	11,500	11,500	675	12,175	0	12,175
PIOP623-0414-1-20017	0520144	GDAA-02-21623-AG12 ISAVAA LUKA ATONYA	22,642	22,642	21,552	1,090	0	1,090
PIOP623-0414-1-20013	0320145	GDAA-02-21623-AG12 KALYANJO STEVEN NYENJO	11,045	11,045	10,295	750	0	750
PIOP693-0414-1-20003	0320010	GDAA-32-21623-AG12 JOHN PALAZA WORKSHOP TRAIN US	9,509	9,509	9,509	0	0	0
PIOP693-0414-1-20013	0320003	GDAA-32-21623-AG12 M. IGAVWA L. ATONYA TRAINING-U	11,531	11,531	11,531	0	0	0
PIOP698-0414-1-20014	0320009	GDAA-32-21623-AG12 J. RENE SOLO R. WORKSHOP PART1	9,015	9,015	7,987	1,028	0	1,028
PIOP698-0414-1-20015	0320011	GDAA-02-21623-AG12 MOSES KLAGO SHORT TRAI IN USA	6,500	6,500	5,376	924	0	924
UNEARMARKED BALANCE			2,184	0	0	2,184	0	2,184
EARMARKED TOTALS > > >			96,574					
PROJECT TOTALS > > >			3,772,000	3,326,596	2,920,924	851,076	0	851,076
EARMARKED TOTALS > > >			3,396,596					

REMOTE SENSING 698-0414

Status as of
2 March

	OBL	Projected EXP 6/30/84	Balance
PSI 1 Spectral Data	1745854	1745854	-
PSI 3 Consultants	102579	95822	6757
USGS	70600	70600	-
USDA and Other	31979	25222	6757
PSI 5 Local Costs	1389094	1391947	-2853 — w/o for Ouma and Wasavwa not yet shown
PSI 6 Commodities	215199	220199	-5000 — assumes no imagery
Computer	70000	-	
New bldg	-	85000	
Imagery	45000	35000	
Other	100199	100199	
PSI 7 Training	94574	96674	-2100 — increased air ticket costs
Kalyango	11045	11645	— may not be spent
Others	83529	85029	
Unarmarked	224700	bal. 221504	-3196
Total	3772000	3550496	

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OUTLINE PLAN AND BUDGET
FOR THE DEVELOPMENT OF THE

REGIONAL REMOTE SENSING FACILITY
NAIROBI, KENYA
1984 - 1994

prepared by

Regional Centre for Services in Surveying, Mapping
and Remote Sensing
P.O. Box 18118,
Nairobi, Kenya.

January 1984

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FUTURE DEVELOPMENT OF THE REGIONAL REMOTE SENSING FACILITY

SUMMARY

This document outlines a 10 year plan for the Regional Remote Sensing Facility (RRSF) and provides a budget and programme for existing services together with an expansion of activity into natural resources survey, monitoring and analysis. In the first seven years of its existence the RRSF has developed a completely new service to the Eastern and Southern Africa Region. The provision of training courses for more than five hundred persons from the region has been a major activity. Establishing an image library with a fully equipped photo laboratory to provide data to the region has made a significant contribution to the use of remote sensing in the region. The quality of the photo-laboratory product has received acclaim from the major remote sensing centres of the western world. Teaching materials and publications have been highly praised and these service functions of the RRSF are some of the most effective known to our visiting consultants and experts.

The provision of a high standard of services is, however, not the goal of remote sensing activity. The RRSF was established to transfer technology to the region in order to foster a better understanding and management of natural resources so that the standard of living of the rural poor will be improved. This goal is realistic and in certain cases significant achievements have already been made. In order to achieve the goal it is necessary to define suitable objectives in the main natural resources fields. However, the

first objective, that of establishing a viable service unit, has been accomplished. These objectives in natural resources areas which impact upon the rural poor and can be efficiently surveyed by remote sensing must be adequately addressed by the RRSF so that suitable objectives in forestry (firewood and fuel supply), hydrology (clean water supply), soil survey, soil conservation and erosion prevention, agricultural development and crop monitoring can be linked to the goal of adequate food crop production. This, together with the fuel required for cooking and adequate supplies of drinking water, sustains the life of the rural poor and if correctly balanced leads to improvement in their standard of living.

The improvement will only occur if effective planning and management of natural resources is achieved. For such effective planning current information is essential and management requires that the information is constantly up-dated so that the situation can be monitored. Such information is rarely found in the region but can be efficiently obtained using remote sensing techniques. In the ten year plan proposed here the RRSF would seek multi-lateral funding from the international donor community and would request funding from the African Remote Sensing Council (ARSC) members within the service area which currently do not support RRSF. In order to achieve balanced and effective progress an advisory council formed of donor representatives and the senior staff of RRSF should meet annually and advise the governing council of RCSSMRS^A and/or the East African Regional Management Committee of ARSC about programme and funding matters. At present the RRSF service region includes Sudan, Ethiopia, Somalia, Kenya,

Tanzania, Uganda, Zambia, Swaziland, Lesotho, Somalia, Malawi and Comoros. African Remote Sensing Council members of the East African region include Sudan which does not contribute directly to RCSSMRS.

The ten year plan proposes that natural resources data be gathered using remote sensing data provided by RRSF and interpreted by natural resources staff of the individual nations in the region. The RRSF will provide the necessary training and RCSSMRS will prepare and publish the maps as they are completed. In order to monitor natural resources a computer system will be installed in RRSF and this will operate a geocoded data bank for the region. The system will be capable of storing natural resources data and printing it out in map form (or map compatible form). The system will also be capable of accepting data from both satellite and other sources and calculating changes, printing these in the form of maps of change, thus providing a national/regional scale monitoring system.

In order to achieve this RRSF must continue its present services of data archiving, data reproduction and project advice and support through its user services activity. It must also continue to provide training linked to the natural resources projects in forestry, water and land resources, and courses which keep abreast of new technology and new earth resources satellite programs. This core programme is an essential basis for natural resources analysis. The ten year plan provides for RRSF staff training so that the

core programme can be completely staffed by personnel from the region. Some technical assistance is provided to support this activity and a decreasing donor contribution to the operating budget is also planned. These items together provide for the orderly transfer of the core programme to a regional funding base. The core programme also ensures the availability of natural resources remote sensing data.

Successful implementation of this plan will provide assessments of natural resources at regional and national levels. These assessments will be initially based on satellite remote sensing data interpretation and the monitoring of such variables as forest cover, standing water bodies, and agricultural land will follow from further analysis of satellite remote sensing data. Natural resources staff in each country will be supported in programmes which link satellite data interpretation to existing staff and programmes. The results will be incorporated in a computerized data bank which will provide a regional service for monitoring natural resources. This monitoring service should be linked into the planning and management of natural resources in each country of the region to ensure continued supplies of firewood, water and agricultural produce for the rural population and the dependant urban populations.

10 Year Budget Summary

1) Proposed contribution by FOCOMMS: staff salary, operating support and accommodation	\$ 7,577,000
2) Other funding requested from donors	\$ <u>23,622,776</u>
TOTAL	\$ <u>31,201,013</u>

Of the \$ 23,622,776 requested from donors the following components are identified:

Operating Cost support	\$ 1,834,972
Technical assistance	\$ 4,641,528
Capital Expenditure (including building costs)	\$ 3,490,000
Overseas training	\$ 6,480,944
Natural Resources Mapping and analysis	\$ 1,905,547
Training	\$ 1,509,348
Travel	\$ 679,205
Contingency	\$ <u>3,081,231</u>
	\$ 23,622,776

BACKGROUND

In 1975 the U.N. Economic Commission for Africa (ECA) sponsored the formation of the Regional Centre for Services in Surveying and Mapping (RCSSM). The RCSSM came into being when its charter was signed by Somalia, Kenya, Uganda, Tanzania and Malawi. Funding for the RCSSM is from the member countries, and not from ECA. The ECA provides the chairman of the Governing Council of the RCSSM. In negotiations with RCSSM, the United States Agency for International Development (USAID) agreed to fund the establishment of a Regional Remote Sensing User Assistance Facility and this has now been done. In recent developments the number of countries with membership in the Regional Centre has increased; Comoros, Swaziland, Lesotho and Zambia have now become full contracting parties bringing total participation to nine countries.

The African Remote Sensing Council, which began to emerge during the last decade has now organized regional management committees to coordinate remote sensing activity around the five major African remote-sensing centres: Cairo, Ouagadougou, Ile Ife, Kinshasa and Nairobi. Activity in these centres varies greatly. In the case of Nairobi, the regional management committee function has been integrated with the Governing Council of the Centre. This has been possible because of the existence of the host organization. Consequently, the host organization has modified its mandate and charter to include remote sensing: Regional Centre for Services in Surveying Mapping and Remote Sensing (RCSSMRS). So far little policy directive has emerged from ARSC as activity has been primarily centred around the various studies by French agencies which have been evaluating the feasibility of

establishing a ground receiving station in Nairobi. The RRSF programme itself is the one originally agreed between USAID and RCSSM and this programme has provided liaison with the African Remote Sensing Council at various stages in development.

The development of the RRSF has been supported by USAID grants which, to June 30th. 1984, total 4.7 million U.S. dollars. These grants have been used to establish and equip photographic darkrooms, an image library, user services facilities and a classroom. More than five hundred persons from the region have attended courses in the application of remote sensing to subjects including natural resources, highway engineering and cartography. The courses are, in general, well received and have resulted in the region increasing its awareness of remote sensing technology. Various projects have been supported and overall the Facility has achieved a great deal on a modest budget.

An abbreviated history of the project shows that it began in 1977 with the arrival of a U.S. government direct hire director of the Facility. During the first year he dealt with contracting, evaluation of proposals and the appointment of the necessary staff as well as ordering and receiving the first major items of project equipment. The contract staff (2 people) arrived in August 1978 and the personal services contractor (photo scientist) shortly afterwards. The personal services contractor left in November 1978. The first project evaluation took place in November/December 1978 and a new project paper was written for the next phase of project activity. This was submitted and approved and came into

During 1979 the Facility began to give courses in remote sensing. Initially these courses were fully sponsored, U.S. AID providing tickets for participants to travel to and from the courses as well as accommodation, allowances and instruction. The programme of courses has continued to the present day and is increasingly popular. In the calendar year 1983 two courses were sponsored by international agencies, and three others had instructors supplied by other governments; France, Australia and Britain. The course programme has now provided training for more than 500 individuals from the East and Southern Africa region and applications usually exceed the available places by a factor of two to one. The course programme was reviewed in 1981, resulting in a recommendation that longer courses be given. This was carefully reviewed by the Facility staff and an "extended" format was designed which includes a classroom session in Nairobi, several months with the participants back in their home agency/country doing some form of project work and a final session in Nairobi where project achievements are reviewed and techniques evaluated in the light of this experience. Two of these extended courses were completed in 1982/3 and two more will be completed in the early half of 1984.

Facility development during the period has been rapid. Once the position of photo-scientist was added to the list of contractor personnel the development of the photo laboratories proceeded rapidly. The design and contracting for the laboratories, installations of equipment and first regular production all took place in 1980 and by 1981 color products were routinely available. The next important step,

the introduction of a large format colour capability, was taken in mid 1982 and ever since, the laboratories have been exceptionally busy producing large format color prints for display, instruction, presentation and sale.

User services developed rapidly in the period 1979-1981 and now consist of a browse file containing more than 7,000 reference prints as well as a collection of colour transparencies and a supporting library of more than 14,000 reproducibles from which users may order products. In addition to the browse facility and image ordering assistance user services also offer basic advice on the use and interpretation of satellite images. Interpretation equipment is available both for demonstration and use and can be used for project work by booking in advance and paying a small fee (currently less than \$5 per hour). The user services and data ordering activity, is under the control of John Baraza who has a staff of two to assist him.

For project planning advice and project work there are two professional staff, Luka Isavwa and Steven Kalyango. Both support John Baraza's work and are often the recipients of enquiries referred to them by John. Steven Kalyango has participated in the successful Zambia Soil Survey project and made major contributions to the Mt. Kenya fieldtrip organized and used for two training courses in 1983. Steven provides advice on agricultural and soil science interpretations of satellite images. Luka Isavwa, an ecologist and rangeland expert has assisted in a great many image interpretation activities. As a result of interpreting images for ecological purposes Luka also did ground cover interpretations

and developed a map of apparent standing forest in Ethiopia. He subsequently worked with Mr. L. Okello of the Dept. of Forestry, Government of Tanzania and assisted with the production of the forest and land-use map of Tanzania. Luka Isavwa is currently away on study leave working for an M.Sc. in forestry applications of remote sensing in Colorado State University, sponsored by USAID funds.

The quality and context of courses has increased greatly since the photo-laboratories began full production. Courses now use the data collection and each student works with the images of his or her own country. This is especially true in the extended courses where the project itself is based on an area in which the student is working. The project has now reached a point where it can support users, produce high quality images and provide training courses. These capabilities can be blended together to assist in the management of natural resources. Satellite images can be used to map the apparent standing forest of a whole nation. The training capacity can be used to train forest inventory officers to do this and the user services equipment provides the necessary support to make this possible. Integrating these capacities to address various natural resources issues is an important step. It will also include the local staff and utilize their expertise as they return from training. The Facility has become an operational reality; it now needs a period of stable operation so that the services it is capable of offering can be utilized by the countries of the region and they can plan ahead to rely on these services into the future.

Presenting these items in numerical form is also useful. During the life of the RRSF project the following activities have taken place:

Training: 24 courses have been given in the region.

Of these 4 were extended training courses.

517 persons attended these courses.

4 Information seminars have been given.

Image Library: An image library for 555 scene centres has been established. More than 14,000 reproducibles are available and user services offers scaled enlargements for sale.

User Services: In the 16 month period to June 30, 1983 709 visits to user services gave a user average of 47.26 consultations per month or more than 2 per working day.

Photo Lab Sales: For the F.Y. 82/3 total sales were KShs. 189,514. Value of total production as per existing list prices was KShs. 729,185/-.

Technical Assistance and Support: The total value of the 16½ man-years of technical assistance staff plus the supplies and consultants for short courses supplied under the contract with Spectral Data Corporation is \$ 2,135,854.00 including estimates of cost to June 30, 1984.

Operating Budget, Support, Supplies, Scholarships: The total value of equipment, operating budget support, scholarships and other items provided to the RRSF total \$ 2,522,146.00 including estimated budgets to June 30, 1984.

NEEDS ASSESMENT

The need for the project arises from the rapid population increase in the region, the increasing pressure on natural resources and the consistent pattern of inadequate government investment in this sector. A majority of countries in the region have not undertaken a comprehensive survey of forest resources in the last two decades. To varying degrees similar situations exist in the countries of the region in resource sectors such as water resources, soil resources, vegetation and rangeland resources, and arable land resources. Without such surveys it is difficult to plan adequate programmes which ensure continued supplies of firewood, water and food from the natural resource base.

Conventional survey methods are time consuming and expensive if applied to national or regional areas. They are not capable of providing data for the region rapidly. If satellite remote sensing data are used and the results compiled by people knowledgeable about the natural resource in each country, a rapid and effective assessment of, for example, the area of standing forest can be made. This was done for Tanzania in the period 1983/4. Other similar assessments were done for Uganda, Kenya, Sudan and Ethiopia. Such rapid surveys provide data which can be used to schedule the existing survey staff and ground crews more effectively. The results from the ground surveys can be used to refine the satellite image interpretation and improve the estimates of standing resources of forest etc.

This interaction between satellite images, national inventories and ground crews is even more effective if linked to a computer data base capable of accepting new data and so producing maps of change. Such a system provides the information for natural resources mapping and monitoring, which is essential for improved planning and management. Because satellite remote sensing data provide the most cost-effective way of meeting the national and regional data needs the project proposal represents an appropriate low cost, effective solution to the need for data.

Other needs must also be considered. The overall need for data about, natural resources and their monitoring has within it a need for training and a need for the supply of satellite data in a suitable form. This has been addressed in the first phase of the project during which USAID funded the establishment of a data library, a photo reproduction service and custom laboratory for specialized data processing and a programme of training. Because the training programme has now had more than 500 participants from the region who have been encouraged to use the services of RRSF there is a need to ensure that these support services continue. If these services do not continue it becomes difficult if not impossible for those trained in the courses to apply the knowledge they have gained.

There is a continuing demand for products from the RRSF which originates in natural resource agencies in the region. Now that the RRSF has been successful in establishing its data distribution service it needs to continue these services to build user confidence in the region. Because

RRSF staff training is not complete there will be a major disruption of services if present technical assistance is withdrawn before fully trained staff are in place. With this new technology finding acceptance and support in the region there is a great need to ensure that this achievement is not negated by the disruption of support and training services at an inopportune time.

To integrate present training activities with the results of recent developments in the satellite programme it is increasingly necessary to teach the computer processing of satellite images as part of the training course. It is also necessary to utilize the efficiency and speed of a computerized data bank if regional monitoring of natural resources is to be effective. One computer system is capable of meeting both these needs if adequately funded and correctly specified.

The regional need is for an inventory and monitoring system for natural resources. This can effectively be achieved by use of remote sensing techniques. The use of these techniques requires a user support and training activity and a computerized data bank system.

In the service region of RRSF, these needs can be quantified as follows. Natural resources inventories are required for the 18 countries of the region. This will generate eighteen national maps of the standing forest reserves, eighteen national maps of standing water bodies and associated water resources, eighteen national maps of major soil types, vegetation, land-type, soil erosion status, and land use; and from these maps of crop suitability, and agricultural

potential. The preparation of each map of the 144 listed will take an average of two man years. However, the effective ground work, local support and organization is available through the agencies of governments. Experience has shown that six man months of RRSF staff support in association with the natural resources agency staff in each country is sufficient to prepare one resource map. Therefore, some 72 man years of RRSF staff support will be needed. Over a ten year period this need is for a permanent natural resources staff of seven professionals (or equivalent).

The entering of such information into a computerized data base generates the need for a computer system and its necessary support equipment, supplies and staff. The staff need would be for a full-time professional and one assistant. Training those who are generating the data from satellite images requires a training programme and the full library of data so that there is the necessary information for analysis. The acquisition of data, its cataloguing, retrieval and storage all require appropriate supervision and a staff to maintain these services, plus a data distribution sales activity. A user services manager, assistants, photo-laboratory staff and an organizer of the teaching programme are all required.

It is extremely difficult to find staff from the region who are both suitably trained and/or have the necessary experience. Therefore, there is a need for a programme of overseas

training so that people from the region can effectively staff the RRSF. Many users of the RRSF are staff of development projects funded by external donors. For this reason, this plan calls for multi-lateral funding so that there is some link between the donor projects (especially those in natural resources) and the regional data base. Satellite data systems currently planned include those operated by the U.S.A., France, Japan, India and the European Space Agency. With such a multinational background to these systems it is necessary for the nations to cooperate in the operation of the RRSF and in programme funding. This extends into a need for a multi-lateral programme..

Whilst these developments are taking place the RRSF needs support for its operating budget and project activity. This support has been provided by USAID funds and over the next few years it must be assumed by the user nations through their support to RRSF. Whilst this transition takes place external funding support will be needed. For complete institutionalization of remote sensing activity it is necessary for the host organization, RCSSMRS, to proceed with the construction of its permanent headquarters. There is a need for multi-lateral funding of this and donor support should be considered.

In the immediate future USAID funding is scheduled to cease on June 30th, 1984. There is a need to continue the core programme of the RRSF at present levels to prevent severe damage to the credibility of RRSF. The core programme which

must be sustained includes the photo-laboratory operation, which provides for data processing and reproduction of satellite image products, and the training and advisory programme which trains resource people from the region and supports their use of the data. The core programme must be maintained if the natural resources activity is to be built on it; it must be maintained if those trained in the RRSF courses are to be supported in their use of the data in resource analysis and project planning.

In budgetary terms these needs are as follows:

Operating Cost support	\$ 1,834,972
Technical assistance	\$ 4,641,528
Capital Expenditure (including building costs)	\$ 3,490,000
Overseas training	\$ 6,480,944
Natural Resources Mapping and analysis	\$ 1,905,547
Training	\$ 1,509,348
Travel	\$ 679,205
Contingency	\$ <u>3,081,231</u>
	\$ 23,622,776

GOAL

The goal of this programme is to provide a Regional Remote Sensing Facility which assists the governments of East and Southern Africa to improve the life of the rural poor by applying remote sensing technology to the management of those natural resources upon which the basic needs of their populations depend. In particular the programme is designed to address the inventory and management of forest resources, water resources and land resources. Forest resources are specifically considered because of their importance in energy planning and the production of charcoal and firewood. Water resources are considered because of their importance in the provision of clean drinking water and irrigation water. Land resources are considered because of the population pressures and the consequent need to expand the cultivated area for food production. This also requires the detection and prevention of soil erosion and the monitoring of the productivity of arable land and rangelands. In all cases the management of these resources necessitates a reliable recent inventory as well as a reliable estimate of change; and many management situations require maps which provide a clear understanding of these resources at the regional and national levels. Such mapping can efficiently be done utilizing satellite and other remote sensing data and is appropriate and in consonance with the aims and purpose of the host organization's motto "Mapping for Development". The goal of this project is, therefore, to apply remote sensing technology in order to map forests, water and land for

development and management over appropriate national and regional areas. Further, we aim to disseminate the expertise to use the technology in the various national organizations concerned with mapping, inventory, evaluation, management and monitoring of natural resources.

OBJECTIVES.

The primary objective is to produce maps of natural resources of the region by collaborating with each of the member states, providing support, advice, consultation and assistance with the mapping of forest resources, water resources, and land resources from satellite data at a national scale. Once this is achieved individual programmes for monitoring these resources can be designed and implemented at regional and national levels, thus providing a timely data base for management decisions. This objective has many components. A primary component is the mapping of forest resources. In the development of the RRSF during the 1977/84 period, rapid assessment of apparent forest cover was undertaken with the cooperation of national scientists for Sudan, Uganda, Kenya, Tanzania and Ethiopia. The average time lapse since the last national survey of resources for these countries was approximately twenty years. The value of an updated survey is, therefore, very considerable.

Water resources are of increasing importance and need to be similarly addressed. An inventory of openwater resources (lakes) in the region is useful and necessary for water management. Increased cultivation in river catchment areas results in increased runoff, sediment loads in the rivers, erosion, and siltation of reservoirs. Increased surface runoff also means reduced groundwater recharge. The semi-arid and arid zones of the subregion are coming under increasing pressures for human settlement. To enable orderly settlement where possible, water resources, in terms of both

surface and ground water, need to be surveyed and assessed. Countries of the subregion are already using remote sensing technology to locate groundwater. This effort should be intensified.

Land resource assessment is a more complex but essential aspect of natural resources inventory and mapping. It requires the mapping of soils, vegetation associations, climate and physiography; when synthesized, these elements lead to land systems maps, land capability maps, agro-ecological zones maps and the definition of agriculturally productive land for development. Soil erosion, aridity and salinity may also be mapped in association with this activity.

In order to facilitate the attainment of the above objectives the RRSF will require a suitable image library, satellite data acquisition on a regular basis, a viable photographic laboratory and a suitable staff of specialist resource scientists, interpreters, and managers. The provision of these items and their constant availability itself forms a basic objective of this programme. Many of these basic items are available from the development phase of the RRSF (1977/1984). Most of the countries in the region will require specialist personnel to work on the national inventory activity. In order to ensure that indigenous personnel are available, suitable training should be provided on a project oriented basis by RRSF; and this in itself forms another objective of this programme.

The first group of objectives can be summarized as follows:

1. To provide a continuing and reliable source of satellite data of a quality suitable for natural resources interpretation and maintain a comprehensive library of originals of data for East and Southern Africa for reproduction and supply throughout the region. Data will initially be in photographic form and computer compatible tapes will be added as necessary.

2. To provide training for natural resources scientists in the use of remote sensing data for the inventory and monitoring of natural resources, especially forests, water, agricultural and rangeland resources. This training may be in the form of courses held in Nairobi, on the job training for small groups in Nairobi, courses for twelve or more participants in their home country and/or agency, or in the process of project implementation.

3. To prepare national maps of apparent standing forest for the countries of the region in collaboration with the appropriate ministries and government agencies. This activity will utilize personnel of the national agencies and suitable training will be provided as necessary and supported by advice, consultation and materials from RRSF as appropriate.

4. To prepare national rangeland habitat maps for the countries of the region in collaboration with the appropriate ministries and government agencies. The maps will contain information vital for devising

suitable rangeland management systems within the countries. This activity will utilize personnel of the national agencies and suitable training will be provided as necessary and supported by advice, consultation and materials from RRSF as appropriate.

5. To prepare national maps of water resources, especially standing water, for the countries of the region, in collaboration with the appropriate ministries and government agencies. This activity will utilize personnel of the national agencies and suitable training will be provided as necessary and supported by advice, consultation and materials from RRSF as appropriate.

6. To prepare national maps of land resources, including soil types, soil erosion hazard and present state of soil erosion, vegetation cover maps, crop potential maps, agro-ecological zones and similar interpretations to aid in agricultural policy formulation and land use planning. This activity will utilize personnel of the national agencies and suitable training will be provided as necessary and supported by advice, consultation and materials from RRSF as appropriate.

As the above six objectives are addressed, the data generated will be of particular value to the region as a regional resource data base for the U.N. Economic Commission for Africa and such regional organizations

as are operated by international cooperation or regional offices of major agencies of the United Nations. Such data should also be available for constant up-dating to permit a continuous monitoring of natural resources in the region, and should form a basis for supplying each national government with advice and warning of impending crises in food supply, water supply or fuel wood supply.

In order to achieve this the RRSF should develop a Geographic Information System (a geo-coded data bank) capable, for example, of storing data for the region on a 5 km. x 5 km. grid cell basis and retrieving it in map-compatible form. Such a data base should accept all available types of input data from all sources including remote sensing, and be available for comparison with current data from satellite remote sensing to permit monitoring of change in forest cover, water resources, land resources etc. To achieve this it is necessary for the RRSF to equip itself appropriately so that data can be stored when it is generated and to build a data bank as rapidly as possible. To implement such a programme it is necessary to achieve the following objectives:

7. To install and make operational a computer system capable of accepting geo-coded data for the region and to have this operating geographical information system ready to accept data as soon as the natural resources mapping objectives begin to produce data.

8. To provide training in the generation, manipulation and management use of the geographic information system for personnel from natural resources agencies within the region.

9. To experiment with and develop suitable map products using the computerized geographical information system so that mapping for development can include timely maps of natural resources linked to suitable cartographic bases.

10. To make available to the region the mapping services developed under objective 9 above.

11. To use the flow of data from present and future satellites (including weather satellites) to detect change in the natural resources and to interpret this for national agencies in the region.

12. To provide training for personnel from national agencies in the region so that they can utilize the data bank, and respond to the information from the monitoring activity and thereby assess and respond to indications of impending drought, depletion of standing forest, development of soil erosion and other threats to the life of the rural poor.

13. To assist in the implementation of practices described in objective 11 above and to integrate remote sensing data with input from other sources.

RRSF will liaise with appropriate government agencies in the region and establish appropriate channels of

of communication and feed-back mechanisms to make the monitoring activity effective.

The above objectives each require several inputs from the region and from the RRSF. These inputs are described in greater detail below. Together the above objectives represent the steps necessary to achieve the ultimate goal of this programme. The present staff of the RRSF has been summarized earlier. The following sections define the programme and outline the capital and equipment costs required for the achievement of the programme goal and the other inputs, and the timetable required to implement the proposed programme effectively to establish a natural resources inventory and monitoring activity for the region.

PROGRAMME

To achieve these stated goals and objectives, factors concerning funding, capital equipment, overseas travel and training in Nairobi, project development, and space for accommodation of the project need to be considered. It is useful to address each of these items individually before blending them into a program of activity.

USAID Funding

At the time of writing the future of USAID funding is the major item in determining the future programme of RRSF. Whilst the programme described below is appropriate and viable, it can only be successfully implemented if an orderly transition from USAID funding to regular operation can be achieved. If this transition is not achieved most of the training and growth funded by USAID will have to be written off and the concepts of the programme will have to be carefully protected and nurtured in a zero growth environment until alternative funding can be found. There is no doubt that the goals and objectives stated above are necessary, appropriate and realistic. The present project is capable of supporting and servicing the attainment of these goals and objectives efficiently. Other structures will be more costly and less efficient, but they will have to be considered if the present system loses USAID support and therefore, becomes impossible to maintain.

Capital Equipment

The proposed computer system for data processing and natural resources inventory work is a necessary development for the RRSF. Unfortunately the original request for \$250,000 approved in principle in the 1980 evaluation, was cut back to \$60,000 in the latest project extension and will produce a system which is not adequate to meet the regional need. The system required is the one originally envisaged and approved. This system must be supported by the necessary technical staff and training, within a realistic programme for technology transfer. The computer system is increasingly necessary if the goal of remote sensing technology transfer is to be achieved. It is essential if effective regional monitoring programmes for natural resources are to be established.

The system should also be capable of operating as a word processor. Word processing capability will greatly assist in the preparation of reports on natural resources. During the ten year development plan a total of 144 reports will have to be prepared for the natural resources mapping programme alone. A suitable system could operate as a terminal permanently linked to the central processing unit.

Overseas Training

Counterpart training has been a major problem. The present situation in which one staff member is undertaking

M.Sc. studies at Colorado State University, results from the history of project extensions. A strategy of established programme supporting center's degree training for four professional staff is necessary. These four should be i) the present agriculture/soils science advisor, ii) the counterpart photo-scientist, iii) the computer specialist, and iv) the user services/project advisor. The appropriate programming would be for the ecologist/range scientist presently away on training to return in 1985 with a completed M.Sc.. The computer specialist should be recruited and be present for the reception and installation of the system in RRSF before being sent overseas for an appropriate course of study (if necessary) and a contract specialist should be available (if necessary) to operate the system at RRSF until the computer specialist returns. The anticipated completion of the computer specialists study overseas would be in 1986.

The agricultural and soil science advisor should be sent for Master's degree training, or a suitable post graduate diploma, starting September 1984 returning in 1985 or 86 as appropriate. The user services and project advisor should leave for training when the ecologist/range scientist returns in 1985. The user services and project advisor would then be expected to return from training in 1987. The photo-scientist position requires immediate positive action and either an appointment made immediately or the present aerial photo technician sent for re-training. It would seem that in either case a 2 or 3 year training programme would be required.

The above training for local staff would produce a cadre of technical expertise of great value to the region and to the host organization. In addition there is every reason to look for additional funds for training other staff overseas. Other donor participation in this area could be of great value. The RRSF could function as a centre which channeled recommendations to other donors for training of nationals from the region who wished to further their knowledge of remote sensing. Training in this category should include provision for advanced study for a counterpart for the Programme Manager. Whilst the duties of a programme manager can be carried out by the Director there is difficulty in combining the representational duties and attendance at regional and international meetings with the day-to-day operation of RRSF. The difficulty is most acute when training courses are in progress.

Overseas training, therefore, requires provision for up to five persons each undertaking 2-3 year courses of study. The requirement during the first five years of the programme would be for 12 man-years of overseas training. This would ensure that there were adequate trained staff to continue a core programme for RRSF at the end of the first five years of the programme.

Nairobi Training

The recent trend for external agencies to contract with the RRSF to conduct courses in remote sensing seems likely to continue. Courses in their present format can reasonably be expected to continue although the frequency of course offerings should be reduced. However, the 500+ professionals

who have attended our courses and are now beginning to apply remote sensing techniques in their work will be a priority. This support will be occasioned by courses to update their knowledge and keep them in touch with new developments in remote sensing. The RRSF must also provide courses to train staff members (from the relevant government departments in the region) in the use and interpretation of remotely sensed data so that they are able to participate in the projects based on remote sensing.

On-the-job training in image processing, computer analysis and image interpretation must be expanded but this requires the provision of suitable space and sufficient staff to accommodate the demand. It is in these areas, tied where possible to the development of projects and the accompanying staff training, where expansion is envisaged. During the first five years of the programme an average of one up-date course per year is expected plus a further one or two per year with shared sponsorship or external funds. Courses in support of project activity will occur as projects develop; one or two per year are envisaged during the first five years of the programme. The second five year period expects that much of the training activity will have passed to universities in the region and will be courses held in the universities during semester breaks or summer sessions to accommodate interest in the region. The organization and support of these courses will require some staff input from RRSF, and support with teaching materials and data preparation.

Project Development

All of the above comments apply to programme components which must be carried out to support the attainment of the goals and objectives. However, the improvement in the lives of the rural poor comes from improved management and awareness of natural resources. Specifically the awareness of the present state of natural resources must be increased at the national and regional levels. To achieve this, many millions of dollars would be required for conventional surveys which would take many years to implement. Alternatively, satellite remote sensing data can be analyzed to provide a rapid overview of natural resources. From this an assessment of the national situation with respect to forest cover, standing water, agricultural land, soil erosion, vegetation types and geological structures can rapidly be made. Existing organizations can then be mobilized and programmed to provide the ground detail in those areas where it is necessary. The initial overview from satellite data is probably only 80% accurate but can be achieved in weeks or months rather than the years required for a national assessment using conventional methods. The cost is one or two orders of magnitude less than in the case of conventional assessments; and so this approach is 120 to 5,200 times more effective than conventional survey systems.

In order to effectively provide this type of information a programme of project activity is necessary. The programme below assumes that forestry, water resources and agriculture will be addressed as major topics. The order, and indeed the topics themselves can be changed to

accommodate particular specific project needs or demands from the region. Once an initial assessment is made, the operations which should include (initially from some of the countries concerned), it is necessary to refine this.

Existing forestry department staff, water resources staff or agricultural ministry staff can participate in this phase using existing staff and equipment with perhaps a short training session in remote sensing principles.

Once this is achieved the resulting information should be stored in a computerized data bank. Each successive set of new data should be analyzed and fed into the data bank so that change can be recorded or assessed and decisions taken about future management. This procedure may conveniently be referred to as monitoring. Data entered into the computerized data base may originate with analysis of new satellite remote sensing data but may include data from other sources, using conventional techniques.

This monitoring of natural resources at a regional level should greatly aid in the planning of firewood, food and water for the rural poor in the region. It should assist in the design of projects which address these issues at different levels and from different perspectives. It will provide valuable data for UN/ECA's regional programmes and for national plans for natural resources projects. Where requested to do so, the RRSF could assist with the preparation and conduct of such national plans and the implementation of appropriate projects.

Space/Accommodation for Project

This issue is of great importance. At present the RRSF organization, the Regional Centre for Service in Cartography Mapping and Remote Sensing (RCSSMRS) is accommodated in the Kenya Commercial Bank Building on Enterprise Road in Nairobi's Industrial Area. This is not an optimum location. Space presently made available for the RRSF activity is inadequate for the needs and would become intolerably congested if the proposed activities were to take place in the present space.

Consequently other space is required. This was recognized by the present Director-General as the single most important priority when he took office. In the three years that have elapsed, building plans have been drawn and tenders called for the construction of the permanent headquarters. Financing has been a major problem and at the moment there is a small fund set aside from the RCSSMRS salary budget plus the expectation that arrears of annual contributions will be paid by the member states in the current financial year. If the new building does not materialize alternate accommodation must be found. There has been some preliminary discussion about occupying space on the UN campus at Gigiri but this has the disadvantage of separating the RRSF and the RCSSMRS. It has the advantage of providing RCSSMRS with additional space to expand its cartographic services at the present site. These services will be much needed if the activities proposed here are implemented.

Space Programme Activity

The period 1984/5 is particularly important in earth resources remote sensing because it includes the release of new types of data and the launch of two new earth resources satellites. The recent shuttle mission in November 1983 carried the European Space Agency's Spacelab. Spacelab was equipped with an earth resources survey camera and the data from this will be released early in 1984. The German space agency has already contacted RRSF with a plan to hold a seminar here showing these new data in May 1984.

The newest satellite in the Landsat series is ready for launch by NASA on 1st March 1984. Data flow will begin in the succeeding two months and it would be appropriate and necessary to gather data for East Africa and hold courses providing information about the Landsat-5 data which differ from other Landsat data in resolution and information content. It is important that these new data be publicized in the region and scientists be made aware of their availability and utility.

In August 1984 the Shuttle is to carry the shuttle imaging radar (SIR) into space. This second experiment using SIR is designated SIR-B. The SIR-B mission is already planned to gather data over East Africa, especially the Rift Valley and NASA has recently concluded an agreement with RRSF to operate in liaison with RRSF for data distribution and coordination of projects in East Africa. In particular RRSF is to provide field support and local

assistance to scientists from the U.S. and from the region working on geological problems.

The French earth resources satellite SPOT is scheduled for launch in April 1985. This new data source will once again require demonstration and introduction to scientists from the region and will form another input to the natural resources data base to assist in regional monitoring.

Clearly, it is important for RRSF to implement a suitable programme taking cognizance of such great activity in earth resources remote sensing.

SCHEME OF ACTIVITY IN 1984.

This RRSF programme for 1984 is dependent on the continuation of USAID funding. If the present USAID funded activity terminates on 30th June 1984 an additional period of one year will be required for the staff to consolidate their positions, reactivate contacts, and follow-up interest in the RRSF. It is not possible in the present circumstances for RCSSMRS to assume the operating costs and personnel costs required to maintain the level of services now being offered. Time, personnel and money will also be required to begin operation of the computer system and to up-grade it from the proposed \$60,000 system. Thus if USAID funding ceases each of the years' activity will be postponed approximately by the period during which donor funding is not available plus at least one further year.

Year One

Capital Expenditure: Reception, installation and set-up of computer system capable of imaging processing, geo-coded data-bank operation. Appropriate staff recruitment. Technical assistance to operate system whilst trainees are overseas for training (if necessary). Experimental operation of system, preparation of demonstration of system, preparation of demonstration and training materials. Acquisition of new data in computer compatible tape form.

Overseas Training: Ecologist/Rangeland specialist continues training for M.Sc.; Agriculture and Soil Science specialist should begin an M.Sc. or graduate diploma course as soon as possible within ()

specialist and photo-scientist should go for training as soon as possible after appointment.

Nairobi Training: Course for Shuttle radar project scientists; course on Landsat-5 data, Project training for forestry data extraction activity. On the job training in photo-science and in image interpretation.

Project Development: Begin forestry data extraction, bring data base up to date, identify and collaborate with forest inventory staff from the region, provide introduction to remote sensing data extraction and to data base management for computer inventory. Prepare images using computer system and accumulate library of images on computer compatible tapes.

User Services: Advisory services, data sales and image library services are maintained to meet demand with expectation of expansion.

Year Two

Capital Expenditure: Minor ancillary equipment acquired as necessary for computer system. Purchase of computer compatible data tapes. Equipment and supplies as necessary for project work.

Overseas Training: Ecologist/Range scientist returns from training and assumes responsibility for User Services/project advice with a coordinating role for forestry work. User services/project advisor leaves for training overseas at M.Sc. level. Computer specialist and photo-scientist continue training. Agriculture/soil science advisor

Nairobi Training: Courses with external sponsorship. One course on SPOT data use and characteristics. On the job training in photo-science and in image interpretation and in computer-assisted image interpretation. Training for water resources analysis and training for agricultural assessment and crop productivity analysis begins. Forestry training continues as necessary.

Project Development: Forestry resources map production should continue with RCSSMRS support. Data should be entered into computerized data base. Forestry officers should have basic understanding of forest resources in their country and be preparing monitoring sites. Forestry programme should be completely under the control of ecology/rangeland project specialist. Water resources programme training and data definition should be underway with preparation from data to be entered into computerized data base. Computer specialist should take control of data base management.

User Services: Continued advisory services, image library and project support activity. Image generation available from computer service, geographic data base available for work in natural resources such as geology, wetlands etc. in addition to project activity. Newsletter and other information brochures published.

Year Four

Capital Expenditure: Supplies for project work, purchase of computer compatible tapes and up-dating of image collections. Costs of initial reports and data summaries

and maps. Probable expansion of photo-typesetting activity and colour reproduction facilities for maps.

Overseas Training: User services/project advisor completes training. Overseas training activity complete for local staff of Centre.

Nairobi Training: Courses with external sponsorship. On-the-job training in photo-science and in image interpretation continues. Computer assisted image interpretation training available. Forestry project training support continues, Hydrology project training continues, Agriculture project training continues.

Project Development: Coverage of region with forestry maps should be complete, hydrology assessments continue, agriculture assessments continue. Data should be entered into computerized data base. Regional information network for natural resources should be established and initial steps taken to improve detail in forestry work. First stages of up-dating of forestry maps should be planned as the opening phase in change detection.

User Services: continued advisory services, image library and project support activity. Computer services include image generation, access to geographic data base for natural resources work. Geocoded data manipulation available. Information services such as newsletter, and explanatory/demonstration material available.

Year Five

Capital Expenditure: Supplies and support for report publication, ancillary equipment for computer systems. Purchase of computer compatible data tapes, increased storage for computer systems and such additional office systems are as necessary (storage, filing etc.).

Overseas Training: Probable scholarships for region, up-dating of staff knowledge with attendance at short courses, international symposia and briefings, especially for new satellite systems planned by European Space Agency, Japan, etc.

Nairobi Training: Courses with external sponsorship. On-the-job training in photo-science and image interpretation. Computer assisted image interpretation training. Support training for on-going natural resources inventory analysis and monitoring in forestry, hydrology, agriculture etc.

Project Development: Forestry data base should be complete so up-dating and initial monitoring results should be achieved for part of the region during this year. Hydrology data base should be completed within this year and initial steps taken to plan and implement up-dating and monitoring activity. Data summaries for regional and national use should be routinely available to international bodies, national governments as agreed through regional meetings to determine policy. Agricultural data base should include climatic data, soils data and initial stages of land cover.

Proposals for projects on a national base giving joint activity in establishing national programmes in natural resource assessment should be encouraged.

User Services: Continued advisory services, image library and project support activity. Computer services including image generation, access to geographic data base for natural resources work, geocoded data manipulation available. Information services such as newsletter, explanatory/demonstration materials and technical notes available.

Years Six Through Ten

During years six through ten there should be a steady state programme in which the staff of RRSF would all be fully employed by RCSSMRS and RRSF would be operating as an integral part of RCSSMRS, which in turn should operate in a manner fully integrated with ARSC. Donor support for the training programme and for operating funds would be on-going and possibly donors would second staff to work in various areas of the programme.

Apart from supporting vehicle purchase and possibly the maintenance contract on the computer there would be no capital inputs in this period. The programme of natural resources mapping should continue with crop capability and land suitability mapping. Monitoring activity would include the continued entry of new data into the geocoded data base. Updated assessments of natural resources would be available and user services and training activity would continue.

Individual donors might sponsor training courses at this stage, providing consultants as appropriate, and possibly provide staff support in addition to budget support for the preparation and publication of natural resources maps. Activity during this period should be the subject of a five year plan compiled

BENEFICIARIES

The direct and indirect impact of the project will benefit several categories of people. A complete description of all beneficiaries is difficult but major groups can be identified as follows.

Immediate Direct Beneficiaries

i) The RCSSMRS and the RRSF; these organizations as recipients of operating funds, and specifically those staff members who receive support for overseas training, and those staff members who receive training in Nairobi. Six professional staff would benefit from overseas training as a result of this project, and a further ten in technical and support positions will acquire skills in photography, photo-processing, image library and user service support and field work.

ii) The trainees who attend courses in Nairobi, this group will acquire skills immediately applicable in natural resources work and should number approximately 100 each year in the first five years of the programme described here.

iii) Ministries and agencies of governments in the 18 countries of the region; these agencies will have low cost training, advice, and support available for their staff and can readily purchase satellite remote sensing data at low cost from the RRSF. Difficulties of foreign exchange for data purchase can be accommodated and image enhancement and scaling can be done to order or as recommended by RRSF advisers and these government agencies benefit from the improved skills of their staff trained by RRSF.

iv) Development projects in the region; such projects have access to a regional data base of satellite images and an advisory service which can assist with most regional and regional scale analysis of natural resources. These projects funded both within and from outside the region are a major force in regional development and their use of remote sensing data continues to grow.

v) Beneficiaries would include the planning and management organizations of the 18 governments in the RRSF service region. National maps of forests, water and land resources would represent the first such compilations for ten years (or more) in most of the countries in the region. Beneficiaries would be the inventory sections of natural resource agencies. The proposed computer data base would greatly assist these national agencies to update their maps and estimates of available natural resources.

vi) The beneficiaries would be national governments and their crisis management systems including food relief and economic planning and forecasting operations. Monitoring activity using the computer data base would greatly assist in developing national strategies for natural resources. If the monitoring activity is fully developed the beneficiaries would be all ministries dealing with forestry, water and agriculture. Monitoring would permit the forecast, detection and assessment of drought conditions and consequently the estimation of food crop production, forestry reserves, losses through fire, standing water and soil moisture/vegetation vigour assessment.

vii) Beneficiaries would be government departments and agencies in the 19 countries of the A.T.P. sub-region. Overall, the major benefit would be improved natural resources data.

Secondary Beneficiaries

As a result of improved data there should be improvement in natural resources management. The beneficiaries in the case of the proposed forestry activity would be the rural poor who should have medium term (and eventually long-term) security in fuelwood, and construction timber as a direct result.

Improved data on water bodies should lead to improved water management. The beneficiaries would be the inhabitants of the regions where improvement in water supplies was achieved.

Improved data on vegetation and land resources should result in improved management practices. These should include expansion of the agricultural area, control of soil erosion and land degradation, monitoring of rangeland and crop productivity and estimates of crop yield. The beneficiaries from these improvements would be the rural poor and the national governments, the rural poor benefitting from the improved quality of land management giving improved food security and enhanced income. National governments would benefit from the forecast of crop yields and the resulting ability to plan food aid and ensure the support of urban populations with food, fuelwood and water.

ADMINISTRATION

The present administrative arrangement whereby the RRSF is operated as a joint project of RCSSMRS and ARSC seems to be an effective basis for operation. A joint agreement exists and can be expanded to include other agencies in a multilateral form. Because there is no direct congruence between RCSSMRS and ARSC's East African Regional Management Committee it seems necessary for financial and administrative reasons to maintain the official identity of RRSF. Member countries of RCSSMRS are making a contribution to the development of remote sensing in the region through the provision of the RRSF staff. A total of five professional staff and ten support staff are funded through RCSSMRS. Countries such as Sudan which are members of ARSC but not RCSSMRS can therefore, be asked to contribute through ARSC to RRSF. This budgetary contribution along with that of other ARSC members and donors from the international community would then be entered into the separate accounting system which exists for RRSF. This permits the operation of both ARSC and RCSSMRS until some rationalization takes place. Mechanisms for this rationalization were proposed at governing council meetings in 1981 and 1982 but the implementation of these actions has not sufficiently clarified the situation. Financial matters should not be allowed to enter into an unclear situation.

Until such time as ARSC or RCSSMRS are able to merge completely or otherwise rationalize the present situation of some overlap it is recommended that the RRSF be operated

as at present by a Director who reports to the Director-General of RCSSMRS. Staff matters affecting RCSSMRS policy and staff and policies pertaining thereto are controlled by RCSSMRS policy. Staff in technical assistance contracts paid by external donors are controlled by the respective contracts and donor policies. At present the operating budget is provided by USAID. As the donor community is approached to contribute to this and RCSSMRS assumes more of these expenses it seems appropriate that donors should meet regularly to consider budget levels and programme activities which they may wish to support. An annual meeting of donor representatives together with representation from other financial contributors (ARSC?), the Director-General of RCSSMRS and the Director of RRSF should take place, the members forming an advisory committee.

The present system of independent budget reporting has been working satisfactorily for several years. If this is continued it is possible to examine the total expenditure and to apportion those items which are financed by each input from the region or from the donor agency. The proposed committee would act in an advisory capacity and receive these accounts annually. They would then agree on a budget and programme which would be presented to the governing council for approval. In view of this the annual meeting of the advisory committee should probably be held in the first quarter of each calendar year so that the committee's advice is available for the April/May meeting of the governing council.

Such an administrative structure has the advantage that RRSF can function in countries that are not members of RCSSMRS. It can function to encourage such countries to become members of RCSSMRS and it can solicit funds from such countries from donors wishing to support RRSF activity in the region. The several sources of funds and the flexibility of the region served leaves the RRSF as a substantive bridge operating between RCSSMRS and ARSC and it provides a suitable vehicle for project activity. The RRSF is appropriately located with RCSSMRS which can plan to absorb RRSF as it becomes financially able to do so. The logical links between remote sensing data, natural resources and mapping make these links technically sound. Links with ECA's division of Natural Resources Science and Technology, department of cartography and remote sensing would also be advantageous. Similar links with those agencies of the U.N. which deal with natural resources would also be valuable. In particular, UNDP, UNESCO, FAO and UNEP should be linked to the proposed RRSF programme in some capacity, the most desirable capacity being as active financial contributors.

The Director of Remote Sensing should provide an annual report to the advisory committee. The Director-General of RCSSMRS should report the decision of the governing council to the donor committee. The advisory committee should seek to secure funds for RRSF support for future planning purposes. The governing council of RCSSMRS should provide policy guidelines within which the RRSF plans would fit. These plans and the RCSSMRS guidelines should be annually reported through the UN/ECA to the ministries of natural resources, science and technology

of the countries in the service region. Provision should be made for the ARSC and RCSSMRS to have appropriate level of representation from the countries of the region and more interaction with policy makers who will receive the natural resources data. Rotation of membership and office of ARSC committees and RCSSMRS governing council should be considered as a method of increasing interaction between these bodies and the government of the region. Financial commitment and representation by fiscal authority should also be considered.

The present system of programme implementation is proving to be a satisfactory one. Daily operation is in the hands of the Director of RRSF with suitable liaison with the Director General of RCSSMRS. The blend of programme activity within and outside the RCSSMRS contracting parties seems to meet with general approval and should be continued.

BUDGET

Major budget items are identified in the inputs section and the basis for the calculations is given below. In the budget presented here the technical assistance personnel costs are based on contractor services under the terms of a USAID technical assistance contract. These figures may bear no relationship whatsoever to the actual costs incurred in supplying technical assistance personnel through other donor governments. Because of these uncertainties the budget for natural resources personnel must be considered as tentative.

This budget is for the operation of the RRSF project only and identifies the commitments of the host organization, the RCSSMRS, to staff support and increasing support of the operating budget for remote sensing.

The following line item notes apply:

1. RCSSMRS Budget for Salaries

This item is budgeted as an RCSSMRS expenditure and is on-going. The salaries and related costs are included here for the Director RRSF, a Range Ecologist, an Agricultural Advisor (soils), a User Services Manager and eight support staff. In addition one aerial photo technician is presently funded but is occupying the position of counterpart to the photo scientist. He should be replaced or retrained immediately. If the RRSF is to continue successfully the position of photo-scientist is of great importance and the appointee must be fully competent.

The position of computer specialist is essential if the natural resources survey and monitoring activity is to be successful. Budget support for the full time appointee

is provided in this budget estimate but the position is not yet filled. The budget shown is based on the total RCSSMRS budget for RRSF salaries and is entered in the 10 year budget table with a 10% per annum allowance for inflation plus incremental creep. This budget item supports present levels of staffing plus one computer specialist and is the only support guaranteed to RRSF after June 30th 1984.

Starting with an initial \$348,846 for 1984/5 this represents a 10 year commitment of \$5,575,867.

2. Accommodation

These figures represent an estimate of the current cost of space occupied by RRSF converted to dollars and inflated at 5% per annum. Space is currently rented and actual rental cost is in shillings the dollar value of which varies considerably. The dollar value given here was calculated in September 1983. Actual costs for RRSF accommodation will reduce when the permanent headquarters of the RCSSMRS is built; however, the floor area allocated to RRSF will increase. The figure given in the budget table is maintained because it represents a present cost and the date of completion of the permanent building is unknown. The value of accommodation provided in the proposed new building would be at least that indicated by this line item.

Starting with an initial \$26,500 for 1984/5 this represents a 10 year commitment of \$333,311.

3. Operating Funds

i) Core Programme. The cost of the core programme in terms of administrative costs, maintenance of the photolab incidents and project activities was \$114,000 for the 1983 CY. An additional amount of \$26,000 was expended by Spectral Data Corporation for supplies sent to the project. From this an annual operating cost for the Facility exclusive of training is estimated at \$130,000. It is proposed that RCSSMRS assume 10% of this cost in the first year of operation, 20% in the second increasing to 50% in the fifth year and remaining at this level. The operating costs are calculated on the basis of a figure of \$130,000 for 1984/5 inflated at 5% per annum through the 10 year period. Donor support is sought for the balance of these costs and it is anticipated that ARSC will contribute to these costs from member country dues gathered in the region.

RCSSMRS 10 year commitment \$680,593, donor support request \$954,524.

ii) Natural Resources Activity. The natural resources analysis and monitoring activity will also require operating funds. On a pro-rata basis the operational costs of an additional staff of five members (hydrologist, geologist, agronomist, agro-climatologist, forester) plus computer support staff and counterpart appointments for at least three of these means provision for the operating support of nine professional staff. The present operating costs (\$130,000 p.a.) are generated in support of nine professional staff (Director RRSF, 3 USAID funded technical assistance

staff, 1 French govt. funded technical assistant, 4 staff (2 Kenyan, 2 Ugandans) currently on the payroll of aerial photo technician, 10 staff (10 Kenyan, 2 Ugandans, 1 Ecology advisor and Agriculture Advisor). The full support of the nine additional staff would also cost \$130,000 p.a. This amount should be restricted to direct administrative costs only (\$70,000) because direct costs for natural resources analysis, consulting support, map production and reports are given as separate budget items.

Thus the administrative costs associated with natural resources activity are estimated at \$70,000 per annum initially, inflated at 5% per annum to give a 10 year total of \$880,448.

Donor support requested for 10 year period is \$880,448.

4. Technical Assistance

i) Core Programme. This item is very difficult to estimate because it will vary according to the type of donor input and the stage of the programme. Initially it seems that an essential item of technical assistance is the presence of Robert Anderson as photo-scientist. This is included under the Technical Assistance line item at an approximate total cost for commercial contracting at \$120,000 p.a. for 1984/5 inflated at 5% and for a period of 5 years. A three year period assumes that a suitable counterpart photo-scientist is hired, that he completes overseas training in two years and returns to RRSF and that he accepts the hand-over of the photo-laboratory in a one year period, if a three year period is satisfactory the

remaining 3 years budget should be used for the same.

On the basis of information from the programme manager is also proposed as a useful member of staff. It is recommended that Mr. (Falconer) be retained until most of the counterpart training is complete. A commercial contract price of \$120,000 per annum is used as a basis for this budgeting inflated at 5% per annum for a 5 year period. Experience has shown that in technology transfer time required for effective transfer of the responsibilities is often under-estimated. A five year period is shown in the budget for these positions but this does not imply either the assent or availability of the persons named. If a 3 year period is adequate the funds for the additional two years should be applied elsewhere in the project.

The core programme activity supported by these two positions therefore calls for a budget of \$1,326,150 of which four man years (\$569,550) may not be used.

ii) Natural Resources Programme. It is considered that applications experts able to act as consultants to the region in such disciplines as forestry, hydrology, agronomy, agro-climatology and computer management of natural resources data would be required. For budgetary purposes these are costed at commercial contract rates as used for the core programme, at \$120,000 p.a. initially. These are shown for a five year period in the budget projections and it is assumed that consultants and other supporting staff will

providing technical assistance to the regional natural resources analysis activity, and to the regional natural resources monitoring programme.

A number of staff will be required for technical assistance for training courses. These are not shown as an independent item but are considered items likely to be provided by donors or sponsors of courses. The budget outline here for the first five years would provide the expertise necessary to launch the natural resources analysis activity and establish the monitoring programme for the forests of the region.

Budget requirement for five technical assistance staff for a 5 year period, requested from donors \$3,305,375.

5. Capital

i) Computer systems and supplies. The computer system is necessary for operation of the regional natural resources data base and monitoring system, a suitable system is estimated at \$250,000. An amount of 550,000 is probably required for the necessary library of data tapes, software and supplies that will be needed. This is based upon the purchase of a satellite data tape in computer compatible form (CCT) being purchased for each scene centre in the region (550). In actual fact it would be more practical to purchase several tapes for some locations and none for others; however, as a planning and budgetary guideline one tape per scene centre is reasonable at a cost of \$1,000 per tape.

The purchase of the computer system and an initial 50 tapes should take place in the first year. Capital budget

Subsequent expenditures of \$100,000 per year are estimated for the second, third, and fourth years of the program for a total of \$300,000 for a four year period. A further \$10,000 per year is estimated for service contract costs and other incidental supplies.

Total costs for the purchase of the computer system, a maintenance contract and tapes are therefore:

First year	\$ 320,000
Second year	\$ 170,000
Third year	\$ 220,000
Fourth year	\$ 170,000
Maintenance contract in each succeeding year	\$ <u>20,000</u>

Donor support requested for

Computer system (Ten year total) \$1,000,000.

ii) Building. The site allocated to RCSSMRS for the building of the permanent headquarters is, as yet, undeveloped although plans exist for the buildings. Financing the construction of these buildings might attract donor support and it is shown here as a two stage operation with \$1 million being spent in the second year and \$1 million the fourth year of this budget plan.

Construction of building capital cost requested from donors \$ 2,000,000.

iii) Interpretation Equipment and Supplies. To adequately support the training and interpretation work a full set of image analysis equipment is required for each student with

... for 30 students \$45,000.

Suitable teaching computers, useful for rapid analysis of small areas and in support of project work. 15 units at \$22,000 each. \$330,000.

Total budget requested for teaching equipment and supplies \$ 375,000.

It is anticipated that these costs would occur immediately after the construction of the classroom and project activity area in year two. This capital expenditure is, therefore, shown in year three of the budget.

iv) Project Support. The project support activity and the project itself requires vehicles. The present vehicles are ageing and will need to be replaced. During a ten year budget cycle the vehicles will need one further replacement. The budget requested is an estimated cost of two field vehicles (e.g. Land Rover/Land Cruiser) purchased in year one and year six of the ten year budget cycle and two Volkswagon combis bought in the same time sequence. An additional pick-up is also considered necessary and useful. To maximise the value of the field vehicles a budget for field equipment is estimated, to include two radiometers (at \$10,000 each) and an allocation of \$5,000 for field instruments such as levels, clinometers, altimeters, soil augers, trowels, spades, sample kits etc.

Field equipment 10 year out \$ 11,000.

6. Overseas Training

i) RRSF Staff. 12 man years at \$16,000 per man year for RRSF staff. This is based on two man years each for

- (a) Photo scientist
- (b) Computer specialist
- (c) User Services specialist
- (d) Agriculture advisor.

An additional four man years of training is budgeted for such possible additional staff appointments as Deputy Director and/or hydrologist or geologist.

Total request to donors \$192,000.

ii) Scholarships for the region. It is expected that these scholarships will be made available to the region by a variety of donors and an allocation of twenty man years per country for the 18 country region over the 10 year life of the project. This gives a total of 360 man years of overseas training or ten persons receiving an award of a two year scholarship in each country. This gives an approximate annual value of scholarships of \$576,000 and this is rounded to a \$500,000 figure available annually for scholarships, inflated by 5% per annum over 10 years.

Total budget allocation for scholarships for region requested from donors is \$6,288,944.

7. Estimated Annual Costs of Project Work
The estimated annual costs of project work consist of field vehicles and the payment of the field staff plus vehicle operating expenses. An overall cost is estimated as follows:

vehicle (2) at \$1,500 per month	\$ 36,000 p.a.
Travel to project areas	
12 staff at 2 trips per annum at	
\$1,500 average trip	\$ 18,000
Map preparation (average 15 maps per year)	
at \$500 per map	\$ 7,500
Map printing (1,000 copies) average of	
\$5,000 per map 15 maps per year	\$ 75,000
Reporting printing (one report per map)	
average cost \$1,000 per report, 15	
per year	\$ 15,000
Annual cost of reporting preparation	
including liaison and maps	
preparation and printing	\$151,500 p.a.
Cost over 10 year life of project with	
5% p.a. inflation	\$ 1,905,547.

This cost should be recovered from the countries of the region as payments for RRSF participation in the project work. However, it is probable that the only effective activity will come from donor funded or World Bank funded natural resources projects. It may be more effective for donors to support this work by direct contributions to the costs shown here and so support a natural resources initiative through RRSF/UNEP.

rather than three or four, and so on. It is proposed that the project be carried out in a number of countries.

8. Project Meetings/Exchanges/Conferences/Seminars

It is considered that project activity will provide a valuable source of information and examples for the R&SF. It is necessary to disseminate the results amongst project groups, and more widely through the region. Such materials can be used as the basis for training others for project work and be incorporated into training courses. It is proposed that one course each year be fully sponsored by a donor and one regional seminar be given.

Annual costs are estimated at \$45,000 per annum for the course and at \$30,000 per annum for the seminar.

It is recommended that the seminar be rotated amongst the countries in the sub-region.

Annual cost \$120,000

Inflated at 5% p.a. gives a

ten year total budget

requested from donors \$1,509,348

9. Professional Travel

It is essential that the professional staff be given the opportunity to present their results at professional meetings and conferences outside the region. At an average cost of \$2,000 per conference it is budgeted for each of the 18 professional staff members to present on average 3 papers in each two year period, or an average of \$3,000 allowance each year.

	84/5	85/6	86/7	87/8	88/9	89/90	90/91	91/2	92/3	93/4	100	1000RS	1000R
STAFFS													
Cost for Salaries	349,846	334,846	423,331	455,664	512,230	563,153	619,798	681,778	749,956	824,951	8,591	1,000,000	1,000,000
STAFFS	26,500	27,325	29,215	30,677	32,210	33,821	35,512	37,288	39,152	41,110	1,000,000	1,000,000	1,000,000
STAFFS	170,000	175,500	143,325	150,491	158,025	165,915	174,211	182,922	192,068	201,671	1,000,000	1,000,000	1,000,000
STAFFS	75,000	73,700	77,175	81,033	86,035	91,330	97,806	93,497	103,421	108,524	1,000,000	1,000,000	1,000,000
STAFFS	240,000	252,000	264,600	277,830	291,720	?	?	?	?	?	1,000,000	1,000,000	1,000,000
STAFFS	600,000	630,000	661,500	694,575	729,303	?	?	?	?	?	1,000,000	1,000,000	1,000,000
STAFFS	300,000	170,000	220,000	170,000	20,000	20,000	20,000	20,000	20,000	20,000	1,000,000	1,000,000	1,000,000
STAFFS		1,000,000		1,000,000							1,000,000	1,000,000	1,000,000
STAFFS			375,000										115,000
STAFFS	65,000					50,000							
STAFFS	48,000	64,000	48,000	32,000									182,000
STAFFS	500,000	405,000	451,850	572,812	607,753	635,141	670,048	703,550	738,727	775,624	1,000,000	1,000,000	6,223,244
STAFFS	151,000	159,075	167,028	175,360	184,149	193,356	203,024	213,175	223,834	235,000	1,000,000	1,000,000	1,000,000
STAFFS	120,000	122,000	122,320	122,615	145,361	152,354	160,812	168,352	177,295	186,153	1,000,000	1,000,000	1,000,000
STAFFS	50,000	55,700	61,575	62,512	65,637	69,919	72,365	75,943	79,782	83,114	1,000,000	1,000,000	171,000,000
STAFFS	2,674,000	3,603,446	3,152,260	3,857,800	2,321,563	1,976,098	2,049,576	2,182,045	2,324,235	2,478,204	1,000,000	1,000,000	1,000,000
STAFFS	401,120	540,817	472,830	578,633	424,794	236,415	307,436	327,307	348,635	371,541	1,000,000	1,000,000	1,000,000
STAFFS	3,075,000	4,117,223	3,625,009	4,436,573	3,256,157	2,272,513	2,357,012	2,509,352	2,672,870	2,846,437	1,000,000	1,000,000	2,237,252,170

CONCLUSIONS
 The support of the project has been taken the form of short-term support in the provision of consultants and materials in several cases, but the government of France has supplied one technical adviser through KREMU to the RCSSMRS to work with RRSF. Thanks to the goodwill of the individuals appointed this has worked well. Other support from France has included the contribution of instructors to French language courses and the provision of total support for the first French language course given here in January 1983.

Other donors have included the governments of Britain and Australia. Britain has provided a total of four consultants in support of four training courses. Australia has provided three consultants in support of two training courses and a small research project.

Discussions with other donor agencies suggest that the time is ripe for formal arrangements to define multi-lateral funding for the project. The French government support seems planned to continue. The well established role of the Netherlands Government, International Training Centre (ITC), would be well suited to the continued training activity. It may be appropriate for ITC to participate by providing instructors for the training courses in Nairobi and by offering scholarships in remote sensing to ITC through RRSF. ITC staff participation in the natural resources activity would also be valuable.

area with possible training activities in Nairobi supported by consultants. A more active programme of rangeland analysis might involve Australian scientists participating in project work here and some personnel from the region might be given scholarships to work with rangelands scientists in Australia and perhaps study in Australian universities.

Similar arrangements might be concluded with Britain. Specifically support of training courses in Nairobi would be valuable. Other support in the form of staff positions might be considered. For example the liaison into the Directorate of Overseas Surveys might become more formal and a D.O.S. staff member could be seconded to RCSEMRS to work with the mapping of natural resources and photo-map activity so that the production of natural resources maps was fully supported. A natural resources advisor, particularly in the field of terrain analysis and land evaluation would be a valuable addition to the staff. Discussions with the British government may result in technical assistance from the Land Resources Development unit of the overseas development administration. Such assistance might also be accompanied by scholarship support.

Similar requests should also be made to West Germany and the Scandinavian countries all of which have natural

resources related activities in this region and that of which involve some remote sensing. It is hoped that these programmes and links with the training institutions might be usefully formed.

Canadian support to the RCSSMRS through the International Development Research Centre (IDRC) is already established with the photo-mapping project. Further Canadian support in the form of direct aid to RRSF through the Canadian International Development Agency (CIDA) should be requested. This might specifically request assistance with computer equipment for image processing and natural resources mapping.

The Indian government has shown interest in cooperation in remote sensing and if explored, it seems that a cooperative agreement with the Indian Space Agency might be developed. Again support in the form of study scholarships in India, and Indian consultants for courses and project work in Nairobi seems a probable support. In total the technical and educational support potential amongst these donors is considerable.

Budget support may come in part from these donors. However, the involvement of the UN family agencies directly concerned with science and natural resources could also be valuable. Operating grants and capital building support should be available from agencies such as UNDP, FAO and UNESCO. Regional funds from groups such as the European Economic Community (EEC) and Federal bodies such as the government of Switzerland might also be available. The donor situation at

RECORD OF THE YEAR

Area

RRSF staff and equipment have improved operating conditions.

Capital - Building

RRSF staff and equipment have improved operating space to upgrade services to region, and to integrate all aspects of activity in purpose built space.

Core programme support - operating and technical assistance

RRSF continues to operate user assistance, image library and reproduction service, with viable advice and on-the-job training. Region benefits from course materials and support in technology transfer activity.

Computer system and supplies

RRSF able to offer advanced training in computer processing of satellite remote sensing data. Computer capacity makes natural resources monitoring possible. RRSF able to offer a computerized image processing service to the region, including images written onto film from existing tapes and disks written for small computer systems.

Natural Resources Project: Operating Budget Support

RRSF able to interact with natural resources agencies and accept data input to computer data bank. RRSF begins process of map compilation and publication for 18 country region using computer assisted mapping and initially concentrating on forest resources.

Technical assistance - natural resources	Interactions with natural resources opened a lot of opportunities for improvement. The... and... local staff... for overseas training.
Overseas Training (RRSF staff)	RRSF staff fully trained to assume responsibilities in core programme and natural resources programme activity.
Overseas Training (other)	Regional personnel trained and able to integrate and cooperate with RRSF staff in implementation of natural resources activity.
Training/seminars (Nairobi)	Regional personnel able to learn what is required to compile natural resources inventory and maps. Also to learn how to build a monitoring system on this base.
Capital - Training Equipment and Supplies	Training activity improved in quality and content.
Capital - vehicles and field equipment	Quality of project support improved. Training benefits from equipment and field experience of staff involved in projects. Field activity relevant to region.
Seminars	Regional projects results shared with other scientists in region. Dissemination of techniques and project planning is encouraged.
Professional staff travel	Results of activity publicized and subject to peer... comment and criticism. Improvement of techniques from suggestions and inputs. Links with similar activities

IMPLEMENTATION PLAN

If this project is to proceed, the following schedules are required. The first is the plan aimed at securing funding and participation by donor countries, the second is the schedule of events required to implement the work plan given above.

1. Implementation Plan - Donor Funding

<u>TASK</u>	<u>ACTION AGENCY</u>	<u>DATE</u>
Circulate project document to potential donors.	RCSSMRS	ASAP
Negotiate possible interim arrangements for project support from USAID (REDSG/ESA) to maintain project support from June 1984.	RCSSMRS/USAID	ASAP
Call donor meeting to discuss participation in funding, training, operational support. Discussion to be based on the concepts, principles and outline budget presented in this document.	RCSSMRS	Before June 1984
Formalize and clarify links between natural resources ministries and agencies in the region and the RCSSMRS and ARSC. Establish clear mechanism for ARSC funding for RRSF.	RCSSMRS	Before June 1984

<u>Task</u>	<u>ACTION AGENCY</u>	
Present programme proposals for governing council approval, identifying activities and budget support based on results of negotiations with USAID.	RRSF	May 1984
Announce programme for 1984/5 and circulate to member countries, and potential participants.	RRSF	May 1984
Determine if computer purchase should proceed and at what level. Establish timetable for computer activities as appropriate.	RRSF/USAID	June 1984
Agree "core programme" activity and support; establish this on a continuing basis until other donor funding and total programme established.	RRSF/USAID/ RCSSMRS	July 1984
Core programme on going.	RRSF	July 1984 onwards
Negotiations with other donors to secure funding for project activity outlined above.	RCSSMRS	Continuous
Definition of other donor inputs and implementation of programme elements.	RCSSMRS/RRSF	Continuous
Satellite Remote sensing data; browse-file update, purchase of new data, reproduction and sales service.	RRSF	Continuous
Advice data selection and ordering assistance, service to users.	RRSF	Continuous
Training support for projects, and applications project design.	RRSF	Continuous

ILLUSTRATIVE IMPLEMENTATION PLAN FOR 10 YEAR DEVELOPMENT

<u>TASK</u>	<u>ACTION AGENCY</u>	<u>DATE</u>
Produce specifications for computer system. Initiate procurement procedures.	RRSF/donor	1st Quarter 1st Year.
Advertise for and appoint computer specialist.	RCSSMRS/RRSF	1st Quarter
Agree staffing profile and donor financed technical assistance staff. Finalize training programme for RRSF staff and define scholarship programme.	RCSSMRS/RRSF Donor	1st Quarter 1st Year
Technical assistance staff brought on board. Financing and furnishing of office accommodation agreed. Staff operating and reporting structure defined. Work programme established.	RCSSMRS/RRSF/ donor	2nd Quarter 1st Year
First major meeting of regional resource leaders held. RRSF staff agree priorities and programme for forestry analysis, map production, data base entry and monitoring system implementation.	RRSF	2nd Quarter 1st Year
Computer system installed and made operational.	RRSF	3rd Quarter 1st Year

DATE	ACTION	PERIOD
Project vehicles replaced	RRSF	3rd Quarter 1st Year.
First forestry course held	RRSF	4th Quarter 1st Year
Data extraction for forestry activity begins	RRSF	4th Quarter 1st Year
Computer specialist leaves for two years overseas training. Agriculture and Soil Science specialist leaves for two years overseas training.	RCSSMRS/Donor	4th Quarter 1st Year
Training schedule for Nairobi based courses finalized. Implementation begins.	RCSSMRS/RRSF	4th Quarter 1st Year
Begin entry of forest data into computerized data base. Experiment with computer system and establish agreed data base system and output products and format.	RRSF	1st Quarter 2nd Year
Building plans finalized contract let, construction work begins on permanent site.	RCSSMRS	1st Quarter 2nd Year
Photo scientist counterpart training begins.	RCSSMRS/RRSF	1st Quarter 2nd Year.
Course held in Nairobi	RRSF	1st Quarter 2nd Year
Forestry data entered into data base for first group of	RRSF/RCSSMRS	1st Quarter 2nd Year.

on-going user service.

Meeting of Advisory Committee Programme and Budget Review.	RCSSMRS/RRSF/ donor	1st Quarter 2nd Year
Programme of courses agreed and implementation begins.	RRSF/donors	1st Quarter 2nd Year
Forestry project holds first seminar in region.	RRSF/donors/host country	2nd Quarter 2nd Year
Preliminary definition of water resources project begins.	RRSF/RCSSMRS	2nd Quarter 2nd Year
Regional scholarships scheme Reviewed and competition and award schemes announced.	RCSSMRS/Donors/ RRSF	2nd Quarter 2nd Year
Preparation and publication of first series of natural resources maps. Map publication schedule agreed in principle.	RCSSMRS	2nd Quarter 2nd Year and continuation.
Project work defined for forestry and water resources activity for next year of operation.	RRSF/RCSSMRS	2nd Quarter 2nd Year.
Building activity approaches initial completion of outer shell.		3rd Quarter 2nd Year.
Equipping of building begins	RCSSMRS	3rd Quarter 2nd Year.
Specifications of training and user analysis equipment. Purchase procedures initiated.	RCSSMRS/RRSF	3rd Quarter 2nd Year
Course	RRSF	3rd Quarter 2nd Year

Initial meeting of participants in water resources project. Project implementation agreed.	RRSF	3rd Quarter 2nd Year
First Training course for water resources activity	RRSF	4th Quarter 2nd Year
Map production per schedule	RCSSMRS	4th Quarter 2nd Year
Building accepted for use initial movement to new building begins.	RCSSMRS	end 4th Quarter 2nd Year
Forestry data base updating continues. First analysis of results and experimental map of change produced.	RRSF	4th Quarter 2nd Year

Implementation follows as planning meetings direct. Policies of different donors and the rates of progress of natural resources projects will dictate schedule of activity. Overall the above illustration shows possible activity but becomes hypothetical until donor participation and funding levels are known.

END OF PROJECT PERIOD

At the end of the project period, the project should be fully integrated into the national system and completely responsible for ERNY. A field staff should be in place operating a user assistance and training facility. The Facility should have a staff of at least 10 professionals and a support staff of twice that number.

There should be an image library containing pertinent images from the various earth resources satellites including both manned and unmanned operations. Reproductions of these data should be available from a fully equipped photographic laboratory and, if funding is agreed, the whole operation should be contained in a complex of new buildings erected on the building site given to ROSSNER by the Kenya Government.

A computer services activity should provide satellite image data in reprocessed form and should be capable of manipulating images to provide contrast and content well suited to the needs of specialist users. The system should also supply images written on to small format disks for users who have image analysis systems which need these.

Natural resources data should be available in map or map-compatible form from the geocoded data base entered into the computer and forming a Geographic Information System. This data base should be regularly up-dated from various sources including current satellite images, and a series of natural resources maps should be published and available to the region. Staff from ministries of natural resources

...ability...
 ...
 ...
 ... can be of direct relevance to resources management.

If functioning satisfactorily the NRSF should become a major element of RCSSMRE providing maps and satellite image materials to support major natural resources development activity. This activity should include data extraction, national and regional scale summaries in map form and a continuous monitoring of the critical natural resources. This activity should be fully supported by training for the personnel of natural resource ministries and by data supply, and project design advice. In total the results should be a functioning natural resources and environment monitoring unit using satellite data to produce national and regional scale data summaries in map form.