

unclassified
CLASSIFICATION

PROJECT EVALUATION SUMMARY (PES) - PART I

Report Control
Symbol U-447

1. PROJECT TITLE ETMA Ruhengeri Environmental Analysis and Management	2. PROJECT NUMBER 698-0427	3. MISSION/AID/W OFFICE OAR
	4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) <input checked="" type="checkbox"/> REGULAR EVALUATION <input type="checkbox"/> SPECIAL EVALUATION	

5. KEY PROJECT IMPLEMENTATION DATES	6. ESTIMATED PROJECT FUNDING	7. PERIOD COVERED BY EVALUATION
A. First PRO-AG or Equivalent FY <u>85</u>	A. Total \$ <u>646,000</u> B. U.S. \$ <u>646,000</u>	From (month/yr.) <u>7/85</u> To (month/yr.) <u>3/86</u> Date of Evaluation Review <u>3/27/86</u>
B. Final Obligation Expected FY <u>85</u>		
C. Final Input Delivery FY <u> </u>		

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. Freeman flowchart should be regularly updated and used by RRAM staff	RRAM/Weber	6/15
2. Detailed outline of Phase I final report should be discussed with relevant GOR agencies based on mutually agreed upon specific outputs from the database analysis.	RRAM/Weber	5/31
3. Short-term assistance in preparation of final report should be investigated by OAR.	OAR/Dupras	5/31
4. Determine GOR agency to serve as institutional base for RRAM Phase II.	OAR/Fuchs, Sisson	8/31
5. Amend SECID contract for RRAM phase II	AFR/RA	8/31
6. Prepare and negotiate new memorandum of understanding with GOR for RRAM phase II.	OAR/Fuchs, Depp, Sisson	10/31
7. Strengthen Ruhengeri office with additional technicians to address agro-forestry, soil erosion and fertility, and meteorological and hydrological concerns.	RRAM/Weber	12/31
8. Phase II should coordinate and pool resources with existing institutions, programs and Projects and promote dialogues with local communities.	RRAM/Weber OAR/Fuchs and Sisson	10/31

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

<input type="checkbox"/> Project Paper	<input type="checkbox"/> Implementation Plan e.g., CPI Network	<input checked="" type="checkbox"/> Other (Specify) <u>M.O.U.</u>
<input type="checkbox"/> Financial Plan	<input type="checkbox"/> PIO/T	<input checked="" type="checkbox"/> Other (Specify) <u>Contract with SECID</u>
<input type="checkbox"/> Logical Framework	<input type="checkbox"/> PIO/C	
<input type="checkbox"/> Project Agreement	<input type="checkbox"/> PIO/P	

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

A. Continue Project Without Change

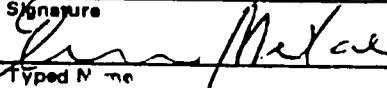
B. Change Project Design and/or Change Implementation Plan

C. Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER FUNDING PARTICIPANTS AS APPROPRIATE (Names and Titles)

D. Dupras, Project Officer - OAR/Rwanda
I. Mutungirehe, Director General Forestry, MINAGRI

12. Mission/AID/W Office Director Approval

Signature 

Typed Name Emerson Melaven

Date 5/28/86

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9. Phase II field activities should concentrate on analysis and management actions in Ruhengeri prefecture.	Weber/OAR	8/31
10. More emphasis should be placed upon short-term training in Phase II both in-country and abroad.	RRAM/Weber OAR/Fuchs and Sisson	10/31
11. Phase I final State of Environment Report due.	RRAM/Weber	9/30
12. Encourage the GOR to commit financial and personnel resources to Phase II of RRAM	RRAM/Weber OAR/Fuchs and Sisson	10/31

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

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A. <input type="checkbox"/> Continue Project Without Change
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C. <input type="checkbox"/> Discontinue Project

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Signature _____

Typed Name _____

Date _____

7

EXECUTIVE SUMMARY

Introduction

From February 26 - March 14, a team carried out an evaluation of the first phase of the "Natural Resource Analysis and Management Project in the Ruhengeri Prefecture" (RRAM). Team members were Robert Winterbottom (IIED), Ed Toth (USAID/AFR/TR/SDP), John Gaudet (REDSO/ESA) and Pheneas Biroli (DGF/MINAGRI).

The specific objectives were to review :

1. the status of project implementation
2. project financial status
3. technical assistance
4. the comprehensiveness of data and reports
5. the degree of coordination with the GOR offices involved
6. Phase II proposal and propose recommendations for future actions.

Project Description

The RRAM project was developed as part of the USAID/ETMA program. The project's focus was on one geographic area, the Ruhengeri Prefecture. It was to work with the GOR and donor agencies to quantify the regional natural resource base and identify and address environmental problems associated with intensified economic development and land use within the prefecture.

Goals and Objectives

Phase I of RRAM was to assist the Prefecture in establishing an adequate environmental information base from which effective regional resource management strategies and interventions could be developed. It also was to assist the GOR in institutionalizing integrated resource management practices in its development decisions. This was an 18 month effort financed directly from the ETMA project. Phase II will use the conclusions reached in Phase I to develop and demonstrate resource intervention techniques pertaining to specific resource issues. It will also work with the GOR in institutional development in resource planning and environmental assessment. This phase will be financed primarily by USAID/Rwanda on a bilateral basis.

Project Activities and Outputs

Four types of activities were undertaken in Phase I

- 1) a systematic collection of available data on physical, biological and human resources in the prefecture;
- 2) an analysis of the data base to determine resource trends and to identify critical environmental issues;
- 3) preparation of a "state of the environment" report (in progress) including priority problems and proposed resolutions and,
- 4) institutional development within the GOR through training/seminars and workshops.

The data base was generated through the use of a permanent field staff (the field manager Bill Weber and his assistant Vincent Nyamulinda), four short term expatriate consultants, several in-country consultants and temporary field staff. The GOR, primarily through the DGF and the University of Rwanda, provided technical, logistical and advisory support. Major reports were produced on forestry/agroforestry, socio/ecological interactions, water resources, agroecology, mining impacts, soil conservation, and resource data base development and management including resource maps of the prefecture. RRAM Phase I is presently in the process of synthesis and analysis of this data base to produce the final "state of the environment" report. The overall quality of the information developed for the data base is good. A more formal framework stating issues, objectives and data needs would have helped make more efficient use of consultants. It would have increased the compatibility of outputs produced making the synthesis and analysis process easier.

Institutional development has occurred in both a formal and informal manner. The assistant manager has received formal training in resource management through project and USAID/Rwanda sponsorship. Now that he has become a GOR official, his talents will be carried into the government. RRAM also sponsored a formal prefectural seminar on resource management which was well attended by local and national GOR officials. Specific recommendations were made for future GOR actions. RRAM has also made a specific effort to use host country institutions (University of Rwanda) and temporary Rwandan technicians in its activities to build local expertise in natural resource management. Informal institutional development has taken place through continued interactions with the GOR on RRAM objectives and GOR policies as they affect RRAM and the prefecture. The degree of interest and involvement of GOR has increased significantly and should be formalized in Phase II.

Project Financial Situation

The RRAM Phase I field manager has done a very good job in terms of financial management. Records on expenditures are all in order. Approximately 50% of the budget has been expended. The remaining funds will be adequate to cover projected costs mainly in data analysis, preparation of the final Phase I report and seminars/workshops on the results of the Phase I activities. Additional expenses will be involved in the preparation of a detailed Phase II scope of work and work plan:

OAR/Rwanda Comments on Evaluation

The majority of the recommendations made in the Evaluation report for Phase I of the project were directed at actions to be taken by the project field office to improve project efficiency before the PACD, September 30, 1986. In general OAR is supportive of these recommendations as they support project objectives and lay the foundation upon which Phase II will be built.

Phase II recommendations, as detailed in the Evaluation Report, are accepted by CAR with the exception of the definition of Phase II's training function and the establishment of a new formal structure to develop institutional linkages. OAR feels that long-term training is not practical during the two year life of Phase II and wants to emphasize short term, in-country training as much as possible. OAR will try to address the long term training of Rwandans in environmental disciplines through other AID programs and projects.

Following discussions of the evaluation report by OAR, RRAM and the GOR staff, it was decided that it would not be practical to encourage the creation of a new formal structure ("comite de gestion", etc.) to facilitate communication as recommended in the Evaluation Report. It is now thought that RRAM could be more effective in Phase II in establishing an institutional network if it integrates its activities with those of a GOR agency, preferably the Agriculture Survey Unit of the Ministry of Agriculture in Kigali.

OAR was disappointed that the Evaluation Report glossed over RRAM's inability to achieve a major project objective. Section 6.3 B of the MOU stated that one of the two long term objectives was "to assist the Government in institutionalizing integrated resource management practises in its development decisions at the prefectural level". The evaluation report acknowledged RRAM's inability to achieve this objective in its recommendations by stating that the "MINAGRI should continue to be encouraged to organize some type of formal structure" to develop institutional linkages. OAR realizes that the Direction General of Forests was not very supportive in assisting RRAM in establishing the institutionalization process within the Ministry or in the Ruhengeri Prefecture. Clearly Phase II must deal with this deficiency. OAR will address the institutionalization issue by requiring GOR's financial and personnel commitment to the project and its assistance in finding an institutional home for the project during Phase II. We expect to have the GOR contribute 25% of the project's costs and in the Memorandum of Understanding will mandate both the GOR and OAR to take a more active role in the project through review of project annual work plans.

RUHENGARI RESOURCE ANALYSIS AND MANAGEMENT PROJECT (RRAM)

**Report of the Project
Evaluation Mission**

**Robert Winterbottom
Edward Toth
John Gaudet**

**Kigali/Ruhengeri
March 14, 1986**

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List of Abbreviation

CCDFP	Centre Communal pour le Développement de la Formation Permanente
CIC	Conseil Interministériel de Coordination
CPEF	Prefectoral Commission on Forests and Environment
DGF	Direction General des Forets
ETMA	Environmental Training and Management in Africa
FSIP	Farming Systems Improvement Project
GIS	Geographic Information System
GOR	Government of Rwanda
IIED	International Institute for Environment and Development
ISAR	Institut des Sciences Agronomiques du Rwanda
OAR	Office of AID Representative
REDSO	Regional Economic Development Support Office (USAID)
SECID	South-East Consortium for International Development
UNR	Université Nationale du Rwanda
USAID	United States Agency for International Development

1. INTRODUCTION

From February 26 - March 14, a team carried out an evaluation of the first phase of the "Ruhengeri Resource Analysis and Management Project" (RRAM). The evaluation team was composed of Robert Winterbottom, contracted by SECID to be the team leader; Ed Toth, representing the Environment and Natural Resources Office of the Africa Bureau of USAID, John Gaudet, the regional environmental officer from REDSO/Nairobi, and Pheneas Biroli representing the Ministry of Agriculture of the Government of Rwanda. The evaluation mission also benefitted from the nearly full-time participation of Bill Weber, ETMA/RRAM Field Manager and Vincent Nyamalinda, Assistant Field Manager. David Dupras of USAID/Rwanda provided support to the mission and participated in several meetings with government officials. Earle Buckley, the SECID project coordinator assisted the evaluation by providing documentation and by organizing a meeting in Washington with Peter Freeman, Winterbottom, Toth and himself just prior to their departure, to review the results of Freeman's mission in January, and other useful background for the evaluation mission.

The specific objectives of the evaluation as contained in Section 9 of the project Memorandum of Understanding, were to:

1. Assess the status of project implementation;
2. Review the use of project funds;
3. Review the use of technical assistance;
4. Review the comprehensiveness of the data collected and reports provided by the project;
5. Review the degree of coordination with various offices of the Government of Rwanda (GOR);
6. Recommend modifications for continuing the project and for Phase II activities.

Subsequent OAR direction upon arrival placed particular emphasis on item 6, the direction and activities of Phase II. Therefore, the evaluation team focussed its efforts on this objective; although, a critical assessment of Phase I activities was a necessary prelude. The evaluation team's goal was not only to assist in defining Phase II of RRAM but to use the evaluation of Phase I as a learning exercise. Both the accomplishments and problems encountered in Phase I should prove helpful to USAID and GOR in the design of projects of a similar nature.

During the course of the two week evaluation mission, the team reviewed available project documents and reports, interviewed key government personnel involved with the project, and visited the project offices and survey sites. (See Annex A, Schedule of Visits.) The team also consulted with the USAID Director and staff during several meetings, and met individually with six different consultants that had worked or were working with the RRAM project.

2. PROJECT DESCRIPTION

2.1 Origin

The Ruhengeri Resource Analysis and Management Project (RRAM) was developed by AID through its regional project, Environmental Training and Management in Africa (ETMA) with the the South-East Consortium for International Development (SECID). The RRAM project evolved from a proposal for a "Cooperative Regional Demonstration Project" (CRDP) within the ETMA group of projects. The Ruhengeri CRDP was to differ from earlier ETMA sponsored projects by a) concentrating the project resources in one particular geographic area, b) working closely with other projects and donor agencies operating in the area, to complement and extend ETMA's limited resources and c) developing an approach that would assist the GOR to more efficiently utilize its natural resources and sustain economic development. It was felt that such an approach or methodology, once developed, could be adapted to other areas in Rwanda and elsewhere in Africa. This initial project concept, which was focussed on the development of a replicable integrated natural resource planning and management methodology, was substantially reworked resulting in the design of a new Ruhengeri Resource Analysis and Management Project. Following the preparation of the project design paper in December 1984, a Memorandum of Understanding for the project was signed by the GOR, SECID and the United States in June, 1985.

2.2. Goals and Objectives

The RRAM project was designed to "help sustain the regional natural resource base" and to minimize environmental problems associated with intensified economic development and land use within the Ruhengeri Prefecture of Rwanda. Phase I of RRAM was to assist the Prefecture in establishing an adequate environmental information base from which effective regional resource management strategies and interventions could be developed by the Government of Rwanda. Equally important was providing assistance to the Government of Rwanda in institutionalizing at the prefecture level integrated resource management practices in its development decisions. As described in the project design paper, the integrated approach to natural resource planning and management recognizes that all natural resources are functionally interconnected and interdependent. By analyzing these interdependencies, integrated planning and management can minimize counterproductive efforts and maximize sustained productivity. In order to be successful, it was argued that the RRAM project would have to provide the GOR with information useful for identifying negative or positive trends in resource use and management, and for formulating GOR policies and programs necessary to deal with these trends.

2.3 Overview of Project Activities

The project was designed in two phases: Phase I, the resource inventory and assessment, to be financed directly with ETMA project funds, and Phase II, the demonstration and resource management interventions, to be financed, at least in part, by USAID/Rwanda on a bilateral basis. Each phase was to be executed over a period of 2 years; however, delays in officially approving Phase I caused it to be officially shortened to 18 months (June 1985 - November 1986) according to the project Memorandum of Understanding. Because of the need to budget and expend funds according to fiscal year calendar, it is now necessary to complete Phase I activities by September 1986 (16 months after the project began) and to initiate Phase II in October 1986.

Four types of activities were to be undertaken in the first phase of the RRAM project.

- 1) a systematic collection of available data pertaining to biological, physical and human resources in the prefecture;
- 2) analysis of this information base to determine trends on resource use and to identify critical environmental problems;
- 3) preparation of a "state of the environment" report including priority problem and proposed solutions, and;
- 4) organization of workshops/conferences to foster collaboration among the various government agencies and to discuss the priority areas for action and the most effective means of intervention. The project was also to provide "on-the-job" training to GOR officials and technicians, to expose them to the inventory/analysis methodology and to foster the incorporation of the RRAM methodology into the GOR planning process.

Phase I of the project began its field activities in June of 1985, soon after the arrival of the SECID Field Manager. The first four months were dedicated to 1) development of the project's infrastructure and administrative organization 2) establishment of institutional contacts and 3) initiation of resource inventory and assessment activities. The second four month period was centered on continued information generation, resource mapping and institutional development within the Rwandan Government^{1/}. The remainder of Phase I will focus on information synthesis, assessment, preparation of the "state of the environment" report and development of a work plan for Phase II activities. There will also be continued efforts in institution-building within the Rwandan Government.

Although the memorandum of understanding specified that an "in-house" project evaluation would take place at about the fifteen month of the project, the evaluation was moved to the tenth month of the project (March 1986) in order to allow sufficient lead time to design, budget, negotiate and finance the second phase. As a result, however, it has

^{1/} Details of implementation activities are provided in the first two progress reports prepared by the SECID Field Manager.

meant that the evaluation cannot really examine the "results" of Phase I, but only the work completed to date, in progress, or planned to be accomplished by the end of Phase I.

3. REVIEW OF PROJECT INPUTS

Four types of project inputs were provided in Phase I. They are:

1. procurement of project material and long term staffing;
2. a series of short term technical consultants;
3. training and institutional support;
4. administrative support by the agency designated to provide technical assistance, SECID, as well as USAID/Rwanda, the Ministry of Agriculture and the local governmental organization within the Ruhengeri prefecture.

Each of these project inputs are reviewed below.

3.1 Project Material Procurement and Long Term Staffing

Material support was to be provided by the RRAM project to GOR. This included housing, vehicles, office and clerical supplies, and specialized technical equipment such as computers. The project did experience several delays in obtaining some materials, notably for aerial photography and computer equipment. This initially caused a slight slowdown in project activities and may delay meeting of Phase I objectives.

Long term staffing was also to be provided by the RRAM project. In addition to the project field manager and assistant manager, there are three additional full time staff: a secretary, a cartographer/draftsman and one driver. Additional part time staff are used for six to ten week periods to address various technical needs such as field inventory and resource map preparation.

The RRAM project had funds available for a project administrative assistant but was unable to recruit a qualified person for this position. Part-time help has recently been hired to handle portions of the administrative support. The lack of full-time administrative support did put a strain on the field manager's ability to provide the type of planning and coordination needed for the development of the assessment methodology and for effective use of short term consultants.

3.2 Short term technical consultants

Short term expatriate technical consultants were brought in to address subject area or data specific needs in the context of the overall RRAM assessment. Four field surveys have been carried out. They are 1) a socio-ecological survey by Lucie Steinkamp-Ferrier; 2) a forestry and soil conservation survey by Fred R. Weber (with subsequent follow-up); 3) a water resource survey by Eric Shiller (with follow-up by two additional consultants); and, 4) an agroecological survey by Leslie Linn.

Consultants Ernest Hardy and Elaine Aderhold developed the aerial photo interpretation/cartography techniques used for resource inventory and resource mapping. Their work was interfaced with that of consultant Edward Backus to develop an experimental computerized geographic information system (GIS). Additional assistance in data analysis, management planning and evaluation was provided by Peter Freeman.

Several in-country consultants were also used in Phase I. Most notable were the contributions of Amy Vedder and Jeffrey Towner on wildlife conservation and park management issues facing the Virungas National Park.

The RRAM project has also supported a variety of research activities being carried out by the Geography Department at the UNR-Nyakinama Campus. One promising study in progress is under the direction of Patrick Wassmer, Department of Geography. It is a comparative analysis of two similar basins within the prefecture, one showing high erosion occurrence, the other showing low occurrence of erosion. Based on this monitoring work, the project hopes to identify differences in land use activities that account for the differences in erosion found. This has direct application to Phase II pilot projects and extension work. In addition, Dr. Wassmer is working in collaboration with Dr. Rutunga of ISAR/Rubona in developing an erosion risk classification for the prefecture. Again, this will have direct value to Phase II objectives.

An additional consultancy by Philip Roark and Bonneau Dickson is scheduled in March. The purpose of this consultancy is to assess currently available hydrologic information and water supply and demand, generate additional information on water resources pertinent to the RRAM project, develop data collection systems needed for future hydrologic and water quality monitoring activities and conceptualize a quantitative model of the major water resource components.

3.3 Training and Institutional Support

This support was the responsibility of both the RRAM project and MINAGRI with local government support at the prefecture level. Due to circumstances discussed under the following section, the RRAM project staff became the principal party in this undertaking, frequently taking the initiative and working on an ad hoc, informal basis. The RRAM project made a particularly strong effort in establishing institutional, governmental and donor contacts for the project's network. Work focused on the collection of relevant information and development of local and national awareness of the project's scope and purpose. The fruits of this effort were apparent in the large governmental participation in and positive reaction to the RRAM sponsored "Conference-atelier sur L'environnement and Le Développement dans la Préfecture de Ruhengeri", held in January, 1986 in Ruhengeri (see also section 6.2).

RRAM has also worked to develop the institutional capabilities and skills of the Rwandan professionals in the National University, ISAR and MINAGRI to increase the chance of the project's sustainability. In

particular, Vincent Nyamulinda, a recent graduate from the Geography Department of the UNR, was the assistant field manager for the project, and has benefitted from a close working relationship with the RRAM field manager. He was also involved in a 3-week, USAID sponsored resource management course held in Costa Rica. His assignment to the project has greatly facilitated cooperation with UNR, MINAGRI, ISAR and the Prefecture. The project was planning to organize additional workshops/conferences and seminars at both the communal and prefectural (and possibly national) levels, but most of this training/institutional development will have to be postponed until the inventory/assessment activities of Phase I are completed and the state-of-the-environment report is drafted. Because of the shortened period of time available for Phase I, these activities will undoubtedly be carried over into Phase II. Phase II should also include more intensive extension/training efforts at the local level (through the CCDFP).

4. EFFECTIVENESS OF PROJECT ADMINISTRATIVE SUPPORT

4.1 SECID

The principal administrative and logistical support has been provided by the South-East Consortium for International Development (SECID). This included financial management support and contractual services for short term consultants under the USAID/ETMA program. The support services of SECID were generally timely and effective in support of Phase I project activities, according to the SECID field manager. In October 1985, the US-based coordinator of the ETMA/RRAM project, Earle Buckley, visited the project to directly assist with progress and budget planning.

4.2 USAID

Both AID/Washington and USAID/Rwanda have provided backup support to Phase I. USAID/Rwanda support consisted of telecommunications facilities and monetary support for the participation of the assistant manager's travel to Costa Rica for training. The USAID mission staff has also been regularly and closely involved in assessing project implementation. In Phase II, USAID/Rwanda involvement will need to expand significantly. Higher USAID profile and involvement will likely encourage the interest and increased commitment of the Rwandan Government in the supporting project activities as well as the institutional development aspects of Phase II. AID/Washington has provided limited field support services. At times its actions have not been closely coordinated with either RRAM or USAID/Rwanda. In particular, communications were sometime delayed. This problem now appears to be under control, though concern remains about future AID/Washington support with the likely loss of the regional affairs office. REDSO/East Africa has provided useful technical advice and evaluation as requested by the project. This support is expected to continue.

4.3 MINAGRI

The Department of Forestry and other sectors in the MINAGRI have been accessible for discussion and interaction throughout Phase I of RRAM. The major obstacle to a more successful interaction was the lack of a formalized working group to officially monitor progress in project implementation. It would have helped to coordinate project actions and facilitated more government involvement in planning RRAM activities. It may have also assisted in wider dissemination and discussion of the reports and studies generated by RRAM in Phase I. However, it must be remembered that this was not part of the official agreement with the Rwandan Government. This basic lack of an appropriate, formal institutional framework should be addressed before a second phase is implemented. Recent increased MINAGRI and general interest and involvement by central government offices is a positive step in that direction. Many suggestions were made during the course of the evaluation mission as to how such a management committee could be organized. (See section 7)

4.4 Ruhengeri Prefecture

As with MINAGRI and other government Ministries, the major obstacle to RRAM's interaction at the prefectural level has been the lack of a formal institutional infrastructure. Due to delays in passage of the "Le Projet de Loi Forestière", the proposed Prefectural Commission on Forestry and Environment (PCFE) has not been established. Neither has action been taken to establish an interim ad hoc or de facto body to serve its functions. As pointed out in the most recent project progress report, the creation of such a regional institution was strongly recommended by the January conference, but there are no indications yet of movement in this direction. Nonetheless, a positive working relationship has been developed in several areas and open lines of communication exist between RRAM and the prefecture. The project's assistant manager has taken part in several prefectural working groups dealing with soil erosion control and soil conservation. The success of the recent RRAM sponsored conference on environment and development within the prefecture was in part due to the effective support and personal interest of the Prefet and Sous-Prefet of Ruhengeri. However, the centralized decision making process in Rwanda, the limited staff resources available at the prefecture level, the heavy administration workload of prefecture personnel and the lack of an official institutional structure will likely continue to severely limit in the near future the potential for developing an institutional basis for natural resource assessment, management and planning at the level of the Ruhengeri Prefecture.

4.5 Université Nationale du Rwanda (UNR) and the Institut des Sciences Agronomiques du Rwanda (ISAR)

The UNR-Nyakinama campus has played a very active role in providing both material and technical support. The university played a critical

part in project mapping activities by providing RRAM with mapping facilities and cartographic support. It provided material support for the recent January Ruhengeri conference. In addition, the university has been the major in-country source of technical support for project activities.

Support and involvement of ISAR in phase one activities have been limited to the participation of one research program director in the RRAM-sponsored conference/workshop in Ruhengeri. The distance from the main office of ISAR in Rubona, as well as a different emphasis between the RRAM Phase I activities (inventory, analysis and national resource management planning) and ISAR programs (focused on long-term research to improve agricultural productivity) as well as staff shortages at ISAR have limited the interaction between the project and ISAR. However, it is anticipated that as the project moves into field trials, applied research and demonstration of natural resource management techniques that directly or indirectly influence agricultural productivity, the level of cooperation between RRAM and ISAR will intensify.

5. FINANCIAL REVIEW

5.1 Disbursement and Funds Remaining

According to RRAM project disbursement reports prepared by SECID, the project had disbursed 49% of the total funds budgeted for Phase I as of the end of January, 1986 (see table 1). Disbursements for training have been lower than anticipated because the communal workshops have not yet been organized. Adequate funds remain for both communal workshops and a second regional workshop/conference to discuss the draft "State-of-the-Environment" report which is to be produced before the end of Phase I.

Equipment and logistical support were budgeted to include one-third of the total funds available for Phase I; however, because of a relatively low level of expenditures for field studies, this category has the largest amount of funds available for the remainder of Phase I (\$117,482).

Expenses for personnel, travel, per diem and transportation have accounted for the largest share of disbursements to date in Phase I, amounting to \$198,537 or 69% of total disbursements during the first ten months of the project.

At least \$500,000 appear to be available for Phase II of the RRAM project. This amount (to be provided by USAID bilateral assistance funds for Rwanda) could be augmented by \$100,000 - 200,000 additional support from the Africa Regional Affairs Office and by a carry-over from other ETMA and RRAM project funds not disbursed before Sept. 30, 1986 (see also section 7.2.5).

Table 1

DISBURSEMENTS - RRAM PHASE I
(US \$)

BUDGET CATEGORY	Total Funds Budgeted	Year 1 Expenses (Oct 84- Sept 85)	Year 2 Expenses (Oct 85- Jan 86)	Funds Available (Feb 86- Sept 96)	% Total Funds Currently Available
Personnel (salaries, allowances, fringes)					
SECID Field Manager	105,188	43,782	23,448		
Consultants	92,568	34,267	13,496		
Assistant Manager and local staff	<u>23,988</u>	<u>2,484</u>	<u>8,286</u>		
Sub-total, personnel	221,744	80,533	45,230	<u>95,981</u>	(43%)
Travel, Per Diem, Transportation					
SECID Manager	70,669	33,112	809		
Consultants	58,372	22,836	4,881		
Local staff/ vehicles operations	<u>20,400</u>	<u>7,513</u>	<u>3,623</u>		
Sub-total, travel, per diem	149,441	63,461	9,313	<u>76,667</u>	(51%)
Equipment and Logistical Support					
Vehicle, computer, procurement costs	36,000	34,466	-		
Office supplies, equipment, communications	43,237	21,379	5,858		
Furniture, contingencies, transit house	22,934	3,068	5,958		
Rent - office	9,040	1,208	1,529		
Field Studies	<u>96,405</u>	<u>11,091</u>	<u>5,577</u>		
Sub-total - equipment	207,616	71,212	18,922	<u>117,482</u>	(57%)
Training					
Conference, workshops	<u>46,500</u>	-	<u>15,967</u>		
Sub-total, training	46,500	-	15,967	30,533	(66%)
TOTAL - Project Costs^{1/}	\$625,301	\$215,206	\$89,432	\$320,663^{2/}	(51%)

^{1/} Includes SECID management overhead; covered by ETMA in 1985, and total of \$63,250 budgeted for year 2. covered by ETMA project in FY 85

^{2/} \$60,000 has been recently added by ETMA to year 2 budget from left-over funds.

6. ASSESSMENT OF ACCOMPLISHMENTS AND PROBLEMS ENCOUNTERED

According to the RRAM Project Design Paper (Dec 1984) the major outputs were to be:

- a. an environmental information base for Ruhengeri (completion of a product);
- b. a prefectural resource analysis which identifies environmental problems and practical approaches to their resolution (relevant assistance in coping with development and environmental conservation needs);
- c. a tested approach to resource assessment and management (development of a process);
- d. trained GOR personnel to deal with resource management issues (institutional development).

Each of these RRAM outputs was reviewed by the evaluation team. Because Phase I is still in progress, it was difficult to fully assess all four outputs, but especially items b) and c).

6.1 The Environmental Information Base

The project has generated a large number of products, which will constitute the first systematic attempt at a Ruhengeri Prefectural environmental data base. A logic flow analysis has been carried out showing how these products both relate to the issues and to each step in an environmental assessment process.

The most evident fact is that a remarkable amount of work has been accomplished over an eight month period. Secondly, much of the accumulated information is very much development oriented. Phase I has not been exclusively a "problem diagnostic exercise" as stated in the draft ETMA End-of-Project Evaluation of November, 1985.

The quality and quantity of much of the data collected today has been reviewed in Freeman's report entitled "RRAM at Mid-Point" , he gives special attention to:

- the socio-ecological survey by Steinkamp-Ferrier;
- the forestry and soil conservation work by Fred R. Weber;
- the water survey by Eric Shiller;
- the agro-ecological survey by Leslie Linn;
- the land use mapping and GIS development efforts of Ernie Hardy and Elaine Aderhold.

Several other studies initiated with UNR were commented on, but in less depth.

After examining the reports and/or reviews which had been assembled by the project he found that several data needs still existed. They included: 1) a need for on-site analysis of tree stands to develop a

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quantitative assessment of standing volume (this is presently being carried out by RRAM with technical support from consultant Fred Weber); and 2) a need for more quantitative data on soil erosion and soil productivity. Quantitative sampling of soil erosion has been begun with the cooperation of the University of Rwanda and could be expanded in cooperation with ISAR and MINAGRI/Génie Rural and Soil Conservation Department. However, both erosion monitoring and control and soil fertility sampling and management will need to be continued as Phase II activities (and beyond).

As mentioned earlier in this section, a great deal of data has been generated during the past eight months. Most of this is of good quality, or, as in the case of Lucie Steinkamp's work, of exceptional quality. What remains to be seen is how well the information can be synthesized into a resource data base for the prefecture. The odds are that the task will be accomplished but will require a very concentrated systematic effort starting no later than April. Once this has occurred, RRAM should be able to convincingly illustrate interrelationships between the major resource related problems in the prefecture and the various actions needed to address them.

6.2. Identification and Analysis of Environmental and Natural Resource Management Problems

6.2.1 Relevance of the Data base

How relevant is the RRAM Data base at this point in the project? One measure of relevancy is the reaction of the participants to management issues identified in the Regional Workshop/Conference held in the Prefecture in January 1986. This Conference was well attended with official participants numbering over 104 and total attendance being over 400. The general reaction to RRAM was summarized by the regional forestry officer for the prefecture who felt that the RRAM information input into the Conference was very helpful in several ways. First, it made the participants aware of the linkages between special environmental problems, such as waste from mining operations and potential resource problems such as the decrease in fisheries in local lakes. Second, it demonstrated the over-all connection between environmental factors such as water, soil, trees, and the activities of people living in the region. Excessive woodcutting, open-pit mining, uncontrolled cultivation of steep slopes and unsound drainage of the marais, were cited by RRAM as having impacts on long term resource productivity. Long term resource management was envisioned as the responsibility of everyone in the Prefecture. Third, the environmental database compiled by RRAM, even in its present unfinished state, was very helpful in drafting the Conference recommendations for use in central and regional planning. (See procès-verbal of the conference/workshop.)

The principal resource management issues identified during the conference were:

- a) soil erosion and the decline in soil fertility;
- b) water resources (especially run-off control in the Lava Zone, mine waste pollution, bilharzia incidence, and water supply and its relationship to hydropower generation and swamp drainage);
- c) forest resources (including agroforestry forest management, and issues related to the National Parks);
- d) land use, tenure legislation and local institutional capacity to handle environmental issues.

These issues (with the possible exception of land tenure) are being examined and documented by RRAM in Phase I. A list of the items pertaining to the issues is shown on the left side of Annex B.

Throughout our interviews with GOR officials, it was clear that they already understood the value of comprehensive data bases to help them identify resource issues and develop prefecture specific solutions to the problems. RRAM produced the tool but GOR officials are already generating ideas for its application. Phase II will be very important in applying and testing several of their ideas for data base application.

Much of the new data arising from the RRAM mapping exercise has yet to be disseminated. The mapping staff in Kigali (Hardy and Aderhold) are still in the process of producing the final products. One staff member, Aderhold, will be organizing seminars later this year in order to display the new material and to discuss the process and results with appropriate audiences. The maps produced will be of significance not only at a regional level, but also on a nation-wide basis.

In connection with the whole subject of presentation and tracking RRAM products, it would be useful for the project staff to continue to use the flow-sheet shown in Annex B. Updated sheets of this nature would be useful for short-term consultants, University of Rwanda researchers, project staff and regional planners. The flow sheets would enable them to show the status of the RRAM data collection and analysis activities at a glance. In addition, the flow-sheets are a useful tool to show the relationships or linkages between physical environmental factors and the key issues under discussion. They also indicate in a general way any large areas where data collection or analysis should be pursued in the future (e.g., in Phase II).

Replicability of the data base in other prefectures should not be a major problem for the GOR in the future. The methodology will be clearly demonstrated by the end of Phase I. In many respects, it is emerging as a labor-intensive rather than technologically intensive approach, which can in large part be handled locally. It also appears that the GIS system introduced into the mapping activities unit in Kigali

will be very useful in replication efforts. Widespread use of GIS system will enable pinpointing areas of concern, the location of sample areas, particular monitoring sites, and village or communal units of interest in continuous sampling procedures, such as is used in the USAID Agricultural Survey now in progress. There should be widespread adoption of the locator system offered by the mapping unit as soon as possible. That would standardize ongoing data collection and insure site location for replication in years to come. (See section 6.3.5 however, for several limitations associated with the GIS.)

6.2.2. Resource Management Planning

One of the outputs identified in the RRAM Memorandum of Understanding, although not contained in the Project Design Paper, was the "design of a Regional Resource Management Plan". Based on our project review, this was an overly optimistic expectation. A resource management plan is a policy decision dealing with resource allocations and determination of mixes of outputs of goods and services. RRAM is only a part of this process. Its focus is 1) resource assessment and 2) development of intervention techniques to maintain resource productivity. Resource allocation, productivity levels, and the scope of resource protection are clearly with the GOR. RRAM is a support system, not a decision maker.

Before the RRAM project began, many people nationally and within the Ruhengeri Prefecture knew in a general way what the priority environmental issues were. However, RRAM is providing a means to review the concerns in a more comprehensive, quantifiable, and detailed manner. One of the largest problems to date has been the ability of the GOR to locate and assess the scope of the problem. The GIS system, once in place, will help define the problem areas where intervention is most critical. It will also assist: 1) long term monitoring and analysis of resource trends; 2) identification of potential national and donor project areas, including standardization of base maps; and finally 3) the decision making process in the development of a resource management plan and assessment of the tradeoffs involved.

One positive outcome of RRAM Phase I has been viewed as a "shortcoming" of the project. It has improved our understanding of the limited institutional capacity of the GOR to develop resource assessments and develop interdisciplinary strategies to address the issues. An assessment of both the GOR absorptive capacity and development control capacity is essential for the long term success of any project. RRAM has shown that presently an institutional weakness exists. It also has served to develop an "intervention technique" to strengthen institutional capacity during Phase II. Preliminary steps have already started in Phase I GOR/RRAM discussions and seminars. Institutional development is a long term process requiring a long term commitment of donor support. It is not expected that RRAM Phase I will change things drastically but it is helping the GOR develop the frameworks for change in Ruhengeri and nationally. Within Phase I it has trained a limited number of GOR staff directly and through seminars.

Finally, RRAM has shown the need for increased donor coordination of programs. The RRAM project has been in contact with several other donor projects going on in Ruhengeri. Many of them, such as the USAID Farming Systems Improvement Project and ISAR, could be used to help address critical questions which have surfaced in the RRAM project. RRAM, Phase I has begun to provide some degree of coordination through the dissemination of base maps to various donor projects working in Ruhengeri. The final report together with its recommendations of priority areas for intervention and intervention proposals will be beneficial in focusing donor projects and GOR extension activities and in making the best use of available donor assistance. This will be very beneficial for Prefecture development and sustained resource management.

6.3. The Assessment Process and Products

The RRAM project approach to environmental assessment was unique in one major aspect. It relied on a small permanent field staff supplemented by a series of short term consultants to address issue specific problems. How well did this approach work? Is the information base developed adequate to address the issues identified? What could/can be done differently to improve on the process?

6.3.1 The RRAM Approach

Overall, the idea of using a small permanent staff supplemented by short-term consultants has both positive and negative aspects. On the positive side, it: 1) reduces the expenses associated with a large permanent field staff and 2) allows for flexibility during the project's life to address new, or do more in-depth analysis of, environmental issues. These positive aspects are apparent in RRAM. The information generated relative to the cost of project has been impressive. Also, the project manager has adjusted the types of external and internal consultancies to meet the needs of the dynamic nature of RRAM.

However, this type of an approach requires: 1) the need for a strong overall framework and logic flow to make effective use of short-term inputs; 2) a strong logistical support service for effective use of external consultants; 3) an internal host country infrastructure to work with and benefit from the techniques used by short term consultants. These three items have caused some difficulties for RRAM, Phase I. It would have been very beneficial to have developed a formalized logic flow model as the initial step of project implementation including: 1) issues, 2) data needs to address the issues, 3) available data resources, 4) the types of consultancies needed, 5) expected outputs, and 6) the time framework involved. It would have made the field manager's job easier as well as given the GOR and consultants a conceptual framework of what was expected to happen and where they fitted into the process. It would also have given the field-manager a more effective means for quality control of consultancies and mid-course adjustments.

The second item of logistical support for the effective use of consultants was handled well under the circumstances of not having an administrative assistant. The field manager and his assistant were able to provide the necessary materials needed and the logistical planning required. But at an expense. It was apparent that this added major burden of logistical support detracted from the manager's and assistant manager's abilities to plan out project direction and to insure that priority areas were sufficiently covered. The opportunity to work in a pro-active rather than re-active mode would have added to the project's success.

The question of host-country institutional support and capacities are major factors influencing the project's success. By definition, RRAM, Phase I, was an attempt to introduce a new concept to both USAID and GOR. Therefore, it could not be expected that the task would be an easy one. The institutional framework did not exist. RRAM has gone a long way to introduce this concept. Should another such project occur at either the prefectural or national level the delays and frustrations experienced will be less. Both USAID and the GOR have gained experience with the concept and approval of RRAM.

Another comment on RRAM is the wise choice of a field manager with host country experience and an established working relationship with the GOR, in-country organizations and USAID. It was also critically important that the GOR assigned in a timely manner a person with the skills and background of the Assistant field manager. Staffing was an important key to the success of RRAM Phase I. Under the same set of circumstances, the use of less qualified individuals new to Rwanda could have had a different outcome. Short term projects such as RRAM cannot afford an exploratory learning phase common to long-term, high budget projects.

Finally, RRAM Phase I showed that introduction of new concepts benefits from a regional approach. Oftentimes, environmental assessments are done at the national level with generalized outputs. What is lost are the pragmatic aspects of the assessment process. The prefectural level of inventory and analysis undertaken by RRAM shows that environmental assessment can lead to specific, small-scale applications of appropriate technology to address area or site specific issues.

6.3.2 Resource Data Base

As mentioned in the RRAM approach assessment, future projects of this type must aim for the development of a formal logic flow model as the initial project product. In reviewing the various types of data developed, it was apparent that although the project is compiling relevant and good quality information, it is not yet evident how the individual reports are to be synthesized and presented as a final product. Most of the pieces are there but when and how will the final product come together? The project manager and his assistant will need to devote a large block of time to the synthesis of the inputs. It does not appear

that any major data gaps exist, although more information would be collected on fisher resources and several less important resource management issues. Also, much information has been collected but not summarized and "packaged" to fit into the final report of Phase I. There may be a problem of merging site specific or topic specific information with the general resource information (map overlays) to form a final project report. We believe the outcome will be positive but will be more difficult than necessary, had the process been better defined and managed from the outset. Sufficient time allotment for information synthesis and presentation is very critical in the upcoming months.

6.3.3 Mapping Techniques

The resource maps produced in RRAM Phase I will play an important role in Phase II. The approach taken in their development is also likely to be applied elsewhere. Therefore, it is important that the question of map development and the GIS system be examined in detail.

The use of photo interpretation to develop a basic resource information base is a standard approach in resource assessment. Unfortunately, the photo-interpretation team had to deal with two major handicaps before standard interpretation was possible. First, because of a misunderstanding in USAID/Kigali for the provision of aerial photo support, photo interpretation was delayed nearly three months. Secondly, the team had to create the base map and locator grid before resource map overlays could be developed. This requires accurate, well flown, aerial photographs. The 1978-80 photos available to the project were deficient in this respect. So even the development of a base map became a major time-consuming undertaking. As a result, other aspects of the resource inventory process were delayed. The types of resource overlays which are being produced will address the major resource issues. However, we feel that the mapping team should have had more interaction with the field manager and consultants. They still do not have a clear picture of what was expected, product priorities or format. The field manager needs to build the framework immediately.

The photo interpretation field team verified various aspects of the data base and were satisfied with their results. What still needs to be checked is if the sum total of various map information bases can be used to actually identify environmental issue areas. The ability to locate such areas is the ultimate test of their value to decision makers and their use in site-specific problem interventions in Phase II. The resource maps need to be experimented with. It should not be a foregone conclusion that the resource maps will support predrawn conclusions.

How well do the categories used (Annex D) and quantitative data generated dovetail with other project outputs? This is still to be determined in the synthesis phase of the project. A preliminary cross check of resource information portrayal indicates a lot of work ahead. The project still has to build its data base (overlays and computer), identify the key issues to be addressed, begin quantifying information to

address the issues and decide on means of visual representation. Just data input to the computer data base and storage and retrieval system (R-Base 5,000) will take three to five weeks. If everything goes along smoothly serious data synthesis and analysis will not occur until May 1st at the earliest.

One major gap in the resource information base is a good hydrologic overlay which can identify stream sensitivity levels or areas of instability. This is important in identifying areas requiring corrective measures and monitoring. The hydrologic team currently in Rwanda will be addressing this issue as well as the water supply issue.

6.3.4 Map Scales

As far as what is the "best" scale for map development, the answer is audience specific. We feel that for the final project report and report presentation, the smaller scales 1:100,000 or 1:250,000 are most useful. They can give the reader a general idea of the situation. However, the basic project related working maps require the larger 1:50,000 scale. Therefore, it is recommended that:

- a) the smaller scale maps should be used for the presentation of results to the general reading audience. They should be of high quality, in color, with very simple, clear legends;
- b) the 1:50,000 scale base map and resource overlays should be considered the basic working tool of the project and will serve the future needs in the Prefecture. The 1:50,000 level of detail is needed in future activities.
- c) The original maps must be on stable material to reduce distortion in reproduction. Legends must be simple with easily read symbols. Current symbols may be too abstract for easy use.
- d) Several complete resource map sets should be developed by the project and distributed to governmental organizations and development projects within the prefecture to encourage their use as prefecture-wide baseline maps and data sources. Blank copies should also be produced as they could be very useful for recording additional information as it is developed (soils, etc.).

Overall, we feel that the mapping team did an excellent job in achieving what they did with what they had to work with. It is unfortunate that more testing of the results could not be done. But circumstances beyond the project's control have limited this. We suggest that the resource maps continue to be field verified particularly where they indicate management concerns. It would be disastrous to release maps which give faulty information.

6.3.5 GIS Automated Systems

The GIS automated mapping system is still not likely to be fully operational during Phase I due to more pressing mapping team priorities. Work on its development and testing of its application should continue into Phase II.

Because it is based on a grid system of data entry, much of the resource information has to be "forced" into boxes. When extracted it may or may not give an accurate representation of the real situation within a given area. A great deal of insight is required for proper interpretation of outputs. This becomes even more the case with the overlays of various resource information bases. This can easily lead to false conclusions.

Before accepting the automated GIS system as a tool for Rwanda resource planning, we feel it needs testing of:

- 1) its accuracy in portraying resource information;
- 2) the ability of its audience to understand its outputs. objective expert evaluation of its applicability from a technical viewpoint.

It appears that a complex series of operations are required to provide the necessary computer commands to develop various map types. This can easily discourage its use. The mapping team's idea of developing an operator's manual to describe the sequence of commands needed to produce various map outputs is excellent.

Considerable talent and insight are required to make effective use of the GIS system. This is particularly true when one considers the question of computer support needs (data updating, etc.) If the use of this tool becomes operational it will require a very qualified individual acting as the coordinator of the system. The duties would be to:

- 1) respond to user requests;
- 2) update the GIS system as better information becomes available;
- 3) maintain the system and control its use.

One final comment is that it is also likely that the mapping team has underestimated the amount of work needed to input data, correct errors and take the bugs out of the system. It is likely that more time will be needed to get the system running than is currently anticipated. It must be kept in mind that the project took this on as an additional responsibility beyond its scope of work. Any benefits derived (and these should be considerable) are a credit to the project. However, the project should not invest time and project resources in this activity at the expense of primary objectives.

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6.4 Development and Testing Procedures in Resource Assessment and Management

All of the other outputs of the RRAM project have been dealt with individually. In this section we take up the most important output of Phase I. That is, to quote the 1984 Project Design Paper, "to assist the Prefecture of Ruhengeri in establishing an adequate environmental base from which effective regional resource management strategies and interventions can be developed by the Government of Rwanda". This includes the development and testing of procedures which can be adapted to other prefectures.

In terms of procedures, it would be possible for Phase I to develop a "cookbook" of how one develops a resource data base and environmental assessment. As pointed out by the field manager, this is only one output that should occur. Approaches will likely vary depending on the problems faced in future prefecture assessments throughout Rwanda. However, RRAM has developed important techniques and approaches which are specific to Rwanda. These are in terms of available technology, in-country support staff and the institutional/governmental framework of Rwanda. RRAM staff have also learned valuable lessons both through the project's strengths and shortcomings. We feel that such information should not be lost. Therefore, we recommend that a process supplement be part of the final RRAM product. Documentation would include the following:

- A general description of the process involved including how the issues were identified, the logic flow in data development to address these issues, and the methods used to develop the data base and validation or monitoring techniques.
- The strengths and weaknesses of the approach taken including problems encountered and their solution.
- Recommendations for future efforts of this kind, the objective being a quality product in a cost efficient and timely manner.

There is no question that, at the prefectural level, effective implementation of natural resource inventories, development of resource management strategies and integrated development based on these are large undertakings. The work involved and institutional support needed cannot be underestimated. However, we feel that there was significant insight shown by the Project Design Paper by considering Phase I to be "...the first step of the process...". We feel that the combined effort of those involved in RRAM has initiated this process by instilling the concept of the inter-relationships of natural resources and their relationship with human activities. This has not been the introduction of a new idea to GOR officials but more a crystalization of ideas they themselves have been developing.

In this light, we must consider two things for the future: 1) how can the active participation of people continue into the future; and 2) how can the dynamic interaction of GOR institutions with the project and, more importantly, with each other be facilitated?

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Experience has shown that the product oriented "short gain" approach of short-term (1-3 year) projects has limited influence on developing institutions to deal with natural resource issues. Such issues as reforestation, erosion control and watershed management require a long time frame to have significant positive outcomes. Therefore, work accomplished in RRAM Phase I and II must be carried forward with active participation of the local people and local institutions.

One vehicle towards this objective is the series of seminars proposed by the RRAM mapping unit. These should be broadened to include an explanation of what a resource assessment is, how the information can address resource issues, and how it leads to intervention techniques on a site-specific basis. Audiences should range from governmental officials to local authorities within the Ruhengeri Prefecture or other selected prefectures.

There is an opportunity for other internationally respected organizations to work with GOR to follow through on the recommendations of the First National Rwanda Seminar on the Environment (September 1985). Recommendations 34 through 39 call for a number of committees, commissions, networks and data bases to be set up to deal with environmental issues. A follow-up workshop is needed. Its specific charge would be the development of an action plan with specific ministerial assignments to address specific tasks associated with the recommendations.

6.5 Preparation of the State of the Environment Report

As discussed above, much work remains to be done to prepare the final report of Phase I, the State of the Environment Report for the Ruhengeri Prefecture. The evaluation mission reviewed the various studies and reports completed or in process with respect to their incorporation into the final Phase I report. An outline of the final report was drafted and discussed with the field staff. By comparing the flow chart (Annex C) and the report outline (Annex B), one can quickly assess what has been done and remains to be done to complete the report.

The principal areas of work that remain to be completed are: drafting of text to accompany maps being developed and data compiled for the physical environment; and the synthesis and preparation of the human resources chapter.

The RRAM staff expects to be assisted in this effort by members of the faculty in Human Geography of the UNR, and by persons working in public health and nutrition.

- Completion of a vegetation map for the Virungas Park and synthesis of information available from the park management plan and other sources.

- Completion of forestry field surveys (inventory and detailed follow-up questionnaires) and a composite map of vegetative cover, as well as a synthesis of this information to clearly and succinctly present management issues and recommendations in the areas of forest management, agroforestry and forest resources development planning. More intensive collaboration with the Forestry Department/MINAGRI will be necessary to produce this chapter.
- Because of delays in organizing soil erosion and soil fertility measurement, it is not clear how far the Phase I report will be able to go in pinpointing and quantifying problems associated with soil conservation. Improved soil conservation practices and proposals to applied research can be outlined, but to deal with soil erosion and declining fertility detailed recommendations will have to follow additional field work and trials in Phase II.
- Since the water resource consultants have not yet prepared their final report, very specific guidance could still be given to them to minimize the need to reunite/synthesize their input into the chapter on water resources in the final report.
- General information has been compiled in the agricultural sector; Freeman has made recommendations concerning the integration and presentation of this material which need to be carried out, presumably in collaboration with the Prefecture agronome, MINAGRI and the Agricultural Survey staff.
- Energy and mineral resources has not emerged as an area of emphasis for the final report, but some information has been collected and can be presented to make the report as comprehensive as possible.

Institutional consideration:

Apparently, a substantial amount of work remains to be done to organize and complete information collection in this area.

- **Conclusion and recommendations:** the preparation of much of this chapter will obviously have to follow drafting of the preceding chapters.

This brief overview of progress in preparing the final report of Phase I reinforces several points made elsewhere in the evaluation report, namely:

- the time available for such an ambitious resource inventory and analysis effort is barely sufficient, particularly given the shortened time frame for Phase I, the administrative duties placed on the field manager, and small size of the core management staff (essentially, 2 persons).

- The efficiency of the process would have been increased by more detailed and explicit planning of the assessment process (using a flow chart) and by better coordination and more intensive interaction among various contributors and authors of interim reports. Preparation of interim reports in the future should be guided with regard to their contribution to the final state of the environment report.

In retrospect, it may be that a management decision should have been made fairly early in the implementation of Phase I to reduce the scope of the "final report" (at least for the first phase) in order to focus data collection, inventory and analysis on recognized priority areas for which information was obviously not widely available and for which action is very much needed: e.g. soil erosion/soil fertility, forest and tree resources, water resources and wetlands development and management and institutional/local participation issues and policies.

7. CONCLUSIONS AND RECOMMENDATIONS

Without a doubt, the first ten months of Phase I of the RRAM project have been very productive. Much useful information has been compiled, and the institutional and personal contacts needed to carry through with the resource assessment and management planning process have been initiated and pursued for a broad spectrum of environmental/natural resource areas. Particularly useful contributions have been made in the area of socio-ecological surveys, forest/tree and water resource management issues and in land use mapping. In the near future, a quantitative analysis of land use patterns should be completed.

With regard to training and institutional development, the RRAM project has successfully raised awareness of the interrelatedness of environmental problems, natural resources management and economic development potentials in a number of people associated with the Phase I activities. Priority areas where management planning and field studies are needed have been identified, and recommendations to deal with these problem areas are being developed.

However, because of the small size of the project field staff and the need to deal with both administrative and technical matters, it appears that insufficient attention was devoted to planning, organization and managing some of the data collection and assessment activities. The need to compress activities which were proposed to be carried out over a 24 month period in less than 15 months made it even more difficult to carefully follow and bring together the various assessment activities.

Nevertheless, the project has established a good base from which to move forward in the second phase, and will in all likelihood achieve its multiple and very ambitious objectives. A second phase is amply justified and very necessary. Funds are available and detailed planning, budgeting and negotiation of Phase II activities should be pursued and completed as soon as possible so as to avoid an interruption between Phases I and II.

7.1 Completion of RRAM - Phase I

The following recommendations are intended to improve project implementation for the remainder of Phase I.

- a.) The part-time administrative assistant currently working with the project should recruit and train a Rwandan to take over on a full-time basis as many administrative tasks as possible, in order to allow the Field Manager and his assistant to concentrate on project management and technical assistance tasks.
- b.) The Freeman flow chart (Annex C) outlining the process and sources of information for the RRAM resource assessment, should be regularly updated and used by the project staff to focus the management of project activities on "work in progress" or "not yet begun", and to guide the integration and analysis process. In particular, it should be expanded to adequately cover those priority environmental problem and resource management areas which have emerged from informal discussions, the conference/workshop and assessment activities completed to date.
- c.) A detailed outline for the final report of Phase I (the State of the Environment of the Ruhengeri Prefecture) should be discussed with the Director General of Forests, interested government technicians and potential contributors to the report, in order to develop a consensus on its content, and to assist in planning its completion. Relevant sections of the project design paper, together with the Freeman flow chart and the draft outline prepared by the evaluation team could be distributed as background for these discussions.
- d.) As part of the detailed planning for the preparation of the final report of Phase I, the report outline and guidelines for writers (regarding style, content, format, for example) should be given to contributors to reduce the need for rewriting and editing the various chapters of the report.
- e.) The RRAM project and USAID/Rwanda should assess the need and feasibility for obtaining short-term assistance in the preparation and production the final report. AID/Washington through the Forestry Support Program or Environmental Planning and Management Project could possibly identify or provide of someone with the skills needed to guide and accelerate the synthesis of available information and production of the report.
- f.) The Director General of Forests/MINAGRI should continue to be encouraged to organize some type of more formal structure (commission de suivi, comite de gestion, comite de coordination, or groupe de travail) to facilitate communication among representatives of the various government departments with an interest and role in RRAM. The committee need not excessively dilute management authority or complicate financial planning and management for the project, but could be organized to insure more rapid and widespread diffusion of progress reports, technical studies and

drafts of material being prepared for the final report. Similarly, this committee could more effectively inform and consult with the key agencies which should be involved with the RRAM project (e.g. Forestry, Soil Conservation, Wetlands Development, Water, Public Works, Interior, Environmental Health, ISAR, etc.).

g.) In order to maximize exchange of ideas and understanding of each other's needs and potential contributions, the field manager should organize project team meetings/consultations whenever a new group of consultants or other persons are contracted to provide assistance. More structured, in-depth interaction between Weber, Steinkamp, Hardy/Aderhold, Schiller, and Linn could have been arranged and are needed in the future. The most logical sequence and timing of consultants needs to be carefully evaluated for Phase II as well, since several consultants in Phase I could have been more usefully programmed later (Linn) or earlier (Freeman).

h.) Of critical importance is the start of the data base analysis. The field manager needs to decide what the end products will be and give direction to his staff on specific products that must be produced. Specifically, he needs to: (1) start the input of tabulated notebook data into the computer storage and retrieval system, in order to make quantitative analysis possible by early May; (2) decide what report data must also be quantitatively assessed and enter that into the storage and retrieval system; (3) decide which map overlays are needed for addressing critical issues identified; other map work should be postponed.

i.) The field manager must decide what specific outputs are expected from the analysis process and develop the methodology and logic flow to insure that the outputs occur. Assuming a May 1 analysis startup date, the project staff will have six to eight weeks to complete all aspects of analysis.

j.) The project staff should put off further work on the automated GIS until the end of the analysis phase or whenever the mapping team has completed its portion of the analysis and final report mapping inputs. The operation of the GIS is not critical to the success of the project.

k.) The project should continue to work with the Virungas National Park in the development of a common database. More importantly, the park should more actively integrate its program with the development of the Ruhengeri Prefecture and adjacent communes. Its current isolation will jeopardize its long term viability. Revenue sharing and sponsoring of resource protection measures in the surrounding communities would help improve the park's image with the local people. The RRAM project staff should work with park officials to this end.

7.2 RRAM - Directions for Phase II

The evaluation team recommends that the overall direction of Phase II should include two main components.

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(1) A continuation and consolidation of the assessment and natural resource management planning process initiated in Phase I in the Ruhengeri Prefecture. This component fills a need for longer-term monitoring of trends in natural resource use and condition. Equally, if not more important, is the need to move on to a more active conservation-management-development phase, which would explore, research, test and demonstrate actions to deal with the natural resource management issues and problems identified in Phase I. In both the monitoring, planning and management activities, there is a continuing need to strengthen local institutions and to support the capability of local communities to understand the ecological aspects of development.

(2) A more structured, directed effort to transfer knowledge gained in the RRAM project and to institutionalize the resource assessment and management planning process at the national level is needed. There are significant opportunities to foster an ecological perspective and the sustainable development concept by increasing the frequency and depth of interactions with all the government services and donor assistance agencies involved in natural resources development. By establishing a presence in Kigali, the RRAM project staff could, in the second phase, have a greater influence on legislation, policy development and decisions regarding project design and direction. The RRAM project could also more directly facilitate the organization of the institutional bases needed to deal with environmental problems and integrated natural resource planning.

7.2.1 Field Activities - Ruhengeri Prefecture

It is beyond the scope of the evaluation team (and beyond their capability, given the limited time available as a full team — less than one week) to develop detailed descriptions and budgets for Phase II activities. In fact, this is described in the project paper as one of the outputs of Phase I, which was to be developed in the last several months of the first 24-month phase of the RRAM project. However, the evaluation team feels that certain types of activities are definitely indicated for Phase II of the project and the directions for Phase II are outlined below.

The field office in Ruhengeri should be strengthened with additional technician-level staff to carry out a variety of field studies and demonstrations. The following emerge as priority areas.

a) Agroforestry species selection trials, demonstrations and applied research regarding the impacts of trees in farm fields (either dispersed, planted on contour lines, border plantings, etc.). Examine impacts on crop yields, food production, soil fertility and overall farm productivity.

b) Measurement and analysis of soil erosion rates in a variety of representative locations where soil erosion appears to be a severe problem. Simultaneously, the relative effectiveness (in terms of reduced soil loss, increased soil fertility and crop yields) and efficiency (in

terms of labor and other inputs) of a wide variety of erosion control and soil conservation techniques should be evaluated. In particular, the current practices and techniques promoted at the national level need to be examined for their appropriateness in the different agro-ecological zones of the Ruhengeri Prefecture, and under different field conditions (slope, soil type, choice of crops, cultivation practices, microclimate, etc.).

c) A more quantitative and systematic analysis of changes in soil fertility is needed. Areas most affected by declining soil fertility have to be more intensively surveyed and the best measures to restore and maintain soil fertility identified.

d) More detailed and intensive inventories of forest resources should be carried out in selected communes (where fuelwood is most scarce and where the conditions of plantations are poorest, for example). In collaboration with the Director General of Forests, the RRAM staff could assist in the preparation of illustrative communal forest management plans, and in organizing practical trials and applied research in conversion of degraded plantations, interplanting of single-species stands with a variety of species to improve ground cover and erosion control, and in sustained yield management for more intensive production of higher-valued forest products where appropriate.

e) The project should provide the assistance and equipment necessary to obtain more detailed meteorologic and hydrologic data, and to gradually build up a data base for use in a water resources model. This information can guide more focused field studies on wetlands development and management, lake level control and potable water supply development.

f) Most of the above activities can be enhanced by a greater effort in Phase II to promote a dialogue with the local communities, and to increase their participation in the planning and management activities of Phase II. In particular, there is a clear need to move ahead with workshops, short-term training and seminars at the local level. In addition to practical training in the establishment and analysis of a variety of resource management trials, CCDFP's would be good vehicles for training and discussion in the areas of agroforestry, forest management, environmental education, soil conservation and improved farming practices.

A number of other field activities could be pursued in Phase II of RRAM, but at the risk of overloading the management capability of the project staff.

7.2.2 Institutional Support for RRAM Activities in the Prefecture.

In the case of each of these activities, the RRAM project should make a special effort to coordinate and pool resources with existing institutions, programs and projects. For example, agroforestry trials

can be linked with the ISAR/ICRAF research programs in Rwanda, the FSIP and Environmental Initiatives in Africa (EIA) Agroforestry projects funded by AID, and DGF coordinated projects in other regions. The soil erosion and soil fertility fieldwork can also be organized in cooperation with ISAR and the UNR. The forest resources management planning should be linked to the DGF (and to the CPFE, as soon as it exists) and benefit from experience gained by the Swiss-funded Projet Pilote Forestier. ISAR, Genie Rural, and MINITRAPE/Director General-Water should be involved with the water resources monitoring and field studies, together with the Prefecture. It is also recommended that whenever possible, specific written agreements be negotiated with cooperating agencies to clarify the roles and contributions of each, and to provide for the long term institutional development aspects of the activity.

7.2.3 Training

In this regard, it is important that the second phase of the RRAM project provide for the long-term training of several people (possibly a geographer, forester and agronomist) in the field of integrated natural resource assessment, planning and management. At present, the GOR is beginning to establish a cadre of middle-level managers and technicians with good training in a variety of resource areas. The number of people with exposure to interdisciplinary approaches needs to be increased. This could be done by providing long term training to individuals in key government agencies.

Long term training could be effectively complemented by the organization of conferences and seminars, not only at the local and commune levels (as discussed above), but also at the prefectural and national levels. The review and discussion of the draft State of the Environment report should be carried on at the national level, after the report is distributed. A special conference could also be organized to review the methodology used to produce the report, and to examine its possible application to other prefectures. In some cases, less comprehensive, more focused assessments may be indicated. Also, it would be useful to organize a follow-up national seminar on the environment, to clarify and assign actions needed to carry through with the recommendations of the first seminar on the environment.

7.2.4 Establishment of a Liaison Office

The evaluation team has concluded that there is a definite need to increase the profile and level of activity of the RRAM project at the national as well as the regional level. Erosion, soil fertility, agroforestry, wetlands management and other environmental and resource management issues of concern to the Ruhengeri Prefecture are also issues in other prefectures. Given the multi-sectoral nature of these issues, planning and policy decisions affecting them must involve a number of separate government departments and institutions. Chief among them is MINAGRI, which currently has and probably will continue for some time to have the greatest impact and influence on environmental policy in Rwanda.

In the first phase, the project staff maintained contact with these institutions in an informal, intermittent manner. We feel this can be improved by establishing a liaison office for the project in Kigali. This office could be situated within the Director General/Forestry, the Agriculture Survey offices next door to DGF, or in new MINAGRI offices if they are constructed in the near future. Another alternative would be to link the RRAM office with the FSIP office in Kigali, where some of the RRAM mapping work is currently underway.

The office would not have as large a permanent staff as in Ruhengeri, and in fact, the project would remain essentially based in Ruhengeri. Only one full-time person would be needed in the Kigali office, to deal with secretarial and administrative duties. The office would provide what is currently lacking, however, namely a base of operations in Kigali for the project management staff.

The Kigali liaison office would allow the project staff to be more involved in a number of areas that would cumulatively reinforce the institution-building aspects of the project. These areas include:

- a) Closer coordination with the DGF on methods used for the preparation of communal forest management plans.
- b) More interaction with the Agriculture Survey Project office on the use of land use analysis to stratify agricultural survey samples.
- c) Continued development and adaption of the GIS technique to meet apparent needs.
- d) Useful exchanges of information with similar resource assessment/land use analysis and planning projects (e.g. Technosynthesis, a project financed by Italy).
- e) More frequent contact with and involvement with ISAR programs and related farming systems surveys and research activities.
- f) Closer involvement in the programs and policies of the Director General/Genie Rural and Soil Conservation departments, particularly with regard to the most effective erosion control strategies.
- g) Increased availability to deal with environmental impact assessment issues associated with development projects.

The liaison office would basically function as an intermediary between the field office in Ruhengeri and the various technical offices and government departments in Kigali. This would strengthen the ties and interactions with these services. In addition, the liaison office could serve as a catalyst for the establishment of a national commission on the environment or some similar body, as recommended in recent national and regional seminars. The liaison office would not need to exist beyond the life of the project. Its functions would be absorbed by 1) the national

environmental commission if dealing with multi-sectoral environmental concerns and management issues, and 2) within the respective departments of MINAGRI and other Ministries, using technical staff which have been exposed to and hopefully trained in the integrated approach to resource management and planning. When specific policy decisions or problems must be addressed, these technicians and department heads would use the CIC mechanism to resolve them, after inter-department consultation has occurred.

The liaison office would also meet administrative and communication needs of the project, by having a permanent base and full-time staff person in Kigali. The office could also serve as a documentation center for environment and development issues and natural resource management topics. This, of course, includes the dissemination and promotion of RRAM project maps and studies.

7.2.5 Resources needed for Phase II

Financial resources available for Phase II appear to be on the order of \$625,000, including \$500,000 earmarked by USAID/Rwanda and \$100,000 from Regional Affairs and possibly more from the ETMA regional project. Additional contributions towards RRAM Phase II objectives may be available through cooperative arrangements with the USAID funded FSIP and the World Bank financed ISAR/ICRAF research. However, past experience indicates it is unwise to depend on such support.

GOR counterpart contributions could be largely in the form of existing infrastructure and office space, notably in the use of the map lab and other facilities of UNR, the use of the ISAR soils lab, access to equipment and materials at the DGF and PPF (for photo interpretation and mapping), and the use of extension and educational materials developed by DGF. The GOR could also be requested to assign additional people to the RRAM project in Phase II and to absorb their base salaries. Staff would be needed for the fieldwork in the prefecture (1 geographer, presently working with the project, 1 forester and 1 agronomist) and for the liaison office in Kigali (1 secretary). The project could fund additional support personnel needed, as well as the US technical assistance and consultants. Other USAID contributions would include operating costs, materials, benefits for local personnel, and contract costs for field studies. An indicative budget is attached.

RRAM - Phase II
Proposed Budget October 1986 - September 1988

(\$1.00 = 90 Fr)

Category	Unit Costs	Total Costs
PERSONNEL - TECHNICAL ASSISTANCE		
Project Director (Kigali. Ruhengeri)	12 mm \$60,000/yr	\$60,000
Field Supervisor (Ruhengeri)	24 mm \$30,000/yr	\$60,000
Ass't Project Director (Geographer)	24 mm 25,000 Fr/mo	6,600
Ass't Field Supervisor (forester)	24 mm 20,000 Fr/mo	5,330
Field Technician (Agronomist)	24 mm 18,000 Fr/mo	4,800
Secretaries (2)	48 mm 15,000 Fr/mo	8,000
Drivers (3)	72 mm 12,000 Fr/mo	9,600
Housing Allowances (local personnel - 3)	10,000 Fr/mo	8,000
Consultants	4 mm \$10,000/mo	40,000
Local Technical Assistance (cartography, field studies w/ ISAR, MINAGRI, UNR)		100,000
Subtotal - Technical Assistance		302,330
LOCAL TRAVEL AND PER DIEM		
Project Director/ Assistant		20,000
Field Supervisor/Assistant		10,000
Technicians/Drivers		8,000
Gas-vehicle maintenance		30,000
Subtotal - Local Travel		68,000

EQUIPMENT AND LOGISTICAL SUPPORT

Vehicle - 4WD pick-up	12,000
Office supplies/communications	5,000
Field Equipment, Tools, Guages, Traps	10,000
Map Production, Printing, Reports	7,500
Subtotal - Equipment	34,500

TRAINING

Conferences - Seminars (national/regional)	25,000
Workshops -Short courses (local)	20,000
Long-term Training/ South-south exchange	15,000
Subtotal - Training	60,000

OTHER

Contractor Overhead (25%)	54,000
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Project Total Phase II **\$518,846**

Annex A: RRAM Project Evaluation - February 28 - March 14, 1986
Schedule of Visits and Meetings

- Feb. 24: Meeting of Freeman, Buckley, Toth and Winterbottom at IIED/Washington.
- Feb 28: Arrival of Winterbottom and Toth, evaluation team members in Kigali. Discussion of terms of reference with USAID/Rwanda. Departure for Ruhengeri Prefecture.
- March 1-2: Orientation by RRAM project staff, Ruhengeri and review of project documentation. Visit to Kinigi Commune.
- March 3: Visit to Geography Department (Mapping Laboratory at UNR, Nyakinama Campus).
Discussion with Forestry survey team. Discussion of Phase II institutional organization.
- March 4: Departure for Kigali.
Arrival of Gaudet (REDSO evaluation team member).
Meeting with Director of Soil Conservation/MINAGRI, Gasamagera Evariste.
Presentation of map products and GIS work by Ernie Hardy and Elaine Aderhold, RRAM staff/consultants.
- March 5: Meeting with Director General of Water, MINITRAPE.
Meeting with Directeur Général des Forêts, Mutungirehe Isaie and Director of Forests and Forest Management, Biroli.
Designation of GOR evaluation team member (Biroli).
Meeting with Dr. Willardson, Wetlands Development/Irrigation consultant, USAID, and USAID Director.
Departure for Ruhengeri (Weber, Biroli, Gaudet, Toth, Winterbottom, and Nyamulinda).
- March 6: Visit to Nyakinama and Mukingo Communes.
Discussion of Phase I accomplishments, problems.
- March 7: Ruhengeri - Discussion of Phase II activities and budget.
- March 8: Meeting with Prefecture forestry agent, Ndagigimana Sylvestre.
Outline and drafting of Phase I assessment.
- March 9: Visit to Virunga National Park
Meeting with Sous-Préfet, Ruhengeri Prefecture.
- March 10: Departure for Kigali. Meeting with Director General, Génie Rural and Soil Conservation, MINAGRI.
Discussion with Water Resources consultants Roark and Dickson.
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- March 11: Meeting with USAID Director and staff.
Meeting with Director General of ISAR/Rubona, Mr. Gahamani
and with Biroli, Director of Forests, MINAGRI.
- March 12: Departure of Gaudet
Meetings with Lucie Steinkamp, RRAM socio-ecological survey
consultant, and Fred Weber, RRAM Forestry consultant.
- March 13: Meeting with Elaine Aderhold, RRAM mapping consultant
Continued writing/typing of draft report.
- March 14: Final debriefing and discussion of draft report with
USAID/Rwanda.
Departure of Winterbottom, Toth for Washington.

**Annex B: Proposed Outline - State of the Environment Report for
the Ruhengeri Prefecture**

(Summary Report for RRAM Project - Phase I)

1. Introduction:

Objectives of RRAM, Phase I, especially regarding development of environmental information base.

Scope of the State of Environment Report - natural resource and socio-economic information included. Addresses environmental and developmental issues and problems. Recommends actions to fill data gaps, and to resolve natural resource management, development problems.

2. Physical Environment:

Best available information on climate, geology and geomorphology, agroecological zones (per Delepierre). Possibly include discussion of life-zones (per Holeridge). Maps for topography/hydrology, geology, rainfall isohyets, agroecological zones.

3. Human Resources:

Demographic data (age, sex and distribution of population) by prefecture, commune, sectors, per 1978 data base. Map of population density.

Socio-economic status as described in commune monographs, and as per indicators from Steinkamp survey.

Shelter and infrastructure issues, as researched by University faculty and students, and from information in Steinkamp survey, and aerial photography (e.g. distribution of various types of dwellings).

Environmental health issues, including bilharzia, problems with toxic mine tailings and drainage. Map showing location of problem areas. Nutrition and other health/welfare issues, as described by public health workers and nutrition projects in the prefecture. Possibly map showing distribution of malnutrition/food deficits.

4. Natural Forests, Pastures and Wildlands:

Extent and condition of remaining natural forests, and natural vegetation (e.g. swamps and marshes).

Diversity and distribution of wildlife: in the park, avifauna, other. Vegetation map of the Virungas Park.

Significant natural areas (for flora or fauna). Status and current or potential threats.

Virungas National Park: description, management issues, problems, recommendations. Refer to park management plan, and current programs and studies by Vedder and map indicating problem areas, priority areas for establishment of buffer zones, etc.

5. Forest Plantations and Trees outside the Forests:

Extent and condition of dominal (state), communal and private block plantations. Ongoing and needed inventory and management actions, as indicated in Weber report, photo interpretation and field surveys.

Extent and condition of dispersed farm trees and small woodlots, line plantings, roadside plantings, field border plantings. Estimated productivity, volume, dominant species, as per field surveys.

Comment on current agroforestry practices; research and development needs as per Weber report and Steinkamp survey.

Summary map of vegetative cover, indicating priority areas for improved management and agroforestry development.

Overview of fuelwood resource situation: surplus and scarcity areas, as per surveys and land use analysis.

6. Soil Resources:

Distribution of soil associations and types (from available maps; will not have new survey until 1987). Discussion of distribution of soil associations, capability, management.

Soil Erosion - description of magnitude, types, and localities most severely affected. Discussion of trends, analysis of causes, assessment of high risk areas. Recommendations regarding control and prevention, for streambanks, fields, steep slopes. Maps should indicate areas of erosion hazard, and erosion control practices.

Soil Fertility - discussion of trends, localities most affected by declines in soil fertility. Analysis of courses, per Weber and Freeman reports. Recommendations for most appropriate, effective means to sustain or increase soil fertility in problem areas.

7. Water and Fisheries Resources:

Lakes and streams - description of quality, quantity, location as per Shiller survey, Bleom inventory.

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Wetlands (marshes and bottomlands) - extent and condition, and trends in their use. Recommendations for their conservation and development as per Willardson.

Water Supply (potable) - description of sources, quality, areas of scarcity or supply problems and recommendations for addressing water supply issues, as per Shiller and Dickson reports.

Fisheries - description of major resources and management issues.

8. Land Use and Watershed Management:

Current and projected land use. Maps and graphics showing mix of land uses through time, with changing percentages of farmland, forest, pasture, wetlands, parkland, urban land/settlements.

Watershed Management - problems, issues and recommendations, as per Roarke study.

9. Agriculture:

Farmers and farmlands - data from agricultural survey and Steinkamp survey on agricultural production, and yields of various crops. Cash crops vs. food crops. Problem areas to be addressed and recommended improvements in agricultural practices and changes in agricultural development policies.

Livestock and pastures - current production, limiting factors, problem areas. Trends in extent and condition of pastures. Alternative sources of livestock fodder.

Interrelationships between trees and food and livestock production - direct impacts on yields of food production; indirect impacts through increased incomes, non-food products, soil fertility, hydrological and climatological influences.

10. Energy and Mineral Resources:

Biomass fuels - data from national wood/crop residues consumption survey. Projected demand for biomass fuels. Effects of fuelwood scarcity and use of crop residues for fuel.

Hydropower: current sources and levels of production. Trends and issues in managing hydropower resources.

Alternative energy resources: current technologies and development potentials.

Mines and mineral resources. Description of mines and environmental problems associated with exploitation. Economic importance. Recommended actions to minimize environmental impacts while realizing development potential.

11. Institutional Considerations:

Land tenure and land-holding patterns.

Forest law and other relevant legislation.

Administrative organization and attribution of responsibilities.

Decision-making process for project planning and development strategies, at the central government and prefectural levels.

Training and manpower issues.

Research, extension, education capabilities.

Summary of institutional constraints, opportunities and recommended actions.

12. Conclusions and Recommendations:

Summary of problem areas, regarding environmental issues, development needs and natural resource management practices, including:

- composite map indicating locations and extent of major environmental problems: soil erosion, declining soil fertility, fuelwood scarcity (low density of farm trees and forest cover), threatened critical areas (streambanks, marshes, park borders).
- composite map showing areas of high priority for development and resource management actions: soil erosion control, soil fertility management, agroforestry, forest management, reclamation of mined/denuded areas, infrastructure development, improved water supply.

Recommended development strategies, policy changes and administrative actions.

(To be finalized after seminar/review of draft report).

Annex: Annotated bibliography, sources of further information.

Listing of relevant government agencies and project offices.

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