International Science and Technology Institute, Inc.

REGIONAL REMOTE SENSING, WEST AFRICA
PROJECT 698-0420

FINAL EVALUATION REPORT

ANNEXES

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ANNEXES

By:

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September 1986

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ANNEX I

A. General Conclusions

A.1 Introduction

On the basis of personal interviews in 12 CRTO member states the USAID evaluators were able to assess the impact of CRTO (and the USAID investment) on remote sensing technology in West Africa.

CRTO impact was measured at different levels such as; effect of training, effect of photolab at CRTO, the promotional effect of CRTO, the effectiveness of the user assistance program, etc. The parameters which were used are noted in Table A-1 of this annex whereas the results of interviews and responses to questionnaires are summarized in the country annexes below.

In addition to evaluating CRTO impact, the team attempted to focus on the familiarity or use of remote sensing techniques for resources management in the countries visited and to establish where R.S. is being used, how such projects are funded, and what national plans exist for future use of the technology.

The responses are summarized below in succinct form indicated by short descriptives phraseology to emphasize each parameter.

A.2. Evaluation Results

A.2.1 CRTO Training - National Opinion (includes trainees and managers)

- Courses too short
- Too much theory (Francophone)
- Not enough hands-on training
- Photolab training very good but given only in English
- African anglophone course poor to fair
- No imagery
- Too few references (francophone)
- No project related work

TABLE A-1

SCHEMATIC SHOWING ASSESSMENT OF CRTO BY MEMBER COUNTRIES* AND USAID MISSIONS

COUNTRY AND MISSIONS	Training Trainee Response			Photolab	CRTO Outreach	User Assist	National Committee	R.S. Cont.	Use RS	Fami-liar w/R.S.	USAID RS funded Project	Other RS Projects	Support Cont. Interest	CRTO Financially
	AN	F	AF											
MAURITANIA		?		?	G	P	YES	NO	YES	F			YES	
USAID									YES	F	YES	NO	YES	NEVER PAID
SENEGAL		P		G	P	P	YES	YES	YES	G	YES	YES	QUESTION	OWE 85,86
USAID					P	P			YES	G			NO	
GUINEA		G			P	P	YES	NO	YES	F	NO	YES	YES	NEVER PAID
USAID		G			P	P			NO	F			YES	
IVORY COAST		F			P	P	YES	NO	YES	G	NO	YES	QUESTION	OWE 85,86
USAID					P	P			YES	G			—	
CAMBEROON	F	F			G	P	YES	NO	YES	G			YES	OWE 1/2 86
USAID					G	P			NP	G	NO	YES	YES	
CONGO		F			P	P	YES	NO	NO	P	NO	NO	QUESTION	OWE 86
USAID					P	P			NO	P			—	
NIGER		F			G	P	YES	NO	YES	G	YES	YES	YES	OWE 84,85,86
USAID		F			G	G			YES	G			—	
MALI		F			P	P	YES	NO	YES	G	YES	YES	YES	OWE 1/2 85+86
USAID		F			P	P			YES	F			YES	
GHANA	G		P	F	G	G	YES	YES	YES	G	NO	YES	YES	NEVER PAID
USAID					G	G				F			—	
LIBERIA	G		P		P	P	?	YES	YES	P	NO	YES	QUESTION	NEVER PAID
USAID					P	P			NO	P			—	
BURKINA FASO		G		G	G	G	YES	YES	YES	G	YES	YES	YES	OWE 85,86
USAID		G			F	F			NO				YES	

G = Good, F = Fair, P = Poor

* Not included: Benin, Togo, Sierra Leone, Algeria.

AN - Anglophone

F - Francophone

A.2.2 Training - opinions of CRTO instructors

- Trainees often not qualified
- Inadequate materials, texts (especially Francophone)
- Hands-on, project oriented and field training inadequate
- Inadequate image treatment facilities

A.2.3 Training - USAID opinions

- Few comments
- Generally favorable
- Training of limited use to specific projects

A.2.4 Training - opinion of Evaluators

A.2.4.1 Anglophone

- Good applications oriented approach
- Lack of qualifications of trainees
- General high to better than average qualification of instructors
- Inadequate support materials, texts, equipment
- African staff inadequate but improving

A.2.4.2 Francophone

- Poor applications orientation
- Too much theory
- Average to high qualification of instructors
- Inadequate support materials, texts, equipment
- African staff average to good.

A.2.4.3 Photolab training

- Good to excellent in English
- Poor in French
- Average to poorly qualified trainees
- Materials, equipment adequate for training

A.3 CRTO outreach or promotion of Center

A.3.1 By Director of CRTO - Poor to average

A.3.2 By anglophone (staff) - Excellent to very good

A.3.3 By francophone Staff - Poor to average

A.3.4 By trainees and African Staff - Good/very good

A.3.5 By USAID missions/Washington - Poor/average

A.4 User assistance. (Providing imagery and services to member states)

A.4.1 In general very poor. Good to very good for Burkina Faso and international projects in Burkina Faso and fair for Ghana.

A.4.2 By anglophone staff including Chief of Project and photolab Technician, very good for Burkina Faso, and fair in other countries considering constraints imposed by Director.

A.4.3 By francophones - very good for Burkina Faso and international programs in Burkina, limited for others.

A.5 Interest in or familiarity with Remote Sensing in member countries and AID missions.

Familiarity is high or good for all countries except for Mauritania and Guinea where it is fair and Congo and Liberia where it is poor. USAID mission familarity usually mirrors country knowledge.

A.6 Countries having Remote Sensing Projects or Using R.S.

A.6.1 Only the Congo is believed not to have initiated any remote sensing projects.

A.6.2 USAID has funded R.S. projects in 5 countries including, Mauritania, Senegal, Niger, Mali, and Burkina.

A.6.3 Other donors have funded R.S. sensing projects in all countries but Mauritania and the Congo.

A.7 Institutionalization of R.S.

All countries except for Liberia have a national R.S. council or committee. Senegal has a center for remote sensing.

A.8 Remote Sensing needs as expressed by national authorities or ex-CRTO trainees.

A.8.1 Need receiving station: Senegal, Ivory Coast, Cameroon, Niger, Burkina Faso

A.8.2 Need national center or expanded center all with exception of Burkina.

A.8.3 Need imagery
All countries

A.8.4 Need training (all levels)
All countries

A.8.5 Need donor funded projects
All countries

A.9 Continued support of CRTO and actual financial support.

A.9.1 Senegal, Ivory Coast, Congo, Liberia question further support of CRTO, all others support CRTO activities.

A.9.2 Of the countries visited Mauritania, Guinea, Ghana, Liberia have never paid dues.

B. Francophone Country Visits

1. FRENCH MINISTRY OF COOPERATION

1. Introduction

This visit was conducted on July 2nd to establish contact and coordinate with the French Ministry of Cooperation and to evaluate the future role of USAID in relation to past and future plans of the French government.

2. Visits

2.1 A visit was made to Mr. Bied-Charreton at the French Ministry of Foreign Affairs, 20 Rue Monsieur, Paris.

- French are reviewing the receiving station for CRTO, if implemented this reduced radius station would provide 1 500 images per year for 3 years plus technical assistance or +/- 30,000,000 FF.
- The French are waiting for the West African Remote Sensing USAID evaluation, and other donor reactions to Dr. Okio's Phase II CRTO proposal. They are waiting for U.S. opinion and are going to conduct their own evaluation.
- French opinion on Okio is still not very positive but improved.
- The French support Agrhymet in Niamey and will put in AVHRR station. Want to provide 10 day normalized vegetation index maps of CILSS countries. They will also send two people to Niamey. They believe infrastructure in Niamey to be good.
- The 1985 budget for CRTO was 2,000,000 FF does not include 1,000,000 FF for Pericolor system.
- Sent new car to Center 1985.
- Sent money (1985) for training of African expert in operation and repair of electronic equipment.
- Sent money for training other technician and specialists in France but Okio not sending them (photolab technician is example).
- 1986 Budget will be 2,500,000 FF with 1,250,000 FF for SPOT

- This budget will go on until 1989 (2.5 million and four experts, 2 senior, 2 junior) unless SPOT station is built.
- French also supporting center through (EEC/ITC) which will provide CRTO with 600,000-700,000 FF for image purchase, documentation/ archiving system, analysis of aerial coverage etc.
- The Spot antenna will be 7.8 meter(i.e., reduced coverage).
- Expect to do pretreatment of Spot data which will provide CCT's and film transparency.
- Photo enlargements, enhancements, corrections are not being considered and if TM is needed U.S. will have to add $ investment.
- French are looking forward to continued U.S. participation at CRTO and the continued contribution of USAID to related projects.
- Hope USAID will fund integrated remote sensing projects.
- Hope USAID will continue to support training at CRTO as well as local staff.
- Local operating budget will be negative. The French hope USAID can kick in on some of this, including electricity, telex, cars, gasoline, office supplies etc.
- The French wish to know if USA thinking about TM reception for Ouagadougou?
- The French expect to let Africans do most of training soon.
- The French are presently funding CRTO to pay for Mr. Sow and Mr. Camara salaries. (Mr. Camara has not been paid for 4 months due to misunderstanding with Director.)

3. <u>Conclusions</u>

- The French have a commitment to CRTO until 1989 for training.
- SPOT station is not definite.
- The French are waiting for U.S. to move.
- The French are waiting for a copy of our evaluation.
- The French would be happy to cooperate with U.S. or other donors for better operation.
- They seem to be more interested in supporting Agrhymet than CRTO.

- Total estimated French investment in RS in all North Africa (includes SPOT imagery and work in France) is 15,000,000 FF per year +/- $2,000,000. (Based on available documents).
- Limited SPOT reception makes location of Reception Station at Ouagadougou less logical in view of Mas Palomas, Fuccino coverage.

2. MAURITANIA

1. Introduction

A visit to Mauritania was undertaken to evaluate CRTO project effect from July 4th to July 9th. During this period a number of individuals were seen but USAID had difficulty in reaching some ministries because of short time frame prior to arrival of evaluator. Nevertheless the Mission was extremely helpful in establishing contacts. Special thanks are due to Assistant Programme Officer [illegible] Camara.

2. Visits

2.1 National Visits

- Mr. Kamal Sheikhouna, Director General, OMRG
- Mr. Diabira Fousseynou, Technical Director OMRG.
- Mr. Mamadou Sarr, Head of Mauritanian RS Committee, Director Dept. of Topography and Cartography, Ministry of Equipment and Transportation.
- Mr. Almany Samba Boly, Dir des Etudes Economiques et de la Règlementation, Ministère de la Pêche.

2.2 USAID Visits

- Mr. George Eaton, Director
- Walter Boehm, Assist Dir
- Nancy Camara, Assistant Program Officer
- Bill Jones, PDO,
- Joe Giordiano, PDO
- Ken Rikard, ENG
- Richard Hough, FFP,
- Charles Habis, HLTH
- Ian J Sliney, FEWS
- Andrew Gilboy, HRD,
- Cheikh Moussa Camara, HRD

BEST AVAILABLE

3. Interviews

3.1 National

- Kamal Sheikhouna, Dir Gen OMRG and Diabira Fousseynou, Techn Dir OMRG. Meeting with the Dir Gen and discussion of general problems with him, they have become very interested in RS and made request to USAID for $40 000. Want to know what happened to their request. Evaluator explained that he didn't know but would find out. Also advised that USAID does not particularly favor geologic projects. Suggested integrated approach with agriculture or hydrology included. Mr. Fousseynou would like to send 6 trainees to CRTO but has been turned down, Dr. Okio told him can only send two. They need to train some geologists to integrate large amount of data existing in Mauritania. This group has new offices and is very keen but doesn't know where to turn. They were much pleased by K. Ebtehadj sensitization mission. Mauritanian gov officials know little about RS and are unaware of methods. Evaluator showed them Senegalese maps and explained methodology. They believe that Mauritania has potential for Lead, Zinc, Copper, Gold and would like to use RS to synthesize data and create new exploration models.
- Mr. Mamadou Sarr, Dir Dept. Topography and Cartography, Head of Mauritanian Remote Sensing Committee. Mr. Sarr explained that no one has followed RS in Mauritania, but a RS committee has been formed, though it has been inactive because it has had 4 ministers at head. Has tried to get all services together for joint efforts; wrote to CRTO to get assistance to form national RS center, waiting for answer; there is very poor coordination among agencies in Mauritania, need centralized activities. They have over 1,000,000 km2, any other kind of mapping would produce redundancy. Evaluator showed Senegal maps and explained how it was done etc. Sarr claims government really

interested in national center. Believes GOM must support CRTO. He believes such a center must provide assistance to users and continue training, he believes beginners courses at CRTO should be more than 3 months, advanced courses more than 12 months; he doesn't believe training outside of Africa is really necessary. His gov. will support CRTO financially and will send more trainees.

- Almany Samba Boly, Chef des Etudes Economiques, Ministère de la Pêche. This ministry is extremely important to the Mauritanian economy and this gentleman as well as others is looking for means of surveillance of their coast to control fishing which is now being exaggerated, by Soviet, Portugese and South Korean fishing boats. Is also interested in upwelling currents, their position and movement.

3.2 USAID Visits

BEST AVAILABLE

- N. Camara. Briefed the evaluator on visit by CRTO representative K. Ebtehadj and set up appointments in GOM, advised evaluator of recent visits to mission of W. Greenwood of Office of International Geology USGS who is attempting to locate phosphate and peat resources. Discussed budget cut-backs at mission etc. Evaluator explained reasons for evaluation.
- W. Boehm, Programs and Assist Director USAID. Described mission interest in RS, described recent visits of Tom Waltz NOAA/PASA who provided data on NOAA coastal zone scanning system, which can follow movement of coastal currents; discussed DOD visit to consider GOM request to conduct coastal water surveillance. Feels GOM must get more training in fisheries methodology of RS. Described other national resources activities of GOM.
- Andrew Gilboy, HRD, discussed training in remote sensing of intended GOM applicants. This includes a Mr. Thiam who has completed a PhD in remote sensing at the Univ of Dakar but wants to go USA for hands on training. Evaluator gave mission names of various appropriate institutes in USA. Advised evaluator of agrometeorologists from GOM trained in RS at Cornell sent by USAID.

- Ian Sliney, FEWS. Discussed FEWS at length and reviewed FEWS data collection format and objectives. Decided need more reliable agricultural production data which RS surveys can supply.
- G. Eaton and W. Boehm, Dir and Asst Dir. Discussed RS/CRTO/Mission constraints and interest in RS. Evaluator explained potential of RS for integrated resource evaluation offered to give slide show.
- Evaluator gave talk/slide show to round table with 12 USAID attendees to discuss methodology in RS projects, application to food security and early warning, discussed RS project description of Senegal and potential for integrated resource development projects. Very good response from all especially Rikard, USAID engineer who has specific uses and background in RS.

4. Conclusions

- Mauritanian interest in RS very high.
- GOM especially needs fisheries surveillance.
- Mauritania wants to send 6 trainees to CRTO.
- Okio turned down 4 accepted 2.
- USAID very interested (most receptive Mission in West Africa.)
- Mauritanian have made request for $40,000 to USAID for R.S. assistance.
- GOM will develop its own center. (Have requested technical assistance from CRTO and funds from USAID mission)
- Will try to conduct integrated survey under one roof.
- GOM is particularly interested in fisheries surveillance and mineral and water exploration.

3. SENEGAL

1. Introduction

Due to airline reservation problems the trip to Senegal was curtailed by one day from July 11 to July 13th.

2. Visits

2.1 National Visits (CRTO TRAINEE *)

- Dr. Mamadou Sall, Geography Dept, University of Dakar, National Remote Sensing Center.
- Mr. Paul Ndiaye, Geography Dept., University of Dakar, National Remote Sensing Center.
- Dr. Salif Diop, Geography Depart, University of Dakar, National Remote Sensing Center.
- Dr. Leborgne, Geography Depart. University of Dakar, National Remote Sensing Center.
- Dr. Guy Mainet, Geography Department, University of Dakar, National Remote Sensing Center.
- Mr. Souleymane Niane, Chef Commitè National de Tèlèdètection, Bureau Organisation et Mèthode, Prèsidence de la Rèpublique.
- Mr. Mandione Gueye, Conseiller Technique, Sec. d'Etat á la Dècentralisation.
- Mr. Khaly Sow* - Photholab Technician, U. of Dakar

2.2 USAID Visits

- Mrs. S.J. Littlefield, Director
- Mrs. C. Tyson, Deputy Director
- Mr. R. Harvey, Acting ADO.

3. Interviews

3.1 National Interviews (CRTO Trainee *)

- University of Dakar, Remote Sensing Center, 5 prof and 1 technician were interviewed in a round table format as well as individually in some cases. Their conclusions are:

- The CAT+ is a body which does not function, they believe that if CAT exists it should be headed by a West African.
- Ouagadougou has not had much impact.
- Donors have not "pushed" enough for effective management at CRTO.
- CRTO has not promoted remote sensing they have not sent out RS materials.
- They (CRTO) have not responded to objectives.
- The Presidency (Senegal) approved a visit to CRTO for purposes of planning National Center but received no response from Okio. After second letter finally received a response from Thombiano.
- Since 1978 Senegal has trained minimum 200 people in basics of remote sensing of which at least 90 have bachelors level or higher degrees in geography with minor in remote sensing. Senegal has conducted or is conducting numerous remote sensing projects (USAID, University of Dakar, FAO, ORSTOM, UNDP, etc.), which have mapped extent of mangroves, vegetation in Ferlo, etc.

  The question is! has CRTO done anything comparable with greater resources?
- CRTO training could be done in individual countries with visiting teams.
- Okio of CRTO comes often to Dakar. But doesn't discuss business.
- There has never been a request to U. of Dakar or Senegal to <u>teach</u> at CRTO.

- Paul Ndiaye, Prof at Geo. Dept added that he believes remote sensing has been very useful to Senegal, is in widespread use; he has conducted and managed RS surveys and believes GOS should and will develop own RS capability, nevertheless believes a Regional Center should be supported, does not believe CRTO has been useful, believes additional RS training should be given to Senegalese outside Africa.

+ Centre Africain de Teledeteetion (in Bamako)

- Mr. Leborgne visiting prof of geography believes Senegal has capability in remote sensing, that it has been useful, believes Senegal has its own center at U of Dakar, believes regional center must be supported by Senegal, believes a regional resource data collection center should exist, believes CRTO should have 3 months basic training courses with 6 months advanced courses, believes Senegalese gov. will send more students but not sure they will pay bills.
- Mr. Khaly Sow*, Photo technician at U of Dakar Geography Dept, Remote Sensing Center. Mr. Sow was trained at CRTO for 10 months period, his funding came from FAC, he published a paper at CRTO titled, "Photography Applied to Remote Sensing", Oct 1985; he is presently working at Geog. Dept, but has no photo lab so he is photo librarian/draftsman feels 10 months training is very short, training was by Sorenson at CRTO and was thought to be good, feels he could map Senegal resources with training he has acquired at University, believes that CRTO training has been useful for other CRTO trained Senegalese personnel.
- Mr. Souleyman Niane, Committee for development of RS in Senegal, Technical Advisor to Presidency of Senegal, Bureau Organisation et Mèthode. Mr. Niane is the author of Oct 1985 Confidential report on the creation of a Senegalese National Remote Sensing Center. This report consist of an evaluation of RS in Senegal and West Africa including Ouagadougou. Exerpts from report.

I. That a national center be created only if it is self supporting.

II. Such a center can only expect low level financing and maintain reccurent costs at low level while producing good results.

III. Short term goals do not include a reception station.

IV. The national center will have to help revivify the CRTO and help it fulfill regional goal.

V. The national center must serve all national users.

VI. The national center will be created at the Dept of Geograph at the University of Dakar.

VII. The national Oceanographic Remote Sensing activities will be placed under the aegis of the National Center for RS.

VIII. Certain equipment available for photo lab work will be made available to the national center.

IX. The national center will be under the joint control of the Ministry of Higher Education, and the Sec. d'Etat á la Recherche Scientifique.

X. An organizational chart has been development (in report) and will be followed by the center.

XI. The national center will use the personnel from the geography Dept until an evaluation of its needs have been made.

XII. An ad hoc technical committee will resolve problems of budget financing etc. and will consist of the BOM, SERST and CNDT.

Mr. Niane stated that the creation of RS center for Senegal was a national priority. Mr. Niane and Prof Sall will go to CRTO in Sept to evaluate center.

- Mr. Mandione Gueye, Conseiller Technique, Sec. d'Etat á la Dècentralisation. Mr. Gueye is on Remote Sensing Committee of Senegal, his ministry received results of USAID RS mapping project in Senegal. He sees RS as vital to development of Senegal. He requested funds for two projects in Remote Sensing: (1) Agricultural Inventory Pilot Project using Thematic Mapper; (2) Development of a G.I.S. for Senegalese Resource evaluation using RS data as base.

3.2 USAID Visits

- Mrs. S.J. Littlefied, Director. Discussed CRTO with Mrs. Littlefield. Her opinion is that regional projects have not worked and have wasted money. Comment made was "If in fact 8,000,000 was spent to train +/- 200 people then the results are not very useful". However, she does believe RS is very useful.

- Mrs. Carol Tyson, Deputy Director. Discussed general potential of RS for which she has high regard and intends to apply it in USAID projects whenever appropriate.

- Mr. Ron Harvey, ADO, Project Manager of RS project funded by AID to map resources of Senegal. Believes RS has been useful, would use more such surveys, does not personaly know CRTO trainees in Senegal, needs maps at 1:200,000 maps or better, has 1:500,000 maps, would support CRTO if trainees could produce such, not sure remote sensing training is better in USA, believes CRTO introductory remote sensing should be one month and long term should be 6 months. Beliveves trainees from CRTO are not adequately trained except to perform basic remote sensing work.

4. Conclusions

- Senegal is ahead of all West African countries in Remote Sensing.
- Partly due to USAID investment.
- At least 5 and probably 10 RS projects have or are being conducted.
- Entire country has been mapped using RS at 1:500 000 for geology, hydrology, land use, vegetation, soils etc.
- The government is intent on creating a center at the University of Dakar.
- Over 50 Senegalese are capable of mapping from RS imagery.
- Over 5 Senegalese have PhD or equivalent training or experiences in RS projects.
- At least 3 Senegalese have project management and budgetary ability.
- Senegal has basic RS equipment.
- Senegal has about 10 CRTO trained scientists all but 2 of whom have had additional training in RS.
- CRTO is considered as useful if Senegal can help it redefine its course.
- CRTO is management defficient.
- CRTO has not met its goals
- CRTO Francophone training is poor to adequate; photo lab is good.
- CRTO has never disseminated data.
- CRTO has not invited Senegalese to teach at Ouaga.
- CAT is considered useless.
- USAID believes CRTO like other regional organizations of little use.
- USAID believes RS has been useful to Senegal.

4. GUINEA

1. Introduction

The visit to a Guine occured between July 14-15th, 1986. Because of the short time involved it was difficult to see many people. Nevertheless Mr. R. Hellyer of the USAID Mission was extremely efficient in arranging for the maximum number of meetings.

2. Visits

2.1 National (CRTO Trainees *)

- Mr. Amadou Kantè - Directeur IGN
- Mr. Djiba Kourouma - Ing. Geodesien, IGN
- Mr. Amadou Tidiane Traorè - Sec. d'Etat à la Recherche Scientifique
- Dr. Kaba, Dir General, Recherche Scientifique et Enseignement Supèrieur.
- Mr. Soumah Fodè - Director Recherche Scientifique.
- Mamadi Camara - Cenasol
- Sandaly Camara - Ing. Cartographique, Travaux Publiques
- Prof Abdoul Goudousi Diallo - Geo Dept University of Guinea.
- Traorè Fodè Laye* - Recherche Scientifique
- Amadou Lamarana Diallo* - Geophysicien, Direction Recherche Scientifique.

2.2 USAID

- Bob Hellyer - ADO/USAID
- Mr. Diarra - Assistant to ADO - Ex Directeur du Cabinet, Secretariat d'Etat Decentralization.
- Mamadi Kaba and Elie Sandy, Project FARANA/USAID

3. Interviews

3.1 Government of Guinea Response

- Mr. Amadou Kantè, Directeur IGN. Mr. Kantè and Kourouma showed a lot of interest but explained that no structure exists as yet to head up RS. No building and no funds are available. Mr. Kantè office was filled with thousands of copies of 1:50000 photomosaics of Guinea produced by the Japanese. These would serve as perfect complement to Landsat imagery. Evaluator showed Senegalese USAID results. This office was in charge of RS in Guinea but desn't seem to be very effective. GOG has proposed merging CRTO/CAT/AAC+. Cannot afford to support them all.
- Mr. Soumah, Director, Direction de la Recherche Scientifique. Is now in charge of Remote Sensing in Guinea and relations with CRTO. Soumah stated that Guinea has sent 11 trainees to Ouaga and one is there now. Believes Remote Sensing very important.
- F.L. Traore* and A.L. Diallo* two CRT^ extrainees presented the government with two RS projects for which funds are now being sought. Diallo spent 6 months at CRTO, is a hydrologist, believes his training was good, too short, teachers were sometimes not effective, all levels of training should be long; believes they should have national center; he believes RS is being used by FAO in Guinea, would like to use RS.
- Mr. Traorè* was at CRTO for 6 months sponsored by the French Govt. (GDTA), is a forestry expert, feels training was good but too short, his training was francophone and believes specialized course should be 9 months and additional field work should be involved; doesn't believe he can map resources after this small amount of training, would like to have maps of Guinea at 1:500,000 and is ready to work on such maps.

+ African Association of Cartography

- Prof Abdoul Goudousi Diallo is from the Geography Dept at the Univ of Guinea, he is probably the most knowledgeable in RS and has already had RS seminar in Guinea 1977 given by FAO also 1981 CNES/IGN/Dept. He is somewhat weak compared to others and would have hard time wresting control of RS. Believes RS courses at CRTO should be longer, total 15 months. Got guick look pictures from CRTO.
- Amadou Tidiane Traorè, Sec d'Etat á la Recherche Scientifique et l'Enseignement Supèrieur. Discussed Remote Sensing with this gentleman who spoke of problems in Guinea. Evaluator described role of CRTO. Mr. Traorè said Guinea needs national center. Evaluator described what national center could be like, what it would need in equipment etc. and that it should act as a distribution center (sales) for existing maps and a clearing house and executing agency for mapping jobs in the country. Evaluator showed USAID Senegalese maps to Mr. Traorè, Mr. Soumah and others all agreed these were the kinds of maps Guinea need.
- Dr. Kaba, only met Dr. Kaba and explained role of evaluation of CRTO.
- Mr. Mamadi Camara - CENASOL. Visited centre to verify soils mapping by Landsat funded by FAO. Saw very poor quality black and white Landsat from early 70's in terrible condition and no longer usable.
- Mr. Djiba Kourouma and Mr. Sandaly Camara, from IGN and Travaux Publics advised that a <u>private</u> corporation, Association de Recherches Scientifiques de Formation et de Dèveloppement (ARESFOD) had just been formed and that they would like to run a center for sales and production of resources maps and RS products. These gentlemen advised me that Mr. Alphamadi Soumah, director of Hydro-Carbure is the president of ARESFOD. In view of the state of government agencies it seemed to them that ARESFOD could better handle contacts with CRTO and other pertinent agencies.

3.2 USAID Interviews

- Robert Hellyer, Lengthy meetings with Mr. Hellyer regarding potential of RS, he would support training at CRTO but would like to see National center.
- Mr. Diarra discussed methods of introducing remote sensing in Guinea. Mr. Diarra felt private enterprise would be more effective. Both the above gentlemen believe RS holds a great deal of promise for Guinea because of the lamentable state of maps and resource information. Both believe that a resource information mapping center; selling maps, photos, images and services would be ideal for Guinea.
- Mr. Kaba and Mr. Landy are both working on Faranah Ag. USAID project and are well aware of uses of remote sensing in such projects. They are using aerial photos.

4. Summary and Conclusions

- Guinea well aware of remote sensing potential
- Trainees from CRTO happy about training
- Guinea wants own center for developing resource maps as quickly as possible.
- RS committee exists in Ministry of Scientific Research
- 4 or 5 competent people are involved in RS in Guinea
- Enthusiasm is very high
- USAID supports CRTO training and believes clean well prepared project in RS would do very well in Guinea
- USAID interested in RS center and would like maps such as Senegal USAID project.

5. IVORY COAST

1. Introduction

The Ivory Coast was visited from the 17th to the 23rd of July. Discussions were restricted in view of USAIDs limited role in the Ivory Coast. A round table was arranged with officials of GOIC by REDSO scientific advisor. Special thanks are due to Jeff Goodsen for his assistance.

2. Visits

2.1 National

- Mr. Mamadou Fofana, Dir Inst. Ecologie Tropicale (IET), Ministère de la Recherche Scientifique.
- Mr. Yaya Sangaré, Dir General Inst. Ecologie Tropicale.
- Mr. Kone, Institut National Géographique, in charge of Remote Sensing.
- Sadané Issiaka, IET

2.2 U.S.A.I.D., Others

- Jeff Goodsen, USAID/REDSO, Science Advisor.
- Jim Washington, USAID/REDSO, Training
- Laurence Bond, USAID/REDSO, Director
- Mr. Van Troye, DCGT, Direction des Grands Travaux (computer science)

3. Interviews

3.1 Government Response

- Round table with above noted nationals plus Van Troye and Mr. Goodson, USAID.

- Mr. Fofana spoke first and described how Ivory Coast has become very interested in RS, has formed RS committee and made recommendations. Mr. Fofana passed word to Mr. Kone.

- Mr. Kone stated the following with regard to remote sensing and CRTO.

  . First we received bills from CRTO; then from CAT; we don't know whom to pay
  . RS in Ivory Coast began confusedly four different groups were involved;
  . Never received documentation from CRTO or Conseil Africain de Télétédection;
  . Okio visited at IC request but had no documents about CRTO;
  . Asked Okio to send original documents on CRTO, has never sent them or anything else;
  . French (Mr. Montroi) came 18 months ago and asked what relations were with CRTO and CAT;
  . Montroi said he would act as intermediary and contact Okio and CAT. No answer in 18 months;
  . Interest in RS in IC required decision;
  . Request from minister to make RS work in IC;
  . Recommended IC pull out of CRTO and CAT;
  . Minister disagreed did not want IC isolated;
  . Minister suggested they pay fees;
  . Minister told him to review and make proposal re. CRTO and group is now working on this);
  . There is the problem of the 3 organisms all asking for money Assoc. Africanies de Catographics, CAT and CRTO;
  . CAT asked 15,000,000 CFA;
  . Very little has come of membership;
  . His main interest at IGN is to bring 1:200 000 maps up to date.

- Fofana spoke again and spoke of difference between admin and technical problems.

  . Reminded audience of CAT/CRTO problems including the fact that IC has paid CFA 112,000,000 to CRTO and additional money to CAT. He asked the question "based on above investment; what do we get?"

- Most IC experts have not been trained at CRTO
- There is no feedback from CRTO;
- Recommended to Ministry of Foreign Affairs that IC pull out of CRTO;
- Minister shocked, says I.C. should stay and should pay,
- CRTO is a suborganism of the CAT, if so I.C. should pay CAT;
- Okio came and got money;
- Two weeks later Buhendwa came for his money;
- Technical problems are many including: Undergraduate program (introductory) courses at CRTO are useless because they bombard everyone with theoretical stuff;
- CRTO proposed someone from IC to go to France without asking advice of Ivory Coast;
- CRTO (Okio) has never visited IC on a technical mission;
- During the time of Ouedraogo, he used to be invited for two days and discussed technical matters;
- Countries must cooperate better on Remote Sensing matters;
- IC is attempting to resolve issues within national commission on remote sensing;
- Ivory Coast will have RS seminars soon;
- Why hasn't USAID checked on CRTO operations?

- Van Troy

  - For technical purposes for environmental monitoring they want station in Ivory Coast (Spot);
  - CRTO training is OK according to him;
  - A station must be placed in West Africa because of the limited recorder ability onboard spacecraft;
  - Ouaga is better, more practical, place for station (SPOT);
  - Problem with EOSAT as data source.

- Van Troy added further that he believes GOIC has capability and wants to develop a national remote sensing center but believes regional center could serve as collection center for transmittal of bulk data, believes CRTO should organize training in other countries, basic course of 1 month and advance courses should be in Europe or USA. Does not believe GOIC will send anymore trainees to CRTO or support the center financially.
- Mr. Fofana also added that he felt strongly that RS could help in development in Ivory Coast but has not yet done so, he has directed RS project and believes his government will develop a national center, believes four national groups have ability to set up such a center, he does not believe CRTO has been useful for Ivory Coast, believes CRTC has not conducted training effectively, and has not coordinated RS research and development projects. Believes a center for data collection could be useful for inventories and facilitating the acquisitions of materials and funds. Believes CRTO should organize training programs in Ivory Coast and further studies should be done in USA or Europe, does not believe CRTO trainees are capable of conducting own RS project, he isn't sure the GOIC will send any more trainees, and believes financial support will only occur if there is good regional coordination.
- Sadani Issiaka, Scientist at I.E.T. believes RS is good for development of IC, doesn't believe it is being used efficiently yet, has never been involved in directing or working in RS projects, believes GOIC will develop own RS capability but is not ready yet, he believes courses should be 3 months for introduction and 12 months specialized, and that trainees should have additional training in US, etc. He doesn't believe trainees are ready to run projects, believes GOIC will send more people to CRTO and support center if conditions improve.

3.2 USAID Response

- Jeff Goodsen, Scientific Affair Officer REDSO, Evaluation Project Control Officer. Mr. Goodsen discussed RS problems in general as they affect region, he is aware of individuals trained at CRTO whom he has seen in various countries who are either working on or would like to work on RS; particularly in Cotonou and Freetown. He mentioned lack of available imagery from CRTO, cannot get cost estimates from Ouagadougou for imagery. With regard to Ivory Coast, REDSO can't do much because of lack of bilateral agreement between USAID/GOIC, but interest in Ivory Coast very high, USAID will fund through special training funds a 2 months course for Ivorian in USA. Mentioned Prof. Fofana at Inst of Tropical Ecology in Abidjan who is forceful RS promoter and user but unhappy with CRTO because of lack of contact and will not send trainees to CRTO. Mentioned FAO funded GOIC project which wants TM imagery of IC but months of discussing with EOSAT/ERIM (IQC) has yet to provide imagery, said GOIC wants to set up own RS center and will have symposium on RS this year or next. He personally is conducting a RS analysis of deforestation in Liberia which could use better data (TM) but it is not available. He believes RS very useful in various projects, believes CRTO training useful, believes advanced/specialized training could be better accomplished in US, believes CRTO should have 3 months intro. course, with advanced courses having different length depending on need, is not sure of effectiveness of CRTO training, doubts ability of CRTO trainees to initiate and follow up on RS projects. Cited lack of donor coordination.
- Jim Washington, Regional Training Office, REDSO. Discussed CRTO/RS training and advised that GOIC has been granted AMDP grant for U.S. training. A RS trainee will be sent with these funds +/- $15,000 to U.S. Discussed effort to have AID MIssions include funding for RS training at CRTO in all pertinent projects. Is conscious of RS potential

and arranged with Goodsen for evaluators presentation of RS slide show to describe to REDSO staff potential of RS for regional and national development.

- Meeting with Laurence Bond, REDSO Director. Discussed purpose of evaluation and arranged for USAID/REDSO remote sensing slide show and discussion.
- Meeting with REDSO Staff, attendees included:

  . L. Bond
  . G. Macarthur
  . J. Babylon
  . J. Holfeld, PDO
  . J. Washington, HRD
  . B. Dodson, FFP
  . D. McLean, ADO
  . J. Goodsen, STO

Evaluator described CRTO role and RS as means of evaluating national and regional resources, described methodology for RS data collection used Senegal as exemple. Question and answer period; discussed potential and limitations of RS, CRTO, Agrhymet other regional projects, food security, geographic information systems and need for donor coordination.

4. <u>Summary and Conclusions</u>

- High level of interest in I. Coast.
- National Committee wants to start national center.
- National Committee to put on RS symposium.
- Few CRTO trainees working in RS in Ivory Coast.
- Few or no contacts with CRTO.
- No feedback from CRTO.
- Very little has come of membership in CRTO.
- Imagery not available from CRTO.
- Requested but never received CRTO documentation,
- Requested I.C. pull out of CRTO but request denied by Minister.

- Too much money requested by counterpart organisms CAT, CRTO, AAC.
- Courses at CRTO are useless - too much theory.
- No coordination with member states.
- Lack of receiving station/data.(no imagery)
- CRTO should organize better basic courses.
- GOIC feels RS could be excellent for development of Ivory Coast.
- Present study of brush fires being conducted by GOIC.
- Other ecological projects being prepared (FAO).
- Trainee to be sent to USA by USAID.
- Non availability of USAID to participate in Ivory Coast activities due to lack of bi-lateral programs.

6. CAMEROON

1. Introduction

Cameroon was visited during the period 19-23 July 1986. Although the results were generally useful a number of individuals could not be seen due to holiday schedules and national budget hearings

2. Visits

2.1 National (* CRTO Trainees)

- Mr. Akem Benedict Fultang, Director Adjoint Centre National de Dèveloppement des Forêts (CENADEFOR).
- Mr. Salomon gwei, Secretary of State for Agriculture.
- Mr. Ndzi Edward Shei, Deputy Director, Dept of Mines and Geology, Ministry of Mine and Power.
- Mr. Samuels Nchamukong, Director National Geographie Center.
- His Excellency Hamadjoda Adjouni, Minister of Livestock, Fisheries and Animal Industries.
- Mr. Martin Eben*, Senior Geologist, Dept of Mines, Ministry of Mines and Power.
- Mr. Mei Pen*, Technicien, CENADEFOR.

2.2 USAID

- Ms. Mosina Jordan, Acting Director,
- Mr. N. Osen, Program Officer
- Mr. Sam Scott, SPDO
- Mr. John Balis, ADO

3. Interviews (*CRTO Trainees)

3.1 National

- Mr. Fultang of CENADEFOR discussed problems at CRTO, doesn't feel CRTO has trained enough people, feels there is management problem, said "I guess the U.S. has not seen the

impact".... feels thatCameroon have some advantage because they have trained a few people; told me that UNDP had sent French RS expert to Cameroons who mapped forestry degradation using 1976-78 imagery, told me they have colour additive viewer from Carl Zeiss but no imagery. He said he sent two telextelex messages to Okio in Feb 1986 to order imagery (he showed both messages) and never got an answer, he then got in touch with Embassy (US) in Yaounde which cabled AID mission Ouagadougou, sent last telex 3 days before interview July 16th, still no answer. This material was ordered to provide means to lay out aerial photo project of all S.E. Cameroon. CENADEFOR has sent two trainees to CRTO from the service Photo/Carto, Mr. Ewane and Mr. Mei Pen. He believes very strongly that RS can be useful to Cameroon and is using it. The country is planning a national center but doesn't know yet where to put it (what ministry). They have requested CRTO help on this. Believes that GOC should support regional center, and believes the center should have a data treatment and dissemination function. Mr. Fultang is a forester who believes CRTO introductory courses in RS should be of 6 months and advanced courses 12 months. He does not believe it is necessary to go out of Africa for additional training. GOC will send additional trainees to CRTO.

- Mr. Gwei, Secretary of State for Agriculture stated very general views about the potential for RS. He expressed his opinion concerning the application of remote sensing to land use inventories and asked numerous questions about remote sensing. Mr. Balis of USAID and evaluator answered these questions and showed Senegalese Remote Sensing maps to Sec of State who whould like similar products. Discussed new ag. incentives in Cameroon and need for updating land use and new areas being developed. Very excited by RS demonstration he saw in Addis Abbeba put on by Hunting Geophysic.

- Mr. Shei Ndzi, Dept of Mines and Geology Deputy Director. Mr. Ndzi somewhat amazed about CAT and CRTO each demanding money. Believes moneys should be paid to CAT which would distribute them to CRTO; Wants to have RS in Ministry of Mines. Believes RS very helpful. Believes a number of people are well trained but need equipment; Mr. Ndzi has a masters degree in geology he believes total length of courses at CRTO should be 9 months with 3 months basic, he definitely believes GOC will send people to CRTO in future.
- Mr. Nchamkong, Director, Nat. Geographic Center. Claims USAID had remote sensing projects in Cameroon in 1975, feels RS is good but must not be allowed to be done without correct mapping standards, believes RS should be in his shop.
- Mr. Hamadjoda Adjouji, Minister of Livestock, Fisheries. The Minister had not been advised of meeting by his secretary so was not prepared. Evaluator discussed RS and showed Senegalese products. Reaction was positive.
- Mr. Martin Eben*, Senior geologist, special assistant to Minister of Mines preparing to go to round table meeting at CRTO. Mr Eben was trained for 4 months at CRTO (funded by USAID), his training was Anglophone and he feels it was good but believes training should be longer, that specialized courses should go on 6-9 months, would like to do project/field work with RS experts, would like to have national center in Cameroon, cannot now interpret imagery well enough to map resources, and is not using RS techniques now. Would like to see Cameroon mapped like Senegal.
- Mr. Mei Pen*, Technician CENADEFOR, Service Photo/Carto was at CRTO seven months for elementary and specialized course. CRTO paid for his studies. He worked in FAO/PNUD vegetation mapping project of South Cameroon using 1976 Lansdat images; he feels his training is good. He had Francophone training and considers the way it was taught "very elementary", feels courses should be longer, at least six months each for advanced and elementary, could like to have more hands-on training.

3.2 USAID Interviews (this was round table talk during which we discussed agricultural of inventories - GIS, etc.)

- Mosina Jordan, Acting Director. Very enthusiastic about RS and Koshrow Ebtehadj CRTO visit very much appreciated by AID and GOC. Mrs. Jordan advised "we want RS to continue and we want this ability in our program. We would like to have a regional training center here." Ms. Jordan also evoked interest of Mission Director J.Johnson who was absent.
- John Balis-ADO, familiar with RS projects for Africa development described possibilities for agriculture inventories, G.I.S. applications and potential for arid lands inventories etc.
- Mr. Olsen and S. Scott asked numerous questions about inventories and other agricultural applications.

4. Summary and Conclusions

- GOC Believes CRTO is useful.
- CRTO training too short.
- CRTO training not hands on
- No imagery available
- No services available
- Requests never answered.
- Poor management at CRTO
- Need national center
- GOC very aware of potential of RS.
- USAID very aware and interested in RS.

7. CONGO

1. Introduction

The Congo was visited between 23-26 July. The USAID representative was met and 3 organizations visited. Problems were caused by the simultaneous visit of D.Thornburg, Governor of Pennsylvania.

2. Visits

2.1 National

- Mr. Louis Soussa, Directeur de Cabinet, Ministre des Mines et de l'Energie.
- Mr. Jonas Kivika, Directeur du Cabinet, Ministère de la Recherche Scientifique.
- Dr. Jacob Mollet, Conseiller á l'information Scientifique et Technique Ministère de la Recherche Scientifique.
- Dr. Marcial Bizenga, Directeur du CERGEC - Centre de Recherche Gèographique et de Production Cartographique.

2.2 U.S.A.I.D., Others

- Christy Collins, USAID representative, Congo
- His Excellency, Ambassador Lukens, U.S. Ambassador
- His Excellency, Dick Thornburg, Governor of Pennsylvania.

3. Interviews

3.1 Government Response, Administrators:

- Soussa of Mines and Energy did not know about or wish to discuss remote sensing; he provided names of individual at Ministry of Scientific Research including:

  . Dr. Dia Mouagana, Director General of Scientific Research

  . Mr. Marcial Bizenga, Director of CERGEC

- Mr. J. Kivika of Scientific Research advised that Dr. Mouagana who is in charge of remote sensing was with Minister up country. Advised me of Congolese keen interest in remote sensing, of structures existing to develop RS at CERGEC, of people involved, of Congolese continued support of CAT and CRTO, of probable participation of Congo in Central African Remote Sensing Center at Kinshasa and of financial and technical constraints to efficient development of RS in Congo. Suggested I visit CERGEC with Dr. J. Mollet, Conseiller Scientifique.
- Dr. Mollet is very enthusiastic and effective in his role as adviser. He knows of Chuck Paul as source of RS information in USAID and is interested in promoting RS in Congo. Mollet took evaluator to see CERGEC Dir, Bizenga.
- Mr. Bizenga, Dir of CERGEC indicated disappointment with CRTO on every level stating that Congo has been forgotten and neglected by regional and international organizations, he advised that the Congo is reviewing its role in the CAT and CRTO and is considering a fusion of CRTO activities with those of AAC (African Association of Cartography). Also considering creation of Central African Regional Remote Sensing Center at Kinshasa in November 86. In view of this have not paid 1985-1986 CRTO contribution. They are also considering paying contribution to CAT only and not to both CAT and CRTO. They feel very strongly about the importance of AAC and are considering whether to fold all RS into AAC in which organization the Congo is 1st Vice President. So trying to resolve 3 problems, CAT - CRTO - AAC. They feel CRTO/RS funding goes to Anglophone countries especially in RS (e.g., Nairobi). Specifically advised me Congo has no remote sensing projects, no imagery, 3 trainees, one retired, one somewhere in ministry, one (cartographer) presently at CRTO. CRTO only accepted one trainee. Evaluaton advised Bizinga of AID role at CRTO; possibility of Phase II, evaluation, Phase I evaluation, French proposal, availability of IQC contractor through Chuck Paul, advised him should write letter to USAID/Embassy to request assistance. Mentioned CIDA/ACDI

radar forestry project in Cameroon, should contact Canadians to possibly get similar sinchronous mapping effort; citing, economy and efficiency. Showed Senegal maps plus report. They want similar material.

3.2 USAID Response

Christy Collins, USAID representative - advised USAID/Congo programs cut back. Kinshasa controls all projects. U.S. Ambassador to Congo interested in opening better relations with Congo. I advised her concerning, CRTO problems plus accomplishments, USAID remote sensing efforts, Congolese efforts and problems, potential of remote sensing for development planning etc, advised on possible effort by Embassy vis-á-vis Congo and remote sensing. Suggested K. Ebtehadj bring TM image (1:200,000) of Congo. Ambassador could present to Minister and arrange for 2 trainees to go to CRTO and 2 to go to advanced training at Pennsylvania State through AFGRAD and Pennsylvania State/Congo University joint effort.

Discussed above when visiting Dr. Thornburg of Pennsylvania who requested letter from evaluator regarding method for such arrangement.

4. Summary and Conclusions

- Although Congo has been only country to pay its bills to CRTO each year it has only had 3 trainees go to Center. (one individual is attending second course.)
- Congo has never had visit from CRTO director or staff. (Visit planned for Sept 1986).
- Congo believes should review membership in CRTO.
- Congo wants national program.
- Congolese interest not very high.
- Remote sensing understanding not widespread.
- Congolese feel reception center and training would be more effective in Kinshasa
- Receiving station at CRTO useless for Congo.

- Affinity to Central African group of nations more likely to influence choice of site and effectiveness of RS program in Congo.
- Congo in bad need of basic resource maps at 1:1 000 000, 1:500 000 and 1:200 000. They do have 1:200 000 topo sheet

8. NIGER

1. Introduction

Niger was visited during the period of 28 July to 1 Aug 1896. Various organizations were visited including USAID, Dept of Agriculture, INRAN, Topographic Services, Agrhymet, World Bank Forestry Project, Forestry and Land Use Planning Project, Direction des Forêts et de la Faune, Direction de l'Hydraulique.

2. Visits

2.1 National (* CRTO Trainee)

- Issoufou Boureima*, Direction Forêts et Faune, Projet Banque Mondiale, also Forestry and Land use Project (USAID).
- Anada Tiega, Directeur adjoint, Direction Forêt et Faune.
- Amul, Directeur Projet PPUSF (FLUP -- Foresting and - land user planning project)
- Annou Garba, Directeur Adjoint, Inran (Institut de Recherche agricole duNiger) Cartography et Sols
- Maman Waziri*, Directeur, Service Topographie,
- Laminou Mamane, Assistant Directeur, Service Topographique
- Abdul Rahamane Iro*, Direction de Topographie.
- Yahaya Zanfuina, Projet PPUSF.

2.2 USAID Personnel Visited

- Robert Coulter jr., Acting Director
- M.T.Kerst, Food for Peace Officer.
- K.Mullally, ADO.
- D.Panther, Project Officer Agrhymet.
- A.Benbow, General Development Officer

2.3 Other Visits

- Steve Daus, Contractor, Forestry and Land Use Project
- Brad Phelps, " " " "

- Bocar Coli, Director Agrhymet
- Idrissa Ouedraogo, Meteorologist, Agrhymet
- Mr. Mishrah, Computer programmer, Agrhymet/WHO
- Tom Kelly; Contractor, Agrhymet Reccurent Cost Analysis, EDI
- Mr. Delormes, FED/CILSS
- Mr. Ouattara, FED/CILSS

3. Interviews

3.1 National Response (*CRTO TRAINEE)

- Issoufou Boureima* - (CRTO trainee) Direction, Forêt et Faune, World Bank Project. Boureima is not presently using remote sensing although did so as director of FLUP project. His view is that training at CRTO was (3 months) too short, it gave him a general view of RS, was good, but too theoretical, did not have enough RS literature, felt people should be allowed to specialize on specific subjects, complained that very few Nigeriens have been to CRTO, believes he should go back for additional training. He doesn't believe a national center would be more appropriate than CRTO.
- Anada Tiega - Director Adjoint, Direction Forêt et Faune. This gentleman was interviewed in place of the Director Mahamadou Manane, who was unavailable. Mr. Tiega understands management problems, feels RS has been and is very useful to Niger development goals, feels CRTO training has been useful to his country, feels CRTO should support resource inventories and environmental studies, feels initiation course at CRTO should be two months, long term advanced courses 12 months, feels additional courses should be given outside Africa, does not believe Nigeriens now have RS management ability, believes GON will send additional trainees to CRTO (one is to go in Nov.).
- Mr. Amul - Director, AID Funded Forestry/Land Use Planning Project, under Dir Forêt et Faune. Feels CRTO is useful and is sensing project trainee to CRTO in Nov. Discussed

international development problems at length. Expects FLUP project to continue. Project uses Landsat, aerial photos etc. for forestry, land use classification.

- Annou Garba, Dir Adjoint INRAN - INRAN has used RS on land use projects (see USAID-Mullally comments), believes RS is useful and has been so for GON, was in charge of small RS project, but has received no training, doesn't know whether GON has RS capability, feels introductory courses should 3 months, and advanced courses over one year, additional training should be given outside Africa, believe GON RS trainees can initiate RS projects. He visited CRTO 1979, requested data but never got anything, because of lack of contact INRAN has not followed up on RS. INRAN worked with FAO on RS map of pastures of Niger.
- Maman Wazir* - Director Service Topographique and representative of GON to CRTO, ex trainee CRTO - Mr. Wazir had just returned from CRTO meetings. He supports the continued operation of CRTO but cited continued problems of management. Mentioned Okio, Thombiano, etc. Also mentioned Burkinabé control until 1984 and said that the committee was taking measures to improve management situation. He was not particularly favorable to an integrated Resource Development and Training Center at Niamey. He felt his training at CRTO had been adequate if too theoretic. (Questionnaire never completed.)
- Laminou Mamane - Assistant Dir, Service Topographique du Niger, Showed little or no interest in interview. Knew little about RS or what was being done in country. Responded to questionaire: believes RS can be useful, and has been useful, not involved in RS, believes RS is under control of Ministry of Agriculture, believes GON should support a regional RS center, and that CRTO has been useful, believes that introductory courses should exceed 3 months, believes in long term courses of more than 12 months, doesn't believe in training outside Africa, doesn't believe GON trainees can effectively work in RS, believes GON will send more trainees to CRTO and will support center financially. Abdoul Rahamane Iro*- Direction de

Topographie - This man received specialized training at CRTO (6 months). He is a photogrammetist. He worked in a soils RS project with INRAN, believes project was a success, and believes his training at CRTO was excellent, believes teachers were good (Francophone), believes his courses should have lasted longer, furthermore he believes hands on training should be emphasized, he believes GON should have its own center, believes he could work in RS given imagery, funds, etc. Presently he is using RS in limited fashion, believes other GON trainees had useful training at CRTO, is aware of resource maps at various scales existing for Niger, believes if CRTO had the means he would like to work on improving GON maps.

- Yahaya Zanfuiun - worked at USAID funded FLUP Project trained by GON and at project by American RS expert, believes his training is good and project a success, has and is using RS daily, would like to have additional training (hands on), does not believe he is ready to do RS inventories, he knows trainees from CRTO but is silent on their effectiveness, he is aware of available GON resource maps, and would like to continue to be involved in RS if possible through CRTO.

3.2 USAID Meetings

- Dennis Panther - Evaluation Control Officer, Project Manager Agrhymet, Project FLUP. Mr. Panther was very helpful in every possible way in setting up meetings in GON at AID and in projects, he took a keen interest in evaluation and showed a very clear understanding of RS potential, problems and related them to his project. Because of his knowledge of Project FLUP and Agrhymet Mr. Panther is conscious of shortcomings of these projects and strongly believes that an integrated RS approach could help Agrhymet. He does not believe RS training would be better accomplished in the U.S., and believes that if CRTO were upgraded that such training should be accomplished there. He believes GON trainees should focus on long term hands on

training at CRTO. He is not sure if present GON CRTO trainees could be effective in planning and executing RS projects. Mr. Panther is concerned about duplication of effort between various regional agencies and concerned that CRTO, CILSS may not be providing effective backup for his projects (e.g., agro-economic data from CILSS; imagery, training from CRTO). Mr. Panther is very concerned about lack of coordination between donors which he feels is creating many problems and will affect the effective completion of his project.

- Kevin Mullally - Acting ADO, USAID Niamey. Mr. Mullally is familiar with CRTO as a result of his previous post at Ouagadougou. After describing different aspects of CRTO Mr. Mullally described RS activities in Niger. These include agroecological zoning maps by Wash DC of Niamey Dept for AID; World Bank-FAC maps of Maradi area, U. of Arizona-similar map of Zinder region. Texas AM conducted soils mapping using RS with INRAN and Tufts University is conducting such mapping with ILCA in a livestock project. Mr. Mullally did not display much enthusiasm for such techniques but did indicate their widespread use in Niger.
- Hamadou Boureima - AID local hire, Forestry project. Described AID funded Tufts/ILCA project, tried to get appointment for evaluator with chief of project but was unsuccessful.
- Carey Coulter - Acting USAID Director. Explained interest in RS in view of Agrhymet and other AID projects and provided evaluator with time to describe GIS as a means of avoiding certain problems now apparent at Agrhymet. Evaluator also discussed unified (donor and scientific) approach to data collection for better crop production, disaster monitoring etc.
- Mike Herst - Food for Peace officer. Discussed, Fews, Agrhymet, CILSS and other data collection systems and their relationship to CRTO and possible means of aggregating data for application in forecasting and disaster prevention.

3.3 Other Visits

- Steve Daus - Contractor FLUP Project
- Brad Phelps - Peace Corps Forester FLUP Project. Steve Daus showed evaluator work ongoing in FLUP project and discussed lack of available imagery from CRTO and relatively low level of training of CRTO trainees. Project is attempting to conduct a forestry/land use evaluation of southern Niger using Landsat imagery/aerial photos and field work. Results are good and similar to PIRT project in Mali. Strongly believes in local (GON) ability to produce good resource maps with adequate training at CRTO and overseas.
- Bokar Coli - Director Agrhymet. Mr. Coli explained operations of Agrhymet described new Dutch "Vegetation Protection" program ($4 million U.S.) which includes labs, dormitories, classrooms and funds for pest control studies. He discussed how these effort are being merged. He also discussed problems of meeting certain project objectives and how RS data could be helpful in achieving some of these goals. Evaluator described how G.I.S. could function as interfaces between Agrhymet, CILSS, CRTO to provide necessary data base which in turn could be used to provide necessary data to achieve present unrealistic Agrhymet goals. Agrhymet is well managed, functioning operation.
- Mr. Idrissa Ouedraogo - Meteorologist Agrhymet. This gentleman described the Agrhymet operation and provided guided Tour of meteo rological data receiving area, processing, computer analysis section, programming, meteo forecasting and disemination, classrooms, library etc. Mr. Ouedraogo is a Burkinabé and well trained and effective in his work as were others who were briefly interviewed including computer operators, data processing technicians and a computer repair specialist.
- Mr. Misrah - Computer Programmer, Agrhymet/WMO. He is one of two WMO employees who teaches computer programming at center. Discussed new VAX computer to be installed and

mentioned in passing that it had adequate capability for G.I.S. which would provide center with needed base data for project forecasting. Also mentioned that the last USAID (Pragma) evaluation had considered G.I.S. Mentioned that CILSS should provide basic agricultural statistics for back-up of Agrhymet.

- Tom Kelly - EDI AID contractor Consultant - Agrhymet recurrent cost, analysis. Discussed goals of Agrhymet and whether feasible. Asked and discussed if recurrent cost/cost benefit pictures could not be improved with more effective data collection and dissemination (such as CRTO resource data base.)
- Meeting with USAID, Agrhymet and FLUP staff. Evaluator described methodology of basic RS resource project, G.I.S. as collector/ manipulator of this and other such data and application to Sahelian food security and drought problems. Discussion ensued as to CRTO/Agrhymet, CILSS and other regional project goals and how these could be better met. Mr. Delormes and Mr. Ouattara working for FED/ISPRA described FED pilot projects to begin collecting data for a G.I.S. These two are working at Agrhymet and in the field. About 20 people attended meeting arranged by Dep Mission Director.

4. <u>Summary and Conclusion</u>

- CRTO trainees are working on RS projects in Niger.
- Many others are being trained in RS locally.
- Interest in Niger in RS is high.
- At least 5 projects have or are using RS effectively.
- Government Agencies are very involved in RS although not able to sustain projects on their own.
- USAID and other donors are depending on RS to meet certain project goals.
- Major effort by Agrhymet needs to be supported with good basic RS data on timely basis to provide crop forecasting.
- CRTO not providing enough support for these functions, projects need imagery. (See Aunou Garba, Panthur)

- CRTO not training at a high enough level.
- CRTO not disseminating data or conducting PR.
- CRTO not efficiently run (financial and management problems):
- CRTO should send out bulletins, report of accomplishments.
- Francophone training too theoretical.
- Imagery too expensive and difficult to obtain from other donors.
- Niger has never had visit from CRTO Director.

9. MALI

1. Introduction

Mali was visited between 1 Aug and 6 August 1986. Various organizations were visited including, USAID, Institut National de Géographie, Direction des Eaux et Forêts, Projet PIRT (Project Inventaires des Resources Terrestres), UNDP, FED, etc. Meetings with various groups were very efficiently organized by Mr. Fofana of USAID ADO Office but because of grasshopper infestation crisis USAID time was limited and many Malians were not available because of heavy rains and viral epidemic in Bamako.

2. Visits

2.1 National (CRTO Trainees*)

- Mr. Gaoussou Traorè, Projet PIRT
- Mr. Seydou Bouarè*, Projet PIRT,
- Diadè Traorè, Directeur Institut National Géographique,
- S. Kanoutè, Directeur Adjoint Eaux et Forêts

2.2 USAID

- Eugene Chiavaroli, Director, USAID/Mali
- Wilbur Thomas, Deputy Director
- Emmy Simmons, AOD,
- James Jackson, ADO,
- Roger Simmons, Program Officer
- Sanath Reddy, Senior Agronomist ADO
- Mamadou Fofana, Project Assistant ADO

2.3 Other Visits

- Mr. Michel Gauthier, Acting Res. Representative, UNDP
- Mr. Andre Berg, Director Ispra, Centre Commun de Recherches, Projet F.E.D. Projet Regional Jolibas

- Mr. T. Kelly, USAID/Agrhymet, Project Design
- Miss C. Hoisington, Africare (Regional Representative)
- Mr. P. Bernard, Dir Project, Africare

3. Interviews

3.1 Government Response (CRTO Trainees - *)

- Gaoussou Traorè, Directeur Projet PIRT. PIRT is Projet Inventaires des Resources Terrestres which was an AID funded project executed by TAMS/EARTHSAT (See 1983 CRTO evaluation). Mr. Traore' has just completed his PHD at Arizona State in Borestry. Mr. Traorè said he does not have a bad opinion of CRTO training, but contacted CRTO 3 years ago about getting imagery, CRTO said not possible, PIRT needs imagery has only one set for southern part of country dating from 1972-78 timeframe, PIRT will be working with FED on small projects using RS field data collection methods for crop production statistics. He sees RS role in the future as permanent integrated resource evaluation method, visited ERIM in USA, saw G.I.S. Immediate PIRT objectives; get pictures and update Malian Resource Maps, doesn't know if CRTO has future, sees national center for RS in Mali, sees political problems of control of such center caused by D. Traorè at Geographic Institute, believes his Ministry (Ministry of Natural Resources Inst. National de Recherche Forestiers et Zootechniques) as proper place for this activity, believes future of PIRT is to be consultant on development in Mali. He believes RS can be great help to Mali but hasn't yet proved to be the ease, believes Mali should support regional center in Burkina, which should provide training and imagery, believes regional center should exist for resource inventory evaluation, monitoring; believes intro courses at CRTO in RS should be longer than 3 months and specialized courses more than 12 months. Does not believe courses in RS should be given outside Africa; believes Mali (he) caninitiate, plan budget its RS projects in Mali. Believes

GOM will send more trainees to CRTO and support center financially PIRT is negotiating with USAID contract to conduct Land Use mapping of part of Mali.

- Seydou Bouarè*, PIRT Project. Trained at CRTO and ITC (funded by Dutch) 2 years and 6 months, specialized training in geomorphology and rural geography. Has published paper, Onchocerciasis in Mali, has worked at PIRT for 5 years, considers project a success; believes CRTO training was good was only 3 months, courses should remain of same duration, doesn't believe additional training is necessary for him (he worked with American experts of PIRT), believes a national center is important, does not believes he is ready to map national resources, believes Niger has numerous available maps at various scales but should be updated.
- Diadè Traorè, Institut Nationale de Cartographie et Géographie. Mr. Traorè is Malian representative to CRTO. Believes all RS activities should be in his shop, thinks CRTO is much better managed now, noted that teachers and administrators at CRTO are now "international", noted photolab was very good, and feels training has improved. Believes strongly in national RS center with help from CRTO. Believes job now is to produce consumers of RS in different countries, need to get equipment, not complicated machines but good ones. Believes CRTO should send agent to Mali to train forestry expert in RS for special Mali/Forestry project. In conclusions assistance to CRTO must be helped by assistance to countries.
- Mr. S. Kanoutè - Dir. Adjoint, Dir. Eaux et Forêts. This man used to work at PIRT and is very familiar with R.S. Techniques. He has two trainees (CRTO) working for him both using remote sensing: (Mr. Alphouseina Maiga, Project Forestier Sikasso and another gentleman of the Projet d'Inventaire des Ressources Ligneuses du Mali). Both are using old PIRT images. He feels GOM should be more emphatic in supporting remote sensing projet and GOM does not care where images come from as long as they get them. CRTO should continue to train at all levels but need not provide imagery.

3.2. USAID Interviews

- Roger Simmons, Program Officer. Evaluator briefed Mr. Simmons on CRTO and objectives of evaluation also discussed R.S. surveys in general and specific applications of R.S. to desertification agricultural inventories etc.
- Mr. Simmons set up meetings with ADO and other staff members and permitted evaluator to give presentation on methodology of remote sensing and its application to West African resource inventories, monitoring of the environment and its potential as a partial means of arriving at a systematic approach to agricultural inventories and food security problems.
- USAID mission personnel attended the meeting and questioned evaluator on potential of remote sensign as a means of solving specific problems including:

  . Need to identify crops and hectarages planted early during season
  . Need seasonal evolution of crop per crop
  . Need end of season estimate per crop for crop production
  . After explanation that combined evaluation using static data (soils, vegetation etc.) plus dynamic data (timely agricultural inventories, demographic factors, and meteological data could yield such data further questions were asked.
  . How can we effectively use Thematic Mapper/Spot to arrive at answers?
  . What are costs?
  . What is timeliness of data?
  . Can CRTO provide such data?
  . Problems of data acquisition, donor cooperation profileration and redundancy of rograms were cited by those present and evaluator.

- Debriefing was held with Dir and Dep. Dir where above discussed further.

3.3. Other meetings

- Michel Gauthier- UNDP Acting Resident Representative. Discussed (informally) various regional agencies and their effects on solving problems. Mr. Gauthier's opinion is that most of these programs have been a drain and of little use. Does not believe they should be supported and believes UNDP will slowly cut back on most or all. With regard to Agrhymet, CRTO and CILSS he does not believe they can meet objectives even if they are unified and there is donor cooperation as long as African countries are not willing to support them.
- Mr. Andre Berg - Centre Commun de Recherches des Communautes Europeennes ISPRA - Projet Joliba Previsions des productions Cerealieres en Afrique de l'Ouest. Mr. Berg described how 3 units of EEC are working with various EEC members, African countries, regional organizations and projects to provide R.S. based inventories, assessments and research oriented results to improve food production. They have decided to begin collecting data for a FED GIS system which is beginning work in Mali, Senegal, Niger and Burkina. Project Jolibas is in Mali. Mr. Delormes is G.I.S. expert with industry partner (Thompson/Sodereg).
- Mr. Tom Kelly, USAID contractor evaluating recurrent costs of Agrhymet project. We discussed recurrent costs problems in all projects and efficiency of RS projects such as Agrhymet and CRTO. What is payoff and when are objectives realistic? If not is role of project valid or not? etc.
- C. Hoisington and Paul Bernard, Africare, Dire Project. Described value of Dire project and applications of RS to such.

4. Summary and Conclusions

- CRTO training valuable or better than before
- Will depend on CRTO for further training
- Need CRTO help for creation of national center
- Need imagery

- CRTO unable to help get imagery
- CRTO has management problems
- CRTO not promulgating RS
- Need source of basic resource data
- CRTO should produce RS consumers in West Africa
- CRTO must help other countries develop centers
- Remote sensing very important to Mali
- PIRT and other projects use RS in Mali
- AID very cognizant of possibilities and aware of problems
- Regional organizations not acclaimed by either UNDP or USAID
- RS awareness high to very high
- Lack of donor or national coordination

10. BURKINA FASO

1. Introduction

As part of the technical evaluation effort of the CRTO a number of individuals at the CRTO and in Burkina Faso were interviewed. Due to lack of time no agencies in the local government were interviewed.

2. Persons visited or interviewed: (CRTO Trainee *)

- Francophone trainees
- Anglophone trainees
- Dr. Okio - Director CRTO
- Mr. Sabaly Traore - Librarian CRTO (Senegalese)
- Mr. Vouama - Archivist CRTO (Congolese)
- Mr. Douyno Sung - Bamaala - Remote Sensing Teaching Assistant CRTO (Sierra Leone)
- Mr. M. Kamara* - User Assistance CRTO (Sierra Leone)
- Mr. Yaya Koussoube* - Lab Assistant, Lecturer, (Burkina) CRTO
- Mr. Joseph P. Okang - Director of Training CRTO
- Mr. Amadou Sow - Agronomist/Range Manager/User Assistance CRTO, (Mali)
- Mr. Benoit Gomina* - Photo Lab Technician CRTO, (Burkina Faso)
- Mr. Jobe Halifa - Civil Eng/Hydrologist, User Assistance CRTO, (Gambia)
- Mr. L. Cunin - Computer Expert User Assistance, (France)
- Mr. F. Ribot - Director Francophone Training CRTO, (IGN France)
- Mr. J. Sorenson - Photolab Director, Spectral Data Corp.
- Mr. P. Gilruth - Forester, Remote Sensing Training, Spectral Data Corp
- Mr. P. Mika - Geographer Remote Sensing Training Spectral Data Corp.
- Mr. K. Ebtehadj - Chief of Party, Spectral Data Corp

- Dr. Salomon Abba, Administrative Director, CILSS
- Mr. Baudouin DeMarken - Regional Project Manager USAID

3.2 Trainees

No formal interviews were held with trainees, but questionaires were passed out and evaluated.

3.2.1 Anglophone Trainees - Introductory course, Length 6 months.

Six anglophone trainees filled in questionaires; 3 are cartographers, 2 geologists and 1 forester, all are USAID funded. Although all followed the main course of instruct- ion, 3 classified their training as hands-on, 2 as a combination of introductory and specialized and one felt training combined all above elements. Four trainees have not worked on RS projects or published, while 2 have published a report on the Nazinga Hydrogeologic Project (Ghana) funded by USAID; 3 felt this training was excellent and 3 felt it was good, 3 felt training (6 months) was long, while 3 felt it was too short; 4 students found their teachers to be excellent, one found them good, one did not reply. 4 felt that some teachers were poor and explained that it was due to the fact that some Francophone teachers who assisted in the anglocphone course were difficult to understand. Four students stated that the introductory course should be shorter and 2 stated it should be longer; 4 felt the specialized course should be longer and 2 (the same as above) felt it should be shorter; all felt hands-on training should be conducted in the field with expatriates. All feel a national center would be optimal for their country; all believe they could map the national resources of their country using R.S., 4 out of 6 use remote sensing in their country. All feel that previously trained CRTO graduates from their countries profited from their experience at CRTO. Two

trainees would support the concept of user assistance at CRTO making maps of their country whereas 4 believe such maps should be made in the national centers in their country.

3.2.2 Francophone Training (Previous CRTO training*)

The training course being conducted at CRTO is a 5 month specialized course dealing with agricultural statistics and agricultural inventories using R.S. as the basis for such studies. The training course was in its 4th month at the time of the evaluation.

Nine of eleven Francophone trainees responded to the evaluators questionnairE. (one trainee was absent, and one has been requested to leave because of inadequate back- ground.)

- Yoya Soumah - Agricultural Engineer, Guinea, Conakry. This trainee has had four years of higher level agricultural training in Guinea. He has never had R.S. training prior to CRTO nor worked in R.S. projects. He believes his training at CRTO has been good and he feels the course is too short, and should exceed 5 months. He believes teachers approach to course is acceptable and feels initial introductory and specialized courses should be longer and should last 8-9 months. He feels that more training should be conducted in the field and with more assistance from expatriate experts. He feels Guinea should have a national remote sensing center. He believes he could not as yet, even under the best conditions, map the resources of his country. He has never used R.S. techniques in projects but would like to apply such methods in the future. He knows other Guinean scientists who have been

trained at CRTO and believes their training has been useful. He feels his country needs to have improved maps at better scales and is convinced that R.S. could help achieve this need.

- Antoine Djessan - Institut National Geographique, Abidjan, Ivory Coast. This trainee has never worked in R.S. projects in the Ivory Coast. His training at CRTO, he believes, is specialized and believes it has been good but too short (5 months). He feels his teachers have been acceptable in their methods but that the introductory part of his training should be longer and the specialized portion shorter (3 months). He doesn't believe additional work in the field is necessary as part of the training at CRTO and believes a center in the Ivory Coast would be more useful. He does not feel that CRTO training would enable him to map resources of the Ivory Coast. He would like to use R.S. in future projects in Ivory Coast. His need for resource maps would be at a scale of 1:20000. He would not, if he were in a position to do so, send additional trainees to CRTO for resource mapping.

- Severin Asse - Resource Manager, Government of Benin. This trainee was financed by the GOB and the FAC and had 4 years of training before coming to CRTO. He had never worked in R.S. prior to CRTO training. He feels his training at CRTO has been mediocre and training period of 5 months is too short. He believes that CRTO professors were convincing in their manner of training. He feels introductory course is long enough and believes additional training depends on area of specialization. He believes additional hands on field training with expatriate experts should be

part of CRTO training. He does not believe a Benin national center is appropriate and he does not feel he could, with his training, map national resources by R.S. methods. He believe R.S. should be applied to mapping and feels that those Beninois trained at CRTO benefitted from their training. He indicated that if mapping of national resources at CRTO were possible that he would be ready to work on such a project.

- Zirria Jean Diallo - Direction National de la Statistique et de l'Informatique, Mali This trainee has a background of 30 months of training in statistics and applied economies (IAMSEA) paid for by the FED. Studies were specialized. He has never been involved with Remote Sensing. He feels his 5 months training at CRTO has been somewhat superficial and believes that the introductory course at CRTO should be longer with more emphasis on photo-inter- pretation. He believes long term training should also be longer with the execution of a specific project as a goal. He believes 10-12 months should be adequate. He supports further project oriented field work. He believes Mali should have a national R.S. program. He does not feel he is ready to undertake mappping of Malian resources by R.S. but he believes others in Mali could do so with proper financing. He intends to use R.S. in agricultural statistics and crop forecasting. He is not aware of existing national (Malian) resources maps and believes that if the CRTO could assist in preparing resource maps he would be especially interested in preparing agricultural land use maps.

- Hamlaoui Ghamri - Institute National de Cartogaphie, Algeria. Prior to coming to CRTO this trainee had 5 years of cartograqphic training in France and Algeria. His studies were financed by the GOA. He has had no previous R.S. training. He feels CRTO training is satisfactory and believes that introductory courses should be longer and specialized courses should last 9 months. He feels additional field work with expatriate experts is warranted and feels that under proper conditions he is adequately trained and could undertake mapping of Algerian national resources by R.S. techniques. He does not believe Algeria needs a national center.

- Mamadou Illiass Diallo - Irrigation Specialist, Project R.A.F., Rep. of Guinea. Received 5 years of training in Guinea and Italy prior to 5 months CRTO training. He has previously used remote sensing under PNUD/UNSO project to produce thematic maps. He feels his training at CRTO has been good but too short. He feels instruction has been quite good and that CRTO introductory and specialized training should be longer. He believes additional field work with expatriates is necessary and that Guinea should have a national center. He believes that given financing and proper working conditions he could map Guinean national resources after training at CRTO. He feels R.S. is very useful and has used it in previous projects and will use it in the future. He is aware of other Guineans who have trained at CRTO and feels their training has been useful. He believes Guinea has some maps available at 1:200,000 but needs more at 1:50000 and 1:20000. He feels that if CRTO could assist in producing national resource maps that he would be ready to work on such a project.

- Augustin Loubaye-Institut Geographique, Congo This trainee received 6 years of cartographic training in Moscow (USSR). He has never worked with R.S. He has previously spent 3 months at CRTO in 1982 and feels CRTO training is good. He had no comments tomake on instructors and feels introductory course should be shorter whereas specialized training should be 6-7 months with increased expatriate assistance in the field. He believes a national R.S. center is appropriate. He intends to use R.S. in mapping upon his return to Congo. He knows other Congolese who have trained at CRTO and does not believe their training was very useful. He believes that Congo has many resources maps at 1:200,000 but these are old and should be improved at a scale of 1:50,000. He would support and participate in such map making if CRTO were capable of such an effort.

- Beldje Bedogo - Agronomist, Ministry of Rural Development Bangui, Central African Rep. Has had 4 years of training as agronomist in CAR financed by the FED. His training was on the job. He feels his training at CRTO was good but too short. Instruction was acceptable. He believes introductory courses should be longer, as should be specialized courses which he feels should last a minimum of 9 months. He is in favor of additional hands-on training and field work under guidance of expatriate experts. He believes that a national center is important but does not feel ready to map the resources of CAR. He has not conducted R.S. project previously but intends to begin upon return to CAR. He would, if CRTO were able to produce resource maps, wish to work on such a project.

- Olivier Balima - Agronomist, Ministry of Rural Development, Burkina Faso. This trainee has had 5 years of training in Burkina financed by GOBF. He has written a report on R.S. application to pasture lands in Burkina (1986) and believes his training at CRTO has been good but too short. He believes that instructors were excellent for theoretical training but created many difficulties with regard to specialized training where their has been deficiency in individual student support. Believes introductory course should be longer (3 months) and specialized course longer (6 months). He feels additional on-site and field work would have been useful with assistance of expatriate trainers. He believes that he is not ready to map natural resources of B.F. but will use R.S. in future He feels previous B.F. CRTO trainees are well trained.

3.3 CRTO Staff

Interviews were held with the entire CRTO staff (with the exception of secretaries and routine administrative personnel). An effort was made to evaluate the scientific, technical, educational and managerial proficiency of the CRTO staff.

3.3.1 Dr. Okio - Director of CRTO. The evaluators interview with the Director took the form of a question and answer period.

- The first question related to the CRTO finanical situation and member nation contributions. Dr. Okio advised the following:

Benin owes dues for 85 and 86 or	(11,000,000 CFA)
Burkina Faso owes for 85 and 86 or	(10,500,000 CFA)

Cameroon owes part of 86 or	(108,000,000 CFA)
Congo owes 86 or	(10,000,000 CFA)
Ghana has never paid and owes	(177,000,000 CFA)
Guinea has never paid and owes	(41,000,000 CFA)
Ivory Coast owes dues for 85 and 86 or	(64,000,000 CFA)
Liberia has never paid and owes	(15,000,000 CFA)
Mali owes part of 85 and 86 or	(13,000,000 CFA)
Mauritania has never paid and owes	(36,000,000 CFA)
Niger owes 84-86	(22,000,000 CFA)
Senegal owes 85 - 86 or	(28,500,000 CFA)
Sierra Leone never paid and owes	(67,000,000 CFA)
Togo has never paid and owes	(24,000,000 CFA)
Algeria has never paid and owes	(370,000,000 CFA)

Thus the total contributions owed by member states exceeds 1.0 billion CFA and amounts to approximately $3.0 million USA.

- The Director was questioned on the number of staff meetings called by the director. This questions was inspired when it was learned that no American contractor personnel had been invited to any formal meetings. Dr. Okio responded that very regular meetings were held and did not go into further detail.

- Regarding budgeting and accounting proceedures, the senior evaluator noted that donors would be happier if budget and expenditure information were provided on a more regular basis. The junior evaluator suggested a quarterly reporting proceedure.

- The Director was questioned regarding the lack of newsletter which had previously been a very effective promotional tool for the CRTO and about the general lack of public relations which was evident to the evaluators during the country visits. The senior evaluator specifically noted the possibility of contacting extrainees to follow up on their carreers. The Director responded that a letter was sent to all trainees in January 1986. However, Dr. Okio did not mention any results of this effort. He also said that a major effort was made to promote CRTO by attending a seminar in Senegal in January 1986, attendance at a seminar in Cotonou on road construction, and he cited Mr. Ebtehadj visits to Ghana, Mauritania, Niger and the Cameroons.

- With regard to the role of Mr. K. Ebtehadj in promoting the center it was noted that Dr. Okio had never received a copy of the 1983 USAID evaluation in which such a role was very clearly specified for the senior American contractor. This was subsequently provided.

- Dr. Okio in discussing the User Assistance Group and its functions felt that by changing the direction of the user assistance programs under the direction of Mr. Parnot (FAC) and Mr. Sow a CRTO African expert, that income could be increased over the 1985 figure of 4.3 million CFA. ($12,300). Thus Dr. Okio proposed concentrating on providings services for pasture, water resources, agricultural inventories, soils and geology, as these relate to regional problems. Unfortunately, the jobs being conducted by the user assistance group at this time are using aerial photos almost exclusively due to lack of Landsatimagery. Dr. Okio also noted that the CRTO had raised its "consulting" User Assistance fee, from 100,000 CFA per month to 60,000 CFA for one day. Dr. Okio also discussed the addition of new African personnel to the user assistance staff including that of a "technician" in 1987.

- The junior evaluator questioned Dr. Okio on the method of placement of incoming receipts, in view of large member contributions in 1986. Dr. Okio responded that the moneys were presently in the CRTO's checking account but that be was looking at a savings account as a means of improving the investment.

- In conclusion Dr. Okio was very upbeat concerning the center and its future.

3.3.2 African Training and Support Staff - (CRTO Trainee*)

The African training and support staff consists of two teachers and two lab assistants, four user assistance experts one of whom functions as a lecturer and four support staff members which includes two photo technicians, a librarian and an archivist. Out of this total of 11 African staff members 8 have been added to the staff since Dr. Okio's arrival in 1984.

- Mr. Sabaly Traore - Librarian CRTO (Senegalese). Discussions were held with this gentleman who is part of the African staff brought on by Director Okio. When interviewed and on various other occasions this staff member had little or no work to do. From discussions and personal observations it was noted that:

  - The library has very limited documentation including: about 550 texts and monographs, 12 technical magazines, 35 reference texts and 129 internal (CRTO) reports.
  - Missing items include general remote sensing texts (French especially), monthly journals, magazines and technical publications, general scientific reference texts and texts on Sahelian and African resources.

- o This staff member has requested that he be allowed to audit remote sensing courses offered at CRTO to better understand his job. He claims to have been turned down by the Director.
- o The facilities available at the library are primitive and bookshelves are badly built and in danger of collapse.
- o The library is poorly maintained and notwithstanding the limited number of entries, the location of specific texts and references is tedious and poorly organized.
- o Mr. Traore lacks enthusiasm and initiative perhaps due to lack of direction.

- Mr. Faustin Vouama - Data Archivist, CRTO (Congolese). Mr. Vouama has had no training in remote sensing or data management yet he has one of the most difficult jobs at CRTO. His duties include data reception (imagery, quick-look data) archiving, dissemination and maintenance. Monthly, he receives hundreds of quick-look Landsat products from Mas Palomas which he must sort, annotate and file. He has neither the facilities nor the training to do this job. Knowing this he has requested that he be allowed to audit the introductory course at CRTO but according to him was refused by the Director. His office and the archives are poorly maintained and disorganized and he cannot be expected to do an efficient job without better training, direction and the materials necessary for an efficent operation.
- Mr. Douyno Sung-Bamaala* - Teaching Assistant (Ghana). Mr. S. Bamaala is a cartographer who is a teaching assistant in the Anglophone training courses. His duties consist of supervising hands-on work in the remote sensing laboratory sessions including; photo-interpretation,

geomorphology, hydrology, aerial thermography, and topography. In addition Mr. Bamaala teaches two segments of the course dealing with cartography.

Unfortunately, Mr. Bamaala is ill prepared to teach remote sensing. His training only includes 3 months of introductory remote sensing at CRTO. This training was acquired in 1985 when the Anglophone course was taught by another CRTO trainee, Mr. Kamara of Sierra Leone. Mr. Bamaala has never had the advantage of being taught by fully trained experts and the rather limited training he has had may be more a disadvantage than advantage. Mr. Bamaala also functions as a draftsman for CRTO in the User Assistance Group.

- Mr. M.S. Kamara* - Hydrologist, User Assistance CRTO (Sierra Leone). Mr. Kamara has been at CRTO for over 7 years. Mr. Kamara received 6 months of training at CRTO and has been involved in teaching and user assistance projects since 1982. He is the author of numerous project oriented reports applying remote sensing techniques to resource evaluation in Sierra Leone, Burkina, Cameroon, Ghana, etc. Mr. Kamara singlehandedly organized and taught the Anglophone course in 1985 when USAID was unable to provide contractor personnel for that purpose. Mr. Kamara has had numerous problems with CRTO management and has expressed his concerns in a number of memorandum to the Director, the Regional Management Committee and the evaluators. Mr. Kamara was terminated earlier in 1986 by the Director but has recently been rehired to work in User Assistance without permission to teach anglophone courses. Mr. Kamaras ability to teach is according to one of the U.S. contractors somewhat limited. According to Mr. Kamara he was not paid for a extended period during 1986.

- Mr. Yaya Koussoube* - Lab Assistant, Lecturer, Francophone course, (Burkina Faso). Mr. Koussoube has been at the CRTO since 1978. He was in the first Francophone course given at CRTO and has since that time been a lab assistant in those courses. Mr. Koussoube is also employed 20% in User Assistance Projects. Presently he is nearly singlehandedly running the 5 months agricultural statistics course being offered at CRTO which was prepared in large part by him. Mr. Koussoube is a geographer and is not trained in agricultural statistics nor as a remote sensing expert, nevertheless he appears to be highly motivated, efficient and stands out as a mainstay of the CRTO Francophone training program.
- Dr. Joseph Okang - Director of Training CRTO (Ghana). Dr. Okang joined CRTO in January 1986. He has a doctorate in Geodetic Science and Photogrammetry from Ohio State and is an engineer by background. Dr. Okang has a few months experience in the use of remote sensing technology based on work in West Germany. Dr. Okang plans and organizes course work at CRTO and has good relations with Dr. Okio and the staff. It is Dr. Okang who appears to be the contact with the U.S. contractor and French staff and it is he who calls staff meetings to discuss training as well as enabling staff to discuss other problems. He is preparing the curriculum for the 9 month training course which will replace the present 6 months course. Dr. Okang advises that CRTO is conducting a survey of locally available experts to assist in teaching specialized courses planned for the future by CRTO such as the agricultural statistics course recently offered. Dr. Okang wished to know if USAID would support such experts. Dr. Okang appears to be well qualified to organize the teaching of courses at the Center

but does not appear to be a strong enough to propose alternatives to the rather peremptory style imposed on every aspect of the Center by the Director.

- Mr. Amadou Sow - Agricultural/Range Management Expert - User Assistance Program CRTO - (Mali). Mr. Sow is presently teaching in the agricultural statistics course at CRTO and is apparently partially qualified to do so. He has studied range management at Colorado State and has a masters in range ecology from ITC in Holland. Mr. Sow has no experience in agricultural inventories and only some experience in Remote Sensing. He is presently running the User Assistance program (in the absence of Mr Parnot the French expert) and a land use study using aerial photos. This study, worth 27 million CFA ($75,000), has been commissioned by the Burkina government.
- Mr. Benoit Gomina* - Photo lab Technician CRTO (Burkina). Mr. Gomina has been at CRTO since 1979. Mr. Gomina has no formal technical training in photograph engineering or processing. Mr. Gomina has, however, had 7 years hands-on experience at CRTO under the tutelage of the U.S. contractor. Somewhat deficient is certain areas, Mr. Gomina needs further training and was offered such by the French government but Dr. Okio has not approved this possibility to improve CRTO capabilities. Mr. Gomina is very poorly paid for the work he does. Mr Gomina is enthusiastic and capable and receives high marks from his American supervisor.
- Jobe Halifa - Hydrologist/Civil Eng, User Assistance CRTO (Gambia). Mr. Halifa has been at the CRTO (User Assistance group) for 2 months, he has had limited training in remote sensing at Delft in Holland where he received a "diploma".

Prior to that Mr. Halifa received a masters in Civil Engineering from the University of Leningrad. Mr. Halifa is working on a hydrology project with Mr. Kamara through the user assistance group. It appears that Mr. Halifa lacks training and experience to effectively support his mission at CRTO.

- Mr. Ndikoumina - Agropastora list - User Assistance CRTO. Not interviewed due to absence in field.
- Mr. Sidi Muktar Sangare - Photo technician (Mali). Not interviewed, new arrival.

3.3.3 Francophone expatriate staff

The French national staff consist of 4 experts two senior, Mr. Parnot and Mr. Ribot, and 2 junior, Mr. Cunin and Mr. Joannes. The junior members have limited experience in remote sensing while the senior members, although they have some, have had little or no experience in teaching or managing remote sensing.

- Mr. J. Parnot - Assistant Director exoffice, Director of User Assistance. Mr. Parnot was not interviewed due to his absence on leave. Relevant comments were made by his compatriots and other staff members of CRTO as follows:

- Mr. F. Ribot - Assistant Director of training Chief of Francophone Training, Cartographer, IGN France. Mr. Ribot has been at CRTO since January 1986 and teaches the basics of remote sensing, he has had little to do with curriculum preparation (after the interview he began working on the new course program). Mr. Ribot believes the level of training is poor and difficult to judge from student transcripts. He described the new course format which will be of 9 months duration instead

of six and will include 4 months of introduction and 5 months of application. He stated that no schedule had been drawn up and that he had neither been advised nor consulted concerning this new format. He stressed he has different views concerning applications of remote sensing and that this aspect should involve problem specific projects in the country of the trainee. Mr. Ribot described the 5 month agricultural statistics course being given at the CRTO as being very poor in quality because of the lack of experts. Originally the course was to have been taught by experts from the GDTA in Toulouse. These experts did not come so the course was taught mostly by African staff, Mr. Ribot, Mr. Cunin a computer technician (see below) and Prof Clanet of the Unviersity of Burkina who is a geographer/ rangeland expert. Mr. Ribot stated that Mr. Okio decided alone to offer the course and that he worked with Mr. Parnot of user assistance only in setting up the course. Mr. Ribot expressed dissatifaction with the organizational aspects of CRTO.

- Mr. L. Cunin - Computer expert - Operator of image enhancement system at CRTO user assistance Group/lecturer. Mr. Cunin expressed extreme fustration with CRTO management and dissatisfaction with the user assistance management and methology. Mr. Cunin demonstrated the French-donated Pericolor computer for the image enhancement system.. This unit is almost 10 years old and although a good demonstration tool for students, it has, according to Mr. Cunin, very limited application to user assistance. This deficiency is due to its relatively small memory and capacity for treatment. The Pericolor system is interactive, has 16K memory and 256 x256 display screen, it is equipped with a digitizing table, a printer and has

numerous functions including; color compositing, edge enhancement, smoothing, 16x zoom, ratios, area measurements, color separation by function, geometric corrections, channel decorrelation, etc. The equipment needs additional host computer memory for image treatment analysis. Mr. Cunin estimates that it would take one month to analyze one Landsat scene. He concluded that the machine is useful for training but expensive for what it is and has no user assistance application. Mr. Cunin has been teaching, math, physics, statistics and digital image analysis and enhancement techniques to the trainees in the agricultural statistics course. Mr. Cunin is very disappointed with the high handed manner in which the user assistance Director deals with his staff. He feels he is not consulted when projects are being bid and that he is then requested to work on user assistance contracts which cannot be accomplished with the equipment and facilities available at CRTO.

3.3.4 Anglophone expatriate staff

The anglophone staff consist of a "permanent" U.S. contractor employee who serves as team leader, a semipermanent photolab technician, and two visiting experts who teach the training course. The contract for the anglophone contractor was let in August 1985 and the chief of party arrived in September 1985. The photolab technician arrived sometime after that date and the two teaching consultants arrived in June of 1986. Anglophone training was provided at the CRTO without interruption from 1979 to June 1983. The numerous problems cited by the anglophone staff can be attributed to the hiatus that existed between June 1982 and September 1985. When anglophone expatriate staff was present at the CRTO only intermittently due to USAID management decision problems.

Training and other support services to CRTO have been provided by Spectral Data Corporation.

Khosrow Ebtehadj - Team Leader/Remote Sensing Lecturer - Spectral Data Corp.

Mr. Ebtehadj is a geologist who was Director of the Iranian Remote Sensing Center and has held various other high level scientific and management positions in remote sensing. His responsibilities as defined by his contract are to teach remote sensing courses at the CRTO, assist the Director of CRTO in promoting the CRTO in West Africa, act as interface between the contractor and USAID and assist in setting up the course curriculum. Based on the junior evaluator's visit to 4 West African countries visited by Mr. Ebtehadj, he has been very successful in promoting R.S. and the CRTO in Mauritania, Cameroon, Ghana and Niger. His teaching and other activities at the center have met with equal success. However Mr. Ebtehadj has been underutilized in his capacity as promoter of the CRTO and in his role as advisor to the Director. In fact, by his account, the Director has refused his assistance in resurrecting the defunct CRTO newsletter and has refused Mr. Ebtehadj permission to travel to Togo and Benin, nor has he requested any assistance in formulating CRTO goals and planning course curricula. This underutilization has been a source of fustration and inefficiency.

Mr. Ebtehadj feels CRTO training can and has been useful although in a limited fashion and would permit trainees to effectively map national resources. Mr Ebtehadj feels that introductory training should be of 2 months duration and long term training 4 months.

- Dr. Paul Mika - Geographer/Chief of Training at CRTO Spectral Data Corp. Dr. Mika has been teaching at CRTO intermittently since 1979 and has had a major impact on course work, field work project implementation, user assistance programs, the photolab, equipment and materials acquisition and in general

the direction, achievements and goals of the CRTO. The following comments and recommendations are taken verbatim from a short report prepared by Dr. Mika.

Comments on Training by Dr. P. Mika:

1. Including the present classes, 221 people have received remote sensing training at CRTO since July, 1978. Of this total, 169 have been francophone trainees and 52 anglophone. After completing the standard 3 months basic course, a total of 112 (87 anglophone and 24 anglophone) students continued with 3 months of advanced training and applications work. Average class size has been 11 basic and 5 advanced for the francophones and 7 basic and 4 advanced for the anglophones.

2. CRTO is planning to extend course duration to 9 months, with the intent of offering a "degree level" curriculum in cooperation with the University of Ouagadougou and perhaps other universities. More stringent requirements for admission and a more rigorous curriculum should be developed if CRTO expects to fulfill its academic ambitions. In addition, continuity in quality of instruction and facilities must be assured.

3. A 5 month francophone course in remote sensing and agro-statistics is currently being offered. CRTO should continue fostering specialized, discipline-oriented, "new techniques-type" of courses for former trainees and for national and multi-national agencies according to their needs.

4. Effort should be made to recruit trainees from planned and on-going projects of regional agencies where remote sensing techniques may be of value in carrying-out their missions.

5. Specialized short-courses for relatively low-level technicians and for middle management personnel should be offered-both in host countries and at CRTO.

6. Francophone trainees should be furnished with formal text books. Perhaps Purdue University's series of LAR's Mini-Courses could be translated into French.

7. In addition to currently planned digital image processing and other equipment for CRTO, consideration should be given to purchasing video recording and projection equipment for training, field work, and acquisition of remotely sensed data from aircraft.

8. Though not solely the responsibility of the training department, CRTO should make an effort to encourage those already trained to do applications work in their home agencies. This would require the identification of "real-world" problems of relevance to their agencies in which remote organizing would be of value; "sensitization" of their superiors regarding the efficacy of remote sensing techniquest; and guidance of project work both in the host country and at CRTO's facilities. CRTO can't just keep on training people - they must see to it that the training, in fact, pays off!

- Mr. Peter Gilruth - Forester/lecturer CRTO, Spectral Data Corporation

Mr. Gilruth is in charge of teaching applications methodology and general remote sensing to anglophone students; he also conducts training of a similar nature in French and is a major participant and leader of field excercises for anglo and francophone students. Mr. Gilruth believes CRTO had been useful to students. He believes CRTO should teach a one month introductory remote sensing course and believes that hands on advanced training should continue from 4-6 months. Mr. Gilruth, commenting on the abilities of the present class

of anglophone students stated: "of the six (students) in our current group of trainees one of (these) would probably not be able to complete a R.S. project. Two would be effective but slow. Two others could be very effective."

Mr. Gilruth made the following additional comments:

Comments on Training:

1. Successful applicants should have a university degree and possibly at least two year's professional experience in their field. The veracity of the applicant's documents needs to be checked.

2. Training classes and administrative staff should have the same working hours if possible. At least certain staff members who possess the necessary keys to supply rooms or refreshment areas should arrange to be on duty during the 12:30 to 3:00pm period.

- Mr. James Sorenson - Photolab Technician, Spectral Data Corporation

Mr. Sorenson's duties includes directing, managing, and maintaining the CRTO photolab. In addition he is in charge of photolab training and production in support of training and user assistance. Mr. Sorenson has worked intermittently at CRTO since 1979. Mr. Sorenson is in large measure responsible for the highly successful and efficient photolab. Mr. Sorenson has been responsible for initiating an environmental analysis consisting of soils and hydrological analysis of the effects of the CRTO photolab effluents on the water table of the immediate area of the facility. He has recommended that an efficient treatment system be procurred and emplaced at CRTO to avoid environmental degradation. The evaluation supports such an effort.

Mr. Sorenson has some doubts about the present CRTO management but feels that R.S. training should continue at CRTO and has been generally beneficial. He also feels that R.S. training could be better accomplished in the U.S.A. Mr. Sorenson believes introductory courses at CRTO should last 3 months and the advanced courses of 6-12 months should be provided to a select few. He believes that some CRTO trainees have been effectively trained while others are not and he feels that the best of these trainees can plan, conduct and complete a R.S. project in their country of origin. In addition he believes that CRTO trainees are not capable of initiating, budgeting or acquiring funds for CRTO.

Mr. Sorenson believes that if the photolab is to effectively support the training and user facilities group of the CRTO, it must acquire additional equipment and materials. These needs are described in other documents and will be further described in the main body of the report.

3.3.4 Other interviews

In an effort to better understand how CRTO interfaces with member states and other international and regional organizations the evaluator visited the CILSS project. The questions posed were how does CILSS gather data particularly as relates agricultural statistics (Diagnostique Permanent) and, can Remote Sensing (CRTO) be of assistance in such an effort?

- Dr. Solomon Abba - Director Administratif et Financier Comite Permanent Inter-Etats pour la Lutte Contre la Secheresse dans le Sahel

Dr. Abba is the Assistant Director fo CILSS and was interviewed in the absence of the Director. Dr. Abba was only mildly interested in the evaluator's questions

and referred the latter to Isa Ndiaye, assistant director of the project Diagnostique Permanent. Mr. Ndiaye was very effective in describing this effort. He stated that Phase I had attempted to assist each country to provide agricultural statistics but had had poor results. Phase II in operations since June 1985 had attempted to emplace a methodology for the collection of agricultural statistics in countries where none existed; the methodology was to be quick and cheap so that by October of each year production figures for each country would be available. This approach was tried in the Gambia and Cape Verde Islands but was unsuccessful because they didn't have the means to collect the data. So they ended up making pilot tests in each of these countries to develop the basis for a future effective methodology.

Phase III began in 1986 and is attempting to apply a new data collection methodology (not described) to Senegal and part of Mauritania which follows an FAO model. Secondly they are trying to recapture information from the last 30 years to establish a data base, thirdly they have decided to look at animal production. In conclusion this group has had a very difficult time collecting useful data and has still to develop a useful methodology for evaluating crop production and providing crop statistics in a timely manner.

Mr. Ndiaye introduced the evaluator to Mr. Mahaman Mustaffa of the statistics modeling branch of CILSS. A short discussion with Mr. Mustaffa indicated that with no reliable statistics modeling was impossible. Neither of these gentlemen had considered using annual remote sensing crop inventories and had never been approached by CRTO to do so. In view of the recent course on that subject offered by CRTO and its pertinence to CILSS and above groups it would appear that cooperative training and exchange of resources and data could assist both these regional entities to reach their stated goals.

3.3.5 USAID interviews

Interviews of the U.S. community were limited due to annual leave absences. Short discussions and debriefings were held with the Ambassador, the Acting USAID Mission Director, the Regional Project Officer and his acting replacement.

In summary, the Project Officer was pleased with the project's progress and its potential and recognized problem areas. The Ambassador was somewhat skeptical of new techniques such as AVHRR and LANDSAT to shed light on or solve certain problems and felt that conventional methods were more appropriate. The evaluator pointed out the fact that none of these techniques was effective alone, that each had its drawbacks but that a carefully integrated approach had not been tried and might be the solution to achieving goals of food security and a useful early warning system.

3.4 Conclusions on CRTO

3.4.1 Training

- courses too short
- not enough hands on training
- training not project oriented
- imagery not available
- francophone courses too theoretical
- francophone course on agrostatistics not taught by experts.
- teachers have no input into training method, courses, etc.
- students are poorly qualified
- anglophone course very good when taught by U.S. experts
- anglophone course poor to average when taught by African experts.
- inadequate training materials; visual aids books, etc.
- almost no texts or reading material for francophone course.

3.4.2 African staff opinions on CRTO

- management too autocratic
- staff allowed few inputs into CRTO activities
- inadequate preparation of staff

3.4.3 French staff opinions on CRTO

- poor organization
- no input by most staff members
- user assistance poorly run
- lack of project oriented approach
- equipment not appropriate or adequate

3.4.4 American staff opinions on CRTO

- American staff underused.
- poor organization
- little or no public relations by CRTO
- poor management
- no input into CRTO management
- user assistance not project oriented
- African staff poorly trained
- trainees unqualified

3.4.5 USAID and other organizational opinions

- USAID believes U.S. contractor doing good job
- Director has done good job Africanizing staff
- CRTO not disseminating information to other regional organizations such as CILSS.
- Director unable to delegate authority
- lack of Deputy Director.

C. Anglophone Country Visits

1. GHANA (July 17-21)

Contacts

Nationals

- Professor G.Benneh, Pro Vice Chancellory and Chairman of Geography Department, University of Ghana, Legon, Accra.
- G.O.Kesse, Director, Geological Survey Department.
- Emmanuael Hutchful, Cartographer, former trainee.
- Samuel A. Ashiaby, Lecturer in Cartography, Geography Dept, Unniversity of Ghana, former trainee.
- Mr. Tandeh, Director, Meteorological Service; Chairman, Ghanaian Remote Sensing Committee.

USAID and Others

- William S. Lefes, Director
- Lawrence A. Meserve
- Emmanuel Atiekue
- Emmanuel Darku, Training Officer

USAID is mildly supportive of the Center which is fairly peripheral to USAID's restricted bi-lateral program. It has gotten favorable reports from ex-trainees and visitors but sees support for country level applications as the major follow on need. Country level applications may be constrained by lack of local equipment and lack of familiarity on the part of local decision makers with the technology. USAID has requested funding (about $20,000) for the Geography Department's proposal to set up a small remote sensing unit for research and teaching purposes at the University and to service government requests for data. USAID would favor a regional or global funding source which Missions could tap for local remote sensing activities.

Ghanaian Officials and Ex-Trainees: Remote sensing has been incorporated into the curricula of the University's Geology and Geography Departments and ex-trainees are using materials acquired at CRTO for teaching purposes. A proposal for a small remote sensing center has been put forward to USAID and CRTO. Aerial photo interpretation is being emphasized for lack of satellite imagery. Remote sensing is reportedly being used in some development activities in Ghana (e.g., the Volta Valley development program) but lack of familiarity with the technology on the part of decision makers and budget/foreign exchange constraints limit more widespread application. A national remote sensing committee has been established to coordinate and facilitate cooperation of activities among government agencies but meets infrequently. The April '85 course was criticized for poor organization and lack of field-oriented, practical applications; a visiting cartographer noted the valuable assistance he had received from the Center's U.S. photo lab specialist but expressed dissatisfaction with the help received from the francophone staff. Nevertheless Ghanaians interviewed expressed hope that the CRTO would continue its mission so as to reinforce member country activities. Priorities for CRTO were expressed as (a) update imagery archives, (b) a well equipped photo lab, (c) receiving station.

2. LIBERIA (July 21-24)

Contacts

Nationals

- Dr. Emmuel M. Emeh, Deputy Managing Director/Operations, Forestry Development Authority.
- Jeremiah M. Lloyd, Technologist II, Forestry Development Authority, former trainee.
- Dr. Eugene H. Shannon, Director, Liberian Geological Survey (LGS).
- Beauford O. Weeks, Geologist, LGS
- Yarta O.T. Clemens, Geologist, LGS
- Antonanis N. Teah, Asst. Cartographic Engineer, LGS
- James A. Samolu, Hydrological Asst., LGS
- Sarbua Mannah, Photo Lab Technician, LGS
- Peter B. Pshorr, Geologist, LGS, former trainee
- Dr. Elihah E. Taylor, Deputy Minister, Ministry of Planning and Economic (MPE)
- Agnew Durley, General Coordinator, Project Monitoring and Evaluation Unit, MPE
- Estelle K. Liberty, Director, Economic Planning Division

USAID and Others

- Harry Marwitz, Acting Deputy Director
- Jerry Neptune, Agricultural Development Officer
- Chistopher M. Brown, Asst. Project Development Officer
- Cecilia Blake, Training Officer
- Jorgen Lissner, Deputy Resident Representative, UNDP

USAID: CRTO is rather peripheral to USAID concerns which are focused on macro economic issues, the general deterioration of the economy, widespread corruption and the application of the Brook Amendment to its program. Technical interventions, even scholarships for training at CRTO, seem unproductive in that environment. USAID also had a confusing experience with REDSO,

USAID/Ouaga and AID/Washington attempting to get imagery for an environmental assessment of a road project. It was recommended that CRTO do more to make its capabilities known in the region.

Liberian Officials and Ex-Trainees: Liberian applications of remote sensing are mainly with existing aerial photography. Use of satellites is limited by cloud cover and funding constraints to procure imagery. The technology is used when donor financing is available (e.g. a $2 million land capability survey now being designed for financing by UNDP/FAO for the Ministry of Agriculture and the Central Agricultural Research Institute).

The Forestry Development Authority (FDA) and the Liberian Geological Survey (LGS) have had staff trained at CRTO and emphasized that their technical competence had benefitted thereby. Most trainees have returned to work at their agencies (one has left for similar work in the private sector). Trainees have been able to apply their experience when specific project opportunities have come up (e.g., use of aerial photos on an FAO/AFDB/IBRD forestry project and work on an FAO publication "Forest Resource Mapping in Liberia") but, in the absence of projects with external financing, trainees are constrained by lack of equipment and materials and their agencies have a hard time making ends meet in the current stagnating economic and political situation. FDA has established a small remote sensing unit; it was set up by an Australian FAO expert and includes five technical staff all trained at CRTO and/or ITC in Holland. Both FDA and LGS expressed need for increased local capability through setting up a small national center. Both agencies support the continued functioning of CRTO for future training needs and as an intermediary professional link with the technology. They thought CRTO needed to do more to make itself known and available to national authorities. Both expressed keen frustration with economic and bureaucratic conditions which smother efforts of technical agencies to pursue their missions.

Discussions with trainees pointed to wide variations in quality of the anglophone program. One, trained in the December 1980 course by the Spectral Data staff, was very pleased with the program,

including its heavy emphasis on applications and field work. One trained in the course starting April 1985 by African staff complained of light schedules, frequent interruptions due to overworked faculty; poor organization and little field work. Also there were wide variations in treatment of students. In the former course, student morale was reportedly high, there was a good collegial atmosphere between the anglophone and francophone students and a solicitous attitude on the part of the CRTO staff. In the latter course the reverse was reported: coldness and indifference by administrative staff (although individual teachers and technicians were helpful), unwillingness to converse in English. Diplomas were reportedly handed out to the graduates in the bus on the way to the airport.

ANNEX II

ATTACHMENT NO. 2 (Block 18)

Statement of work

A. Objective:

The objective of the evaluation is to provide a comprehensive final report on project 698-0420, Regional Remote Sensing, West Africa (WARS). The evaluation will assess the degree to which the project met its Phase I objectives, identify lessons learned in implementing the project and, if warranted, make recommendations for future A.I.D. investment in the Regional Remote Sensing Center (Centre Regional de Teledetection de Ouagadougou, CRTO).

B. SCOPE OF WORK:

A final evaluation is required to assess Project 698-0420, West Africa Regional Remote Sensing (WARS I) obligated in FY 78 (2/24/78) for $3,375,000 and which terminates (PACD) 12/31/86. The project has been previously extended, most recently from 3/31/84 to the new PACD, due to earlier implementation delays.

1. The project should be assessed in terms of its stated intentions and projected outcomes. Wherein actual outcomes differ, the evaluation should identify the causes of the differences, e.g., assumptions in the Log Framework which did not prove correct, environmental factors and/or other factors outside the span of management control of the Regional Remote Sensing Center and A.I.D. It should also offer observations on whether and how achievement (or failure to achieve) of specific project outputs affected the achievement of the Project Purpose as a whole (Phase I in the original Grant Agreement; Phase II—developing Receiving Station capabilities—was never begun):

> Establishing a Regional Remote Sensing (RS) Center (hereafter, CRTO) which (a) trains African development officials in RS data applications, (b) provides services to users in applying RS data in development planning and resource management, (c) sensitizes African decision-makers with RS' potential in addressing their needs and (d) provides an information and reference service (archives) to classify, store and hold ready RS data for future application.

2. The evaluation should consider and comment on the institutional and financial viability of CRTO historically, from 6/83 - 6/86, and under a range of future options from no external (non-member or client) financing to current levels (about $900,000 year from AID and France) to increased levels.

3. The technical capacity of the CRTO should be evaluated in terms of performance with the equipment and technical assistance levels it currently has (e.g., is full use being made of that capacity? What are the limiting factors? etc.). The evaluation should also consider whether CRTO's current capacity limits the demand for its services and ability to achieve greater financial viability through increased member subsidies and user fees. In view of continuing and perhaps increasing other donor interest and support to CRTO, some recommendations should be made, subject to further detailed inquiry, as to appropriate future directions in technical capacity development. These options would include receiving station capacity (a French interest), digital tape processing capacity, Geographic Information System applications, etc. The staffing, organizational and cost implications of these options should be addressed in summary terms with cost estimates.

Finally, the evaluation should be carried out in as collaborative a fashion as possible with the CRTO leadership and staff, the representative(s) of the CRTO Regional Ministerial Management Committee (if identified or designated) and other donors, particularly the French (FAC) who have expressed interest in a collaborative evaluation.

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Evaluation Methodology

The evaluation should essentially pick up CRTO's development since the last evaluation prepared June 1983 by Mssrs. Paul and Stancioff and refer directly to the recommendations made in that report. As part of the above or in supplement to it, the evaluators should explicitly address the following items:

a] an interview sample of CRTO trainees to determine what use they have been able to make of their training, and development of recommendations to CRTO and A.I.D. on selection and/or training improvements;

b] a sampling of users to determine to what extent services provided by CRTO satisfied their needs and expectations, including the cost and timeliness of services;

c] technical concerns, including an assessment of how well CRTO uses its current capacity in equipment and technical staff, and the range of applications to which it is put;

d] institutional concerns, including the following:

-a financial history of CRTO from 6/83 to date including member country subsidies, external donor support and other income or revenues and its expenditures;

-staffing, African and expatriate, and the identification of patterns or trends and problems to be addressed;

-CRTO's relationships with member countries and its governing board, the Regional Management Committee, including issues of finance and satisfaction with the range of services provided;

-CRTO's efforts to promote its services, develop new clients and stimulate appropriate interest in Remote Sensing technology in addressing regional development planning and resource management needs; and

-facilities requirements, including the use made of existing space and any improvements recommended.

In carrying out the evaluation, the contractor shall provide the services of a full-time evaluation team leader, experienced in A.I.D. evaluation requirements, knowledgable about A.I.D. procedures in general, with working level fluency in French and preferably with experience in remote sensing in Africa. A highly competent remote sensing technician is required during much of the evaluation to assess current operations, assist in understanding other donor interest and efforts and integrating technology with institutional concerns. Shorter-term assistance in institutional analysis with emphasis on management and finance and

assistance in interviewing trainees or clients of CRTO are required and should be secured locally where possible at appropriate compensation rates. The contract should have provision for translation and secretarial services.

The evaluation report (see further below) may also cover other aspects of CRTO's operations and development and the context in which it functions but must fully cover the above to be acceptable to A.I.D.

C. Required Reports:

The contractor shall provide a report entitled Final Evaluation, Project 698-0420, Regional Remote sensing, West Africa. The report shall be in reproducible form, five copies each in English and French, and be addressed to both A.I.D. and CRTO. Its format will include:

1. An Executive Summary, including a summary of findings and recommendations.

2. Body of the Report

(N.B. The foregoing sections shall be about 35 pages and in both English and French.)

3. Annexes, including justifications or analyses leading to findings or recommendations, supporting data, etc. The annexes may be in their original language (English or French)and need not be translated.

The report shall be presented to A.I.D. and CRTO in draft form for review before preparation in final form.

Distribution of the report, both drafts and final, in both English and French will be as follows:

CRTO
AID/AFR/RA (2 copies)
USAID/Burkina Faso RLO
REDSO/WCA

ENTRE REGIONAL DE TELEDETECTION

OUAGADOUGOU

TABLE RONDE DES BAILLEURS DE FONDS

PROCES - VERBAL

OUAGADOUGOU, 28 - 29 JUILLET 1986

Suite à sa réunion de 1985 qui a noté avec satisfaction les résultats de la Phase I du Centre Régional de Télédétection de Ouagadougou, le Comité de Gestion Régional a décidé d'entamer les démarches nécessaires à l'effet de mobiliser les ressources nécessaires à la Phase II du Centre.

C'est dans ce cadre qu'a été organisée les 28 et 29 Juillet 1986 dans la salle de réunion de l'Hôtel Silmandé, à OUAGADOUGOU, une Table Ronde de Bailleurs de Fonds en vue du financement de cette Phase.

Ont pris part à cette table ronde, les représentants des organismes ci-après :

- le Centre Canadien pour la Recherche et le Développement International (C.R.D.I.) ;
- FRANCE : Ministère de la Coopération ;
- la F. A. O. ;
- Le Fonds Européen de Développement (F E D) ;
- le P N U D ;
- l' U N S O ;
- l' U S A I D.

Le C.R.T.O. était représenté par les membres du Bureau du Comité Ministériel de Gestion :

- le Ministre Délégué auprès du Président de la République chargé du Plan et de la Statistique du Bénin, Président du Comité Ministériel de Gestion ;
- le Ministre de l'Equipement du Burkina Faso, 1er Vice-Président ;
- le Ministre des Transports et des Travaux Publics du Mali, 2e Vice-Président ;
- le Ministre des Mines et de l'Energie du Cameroun, 4e Vice-Président ;
- le Secrétaire Général du Ministère des Finances du Niger représentant son Ministre, 3e Vice-Président.

BEST AVAILABLE

CEREMONIE D'OUVERTURE

A l'ouverture de la séance, le Ministre de l'Equipement du Burkina Faso a souhaité la bienvenue aux délégations en terre libre du Burkina. Il a déclaré que le Peuple Burkinabè et son Président, son Excellence le Capitaine Thomas SANKARA apprécient hautement les résultats auxquels est parvenu le CRTO à l'actif duquel, 262 cadres ont été formés et 37 projets conduits.

Il a ensuite remercié la France, les USA et le Canada pour leurs contributions au succès de la 1ère phase du Centre.

Dans son allocution d'ouverture, le Président du Comité Ministériel a remercié le Burkina Faso, pour l'accueil combien chaleureux que les délégations ont reçu depuis leur arrivée à OUAGADOUGOU.

Après un bref rappel historique du CRTO, il a situé l'objectif de la présente réunion qui est de : mobiliser les ressources en vue du démarrage effectif de la phase II du CRTO.

Il a remercié les bailleurs de fonds et exprimé sa satisfaction sur les contacts que le Bureau a eus avec eux, et convié les participants à faire des propositions concrètes au cours de la présente réunion.

Il a enfin rappelé les points essentiels de discussions, tels qu'ils sont proposés dans l'ordre du jour.

Après ces deux déclarations introductives, les participants ont adopté l'ordre du jour suivant :

- Exposé du rapport de présentation ;
- Etablissement d'un schéma de financement ;
- Elaboration d'un planning d'exécution des travaux ;
- Projet de Procès-verbal ;
- Séance de clôture.

BEST AVAILABLE

RAPPORT DE PRESENTATION DU C.R.T.O.

Sur la base de cet ordre du jour, le Directeur Général du C.R.T.O. a fait une présentation claire et exhaustive du CRTO.

DEBATS

C.R.D.I. : intéressé à toutes activités de développement le CRDI continuera à appuyer le CRTO dans le cadre des projets nationaux spécifiques.

FRANCE : après avoir rappelé qu'elle a jusqu'ici soutenu la Formation, l'Assistance aux Utilisateurs au CRTO, la France s'est déclarée prête à contribuer pour 30.000.000 FF dans la Phase II et a son souhait que d'autres pays s'associent à elle pour les investissements.

F. A. O. : présente en qualité d'observateur, la FAO Ouaga regrette de n'avoir pas eu le temps de contacter son Siège à Rome. Elle est tout à fait de tout coeur avec le CRTO et souhaite que les bailleurs de fonds apportent leurs contributions et tout le soutien nécessaire à son développement.

Elle a suggéré au CRTO de signer un accord de coopération avec le Siège FAO.

F. E. D. : pour le FED, le CRTO, est éligible sur le FED Régional Afrique de l'Ouest. Son Délégué à indiqué les procédures de présentation des projets.

Le Délégué a ensuite assuré que le FED appuiera le CRTO tout en indiquant toutefois qu'il lui est difficile de se prononcer formellement avant la réunion prochaine des ordonnateurs nationaux.

G. T. Z. : dand le message qu'il a envoyé, à l'intention de la table ronde, le GTZ s'engage à intervenir dans la Formation, dans l'exécution de projets dans divers Etats et dans le besoin en équipements nécessaires pour ces projets.

P N U D : est intéressé au programme de développement du CRTO et y a contribué par des bourses de formation, par l'envoi de 2 Volontaires et le financement de la présente table ronde. Le PNUD est en train d'étudier le montant de sa contribution à la Phase II dans le cadre de son programme régional.

U N S O : manifeste beaucoup d'intérêt pour le CRTO avec lequel elle peut beaucoup faire dans le cadre de la lutte contre la désertification et la sécheresse. La contribution de l'UNSO reste acquise pour la Formation.

U S A I D : l'USAID Ouaga supporte de tout coeur le CRTO et sa Phase II mais ne peut pas préciser l'importance de l'enveloppe financière, compte tenu des restrictions budgétaires actuelles et de l'évaluation en cours.

Toutefois, la représentation assure que l'USAID poursuivra son appui au Laboratoire Photographique et à la Formation.

Après que le Directeur Général du CRTO ait répondu aux questions des uns et des autres, le Président de séance a fait le point en retenant que le Comité va demander au FED de lui financer une étude de spécification pour l'installation à Ouagadougou d'une station avec un maximum d'universalité.

Les termes de référence de cette étude porteront sur :

- la réception simultanée de LANDSAT et de sPOT ;
- l'exploitation des potentialités des deux satellites ;
- le meilleur ratio coût/bénéfice ;
- la possibilité qu'offrent les opérateurs d'accorder l'exclusivité de commercialisation des images au CRTO.

BEST AVAILABLE

SCHEMA DE FINANCEMENT

A l'issue des discussions sur ce point, le schéma suivant de financement a été retenu :

	OPTION LANDSAT ET SPOT
A - STATION	
1) Réception	
- Antenne	
- Réception	
- Enregistreurs	FED, FRANCE
- Rechanges	
- Option Météo	
- Formation	
2) Chaîne de traitement	
- Prétraitement	
- Restitution CCT et FILM	FED, FRANCE
- Traitement	
- Rechanges	
- Formation	
3) Energie	FED
4) Laboratoire Photographique	USAID
5) Fonds de roulement	CRTO
B - EQUIPEMENT POUR LA FORMATION ET BOURSES	FED, PNUD, UNSO, USAID, FAO, [illegible]
C - APPUI ADMINISTRATIF ET DE GESTION	PNUD
D - INFRASTRUCTURE	FED
E - PROJETS SPECIFIQUES (de soutien au CRTO)	GTZ, CRDI.

PLANNING D'EXECUTION

Le planning d'exécution suivant a été adopté :

I - 15/8 - 1. Rédaction des Termes de références de l'étude, élaboration du dossier et de l'appel d'offres.

2. Envoi à la Commission des Communautés Européennes des Termes de références.

II - 15 SEPT.

. Communication des Termes de références au CNTP

. Communication de la short liste des bureaux d'études au CNTP

III - 30 SEPT.

Lancement de la consultation pour l'étude technique et l'élaboration d'appel d'offres.

IV - OCT. - NOV. 1986

Réunion des ordonnateurs nationaux du FED sur la Coopération régionale.

V - 30 NOV. 1986

Dépot des offres de l'étude technique.

VI - 31 DEC. 1986

Adjudication de l'étude

VII - 15 JANV 1987

Signature du contrat d'étude technique et élaboration du dossier appel d'offres.

VII - 31 MARS 1987

Dépot du dossier d'études par le Consultant.

Approbation du dossier par le Comité Ministériel de Gestion.

IX - 30 Avril 1987

Signature des différentes conventions : FAC, CCF, etc...

X - 31 MAI 1987

Lancement de l'appel d'offres pour les travaux

XI - 31 AOUT 1987

Dépôt des offres

XII - 31 OCT. 1987

Dépouillement et adjudication

XIII - 30 NOV. 1987

Démarrage des travaux

Ont signé :

Pour le Bureau du Comité Ministériel de Gestion du C.R.T.O.	Pour les partenaires au développement
Le Ministre Délégué auprès du Président de la République chargé du Plan et de la Statistique de la République Populaire du Bénin, Président du Bureau Ministériel	Délégation de la France
Le Ministre de l'Equipement du Burkina Faso 1er Vice-Président	Délégation de l'USAID
Le Ministre des Transports et des Travaux Publics de la République du Mali, 2e Vice-Président	Délégation du FED
Le Ministre des Mines et de l'Energie de la République du Cameroun 4e Vice-Président	Délégation du CRDI
Le Secrétaire Général du Ministère des Finances de la République du Niger, représentant son Ministre, 3e Vice-Président	Délégation du PNUD
	Délégation de l'UNSO
	Délégation de la FAO

Annex IV CRTO User Assistance Projects

PROJECT DESCRIPTION	USER	COUNTRY	FINANCING AGENCY
- HYDROLOGY			
- Remote sensing applied to dam site studies.	ONBAH	BURKINA	CRTO/FAC 1979
- Hydrographic study (road proposal Barasalogo-Lanfiera).	LAVALIN INTERNATIONAL INC.	BURKINA	LAVALIN/ACDI 79
- Hydrographic study (road proposal PO-BITOU).			
- Dam inventory and hydrologic analysis.	LAVALIN INTERNATIONAL INC.	BURKINA	LAVALIN/ACDI 79
- Remote sensing and watershed management. 1:200,000 mapping	Direction Gen. de l'Environnement	BURKINA	MIN. ENVIRONNEMENT ET TOURISME CRTO/FAC - 1980
- Map updating and water volume estimation using landsat imagery.	LAKE VOLTA AUTHORITY	GHANA	CRTO/CRDI - 1981
- Water resources monitoring by satellite imagery (Pissila Region).	ONBAH	BURKINA	ONBAH-CRTO/CRDI 1981
- Landsat data integration for water volume estimation (Dakiri dam).	ONBAH	BURKINA	ONBAH/CRTO/CRDI 1981
- Water resource monitoring using remote sensing (Lake Volta).	Institut Geographique du Burkina	BURKINA	IGB-CRTO/FAC 1982
- Remote Sensing applications to mapping of sudanian water resources (region of Ouahigouya).	IGB	BURKINA	IGB-CRTO/FAC 1982
- Feasibility study for regional hydrological application. (Region of Yaeres)	Direction de l'Amenagement du territoire YAOUNDE	CAMEROON	CRTO/FAC 1983
- Research for appropriate water retention sites. (YAKO-LEO road project)	GAUFF - JBG	BURKINA	GUAFF - JBG
- Water retention site study by means of photo-interpretation. (ranch of NAZINGA)	Project NAZINGA ranch d'animaux sauvages	BURKINA	USAID-CRTO/CRDI

PROJECT DESCRIPTION	"SER	COUNTRY	FINANCING AGENCY
- Research for appropriate water retention. (YAKO-LEO road project)	GAUFF-JBG	BURKINA	GAUFF - JBG
- Water retention site study by means of photo-interpretation. (ranch of NAZINGA)	Project NAZIN-GA ranch d'animaux sauvages	BURKINA	USAID-CRTO/CRDI 1984
- Daily analysis of 22 water sites; Cartography at 1:50,000 scale.	Direction de la Peche et de la Piscic. BOBO-DIOULASSO	BURKINA	GTZ 1984
- Topographic analysis of water height/ surface using LANDSAT; a study of small dam siting potential imagery; for 18 dams using photo-interpretation.	CIEH	BURKINA	UNESCO 1985
- Terms of reference on the application of remote sensing to water resource studies in Africa.	CIEH	WEST AFRICA	CIEH 1985
HYDROGEOLOGY			
- Remote sensing for well drilling site selection. (Black Volta)	Projet Hydrau lique villa-geoise-Volta Noire Haer	BURKINA	CRTO/FAC 1982
- Remote sensing for well drilling site selection. (Tema village)	Administration locale de Tema	BURKINA	CRTO/FAC 1983
FOREST MANAGEMENT			
- Use of Remote Sensing in a forestry planning program. (region of FADA-N'GOURMA)	Direction de l'Amenagement Forestior et du Reboisement (Projet Bois Village)	BURKINA	CRTO/FAC 1979

PROJECT DESCRIPTION	USER	COUNTRY	FINANCIG AGENCY
- Deforestation analysis.	Direction du Developpement Regoinal.	COTE D'IVOIKE	CRTO/FAC 1980
- Forestry resource analysis. (region of Ouagadougou)	Direction de l'Amenagement Forestier et du Reboisement (Projet Bois de Village)	BURKINA	Suisse-CRTO/FAC 1985
- Forestry inventory by photo-interpretation.	AVV	BURKINA	CCCE 1985
- Application of remote sensing to forest inventory and management. (Forest of DINDERESSO)	Diretion de l'Amenagement Forestier et du Reboisement	BURKINA	US AID-CRTO/CRDI 1982
- Soils cartography of the Forest Reserve of BISSIGA.	Direction de l'Amenagement Forestier et du Reboisement	BURKINA	MIN.ENVIRONNEMENT ET TOURISME CRTO/ CRDI.
RURAL DEVELOPMENT			
- Landuse study using LANDSAT. (BANDAMA, C.I.).	Programme Onchcercose	COTE D'IVOIRE	OMS- CRTO: CRDI 1980
- LANDSAT analysis of Landuse. (Nord-Est C.I.)	Programme Onchocercose	COTE D'IVOIRE	OMS-CRTO: OMS- CRTO/FAC 1980
- LANDSAT analysis from aerial photos.	Conference Episcopal du BURKINA	BURKINA	Conference Episcopale - 1981
- Landuse mapping and soils mapping.	Universite Nationale du BENIN	BENIN	CRTO : CRDI 1983

ANNEX V.

Equipment and Services of CRTO Photographic Laboratory

A. Equipment

- Enlarger, 10 x 10 inch, Durst, with Dichroic Color Head.
- Enlarger, 4 x 5 inch, Durst, with Dichroic Color Head.
- Color Analyzers
- Versamat, Kodak, Model 11, CL, black-and-white continuous film processor.
- Color Processor, 35mm to 16 x 20 inch film and paper, King Concepts.
- Diazo Contact Printer, Folex (West Germany).
- 20 inch Diazo processor.
- Densitometer, Transmission/Reflection, MacBeth.
- Sensitometer, E.G. & G., Mark IV.
- Color Composite Printing System (Vacuum Printing Frame, Register Punch and Point Light Source).
- Photo Print Dryer, 16 inch, Arkay Model RC-1601.
- Photo Film Dryer, King Concepts.
- Photo Sinks, Temperature Controlled.
- Chemical Mixers.
- Silver Recovery System.
- Mounting Press and Equipment.
- Light Tables.
- Various equipment necessary for maintenance.

B. Services

- B & W prints 16 x 24 inches.
- Color prints 16 x 24 inches.
- B & W transparencies 16 x 24 inches.
- Color transparencies 16 x 24 inches
- Consinuous production of aerial photographic prints.
- Processing of 35mm and other film.
- Diazzo printing.
- Colour composites.

Additional capabilities include:

- A browse file of LANDSAT data for each nominal scene center in West Africa. (about 1500 scenes)
- Production of special products to support projects or training.
- Photographic training course which provides training in:
  a. Mechanical and physical properties of B&W film and paper;
  b. Basic B&W chemistry;
  c. Fundamentals of cameras;
  d. Basic optics;
  e. Basic B&W sensitometry;
  f. Mechanical and physical properties of color film and paper;
  g. Color chemistry;
  h. Color sensitometry;
  i. Light & light soucres, electromagnetic spectrum.

ANNEX VI

Cost of Imagery and Its Effect on Remote Sensing in West Africa

In 1972 costs of imagery and its effect on remote sensing in West Africa was $12.00 per image. Today the basic cost of the equivalent data is $360.00 for MSS and $640.00 for TM. In 1972 a user could buy negative transparencies of channels 4, 5 and 7 for $4.00 each, by compositing these through the use of appropriate photographic techniques and enlarging the product, any individual could produce outstanding color materials for less than $250.00. At that time a multi-temporal data set of a 35,000 mile area, using Landsat acquisitions from four dates and enlarging these to a scale of 1:250,000 (providing the user with black and white imagery of 3 channels four times and colors composits for all 4 seasons) cost $1,500.00 for materials. Today the cost of acquiring and producing comparable bulk products is $4000.00 while an equivalent computer tape generated product would cost a minimum of $16,400 for a TM scene.

The reasons for this increase are singularly few and simple in the view of the evaluators and are:

1. The elimination of subsidies to the Landsat program.

2. The change in product format imposed on the U.S.G.S. an industry which increased costs but did not necessarily improve quality.

3. The totally erroneous notion that resource analysis can best be conducted using computer enhancements and therefore computer tapes of Landsat imagery. These products have been promoted throughout the world to the detriment of 3rd world users who cannot afford the costs of the tapes and the computer equipment necessary for their analysis nor the complex training required for such analysis. Furthermore an erroneous impression has been fostered suggesting that

computer enhancement and analysis is more quantitative and thus more effective, leading many scientists to the conclusion that multidate comparative analysis is no longer necessary for most tasks.

The lack of imagery, its increased cost and its misuse has increased the cost and decreased the benefits of this approach to resource mapping and management. Instead of using Landsat and other satellite imagery for remote sensing surveys of Africa, resource analysts continue to rely heavily on aerial photo missions at a much greater cost and without the advantages of the previously inexpensive, and of particular importance, repetitive Landsat or satellite coverage.

Computer enhanced imagery, although useful, costs at least 10 times more than bulk or conventionally (photographically) treated imagery. Thus a computer enhanced set of 13 images of Senegal cost approximately $30,000.00 in 1983 while the bulk version of this set of imagery plus five other sets of different dates cost $13000. Further massive costs are incurred by applying computer analysis techniques to the interpretation which does not necessarily improve the quality of the interpretaton since the parameters evaluated must in both cases be interpreted by the same person.

A recent "bulk image", thematic interpretation of Senegal funded by USAID provided the government of Senegal with 10 different maps based on LANDSAT image interpretation and field work. This analysis cost $10/km2 or $1.00/km2 for each theme mapped. Had computer products been used at todays costs and using the computer analysis techniques available it is estimated that the imagery products alone would have cost at least $500,000.00 whereas the analysis might well have reached $20,000,000. Such costs are not beneficial and are no longer as advantageous as they once were even when compared to aerial photographic coverage analysis.