PD BB 1941

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: A (A = Add, C = Change, D = Delete) — Amendment Number: — DOCUMENT CODE: 3

2. COUNTRY/ENTITY: ZAIRE

3. PROJECT NUMBER: 660-0124

4. BUREAU/OFFICE: AFRICA 06

5. PROJECT TITLE (maximum 40 characters): APPLIED AGRICULTURAL RESEARCH AND OUTREACH II

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 09 DD 30 YY 98

7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4)
A. Initial FY 90 B. Quarter 3 C. Final FY 95

8. COSTS ($000 OR EQUIVALENT $1 = 550 zaires

A. FUNDING SOURCE	FIRST FY 90 B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total	8,000		8,000	20,000		20,000
(Grant)	(8,000)	( )	(8,000)	(20,000)	( )	(20,000
(Loan)	( )	( )	( )	( )	( )	(
Other U.S. 1.						
Other U.S. 2.						
Host Country		3,584	3,584		21,504	21,504
Other Donor(s)						
TOTALS	8,000	3,584	11,584	20,000	21,504	41,504

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	C. 2. Loan	D. OBLIGATIONS TO DATE 1. Grant	D. 2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	E. 2. Loan	F. LIFE OF PROJECT 1. Grant	F. 2. Loan
(1) DFA	141	080		0		8,000		20,000	
(2)									
(3)									
(4)									
TOTALS				0		8,000		20,000	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each): 012 | 020 | 070 | 079 | 090

11. SECONDARY PURPOSE CODE: 181

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code	R/AG	XII	BSW	PVON	ENV	PRE
B. Amount	20,000	18,000	6,000	5,200	4,000	3,000

13. PROJECT PURPOSE (maximum 480 characters)

To strengthen and improve the capacity of the Department of Agriculture and collaborating institutions to develop and transfer agricultural technologies for selected food crops, on a sustainable basis, to farmers.

14. SCHEDULED EVALUATIONS
Interim MM 11 YY 92 | MM 11 YY 94 | Final MM 11 YY 98

15. SOURCE/ORIGIN OF GOODS AND SERVICES
☐ 000 ☐ 941 ☐ Local ☑ Other (Specify) 935

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a ____ page PP Amendment)

17. APPROVED BY
Signature: Charles W. Hausser
Title: Director, USAID Zaire
Date Signed: MM 07 DD 06 YY 90

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

AID 1330-4 (8-79)

ACTION MEMORANDUM FOR THE DIRECTOR

Date : June 29, 1990

From : Allen P. Fleming, ARD

Subject: Applied Agricultural Research and Outreach II Project. 660-0124

Through: Ronald D. Harvey, ARD

I. Action: Your approval is requested for a grant of $20,000,000 from the Development Fund for Africa Account for the Applied Agricultural Research and Outreach II Project, 660-0124 (RAV II).

II. Discussion:

A. Description of the Project: The purpose of the project is to strengthen and improve the capacity of the Department of Agriculture and collaborating institutions to develop and transfer agricultural technologies for selected food crops, on a sustainable basis, to farmers. The project provides funding for important activities in outreach and technology transfer, applied research in agricultural technology and related natural resource management, research management, human resources development, and improvement in the financial sustainability of food crop research. RAV II will be implemented by the Applied Agricultural Research and Outreach Service of the Department of Agriculture (Service National de Recherche Agricole Appliquée et de Vulgarisation - SENARAV). SENARAV is composed of a National Coordination Unit, the National Cassava Program (PRONAM), the National Maize Program (PNM), and the National Grain Legume Program (PNL). The Project builds on the accomplishments of the RAV I (660- 0091), and will use lessons learned from that project to consolidate and refocus project effort to improve impact at the farm household level.

The project will closely follow the country development strategy and the recent Action Plan, emphasizing USAID Zaire's focus on the regions of Bandundu and Shaba and the priority objectives of mission support to the agricultural sector, specifically increased sustainable crop production and productivity for domestic and export markets, and the development of soil conservation and natural resource management technologies for small farmers, which is extremely important in light of Zaire's selection as a priority Global Climate Change country. The project's outreach activities support USAID Zaire's policy of

using non-governmental organizations (NGOs) working in rural areas to improve the institutional basis for development activities. The project also is a key input into the Africa Bureau's strategy for the support of agricultural research and faculties of agriculture. It will facilitate the integration of SENARAV programs into the National Institute for Agricultural Research and Studies (INERA), an effort aimed at restructuring of the national agricultural research system to ensure sustainability, that USAID has supported in cooperation with the World Bank, UNDP, and, more recently, other donors. It also reinforces the mandated role of U.S. Title XII Universities in building agricultural research institutions in developing countries.

The project beneficiaries will include rural farmers, with a special focus on female farmers, who provide much of the agricultural labor of the country. The project will develop technologies and outreach methods which meet the labor-productivity, income, and nutritional needs of rural households. NGOs will be strengthened in their ability to provide targeted extension information, crop varieties, and agricultural technologies to their clients. The project will also address the needs of women as research and outreach professionals to the maximum extent possible.

Project outputs will include: sustainable, productive, and socioeconomically-adapted technologies and crop varieties; improved methods for the transfer of technologies to public and private development entities; improved financial sustainability of food crop research activities; trained research, outreach, and research management staff; and improved management practices in the three food crops research programs and outreach. An innovative feature of the project will be to assist in the creation of a Research Endowment Fund to be funded, in part, by debt swaps to provide funding for research activities towards the end of the life of project.

B. Financial Summary: The first year of project funding will consist of an FY 90 obligation of $8,000,000. Total life-of-project funding is $20,000,000. The GOZ will contribute to the project support in local currency and in-kind amounting to no less than the equivalent of $21,504,000.

The overall breakdown of the requested project funding is as follows:

	Initial Obligation ($000's)	LOP ($000's)
Technical Assistance	4,463	10,172
Training	1,245	4,333
Vehicles, spare parts	535	1,004
Construction/ Rehabilitation	401	900
Other Research Support	246	396
Office Equipment/ Supplies/HH Furnishings	448	736
Networking (International)	223	1,000
Evaluation/Audit	53	505
Contingency	386	954
TOTAL	8,000	20,000

C. Committee Action and Findings: USAID review of the project confirmed the socioeconomic acceptability and the technical soundness of the project. The Initial Environmental Examination approved a categorical exclusion for technical assistance, training, research management, and sustainability activities. Analyses performed during Project Paper design recommended negative threshold determinations for research and foundation seed production use of pesticides; limited construction and rehabilitation; and small-scale irrigation for research purposes. Environmental policy concerns have led AID to designate Zaire as one of the eight core Global Climate Change countries. The project features substantial allocation of effort to natural resource management including: maintenance of soil fertility; techniques to improve fallows to accelerate fertility and soil physical property regeneration; and legume intercrop and cover crop management. Net environmental impact from technology development and outreach will be positive. An updated IEE is included as Annex K to the PP.

The Implementation Plan contained in the PP has been carefully reviewed by the Project Committee, which concluded that the Plan was realistic and established a reasonable time frame for carrying out the project.

Requirements of Section 611(a) the Foreign Assistance Act of 1961, as amended, have been met for the project components to the satisfaction of USAID's Senior Engineer, Project Design and Operations Office. Section 611 (e) certification is not required because construction costs are under $1 million.

D. Special Concerns:

USAID will enter into negotiation of a Collaborative Agreement with the South-East Consortium for International Development (SECID) group of Title XII Universities. Southern University of Louisiana will be the lead institution for SECID. SECID will provide technical assistance, manage participant training, procure most commodities, and manage construction and rehabilitation activities. Substantial financial management assistance will be provided by the project. Significant in-country training, workshops, and seminars will be an integral part of the project.

Local Cost Financing, in accordance with the procedures provided in HB 1B, Chapter 18, is authorized in the Project Paper in order to (a) ensure an expeditious disbursement of dollars, and (b) avoid a shortage of local currency for project needs due to a lack of sufficient counterpart funds.

In accordance with A.I.D. procedures, the project design was awarded to SECID, a group of Title XII Universities, after a competitive REI. SECID assigned Southern University, an 1890 HBCU, to lead the collaborative design effort, and subcontracted design assistance to an 8(a) minority-owned firm. Project Committee review of the collaborative design resulted in the decision to proceed to negotiate a Collaborative Agreement to implement the project with SECID. The Mission has strongly encouraged SECID to solicit participation, to the maximum extent possible, of small business concerns, economically and socially disadvantaged enterprises, and women-owned firms, in response to Gray Amendment concerns.

The USAID officer currently responsible for the project is Mr. Ronald J. Harvey, Chief, ARD. Project implementation will be supervised by Mr. Allen Fleming, ARD.

III. Waivers: All waivers needed for project implementation are incorporated within the provisions of the blanket waiver for "Procurement of U.S. Goods and Services under the DFA"; the AID/W Blanket Transportation Waiver (to be renewed after August 10, 1990); and the Blanket Source/Origin Waiver for Project Procurement of Certain Vehicles and Motorcycles Plus Spare Parts Purchased with These Vehicles. No additional waivers are expected for this project.

IV. Justification to Congress: The Congressional Presentation reference is Fiscal Year 1990, Annex 1, Africa, page 423.

Congressional notification was made on June 14, 1990 and expired on June 29, 1990.

V. Authority: You have authority under Section 4.A of DOA 551 to authorize a project of up to $20,000,000 and ten years of life-of- project, provided that no significant policy issues are involved and provided no waivers are required which exceed your authority. No such policy issues or waivers are involved here.

VI. Recommendation: That you sign the attached Project Authorization and thereby approve life-of-project funding of $20,000,000 for the Applied Agricultural Research and Outreach Project (660-0124).

VII. Attachments:

1. Project Agreement
2. Project Authorization (Pages xi - ix of Project Paper)
3. Project Paper

Charles W. Johnson
Director
USAID/~~Kinshasa~~ Zaire

Date: July 6, 1990

Clearances:

G.W. Anderson, PDO	RAM for GWA	7/2/90
R.D. Harvey, ARD	[illegible]	6/2/90
J. Kryschtal, EXO	JK	7/3/90
D. Dolley, CONT	[illegible]	7/3/90
J. Bierke, PEP	[illegible]	7/5/90
C. Signer, PDO/CMS	[illegible]	7/3/90
M. Sullivan, GDO	MS	3 July 90
C. Brown, RLA	(Draft)	
B. DeMarcken, D/DIR	[illegible]	3 July 90

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PROJECT AUTHORIZATION

Name of Country : Republic of Zaire

Name of Project : Applied Agricultural Research and Outreach II

Number of Project: 660-0124

1. Authorization.

Pursuant to the Foreign Assistance Act of 1961, as amended, and the Foreign Operations, Export Financing and Related Programs Appropriations Act, 1990, I hereby authorize the Applied Agricultural Research and Outreach II Project (RAV II) for the Republic of Zaire, involving planned obligations of not to exceed $20.0 million in grant funds over an eight (8) year period, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the project. The planned life of the project is eight years from the date of initial obligation.

2. Project Description.

The Project will assist the Government of Zaire (GOZ), and more specifically, the Department of Plan, the Department of Agriculture, Rural Animation and Community Development, and the Department of Higher and University Education and Scientific Research to increase their capacity to develop and transfer agricultural technologies for selected food crops, on a sustainable basis, to farmers. The project will fund outreach and technology transfer, applied research in agricultural technology development and related natural resource management, research management, training and human resources development, and improvement in the financial sustainability of food crop research. The project will be implemented by a consortium of Title XII institutions in collaboration with the Applied Agricultural Research and Outreach Service of the Department of Agriculture (Service National de Recherche Agronomique AppliquEe et Vulgarisation - SENARAV). SENARAV is composed of a National Coordination Unit, the National Cassava Program (PRONAM), the National Maize Program (PNM), and the National Grain Legume Program (PNL).

3. Conditions Precedent and Covenants.

The Project Agreement, which may be negotiated and executed by the officer to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority, shall be subject to the following essential conditions precedent and covenants, together with such others as A.I.D. may deem appropriate.

(A.) Conditions Precedent

Except as A.I.D. may otherwise agree in writing, prior to the initial disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Grantee will furnish to A.I.D., in form and substance satisfactory to A.I.D.:

(1.) A statement of the names of the persons holding or acting in the offices of the Grantee, and of any additional representatives, together with a specimen signature of each person specified in such statement.

(2.) Documentation confirming that the Grantee shall, beginning January 1, 1991, pay SENARAV professionals (AO, M.S. and Ph.D. staff) salary and benefits equal to those of comparable INERA staff, funding their base salaries and all other benefits from non- Counterpart Fund (CPF) sources.

(3.) Documentation confirming that the Grantee shall, beginning January 1, 1991, pay the base salaries and all other benefits of non-professional SENARAV staff from non-CPF sources.

(4.) Documentation confirming that the Grantee shall, beginning January 1, 1992, pay all salaries (base and any supplement thereto) and all other benefits for all SENARAV professional and non-professional personnel, from non-CPF sources.

(5.) Documentation confirming that the Grantee shall disburse all approved and budgeted Grantee funds for SENARAV on a timely, quarterly basis beginning in Grantee fiscal year 1991.

(6.) Documentation confirming that the Grantee shall require long-term participant trainees, upon completion or return from their degree programs, to work in SENARAV for a period of time equal to that of their training, or that the Grantee shall return the costs of such training provided by USAID to the Agency.

(7.) Documentation confirming that the Grantee shall provide, by January 1991, space in a single building sufficient for SENARAV Coordination offices for Grantee and Technical Assistance staff. USAID will assist the Grantee to rehabilitate the assigned space.

(8.) Documentation confirming that the Grantee has designated SENARAV, through its National Maize Program (PNM), as the national service responsible for maize research.

(9.) Documentation confirming that the Grantee has waived the two-year employment requirement for eligibility for B.S.- and M.S.-level training for women employees of SENARAV who otherwise meet training selection criteria, and shall begin

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to hire women for SENARAV research and outreach positions at the A1 level and higher by January 1991.

(B.) Notification

When A.I.D. has determined that the conditions precedent in Section 3(A) above have been met, it will promptly so notify the Grantee.

(C.) Terminal Date for Initial Conditions Precedent

If the conditions precedent specified above have not been met within 90 days from the date of the Project Agreement, or such later date as A.I.D. may agree to in writing, A.I.D., at its option, may terminate the Project Agreement by written notice to the Grantee.

(D.) Covenants

(1.) Project Evaluation. The Parties shall agree to establish an evaluation program as part of the Project. Except as the Parties otherwise agree in writing, the program will include, during implementation of the Project and at one or more points thereafter:

(a.) evaluation of progress toward attainment of the objectives of the Project;

(b.) identification and evaluation of problem areas or constraints which may inhibit such attainment;

(c.) assessment of how such information may be used to help overcome such problems; and

(d.) evaluation, to the degree feasible, of the overall development impact of the Project.

(2.) SENARAV and INERA Integration. The Grantee shall covenant to implement the program and schedule for SENARAV and INERA integration detailed in the interdepartmental memorandum of November 1989.

(3.) Seed Policy. The Grantee shall covenant to pursue the policy of privatization of the multiplication and distribution of crop seeds and plant propagation materials, as well as to take requisite measures to assure the timely release of new varieties for multiplication.

(4.) Legal Status of Subgrantees. All organizations to be funded under the project must have legal status in Zaire.

(5.) Participant Training. The Grantee shall covenant to repay to A.I.D., following written demand, the costs of training of any personnel who are not employed by SENARAV for a period equal to their period of training, except as A.I.D. may agree otherwise in writing.

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(6.) Irreversibility. The Grantee shall covenant not to reverse or undo any action required to satisfy conditions precedent to disbursement.

4. Source and Origin of Commodities; Nationality of Providers of Services.

Except as A.I.D. may otherwise agree in writing:

(a) Goods and services required for the Project shall have, in the case of goods their source and origin, and in the case of services, their nationality, in countries included in Code 935 of the A.I.D. Geographic Code Book in effect at the time orders are placed or contracts are entered into for such goods or services ("Foreign Exchange Costs"), except as provided in the Project Grant Standard Provisions Annex, Section C.1.(b.) with respect to marine insurance and except as specified in subsections (b) and (c) below. All reasonable efforts will be used to maximize U.S. procurement whenever practicable.

(b) Air travel and transportation to and from the U.S. shall be only upon certified U.S. flag carriers.

(c) Ocean shipping costs financed under the Grant shall be only on vessels under flag registry of the countries included in A.I.D. Geographic Code 935, subject to the 50/50 shipping requirements under the U.S. Cargo Preference Act and the regulations promulgated thereunder.

5. Local Cost Financing.

With respect to the local cost financing which is authorized above, I hereby determine, in accordance with A.I.D. Handbook 1B, Ch. 18, that the prices of the goods and services to be acquired locally are reasonable, taking into account comparable delivery terms and prices from eligible sources, and the implementation schedule of the project.

Charles W. Johnson
Director
USAID Zaire

Date July 6, 1990

LIST OF ACRONYMS USED IN THIS DOCUMENT

ADO	Agricultural Development Officer, USAID Zaire.
A.I.D. or USAI	U.S. Agency for International Development.
ARD	Agriculture and Rural Development, USAID Zaire.
CIAT	Centro Internacional de Agricultura Tropical (International Center for Tropical Agriculture
CIMMYT	Centro Internacional para el Mejoramiento de Maize y Trigo (International Center for the Improvement of Corn and Wheat).
CODIAK	Compagnie de Developpment Agro-Pastoral Integtre du Kwango-Kwilu, Kikwit (World Bank financed project).
COP	Chief-of-Party (Contractor's Technical Assistance Team).
CRM	Centre de Research Sur le Mais.
CRSP	Collaborative Research and Support Program, USAID.
DAGP	General Project Administration Directorate, GOZ.
DOA	Department of Agriculture.
DOP	Directorate du Plan.
DOPBP	Department des Finance Budget et Portefeuille.
EEC	European Economic Community.
EPA	United States Environmental Protection Agency
EPIF/CAL	Etude Pilote pour l'Integration des Femmes/Centre Agricole, Lusekele.
FAO	Food and Agriculture Organization.
FCRAC	Food Crops Research Advisory Committee.
FSI	Foreign Service Institute.
FSR/E	Farming System Research and Extension.
FSR	Farming System Research.
GDP	Gross Domestic Product.
GNP	Gross National Product.
GOZ	Government of Zaire.
IARCs	International Agricultural Research Centers.
ICRISAT	International Center for Research in the Semi-Arid.
IITA	International Institute of Tropical Agriculture.
IMF	International Monetary Fund.
INEAC	Institut National pour l'Etude Agronomique du Congo Belge.
INERA	Institut National pour l'Etude et la Recherche Agronomique.
IRR	Internal Rate of Return.
ISNAR	International Service for National Agricultural Research.
MOA	Ministry of Agriculture.
MPR	Mouvement Populaire de la Revolution
NGO	Non-Governmental Organization.
NYZS	New York Zoological Society.
PACD	Project Agreement Completion Date.
PID	Project Identification Document.

PIO/P	Project Implementation Order/Participants (training).
PIO/T	Project Implementation Order/Technicians.
PIP	Priority Investment Program.
PM	Person-Month.
PNL	Programme National des Legumineuses.
PNM	Programme National du Mais.
PP	Project Paper.
PRA	Projet de Recherche Agronomique.
PRAAL	Plan d'Action pour la Promotion Vivriere et l'Autosuffisance Alimentaire.
PRONAM	Programme National Manioc.
PVO	Private Voluntary Organization.
PY	Person-Year.
R&D	Research and Development (Teams or Unit).
RAC	Research Advisory Committee.
RAV II	Recherche Agronomique Appliquee et Vulgarisation, Phase II.
RAV I	Recherche Agronomique Appliquee et Vulgarisation, Phase I.
RMC	Research Management Committee.
RML	Research Management Loop.
SENARAV	Service National de Recherche Agronomique Appliquee et Vulgarisation.
SENASEM	Service National de Semence.
SEP	Service d'Etude et Planification.
SNV	Service National de Vulgarisation.
TA	Technical Assistance or Technical Assistant (advisor).
TDY	Temporary Duty.
TROPSOILS	Soil Management Collaborative Research Support Program.
UNDP	United Nations Development Project.
USAID	United States Agency for International Development.
USAID Zaire	United States Agency for International Development Mission in Kinshasa, Zaire.
USDA	United States Department of Agriculture.
USIA	United States Information Agency.
WB	World Bank or the International Bank for Reconstruction and Development.

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I. EXECUTIVE SUMMARY AND RECOMMENDATIONS

A. Introduction

The RAV II Project (RAV is an acronym derived from the project's French name, Recherche Agronomique Appliquee et Vulgarization) is to consolidate the development of research and outreach programs for cassava, maize, and grain legumes in Zaire. This project (660-0124) is a follow-on to RAV I (660-0091), launched in 1983 and ending in September 1990.

RAV II's project goal is to increase agricultural production, productivity, and rural household income in the zone of USAID program emphasis. This goal will be accomplish by the development and distribution of more productive varieties of maize, cassava and grain legumes, and by the transfer of adoptable technologies to women and men farmers in Zaire.

The project purpose is to strengthen and improve the capacity of the Department of Agriculture, Rural Animation and Community Development (DOA) and collaborating institutions to develop and transfer agricultural technologies for selected food crops, on a sustainable basis, to farmers.

RAV II will support the five-year plan of the Government of Zaire (GOZ) to increase agricultural productivity and improve rural incomes and nutrition. The project also reflects USAID's past and current program goal of increasing the welfare of the beneficiary population by raising agricultural productivity; and it is further supportive of the Africa Bureau's plan to strengthen agricultural research and faculties of agriculture in the Region, in which Zaire has been targeted as one of the eight technology-generating countries for long-term investment by the Agency.

B. Project Description

RAV II will be an eight-year, $41.5 million project ($20.0 million from USAID and $21.5 million from the GOZ) to strengthen and improve the capacity of the DOA and collaborating research and outreach entities to develop and transfer agricultural technologies for selected crops to farmers on a sustainable basis. Phase II of the project builds on the progress made in RAV I, but places much greater emphasis on outreach, technology transfer, and research management. The project will be implemented with the assistance of U.S. Title XII institutions. The implementing GOZ agency is the National Applied Research and Outreach Service (SENARAV), established in early 1990 by the elevation of the project to a division of the DOA.

RAV II will have five main components:

1. Applied Research,

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2. Outreach and Technology Transfer,
3. Research Management,
4. Sustainability, and
5. Human Resources Development.

Under the research management component, research station facilities will be renovated and, to a lesser extent, new construction undertaken at sites which are designated as core facilities of the national research system. Technical assistance and training will be provided to strengthen the operation and maintenance of station facilities and equipment. Substantial technical assistance and training will be devoted to upgrading the program budgeting and financial accounting and control systems to ensure that capital and operating resources are used efficiently. It is envisioned that technical assistance will have two general roles. The first role will be that of an active advisor to assist SENARAV in developing and managing research programs and personnel. The second role is that of a researcher or specialist who works with the Zairian counterparts in developing and implementing specific programs.

RAV II will support rehabilitation and construction at the following sites:

* Kaniameshi -- Seed conditioning and storage facility; housing construction; erection of the greenhouse and screenhouses purchased under RAV I. The connection of Kaniameshi to the electrical grid and the rehabilitation of existing farm and office structures, will be accomplished during 1990 by RAV I.

* M'Vuazi -- A germplasm conservation unit, seed conditioning and storage, tissue culture, pathology, entomology and soil science laboratories will be rehabilitated.

* Kinshasa -- As part of the project agreement, the GOZ will be asked to supply a government-owned building which will be used by SENARAV for office space which may require rehabilitation.

* Gandajika-- Seed conditioning and storage facilities will be installed in rehabilitated space, along with the rehabilitation of a greenhouse, some houses and restoration of a garage.

Some housing rehabilitation may be needed for researchers assigned to the three principal testing sites:

* Kiyaka,
* Niembo, and
* Mulungu.

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Under RAV I, several site and design engineering studies were undertaken. Additionally, USAID and the World Bank have collaborated on the identification of standard designs for office and laboratory facilities on research stations which will be constructed or rehabilitated under the Agricultural Research Project loan of the World Bank, the United Nations Development Program (UNDP) support to the Institut National pour l'Etude et la Recherche Agronomique (INERA), and RAV II.

1. Project Components

a. Applied Agricultural Research

Varietal improvement of cassava, maize, and grain legumes, initiated in RAV I, will continue in RAV II, but will be more focused on farmer-identified constraints to increased production. Varieties will be developed that are resistant or tolerant to pests and diseases, tolerant of low fertility and pH soils, higher yielding than traditional varieties, high in protein content in grains and leaves, and acceptable to farmers. Sustainable, low-input technologies and management practices will be developed to increase soil fertility and enhance soil conservation and other natural resources. Finally, optimum, sustainable cropping mixes and production practices will be developed to increase productivity. All station-based researchers will have responsibilities for on-farm research. Functional collaboration between SENARAV and INERA will be developed. Although all technical assistance team members will participate in this activity, the Chief-of-Party, the Entomologist, the Plant Breeder (maize) and the Plant Breeder (legumes) will have the main responsibilities. Detailed percentages of effort for this activity as well as for the other activities can be found in Table I-8 in Annex I.

b. Outreach and Technology Transfer

The technology transfer component will improve the flow of information to researchers and enhance their willingness to use the information that is provided by identifying, characterizing, and prioritizing clientele groups. Research will be farmer-driven, involving producers as full participants in the testing and verification of technologies, and success will be measured in terms of farmer adoption of new technologies. This component will also provide increased institutional support to selected public and private outreach entities through in-service training, technical assistance, and monitoring and evaluation. The Farming Systems and Outreach teams that operated under RAV I will be reorganized into combined Research and Development (R&D) Teams, with the participation of station-based researchers on the teams. As stated above, all technical assistance team members will participate in this activity with the R&D Training Specialist, the Agronomist, the Agricultural Economist, and the FSR/E Specialist taking key leadership roles.

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c. Research Management

Researchers and administrators will be provided academic, technical (short-term) and in-service training to design, administer, manage, and implement applied agricultural research programs through the development of improved planning and management practices, carefully programmed human resources development, and further strengthening of research support services. This includes establishment of research priorities, financial management procedures, a sound capacity for data management, improved infrastructure, and refined staffing and training plans. It is envisioned here that the Chief-of-Party, the Financial Management Specialist, and the Station Manager will play predominant roles.

d. Sustainability

The project will strengthen the economic, program and environmental sustainability of applied agricultural research in Zaire by adopting cost-saving measures, accelerating the diffusion of new and sustainable technologies, creating public awareness about the high returns to agricultural research, and possibly establishing a new Zaire Food Crops Research Endowment from non-traditional donor sources and a debt-for-equity swap. Activity for this effort will be primarily the responsibility of the Financial Management Specialist, although most team members will have a role to play.

e. Human Resources Development

Under this component, the project will strengthen SENARAV's capacity to conduct and manage research by providing four types of training: (1) long-term graduate training overseas, (2) short-term training outside Zaire at relevant International Agricultural Research Centers (IARCs) and universities, (3) in-country workshops and seminars, and (4) in-service, and on-the-job, training. Farming systems research and extension concepts will be introduced. Human Resources Development cuts across all disciplines, and as such, each team member's scope of work includes a Human Resources component.

2. A Focus on Environmental Responsibility

Despite the apparent abundance of land in Zaire, the country faces serious near- to mid-term environmental deterioration, in part linked to traditional agricultural practices. RAV II will implement plans and develop technologies to protect Zaire's soil, forest, and water resources. RAV II will also develop improved technologies to limit further degradation, and rehabilitate environments which have already been degraded. The traditional slash and burn agriculture practiced by most Zairian farmers, for example, contributes directly to global change and worldwide environmental deterioration. The system also destroys major

germplasm resources for the world. Zaire's tropical rain forests, its tropical deciduous forests, and its gallery forests all represent ecotypes which are threatened worldwide.

3. Outputs

The outputs expected from the project are:

* Improved research management -- that is, better trained researchers and research administrators;

* Improved coordination and linkages among researchers, outreach entities, and farmers;

* Improved linkages with IARCs, universities, private and public institutions, and other African agricultural research institutions;

* More efficient research management;

* Improved research results and technologies;

* Increased production, nutrition, and productivity at the farm level;

* A Zairian capability for managing the nation's research programs; and

* Protection and enhancement of Zaire's natural resource base.

4. Timing and Project Duration

This will be an eight-year project, beginning in 1990. Eight years are viewed by the design team as the shortest possible time period for the achievement of the project goal. Similarly ambitious plans elsewhere in the developing world have required 10 to 20 years to achieve their objectives. Thus, it may be deemed necessary, later in the life of the project, to consider a continuation of support for agricultural research and outreach, beyond the current project's PACD.

5. Financial Plan

The total cost of the project is $41.5 million, of which USAID will contribute $20.0 million and the GOZ will contribute $21.5 million. Of the latter sum, $12.2 million will be contributed from commodity import- and P.L.480-generated counterpart funds and $9.3 million from regular budget resources (the investment and operating budgets) of the GOZ.

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6. Beneficiaries

Immediate beneficiaries of this project will include farmers participating in technology transfer activities, outreach entities receiving institutional support from SENARAV, and other agricultural research institutions. The ultimate beneficiaries, however, will be a larger number of rural households. They will benefit from enhanced production, productivity, and income, resulting from adoption of improved technologies produced by SENARAV.

7. Implementation

The grantee will be the GOZ. Overall responsibility for the implementation of most of the U.S. dollar budget for the project will rest with a Title XII contractor and lead institution, which will provide the long-term technical assistance team and short-term advisors to work with USAID and Zairian counterparts. The contractor will be responsible for most commodity procurement and management of participant training.

C. Alternative Strategies

The project design team considered a number of alternative strategies in preparing the project paper. None offered were better than the approach finally selected. The alternatives rejected are summarized below.

1. Classic On-Station Research Approach

The on-station research approach, where all trials are conducted at the research station, is less costly and more easily controlled than an on-farm, or mixed station/farm strategy. However, a pure on-station research program has major disadvantages, especially where the transfer of technology to farmers by extension is already weak. Total separation of research and dissemination hampers market acceptance of superior technologies, and may reduce their applicability.

2. Classic On-Farm Research Approach

Complete reliance on on-farm research is also inappropriate in Zaire. On-station research under more controlled conditions is necessary because statistical precision, which is difficult to obtain in a program based strictly on on-farm research, is needed in some cases. Also, appropriate technologies must be continuously developed on-station in order to maintain a flow of technologies to farms for farmer testing. Finally, developing and maintaining germplasm is virtually impossible without use of station facilities.

3. Increased Funding to the International Agricultural Research Centers

Total reliance on the IARCs to conduct applied agricultural research is not a realistic alternative. The IARCs have global and regional mandates and would have difficulty addressing Zaire-specific research, management, and sustainability needs. However, the IARCs are extremely important sources of basic research, training, and experience. Therefore, close coordination between SENARAV and the IARCs will be fostered under the project.

4. Institutional Development of SENARAV without Research Assistance

Previous reviews and evaluations of RAV I have noted a variety of management problems and weaknesses. The project could have concentrated solely on institutional development, without including the applied research component of RAV II. The result of this approach would have been a less complex project, featuring management advisors to SENARAV and participant training. However, such a project would have little capacity for developing appropriate technologies for farmers through applied research, and would be of little interest to the GOZ and USAID. USAID has a long-term commitment to the development of improved and relevant technologies in Zaire as a major strategy for increasing agricultural production and income. This alternative approach would also delay farm-level impact.

D. The Selected Strategy

The strategy that was finally chosen for RAV II combines the best elements of the approaches described above. On-station research will continue to be supported, with greater emphasis on a multidisciplinary approach. Major emphasis will also be placed on research management, sustainability (financial, program and environmental), training, and the development of R&D teams to enhance technology transfer. Moreover, this strategy supports and enhances the dual role of the technical assistance team, i.e., as active advisors in the management of SENARAV's programs, as well as researchers/other specialists with specific technical roles to fill.

II. PROJECT BACKGROUND

A. Economic Setting

The Zairian economy experienced slow growth during much of the three decades since independence. Gross domestic product (GDP) grew at an average annual rate of 1.4 percent from 1965 to 1980 and at a lower 1.0 percent rate from 1980 to 1985. Factors that contributed to slow economic growth include deterioration in transportation infrastructure, a sharp reduction in investment following nationalization in 1973, cumbersome governmental regulations on economic activity, and bureaucratic inertia. A further contributing factor was the decline in international prices of mineral exports, which constitute more than one fifth of GDP.

Beginning in the early 1980s, Zaire implemented macroeconomic policy changes designed to stimulate economic growth. In 1982, a policy of price liberalization was adopted, under which national price and marketing controls were eliminated. In 1983 there was a substantial devaluation of the zaire and a movement to flexible exchange rates. These policies were implemented by the GOZ with assistance from the International Monetary Fund (IMF). In addition, the World Bank is also working with the GOZ under a structural adjustment program begun in 1986 to assist in the implementation of further macroeconomic reforms.

Much stronger economic growth has occurred more recently. During the period 1986-88, GDP grew at an average annual rate of 2.6 percent. Though output growth was slower than population growth, the gap narrowed. At the same time, serious problems continue to plague the national economy. The stimulus of price liberalization has been weaker than anticipated. Shortages of foreign exchange for imports hamper expansion in all sectors. And private investment as a percent of GDP has declined, falling from 7.4 in 1984 to 4.7 in 1988 (IMF, 1989).

The policy reforms in recent years have addressed (though not eliminated) critical constraints on economic growth. Zaire will need to persevere in its macroeconomic policy reform in order to achieve future growth in output. Furthermore, a sharp reversal is needed in the continuing decline in the interior road network and the national railway system. Sound macroeconomic policies and infrastructure improvement are preconditions for the growth of agriculture and the national economy.

B. The Agricultural Sector

Agriculture employs approximately 70 percent of the labor force and contributes 30 percent of GDP. This share of GDP is smaller than in many other African countries because of the importance of the mineral export sector.

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The traditional sector produces approximately 60 percent of total agricultural output. The dominant crops are cassava, maize, groundnuts, beans, bananas, and rice. According to a 1985 survey, 97 percent of households in the five regions making up the Southern Band of Zaire produced cassava (Shapiro, 1987). Maize, the second most important crop, was cultivated by 92 percent of households. The third most important crop, groundnuts, was produced by 44 percent.

Real output in the agricultural sector declined during 1965-73, followed by a long period of steady growth that continues to the present. During 1973-80, real output of agriculture grew at an annual rate of 0.9 percent (World Bank, 1988). Real output increased to a 2.3 percent rate in the 1980-84 period and to a 3.6 percent rate in 1984-88 (IMF, 1989). These rates of agricultural growth exceeded those of many other African countries. From 1980-85, for example, agricultural output in sub-saharan Africa grew at only 0.4 percent (World Bank, 1988).

Despite these increases in total agricultural output in Zaire, per-capita output has remained nearly constant in recent years. Population grew at an annual rate of 3.1 percent in the 1975-84 period for the country as a whole (Shapiro, 1990). The population increase was highly concentrated in urban areas, where the growth rate was nearly seven percent annually. Rural agricultural population grew at a much lower rate of 1.2 percent. As a consequence, agricultural output per capita has not increased. Rising food demand has been met partly by imports. Imports of all major food items except maize have increased since 1980. In relative terms, food accounts for approximately 20 percent of total imports.

Agricultural research has played an important role in the growth of agricultural output in many countries. Before independence, Zaire had one of the largest and best known African agricultural research systems, INEAC (Institut National pour l'Etude Agronomique du Congo Belge). The colonial government did not train Zairians in scientific disciplines or research management, and INEAC was dissolved shortly after independence.

Efforts to establish an applied agricultural research system in Zaire since independence have been sporadic. Some attempted to strengthen INERA, the successor to INEAC. Other efforts were centered on national commodity research programs. Three such commodity programs were brought together under an umbrella unit, RAV (the forerunner of SENARAV), within the DOA in 1983. In November 1989, representatives from both SENARAV and INERA discussed and agreed on several steps leading to the integration of the two institutions. This integration is scheduled to take place in 1992, provided it is accepted by the ad hoc evaluation committee.

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C. National and External Support for Agriculture

1. GOZ Strategy

The GOZ has long asserted that agriculture is its top investment priority. However, agriculture's share of total public spending on recurrent and investment accounts has remained far lower than the sectoral contribution to GDP. In 1985, agriculture's share of total spending fell to less than one percent, while the sectoral contribution to GDP was approximately 30 percent (World Bank, 1988).

The GOZ's three-year rolling Priority Investment Program (PIP) allocated between 7.8 and 10.7 percent of total planned investment to agriculture during 1986-1989 (IMF, 1989). PIP funds for agriculture were dispersed across 66 projects, mostly under the Ministries of Agriculture and Rural Development. Thirty percent of these agricultural investments were for food crop production projects. The first (unofficial) draft of the PIP for 1991-1994 allocates a much higher share (22 percent) of total planned investment to agriculture.

In its Five Year Plan (1985-1990), the GOZ set a goal of food self-sufficiency for Zaire. To achieve this goal, an action plan, PRAAL (Plan d'Action pour la Promotion Vivriere et l'Autosuffisance Alimentaire), to increase food crop production was developed. The plan was designed to provide agricultural support services and materials to areas not served by existing projects of the Ministries of Agriculture and Rural Development. A significant proportion of the investment budget for agriculture has been allocated to PRAAL in recent years, though many of its activities have suffered from inadequate planning and supervision.

Agricultural research is conducted by two major GOZ agencies: INERA in the Ministry of Higher Education and Scientific Research and SENARAV in the DOA. INERA continues to face serious shortages of finances and skilled manpower. Severe budget cuts reduced the 1987 budget to 40 percent of the 1983 level. INERA employs 59 researchers, of whom four hold Ph.D degrees, 10 M.S. - equivalent degrees and 45 AO (approximately equivalent to a B.S.) degrees. SENARAV, financed partially by USAID since 1983, employs 55 researchers, including five trained at the Ph.D. level and 21 at the M.S. level (including those currently in advanced degree training).

Since 1984, the International Service for National Agricultural Research (ISNAR) has been working with an inter-ministerial working group appointed by the GOZ to improve planning and coordination of agricultural research. As a result of this effort, a National Agricultural Research Program (Plan Directeur) was prepared, covering the period 1990-2000. The Plan provides substance to the 1985 decision of the Executive Council of the GOZ to select

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nine main and secondary research stations representing Zaire's principal agro-ecological zones. The main stations are Yangambi, Nioka, Mulungu, Gandajika, and M'Vuazi. The secondary stations are Kiyaka, Bambesa, Luki, and Kipopo (or Kaniama). Kaniameshi has since been included in the above list.

Among the pressing agricultural research policy issues facing the GOZ is the relationship between INERA and SENARAV. In late 1989, officials of the DOA and the Ministry of Higher Education and Scientific Research agreed on a phased plan to integrate the two agencies. The design team is highly supportive of the plan.

Extension is a particularly weak link in the support network for agricultural development in Zaire. The National Extension Service (SNV), consisting of 5,000 agents, is dysfunctional in many areas of the country. It has little or no connection with research and lacks vehicles and supplies. Virtually the only effective extension currently carried out is by a diffuse patchwork of non-governmental organizations (NGOs) and export-commodity firms.

2. Donor Involvement

The World Bank has taken the lead role in donor coordination for agricultural research in Zaire. A 1989 pre-appraisal mission for the Bank's Agricultural Research Project identified a level of total public research investment deemed appropriate for the GOZ and its donors over the next five years. Significant divergences from this program by individual donors would likely detract from consolidation of the national research system.

The Bank has agreed to finance rehabilitation of research stations and has asked other donors to declare their intention to follow suit. USAID, UNDP, and the Bank are likely to be the major contributors.

In addition to research, the current Bank strategy for agricultural development in Zaire includes increased investment in transport infrastructure; greater capacity of the financial services sector to provide agricultural credit; support to the national extension service, SNV, beginning with a pilot extension project; support for producer organizations and NGOs delivering agricultural inputs and services; enhanced GOZ capability in planning, policy formulation, coordination, and supervision; regional decentralization of GOZ agencies providing agricultural services; and minimizing recurrent expenditures by Bank-funded projects.

Other donors include the Food and Agriculture Organization (FAO), Belgium, Canada, and the European Economic Community (EEC). FAO provides technical assistance to the DOA in the areas of agricultural statistics, price analysis, and seed certification. FAO has also supported the National Fertilizer Program (SENAFIC) and

the national seed agency (Service National de Semence, SENASEM). Belgium currently supports over 50 agricultural projects, some carried out jointly with the World Bank. Canadian assistance in agriculture is concentrated in the Kivu Region on livestock production, animal health, producer cooperatives, and forestry. The EEC concentrates its programs of rural development and reforestation in Bas-Zaire and western Bandundu.

3. USAID's Strategy

The objective of USAID's agricultural program in Zaire is to increase agricultural production, productivity, and rural household incomes. The premise of the program is that market-oriented policies are the key to increasing production and improving distribution of food crops in Zaire. The appropriate role envisioned for government in agricultural development is to provide and maintain infrastructure, to carry out applied agricultural research to facilitate the flow of information and credit to producers and marketing agents, and to set and enforce minimum quality standards (e.g., through seed certification).

The USAID agricultural portfolio contains two projects that have actively promoted new crop technologies developed under RAV I.

The Area Food and Market Development Project (660-0102) seeks to increase agricultural production, marketing, and processing in Central Bandundu. The project assists non-governmental organizations (NGOs) in delivering services (including extension), equipment, and materials to small farmers and merchants.

The Central Shaba Agricultural Development Project (660-0105) seeks to increase regional food production and the marketed surplus available for distribution to urban centers. In addition to providing extension services, the project supports the construction of food crops storage facilities, road renovation, and seed production. RAV II will build on and strengthen ties established with Projects 102 and 105 under RAV I.

Complementing the preceding two projects is the Agricultural Policy and Planning Project (660-0119). It provides support, including technical assistance, to SEP (Service d'Etudes et Planification) in the DOA. The objective of the project is to increase the GOZ's institutional capacity to develop and implement coordinated agricultural policies and investment plans. The project addresses priority policy issues, including food security, price liberalization, marketing costs, trade and commercial policy, agricultural credit and savings mobilization, and agricultural input policy. Opportunities to achieve the shared and complementary objectives of SENARAV and SEP were not realized under RAV I. Under RAV II, close collaboration between the two agencies is envi-

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sioned, especially in the collection and analysis of farm-level data (see Annex I, Institutional Analysis).

III. PROJECT RATIONALE AND DESCRIPTION

A. Overview

The USAID Mission's and GOZ's agricultural development strategy is based on improving food security by increasing food production, leading to increased rural income. While traditional food production systems evolved as an adaptation to the physical characteristics and resource limitations of Zaire, they are inadequate in the face of rapid population expansion into fragile environments. Per capita production is stagnant (or declining) and productivity is decreasing. At present, food grain supply is kept in balance with domestic consumption only through imports. Without major advances in agricultural productivity in the next two decades, this unfavorable gap may widen.

GOZ strategy since 1983 has focused on maintaining economic and political stability, and on the need to continue stabilization programs. Both the GOZ strategy and USAID's goal recognize that sustained economic development is dependent on increased agricultural productivity, which (in turn) requires investments in agricultural research. A strong national agricultural research system is essential for the development of technological solutions to the constraints faced by Zaire's agricultural producers. Creation of a sustained national capacity to conduct agricultural research requires adequate human, material, and financial resources, and the ability to mobilize, allocate and manage them effectively and efficiently.

B. The Applied Agricultural Research and Outreach Project (RAV I; 660-0091)

1. Achievements

RAV I, as indicated in the PID for RAV II, was successful in selecting and developing several high-yielding lines of cassava, maize, groundnuts, beans, cowpeas, and soybeans. The project provided long-term training for 38 Zairian Ph.D. and M.S. candidates, and 70 SENARAV employees participated in short-term technical training. The project established an organizational and managerial structure for SENARAV, and built up the infrastructure for SENARAV's national programs. Foundation seeds were distributed to at least 30,000 farmers through 139 PVOs, governmental, and private sector outreach entities.

2. Shortcomings and Lessons Learned

While considerable progress was achieved, RAV I evidenced several shortcomings. Among the more important ones, the design

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team calls attention to weaknesses in the administration of research programs and research resources, the low level of financial commitment to the project by the GOZ, constraints to travel and mobility of research personnel that contributed to a generally weak technology transfer/outreach effort, little interdisciplinary team research, inadequate monitoring and evaluation, and underdeveloped feedback mechanisms that could provide researchers with valuable information concerning farmers' constraints and circumstances.

These shortcomings will be addressed by RAV II's program of work described in this project paper, and serve as guidance and "lessons learned" for the new phase of the project. Specifically, the team suggests that the following important lessons have been derived from the RAV I project. First, a low-level financial contribution by the host government clearly fails to promise sustainability for the project after external funding ends. The lesson here is that the host government must support RAV II generously. Second, incremental funding from the GOZ must be assigned with highest priority to help make the SENARAV staff mobile, permitting it to devote more effort to off-station research and related outreach efforts. Third, and as staff mobility is enhanced, researchers' understandings of the constraints and circumstances of farmers will be enhanced, and that should improve the relevance of the project's technology generating activities. Finally, the relevance and adaptability of new technologies should be closely monitored and evaluated for farm-level impact to ensure a fully developed feedback mechanism from farmer to researcher.

C. The Applied Agricultural Research and Outreach Project (RAV II; 660-0124) in Perspective

1. Project Goal and Purpose

The goal of RAV II is to increase agricultural production, productivity, and rural household income in the zone of USAID program emphasis. The goal will be achieved by strengthening and improving the capacity of the DOA and collaborating institutions to develop and transfer agricultural technologies for selected food crops, on a sustainable basis, to farmers. RAV II (660-0124) is a follow-on effort to RAV I, which began in 1983.

The project will strengthen and expand on-going research on cassava (Programme National Manioc, PRONAM), maize (Programme National du Mais, PNM), and grain legumes (Programme National des Legumineuses, PNL); provide increased support to farming systems and outreach activities; and improve research management. Additionally, the project will devote increased attention to long-term financial, program, and environmental sustainability and will strengthen monitoring and evaluation systems. Human resources development will also be a major focus of project activities.

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The project will benefit the national research system, the GOZ, farmers, consumers, and private and public sector outreach entities in Zaire by enhancing and furthering RAV I's activities. The project will:

* improve and maintain germplasm and the varietal purity of cassava, grain legumes (beans, groundnuts, cowpeas, and soybeans), and maize;

* provide sustainable, low-input and improved management practices designed to increase soil fertility and conserve Zaire's natural resource base;

* improve the overall productivity of farming systems, from the point of view of both farm earnings and the farm family's nutritional status;

* develop sustainable biological control and integrated pest management systems for major crop diseases and pests;

* enhance the linkages between on-station research, on-farm research, and outreach, and ensure that the farmer is included as a full partner in the development and testing of technology;

* increase and strengthen the linkages between SENARAV and the IARCs, other national and regional research programs in Africa, and all public and private sector agricultural research programs in Zaire; and

* draw on the resources available through U.S. Title XII institutions to provide SENARAV with direct access to a large pool of expertise worldwide in research, extension, and training.

2. Geographic Setting

USAID's policy in recent years has been to concentrate its development efforts in Zaire's Southern Band. This policy is discussed in numerous mission documents. RAV II's financial and technical support to SENARAV activities will, therefore, emphasize the Southern Band. However, SENARAV itself may decide to extend its activities to other parts of the country, utilizing resources made available from the GOZ. The use of GOZ resources to support the expansion of SENARAV activities into other areas should not reduce the government's support to RAV II activities, but should be based on increased total GOZ support to SENARAV.

RAV II will operate out of three types of research and outreach locations: research stations, testing centers, and outreach sites. Commodity research will include breeding and selection and

support for agronomic, plant pathological, and entomological work.

The great majority of research will be conducted at M'Vuazi, Gandajika, and Kaniameshi. Applied research on beans will continue to be based at Mulungu. Testing sites (Kiyaka, Mulungu, and Niembo) will be utilized to screen technologies on-station at an early stage in development for their adaptability to different agro-ecological conditions. Outreach sites will be responsible for conducting on-farm research and for providing institutional support to outreach. Table 1 shows the type of activities that will be conducted at each of the six sites. Moreover, RAV II will exchange crop varieties and other trial materials, identify joint research topics, and otherwise collaborate with other elements of the national agricultural research system in Zaire. Specifically, further useful adaptive testing of SENARAV - produced techologies can be envisioned at such INERA stations as Yangambi, Bambesa and Nioka. However, this is a low intensity form of cooperation which will not require project resources for facilities improvement or support of personnel.

a. Selection of Research Stations

The selection of the M'Vuazi, Gandajika, and Kaniameshi research stations was based primarily on three factors.

Agro-Ecological Representativeness. Soil type and elevation vary considerably in the Southern Band. The Gandajika station in Kasai Oriental is representative of elevations for much of Southern Bandundu, part of Kasai Occidental, Kasai Oriental, and Central and North Shaba. Three major soil groups are represented. The M'Vuazi station is a low elevation site, representative of Bas-Zaire, Bandundu, and part of Kasai Occidental. Unfortunately, the soils on the station itself are not representative of those of the region, but representative soil types are available in close proximity. The Kaniameshi site represents the higher altitude regions of Southern Bandundu, Southern Shaba and Kivu. Soils on the station are representative of one major soil group in the region.

Utilization of Infrastructure Developed Under RAV I. Under RAV I, PRONAM was centered at M'Vuazi, PNM at Kaniameshi, and PNL at Gandajika. Considerable infrastructure development occurred at M'Vuazi and should be consolidated in RAV II. Even though little infrastructure development occurred at Gandajika, the PNL program has probably made the most efficient use of the limited resources available to it, but existent infrastructure is inadequate to meet program needs. After losing access to offices, laboratories, field space, and storage facilities at Kisanga, PNM moved its research activities to Kaniameshi, where very little infrastructure exists.

Cost and Sustainability. Long-term sustainability, as well as operational costs for RAV II itself, are major considerations in the selection of primary research sites. Each site adds significantly to the operating costs of SENARAV. When RAV II funding terminates, the entire cost of maintaining the primary research sites will fall on the GOZ. The design team concludes that it is possible to maintain only three primary research sites.

Table 1. Primary Research, Testing, and Outreach Sites

Location	Research	Testing***	Outreach
M'Vuazi	X		X
Kiyaka *		X	X
Gandajika	X		X
Niembo		X	X
Kaniameshi	X		X
Mulungu**		X	

* The Bandundu outreach team will actually be based in Kikwit.

** Applied research on beans will continue to be based at Mulungu.

*** This table includes only sites where major activities funded under RAV II are to take place. Adaptive testing will also be done at other INERA stations, where appropriate, and which will require minimal or no additional financial support from the project.

b. Selection of Testing Sites

Activities at the testing sites are critical to the national research programs. On-station testing at these sites will ensure that technologies are subjected to the full range of bio-physical-conditions typical of the Southern Band. The three testing sites, Kiyaka, Mulungu, and Niembo, were selected because of their importance in relation to the following factors:

Agro-Ecological Conditions. The three testing sites were selected in part to complement the agro-ecological conditions at M'Vuazi, Gandajika and Kaniameshi. Mulungu is a high elevation site with soil groups which are representative of the Kivu Region. It is an important site from the point of view of environmental impact. The expansion of agricultural lands in this area directly threatens the future of Zaire's tropical rain forest resources and is of great concern to ecologists throughout the world. Kiyaka includes two important soil associations typical of Bandundu.

RAV I. With the exception of Niembo, SENARAV has established programs at each of these sites. Under RAV I, an agreement was signed with Project 105, designating the assignment of an agronomist to Niembo. This will permit RAV II to take full advantage of the well developed testing program already underway at Niembo.

c. Selection of Outreach Sites

Five outreach sites were selected because of their importance in relation to one or more of six factors.

Importance to Increased Food Security for Zaire. Bas-Zaire and Bandundu represent major food-producing areas for Kinshasa. Inclusion of Kikwit as an outreach site ensures that the important food producing region of Kwilu (Bandundu) is well covered. The industrial work force in Southern Shaba demands a secure food supply, which is met by production in Southern Shaba itself, Kasai Occidental and Oriental, and Central Shaba. Kasai currently imports food, but could potentially become self-sufficient, and possibly a net food exporter. Some production currently is exported to Southern Shaba.

Farm Density and Current Level of Technology. Farm density is an important factor both because it affects the kinds of technologies that are currently used (and which can be potentially used), and because of the need to conserve resources in reaching large numbers of farmers. Farm density is high in Kasai, and farmers are turning to sedentary (rather than shifting) agriculture as land scarcity becomes an important constraint. Large numbers of farmers can be reached at low cost. Adoption of improved technologies, e.g., the use of fertilizer, has already begun. Farm density is also high in Southern Shaba, and this region contains

the only sizeable clientele groups using improved agricultural technologies.

Complementing other Development Activities. USAID funds major projects in Central Shaba and Bandundu. Both are dependent on technologies generated by SENARAV.

Environmental Impact. Central Shaba is a critical site from this perspective. Two national parks are located in the area. In addition, the gallery forests along the waterways in the region, important migration alleys for many animal species and important genetic resources in their own right, are undergoing rapid destruction. In Bandundu, Kasai, and Bas Zaire, "savannization" is occurring as once-forested lands are degraded and fail to return to their original vegetative cover.

Nutritional Status. Inhabitants of Bandundu appear to suffer from poor nutritional status, second only to Kivu. As man-to-land ratios grow in Kasai, nutrition is becoming an increasing concern there as well.

Market Potential. Bas-Zaire and Bandundu are linked to Kinshasa by road. Kasai Oriental and Kasai Occidental are linked to both Shaba and Kinshasa by railroad and river transport. Shaba Central is linked to Southern Shaba, a food deficit region, by road and rail.

3. Project Orientation

Zaire's food imports have increased steadily since independence and continue to grow, while the resources needed to maintain and increase agricultural production are threatened. Soil fertility decreases as fallow periods in shifting cultivation systems are shortened. Gallery forests, the areas with the most productive soils in many regions of Zaire, are cleared, not allowed to regenerate adequately, and gradually evolve into less productive savannahs. Labor, the single most limiting constraint to production for most Zairian farmers, becomes even less productive as soil fertility declines, optimal sites for agriculture are degraded, and weed and pest infestations increase. In summary, despite the apparent abundance of land in Zaire, the country faces serious near- to mid-term environmental deterioration, in part linked to agricultural production.

Environmentally responsible agricultural development involves, in the first instance, protecting Zaire's soil, forest, and water resources. Conservation of the country's natural resources, particularly its rain forests, is important for integrity of the environment in Zaire and abroad. Many of Zaire's natural and environmental resources are subject to depletion. Replacing these, if depletion occurs, may be either physically impossible or prohibitively costly.

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Environmentally responsible agricultural development involves, in the second instance, improving agricultural practices to limit further degradation and rehabilitate environments which have already been degraded. The traditional slash and burn agriculture used by most Zairian farmers, for example, contributes directly to worldwide environmental deterioration. Large amounts of carbon dioxide are released by burning, which interacts in the upper atmosphere, contributing to ozone depletion. Further, the system destroys major germplasm resources for the world; Zaire's tropical rain forests, its tropical deciduous forests, and its gallery forests all represent ecotypes which are threatened worldwide.

Environmental considerations will be addressed in RAV II through a number of mechanisms:

* training in the principles of ecologically sound agricultural development for SENARAV scientists and technicians;

* development of linkages between Zaire's agricultural research system and international organizations that are willing to contribute financial resources and expertise to preserving and rehabilitating Zaire's natural resources;

* a focus on agro-ecological zones subject to near-term degradation; and

* development of ecologically responsible and affordable technologies that are adoptable by Zairian farmers.

Between 1973 and 1989 applied agricultural research in Zaire was mainly discipline-oriented. While a scientifically sound approach, few research results directly benefitted farmers. Although part of the problem was due to an ineffective extension system, the nature and relevance of the research conducted was also at fault. Applied agricultural research in RAV II will build on progress made in establishing an effective technology development system during RAV I.

Multidisciplinary team research will build on on-going subject matter research efforts, continue to develop improved varieties and technologies, and explore the plant, soil and climatic relationships that affect production of the principal crops grown in Zaire. Breeders, entomologists, pathologists, agronomists, and social scientists will work together to clarify constraints to productivity in each crop, and develop knowledge and plant materials designed to overcome them.

Developing improved technologies does not ensure their transfer to farmers. Therefore, researchers must understand and appreciate the farm environment and farmers' cropping systems,

production constraints, resources, and needs so that relevant technologies are developed to solve problems confronted by farmers.

SENARAV's approach to technology development and dissemination is to build a system in which information flows freely from researchers to farmers and from farmers to researchers. This system can only function if station-based researchers are directly involved with farmers; on-farm testing is an integral part of both the research and farmer feedback processes; and outreach is an inherent outcome of farmer-to-researcher dialogue and cooperation. By forming R&D teams, SENARAV captures the essence of the farmer-to-researcher link. They will be responsible for conducting surveys and collecting data about clients and their farming systems, conducting on-farm trials, organizing in-service training and planning and review sessions for outreach entities, and providing technical assistance to outreach agents.

The technology transfer component will enhance delivery of improved technologies. The ultimate payoff from agricultural research comes when new technologies are adopted by farmers, leading to increased farm productivity and to increased cash flows in the total national economy. Without successful transfer of technology to farmers, agricultural research cannot earn positive returns and agricultural productivity cannot increase.

It is impossible for SENARAV to work effectively across the entire farm population of Zaire. Identifying, characterizing, and prioritizing clientele groups must be a major responsibility of the R&D teams. Researchers will participate in this process. Three types of factors will be utilized to identify, characterize, and prioritize clientele groups: bio-physical characteristics, cropping systems, and socioeconomic characteristics. Building consensus among SENARAV personnel regarding the priorities that are established for research and extension activities is fundamental. Without consensus, information that is gathered remains unused by researchers and priorities are ignored in practice, even when approved in theory.

On-farm testing is a necessary adjunct to on-station research because it permits the researcher to subject technology to a wider range of bio-physical variation than exists on the research station; collect social and economic data that cannot be collected on station; and see how a new technology will impact the total farming system. Conducting on-farm tests of new technologies will be a second major responsibility of the R&D teams, one that is fully shared by station-based researchers and outreach agents. Three types of on-farm trials will be utilized. Research-oriented trials, primarily the responsibility of station-based researchers, are designed to submit technologies to a wide range of bio-physical variation. Production-oriented trials, primarily the responsibility of the R&D teams, are designed to provide socioeconomic data about the target crop. Pre-dissemination trials, the

responsibility of the R&D Teams or collaborating outreach entities, are designed to see how a new technology affects system performance.

SENARAV's institutional support to outreach entities will include providing in-service training, both general skills improvement in such areas as farming systems methodologies and recurrent technical training needed to utilize new technologies; priority access to new SENARAV technologies; technical assistance and extension materials; assistance in data analysis and evaluation; and organization of semi-annual planning and review sessions.

D. RAV II Project Components

1. Applied Agricultural Research

a. Varietal Improvement

RAV II, like RAV I, will concentrate on genetic improvement for cassava, maize, and grain legumes. Selection and breeding activities must be responsive to farmers' needs and address farmer-identified constraints to increased production. Crop lines will be developed and screened in early generations for disease and pest resistance, yield, acceptability to farmers, and adaptability to specific agro-ecological zones. The plant improvement programs will determine nutritive quantity and quality of grains, leaves, and roots. Other characteristics such as leaf, grain, and root color and acceptability will be determined, as well as processing quality and post-harvest storability.

The cassava program will continue to focus on development of high-yielding lines, resistant or tolerant to major pests and diseases. Additionally, the quality and quantity of both leaves and roots will be included as selection criteria, as well as the adaptability of cassava lines to low soil fertility and different soil types. Taste preferences between cassava producing areas will also be considered. The breeding program will utilize innovative breeding procedures (for example, CIAT breeding procedures and tissue culture) to develop superior lines in five years and, in the case of tissue culturing, to produce virus-free plants.

The maize improvement program will continue to focus primarily on open-pollinated maize varieties and to select varieties having good yield potential and resistance to streak virus, leaf blight, and striga. Grain color and acceptability, protein content, storability, and adaptability to low fertility soils will also be examined.

The legume program will include, as did RAV I, selection and development of bean, groundnut, cowpea, and soybean varieties. The program will continue to focus on the identification and selection of grain legume varieties that have high and stable yields for

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the various agro-ecological zones of Zaire. Additionally, grain legumes will be developed and selected for their adaptability to intercropping systems and low soil fertility; acceptability, size, and color of grains; pest resistance; and seed storability.

b. Soil Fertility

Low soil fertility is one of the major constraints to increasing food production in the Southern Band of Zaire. However, much basic data needed to develop sound research programs have not been collected. While the nutrient demands of specific crops like corn are known, very little is known about the nutrient demands of intercropping systems. During RAV II, several lines of investigation will be pursued.

The use of chemical inputs may be appropriate. Some farmers have already adopted the use of chemical fertilizers and others will, it is hoped, gain access to chemicals in the future. Even where chemical fertilizers are used, however, the economic viability of fertilizer recommendations must be monitored carefully since returns to fertilizer use vary with market prices of both the input and the product.

In other cases, crop rotations, alley cropping, and the use of compost and compost/chemical fertilizer mixes may be more appropriate. In Kasai Oriental, for example, farmers are in the process of changing from a system of shifting agriculture to permanent agriculture, largely as a result of growing population density. When this change occurs, farmers become much more concerned with maintaining the long-term productivity of their land.

In much of the Southern Band, however, farmers continue to utilize a system of shifting agriculture; village sites are fixed, but land parcels are not continuously cropped. The length of the fallow period is decreasing in virtually all shifting cultivation systems in the Southern Band, but farmers do not yet recognize land per se as a constraint to production since they can normally find a site for cultivation. These farmers are less inclined to adopt labor-intensive practices like alley cropping. In RAV II, the emphasis in these areas will be on ways of making the fallow period more productive to restore soil fertility more rapidly.

c. Cropping Systems

The majority of Zairian farmers grow their crops in traditional systems that have been developed over a long period of time by trial and error. There is a rationale for their cropping mix and production practices, but their farming methods are inadequate to meet national demand for food production. The resources needed to sustain agricultural production are being depleted faster than they are being replenished. As population increases, productivity declines, and pressures for cash income grow, the nutritional

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status of the household decreases. In RAV II, both the cropping mix and production practices characteristic of existing farming systems will be examined and ways of improving them will be tested.

The nutritional status of households in many parts of the Southern Band is poor and often declining. One emphasis of research in RAV II will be to determine ways of improving family nutrition--for example, through the introduction of soybeans and the use of soybean flour in fou fou. Cash income is another factor that is critical. Beans and groundnuts, for example, are important cash income crops in Bas-Zaire both because of their high value and because they are harvested at a time of year when school fees are due. RAV II will collect data and examine ways of increasing total parcel income generation and the timing of income, rather than concentrating solely on increasing the total production of a single crop. Finally, biological sustainability is a critical issue. If Zaire's resource base is to be conserved, agricultural production must be intensified. Ways to increase the total productivity of the resource base will be examined.

d. Pest and Disease Control and Management

Crop varieties and lines will be screened for resistance/tolerance in early generations to major disease and pest problems. Biological control methods, in addition to management practices and cropping systems for optimum diseases and pests control, will be developed for all SENARAV crops.

e. Strengthened Linkages

RAV II will strengthen SENARAV's linkages with international agricultural research networks. This will include increased collaboration with the IARC's, particularly CIMMYT for maize, CIAT for manioc and beans, ICRISAT for peanuts, and IITA for manioc, maize, and grain legumes. Collaboration will include utilizing germplasm provided by the Centers, participating in the Center's regional trials, and utilizing short-term technical assistance from the IARC's when possible. RAV II's collaboration will also extend to other research networks, such as the Bean/Cowpea CRSP and the Tropsoils CRSP, and to joint research and the exchange of materials and information with other national agricultural research programs and institutions in Africa.

2. Technology Transfer and Outreach

SENARAV's system is one of technology development and transfer. Like any system, its performance will be only as strong as its weakest links. The weakest links today are its farming systems and outreach components. They are weak both because of factors internal to SENARAV and because of SENARAV's dependence on other private and public sector entities to reach large numbers of farmers.

a. Internal Factors.

As the Threshold Decision Evaluation points out, the farming systems and outreach components were neither effectively linked to, nor incorporated into, on-station research components in RAV I. The evaluation recommends that the two components be combined into one unit, a recommendation which will be followed in RAV II with the formation of R&D teams.

Further, in RAV I, little formal training in either farming systems or extension methods were provided to SENARAV personnel; supervision provided was also inadequate. As a result, disparate methods and approaches are utilized by the three national programs. While PNL has effective outreach and farming systems units, PNM's units are frail and much of the effort by PRONAM's units is misdirected.

The commodity focus of the teams has led to single commodity-oriented on-farm trials. Little research on cropping systems was conducted; little attention was paid to the collection of farm-level impact data; little feedback was provided to, or used by, station-based researchers who themselves appear to have conducted, for the most part, only limited on-farm research.

The R&D teams in RAV II will be expanded, provided with adequate financial and logistic support, be given a regional rather than a commodity focus; and provided with adequate training, technical assistance, and supervision. Station-based researchers will be required to participate in on-farm research.

b. External Factors.

SENARAV is dependent for its success, in the main, on the quality of activities conducted by outreach entities beyond its direct control. These entities vary enormously in capability, willingness to devote resources to working with SENARAV, and their potential for achieving farmer-level impact. They are another weak link for SENARAV.

SENARAV can strengthen this link only by improving support to collaborating outreach entities. Just as SENARAV cannot hope to work with all farmers in Zaire, it cannot hope to provide effective institutional support to all of the outreach entities in Zaire's Southern Band. One of SENARAV's first undertakings will, therefore, be to select collaborating entities. As a general guideline, SENARAV will provide support to outreach entities which work with the priority clientele groups and have (or have the potential to develop) effective technology dissemination programs. Primary Collaborators, who will receive the majority of SENARAV's attention, will be selected on the basis of their (a) willingness to enter into a formal agreement with SENARAV, (b) shared priorities,

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(c) quantity and quality of human and fiscal resources, (d) interest in meeting the needs of farmers, particularly women farmers, and (e) number of farmers served. Annex H provides more details on SENARAV's interaction with outreach agencies, including special relationships with USAID Zaire Projects 102 and 105 and the U.S. Peace Corps, which will be reinforced.

3. Sustainability

RAV II will also initiate steps to ensure program and economic sustainability. The term "sustainability" has several meanings. For the design of this project, a definition suggested in a recent USAID study (DPMC/OICD/USDA) is adopted:

> "Sustainability refers to the ongoing, dynamic process of continuing the valued results of development activities."

"Ongoing dynamic process" suggests that capacity is created and that processes are put in place. "Ongoing" means that capacity or process begins when development activities are designed, and continues throughout and beyond the project period. "Dynamic" indicates that the process allows for change and adaptation. "Continuing" emphasizes that results persist over time and that the relevant time frame for assessing sustainability may be longer than the life of the project. "Valued results" emphasizes that performance and change are the ultimate criteria on which success (or failure) of development activities are based. To be worthwhile, these results must be "valued" from social, economic, political, and environmental points of view.

Sustainability is an issue of great importance to RAV II. The term has many meanings, two of which are especially important to the long-term success of SENARAV.

a. Economic sustainability

Economic sustainability of agricultural research occurs when the value of increased production exceeds the opportunity cost of generating and disseminating new technologies. The problem of economic sustainability for SENARAV concerns the current low rate of diffusion of appropriate food crop technologies. RAV II will address this problem by ensuring that technologies are adoptable by small farmers and by building strong ties with outreach entities.

b. Program sustainability

Program sustainability concerns the level and variability of funding for agricultural research. Financial constraints have prevented the government and local organizations from continuing development activities for externally-funded projects. Government

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revenues fluctuate and annual levels of funding for agricultural research are uncertain. The problem of program sustainability, then, is evidenced by the current small share of the SENARAV budget supported by the GOZ and by the large annual fluctuations in agricultural research funding. These problems will be addressed in RAV II through phased increases in GOZ core budgetary support, including payment of all personnel costs beginning in year two of the project; the Zairian Food Crops Research Endowment, a research grants program; and improved mechanisms for seed multiplication and vegetative propagation. It should be noted that SENARAV will not be involved in the business of certified seed production and plant multiplication, nor will SENARAV in any way invest in distribution of seed, nor become directly involved in the establishment of seed multiplication enterprises. SENARAV's role will be limited to applied research, varietal development, and production of foundation seeds and disease-free planting material to be bulked and distributed by third parties.

c. Environmental sustainability

RAV II will focus its efforts on the development of technologies that preserve the natural resource base, which can, in turn, help ensure that agricultural production in Zaire is maintained at an acceptable level over the long term. Specific actions will include: 1) a greater focus on fragile agro-ecological zones as on-farm testing and outreach sites; 2) greater emphasis on the development of environmentally sound technologies such as improved fallow and other systems aimed at improving soil fertility; 3) short-term training in agro-ecology; and 4) investigation of possible new linkages with international conservation organizations, including the establishemnt of a Zairian agricultural research fund through a debt-for-nature swap.

4. Human Resources Development

One of the most severe limitations to a viable technology development and dissemination system in Zaire is the lack of sufficient numbers of highly qualified personnel for planning and implementation. Most food crop research is currently being conducted by personnel trained only to the baccalaureate level. Some progress in alleviating this constraint was made in RAV I. A total of eight persons received M.S. degrees, and one Ph.D. was completed during the first phase. Currently, 29 candidates, including nine for the Ph.D., are still in training.

In RAV II, human resources development will be a high priority. The emphasis on plant breeding and crop protection in RAV I accurately reflected the importance of these areas for SENARAV. While continuing to be important areas for training, RAV II will expand its long-term, short-term, and on-the-job training to areas not adequately covered by RAV I.

Utilizing farming systems methodologies requires skills in agricultural economics, agronomy (including soil science), sociology, and extension methods. Insufficient numbers of persons have received training in these areas to support effective on-farm research. Food crops are produced almost exclusively by women in many areas of Zaire. As a consequence, more women are needed as project personnel, and appropriate training provided them. Research administration and support need appropriately trained personnel. Minimal specialized (and no advanced degree) training has been undertaken in these areas. Skilled outreach personnel are essential for effective extension programs, particularly programs dependent on NGOs. This is another area where human resources development is presently deficient. The management of SENARAV's facilities, equipment, vehicles and library resources are also in need of additional trained human resources.

5. Research Management

The research management component of RAV II will introduce and/or improve research management practices launched under RAV I. Improving management at the national and station levels is key to strengthening the agricultural research system in Zaire.

Administratively, research management in RAV II will strengthen the linkages between applied research and farmer adoption of improved technologies. A strategic plan for the three national research programs will be developed. Research priorities will be based on a common set of criteria to identify priority agro-ecological zones, researchable problems, and individual research projects with clear program objectives and evaluation guidelines and procedures.

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IV. IMPLEMENTATION PLAN

A. Overall Project Implementation

The implementation plan described below addresses 11 major elements: (1) contracting, (2) methods of selection and project management, (3) responsibilities, (4) relationships with SENARAV, INERA and other agricultural research institutions, (5) the role and responsibilities of technical assistance, (6) participant training, (7) a two-year workplan, (8) major implementation tasks, (9) tasks during the transition from RAV I to RAV II, (10) a procurement and commodities acquisition plan, and (11) monitoring and evaluation. Reference should be made to important related Annexes, in particular Annex E (Logframe Matrix), Annex H (Technical Analysis), Annex I (Institutional/Administrative Analysis), Annex J (Economic/Financial Analysis), and Annex N (Implementation Schedule) to supplement this summary discussion.

B. Contracting

Technical assistance, procurement, and training will be provided under a single agreement between USAID and the Title XII contractor. The contractor will have sole responsibility for the management of all related project costs, following the guidelines agreed on with USAID and appropriate Zairian entities. All commodities will be purchased according to AID Handbook 15, and the provisions of this project paper.

The contractor and lead institution may sub-contract with other suitable institutions.

C. Methods of Selection and Project Management

The experience of Title XII institutions in agricultural research and management, the resources at their disposal, and their linkages with international agricultural institutions give them a comparative advantage in successfully accomplishing the training, research, outreach, sustainability,and management tasks of the project. Contractor selection criteria included the following:

* ability to execute planning and management activities;

* ability to work within a national agricultural research system in a collaborative fashion to develop/strengthen the research programs, outreach activities and institutional linkages described in Chapter III;

* number of sub-contracting institutions and firms that satisfy the Gray Amendment.

The project will be implemented through an AID direct contract. SENARAV will retain, with USAID, its present co-approval

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authority for all major actions pertaining to contractor selection, approval of work plans, evaluation of contractor performance, financial management, execution of project implementation orders, internal project evaluations, and modifications of project objectives, inputs or outputs. In this way, SENARAV will share authority and responsibility for project implementation, but will not be burdened with the operational administration of the technical assistance contract. All technical assistance candidates for membership on the implementation team will be approved by SENARAV and USAID.

1. Gray Amendment

Gray Amendment concerns will be met in that Southern University, an 1890 historically black university which led the project design for the South-East Consortium for International Development (SECID), will also, upon successful completion and acceptance by A.I.D., lead project implementation under a Collaborative Agreement. Other participating SECID universities are also 1890 institutions. An effort will also be made, in selecting subcontracting private firms, to utilize to the extent possible those which fall under Gray Amendment provisions.

D. Responsibilities

1. USAID

USAID Zaire has designated an experienced agricultural development officer in the Agricultural and Rural Development (ARD) Office as Project Officer. This person will be responsible for USAID approvals, guidance, and general monitoring of the project. USAID will also contract for external evaluations and audits and will handle procurement of vehicles (including motorcycles). The Project Officer will be backstopped by the ARD Chief and his Deputy and will be supported by USAID staff in other divisions, including (but not limited to) the Project Development Office (commodity procurement, engineering questions), Controller's Office (financial management), Executive Office (contracting, personnel logistics), General Development Office (training), and Program Office (Counterpart Funds).

The USAID Project Officer will have the following specific responsibilities:

* maintain frequent contact with the COP, SENARAV Coordination and other GOZ officials exercising project management functions;

* in coordination with the COP, and the SENARAV Scientific Director, participate in periodic inspection visits to

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project sites to assess progress toward the achievement of project objectives;

* analyze and approve project implementation actions which require prior USAID approval;

* review documents submitted by the GOZ to meet the project's conditions precedent in cooperation with the USAID legal advisor;

* participate, review and approve the project's annual work plans;

* review the scopes of work for, and the results from, studies undertaken by the contractor;

* review quarterly and annual project progress reports prepared and submitted by the contractor's COP;

* arrange for and review periodic audit reports of project finances and implementation;

* review project reimbursement vouchers submitted by the project contractor to USAID;

* Assist with the preparation scopes of work for project evaluations, and draft project implementation orders for technical services (PIO/T) for the evaluation teams; participate in the mid-project and end-of-project evaluation with specialists from outside USAID;

* participate in annual in-house reviews of the project, as well as in joint project reviews with the GOZ; and

* prepare an agenda for (and chair) periodic USAID project committee meetings as needed to facilitate project implementation.

2. GOZ

The government-appointed SENARAV Coordinator/Director and Deputies will serve as the primary counterparts to the project's COP and will be responsible for the management of all programmed fiscal activities. DOA/SENARAV will also name principal collaborators to work with each long-term technical assistance team member. The project management structure is presented in Figure 1. The GOZ/SENARAV will provide land for experiments, office space (including office space and related support facilities for the technical assistance team), and ensure payment of local currency expenses, as estimated in Table 5, Section V below.

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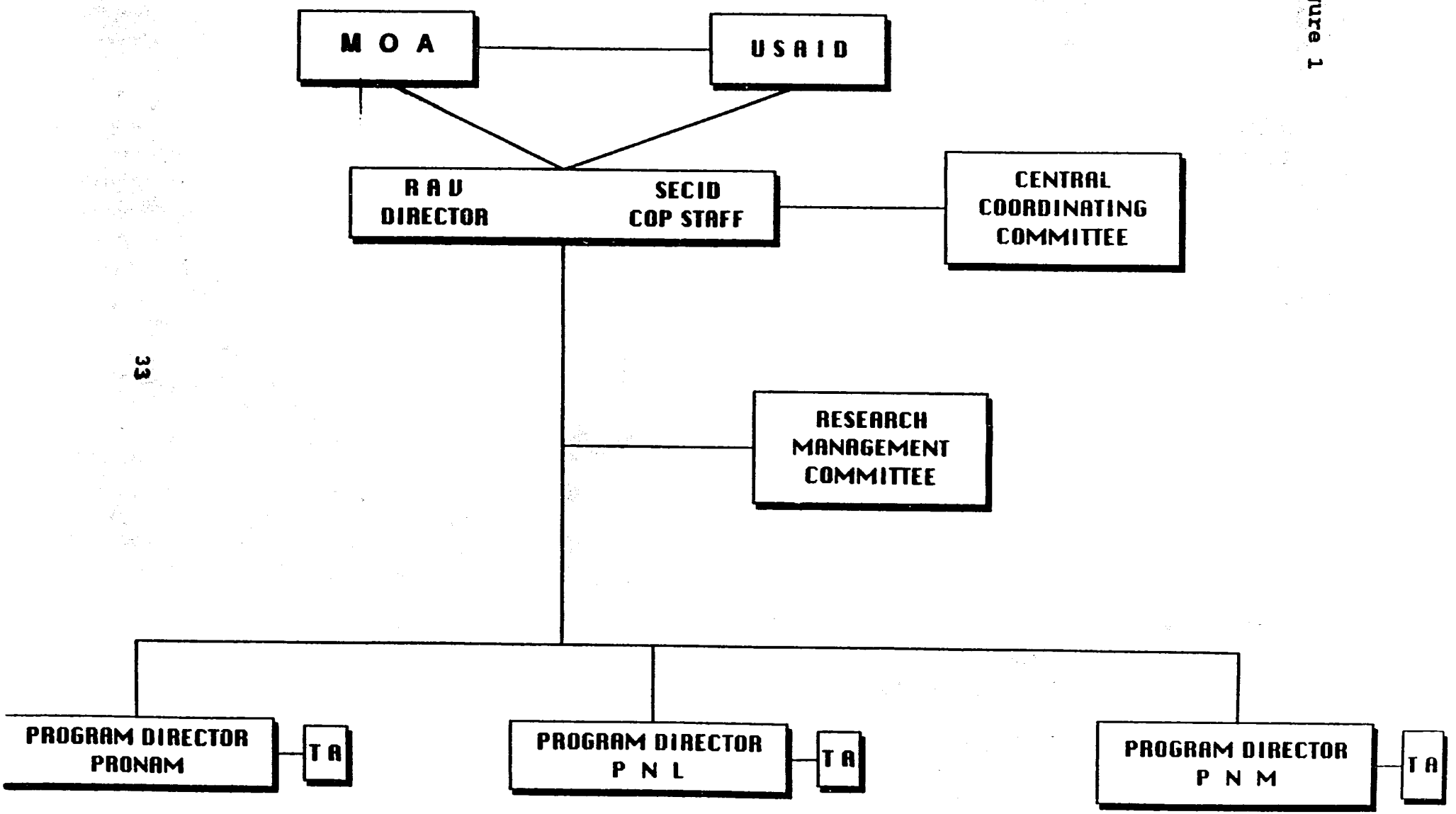
Figure 1

PROJECT STRUCTURE OF R A V II



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3. The Contractor

The contractor will provide necessary technical assistance inputs and actions required for successful implementation of the project, including technical assistance personnel; training; the procurement of specified project commodities; and technical assistance costs from project funds. The US technical assistance team, as well as the national staff, will be located in office space to be rehabilitated or rented by SENARAV to facilitate internal project administration and coordination.

As stated earlier, the contractor will serve in two roles, the first to assist SENARAV in developing and managing SENARAV Research Programs and Personnel. The second role is that of a Researcher or Specialist who will work with the Zairian counterparts on specific programs. With the dual role in mind, the proposed technical assistance team will be composed as follows. Detailed job descriptions of each position can be found in Annex I

The COP/Research will be stationed at Kinshasa for eight years. His principal responsibility will be to assist the Director of RAV in management of the three national research programs. He will also serve as principal advisor for applied research and research management.

The R&D/Training Specialist will also be stationed at Kinshasa on a three year assignment. The principal responsibility of this R&D Specialist will be to provide training in FSR/E methodologies and technical support to the R&D field units located in the three major agri-ecological zones in the southern band of Zaire. This person will also help coordinate the project's overall training program, will take the lead in the preparation of relevant outreach documents, and will provide routine backstopping for the R&D teams in Kikwit and M'Vuazi.

The Financial Management Specialist will be responsible for preparing the budget, financial planning, establishment of an endowment fund, and training in financial management. This person will be stationed at Kinshasa for six years.

The Plant Breeder Specialist (maize) will be responsible for both hybrids and open pollinated maize improvement; on-the-job training of counterpart staff and assisting in on-farm trials. This person will be stationed at Lubumbashi for a three year assignment.

The Plant Breeder (legumes) will be responsible for legume improvement (including beans, cowpeas, peanuts and soybeans); will conduct on-station and on-farm trials; and will also provide on-

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the-job training of counterpart staff. This person will be stationed at Gandajika on a three year assignment.

The Agronomist (soil fertility specialist) will provide support to the multidisciplinary team, design and implement trials concerning improving soil fertility, conservation sustainability and multicropping systems and provide on-the-job training of counterpart staff. This person will be stationed at M'Vuazi on a three year assignment.

The Agricultural Economist will serve as senior level economist for the R&D unit and participate in on-farm survey and data collection. This person will also provide on-the-job training of counterpart staff, and will be stationed in Lubumbashi for three years.

The Entomologist will be stationed at Lubumbashi and will serve as the senior entomologist for all three national programs. He will assist in designing and implementing an integrated pest management research program as well as conducting research on storage pests, maize streak resistance, etc. This is a three year position.

The Research Station Management Specialist will provide expertise in the area of Research Station Management. This person will be stationed at Lubumbashi for two years.

The Farming Systems Research/Extension Specialist will assist counterparts in designing and implementing project work plans for outreach and FSR/E Programs; developing training materials, listing recommendations, etc. This person will be stationed at Lubumbashi for two years and will have routine backstopping responsibilities for the R&D teams in Kaniameshi, Niembo and Gandajika.

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E. Relationships with SENARAV, INERA and Other Agricultural Research Institutions

The relationships to be established with SENARAV, INERA and other agricultural research institutions will involve joint identification of research topics, research activities, and the management of research facilities. SENARAV will fund the cost of research through the project, provide equipment and supplies, and lead the design of research protocols. SENARAV will also train personnel for outreach trials, co-monitor progress of the trials, and prepare and distribute reports of research results to all participants to further information-sharing between SENARAV and INERA and with target, beneficiary group.

F. Roles and Responsibilities of Technical Assistance

The technical assistance contractor will have responsibilities in the implementation phase of RAV II which will include planning, policy guidance, evaluation/monitoring, and overall coordination relating to the activities of collaborating institutions. This will also include providing support for documentation, data processing, timely shipping of personal effects and project materials, and providing funds for a local working capital account. Project management will be led by a designated lead institution. A primary subcontract will be executed by the contractor with the lead institution to provide it with maximum authority to implement all management functions necessary to the project.

The technical assistance team will work within SENARAV's organizational structure. Assignments of team numbers will entail being active in overall management and administration, and serving as advisors and researchers to the Kinshasa coordinating office of SENARAV and to the three National Programs: PRONAM, PNL, and PNM. Each team member will be assigned a counterpart and technical support staff.

G. Participant Training

Candidates for training funded by RAV II will be selected jointly by the GOZ/SENARAV, the technical assistance contractor and USAID. SENARAV and the contractor (represented by the COP) will furnish to USAID substantive information required for the PIO/P. USAID Zaire will issue unfunded PIO/Ps to authorize expenditures of training funds by the contractor.

The contractor will be responsible for the identification of appropriate training opportunities, placement of participants, and all logistical and financial arrangements. This will be done prior to the departure of the trainee. The contractor will also ensure that arrangements are made for lodging, language training, and

allowance payments, and will monitor trainee performance throughout the period of training.

For long-term participants, progress reports will be furnished to USAID, SENARAV and the COP. A trainee's progress report will provide the name, institution, course of study, date of enrollment, expected date of completion, grade point average, and evaluative comments from the trainee's faculty advisor.

Reports on short-term training funded by the project will be prepared quarterly and will form a part of all quarterly project reports.

H. Two-Year Work Plan

Within 90 days of project start-up, the technical assistance team, in consultation with appropriate Zairian counterparts, will construct a detailed two-year work plan. The plan will address the following issues:

* budgets (GOZ and U.S. dollar budgets) by program, project component, and station/work site;
* design and implementation of on-station and on-farm research trials;
* staffing patterns (by program, project component and station) and training schedules;
* program monitoring and evaluation schedules;
* station rehabilitation; and
* commodity acquisition.

I. Major Implementation Tasks

Following is a schedule of project implementation milestones.

Project Yr. 1990 (Month)	Major Event/Task	Responsible Entity
1	Authorization of Project	USAID
	Obligation of funds	USAID
	GOZ Meets Conditions Precedent	GOZ

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	Arrival of part of TA team	CONTRACTOR
2	Annual Scientific Review	SENARAV/ CONTRACTOR
	Arrival of rest of TA team	CONTRACTOR
3	Return of some participant trainees	CONTRACTOR/ GOZ/USAID
	Review and implementation of initial commodity acquisition plan	CONTRACTOR/ USAID/SENARAV
	Review and implementation of initial facility rehabilitation plans	CONTRACTOR/ SENARAV
	In-country training	CONTRACTOR
4	Human Resources Needs Assessment	CONTRACTOR/ GOZ
5	Reorganization of R-D teams regionally	SENARAV/ CONTRACTOR
	Assignment of national coordinator of R-D Unit	SENARAV
6	Completion of two-year plan of work	GOZ, CONTRACTOR
	Initial Project Training Plan	CONTRACTOR/GOZ
	Completion of baseline surveys to delineate clientele groups and agro-ecological zones	CONTRACTOR/ SENARAV
7	Selection of Primary Outreach Collaborators	SENARAV/ CONTRACTOR
8	First semi-annual planning session with outreach collaborators and completion of outreach two-year plan.	SENARAV/ CONTRACTOR

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22	Internal Evaluation Technologies prepared for release	CONTRACTOR SENARAV/ CONTRACTOR
50	Major External Evaluation	USAID
64	Internal Evaluation	CONTRACTOR
96	End of Project Evaluation	USAID

J. Tasks During the Transition Period from RAV I to RAV II.

All activities of RAV during the transition period should continue; therefore, the following are recommended:

* IITA should retain key staff until the end of RAV I, currently scheduled for September 1990.

* USAID should continue support for long-term participant trainees, to be funded and managed under RAV II. Also, activities such as procurement, rehabilitation of facilities, and related project activities should continue.

* The contractor should assign technical assistance personnel on a TDY basis no later than July 1990. The long-term technical assistance team should begin duty in August 1990, to allow overlap with the RAV I team of IITA.

K. Procurement and Commodities Acquisition Plan

Project procurement during the transition period will be handled by USAID. After the start of RAV II, the contractor will handle the purchase of all goods and services, with the exception of vehicles, which will be purchased by USAID Zaire. A preliminary list of commodities and their cost is found in Appendix J. SENARAV and the COP will prepare annual procurement plans for commodities to be purchased by the contractor. Particular attention will be given to computer hardware and software to ensure that it is compatible with the systems to be developed for INERA. In-country staff will inspect commodities on delivery to ensure compliance with specifications. Air freight will be used for all but the heaviest and lowest priority items.

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RAV II will be funded through the Development Fund for Africa, which grants a special waiver pertaining to U.S. source rules for the purchase of goods and services (Table 2). The contractor will solicit participation to the maximum extent possible of small business concerns, economically and socially disadvantaged enterprises and women-owned firms in response to the Gray Amendment.

All waivers needed for project implementation are incorporated within the provisions of the blanket waiver for "Procurement of U.S. Goods and Services under the DFA;" the AID Blanket Transportation Waiver (to be renewed after August 10, 1990), and the Blanket Source/Origin Waiver for project procurement of certain vehicles and motorcycles, plus spare parts purchased with these vehicles (to be renewed after March 6, 1990).

All USAID project-procured commodities will become the property of the GOZ (unless other agreements are made by both parties) at the end of the project.

Long-term housing leases reimbursable under the project for the technical assistance team will be signed by the COP, or his designee. Housing and household effects will be equivalent in size, quality and cost to that provided AID direct-hire personnel. In-country technical assistance team members will be reimbursed by the contractor for basic utility costs and guard service.

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Table 2. RAV II Authorized Procurement Under The Development Fund for Africa.

	Goods or Services to be Procured	Authorized Source (or Origin)	Expected/Preferred Source (if different from Authorized Source)	Documentation Requirement	Comments
1.	Participant Training	935	USA for most all long-term training.	Special DS/IT approval i: not required.	
2.	Technical Assistance	935	U.S. Universities for long-term TA.		
3.	Ocean Shipping (Cargo Preference)	50% Gross tonnage of AID financed commodities to be shipped on U.S. Flag commercial vessels.	Zaire Blanket Transportation Waiver 89-B-4 permits expanded use of code 935 Flag vessels.	Normal rules apply.	
4.	Air Travel and Transportation.	U.S. Flag Carriers.		Mission Director may approve exceptions.	Exceptions to be used sparingly.
5.	Motor vehicles	935	AID/W Blanket Vehicle Waiver permits use of code 935 source/origin.	Procurement plan for DFA activity should indicate whether U.S. manufactured vehicles are available to meet the needs of the activity; Procurement PIL.	No FFA section 636(1) Waiver is required
6.	Construction/Rehabilitation Service	935	Local constructor/rehabilitation of less than $1 mil.	Mission Director Approval.	
7.	Imported Shelf Items	935			
8.	Laboratory Equipment, Furniture, Household and Office Equipment.	935, however U.S. source equipment may not be financed if the U.S. domestic price is less than parity.	Mission Director may approve exceptions.	No unit price limitation or total cost limitation on Code 935 Procurement of non-code 941 origin; Procurement PIL.	

L. Monitoring and Evaluation

1. Monitoring

a. Work Plan and Monitoring Plan

Following arrival on site, initial annual work, budget and monitoring plans will be developed by SENARAV and contractor personnel for approval by USAID. The work and monitoring plans will incorporate the project monitoring system described in Chapter VI. USAID, the GOZ, and the contractor will use the monitoring plan as a basis to measure project progress. The plans will be reviewed and modified as needed, but at least every 12 months, and implementation adjustments will be made as deemed necessary.

b. Site Visits

The USAID Project Officer will visit project sites no less than twice each year. Visits should include station trials, on-farm trials, and outreach activities. Reports of these visits will be submitted by the Project Officer.

c. Project Committee Meeting

The Mission maintains an active system of project committees (PCs). The PC is composed of representatives from key Mission offices and meets as needed to review implementation plans, project progress and objectives. The PC may be convened at any time to discuss specific implementation problems, proposed modifications, and plans for evaluation.

d. Joint Reviews

The joint review brings together key USAID and GOZ staff and is usually held at the project site. Joint reviews examine progress made towards achieving project purposes and whether planned activities are likely to produce the intended impact. Assumptions are also reviewed.

5. Audits

This project paper provides for a rigorous and continuing audit process.

bC

2. Evaluation Schedule

Evaluations will be completed periodically.

a. First Internal Review, 1992

All technicians will have been in place and project-procured equipment and supplies in operation for sufficient time to permit an assessment of whether project implementation will result in the achievement of outputs. Thus, the review by the contractor's home office will make initial judgments concerning the feasibility of the planned timetable and adequacy of resources.

b. Mid-Term External Evaluation, 1994

A major external evaluation is scheduled for 1994. It will measure the project's achievement of goal and purpose, and inputs and outputs, according to the targets set forth in the logical framework. The GOZ and USAID will be provided with specific recommendations.

c. Second Internal Review, 1996.

A second internal evaluation will occur in 1996. It will provide USAID, the GOZ, and the contractor with an assessment of the degree to which recommendations made in the first internal and first external evaluations have been successfully implemented. In addition, it will measure the project's achievement of goal and purpose, and inputs and outputs, according to the targets set forth in the logical framework.

d. End-of-Project External Evaluation, 1998

The project's accomplishment of goal and purpose will be evaluated in 1998.

2. General Evaluation and Review Methodology

The evaluations and reviews will be conducted in close collaboration with appropriate GOZ officials. The project contractor in-country and state-side teams and SENARAV staff will participate to the fullest extent possible, although not as members of the evaluation teams. The evaluations team will draw on annual assessments, audits, reports, and previous evaluations of the project. The evaluation teams will interview project staff, farmers, outreach entities, other donor agency representatives, USAID staff, and GOZ officials to assess the impact of the project.

V. COST ESTIMATES AND FINANCIAL PLAN

A. Introduction

RAV II is an eight-year project, with a total USAID contribution of $41.5 million. It is anticipated that the GOZ will contribute $21.5 million, with $12.2 million coming from commodity import- and PL 480-generated counterpart funds and the balance from GOZ regular budget resources.

This chapter brings together the financial analysis for RAV II prepared by the design team, including estimates of project costs and related financial plans. It is organized into five sections (after this introduction), dealing with the budget summary, sources of financing, the budget by program components and major work sites, the disbursement plan, and financial control. Five main tables relating to these sections of the chapter are presented here; more detailed, supporting information appears in tables attached to the Economic/Financial Analysis Annex J, beginning with Table J-7.

Three key questions are addressed by this chapter:

* What financial resources will be needed to implement successfully RAV II?

* How should they be distributed by budget line, by year over the life of the project, by major program component, and by location, or major work site?

* What sources of funding should be drawn on for these uses?

Precise responses require the kinds of data and forward planning processes that are to be put in place by RAV II. Therefore, the design team was only able to develop indicative budgets, and first-round estimates of some dimensions of their allocations. These need to be refined after the start-up of RAV II, and rolled over and improved continuously during its life.

The process followed by the team to develop its financial analysis involved, first, designing SENARAV's program of work and some financial data bearing especially on USAID as a funding source. Results were then discussed with Mission staff and SENARAV representatives, who provided generously relevant data and information available to them. A full budget was then estimated in at least three iterations, after each of which separate meetings were held by the design team with USAID and SENARAV. Several guiding principles emerged from this process, the most important of which were:

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* project economically the technical assistance-related components;

* increase the financial participation of the GOZ in RAV II to ensure financial and program sustainability after the project terminates;

* make realistic estimates of the (limited and somewhat unpredictable) availability of counterpart funding;

* project generous contingency allowances; and inflate cost estimates at a 5.0 percent annual rate in U.S. dollar terms, assuming that the rate of exchange of the local currency will adjust fully for Zaire's inflation (which has occurred in the most recent past).

B. Budget Summary

The project's resulting budget summary, developed with tl above principles in mind, appears in Table 3. Six facts concerni the table are brought to the reader's attention.

* While about half of all project resources will be derive from USAID, the GOZ will be contributing 22 percent fr its regular budget resources--up substantially from tl current ten percent level.

* The percentage of resources devoted to personnel cost will be significantly less than the 60 to 80 percer figure that prevails worldwide for comparable agricul tural research/extension enterprises.

* The budget reflects 10 long-term technical assistanc positions (38 person-years), 56 person-months of short term technical assistance, and six person-years of hom office backstopping personnel. The costs of all techni cal assistance personnel were progressively cut back b each budget iteration. In the last one, a long-ter specialist in research management was withdrawn, plu short-term effort in biometrics, agricultural economics documentation/information,post-harvest/storage/utiliza tion, research management, and debt conversion/endowment Correspondingly, if additional funds become available the design team recommends that consideration be give to restoring effort in these areas.

* Counterpart funding requirements will actually be lowe on average (about US$1.5 million annually) than they hav been over the past four years of RAV I.

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Table 3. RAV II Life of Project Costs Contributed by the USG and the GOZ, Millions U.S. Dollars.*

Item	CONTRIBUTIONS BY: USG	GOZ: Counterpart Funds: Contr-actor	GOZ: Counterpart Funds: SENARAV	GOZ: Regular Budget Res.	GOZ: Sub-total	Total Dollars	Percent of Total
1. Personnel/TA	10.2	-	0.6	6.7	7.3	17.5	42.17%
2. Participant Training	4.3	-	-	-	-	4.3	10.36%
3. Vehicles, repair, fuel	1.0	-	3.9	1.0	4.9	5.9	14.22%
4. Facilities Rehabilitation	0.9	-	0.9	0.4	1.3	2.2	5.30%
5. Other research support	0.4	-	1.1	0.3	1.3	1.7	4.10%
6. Office equipment supplies, etc.	0.7	-	1.0	0.3	1.3	2.0	4.82%
7. In-country travel	-	-	1.9	0.5	2.4	2.4	5.78%
8. Audits, evaluations	0.5	-	-	-	-	0.5	1.20%
9. Networking/Research grants	1.0	0.6	1.0	-	1.6	2.6	6.27%
10. Contractor Logistic Support		0.4	-	-	0.4	0.4	0.96%
11. Contingency	1.0	-	0.8	0.2	1.0	2.0	4.82%
Totals	20.0	1.0	11.2	9.3	21.5	41.5	100.00%
Percent of Contributions	48.19%				51.81%		

* Because the values given in this table have been rounded, while their individual integrity has been maintained, not all rows and columns appear to sum correctly. The totals given, however, are in fact correct.

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* The budget holds expenditures in infrastructure construction/rehabilitation to $1.8 million, principally by maximizing use, through renovation, of sound existing structures. By contrast, the budget allocates over one quarter of all costs to supporting the mobility of project staff and research/office operations.

* The cost of inflation to the project is quite modest, mainly because of the early-stage bulge in the expenditure profile. A contingency allowance of about five percent of all line items will be available. This contingency, together with the inflation allowance, ensures an adequate working reserve for the life of the project.

C. Sources of Financing

Two additional tables (Tables 4 and 5) detail the data of Table 3 by year and sources of financing. They describe a major "front-end" contribution by USAID to the project and a reasonably flat profile of GOZ expenditures. This flat profile reflects a steady downward trend in the GOZ's counterpart funding and a significant upward trend in funding from its regular budget resources (the "investment" and "operating" budgets).

Following its recommended conditions precedent, the design team projects a rapid phase-in of funding from regular budget resources of personnel expenditures for SENARAV. Table 5 footnotes how this process is to occur.

D. Budget by Program Components and Major Work Site

Table 6 summarizes project budget data by line item and major program component; Table 7 summarizes the line item data by principal work site. In each case, the estimates were prepared by first identifying those budget lines with largest variance by project component and by main work site location. Their expenditures were disaggregated by component and work site; and the residual expenditures remaining from the total budget were then allocated by component and work site, based on the judgments of the design team and SENARAV staff. In the future, the implementation

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Table 4. RAV II Life of Project Costs Contributed by the U.S. Government, Beginning August 1, 1990, ($000)*.

ITEM (Source)	PROJECT YEAR YEAR-1	YEAR-2	YEAR-3	YEAR-4	YEAR-5	YEAR-6	YEAR-7	YEAR-8	TOTAL	Percent of Total
1. Personnel: long-term, short-term, home office (Table J-7)	2,510	2,499	2,453	882	576	609	327	316	10,172	50.86%
2. Participant training: long-,short-term (Table J-9)	642	763	768	646	726	476	259	53	4,333	21.67%
3. Vehicles, repairs	572	29	-	-	374	29	-	-	1,004	5.02%
4. Facilities, rehabilitation,	-	450	300	150	-	-	-	-	900	4.50%
5. Other research support: lab eq., supplies, etc.	249	27	27	29	24	13	13	14	396	1.98%
6. Office eq., supplies, household furnishings	413	90	93	35	33	28	21	23	736	3.68%
7. Audits, evaluations	60	-	168	-	-	170	-	107	505	2.53%
8. Networking/ Research grants	100	150	150	150	150	100	100	100	1,000	5.00%
9. Contingency	232	201	204	94	93	72	33	25	954	4.77%
Total	4,778	4,209	4,163	1,986	1,976	1,497	753	638	20,000	100.00%
Percent of Total	23.89%	21.05%	20.82%	9.93%	9.88%	7.49%	3.77%	3.19%	100.00%	

* All estimates are adjusted for a 5.0 percent annual rate of inflation.

Table 5. RAV II Life of Project Costs Contributed by GOZ Counterpart Funds (CPF) and Regular Budget Resources (RBR), Beginning October 1, 1990, ($000)*.

ITEM (source)	1990	1991	1992	1993	1994	1995	1996	1997	1998	TOTAL	Percent of Total	Percent of CPF & RBR
	CALENDAR YEAR											
1. Personnel (Table 6)												
CPF	229	396		-	-	-	-	-	-	625	2.91%	5.11%
RBR	8	596	767	822	864	906	952	999	787	6,701	31.16%	72.27%
2. Vehicle repairs, and fuel.												
CPF	43	484	506	506	499	497	488	484	354	3,861	17.95%	31.56%
RBR	80	25	27	56	88	124	163	207	190	960	4.46%	10.35%
3. Facilities rehabilitation												
CPF		550	350							900	4.19%	7.36%
RBR				60	63	66	69	73	57	388	1.80%	4.18%
4. Other research support - lab eq., supplies, etc.												
CPF	26	134	140	140	138	138	134	128	94	1,072	4.99%	8.76%
RBR	25	7	7	16	24	34	45	55	50	263	1.22%	2.84%
5. Office equipment/supplies, household furnishings												
CPF	13	248	168	170	84	84	83	79	58	987	4.59%	8.07%
RBR	2	83	56	57	15	21	28	34	31	327	1.52%	3.53%
6. In-Country travel												
CPF	54	238	250	249	245	245	241	237	173	1,932	8.98%	15.79%
RBR	25	13	13	28	43	61	80	101	93	457	2.13%	4.93%
7. Networking/Research grants												
CPF	55	200	200	200	200	200	200	200	150	1,605	7.46%	13.12%
RBR											0.00%	0.00%
8. Contractor Logistic Support												
CPF	25	100	100	90	30	20	20	10	8	403	1.87%	3.29%
RBR											0.00%	0.00%
9. Contingency												
CPF	26	146	123	108	97	96	94	91	66	847	3.94%	6.92%
RBR	3	8	6	12	17	24	31	39	36	176	0.82%	1.90%
Subtotals												
CPF	471	2,496	1,837	1,463	1,293	1,280	1,260	1,229	903	12,232	56.88%	100.00%
RBR	143	732	876	1,051	1,114	1,236	1,368	1,508	1,244	9,272	43.12%	100.00%
Totals	614	3,228	2,713	2,514	2,407	2,516	2,628	2,737	2,147	21,504	100.00%	
Percent of Total	2.86%	15.01%	12.62%	11.69%	11.19%	11.70%	12.22%	12.73%	9.98%	100.00%		
Percent of CPF	3.85%	20.41%	15.02%	11.96%	10.57%	10.46%	10.30%	10.05%	7.38%	100.00%		
Percent of RBR	1.54%	7.89%	9.45%	11.34%	12.01%	13.33%	14.75%	16.26%	13.42%	100.00%		

*All estimates (except 3,7,and 8) are adjusted for a 5.0 percent annual rate of inflation.

NOTE: This is an illustrative budget only, from which there may be variance. Commitment is, therefore, not made to follow this exact line-item budget, but rather to the total amounts to be provided.

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Notes/Assumptions on Budget Table 5

1) Personnel

a) GOZ (RBR) funds salaries and other benefits on PhD/MS/AO group beginning January 1991.

b) GOZ funds salaries and other benefits of all personnel beginning January 1991; CPF pays salary supplements for 535 people; GOZ has range of options, from dismissing all "excess" personnel and paying severance pay by retaining all current personnel and picking up all costs not covered by CPF through CY1991. Assumption is that GOZ costs will be roughly equivalent with any option.

c) GOZ funds all personnel costs beginning January 1992; staff reduced to recommend level (535).

d) Final staffing pattern (established in January 1993) assumed to comprise: 70 persons of AO/MS/PhD staff go from 55 (1990) to 65 (1992) to 70 (1993); A1/A2/A3 staff go from 246 (1990) to 51 (1992); non-professional staff go from 498 (1990) to 414 (1992).

e) Base year (CY90) estimates for base salaries, salary supplements and other benefits are based on SENARAV's adjusted 1990 annual budget; current staffing pattern used to determine number of persons at each salary level within each professional group; other benefits assumed to be equal for all levels of personnel.

f) Approximately $85,000 (estimated 1990 level) has been included for temporary labor in 1990 budget, increasing at 5 percent per year after 1992.

g) 1990 average annual salary: AO/MS/PhD: 357, A1/A2/A3: 172, non-prof.: 154; other benefits for all categories: 227; primes: AO/MS/PhD: 2,342, A1/A2/A3: 1,078, nonpprof.: 472

2) Five percent non-compounded annual dollar inflation rate built into all line items except facilities rehabilitation, networking/research grants, contractor logistic support, and contingencies.

3) RBR contributions, which can be from any non-CPF source, have been calculated to increase 5 percent per year, beginning in 1992, for vehicle repairs/fuel, other research support, office equipment/supplies, in-country travel, and contingencies. That is, RBR percentage contribution in these line items goes from 5 percent in 1992 to 35 percent in 1998.

4) Networking/research grants has been increased to make this activity more viable and to include current INERA potato funding.

5) Ten thousand dollars per contract year has been budgeted for contractor logistic (office) support.

6) An exchange rate of 550 zaires= $1.00 U.S. was taken as the assumed average rate for 1990.

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Table 6. RAV II Life of Project Costs % Distribution by Program Component.

BUDGET LINES	PROJECT PROGRAM COMPONENT					TOTAL
	Sustain-ability	Training	Outreach	Research	Manage-ment	
Technical personnel	0.13	0.21	0.26	0.23	0.17	1.00
Local personnel	0.13	0.21	0.26	0.23	0.17	1.00
Participant training	0.12	0.06	0.12	0.46	0.24	1.00
Other	0.04	0.31	0.24	0.36	0.05	1.00
Average	0.11	0.20	0.22	0.32	0.16	1.00

Table 7. RAV II Life of Project Costs % Distribution by Main Work Site.

BUDGET LINES	MAIN PROJECT WORK SITE				TOTAL
	Mvuazi	Ganda-jika	Lumbum-bashi	Kinshasa	
Personnel	0.24	0.08	0.31	0.37	1.00
In-Country training	0.30	0.15	0.15	0.40	1.00
Vehicles, fuel, repairs	0.21	0.50	0.19	0.10	1.00
Facilities rehabilitation	0.20	0.20	0.60	-	1.00
Research support	0.40	0.25	0.25	0.10	1.00
Office support	0.30	0.25	0.25	0.20	1.00
Other	0.20	0.20	0.30	0.30	1.00
Average	0.24	0.23	0.31	0.22	1.00

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technical assistance team and SENARAV staff should be expected to develop the project budget by year with cross-tabulated matrices for expenditures x work site x program component x source of funding. These matrices will result in more rigorous planning, better implementation controls, and much improved overall accountability of project resources.

Table 6 demonstrates that almost a third of all project resources are devoted to the applied research component, but that outreach and training activities rank a close second. The design team views these results as reasonably reflecting financial priorities, though its judgment is that any incremental monies that become available should probably be devoted first to the outreach component. Table 8 indicates that most resources are to be devoted to the Lubumbashi main work site, which reflects both its distance from the central office in Kinshasa and the spread and complexity of the activities programmed for that location.

E. Disbursement Plan

Table 8 presents information required by AID Handbook #3 on methods of implementation and financing.

All dollars will be obligated over an eight-year period. The major portion of the USAID $20.0 million contribution will be transferred to a Title XII contractor through a letter of credit (TFCS/LOC) mechanism, and to other contractors as appropriate. The Title XII contractor will issue monthly reports of its dollar expenditures to USAID Zaire. Other contractors, such as the evaluation contractor, will submit vouchers to USAID. Local currency will be transferred directly from USAID Zaire's account to accounts set up by the contractor in Kinshasa on a monthly basis. The contractor will issue quarterly reports of its local currency expenditures to the USAID Zaire's Controller's Office.

It is planned that USAID Zaire will make available to the project $12.2 million in local counterpart funds. There is some question, given the anticipated levels of future commodity import and PL 480 sales, whether CPFs will be available in sufficient quantities to fully fund the project. If not enough CPFs are available to meet the project's needs, it may be necessary to finance some local costs by converting dollars to zaires. This, however, will be considered an exceptional practice. The Title XII contractor will asist USAID and the GOZ with the management of the $12.2 million CPFs, as well as with the remaining project funds to be contributed by the GOZ.

The contractor and SENARAV will estimate the counterpart funds required for the first quarter of activities and these funds will be advanced into a bank account set up exclusively for them. All subsequent project advances will be made on a timely quarterly basis.

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Table 8. RAV II Life of Project Methods of Implementation and Financing.

Method of Implementation	Method of Financing	Amount Millions US$	
U.S. Government Contributions:			
All USG contributions, except audit/evaluation, facilities rehabilitation, AID direct procurement, and contingency	Letter of Credit to Title XII Institution	16.6	
Audit/evaluation, AID direct procurement	Direct Payment to Contractor(s)	1.5	
Facilities rehabilitation	Direct Payment to Contractor(s)	0.9	
Contingency	Direct Payment	1.0	
Sub-Total USG			20.0
Government of Zaire Contributions:			21.5
Grand Total			41.5

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F. Financial Control

Accurate financial control and reporting on all dollar and CPF expenditures to USAID will be the responsibility of the contractor and SENARAV (respectively). All financial records are (or will be) computerized; and the systems established will be approved by a certified public accountant. The financial tracking system should be designed to track dollar, CPF, and GOZ regular budget expenditures.

The contractor will send a copy of the (TFCS/LOC) report to USAID Zaire. The contractor's operations will undergo an annual audit to review all financial procedures and ensure USAID Zaire that project activities are in full compliance with AID regulations. Locally based accounting firms will be called on for audits of the contractor's operations in Zaire and those of SENARAV and the GOZ relating to this project.

VI. MONITORING AND EVALUATION

A. Overview

The monitoring and evaluation system will strengthen and improve methods that were used in RAV I to track progress towards the achievement of the project's goal and purpose, and to monitor its inputs and outputs. The system will call for a higher level of accountability in project monitoring through an increased number of peer review sessions, written annual assessments of each project component, and annual conferences of all project personnel.

Project components include research management, applied research, outreach activities, human resources development, and sustainability. Monitoring activities for each project component will be specifically indicated, noting the data to be collected, who will collect the data, the type of analysis, and the reports to be issued.

The minimum performance indicator (PI) and impact indicator (II) for each component will include:

Outreach

PI: Annual work plans for each national program, including three types of on-farm trials and in-service training for Primary Collaborators.

II: A 10 percent average rate of adoption of improved technologies on farms involved in pre-dissemination trials.

Research Management

PI: Establishment of a Research Advisory Committee, provision of training in research management, and development of procedures to implement all elements (see Institutional/Administrative Analysis, Research Management) of a research management loop.

II: Zairian management of the three national commodity programs; development and implementation of a strategic plan with a research program that is effectively budgeted, supervised, and evaluated.

Applied Research

PI: Increased numbers of potential technologies being tested.

II: Twelve improved technologies for maize, cassava, and grain legume production that are developed and ready for release.

Human Resource Development

PI: Thirty-three advanced degrees provided through long-term training; short-term training programmed and implemented.

II: By 1994, expatriate technical assistance in each program will serve largely in an advisory capacity, and by 1998 no expatriate personnel will be needed.

Sustainability

PI: GOZ funding of a greater share of project costs out of its regular budget resources (non-CPF).

II: GOZ supporting all national personnel costs of SENARAV by 1992 and a regularly increasing share of non-personnel costs during the life of project.

B. Farm-Level Monitoring and Evaluation

1. Farm-Level Indicators

Accurately predicting and evaluating the impact of technological change requires that correct indicators be utilized. While yield per unit area and revenues from project crops are important variables, these alone are not sufficient to evaluate SENARAV's farm-level impact. The impact indicators utilized by SENARAV should, therefore, be expanded.

a. Returns to Labor

Labor is the single most important constraint for many Zairian farmers. Most are completely dependent on family labor, and women supply the single largest labor input in most cases. SENARAV's technologies should, therefore, be evaluated in terms of increased returns to labor.

b. System Productivity

Extensive research throughout the world has shown that farmers attempt to maximize the overall productivity of their farming system rather than the productivity of any single element. Where farmers produce only one or two commodities, yield per unit area of a given commodity will provide a fairly accurate measure of total system productivity. In Zaire, however, the vast majority of farmers are producing a large number of commodities. SENARAV's technologies should, therefore, be evaluated on the basis of their impact on total productivity and revenue gained from a given parcel of land, preferably over the life of the parcel.

2. Monitoring Activities at the Farm Level

Monitoring farm-level activities is particularly important to SENARAV because the national programs are dependent on the quality, timeliness, and consistency of outreach activities. Monitoring farm-level activities is, therefore, designed to achieve three objectives: (a) determine whether outreach entities are delivering inputs and information to farmers in a timely and consistent manner; (b) evaluate changes in performance of entities over time; and (c) provide information for deciding which entities are most effective and should receive more resources from SENARAV.

* SENARAV will monitor the activities of the R&D teams and Primary Collaborators (see Technical Analysis) through a monthly activities report.

* Each R&D team will keep a daily record of all farm- level activities and will prepare a monthly report to be submitted to the national coordinator and forwarded to the Central Coordinating Unit. The team leader will supervise daily recording activities and prepare the monthly reports.

* SENARAV will be responsible for developing the reporting form and distributing it to Primary and Secondary Collaborators.

* The Primary Collaborators will be responsible for providing a completed report to the regional R&D team leader each month.

3. Evaluating Farm-Level Impact

a. On-Farm Trials as a Source of Impact Data

On-farm trials will be a primary source of data regarding farm-level impact. Primary responsibility for data collection varies with the type of trial. Instruments for data collection will be prepared by the R&D teams and cooperating researchers for each on-farm trial.

* Researchers, with assistance from the R&D teams, will be responsible primarily for data collection in research-oriented trials.

* The R&D teams will be primarily responsible for data collection for production-oriented trials, but some of these trials will be conducted by Primary Collaborators, in which case they will have responsibility for data collection.

Both the R&D teams and the Primary Collaborators will be responsible for data collection for pre-dissemination trials, depending on whether the R&D team itself conducts a trial, or whether the trial is conducted by a Primary Collaborator.

The pre-dissemination trials are especially important in measuring success for two reasons. First, in pre-dissemination trials farmers are asked to assume all of the risks and costs associated with the new technology. Thus, the trial itself is a good measure of the "real" acceptability of solutions posed by SENARAV. Second, follow-up studies of cooperators in pre-dissemination trials provide an estimation of the rate of adoption of the technology (e.g., the percentage of farmers in a given clientele group who adopt the new technology) and the rate of diffusion of the new technology (e.g., the percentage of farmers' production that will utilize the new technology).

It is preferable to conduct two- and three-year follow-up studies to develop a better prediction of rates of adoption and diffusion since farmers often put larger shares of their production under the new technology over time. Based on the rates and levels of adoption of cooperators in pre-dissemination trials, SENARAV can develop a realistic prediction of how new technologies should spread to non-cooperator members of the priority clientele groups. Given the time and cost involved in conducting exhaustive, statistically valid surveys of farmers, these measures should, in many cases, be accepted as "best possible" indicators for project evaluation purposes.

SENARAV will also evaluate the effectiveness of the activities conducted by its Primary Collaborators (and therefore, of the effectiveness of its institutional support to the collaborators) through periodic farm-level surveys. Such surveys will be conducted once every two years. Primary Collaborators will be expected to provide SENARAV with the information needed to conduct these surveys. The purpose of the farm-level survey is twofold: to verify the information that is being submitted in monthly activity reports by collaborators and to assess the overall impact of adopting the new technologies.

4. Evaluating Institutional Support to Outreach

a. In-Service Training

SENARAV will routinely evaluate its in-service training activities. Because details of the evaluation approach are discussed in the Technical Analysis, only summary statements apear below.

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* SENARAV will include a written participant evaluation in each training session offered during its semi-annual general skills improvement training programs.

* Trainers for each training session will submit a written report within 30 days of completion of the event.

* Each entity which sends participants to one or more training sessions each year will be responsible for supplying to SENARAV an annual evaluation report.

* A summary of training sessions and evaluation results will be included in each annual SENARAV accomplishment report.

* Technical training will be evaluated by the use of a pre- and post-test methodology in which gains in knowledge are measured. The post-test should be administered no sooner than 30 days after the field exercise. The annual report of the R&D teams will include an analysis of the results of the pre- and post-tests.

b. Other Support Services

SENARAV will provide Primary Collaborators with a general questionnaire at least once every two years in which the overall performance of SENARAV's support is evaluated.

C. Activities at the Research Management Level

1. Annual reports prepared on research management technical assistance will include the results of:

   a. the integration of SENARAV's budget, including GOZ, USAID, and other donor support;

   b. networks and in-kind services;

   c. research operations, including expenses against budgets; executed versus planned programs; station management costs, cost effectiveness, cost of on-farm testing, cost of outreach operations, and vehicle costs; success rates of tests and experiments; and the extent of interdisciplinary research; and

   d. the status of procurement and inventory systems.

2. Evaluations of research results will focus on a determination to continue or change the direction and/or methodology of research. This will include:

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a. whether the results are significant enough for transfer to the outreach program; and

b. the social and economic impact of technologies, including the impact on labor, productivity, production, and income at the farm level; the number of farmers adopting new technologies and the number of women adopting new technologies; and the constraints to adoption.

3. A personnel performance system in line with GOZ statutory requirements will begin operating during Year 2 of the project. RAV II will propose a set of salary and non-salary incentives for research personnel and support staff.

4. Participant evaluation will occur at the end of each short course, seminar or workshop.

5. The effectiveness of activities will be measured according to what trainees do with the training they received, i.e., whether they passed experience on to their colleagues and/or whether they used the training to become more effective and efficient in their jobs.

6. Assessment reports will be prepared for each activity for feedback into future programs. The reports will be prepared by the Outreach/Training Specialist who will also be responsible for organizing, implementing and evaluating all research management training activities.

7. The two-year work plan will be evaluated annually to quantify achievements.

D. Activities at the Applied Research Level

1. The number and quality of new trials and new technologies developed will be regularly recorded by researchers.

2. Quarterly and annual reports, based on Item 1 above, will be submitted to the Coordination Unit.

3. Each researcher will be responsible for preparing quarterly and annual reports of all research related activities, including on- and off-station research. These reports are to be submitted to the respective program director who will prepare a comprehensive annual report and forward it to the Coordination Unit.

4. Each national program director will be responsible for the preparation of an annual report which highlights and quantifies the activities of the applied research component for that particular program.

E. Activities at the Human Resource Development Level

1. Quarterly and annual reports will provide information on:

   a. number of personnel in long-term and short-term training programs (disaggregated according to sex);

   b. how well training programs have kept on schedule;

   c. performance of personnel in training;

   d. where training occurred;

   e. number of personnel completing training; and

   f. conformance of training accomplished with the overall Training Plan.

2. Each participant in training will be required to submit an annual report detailing activities, problems encountered, and suggestions for the resolution of major concerns.

3. At the end of all long-term training programs, a final report will be submitted by the participant. It should address the nature of training; length of training program; major problems encountered; and suggestions for improvement.

4. The COP and the SENARAV Scientific Director will prepare the outline of information needed for individual annual and final reports.

5. The COP and the SENARAV Scientific Director will be responsible for the preparation of the annual reports to be submitted to the coordinating unit.

6. The COP and the SENARAV Scientific Director, with help from the technical assistance team, will continue tracking long-term personnel for at least two years after their return to Zaire. Of particular interest will be:

   a. length of time before placed in a job;

   b. nature of the job;

   c. problems encountered in re-settling; and

   d. job satisfaction.

F. Activities at the Sustainability Level

1. Annual Reports will provide information on:

   a. numbers of organizations contacted regarding contributions to the Zaire Food Crops Research Endowment, the number of responses (positive and negative) and the amount of funds contributed;

   b. number of signed agreements with entities for the production and distribution of certified seeds and planting materials;

   c. revenues from sales of foundation seeds and research services; and

   d. internal rates of return to research based on ex post adoption rates.

2. The Financial Management Specialist, together with GOZ counterparts, will be responsible for keeping records of the above activities and preparing annual reports.

G. Reporting and Feedback Mechanisms

Reporting and feedback mechanisms are to include:

1. quarterly review sessions at each research station coordinated by the Program Director;

2. written annual assessments for each national program, prepared by each national program director;

3. annual conferences of all project personnel (organized by the SENARAV Central Coordination Unit) to provide continuity among the various programs and discuss common issues and concerns and to make recommendations;

4. semi-annual sessions conducted in which R&D teams, researchers, and Primary Collaborators meet to review progress and make recommendations for future research and development activities;

5. establishment of a Planning Review Committee to meet quarterly to review reports and their implementation activities key users of the information system will be represented on this Committee);

6. annual reports in October of each year; and

7. an annual scientific review.

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The following reports will be submitted to USAID.

* Two-year workplans: the initial plan will be submitted not later than 90 days after the arrival of the technical assistance team. A revised plan will be submitted within 180 days. Subsequent two-year plans, and annual plans based on the two-year plans, will be submitted on the anniversary dates of the prime contract.

* Quarterly reports: these will be brief, focussing on project operations, implementation progress, accomplishments and problems.

* Annual reports: an annual report will be submitted not later than 45 days after each year of project implementation. It will be a comprehensive report of project progress, problems, achievements, and impacts. It will also include an assessment of the performance of USAID, GOZ, and the technical assistance contractor in meeting their obligations. The format will be developed jointly by the USAID project officer and the COP.

H. Project Reviews, Audits, and Evaluations

1. Project Reviews

Annual Program Internal Reviews will serve as an internal evaluation. Participants will include USAID, the technical assistance contractor and SENARAV/DOA.

Also, Annual General Internal Reviews will be conducted of individual programs of the main research stations.

2. Audits

Financial and Procurement Audits: these will be conducted by independent outside auditors to be contracted by USAID.

3. Internal Reviews

Internal reviews have been scheduled in order to allow project management the opportunity to address problems early. Problem areas will be identified and steps taken to address them.

a. Date: July, 1992.

Objectives:

* to determine the availability and timeliness of delivery of project inputs; and

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to determine the extent to which project inputs are contributing to the achievement of outputs.

Performed by: USAID Project Officer, contractor, and lead institution.

b. Date: July, 1996.

Objectives:

* to determine the availability of project inputs;

* to determine the extent to which they are contributing to outputs;

* to determine the extent to which the project purpose is being achieved based on output level; and

* to provide an assessment of the need to modify outputs.

Performed by: Project Officer, Contractor and Lead Institution representative.

4. **External Evaluations**

a. Date: November 1994.

Objectives:

* to determine the extent to which project components are contributing to the intended purpose;

* to assess whether important assumptions are satisfied; and

* to determine the extent to which the project is prepared to shift from an intensive long-term technical assistance mode in research management, applied research, and outreach to a small technical assistance research management team of two supported by short-term technical assistance.

b. **Final** Evaluation

Date: End of project.

Objectives:

* to measure the achievement of the project's goal, purpose, outputs and inputs; and

to provide recommendations for the future direction of USAID-sponsored agricultural research and outreach projects.

Each evaluation will be conducted in close collaboration with appropriate GOZ officials.

VII. SUMMARIES OF ANALYSES

A. Technical Analysis

The USAID Mission's and GOZ's agricultural development strategies are based on improving food security by increasing food production. Traditional food production systems have developed in response to the physical characteristics and resource limitations of Zaire, but they are no longer adequate in the face of rapid population expansion into fragile environments. At present, Zaire's food grain production and imports are in balance with total domestic consumption. However, the rate of population increase (3.0 percent per year) is growing faster than the long-term average annual increase in food crop production. Urban population is growing rapidly (7.0 percent annually), while rural population growth is much lower (1.0 percent). Without major advances in agricultural productivity in the next two decades, the gap between domestic production and consumption needs may widen considerably.

Both the GOZ strategy and USAID's mission goal recognize that sustained economic development is dependent on increased agricultural productivity, which (in turn) requires investment in agricultural research. A strong national agricultural research system is essential for the development of technological solutions to the constraints faced by Zaire's agricultural producers. Creation of a sustained national capacity to conduct agricultural research requires adequate human, material, and financial resources and the ability to mobilize, allocate and manage them effectively and efficiently.

RAV I, funded by USAID and GOZ, was successful in selecting and developing several high yielding lines of cassava, maize, groundnuts, beans, cowpeas, and soybeans. The project provided long- term training for 38 Zairian Ph.D. and M.S. candidates, and 70 SENARAV employees participated in short-term technical training. The project established an organizational and managerial structure for SENARAV and built up the infrastructure for SENARAV's national programs. Foundation seeds were distributed to at least 30,000 farmers through 159 PVOs, governmental, and private sector outreach entities.

RAV II will build on the successes of RAV I. The project will strengthen and expand on-going research for cassava, maize, and grain legumes, provide increased support for farming systems and

outreach activities, and improve research management. Additionally, the project will devote increased attention to long-term financial and program sustainability and will strengthen the monitoring and evaluation systems utilized by SENARAV. The project will benefit the national research system, the GOZ, farmers, consumers, and private and public sector outreach entities in Zaire.

Environmental responsibility will be a major thrust of RAV II. Environmentally responsible agricultural development involves, in the first instance, protecting Zaire's soil, forest, and water resources. It involves, in the second instance, improving agricultural practices to limit further degradation and rehabilitate environments already degraded. In RAV II, environmental responsibility will be a major focus of research, training, and outreach, addressed through:

* training in the principles of ecologically sound agricultural development for SENARAV scientists and technicians;

* development of linkages between Zaire's agricultural research system and international organizations that are willing to contribute financial resources and expertise to preserving and rehabilitating Zaire's natural resources;

* a focus on agro-ecological zones subject to near-term degradation; and

* development of ecologically responsible technologies that are adoptable by Zairian farmers.

1. Applied Agricultural Research

In RAV II, three types of research activities will be conducted: applied research, on-station tests of potential technologies, and on-farm tests. Major research activities will be conducted at Kaniameshi, Gandajika, and M'Vuazi. On-station testing will occur at Gandajika, Kiyaka, Mulungu, and Niembo. R&D teams responsible for both on-farm tests and support to outreach entities will be located at M'Vuazi, Kiyaka, Gandajika, Niembo, and Kaniameshi.

RAV II, like RAV I, will concentrate on genetic improvement for cassava, maize, and grain legumes. Selection and breeding activities must be responsive to farmers' needs and address farmer-identified constraints to production. Crop lines will be developed and screened in early generations for disease and pest resistance, yield, acceptability to farmers, and adaptability to specific agro-ecological zones. The plant improvement programs will determine nutritive quantity and quality of grains, leaves, and roots. Other characteristics, such as leaf, grain, and root

color and acceptability, will be determined, in addition to processing quality and post-harvest storability. The crop protection units will screen and evaluate crop lines and varieties for major diseases and pests.

Between 1973 and 1989 applied agricultural research in Zaire was mainly discipline-oriented. In RAV II, multidisciplinary team research will build on on-going subject matter research efforts and continue to develop improved varieties and technologies and to explore the plant, soil and climatic relationships that affect production of the principal crops. An interdisciplinary team of breeders, entomologists, pathologists, and agronomists will work with social scientists to clarify constraints to increasing productivity in each crop and to develop knowledge and plant materials designed to overcome these constraints.

Applied agricultural research in RAV II will:

* improve and maintain germplasm and the varietal purity of cassava, grain legume (beans, groundnuts, cowpeas, and soybeans), and maize;

* provide sustainable, low-input and improved management practices designed to increase soil fertility and conserve Zaire's natural resource base;

* improve the overall productivity of farming systems, from the point of view of both farm earnings and the farm family's nutritional status;

* enhance the linkages between on-station research, on-farm research, and outreach and ensure that the farmer is included as a full participant in the development and testing of technology; and

* increase and strengthen the linkages between SENARAV and IARCs, other national and regional research networks and programs in Africa, and public and private sector agricultural research programs in Zaire.

2. Outreach/Technology Transfer

The goal of SENARAV's outreach and technology transfer component is to deliver improved technologies to large numbers of farmers who are willing and able to adopt them. Achieving this goal requires that the outreach and technology transfer component of SENARAV play two important roles in the overall technology development and dissemination system.

First, it must provide researchers with input information which permits researchers to identify the problems which can be most fruitfully addressed. Effective applied research is farmer

driven. It focuses on problems which are: (a) important to a significant number of farmers; (b) solvable within a reasonably short time frame; and (c) amenable to solutions which are adoptable by farmers, given their constraints, resources, and goals.

Second, the outreach or technology transfer component must provide farmers with outputs from research--the information that they need in order to apply new technologies on their own farms. Cost-effective outreach is systematic and priority-driven. No outreach system can provide service to all potential end users; no technology is universally adoptable by all farmers. To achieve effective technology transfer SENARAV must prioritize the use of human and fiscal resources based on realistic assessments of potential farm level impact.

SENARAV will:

* improve the flow of information to researchers by identifying, characterizing, and prioritizing clientele groups;

* ensure that research is farmer-driven by involving farmers as full participants in the testing and verification of technologies, and by measuring success in terms of farmer adoption of new technologies;

* provide increased institutional support to selected public and private outreach entities through in-service training, technical assistance, provision of extension materials and monitoring and evaluation; and

* reorganize the Farming Systems and Outreach Teams of RAV I into combined Research and Development (R&D) Teams, with the participation of station-based researchers.

B. Institutional/Administrative Analysis

Many cases of major agricultural research impact have been documented. Estimated rates of return to investments in successful research programs have been in the 30 to 80 percent range--far higher than for any other form of capital investment. Keys to these successes have been the following:

* A strong national research/extension system that fixes priorities and feeds information back from farmers to research personnel in a "research management loop" (RML);

* A research/extension system whose actions are reinforced by national policy; and

* Teamwork at all levels of the system.

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The purpose of RAV II's research management component is to support the rapid development of Zaire's technology development and dissemination system.

1. Strengthening Agricultural Research Management

Restructuring and management reinforcement at the national and station level are keys to strengthening the agricultural research system in Zaire. A strategic and integrated plan for restructuring will be proposed, created, and implemented, starting in 1990 with full adoption by all parties by 1993.

Administratively, research management in RAV II will further establish linkages between applied research and farmer adoption of improved technologies. A strategic plan for the three national research programs will be developed, with research priorities based on a common set of criteria to identify initial geographic concentrations of research. Researchable problems within individual research projects will be identified, and the plan will establish clear program objectives and evaluation guidelines and procedures. Program budgeting of research activities will be developed for each national food crop program. The budgeting process will include planning, organization, and implementation of research and outreach activities, station facility development, supporting services, operations, and maintenance. Individual research projects will be peer reviewed by nationally recognized scientists.

To date, research management and agricultural research priority setting in Zaire have been done on a limited basis. INERA and SENARAV programming of research priorities for food crops has been based primarily on crop rankings by either surface area or production. Other criteria should include geographic distribution, nutrition, and expected economic return. Priorities should also reflect problems as defined by producers and other important commodity system participants. Problems will be defined or ranked on a researchable basis and capability for solution in the near-, medium-, and long-term.

These objectives will be met through a number of mechanisms.

a. A Research Advisory Council will serve in an advisory capacity to the Office of the Department of Agriculture and formulate research/extension recommendations after reviewing periodically plans and progress reports of SENARAV and cooperating programs in the research/extension system.

b. Training in cost-effective research management will be provided.

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c. Smoothly functioning research management loops within SENARAV will be established to ensure timely programming and accountability of the planning, implementation, evaluation and feedback functions of the research and extension system.

Strengthening of SENARAV research management capabilities will be accomplished if, by the end of the project, Zairian management of the three national commodity programs for cassava, maize and grain legumes has established and implemented a strategic plan with a research program that is effectively budgeted, supervised, and evaluated.

2. Human Resources Development

The goal of the training component of RAV II is to provide a cadre of qualified and experienced professionals who will assume all management, administrative and technical responsibilities for SENARAV in order to maintain a viable program after departure of the technical assistance team from Zaire. This component will develop Zaire's human resources through (a) on-the-job training combined with (b) advanced degree training in technical and managerial areas at U.S institutions and international centers, and with (c) non-degree short-term training in critical areas relating to technical agricultural research and outreach, and in administration and management of research/outreach systems. Non-degree programs will be conducted off-shore and in Zaire, using short courses, workshops, and seminars.

Advanced degree training during RAV II will include agricultural economics, rural sociology, agronomy (including soil science), in addition to plant breeding and crop protection, to facilitate the development of balanced interdisciplinary research teams and to provide a critical mass of advanced degree professionals. All degree training during RAV II will commence as candidates already in training return in order to maintain program continuity.

Key features of the training to be accomplished under the RAV II project are: (a) the inclusion of women and (b) the integration of degree training with relevant thesis research to be supervised by faculty who may become involved in short-term consulting assignments with the project.

C. Economic/Financial Analysis

This analysis examines the potential return on investment in food crop research under RAV II. The section identifies key constraints that frequently limit returns to agricultural research investments in sub-Saharan Africa and in Zaire; ways in which these constraints will be addressed in RAV II are discussed. The method of economic surplus is used to estimate potential returns to the

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project. The prospects for financial sustainability of the project are analyzed and steps to address this problem are proposed. A project budget, reflecting the contribution of a proposed Zairian Food Crop Research Endowment, is presented.

1. Factors Affecting Economic Returns to Agricultural Research

Agricultural research projects in sub-Saharan Africa, and particularly in Zaire, often encounter constraints that severely limit the economic returns from research investments. These constraints include the following:

a. Potential Constraint: Lack of critical mass of researchers within countries and within experiment stations. RAV II Remedy: This potential constraint will be addressed in RAV II by concentrating resources and personnel in three research station locations, M'Vuazi, Gandajika, and Kaniameshi. National-level conferences will bring researchers together periodically and a research journal will be published to strengthen ties among Zairian agricultural researchers. A smal grants program, identified in the budget as "networking inside and outside Zaire," will strengthen linkages with the IARCs, CRSPs, and other international, regional and national organizations.

b. Potential Constraint: Incongruence between research and prevailing crop mixes. RAV II Remedy: Crop priorities established for research under RAV I were generally sound and will continue under RAV II; these priorities include the major crops grown in the Southern Band of Zaire: cassava, maize, and grain legumes.

c. Potential Constraint: Ignoring socioeconomic factors in research design. RAV II Remedy: Socioeconomic considerations played an important role in the design of this project paper. The R&D teams proposed for RAV II will test new technologies in the context of farmer's fields and households; this information constitutes vital feedback for subsequent research design.

d. Potential Constraint: Weak linkages between research and extension. RAV II Remedy: RAV II will strengthen its ties with extension through contractual relationships with selected outreach entities, chosen for their degree of effectiveness. Short-term training in extension methods will be provided for outreach entities.

Labor is a binding constraint in many areas in the Southern Band, though the degree of labor scarcity varies considerably across communities and regions. RAV II will consider labor requirements in the selection of new technologies and will choose those with the greatest potential for increasing labor productivity.

2. The Role of Economic Analysis in RAV II

Returns to labor and project impact on household income will constitute a central focus of economic analyses carried out during the project. Agricultural policy and macroeconomic aspects of RAV II will also be analyzed periodically. Timely economic analyses of economic returns to project activities can contribute to greater domestic support for research and extension funding. Such analyses are viewed as an important element in enhancing the long-term sustainability of Zairian agricultural research and technology dissemination.

3. Estimated Rate of Return to RAV II

The economic surplus approach, a common methodology for analyzing agricultural research programs, was used to estimate the internal rate of return to RAV II. This methodology assumes that new technologies shift crop supply curves to the right. Annual projected benefits were then measured as the increases in combined consumer and producer surplus, with the rate and extent of adoption increasing each year. Annual costs of RAV II were estimated and subtracted from benefits for each year. The estimated stream of net benefits from RAV II over 20 years yields an internal rate of return of 42 percent for cassava research and 31 percent for maize research.

Assumptions about the adoption rate, crop-production cost reductions due to research, and the probability of research success were based on average estimates drawn from the experience of design team members in other African countries. Demand and supply elasticity estimates were based on values used in rate-of-return studies in other developing countries. Since empirical estimates of key parameter assumptions were not available in Zaire, a sensitivity analysis of these assumptions was conducted. The most important conclusion from the sensitivity analysis is that the rate of adoption has a major impact on the economic returns to the project.

4. Financial Sustainability of RAV II

The design of RAV II addresses the issue of financial sustainability of the project through (in part) assistance which may lead to the creation of an endowment fund during the implementation phase. The purpose of the Zairian Food Crop Research Endowment will be to provide income to support agricultural research activities.

Potential sources of funds for the Endowment include debt-for-development and debt-for-nature swaps. The design team was contacted by several U.S. conservation organizations concerned with the cutting of Zairian forests and resulting environmental degradation. These organizations wish to participate in, or facilitate, debt swaps whose local currency proceeds would be used

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for environmentally responsible agricultural research.

Most debt swaps carried out in other countries have converted debt held by private banks. Zaire has a limited amount of private debt, which is currently being organized by Citibank under a "Kinshasa Club" agreement among lenders. The status of this debt and the mechanisms for conversion were under negotiation during the design phase. The availability of this debt and modalities of conversion will be studied by an experienced debt broker from an organization like the Debt-for-Development Coalition, during the implementation phase. Annex J contains a list of initial steps that need to be taken to carry out a debt swap.

Management of the Zairian Food Crop Research Endowment will involve the critical function of preserving the asset base. Short-term technical assistance in endowment management to address these issues has been budgeted. The attempt by the School of Public Health in Kinshasa to establish an endowment will serve as a useful guide in establishing an endowment to support agricultural research. It should be noted that plans for the School Endowment anticipate funds from foreign contributions (grants). Contributions from foreign foundations represent a potential source of funding for the Zairian Food Crop Research Endowment as well. Sales of seeds (including especially foundation seeds), research services, and patents for germplasm also represent potential sources.

D. Environmental Analysis

The management and research components of RAV II are eligible and recommended for categorical exclusion pursuant to the provisions of 22 CFR 216.2(c)(1)(iii) and 216.2(c)(2)(ii) and (iii). Rehabilitation activities are recommended for negative threshold determination. A risk-benefit analysis will be required before pesticides can be procured.

Even though pesticides are used at the research stations, they will only be a part of a secondary pest management system. The primary pest management system will emphasize traditional integrated methods such as cultural practices, resistant varieties, and the preservation of naturally occurring agents.

E. Social Soundness Analysis

The project will reach primarily farmers who reside in Zaire's Southern Band. The Southern Band includes 40 percent of Zaire's total population, with highest densities in close proximity to major industrial centers. It includes a wide range of ethnic and linguistic diversity within (as well as among) households. The typical farm household has 6.7 persons who farm an area of about one hectare (Shapiro, 1987, preliminary results). There is, however, variability across regions, with important implications

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for the household's workload and its access to labor.

1. Constraints

Farmers in the Southern Band face four major constraints. First, market and transportation infrastructure are poorly developed. This results in low farm-gate demand for products, low farm-gate prices, and low incentive levels for producing food beyond consumption needs. The second is land. While it is possible to gain legal title to land, few small farmers can do so. Land values are high, especially north and south of Kivu. Thus, most farmers gain access to land through customary land tenure, which makes them dependent on traditional authority figures for gaining land use rights. The third is labor, an especially serious constraint for women. With continued rural-to-urban migration, the labor shortage can be expected to increase in rural areas, coinciding with an increased demand for food in urban areas. Finally, traditional authority systems, particularly where authority figures have a vested interest in maintaining such practices as forced culture, can limit farmers' ability to adopt new technologies.

2. Women, A Critical Clientele for RAV II

Project designers and implementers have often paid inadequate attention to the role of women in agricultural production. Extension services have largely been oriented toward the male farmer. As a result, generally speaking, productivity of men in agriculture has tended to increase, while the productivity of women has stagnated. RAV I was not able to address this problem adequately. Although women participated in on-farm trials, no deliberate attempt was made to address their specific constraints. This practice will be reversed in RAV II.

Women face special constraints in adopting new technologies. They are often dependent on men to acquire land use rights. Their fields are often farther from the village and of lower quality than those of men. They play multiple roles within the household, and supply the bulk of labor for agricultural production in the Southern Band. Thus, labor is an even greater constraint for women than for men. They often have very little authority within local social structures, which implies that their ability to alter social norms in order to adopt new technologies will be limited.

RAV II clearly identifies women as a major clientele for food crop technologies. Women's constraints will be identified in baseline and rapid reconnaissance surveys. The results of previously conducted surveys will be consulted where available (e.g. Project 102). Data collection will be disaggregated by sex, with special attention to labor constraints faced by women. Outreach entities will be selected, in part, based on their

commitment to meeting women's needs. Women will be provided with professional training. In summary, attention will be paid in each component of RAV II to the important role played by women.

VIII. CONDITIONS AND COVENANTS

A. Conditions Precedent to First Disbursement

Except as USAID may otherwise agree in writing, prior to the intitial disbursement under the Grant, or to the issuance by USAID of documentation pursuant to which disbursement will be made, the Grantee will furnish to A.I.D, in form and substance satisfactory to A.I.D:

1. A statement of the names of the persons holding or acting in the offices of the Grantee, and of any additional representatives, together with a specimen signature of each person specified in such statement.

2. Documentation confirming that the Grantee shall, beginning January 1, 1991, pay SENARAV professionals (AO, M.S. and Ph.D. staff) salary and benefits equal to those of comparable INERA staff, funding their base salaries and all other benefits from non-Counterpart Fund (CPF) sources.

3. Documentation confirming that the Grantee shall, beginning January 1, 1991, pay the base salaries and all other benefits of non-professional SENARAV staff from non-CPF sources.

4. Documentation confirming that the Grantee shall, beginning January 1, 1992, pay all salaries (base and any supplement thereto) and all other benefits for all SENARAV professional and non-professional personnel, from non-CPF sources.

5. Documentation confirming that the Grantee shall disburse all approved and budgeted Grantee funds for SENARAV on a timely quarterly basis beginning in Grantee fiscal year 1991.

6. Documentation confirming that the Grantee shall require long-term participant trainees, upon completion or return from their degree programs, to work in SENARAV for a period of time equal to that of their training, or that the Grantee shall return the costs of such training provided by USAID to the Agency.

7. Documentation confirming that the Grantee shall provide, by January 1991, space in a single building sufficient for SENARAV Coordination offices for Grantee and technical assistance staff.

USAID will assist the Grantee to rehabilitate the assigned space.

8. Documentation confirming that the Grantee shall designate SENARAV, through its National Maize Program (PNM), as the national service responsible for maize research.

9. Documentation confirming that the Grantee has waived the two-year employment requirement for eligibility for B.S.-and M.S.-level training for women employees of SENARAV who otherwise meet training selection criteria, and shall begin to hire women for SENARAV research and outreach positions at the A1 level and higher by January 1991.

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B. Notification

When A.I.D. has determined that the conditions precedent in section VIII.A. above have been met, it will promptly notify the Grantee.

C. Terminal Date for Initial Conditions Precedent

If the conditions precedent specified in Section VIII.A. have not been met within 90 days from the date of this Agreement, or such later date as USAID may agree to in writing, USAID, at its option, may terminate the Project Agreement by written notice to the Grantee.

D. Covenants

1. Project Evaluation

The Parties shall agree to establish an evaluation program as part of the project. Except as the parties otherwise agree in writing, the program will include, during the implementation of the project and at one or more points thereafter:

a. evaluation of progress toward attainment of the objectives of the project;

b. identification and evaluation of problem areas or constraints which may inhibit such attainment;

c. assessment of how such information may be used to help overcome such problems; and

d. evaluation, to the degree feasible, of the overall development impact of the project.

2. SENARAV and INERA Integration

The Grantee shall covenant to implement the program and schedule for SENARAV and INERA integration detailed in the interdepartmental memorandum of November 1989.

3. Seed Policy

The Grantee shall covenant to pursue the policy of privatization of the multiplication and disribution of crop seeds and plant propagation materials, as well as to take requisite measures to assure the timely release of new varieties for multiplication.

4. Legal Status of Subgrantees

All organizations to be funded under the project must have legal status in Zaire.

5. Participant Training

The Grantee shall covenant to repay to A.I.D., following written demand, the costs of training of any personnel who are not employed by SENARAV for a period equal to their period of training, except as A.I.D. may agree otherwise in writing.

6. Irreversibility

The Grantee shall covenant not to reverse or undo any action required to satisfy conditions precent to disbursement.

ANNEX A. MATERIALS CONSULTED

ANNEX A: MATERIALS CONSULTED

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ANNEX B. SCHEDULE FOLLOWED BY THE DESIGN TEAM

ANNEX B: SITE VISIT SCHEDULE FOLLOWED BY DESIGN TEAM

March 27-29, 1990	Bas-Zaire to INERA/SENARAV Station, MVUAZI (PRONAM Headquarters) and outreach areas near KAVUAYA.
Team Members:	Braxton, Harris, Hertford, Price and Swisher
GOZ:	Binsika and Lema
USAID:	Fleming and M'Pela
March 31-April 3	Bandundu to KIKWIT and INERA/SENARAV Sub-Station, KIYAKA, and selected outreach sites.
Team Members:	Braxton, Harris, Kraybill and Swisher
GOZ:	Mossala, Useni and Nsiama
USAID:	Fleming and M'Pela
	April 2: Side trips to outreach sites:
	Lusekele: Braxton, Harris, Kraybill, Useni, Mossala and M'Pela.
	Idiofa: Swisher, Nsiama and Fleming.
April 7-10, 1990	Shaba to Lumbumbashi and INERA/SENARAV Station, KISANGA, (PNM Headquarters), new SENARAV Station (KANIAMESHI) and side trips outreach sites.
Team Members:	Braxton, Harris, Kraybill, Price and Swisher.
GOZ:	Mota, Lema and Lutaladio
USAID:	Fleming and Tshishiku
	April 3-4 side trips:
	Central Shaba Project in Niembo: Braxton, Harris, Swisher, Fleming and Tshishiku.
	Fungurume and Mulungwishi: Kraybill, Moto and Lema.
April 11-13, 1990	Sud-Kivu to BUKAVU and INERA Station, MULUNGU (PNL research) and outreach areas.
Team Members:	Braxton and Harris
GOZ:	Lema and Osiname (IITA, RAV I TA)
USAID:	M'Pela

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April 16-17,1990	Bas-Zaire to INERA/SENARAV Station, MVUAZI (PRONAM headquarters).
Team Members:	Quebedeaux
GOZ:	Mvi
April 18-21, 1990	Kasai Oriental to INERA/SENARAV Station, GANDAJIKA (PNL Headquarters) and outreach areas.
Team Members:	Braxton, Harris, Quebedeaux and Swisher.
GOZ:	Lema, Mossala, Mehta and Mvi
USAID:	McMahon and Fleming
April 30-May 2	Shaba to LUMBUBASHI and INERA/SENARAV Station, KISANGA, (PNM Headquarters), new SENARAV Station (KANIAMESHI) and outreach sites.
Team Members:	Quebedeaux
GOZ:	Mota, Kaninda

ANNEX C. INDIVIDUALS CONSULTED IN ZAIRE

ANNEX C: INDIVIDUALS CONSULTED IN ZAIRE BY THE DESIGN TEAM

NAME	POSITION	ORGANIZATION/FIRM
1. United States Agency for International Development		
Mr. Dennis Chandler	Mission Director	USAID Zaire
Mr. Joseph Goodwin	Dep Director	USAID Zaire
Mr. Ron Harvey	ARD Chief	USAID Zaire
Mr. John McMahon	ARD Dep Chief	USAID Zaire
Mr. Allen Fleming	Project Officer Project 124	USAID Zaire
Mr. Mechell Jacob	ARD	USAID Zaire
Mr. Richard Macken	Dep Chief, PDO	USAID Zaire
Mr. Sanath K. Reddy	Ag. Dev. Officer	REDSO/WCA Abidjan
Mr. Robert Braden	Engineer, PDO	USAID Zaire
Mr. Kamal Zein	GDO/Human Resources Development Officer	USAID Zaire
Cit. Massila	GDO/Training Officer	USAID Zaire
Ms. Carol Felkel	ARD/Project Officer Projects 102 and 105	USAID Zaire
Cit. M'Pela Monshem	ARD/Program Assistant	USAID Zaire
Cit. Tshishiku Kabundi	ARD/Program Assistant	USAID Zaire
Mr. James C. Sentz	Ag Liaison Officer (IITA)	USAID Nigeria
Mr. Raymond Martin	HPN Division Chief	USAID Zaire

2. United States Embassy, Zaire

Mr. James J. Hogan	Conseiller pour les Affairs Culturelles et Presse	Embassy of the U.S.A. in Zaire
Mr. Peter G. Piness	Director	American Cultural Center, Lubumbashi

3. Government of the Republic of Zaire (excluding project personne

Cit. Mubenga Mukendi	Secretaire d'Etat	DOA
Prof. Mafuka Mbe-Mpie	Counseiller Principal	Cabinet du Premier Commissaire D'Etat
Dr. M. Mehta Lidoga	Advisor	GOZ NAT'L AG RESEARCH SERV.
Cit. Nzakihwena	Coordinator	PNR

4. SENARAV Coordination Unit

Cit. Mota Bakajika	Coordinator	SENARAV/Kinshasa
Dr. Lema Ki Munseki	Technical Director Entomologist	SENARAV/Kinshasa
Cit. Useni Kembolo		SENARAV/Kinshasa
Cit. Kifumbi	Secretary	SENERAV/Kinshasa
Dr. Frank Brockman	COP, IITA TA SENARAV	IITA
Mr. Masseye Seye	Administrator SENARAV TA	IITA

5. INERA Kinshasa Office

Dr. Lutaladio ne Bambi	Scientific Director	INERA/Kinshasa
Cit. Binsika Bi Mayala	Director of Planning Division	INERA/Kinshasa
Cit. Mossala Makambo	Chief de Service Multiplication	INERA/Kinshasa

Mr. Lionel Seydoux	Technical Advisor INERA/Kinshasa	FAO

6. Donors and Associated Agencies

Dr. Lowell S. Gleason	International Agriculturist	Minnesota (Private Consultant)
Mr. Charles Chevalier	Mission Chief	WORLD BANK Kinshasa
Mr. Jan Weijenberg	Consultant	WORLD BANK WASHINGTON, DC
Ms. Julia M. Morris	Coordinator for Africa	FORESTRY SERVICE SUPPORT PROGRAM USAID/Washington
Dr. Sharon Pfeifer	AAAS Science Diplomacy Fellow	
Mr. Robert Winterbottom	Director, Forestry and Land Use	WORLD RESOURCES INSTITUTE

7. PRONAM and others at M'vauzi

Dr. She Nsiama Hatalman	Acting Director Entomologist	PRONAM/Mvuazi
Dr. Olu Osiname	Agromonist	IITA
Dr. Diane Florini	Outreach Specialist	IITA
Dr. Christopher Bartlett	Agricultural Economist	IITA
Mr. Chiti Babu	Station Manager	IITA
Cit. S.T. Tubanza	Research Assistant Plant Breeder	PRONAM/Mvuazi
Cit. Mayala Rutikanua	Research Assistant Agronomist	PRONAM/Mvuazi
Cit. Tshibamba-Mulumba	Research Assistant Entomologist	PRONAM/Mvuazi
Cit. Ndombo Delo	Section Chief Plant Breeder	PRONAM/Mvuazi
Cit. Kassongo Kazumba	Research Assistant Sociologist	PRONAM/Mvuazi

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Cit. Dimbwa Kabuyaya	Research Assistant Plant Pathologist	PRONAM/Mvuazi
Cit. Ndambi Ndoki	Research Assistant Agronomist	PNL/Mvuazi
Cit. Lutete Dianikenda	Research Assistant Plant Pathologist	PRONAM/Mvuazi
Cit. T. Kalamba	Chief d'Antennae Ingenieur Technicien	PNM/Mvuazi
Cit. Lodi Lama	Legume Breeder Agronomist	PNL/Mvuazi
Cit. Belawaku Va Kanda	Seed Multi'n Technician	PROMAN/Mvuazi
Cit. Moukwa Emini	Chief of Personnel	PRONAM/Mvuazi
Cit. Mutombo Tshibadi	Extension Spl'ist	PRONAM/Mvuazi
Cit. Masombe Makutala	Chief, Const'n Topographist	PRONAM/Mvuazi

8. PROCAR (Project 105) and project collaborators

Mr. David Olsen	COP (former)	PRAGMA CORP.
Mr. Wade Gregory	Acting COP	PRAGMA CORP.
Cit. Nkoy Baumbu	Dir of Project	PROCAR/Bandundu
Ms. Catherine Reid	Ext'n Specialist EPIF/CAL	
Ms. Lisa McGowan	Project Director EPIF/CAL	INT'L CENTER FOR RES'CH ON WOMEN
Dr. Craig Smith	Agromomist PROCAR/KITWIT	PRAGMA CORP.
Ms. Windy Archer	PROCAR/KITWIT	PRAGMA CORP.
Mr. Keita	Outreach Spl'ist RAV/Lusekele	IITA
Cit. Kamizelo Kitambala		PRONAM/Kiyaka
Cit. Nangunza Banga-		DEVEKI

Cit. Matosi Matungu		SENAFIC/FAO
Cit. Lelo Wanba Kifulu		SENEFIC FAO/Bandundu
Cit. Kimbala Nbar-A'Sanon		Nonville CODAIK
Cit. Kapumba Gulumenza		SNV/Bandundu
Cit. Malu-Malu Mankwaka	Chief d'Antenna du	FOMDEF
Cit. Dyemo Kikuekue	Comptable	SENASEM/Lusanga
Cit. Ekofo-Eyenoa	Chief de Centre	SENASEM/Lusanga
Cit. Bukasa Kalenbue	Chief d'Antenne	PNL/Kiyaka
Cit. Mbuyi Lusambo	Assoc. Director for Agriculture	PEACE CORPS Bandundu
Ms. Martha Sutula	Agricultural Leader	PEACE CORPS
Mr. David Aspholm	Regional Representative	PEACE CORPS Bandundu
Mr. David Noyles		CENTER AGRICOLE Lusekele
Mrs. Miriam Noyes	Support Person	CENTER AGRICOLE Lusekele
Cit. Munkoko	Director General	COMBILIM/Idiofa
Mr. Maes	Admin General	COMBILIM/Idiofa
Cit. Mokulatanga	Technical Director	COMBILIM/Idiofa
Cit. Kitoko	Chef de Femile Senior et Evaluat'n	DPP-AR

9. SENARAV/INERA Sub-Station at Kiyaka

Cit. Kalonda Oyombo		PNM/Kiyaka
Cit. Kakungwa Mukoko		PNL/Kiyaka
Cit. Lodi Lama		PNL/Mvuazi
Cit. Kaziana Nwia		PRONAM/Kiyaka
Cit. Nuoyi Kalala		PNM/Kiyaka

Cit. Gambu Gambolo		PRONAM/Kiyaka
Cit. Mubwon Ibun		PRONAM/Kiyaka
Cit. Nzemba Wabeya		INERA/Kiyaka
Cit. Mukuba Otung		INERA/Kiyaka
Cit. Nzombi Milo		INERA/Kiyaka
Cit. Botango Benghebe		INERA/Kiyaka
Cit. Kisoka Mambwene		INERA/Kiyaka
Cit. Anzolo Ngende		INERA/Kiyaka
Cit. Matensi Mong Anzal		PRONAM/Kiyaka
Cit. Kamizelo Kitambala		PRONAM/Kiyaka

10. SENARAV at Kisanga/Kaniameshi and collaborators

Dr. Mulamba N. Nyindu	Director	PNM/Kaniameshi
Dr. Kenric Johnson	Plant Breeder	IITA
Dr. Wolfgang .O. Vogel	Ag Economist	IITA
Dr. M.S. Alam	Entomologist	IITA
Dr. Dennis Shannon	Agronomist	IITA
Cit. Koko Nzeza	FSR	PNM/Kaniameshi
Cit. Asanzi Mbey Yame	Agronomy	PNM/Kaniameshi
Cit Musubao Mathe	Research Asst Agronomist	PNM/Kaniameshi
Cit. Mutombo Kabwe	Research Asst Agronomist	PNM/Kaniameshi
Cit. Kalambo M.	Ameliorateur	PNM/Kaniameshi
Cit. Mosha Tshimbonbo	Antennae Chief	PRONAM/Kaniameshi
Cit. Asanzi Mbey Yame	Agronomy	PNM/Kaniameshi
Cit. Kasongo	Regional Agricultural Inspector	DOA/Lubumbashi

Cit. Baruani Kichochi	Responsable Laboratoire de Semences	MBEKO-Shaba Fungurume
Cit. Kapend Alal	Chef de Production	MBEKO-Shaba Fungurume
Cit. Mateso	Directeur	PROJET HINTERLAND MINIERE Shaba
Cit. Oyokolol(	Technical Director	PROJET HINTERLAND MINIERE Shaba
Cit. Motte	Financial Advisor	PROJET HINTERLAND MINIERE Shaba
Cit. Kaunda Nyirongo	Director of Extension	MULUNGWISHI MISSION
Cit. Kakompe Kasokela	Agronome	MULUNGWISHI MISSION
Eric Tollens, Ph.D.	Professor	CATHOLIC UNIVERSITY LEUVEN, BELGIUM
Elwyn Blattner	President	GROUP AGRO - PASTORAI ET INDUSTRIEL/Kinshas
Cit. Suha Batana	Data Collection Advisor Project 102	CHEMONICS
Lumbwa Kafusha	Farmer	LIKASI, Shaba

11. Project 102 in Central Shaba and collaborators

Mr. Minh Nguyen	Team Leader Project 105	CHECCI CORP.
Cit. Mubwa Manwana	Project Director Project 105	
Cit. Kangudi Yeta	Station Chief	Niembo
Cit. Mukanya Seba	Kabongo Zone Chief, Project 105	
Cit. Banza Mpanga	President	[illegible] Cooperative

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Cit. Kilumba Kilo	Conseiller	SOCAECO Cooperative

12. PNL program at INERA Station at Mulungu and collaborators

Cit. Pyndji	Entomologist	INERA/Mulungu
Cit. Mbikayi	Plant Breeder	INERA/Mulungu
Cit. Musungayi	Agronomy	INERA/Mulungu
Cit. Elukesu Komba	Agronomy, FSR	INERA/Mulungu
Cit. Lunze	Soil Scientist	INERA/Mulungu
Ctne. Bahindwa Ntan-kwinka Gyslaine	Chef du Project	PROJECT DE LA FEMME AU BUSHI/Bakuvu
Ctne. Bachu Bahati Nyenyezi	Regional Secretary	CONDIFFA/Bakuvu

13. PNL at INERA station in Gandajika and collaborators

Cit. Kilumba Ndayi	Director	PNL/Gandajika
Cit. Wangata Mbumga	Research Asst Peanut Breeder	PNL/Gandajika
Cit. Mpungu Tuabanya	Antennae Chief	PRONAM/Gandajika
Cit. Mulamba Nkombe	Center Director	INERA/Gandajika
Cit. Frangoie Ngoie	Research Asst Bean Breeder	PNL/Gandajika
Cit. Milanbo Bwimba	Responsible de la Vulgarization	PNL/Gandajika
Cit. Major Ludimi	Antennae Chief	PNM/Gandajika
Cit. Kubengu Mudilamika	Research Technician	PNL/Gandajika
Cit. Mpoyi Mudiamvita	Research Assistant	PNL/Gandajika
Cit. Tghunza Mudiba	Research Technician	PNL/Gandajika
Cit. Kanonge Malenge		PNL/Gandajika
Cit. Tshibangu Munzangi		PNL/Gandajika
Cit. Kadiombo Katumbayi		INERA/Gandajika
Mr. Pierre Lauffer	Volunteer Ag Extension	PRACE CORPS

Mrs. Laura Lauffer	Volunteer	PEACE CORPS
	Nutrition Extension	PEACE CORPS
Ms. Yvonne Zincola	Ag. Extension	PEACE CORPS
Jennifer Hirsch	Ag. Extension	PEACE CORPS
Mr. M. Budden	Technical Advisor	SENASEM/Gandajika
Cit. I. Mvirzelu-Nzau	Center Chief	SENASEM/Gandajika

ANNEX D. PID APPROVAL MESSAGE AND SUMMARY OF PP RESPONSES

ANNEX D

Guidance Cable for Zaire Applied Agricultural Research and Outreach Project II--PID (660-0124)

GUIDANCE ISSUES	CHAPTER AND ANNEX IN PROJECT PAPER WHERE ISSUES ARE ADDRESSED
1. Achievements in previous project.	Chapter III, Annex H
2. Project Impact/Benchmarks	Chapters VI,VII, Annex H
3. Project sustainability/ strategy	Chapters III,VII, Annex J
4. GOZ commitment during LOP strategy/coordinating group	Chapters II,IV, VIII, Annex I
5. Research grant	Annex I
6. International Research networks	Chapter III,IV, Annex H
7. Status of Threshold Evaluation Recommendation	Annex I
8. Benefits of training	Chapter III,IV, VII, Annex H&I
9. Proposed Endowment	Annex J
10. Soil management	Chapter III, Annex H
11. World Bank	Chapter II, Annex I

ACTION AID2 INFO AMB DCM ECON

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DE RUEHC #3665/01 1691844
ZNR UUUUU ZZH
R 191840Z JUN 89 ZDK CTG HKI 0009 1710651 SERVICE
FM SECSTATE WASHDC
TO RUEHKI/AMEMBASSY KINSHASA 8013
RUEHAB/AMEMBASSY ABIDJAN 6415
BT
UNCLAS SECTION 01 OF 02 STATE 193665

20-JUN-89

TOR: 13:57
CN: 63312
CHRG: AID
DIST: AID
ADD:

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NAME DATE

AIDAC

E.O. 12356: N/A

SUBJECT: GUIDANCE CABLE FOR ZAIRE APPLIED AGRICULTURAL RESEARCH AND OUTREACH II PID (660-0124)

1. SUBJECT PID WAS REVIEWED ON JUNE 8, 1989 AND APPROVED AT U.S. DOLLARS 20 MILLION; LOP EIGHT YEARS. ECPR WAS CHAIRED BY AFR/PD DIRECTOR AND WAS ATTENDED BY REPRESENTATIVES FROM AFR/CCWA, ST/FA, AFR/TR, AFR/TR/ANR, AFR/DP/PAB, AND BIFAD.

2. SUMMARY

ECPR DECISION DELEGATES PROJECT APPROVAL TO USAID KINSHASA WITH THE UNDERSTANDING THAT FOLLOWING GUIDANCE WILL BE INCORPORATED IN ENSUING PROJECT PAPER AND RESPECTIVE GRANT AGREEMENT. AS AGREED IN ISSUES MEETING, A TITLE XII INSTITUTION WILL PROVIDE TECHNICAL ASSISTANCE UNDER A COLLABORATIVE ASSISTANCE CONTRACT MODE. SINCE PROPOSED PROJECT IS AN ONGOING RESEARCH EFFORT, PP SHOULD INCLUDE A SECTION DESCRIBING ACHIEVEMENTS ATTAINED IN PREVIOUS PROJECTS. MAJOR FOCAL POINT OF ECPR DISCUSSION CONCERNED NECESSITY TO DEMONSTRATE PROJECT IMPACT AT THE PURPOSE LEVEL (SEE PARA. 3 BELOW), IN THE SAME CONTEXT THAT BENCHMARKS AND TARGETS MUST BE ESTABLISHED TO MEASURE IMPACT, PROJECT PAPER DESIGN MUST ALSO INCLUDE A STRATEGY TO ASSURE PROJECT SUSTAINABILITY AND CORRESPONDING GOZ COMMITMENT DURING LOP (SEE PARA. 4 BELOW). OTHER CONCERNS INCLUDED RESEARCH GRANTS, INTERNATIONAL RESEARCH NETWORKS, STATUS OF EVALUATION RECOMMENDATIONS, BENEFITS OF TRAINING, PROPOSED ENDOWMENT, AND SOIL MANAGEMENT (SEE PARA. 5). END SUMMARY.

USAID / ZAIRE

ACTION	INFO
DIR	
D/DIR	
PRM	
CONT	✓
PDO	
GDO	
ARD	✓
HPH	
EXO	
JAO / PER	
GSO	

ACTION DUE: 6/26/00

3. IMPACT

THE MISSION MADE A CONVINCING ARGUMENT IN THE PRE-CDSS REVIEW THAT ALL PROJECT ACTIVITIES WILL BE EVALUATED AND IMPACT MEASURED IN ACCORDANCE WITH OBJECTIVES AND

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INDICATORS ESTABLISHED FOR THE ENTIRE PORTFOLIO. ECPR EMPHASIZED THE NEED TO ESTABLISH CLEAR, MEANINGFUL, AND PRAGMATIC BENCHMARKS WITHIN SPECIFIED TIMEFRAMES IN ORDER TO FACILITATE MEASUREMENT OF PROGRESS.

AS PART OF THIS EFFORT, IMPACT INDICATORS MUST REFLECT HOW THE PROJECT WILL DIRECTLY BENEFIT TARGET BENEFICIARY FARMERS. DEMONSTRATION OF THE PRACTICAL APPLICATION OF PROJECT RESULTS ON TARGET FARMERS IS CONSIDERED PARTICULARLY IMPORTANT IN LONG-TERM RESEARCH PROJECTS WHERE RESULTS ARE NOT AS EASILY SHOWN AS IN MORE TRADITIONAL PROJECTS AND MAY APPEAR NON-EXISTENT TO THE CASUAL OBSERVER. TO ATTAIN A MORE NARROW IMPACT FOCUS, THE PROJECT PURPOSE STATEMENT SHOULD CONCENTRATE ON THE PRIMARY BENEFITS THAT SMALL FARMERS WILL RECEIVE AS A RESULT OF PROJECT IMPLEMENTATION. REFERENCE TO INCREASED INCOME AND PRODUCTION SHOULD BE LEFT AT THE GOAL LEVEL.

AT THE EOPS LEVEL, PROJECT DESIGN MUST ESTABLISH REALISTIC OBJECTIVES SO THAT PROJECT IMPLEMENTATION CAN BE READILY ADJUSTED IN LIGHT OF ESTABLISHED BENCHMARKS. FOR EXAMPLE, IT IS EXPECTED THAT IMPACT ASSESSMENT WOULD INCLUDE MEASUREMENT OF THE EFFECTIVENESS OF THE RESEARCH STRATEGY PLAN WHICH ESTABLISHES AND PRIORITIZES LONG-TERM RESEARCH EFFORTS.

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4. SUSTAINABILITY

IN THE SAME CONTEXT AS THE PRECEDING DISCUSSION, TARGETS AND BENCHMARKS TO ASSURE PROJECT SUSTAINABILITY MUST BE ESTABLISHED OVER LOP. THIS DESIGN EFFORT SHOULD INCLUDE

A PLANNED STRATEGY TO ASSURE GOZ COMMITMENT TO AGRICULTURAL RESEARCH FROM THE STANDPOINT OF FINANCIAL AND INSTITUTIONAL SUPPORT. THE PLAN SHOULD DESCRIBE THE SPECIFIC WAYS THE MISSION PLANS TO ENGAGE THE GOVERNMENT IN A DIALOGUE ON SUSTAINABILITY. THE PLAN WOULD INCLUDE WHAT SUBJECTS WILL BE DISCUSSED AS WELL AS HOW MUCH PROGRESS IS EXPECTED AND WHEN. FROM THE INSTITUTIONAL PERSPECTIVE, PROJECT DESIGN SHOULD CONSIDER USING A DONOR COORDINATING GROUP UNDER THE SPONORSHIP OF THE SPECIAL PROGRAM ON AFRICAN AGRICULTURAL RESEARCH (SPAAR) TO ENHANCE LONG-TERM SUSTAINABILITY OF THE RESEARCH SYSTEM. A REALISTIC ASSESSMENT OF THE ANTICIPATED TIMEFRAME REQUIRED FOR CONTINUED A.I.D. AND OTHER DONOR SUPPORT SHOULD ALSO BE INCLUDED.

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5. OTHER CONCERNS

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A. RESEARCH GRANTS. PROJECT DESIGN SHOULD INCLUDE FUNDING FOR RESEARCH GRANTS TO INDIGENOUS UNIVERSITIES (PROFESSORS AND SENIOR LEVEL STUDENTS) IN ORDER TO TAKE ADVANTAGE OF AND AUGMENT EXISTING TALENT. RESEARCH GRANTS WOULD PROVIDE A MEANS TO MEASURE PROJECT IMPACT BASED ON INHERENT DATA-GATHERING CAPABILITIES AS WELL INSTITUTIONALIZING HOST COUNTRY RESEARCH EFFORTS.

B. INTERNATIONAL RESEARCH NETWORKS. PP SHOULD INCLUDE FUNDING FOR NETWORKING WITH INTERNATIONAL RESEARCH CENTERS (PARTICULARLY IN-COUNTRY RESEARCH ON KEY COMMODITIES) IN ORDER TO BENEFIT FROM WIDER ARRAY OF KNOWLEDGE AVAILABLE.

C. STATUS OF EVALUATION RECOMMENDATIONS. PP SHOULD INCLUDE DISCUSSION OF IMPLEMENTATION STATUS OF RECOMMENDATIONS MADE IN RECENT THRESHOLD EVALUATION AND HOW THIS PROJECT IS ADDRESSING THEM.

D. BENEFITS OF TRAINING. PP SHOULD DEMONSTRATE IMPACT OF LONG-TERM TRAINING PERFORMED UNDER PREDECESSOR PROJECTS AND TECHNOLOGY GENERATED BY THOSE TRAINED TO THE PHD AND MSC. LEVELS.

E. PROPOSED ENDOWMENT. MISSION SHOULD CONSULT WITH RLA REGARDING JUSTIFICATION AND POSSIBLE MECHANISMS FOR ESTABLISHING A LOCAL CURRENCY ENDOWMENT FUND.

F. SOIL MANAGEMENT. PP SHOULD INCLUDE A SECTION ON SOIL MANAGEMENT WHICH DISCUSSES PREVENTION OF SOIL DEGRADATION AND SOIL FERTILITY MAINTENANCE. MISSION IS URGED TO INCLUDE A SOIL SCIENTIST AS PART OF THE TECHNICAL ASSISTANCE COMPONENT OF THE NEW PROJECT.

G. WORLD BANK INITIATIVE IN AG EXTENSION. IF IN NEXT FEW MONTHS GOZ DECIDES TO MOVE FORWARD WITH NATIONWIDE EXTENSION EFFORT PROPOSED BY WORLD BANK (THE BENOR APPROACH), PP SHOULD DISCUSS HOW PROJECT'S OUTREACH ACTIVITIES MIGHT BE AFFECTED AND WHAT ALTERNATIVE MEASURES WOULD BE APPROPRIATE.

6. MISSION REPRESENTATIVES

PARTICIPATION OF MISSION REPRESENTATIVES HARVEY AND MACKEN WAS VERY MUCH APPRECIATED AT ECPR AS THEY MADE AN EXCELLENT INTRODUCTORY PRESENTATION AND FACILITATED DISCUSSION AND PROVIDED INVALUABLE INSIGHT ON PAST RESEARCH EFFORTS. THEIR PRESENCE SIGNIFIED IMPORTANCE MISSION ACCORDS TO DESIGN OF THIS PROJECT. MISSION IS ENCOURAGED TO SEND REPRESENTATIVES TO AID/W TO ASSIST IN ALL FUTURE DESIGN REVIEWS. BAKER

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APPENDIX E. LOGFRAME MATRIX

PROJECT DESIGN SUMMARY

LOGICAL FRAMEWOR

Life of Project:
From FY 90 to FY 98
Total U.S. Funding: $20,000

Project: Zaire Applied Agricultural Research and Outreach II Project, 660-0124

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program Goal: To improve food security and contribute to economic growth of farmers through increased production, and rural household income.	1. Increased production and sale of food crops 2. Increased farmer incomes in project areas and zones of diffusion 3. A 10 to 20 percent increase in real income of households adopting new technologies.	1. GOZ statistics on agricultural production and income 2. Project reports 3. External post project evaluation	1. Technology transfer process maintained through continued existence and strengthening of NGO's, PVO's, projects and private sector extension. 2. GOZ liberalization of food policy and agricultural marketing.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Purpose: To strengthen and improve the capacity of DOA and collaborating institutions to develop and transfer agricultural technologies for selected food crops, on a sustainable basis, to farmers.	1. Increased number of sustainable technologies, responsive to client needs, produced by applied research. 2. Increased adoption of economically viable technologies by farmers. 3. Zairians fully managing the national research programs for selected food crops. 4. Significantly higher levels and greater continuity of financing for agricultural research.	1. SENARAV, SEP and other DOA reports 2. SENARAV work plans 3. Reports from outreach en-tities and periodic evaluation of SENARAV institutional support for outreach entities 4. Project evalua-tions and audits 5. Special studies to measure such factors as the degree to which (a) research priorities reflect farmers' problems; (b) SENARAV technologies have been adopted by farmers; (c) research management has im-proved over time.	1. The technologies now available to SENARAV are adoptable by farmers. 2. Outreach entities effectively carry out agreed upon functions. 3. GOZ will steadily raise the level of annual funding for agricultural research and will supply monies on a timely basis. 4. GOZ and donors will support the development of a foundation to help finance ag-ricultural research and related activities. 5. GOZ and other cooperating entities will recognize and act upon women's needs. 6. Supporting transportation and communication infrastructure will be maintained. 7. Research programs will mobilize, train, and retain qualified personnel. 8. Improved agricultural policies will be implemented to encourage private sector participation in agricultural development. 9. DSR, DOA, and Ministry of Higher Education and Scientific Research roles in agricultural research will be resolved.

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NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Outputs: 1. Productive and economically and socially adapted technologies developed and germplasm introduced, created, and maintained.	1.1 20 improved technologies for maize, cassava, and grain legume production developed by SENARAV.* 1.2 Tissue culture facilities established at research stations. 1.3 Germplasm conservation facilities and seed preparation laboratories established at research stations. 1.4 Germplasm rejuvenation programs maintained at research stations. 1.5 3 maize, 2 cassava, and 3 grain legume varieties developed and released.	1. SENARAV, SEP, and other DOA reports. 2. Outreach entity reports and outreach publications. 3. Project evaluations and audits. 4. Journal articles, conference papers, and conference reports. 5. Farm household level surveys.	1. SENARAV programs successfully targeted and prioritized and the technologies now available to SENARAV are adoptable by farmers. 2. SENASEM and outreach entities effectively executive agreed upon functions. 3. GOZ will supply monies on a timely basis each year. 4. Management autonomy and control of agricultural research fund. 5. IARC's retain capacity and funding to work with Zairian research structures. 6. Efficient and timely procurement of TA personnel, equipment, and required site rehabilitation. 7. GOZ and cooperating outreach entities will recognize and act upon women's needs and SENARAV and outreach entities will be able to identify women for short term and long term training. 8. National programs will be able to identify, mobilize, train, and retain qualified personnel. 9. Private sector entities to take responsibility for seed and planting material replication and distribution exist, are willing to cooperate with SENARAV, and are capable of producing and distributing certified seed and high quality, disease free planting material. 10. DSR, DOA, and Ministry of Higher Education and Scientific Research will be willing to adopt linkages. 11. Base line data on nutritional status of households will be collected to evaluate changes in nutritional status.
2. Improved methods and processes for the transfer of technology to public and private sector development entities: a. Signed agreements with public and private sector outreach entities in each region covered by the project; b. On-going in-service training program developed by SENARAV for NGO's and government outreach agents in the use of improved technologies, outreach methods, and program monitoring and evaluation techniques; c. Computerized data base established which is used to monitor and evaluate technology adoption by farmers; d. Improvement in the economic well being and nutritional status of households adopting new technologies; e. Increased numbers of women adopting technologies developed by SENARAV, resulting in increased income for women.	2.1 50 research and extension publications. 2.2 Written objectives, methods, and evaluation criteria for research-development teams for each national program. 2.3 30 on-farm trials per national program, with trials distributed over priority agroecologic zones and representative farmer clientele groups. 2.4 Objectives, methods, and evaluation criteria incorporated into agreements with cooperating outreach entities stating how women will be incorporated as beneficiaries and stating the number of women who will be reached through outreach activities. 2.5 SENARAV conduct at least 2 training programs per year for supervisory level personnel in cooperating outreach entities and are evaluated by participants.		

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NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Outputs: Cont'd.			
3. Improved sustainability of SENARAV activities and programs: a. Establishment of a competitive grants program for research carried out by Zairian scientists in collaboration with researchers in US universities and international research institutions; b. Signed agreements with private sector entities for producing and distributing seeds and planting material; c. Establishment of a fund for agricultural research in Zaire.	3.1 25 internationally and nationally recognized organizations contacted regarding contributions to Zaire agricultural research fund. 3.2 8 research grants awarded to Zairian researches working collaboratively with U.S.or international research institutions. 3.3 10 Agreements with private entities for foundation seed and disease-free planting material.		
4. Research and outreach staff trained in technical and management fields with an increased number of women trained and employed as research and outreach personnel.	4.1 Training for SENARAV personnel, including training in farming systems methodologies, training for teaching adult learners, gender issues analysis, and program planning and evaluation.		

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Outputs: Cont'd.	4.2 11 Ph.D., 22 M.S. and 75 specialized short-term trainees in agricultural science, social science, and management disciplines, including 5 women trained at the B.S. or Ing. Agronome level, 2 women trained at the M.S. level and 1 woman trained at the Ph.D. level.		
5. Research management improved through: a. Collaborative research programs with private and public sector research entities; b. Development of two year work plans for each national program, rolled over annually; c. Development of a strategic plan for research for SENARAV; d. Research linkages between SENARAV and INERA; e. Improvement of operation and management procedures for each research station; f. Internal and external peer review of national research programs; g. Improved collaboration with international research centers; h. Program budgeting to the level of individual research activities.	5.1 Annual budgets for each national program. 5.2 Research and outreach plans of work and annual accomplishment reports written for each SENARAV national program. 5.3 Collaborative research agreements signed with public and private sector research programs.* 5.4 At least 2 project research or extension publications presented or published focusing on women in development at national or international seminars, workshops, or conferences. 5.5 Rehabilitation of PNI, PRONAM, and PNL research facilities, offices, and housing. 5.6 Annual peer review sessions for each national program. 5.7 Publication of annual SENARAV report highlighting significant achievements.		

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS		MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Inputs:	(Millions of U.S.$)			
	USG	LC		
1. Personnel	10.2	6.8	USAID Controller records. Title XII contractor's records. Audit reports. SENARAV financial records.	1. GOZ financial support for SENARAV will increase to at least US$2.5 million annually over the life of the project, to include all personnel costs after Year 3. 2. Adequate counterpart funds (US$ 8.8 million) to be made available to the project. 3. Selective down-sizing of SENARAV staff occurs.
2. Participant training	4.3	0.0		
3. Vehicle, repair, fuel	0.7	4.6		
4. Facilities rrehabilitation	0.9	0.9		
5. Other research support	0.4	1.3		
6. Office equipment, supplies, etc.	0.7	0.8		
7. In-country travel	0.0	2.3		
8. Audits, evaluations	0.5	0.0		
9. Networking, outside Zaire	0.6	0.6		
10. Contigency	1.7	1.7		
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	20.0	19.0		

ANNEX F. STATUTORY CHECKLIST

(to be included by USAID)

5C(1) - COUNTRY CHECKLIST

Listed below are statutory criteria applica to: (A) FAA funds generally; (B)(1) Develo Assistance funds only; or (B)(2) the Econom Support Fund only.

A. GENERAL CRITERIA FOR COUNTRY ELIGIBILITY

1. FY 1990 Appropriations Act Sec. 569(b). Has the President certified to the Congress that the government of the recipient country is failing to take adequate measures to prevent narcotic drugs or other controlled substances which are cultivated, produced or processed illicitly, in whole or in part, in such country or transported through such country, from being sold illegally within the jurisdiction of such country to United States Government personnel or their dependents or from entering the United States unlawfully? NO

2. FAA Sec. 481(h); FY 1990 Appropriations Act Sec. 569(b). (These provisions apply to assistance of any kind provided by grant, sale, loan, lease, credit, guaranty, or insurance, except assistance from the Child Survival Fund or relating to international narcotics control, disaster and refugee relief, narcotics education and awareness, or the provision of food or medicine.) If the recipient is a "major illicit drug producing country" (defined as a country producing during a fiscal year at least five metric tons of opium or 500 metric tons of coca or marijuana) or a "major drug-transit country" (defined as a country that is a significant direct source of illicit drugs significantly affecting the United States, through which such drugs N/A

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are transported, or through which significant sums of drug-related profits are laundered with the knowledge or complicity of the government): (a) Does the country have in place a bilateral narcotics agreement with the United States, or a multilateral narcotics agreement? and (b) Has the President in the March 1 International Narcotics Control Strategy Report (INSCR) determined and certified to the Congress (without Congressional enactment, within 45 days of continuous session, of a resolution disapproving such a certification), or has the President determined and certified to the Congress on any other date (with enactment by Congress of a resolution approving such certification), that (1) during the previous year the country has cooperated fully with the United States or taken adequate steps on its own to satisfy the goals agreed to in a bilateral narcotics agreement with the United States or in a multilateral agreement, to prevent illicit drugs produced or processed in or transported through such country from being transported into the United States, to prevent and punish drug profit laundering in the country, and to prevent and punish bribery and other forms of public corruption which facilitate production or shipment of illicit drugs or discourage prosecution of such acts, or that (2) the vital national interests of the United States require the provision of such assistance?

3. 1986 Drug Act Sec. 2013. (This section applies to the same categories of assistance subject to the restrictions in FAA Sec. 481(h), above.) If recipient country is a "major illicit drug producing country" or "major drug-transit country" (as defined for the purpose of FAA Sec 481(h)), has the President submitted a report to N/A

Congress listing such country as one: (a) which, as a matter of government policy, encourages or facilitates the production or distribution of illicit drugs; (b) in which any senior officia of the government engages in, encourages, or facilitates the production or distribution of illegal drugs; (c) in which any member of a U.S. Government agency has suffered or been threatened with violence inflicte by or with the complicity of any government officer: or (d) which fails to provide reasonable cooperation to lawful activities of U.S. drug enforcement agents, unless the President has provided the required certification to Congress pertaining tc U.S. national interests and the drug control and criminal prosecution efforts of that country?

4. FAA Sec. 620(c). If assistance is to a government, is the government indebted to any U.S. citizen for goods or services furnished or ordered where: (a) such citizen has exhausted available legal remedies, (b) the debt is not denied or contested by such government, or (c) the indebtedness arises under an unconditional guaranty of payment given by such government or controlled entity? NO

5. FAA Sec. 620(e)(1). If assistance is to a government, has it (including any government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities? NO

6. FAA Secs. 620(a), 620(f), 620D; FY 1990 Appropriations Act Secs. 512, 548. Is recipient country a Communist country? If so, has the President: (a) determined that assistance to the country is vital to the security of the United States, that the recipient country is not controlled by the international Communist conspiracy, and that such assistance will further promote the independence of the recipient country from international communism, or (b) removed a country from applicable restrictions on assistance to communist countries upon a determination and report to Congress that such action is important to the national interest of the United States? Will assistance be provided either directly or indirectly to Angola, Cambodia, Cuba, Iraq, Libya, Vietnam, South Yemen, Iran or Syria? Will assistance be provided to Afghanistan without a certification, or will assistance be provided inside Afghanistan through the Soviet-controlled government of Afghanistan? NO

7. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, damage or destruction by mob action of U.S. property? NO

8. FAA Sec. 620(l). Has the country failed to enter into an investment guaranty agreement with OPIC? NO

9. FAA Sec. 620(o); Fishermen's Protective Act of 1967 (as amended) Sec. 5. (a) Has the country seized, or imposed any penalty or sanction against, any U.S. fishing vessel because of fishing activities in international waters? (b) If so, has any deduction required by the Fishermen's Protective Act been made? NO

10.	FAA Sec. 620(q); FY 1990 Appropriations Act Sec. 518 (Brooke Amendment). (a) Has the government of the recipient country been in default for more than six months on interest or principal of any loan to the country under the FAA? (b) Has the country been in default for more than one year on interest or principal on any U.S. loan under a program for which the FY 1990 Appropriates Act appropriates funds?	NO
11	FAA Sec. 620(s). If contemplated assistance is development loan or to come from Economic Support Fund, has the Administrator taken into account the percentage of the country's budget and amount of the country's foreign exchange or other resources spent on military equipment? (Reference may be made to the annual "Taking Into Consideration" memo: "Yes, taken into account by the Administrator at time of approval of Agency OYB." This approval by the Administrator of the Operational Year Budget can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)	N/A
12.	FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have relations been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?	NO
13.	FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the A.I.D. Administrator in determining the current A.I.D. Operational Year Budget? (Reference may be made to the "Taking into Consideration" memo.)	Covered in AID OYB "Taking into Consideration" memo.

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14. FAA Sec. 620A. Has the President determined that the recipient country grants sanctuary from prosecution to any individual or group which has committed an act of international terrorism or otherwise supports international terrorism? NO

15. FY 1990 Appropriations Act Sec. 564. Has the country been determined by the President to: (a) grant sanctuary from prosecution to any individual or group which has committed an act of international terrorism, or (b) otherwise support international terrorism, unless the President has waived this restriction on grounds of national security or for humanitarian reasons? NO

16. ISDCA of 1985 Sec. 552(b). Has the Secretary of State determined that the country is a high terrorist threat country after the Secretary of Transportation has determined, pursuant to section 1115(e)(2) of the Federal Aviation Act of 1958, that an airport in the country does not maintain and administer effective security measures? NO

17. FAA Sec. 666(b). Does the country object, on the basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. who is present in such country to carry out economic development programs under the FAA? NO

18. FAA Secs. 669, 670. Has the country, after August 3, 1977, delivered to any other country or received nuclear enrichment or reprocessing equipment, materials, or technology, without specified arrangements or safeguards, and without special certification by the President? NO

Has it transferred a nuclear explosive device to a non-nuclear weapon state, or if such a state, either received or detonated a nuclear explosive device? (FAA Sec. 620E permits a special waiver of Sec. 669 for Pakistan.) NO

19	FAA Sec. 670. If the country is a non-nuclear weapon state, has it, on or after August 8, 1985, exported (or attempted to export) illegally from the United States any material, equipment, or technology which would contribute significantly to the ability of a country to manufacture a nuclear explosive device?	NO
20.	ISDCA of 1981 Sec. 720. Was the country represented at the Meeting of Ministers of Foreign Affairs and Heads of Delegations of the Non-Aligned Countries to the 36th General Assembly of the U.N. on Sept. 25 and 28, 1981, and did it fail to disassociate itself from the communique issued? If so, has the President taken it into account? (Reference may be made to the "Taking into Consideration" memo.)	Covered by the "Taking into Consideration" memo.
21.	FY 1990 Appropriations Act Sec. 513. Has the duly elected Head of Government of the country been deposed by military coup or decree? If assistance has been terminated, has the President notified Congress that a democratically elected government has taken office prior to the resumption of assistance?	NO
22.	FY 1990 Appropriations Act Sec. 539. Does the recipient country fully cooperate with the international refugee assistance organizations, the United States, and other governments in facilitating lasting solutions to refugee situations, including resettlement without respect to race, sex, religion, or national origin?	YES

B. FUNDING SOURCE CRITERIA FOR COUNTRY ELIGIBILITY

1. Development Assistance Country Criteria

a. FAA Sec. 116. Has the Department of State determined that this government has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, can it be demonstrated that contemplated assistance will directly benefit the needy? **NO**

b. FY 1990 Appropriations Act Sec. 535. Has the President certified that use of DA funds by this country would violate any of the prohibitions against use of funds to pay for the performance of abortions as a method of family planning, to motivate or coerce any person to practice abortions, to pay for the performance of involuntary sterilization as a method of family planning, to coerce or provide any financial incentive to any person to undergo sterilizations, to pay for any biomedical research which relates, in whole or in part, to methods of, or the performance of, abortions or involuntary sterilization as a means of family planning? **NO**

2. Economic Support Fund Country Criteria

a. FAA Sec. 502B. Has it been determined that the country has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, has the President found that the country made such significant improvement in its human rights record that furnishing such assistance is in the U.S. national interest? **NO**

b. FY 1990 Appropriations Act Sec. 569(d). Has this country met its drug eradication targets or otherwise taken significant steps to halt illicit drug production or trafficking? **YES**

5C(2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A includes criteria applicable to all projects. Part B applies to projects funded from specific sources only: B(1) applies to all projects funded with Development Assistance; B(2) applies to projects funded with Development Assistance loans; and B(3) applies to projects funded from ESF.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT

1. FY 1990 Appropriations Act Sec. 523; FAA Sec. 634A. If money is to be obligated for an activity not previously justified to Congress, or for an amount in excess of amount previously justified to Congress, has Congress been properly notified? — CN sent on 6/14/90, expired on 6/28/90.

2. FAA Sec. 611(a). Prior to an obligation in excess of $500,000, will there be: (a) engineering, financial or other plans necessary to carry out the assistance; and (b) a reasonably firm estimate of the cost to the U.S. of the assistance? — YES

3. FAA Sec. 611(a)(2). If legislative action is required within recipient country with respect to an obligation in excess of $500,000, what is the basis for a reasonable expectation that such action will be completed in time to permit orderly accomplishment of the purpose of the assistance? — N/A

4.	FAA Sec. 611(b); FY 1990 Appropriations Act Sec. 501. If project is for water or water-related land resource construction, have benefits and costs been computed to the extent practicable in accordance with the principles, standards, and procedures established pursuant to the Water Resources Planning Act (42 U.S.C. 1962, et seq.)? (See A.I.D. Handbook 3 for guidelines.)	N/A
5.	FAA Sec. 611(e). If project is capital assistance (e.g., construction), and total U.S. assistance for it will exceed $1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability to maintain and utilize the project effectively?	U.S. Financing for construction is below $1,000,000.
6	FAA Sec. 209. Is project susceptible to execution as part of regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.	NO
7.	FAA Sec. 601(a). Information and conclusions on whether projects will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.	Project will support the National Agricultural Research and Outreach system and will improve technical efficiency of agriculture.
8.	FAA Sec. 601(b). Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).	Project encourages private US participation in Title XII collaborative agreement mode.

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9. FAA Secs. 612(b), 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.

The GOZ will contribute $21.5 million in GOZ and counterpart funds for project local costs.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?

NO

11. FY 1990 Appropriations Act Sec. 521. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?

N/A

12. FY 1990 Appropriations Act Sec. 547. Will the assistance (except for programs in Caribbean Basin Initiative countries under U.S. Tariff Schedule "Section 807," which allows reduced tariffs on articles assembled abroad from U.S.-made components) be used directly to procure feasibility studies, prefeasibility studies, or project profiles of potential investment in, or to assist the establishment of facilities specifically designed for, the manufacture for export to the United States or to third country markets in direct competition with U.S. exports, of textiles, apparel, footwear, handbags, flat goods (such as wallets or coin purses worn on the person), work gloves or leather wearing apparel?

N/A

13. FAA Sec. 119(g)(4)-(6) & (10). Will the assistance: (a) support training and education efforts which improve the capacity of recipient countries to prevent loss of biological diversity; (b) be provided under a long-term agreement in which the recipient country agrees to protect ecosystems or other

a) YES

b) NO

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wildlife habitats; (c) support efforts to identify and survey ecosystems in recipient countries worthy of protection; or (d) by any direct or indirect means significantly degrade national parks or similar protected areas or introduce exotic plants or animals into such areas?

c) NO

d) NO

14. FAA Sec. 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (either dollars or local currency generated therefrom)? N/A

15. FY 1990 Appropriations Act, Title II, under heading "Agency for International Development." If assistance is to be made to a United States PVO (other than a cooperative development organization), does it obtain at least 20 percent of its total annual funding for international activities from sources other than the United States Government? N/A

16. FY 1990 Appropriations Act Sec. 537. If assistance is being made available to a PVO, has that organization provided upon timely request any document, file, or record necessary to the auditing requirements of A.I.D., and is the PVO registered with A.I.D.? N/A

17. FY 1990 Appropriations Act Sec. 514. If funds are being obligated under an appropriation account to which they were not appropriated, has the President consulted with and provided a written justification to the House and Senate Appropriations Committees and has such obligation been subject to regular notification procedures? N/A

18. State Authorization Sec. 139 (as interpreted by conference report). Has confirmation of the date of signing of the project agreement, including the amount involved, been cabled to State L/T and A.I.D. LEG within 60 days of the agreement's entry into force with respect to the United States, and has the full text of the agreement been pouched to those same offices? (See Handbook 3, Appendix 6G for agreements covered by this provision).

Not yet, but it will be

19. Trade Act Sec. 5164 (as interpreted by conference report), amending Metric Conversion Act of 1975 Sec. 2. Does the project use the metric system of measurement in its procurements, grants, and other business-related activities, except to the extent that such use is impractical or is likely to cause significant inefficiencies or loss of markets to United States firms? Are bulk purchases usually to be made in metric, and are components, subassemblies, and semi-fabricated materials to be specified in metric units when economically available and technically adequate?

YES

20. FY 1990 Appropriations Act, Title II, under heading "Women in Development." Will assistance be designed so that the percentage of women participants will be demonstrably increased?

YES

21. FY 1990 Appropriations Act Sec. 592(a). If assistance is furnished to a foreign government under arrangements which result in the generation of local currencies, has A.I.D. (a) required that local currencies be deposited in a separate account established by the recipient government, (b) entered into an agreement with that government providing the amount of local currencies to be generated and the terms and conditions under which the currencies so deposited may be utilized, and (c) established by agreement the responsibilities of A.I.D. and that government to monitor and account for deposits into and disbursements from the separate account?

AID will so require

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Will such local currencies, or an equivalent amount of local currencies, be used only to carry out the purposes of the DA or ESF chapters of the FAA (depending on which chapter is the source of the assistance) or for the administrative requirements of the United States Government?

Has A.I.D. taken all appropriate steps to ensure that the equivalent of local currencies disbursed from the separate account are used for the agreed purposes?

If assistance is terminated to a country, will any unencumbered balances of funds remaining in a separate account be disposed of for purposes agreed to by the recipient government and the United States Government?

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FY 1990 Appropriations Act Sec. 546 (as interpreted by conference report for original enactment). If assistance is for agricultural development activities (specifically, any testing or breeding feasibility study, variety improvement or introduction, consultancy, publication, conference, or training), are such activities: (1) specifically and principally designed to increase agricultural exports by the host country to a country other than the United States, where the export would lead to direct competition in that third country with exports of a similar commodity grown or produced in the United States, and can the activities reasonably be expected to cause substantial injury to U.S. exporters of a similar agricultural commodity; or (2) in support of research that is intended primarily to benefit U.S. producers?	N/A
b. FAA Sec. 107. Is special emphasis placed on use of appropriate technology (defined as relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?	YES
c. FAA Sec. 281(b). Describe extent to which the activity recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.	See Section VII.B of the PP.

d. FAA Sec. 101(a). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth?

YES

e. FAA Secs. 102(b), 111, 113, 281(a). Describe extent to which activity will: (1) effectively involve the poor in development by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, dispersing investment from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using appropriate U.S. institutions; (2) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward a better life, and otherwise encourage democratic private and local governmental institutions; (3) support the self-help efforts of developing countries; (4) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (5) utilize and encourage regional cooperation by developing countries.

a) The project will develop and transfer appropriate and sustainable food crop technologies to poor rural household with the assistance of Title XII US universitie

b) The project will provide training and material assistance to rural non-governmental organizations (NGO's) and farmer groups in productivity, income, and nitrition improval agricultural technology.

c) Provides technologies for self-help efforts.

d) The project targets rural women as primary beneficiaries at researe and outreach efforts. It will also train women professionals in agricultural disciplines

e) The project fosters regional scientific cooperation.

YES

f. FAA Secs. 103, 103A, 104, 105, 106, 120-21; FY 1990 Appropriations Act, Title II, under heading "Sub-Saharan Africa, DA." Does the project fit the criteria for the source of funds (functional account) being used?

They will be

g. FY 1990 Appropriations Act, Title II, under heading "Sub-Saharan Africa, DA." Have local currencies generated by the sale of imports or foreign exchange by the government of a country in Sub-Saharan Africa from funds appropriated under Sub-Saharan Africa, DA been deposited in a special account established by that government, and are these local currencies available only for

use, in accordance with an agreement with the United States, for development activities which are consistent with the policy directions of Section 102 of the FAA and for necessary administrative requirements of the U. S. Government?

h. FAA Sec. 107. Is emphasis placed on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)? — YES

i. FAA Secs. 110, 124(d). Will the recipient country provide at least 25 percent of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)? — YES

j. FAA Sec. 128(b). If the activity attempts to increase the institutional capabilities of private organizations or the government of the country, or if it attempts to stimulate scientific and technological research, has it been designed and will it be monitored to ensure that the ultimate beneficiaries are the poor majority? — Of course

k. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government. — See BIC above

l. FY 1990 Appropriations Act, under heading "Population, DA," and Sec. 535. Are any of the funds to be used for the performance of abortions as a method of family planning or to motivate or coerce any person to practice abortions? — NO

Are any of the funds to be used to pay for the performance of involuntary sterilization as a method of family planning or to coerce or provide any financial incentive to any person to undergo sterilizations?	N/A
Are any of the funds to be made availabl to any organization or program which, as determined by the President, supports or participates in the management of a program of coercive abortion or involuntary sterilization?	N/A
Will funds be made available only to voluntary family planning projects which offer, either directly or through referral to, or information about access to, a broad range of family planning methods and services?	N/A
In awarding grants for natural family planning, will any applicant be discriminated against because of such applicant's religious or conscientious commitment to offer only natural family planning?	N/A
Are any of the funds to be used to pay for any biomedical research which relates, in whole or in part, to methods of, or the performance of, abortions or involuntary sterilization as a means of family planning?	N/A
m. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?	YES
n. FY 1990 Appropriations Act Sec. 579. What portion of the funds will be available only for activities of economically and socially disadvantaged enterprises, historically black colleges and universities, colleges and universities having a student body in which more than 40 percent of the students are Hispanic Americans, and	Project collaborative agreement to be negotiated with at Title XII consortium led by an HBCU University.

private and voluntary organizations which are controlled by individuals who are black Americans, Hispanic Americans, or Native Americans, or who are economically or socially disadvantaged (including women)?

o. FAA Sec. 118(c). Does the assistance comply with the environmental procedures set forth in A.I.D. Regulation 16? Does the assistance place a high priority on conservation and sustainable management of tropical forests? Specifically, does the assistance, to the fullest extent feasible: (1) stress the importance of conserving and sustainably managing forest resources; (2) support activities which offer employment and income alternatives to those who otherwise would cause destruction and loss of forests, and help countries identify and implement alternatives to colonizing forested areas; (3) support training programs, educational efforts, and the establishment or strengthening of institutions to improve forest management; (4) help end destructive slash-and-burn agriculture by supporting stable and productive farming practices; (5) help conserve forests which have not yet been degraded by helping to increase production on lands already cleared or degraded; (6) conserve forested watersheds and rehabilitate those which have been deforested; (7) support training, research, and other actions which lead to sustainable and more environmentally sound practices for timber harvesting, removal, and processing; (8) support research to expand knowledge of tropical forests and identify alternatives which will prevent forest destruction, loss, or degradation; (9) conserve biological diversity in forest areas by supporting efforts to identify, establish, and maintain a representative network of protected tropical forest ecosystems on a worldwide basis, by making the establishment of protected areas a

Yes. PID IEE provides categories exclusion and negative threshold determination.

Yes. Project research directed at reducing agricultural clearing pressure on forests improving sustainability of agricultural production as per(a),(d),(c), and (k).

condition of support for activities involving forest clearance or degradation, and by helping to identify tropical forest ecosystems and species in need of protection and establish and maintain appropriate protected areas; (10) seek to increase the awareness of U.S. Government agencies and other donors of the immediate and long-term value of tropical forests; and (11)/utilize the resources and abilities of all relevant U.S. government agencies?

p. FAA Sec. 118(c)(13). If the assistance will support a program or project significantly affecting tropical forests (including projects involving the planting of exotic plant species), will the program or project: (1) be based upon careful analysis of the alternatives available to achieve the best sustainable use of the land, and (2)/take full account of the environmental impacts of the proposed activities on biological diversity? N/A

q. FAA Sec. 118(c)(14). Will assistance be used for: (1) the procurement or use of logging equipment, unless an environmental assessment indicates that all timber harvesting operations involved will be conducted in an environmentally sound manner and that the proposed activity will produce positive economic benefits and sustainable forest management systems; or (2) actions which will significantly degrade national parks or similar protected areas which contain tropical forests, or introduce exotic plants or animals into such areas? NO NO

r. FAA Sec. 118(c)(15). Will assistance be used for: (1) activities which would result in the conversion of forest lands to the rearing of livestock; (2) the construction, upgrading, or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undergraded forest lands; (3) the NO NO

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colonization of forest lands; or (4) th NO
construction of dams or other water
control structures which flood relative NO
undergraded forest lands, unless with
respect to each such activity an
environmental assessment indicates that
the activity will contribute
significantly and directly to improving
the livelihood of the rural poor and wi
be conducted in an environmentally soun
manner which supports sustainable
development?

s. FY 1990 Appropriations Act
Sec. 534(a). If assistance relates to
tropical forests, will project assist
countries in developing a systematic
analysis of the appropriate use of thei N/A
total tropical forest resources, with t
goal of developing a national program f
sustainable forestry?

t. FY 1990 Appropriations Act
Sec. 534(b). If assistance relates to
energy, will such assistance focus on
improved energy efficiency, increased us
of renewable energy resources, and
national energy plans (such as least-cos N/A
energy plans) which include investment i
end-use efficiency and renewable energy
resources?

Describe and give conclusions as to how
such assistance will: (1) increase the
energy expertise of A.I.D. staff, (2)
help to develop analyses of energy-secto N/A
actions to minimize emissions of
greenhouse gases at least cost, (3)
develop energy-sector plans that employ
end-use analysis and other techniques to
identify cost-effective actions to
minimize reliance on fossil fuels, (4)
help to analyze fully environmental
impacts (including impact on global
warming), (5) improve efficiency in
production, transmission, distribution,
and use of energy, (6) assist in
exploiting nonconventional renewable
energy resources, including wind, solar,
small-hydro, geo-thermal, and advanced

biomass systems, (7) expand efforts to meet the energy needs of the rural poor, (8) encourage host countries to sponsor meetings with United States energy efficiency experts to discuss the use of least-cost planning techniques, (9) help to develop a cadre of United States experts capable of providing technical assistance to developing countries on energy issues, and (10) strengthen cooperation on energy issues with the Department of Energy, EPA, World Bank, and Development Assistance Committee of the OECD. — N/A

u. <u>FY 1990 Appropriations Act, Title II, under heading "Sub-Saharan Africa, DA"</u> (as interpreted by conference report upon original enactment). If assistance will come from the Sub-Saharan Africa DA account, is it: (1) to be used to help the poor majority in Sub-Saharan Africa through a process of long-term development and economic growth that is equitable, participatory, environmentally sustainable, and self-reliant; (2) being provided in accordance with the policies contained in section 102 of the FAA; (3) being provided, when consistent with the objectives of such assistance, through African, United States and other PVOs that have demonstrated effectiveness in the promotion of local grassroots activities on behalf of long-term development in Sub-Saharan Africa; (4) being used to help overcome shorter-term constraints to long-term development, to promote reform of sectoral economic policies, to support the critical sector priorities of agricultural production and natural resources, health, voluntary family planning services, education, and income generating opportunities, to bring about appropriate sectoral restructuring of the Sub-Saharan African economies, to support reform in public administration and finances and to establish a favorable environment for individual enterprise and self-sustaining development, and to take

YES

YES

YES

YES, to the extent applicable.

into account, in assisted policy reforms, the need to protect vulnerable groups; (5) being used to increase agricultural production in ways that protect and restore the natural resource base, especially food production, to maintain and improve basic transportation and communication networks, to maintain and restore the renewable natural resource base in ways that increase agricultural production, to improve health conditions with special emphasis on meeting the health needs of mothers and children, including the establishment of self-sustaining primary health care systems that give priority to preventive care, to provide increased access to voluntary family planning services, to improve basic literacy and mathematics especially to those outside the formal educational system and to improve primary education, and to develop income-generating opportunities for the unemployed and underemployed in urban and rural areas?

YES indeed.

v. <u>International Development Act Sec. 711, FAA Sec. 463.</u> If project will finance a debt-for-nature exchange, describe how the exchange will support protection of: (1) the world's oceans and atmosphere, (2) animal and plant species, and (3) parks and reserves; or describe how the exchange will promote: (4) natural resource management, (5) local conservation programs, (6) conservation training programs, (7) public commitment to conservation, (8) land and ecosystem management, and (9) regenerative approaches in farming, forestry, fishing, and watershed management.

N/A

w. <u>FY 1990 Appropriations Act Sec. 515</u>. If deob/reob authority is sought to be exercised in the provision of DA assistance, are the funds being obligated for the same general purpose, and for countries within the same region as originally obligated, and have the House and Senate Appropriations Committees been properly notified?

N/A

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2. Development Assistance Project Criteria (Loans Only)

a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan at a reasonable rate of interest. N/A

b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20 percent of the enterprise's annual production during the life of the loan, or has the requirement to enter into such an agreement been waived by the President because of a national security interest? N/A

c. FAA Sec. 122(b). Does the activity give reasonable promise of assisting long-range plans and programs designed to develop economic resources and increase productive capacities? N/A

3. Economic Support Fund Project Criteria

a. FAA Sec. 531(a). Will this assistance promote economic and political stability? To the maximum extent feasible, is this assistance consistent with the policy directions, purposes, and programs of Part I of the FAA? N/A

b. FAA Sec. 531(e). Will this assistance be used for military or paramilitary purposes? N/A

c. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made? N/A

5C(3) - STANDARD ITEM CHECKLIST

Listed below are the statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by imposing limits on certain uses of funds.

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A. PROCUREMENT

1.	FAA Sec. 602(a). Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed?	YES
2.	FAA Sec. 604(a). Will all procurement be from the U.S. except as otherwise determined by the President or determined under delegation from him?	NO. This project is DFA funded.
3.	FAA Sec. 604(d). If the cooperating country discriminates against marine insurance companies authorized to do business in the U.S., will commodities be insured in the United States against marine risk with such a company?	N/A
4.	FAA Sec. 604(e). If non-U.S. procurement of agricultural commodity or product thereof is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? (Exception where commodity financed could not reasonably be procured in U.S.)	N/A

5.	FAA Sec. 604(g). Will construction or engineering services be procured from firms of advanced developing countries which are otherwise eligible under Code 941 and which have attained a competitive capability in international markets in one of these areas? (Exception for those countries which receive direct economic assistance under the FAA and permit United States firms to compete for construction or engineering services financed from assistance programs of these countries.)	NO
6.	FAA Sec. 603. Is the shipping excluded from compliance with the requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 percent of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent such vessels are available at fair and reasonable rates?	N/A
7.	FAA Sec. 621(a). If technical assistance is financed, will such assistance be furnished by private enterprise on a contract basis to the fullest extent practicable? Will the facilities and resources of other Federal agencies be utilized, when they are particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?	(a) Procurement is by Title XII collaborativ agreement which encourages private sector involvement (b) YES
8.	International Air Transportation Fair Competitive Practices Act, 1974. If air transportation of persons or property is financed on grant basis, will U.S. carriers be used to the extent such service is available?	YES
9.	FY 1990 Appropriations Act Sec. 504. If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States?	YES

10. FY 1990 Appropriations Act Sec. 524. If assistance is for consulting service through procurement contract pursuant to 5 U.S.C. 3109, are contract expenditures a matter of public record and available for public inspection (unless otherwise provided by law or Executive order)? **YES**

11. Trade Act Sec. 5164 (as interpreted by conference report), amending Metric Conversion Act of 1975 Sec. 2. Does the project use the metric system of measurement in its procurements, grants, and other business-related activities, except to the extent that such use is impractical or is likely to cause significant inefficiencies or loss of markets to United States firms? Are bulk purchases usually to be made in metric, and are components, subassemblies, and semi-fabricated materials to be specified in metric units when economically available and technically adequate? **YES**

12. FAA Secs. 612(b), 636(h); FY 1990 Appropriations Act Secs. 507, 509. Describe steps taken to assure that, to the maximum extent possible, foreign currencies owned by the U.S. are utilized in lieu of dollars to meet the cost of contractual and other services. **N/A**

13. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release? **NO**

14. FAA Sec. 601(e). Will the assistance utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise? **YES**

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B. CONSTRUCTION

1. FAA Sec. 601(d). If capital (e.g., construction) project, will U.S. engineering and professional services be used?	NO, local procurement is permitted.
2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?	YES
3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed $100 million (except for productive enterprises in Egypt that were described in the CP), or does assistance have the express approval of	N/A

C. OTHER RESTRICTIONS

1. FAA Sec. 122(b). If development loan repayable in dollars, is interest rate at least 2 percent per annum during a grace period which is not to exceed ten years, and at least 3 percent per annum thereafter?	N/A
2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights?	N/A
3. FAA Sec. 620(h). Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the Communist-bloc countries?	YES

4. Will arrangements preclude use of financing:

a. FAA Sec. 104(f); FY 1990 Appropriations Act under heading "Population, DA," and Secs. 525, 535. (1) To pay for performance of abortions as a method of family planning or to motivate or coerce persons to practice abortions; (2) to pay for performance of involuntary sterilization as method of family planning, or to coerce or provide financial incentive to any person to undergo sterilization; (3) to pay for any biomedical research which relates, in whole or part, to methods or the performance of abortions or involuntary sterilizations as a means of family planning; or (4) to lobby for abortion? YES

b. FAA Sec. 483. To make reimbursements, in the form of cash payments, to persons whose illicit drug crops are eradicated? YES

c. FAA Sec. 620(g). To compensate owners for expropriated or nationalized property, except to compensate foreign nationals in accordance with a land reform program certified by the President? YES

d. FAA Sec. 660. To provide training, advice, or any financial support for police, prisons, or other law enforcement forces, except for narcotics programs? YES

e. FAA Sec. 662. For CIA activities? YES

f. FAA Sec. 636(i). For purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained? YES

g. FY 1990 Appropriations Act Sec. 503. To pay pensions, annuities, retirement pay, or adjusted service compensation for prior or current military personnel? YES

h. FY 1990 Appropriations Act Sec. 505. To pay U.N. assessments, arrearages or dues? YES

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i. FY 1990 Appropriations Act Sec. 506. To carry out provisions of FAA section 209(d) (transfer of FAA funds to multilateral organizations for lending)? YES

j. FY 1990 Appropriations Act Sec. 510. To finance the export of nuclear equipment, fuel, or technology? YES

k. FY 1990 Appropriations Act Sec. 511. For the purpose of aiding the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights? YES

l. FY 1990 Appropriations Act Sec. 516; State Authorization Sec. 109. To be used for publicity or propaganda purposes designed to support or defeat legislation pending before Congress, to influence in any way the outcome of a political election in the United States, or for any publicity or propaganda purposes not authorized by Congress? YES

5. FY 1990 Appropriations Act Sec. 574. Will any A.I.D. contract and solicitation, and subcontract entered into under such contract, include a clause requiring that U.S. marine insurance companies have a fair opportunity to bid for marine insurance when such insurance is necessary or appropriate? YES

6. FY 1990 Appropriations Act Sec. 582. Will any assistance be provided to any foreign government (including any instrumentality or agency thereof), foreign person, or United States person in exchange for that foreign government or person undertaking any action which is, if carried out by the United States Government, a United States official or employee, expressly prohibited by a provision of United States law? NO

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ANNEX G. HOST GOVERNMENT REQUEST FOR ASSISTANCE

(to be included by USAID)

REPUBLIQUE DU ZAIRE
CONSEIL EXECUTIF

Département de l'Agriculture, Animation Rurale et Développement Communautaire

Le Commissaire d'Etat

Kinshasa, le 27 JUIN 1990

N° 0720 / BCE /DAARDC /..90

TRANSMIS COPIE POUR INFORMATION AUX:

- Citoyen Premier Commissaire d'Etat
- Citoyen Vice-Premier Commissaire d'Etat, chargé des questions économiques, financières et monétaires

TOUS à KINSHASA/GOMBE

Objet : Requête d'assistance financière

A Monsieur le Directeur
de l'USAID
à KINSHASA/GOMBE

Monsieur le Directeur,

Je me réfère à votre lettre du 8 mai 1990 par laquelle, à travers nous, vous avez bien voulu notifier au Conseil Exécutif l'achèvement de l'accord de subvention du Projet 066-0091 passé entre la République du Zaire et les Etats-Unis d'Amérique pour le Service National de Recherche Agronomique Appliquée et Vulgarisation (SENARAV) conclu en date du 13 septembre 1983 et tel qu'amendé à ce jour par la Lettre de Mise à Exécution n° 9 du 31 mai 1988.

Au regard de l'importance de ce Service dans le cadre du développement de l'agriculture, le but de la présente est de solliciter au même nom du Conseil Exécutif une nouvelle subvention pour un soutien financier de ses différentes activités.

Cette assistance financière nous permettra de couvrir essentiellement pour une nouvelle phase du Projet les dépenses relatives à l'assistance technique, la formation court et long terme, les achats des équipements et matériels de recherche, la réhabilitation de l'infrastructure de recherche ainsi que tous les autres coûts d'opérations.

Tout en vous remerciant à l'avance de l'appui que vous allez apporter à notre requête, je vous prie d'agréer, Monsieur le Directeur, l'assurance de ma considération distinguée.

Dr. Ir. ONYEMBE PENE MBUTU LOLEMA

ANNEX H. TECHNICAL ANALYSIS

ANNEX H. TECHNICAL ANALYSIS
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ANNEX H. TECHNICAL ANALYSIS

I. THE AGRICULTURAL PRODUCTION ENVIRONMENT

A. General Overview

Zaire, a country of approximately 2.3 million square kilometers, has abundant land. It is estimated that only about 3 percent of the total land area is presently under cultivation, with another 2 percent or less used for grazing. More than three-quarters of the country's area is covered by forests and woodlands. Zaire can be divided into four major biogeographical regions: (1) the central basin of the Zaire River, (2) the transitional woodlands to the north and south of the central basin, (3) the tropical humid montane area of the eastern Zaire basin, and (4) the gallery forest and savannah region along the southern border with Angola and Zambia.

The central basin, covered by the closed canopy rain forest of the Zaire River basin, is sparsely populated and supports a very limited commercial timber industry. The basin receives 2000-3000 mm of rainfall per year and its soils are generally classified as Oxisols (USDA Soil Taxonomy). Much of the area is suitable for perennial tree crop production and many palm oil, coffee, and cocoa plantations are located in this region. Annual food crop production is unsuited to the region; deforestation results in organic matter losses and nutrient leaching.

North and south of the rain forest are transitional forests characterized by an open canopy covering at least 40 percent of the land surface. These areas receive less rainfall (1200-2000 mm) than the central basin, although the bimodal distribution of rainfall permits two growing seasons per year. These transitional woodlands support a large proportion of the country's population owing to the availability of relatively fertile forest soils for cropping. In areas of high population density, pressures from cropping and wood harvesting have caused considerable loss of the original forest. These pressures have also resulted in reduced fallow periods, leading ultimately to declining yields and raising questions regarding the near-term sustainability of present agricultural practices.

The tropical montane region lies east of the central rain forest along the eastern border, adjacent to Kivu. This high altitude region supports a dense humid upland forest and has the country's most fertile soils (of volcanic origin). It is also the most densely populated rural area of Zaire. Rainfall is plentiful (2000 mm) and permits two growing seasons per year. A wide variety of crops are cultivated in the area. Production of arabica coffee and quinine is centered here, as is bean and potato production. High population densities put pressure on the natural resources for

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both agricultural and fuelwood production. Overharvesting of trees, short fallow periods, and farming on steep hillsides have caused degradation of both soil and forest resources.

The gallery forest/savannah region south of the forest transition zone receives 800-1500 mm of rainfall per year in a unimodal pattern that permits only a single growing season. Soils are poor, typically low in Ph and sandy. The region consists primarily of open woodlands of drought-tolerant trees that can withstand the four to seven month dry season. The higher plateaus have isolated gallery forests along waterways dispersed throughout a grassy savannah. This area is sparsely populated, except around the urban centers, which are built upon mining activities for the most part. The region is a net importer of food from the transition forest to the north and from Zambia to the south.

B. Technological Level

Zaire's population, estimated to be 35.6 million, is growing at an annual rate of approximately 3 percent. Since 1970, urban population growth has been very rapid (seven to ten percent per year), while rural population growth has been quite modest (one percent per year). This reflects continued rural to urban migration.

Agricultural production in Zaire has typically been carried out by two distinct sectors:

*The traditional sector, consisting of three to four million small (about one hectare) family farms, practicing slash and burn agriculture with minimal inputs;

*The modern sector, which includes perhaps nine hundred larger plantations (averaging 300 hectares in size) and other agribusiness enterprises using modern production techniques.

The traditional sector is predominantly oriented toward production of food crops, while the modern sector is oriented to the production of industrial and export crops. Additionally, a small but growing class of commercially oriented farmers, using technologies more advanced than those used in the traditional sector, has developed in recent years. This group produces significant amounts of coffee and cotton, and also produces food crops such as maize, legumes, and, (in some cases) cassava. There is some livestock production in the modern sector.

Food production in the traditional sector is carried out using very simple technology. Land is cleared by slash and burn methods, followed by hand planting. Capital inputs typically consist of a small number of rudimentary tools (hoe, machete, axe). Use of fertilizers is extremely limited, usually occurring only in areas

served by agricultural development projects. With the exception of cassava, which is grown and harvested on a continuous basis, crops are most commonly grown during two distinct seasons. The time of onset (and length) of the two seasons varies with location, since rainfall distribution varies greatly from one part of Zaire to another. Most farmers use a multicropping system with cassava-based, maize-and-cassava based, or sweet potato-cassava based systems being the most prevalent. Traditionally, long fallow periods were used as a means of restoring soil fertility. Today, however, especially in the more densely populated areas of the country (Bas-Zaire, parts of Shaba, Bandundu and Kivu), fallow periods have been shortened, with adverse effects on yields.

The modern sector also experiences serious constraints to production in many cases. Shortages of foreign exchange limit the availability of imported agricultural inputs. Inputs are not reliably available and are difficult to obtain. Access to financial sources for rehabilitation of older plantations is limited. As a result, technologies utilized in the modern sector often resemble the technologies found in the traditional sector.

C. Major Agricultural Enterprises

Cassava is widely cultivated and is the staple of the diet in most of Zaire. Maize is also widely produced and is the staple of the diet within much of the two Kasais and Shaba Regions. In addition, rice, bananas, and ground nuts are important in the diet. Major industrial and export crops include rubber, seed cotton, palm oil, quinine, sugar, coffee, cocoa, tea, and tobacco. Major livestock species include goats, cattle, sheep, pigs, and poultry. Wood production from Zaire's massive forest reserves presently amounts to approximately half a million cubic meters. Most of the wood products are consumed domestically, but 30 to 40 percent of the production is exported.

II. APPLIED AGRICULTURAL RESEARCH IN ZAIRE

The agricultural development strategy of USAID and the GOZ is based on improving food security by increasing food production. Traditional food production systems have developed in response to the physical characteristics and resource limitations of Zaire, but they are no longer adequate in the face of rapid population expansion into fragile environments. At present, Zaire's food grain production and imports are in balance with total domestic consumption. However, the average annual population increase (3.0 percent per year) is greater than the long-term average annual increase in food crop production. Urban population is growing rapidly (7.0 percent annually) while rural population growth is much lower (1.0 percent). Without major advances in agricultural productivity in the next two decades, the gap between domestic production and consumption needs may widen considerably.

Both the GOZ strategy and USAID's mission goal recognize that sustained economic development is dependent on increased agricultural productivity, which, (in turn) requires investment in agricultural research. A strong national agricultural research system is essential for the development of technological solutions to the constraints faced by Zaire's agricultural producers. Creation of a sustained national capacity to conduct agricultural research requires adequate human, material, and financial resources and the ability to mobilize, allocate and manage them effectively and efficiently.

A. RAV I: Applied Agricultural Research and Outreach Project

The GOZ and USAID supported the Applied Agricultural Research and Outreach Project (RAV I,660-0091) for the period 1983 to 1990. RAV I (660-0091) was successful in:

1. Selecting 11 and developing 20 crop varieties (seven cassava, five maize, five peanut, two cowpea and one soybean) that were superior in yield to local varieties;

2. Providing long term training in the basic agricultural sciences for 38 Zairian Ph.D. and MSc candidates, plus short-term technical training for 70 SENARAV employees;

3. Establishing organizational and managerial structures and related systems needed for SENARAV to conduct its research program;

4. Building up the infrastructure of all three programs, especially PRONAM; and

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5. Distributing improved foundation seed to at least 30,000 farmers, either through direct contact between SENARAV and farmers or through 139 local PVOs, governmental and for-profit organizations.

RAV II is a follow-on project to RAV I that will build upon the successes of RAV I, while addressing those principal weaknesses identified in the PID for RAV II. They are:

1. Sub-standard institutional management and administration of research and research resources;

2. Insufficient applied research generating technologies relevant to farmers' needs;

3. Inadequate outreach programs, especially concerning technology transfer;

4. Lack of a basis for sustained financial viability; and

5. Lack of interdisciplinary research efforts and a poor understanding of farming systems concepts.

B. RAV II: Applied Agricultural Research and Outreach Project

Farmers in Zaire face uncertain weather conditions, a changing market situation for both inputs and products, differing endowments of resources -- land, labor, capital -- and varying access to information about new technologies which might increase productivity. The national agricultural research system must find ways to increase agricultural productivity in the face of this great variability at the farm level. In addition, the INERA/SENERAV research system must address this range of problems with a limited budget, an undertrained senior staff, and a relatively late start in developing its research programs. In summary, USAID can significantly assist the Government and farmers of Zaire to achieve research sustainability and increased productivity of agriculture by providing support for a project with five sets of activities or components, including strengthening:

* Applied Agricultural Research,

* Outreach and Technology Transfer,

* Sustainability,

* Research Management, and

* Human Resources Development.

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A detailed description of the scope and nature of activities proposed for RAV II's Applied Agricultural Research and Outreach and Technology Transfer components are provided in the Technical Analysis which follows. A discussion of activities planned under the Research Management and Human Resources Development components are provided in the Institutional/Administrative Analysis, and Sustainability is discussed in the Economic Analysis.

C. A Focus on Environmentally Responsible Development

Despite the apparent abundance of land in Zaire, the country faces serious short- to near-term environmental degradation in many of its agriculturally productive regions. Extensive degradation of the natural resource base has already occurred in some areas. Extensive soil erosion is clearly a problem in parts of Bandundu, Shaba Central, and Kasai Oriental.

In many areas, traditional production systems are incapable of meeting farmers needs. In Bas-Zaire, Bandundu, and Central Shaba, fallow periods in the traditional shifting agricultural system are decreasing, leading to lowered yields, greater and more rapid overall degradation of the soil resource base, and declining returns to labor per unit area of land. Farmers experiencing lower productivity per unit area are increasing the amount of land under cultivation, thereby increasing the effective man to land ratio and reducing the fallow period still further. This pattern, repeated throughout much of Zaire, indicates that traditional production systems are becoming unstable and is a warning that agricultural production practices must change.

Even though the country has a low overall rate of deforestation, the threat to its forest resources is still a serious one. In Kivu, for example, which has the highest rural population density in Zaire, expansion of farm land directly threatens the animal and plant resources of Zaire's rain forests. In Central Shaba, farmers are no longer able to meet their production needs on the traditionally farmed savannah soils. As a result, they move into the gallery forests along waterways. These forests, threatened throughout the tropical world, represent unique and important biological systems.

These observations may seem unimportant in a country where only 3% of the national territory is utilized for agricultural production. However, Zaire's growing food deficit shows that the natural resource base is, in fact, under stress. In addition, by the year 2000, it is estimated that 50% of Zaire's population will be urban. Given the poor transportation infrastructure, food for urban dwellers will have to be produced on a small portion of the total land available in Zaire. Food produced far from the few existent roads and railroads, or navigable waterways, simply cannot be moved to urban centers. Lessons learned in Brazil, Mexico,

Kenya, and many other nations have shown that ignoring potential environmental deterioration is costly. Too often, agricultural research has focused on increasing production without adequately considering agricultural scientists' and farmers' responsibilities to protect the natural resource base.

Zaire is fortunate to have a large natural resource base which remains, in some areas, relatively untouched. RAV II will focus its efforts on preserving that resource base to ensure that agricultural production in Zaire can be maintained over the long- term. Thus, the theme of "environmentally responsible" agricultural development is repeated throughout this document; and the environment is taken into account in each component of project planning, rather than as an isolated topic.

1. Focus on Fragile or Stressed Agro-Ecologic Zones

The potential for avoiding near-term environmental degradation is included as a factor in determining priority agro-ecological zones for on-farm testing and outreach. For example, Central Shaba has been added as an outreach site for RAV II, partly because of the enormous stress on gallery forests in that area.

2. Conservation-Oriented Research

Applied research will focus on the development of technologies which are environmentally sound. For example, research will focus on soil fertility, improved fallow systems, and the use of such technologies as alley cropping and green manure, which can significantly reduce environmental degradation. Environmental degradation in Zaire is fueled by the labor constraint faced by farm families. In RAV II, returns to labor is one of the major criteria that will be used to evaluate the potential impact of new technologies. Varietal improvement itself, which allows farmers to produce more on less land, is an important technology for preserving the environment.

3. Training

Agro-ecology is one major area of short-term training that will be provided by the project contractor. In addition, the contractor will investigate the potential of providing training in agro-ecological principles, methods, and field studies to long-term participant trainees. U.S. universities, collaborating with the contractor, have indicated a willingness to explore the possibilities of providing SENARAV trainees with field experience in the Pic Macaya Bioshpere Reserve Project in Haiti, a USAID-funded project that focuses on the relationship between agricultural development and environmental preservation. The University of Maryland's Global Change Climate Center can also be drawn on for this purpose.

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4. Linkage

Many international organizations are deeply concerned about the fate of the enormous biological wealth of Zaire. While most attention has focused on Zaire's tropical rain forests, greater attention should be paid to other unique ecosystems in Zaire. Its tropical deciduous forests, for example, are under greater threat than the rain forests at the current time. These forests have virtually disappeared on a worldwide basis. Gallery forests are also threatened everywhere. By stabilizing and intensifying agricultural production on lands appropriate for agriculture, these unique biological systems can be preserved. The design team was contacted about the potential for initiating cooperation between such organizations as the New York Zoological Society(NYZS) and SENARAV. Links between such organizations as the NYZS, Fairchild Botanical Gardens, the Missouri Botanical Garden, and the Organization for Tropical Studies will be explored in RAV II. Additional linkages between agricultural research in Zaire and conservation will be explored in relation to the possible establishment of a Zairian agricultural research fund through a debt-for-nature swap.

In short, environmental responsibility is not simply a token theme for RAV II.

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III. APPLIED AGRICULTURAL RESEARCH

In RAV II, three types of research activities will be conducted: applied research, on-station tests of potential technologies, and on-farm tests. Major research activities will be conducted at Kaniameshi, Gandajika, and M'Vuazi. On-station testing will occur at Gandajika, Kiyaka, Molungu, and Niembo. R&D Teams, responsible for both on-farm tests and support to outreach entities, will be located at M'Vuazi, Kiyaka, Gandajika, Niembo, and Kaniameshi.

RAV II, like RAV I, will concentrate on genetic improvement for cassava, maize, and grain legumes. Crop lines will be developed and screened in early generations for disease and pest resistance, yield, acceptability to farmers, and adaptability to specific agro-ecological zones. The plant improvement programs will determine nutritive quantity and quality of grains, leaves, and roots. Other characteristics (for example, leaf, grain, and root color) will be determined, in addition to processing quality and post-harvest storability.

Between 1973 and 1989 applied agricultural research in Zaire was mainly discipline-oriented. In RAV II, multidisciplinary team research will build upon on-going subject matter research efforts and continue to develop improved varieties and technologies. The multidisciplinary team will also explore the plant, soil and climatic relationships that affect production of the principal crops grown in Zaire. Breeders, entomologists, pathologists, and agronomists will work with social scientists to clarify constraints to increasing productivity in each crop, and develop knowledge and plant materials to overcome them.

RAV II will develop actively agreements with appropriate international agricultural research institutes, national programs, private and public sector institutions, and U.S. universities to strengthen the national research programs. While major aspects of the Applied Agricultural Research component are summarized in Chapter III, Project Rationale and Description, some additional areas for research are listed in this section.

A. Programme National Manioc (PRONAM)

PRONAM's selection criteria, developed under RAV I, are based on the following objectives:

* to identify or develop high-yielding and sweet cassava varieties, resistant or tolerant to major cassava pests and diseases; and

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* to identify cassava varieties with palatable leaves and tubers.

PRONAM reports that several potentially good lines are nearly ready for release, and has released two varieties, F-100 and Kuniani, which have been widely adopted by farmers.

Additional selection criteria are necessary for PRONAM to develop a more successful breeding program:

* adaptability to low versus high fertility soil types and, in Bas-Zaire, adaptability to low Ph and low phosphorus levels;

* varietal adaptability to specific agro-ecological environments, including soil type and altitude (low, medium and high);

* varietal adaptability to different rainfall regimes and to drought;

* varietal and germplasm tolerance for termites (termites cause significant crop damage in the Southern Band);

* increased protein content of leaves; and

* variations in tastes between regions.

The development of selection/breeding techniques used by PRONAM can be accelerated. CIAT's (Centro Internacional de Agricultura Tropical) selection/breeding program can develop a cassava variety in five years, whereas it takes PRONAM eight years. Tissue culturing should be considered, which may reduce varietal development time even further. Cassava tissue culturing does not require a sophisticated laboratory or equipment. The plant pathology laboratory at M'Vuazi, for example, would be quite sufficient for this purpose with a few modifications. Tissue culture should be used for meristem culture propagation, germplasm conservation, and to help eradicate diseases from experimental material. The design team observed that multiplication plots were heavily infected with viruses, again indicating the need for improved breeding procedures. A computerized data base, including key characteristics of germplasm accessions, will be developed. The design team also recommends that research explore new uses for the crop in medicine, brewing beer, or animal feed.

B. Programme National du Mais (PNM)

The major objective of PNM is to identify, through introduction and/or breeding, high yielding maize varieties with accepted grain color and texture that are resistant to major pests and diseases. The PNM program has had limited success in meeting its

objectives. It has produced several potentially useful varieties, some of which are resistant to streak virus.

However, PNM's priorities do not reflect farmers' needs in the Southern Band. Only a small sample of farmers near Lubumbashi has been interviewed; their more advanced production techniques are not representative of maize production as a whole in the Southern Band. The design team recommends that PNM re-examine its priorities, based on information gained from a more through, geographically extensive survey of maize producers in the Southern Band.

The economic importance of striga on maize should be determined. If important, striga resistant lines should be developed and other cultural practices for combating striga should be examined. The feasibility of different methods for providing the inputs needed to produce maize should also be examined. The use of compost or compost/fertilizer mixes and intercropping corn into a green manure crop may be possibilities. And breeding criteria should be expanded to include selection for date of maturity and different altitudes.

The current program effort on hybrids is probably adequate and should be continued. However, hybrids require a higher level of inputs that are difficult and costly to procure.

C. Programme National des Legumineuses (PNL)

The breeding and selection criteria for beans, groundnuts, cowpeas and soybeans (grain legumes) effectively address farmers' constraints to increased production. In fact, this program appears to have the best understanding of farmers' problems and production constraints of the three national programs. A more multidisciplinary approach is utilized, and greater attention is paid to intercropping systems, low-input technologies, and clientele identification. In addition, legumes are selected to utilize local Rhizobia strains for maximum biological nitrogen fixation. The program has produced five potentially useful lines of beans, soybeans, peanuts, and cowpeas.

The major objective for bean breeding under RAV I, which should be continued under RAV II, is to identify or develop disease resistant varieties with high and stable yields for the various ecologies of low, medium, and high altitudes. Additionally, the program has attempted to obtain disease-resistant, intermediate-growth type varieties with high and stable yield for use in intercropping with maize, to breed drought tolerant varieties and to seek composites or variety mixtures for the specific high altitude bean producing areas where variety mixtures are commonly used. Groundnut selection criteria include obtaining early-maturing Valencia and Spanish varieties that are tolerant or resistant to Cercosporaea and rosette and are adapted to soils of low or aver-

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age fertility. Cowpeas and soybeans are selected on the basis of early or medium maturity with high yields and acceptable levels of insect resistance or tolerance.

Systems for legume storage and off-season seed multiplication should be examined in future research.

D. Agronomic and Supporting Research

Agronomic trials have been conducted in all three research programs, particularly in intercropping and alley cropping with leguminous agroforestry tree species. Similarly, entomological and plant pathological research has been conducted in all three programs; useful data have been obtained. However, a concentrated effort to integrate these research themes into breeding and selection activities should be undertaken.

E. Soil Fertility and Soil/Water Management

Soil fertility has been identified as a major constraint to increasing small farmers' food crop production in many parts of the Southern Band. However, specific constraints have not been identified and prioritized. Although some work has been done on nutrient deficiency identification, once again the integration of these activities into other research areas is lacking. Under RAV II, research will:

* seek to identify agronomic practices which minimize soil losses due to erosion under farmers' conditions;

* identify and test potential soil management systems for hillside farming, (e.g., ridge tillage and contour planting) on different soil types, cropping systems, and on gradients;

* identify profitable uses for crop residues and in different cropping systems; and

* utilize the indigenous knowledge base to identify soil "domains," based upon local names and classification systems, for eventual development of soil management recommendations specific to different farmer-identified domains.

F. Pest and Disease Control

Insects and micro-organisms have thrived in Zaire, and other tropical countries, because of the favorable climate. A wide variety of biotypes and races of insect pests, parasitic nematodes and pathogenic micro-organisms exist, and cause significant crop damage. Their ability to adapt to the changing environment and to

survive, and their amazing reproductive mechanisms, have assured their continued existence. Without a doubt, diseases and damage caused by these pests are one of the major constraints to crop production in Africa and Zaire, in particular. Therefore, screening crop lines in early generations for resistance/tolerance to major diseases and pests will be accelerated in RAV II. Also, data on disease incidence and pest damage in all of the management systems will be collected to identify the nature and extent of the problems, and develop appropriate technologies for effective control. On-farm surveys of pest and disease problems will be conducted once a year.

The entomologist on that technical assistance team will introduce and screen exotic natural enemies of pest species, increase populations of natural enemies, and develop integrated pest management systems to control effectively and manage pests. Although stationed at Kaniameshi to work specifically with rearing the leafhopper that transmits maize streak virus, the entomologist will have the additional responsibility of working with pest management systems, biological control, storage insect control, and seed resistance to storage weevils and other pests.

G. Other Research Opportunities

In RAV II, both the cropping mix and production practices characteristic of existing farming systems will be examined and alternative ways of improving them will be tested. One research emphasis in RAV II will be to determine ways of improving family nutrition, e.g., the introduction of soybeans and use of soybean flour in fou. Cash income is another factor that is critical. RAV II will collect data on, and examine ways of increasing total parcel/farm income and its timing, rather than concentrating solely on increasing the total production of a single crop. Finally, biological sustainability is a critical issue. Ways to increase the total productivity of the resource base will be examined.

The potential for expanding research to include additional crops will be examined. Amaranth, for example, is one of the most under-rated, but important crops in Africa. Most farmers grow the crop, usually in association with other food crops. Amaranth is compatible with most intercrop mixes. It has extremely high tolerance to moisture stress, and is adapted to most agro-ecologic zones in Africa. Similarly, some research on potatoes and lentils may be useful.

H. Collaboration of RAV II with Other Agricultural Research Institutions

RAV II will develop memoranda of understanding with several institutions to work with its targeted crops. Potential collaborators include:

* CIAT -- beans and cassava utilization and tissue culture;

* IITA -- cassava, cowpeas, and maize;

* CIMMYT -- maize;

* ICRISAT -- groundnuts;

* TROPSOILS CRSP -- soil management and sustainability;

* Bean/Cowpea CRSP;

* Cameroon -- University Centre of Dschang for training and collaborative research, National Cereals Research and Extension Program for maize, National Roots and Tubers Program for manioc;

* Zimbabwe -- National Agricultural Research Program for hybrid maize;

* Tanzania -- Ilonga National Agricultural Research Program for maize and cowpeas;

I. Coordination with INERA

SENARAV will work with relevant research sections of INERA to ensure research coordination and to avoid duplication of efforts. SENARAV and INERA staff will carry out jointly experiments in important agro-ecological zones where SENARAV has no staff, under a cost-sharing arrangement. Collaboration between SENARAV and INERA at Mulungu will be strengthened and expanded. Opportunities for the two institutions to make food crop research more cost-effective and sustainable will be explored and agreed on.

J. Phasing/Scheduling Over Time

During the first six months after arrival, the technical assistance team will help conduct a survey to delineate major agro-ecologic zones in the Southern Band of Zaire. The survey will also collect data to clearly describe and document prevalent farming systems and identify major constraints. This baseline survey will be implemented during the 1990 growing season. The survey will be conducted again in the following rainy season (1991). In areas having monomodal rainfall patterns, the survey should be implemented during the primary growing season.

All of RAV I's breeding programs, including the cassava program, now require a minimum of eight years for the development of a variety. The process can take longer, depending on the complexity of inheritance (number of genes included, gene location, gene

linkages, etc.). This period must be reduced by adaptability testing and selecting from available adaptable lines.

Although the PID states that 20 improved varieties were developed under RAV I, the design team could not verify this number. For example, all of the potentially good cassava varieties were observed growing in the field. There are three outstanding varieties: F-100, Kuniani, and 40230/3. The first two have been released; the third, now the most promising variety "on the shelf," appears more resistant to cassava bacterial blight and mosaic diseases than the other two. However, it was not clear whether 40230/3 is a sweet or a bitter cassava. When asked, the researchers indicated that it is "semi-sweet."

The total count of technologies on the shelf is nine: two cassava, three maize, one peanut, two cowpea and one soybean.

The information from the baseline survey should be incorporated into research at the earliest possible date. The varietal and technology development and release schedule given in Table H-1 for RAV II is based on what is supposed to exist today.

Table H-1. Proposed Varietal Research Schedule

Item	Year***								
	1992	93	94	95	96	97	98	99	2000
Cassava Technologies Prepared for Release	1	1*	1	2	1**	1	1	1	1
New Technologies under Development	2	2	0	1	2	2	2	0	2
Maize Technologies Prepared for Release	0*	1	1	2	1**	1	1	1	1
New Technologies under Development	2	2	0	0	2	2	2	0	2
Legume Technologies Prepared for Release	1	1*	1	2	1**	1	1	1	1
New Technologies under Development	2	2	0	1	2	2	2	0	2
TOTAL	8	9*	3	6	9**	9	9	3	9

* In 1990 and 1991, final evaluation of technologies actually on shelf may alter the planned technology development.

** Production packages will be upgraded in 1996; accounts for three of the nine technologies in 1996.

*** Each program will produce a production package publication similar to "Growing Cowpeas in the Morogoro Region of Tanzania" (Price, Machanga and Asenga, 1982).

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IV. OUTREACH AND TECHNOLOGY TRANSFER

A. Outreach and Farming Systems in RAV I

There were numerous outreach and on-farm research problems associated with RAV I.

First, there were two teams, the "farming systems" and the "outreach" teams. Their roles were not clearly delineated, and their ability to interact with station-based researchers was limited. It appears that station-based discipline researchers participated in on-farm activities very rarely. The teams' ability to provide feedback, which is actually used to guide the national research programs, varied greatly between the three programs. In the PNL program, for example, it appears that the farming systems and outreach teams have been utilized effectively. In general, no uniform methodological or management approach has been applied.

Second, with the exception of PNL, there has been an overemphasis on single-commodity trials, inadequate attention to multicropping research, and inadequate data on system performance.

Third, the teams have suffered from inadequate logistic and financial support, a poorly organized work schedule, and inadequate data base management and analysis. The field personnel have had no vehicles or motorcycles, for the most part, and funds for per diem have not been available. With some exceptions, work schedules have not been routinized. Most teams do not have a computer and data has been collected, but not entered into a computer.

B. The Research and Development Unit in RAV II

In RAV II, farming systems work and support to outreach will be greatly increased. The 1988 Threshold Decision Evaluation suggested that the farming systems and outreach teams of RAV I be combined, and the design team agrees completely. The Design Team suggests that these teams be called "Research and Development Teams" (Equipes de Recherche et Development) because this terminology captures the essence of their function: to play a role in research and provide support to development activities. The teams should be organized as part of a Research and Development Unit (Unite de Recherche et Development or URD) of SENARAV, with one national coordinator.

The R&D teams will be responsible for both on-farm research and for SENARAV's institutional support to outreach. In addition, most farm level impact data will be collected by these teams. Rather than rely on external impact evaluations, or utilize periodic evaluations performed by SENARAV personnel, farm level impact data will be collected as a normal part of the data collec-

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tion of the R&D teams and their collaborating outreach entities. This will ensure that data is consistently and continually generated, and that they are used to improve program performance.

C. A Geographic Rather than a Commodity Focus

Effective on-farm research and outreach are systems oriented and geographically specific by definition. The R&D teams should, therefore, be organized by region, not by commodity or national program. Each team should have a leader at the M.S. level, who reports to the national coordinator. Each team should consist of one or more "field units" of three persons, at least one at the A0 level. By the end of Year 2 of the project, there should be 11 field units: two at M'Vuazi, two at Kiyaka, three at Gandajika, one at Niembo, and three at Kaniameshi. The 11 field units will be organized into four R&D teams, with team leaders located at M'Vuazi, Kiyaka, Gandajika, and Kaniameshi; the field unit located at Niembo will report to the team leader at Gandajika. Individuals assigned to the R&D teams should have on-station responsibilities. Optimum staffing levels that will be required for the R&D teams by site are shown in Table H-2 and are discussed below.

These "optimum" staffing patterns may not be achieved at the outset. However, the design team recommends that:

* Every effort be made to ensure that the four M.S. positions are filled immediately.

* All R&D personnel be recruited from current SENARAV staff, and include individuals who are already assigned to either the farming systems or outreach teams.

* Only seven field units be established at project start-up; the other three field units, one at Gandajika, one at Niembo, and one at Kaniameshi should be established in Year 2.

* Sub-optimal staffing patterns at the field unit level be accepted initially; however, optimal staffing should be reached with 18 months of project start-up.

The 1988-89 personnel rosters for PNM, PRONAM, and PNL suggest that near-optimum staffing levels can be met virtually immediately for the first seven field units and the four team leader positions.

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Table H-2. Ideal Staffing Levels for Research and Development Teams

Site	Team Leader	Field Units		Social Sci.*
M'Vuazi	1 M.S.	2 A0	4 A1	1
Kiyaka	1 M.S.	2 A0	4 A1	1
Gandajika	1 M.S.	3 A0	6 A1	2
Niembo	None**	1 A0	2 A1	1
Kaniameshi	1 M.S.	3 A0	6 A1	2

* M.S. or A0 level.

** Field Unit only, Team Leader located at Gandajika.

D. Focusing Research and Outreach on Priority Clientele Groups

Technology is client-specific, and a major factor in achieving cost-effective technology transfer is to prioritize clientele groups and focus outreach efforts on those groups with the highest potential for farm level impact. Identifying, characterizing, and prioritizing clientele groups is, therefore, critical for SENARAV. Three factors should be utilized to identify and characterize farmer groups.

1. Bio-Physical Factors

In each of the regions where SENARAV will work, agro-ecological zones will be described and mapped. Priority will be given to working in those zones where expected impact from adoption of SENARAV technologies is highest. Criteria which can be utilized to determine the expected impact include: total area in the agro-ecological zone; biological potential for improving system productivity; and potential impact of improved technology on agro-ecological system stability.

2. Cropping System

SENARAV's technology transfer programs should give first priority to cropping systems where one or more of the project crops are important. Criteria which can be used to determine the importance of SENARAV crops in the cropping system include: presence of more than one SENARAV crop; total area in SENARAV crops; and revenue from SENARAV crops.

3. Socio-Economic Factors.

Farmers vary in both their willingness and their ability to adopt new technologies. Cultural factors which are not amenable to quantitative data collection often play a decisive role in determining farmers' general willingness to change. These factors are important and should be recognized as constraints to impact where they are present. SENARAV's intimate knowledge of local beliefs, customs, and attitudes are the only source of information for determining the importance of such constraints. Factors which can be measured include: level of commercialization; access to inputs; accessibility; existent outreach mechanisms; and number of potential clients. Finally, SENARAV should give the first priority to working with larger clientele groups.

Women should be included as an additional socioeconomic factor. In RAV I, women were not identified as major beneficiaries of project activities. As far as the design team can discern, women were not employed in professional or technical positions by SENARAV. Even the 1988 Threshold Decision Evaluation does not

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specifically evaluate RAV I's effectiveness in reaching women as clients, nor does it comment on the absence of women professionals in SENARAV. Yet, women are the major producers of food crops for all three national programs. Experience in much of the world has shown that women farmers have social constraints which inhibit working with male outreach agents. The number of women, the presence of women's groups, and the existence of women outreach agents working in a particular area should all be included in determining priority clientele groups for SENARAV.

The design team's assessment is that inadequate data are available to prioritize clientele groups in most regions since previous data collection does not appear to have been focused on specific agro-ecological zones and their clientele groups, and farming systems. Station-based researchers appear to have played a minor role in data collection and analysis. Further, weak monitoring and evaluation systems in RAV I have led to a situation where baseline data used to measure project impact are not available in most cases. Particularly striking is the absence of data regarding labor constraints, which appear to be the single most limiting factor to production in most regions. Therefore, the design team recommends that:

* a baseline survey be conducted during the first six months of project life to identify, characterize, and prioritize clientele groups.

* station-based researchers participate in this survey.

* researchers from each national program participate in the survey at each site--that is, for example, the survey in Bas-Zaire should not be completed only by the M'Vuazi R&D team and station-based researchers, but with researchers from PNL and PNM as well.

* all survey activities in each region be conducted within a one-month period of time.

* surveys be completed in Bas-Zaire, South Shaba, and Bandundu.

* survey activities be undertaken in coordination with SEP if possible to strengthen SENARAV's links to agricultural policy analysis.

Because good information is already available from Kasai Oriental (see, for example, "Enquete Exploratoire Menee a Nsanda/Mpasu, Zone de Gandajika," National Legume Program, n.d.), a survey is probably not be needed there.

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E. Build Consensus for Research and Outreach Activities

Clientele groups are identified and characterized in order to make the applied research and technology transfer system more efficient by focusing all activities on solving the problems of one or a few groups of farmers. Building consensus is a necessary step in this process, and one that must extend beyond the members of the R&D teams. Extensive discussion among all research and outreach personnel will be required to achieve this goal. The design team plans, as a part of the baseline survey, a priority-setting exercise in which all SENARAV researchers participate. During this exercise, priority agro-ecologic zones should be defined and mapped, priority clientele groups identified (including their constraints and major problems), and Primary Collaborators for outreach efforts selected.

F. A Farmer-Driven System with Success Measured in Farmers' Terms

Focusing research on priority clientele groups is only the first step in ensuring that the technology development and dissemination system is farmer driven. The system must also incorporate the farmer as a full partner in testing and validating solutions. This requires, first of all, getting the farmer involved in technology development at an early stage, when many potential solutions are under consideration by researchers.

On-farm trials should be initiated early in the research process. Three types should be conducted.

1. Research-Oriented Trials

These are designed to subject new technologies to a wide range of bio-physical conditions on farmers' fields under controlled conditions. Station-based researchers will be responsible for designing these trials and for the majority of data collection, with the R&D teams providing routine supervision. Each station-based researcher should conduct at least one research-oriented on-farm trial every two years. In addition, it is noted that these trials should:

* be conducted early in the research process;
* include replications <u>on</u> each farm (which may imply renting plots for the trials and utilizing non-farmer labor to install and maintain plots);
* include as little variability in non-experimental factors (such as use of fertilizer) to mirror more accurately farm conditions;

* include little or no risk for the farmer;

* be subject to intensive collection of bio-physical data about the target crop;

* include the full range of promising treatments;

* involve periodic qualitative evaluation by cooperating farmers, including organized farmer field days at important stages in the cropping cycle; and

* be placed on very few farms that are representative of local bio-physical conditions.

2. Production-Oriented Trials

This type of trial(s) is designed to determine the performance of a few (usually two to five) promising treatments under a wide range of socioeconomic and management conditions. They provide the researcher with information about farmer and consumer preference and economic and social data. Production-oriented trials are primarily the responsibility of the R&D teams, though they will often need assistance from station-based researchers. Where possible, Primary Collaborators will also conduct some of these trials.

They should:

* include a few of the most promising treatments;

* include a large number of farms selected to represent a wide range of socioeconomic and management conditions;

* include a few replications, or just one, per farm;

* include moderate levels of risk for the farmer, but - ensure a "cushion" which will reduce farmer losses for "failure" treatments;

* be subject to intensive collection of socioeconomic data, such as labor demands, revenues from sales, home consumption, and use of by-products; and

* include minimum control over non-experimental factors (such as fertilizer use, number of weedings, planting density and spacing).

3. Pre-Dissemination Trials

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These trials are designed to provide the researcher with information about how new technologies impact the overall farming system. They are similar to the traditional extension demonstration plot, but do require data collection, something that traditional extension demonstrations often ignore. Some will be conducted by the R&D teams but the majority will be the responsibility of Primary Collaborator.

These trials should:

* be placed on as many farms as possible;

* allow the farmer to assume all risk;

* include only two treatments, the farmer's traditional practice and the improved practice;

* include data collection on system performance (e.g., such factors as total value of all sales from a parcel, total labor invested in the parcel, etc.); and

* include no imposed uniformity.

These on-farm trials are designed to get the station-based researcher into direct contact with farmers; provide farmer feedback before costly errors in research are committed; reduce the risk associated with new technology; and produce socioeconomic data that can be extrapolated to estimate project impact.

G. Increased Institutional Support to Outreach

SENARAV's ultimate farm-level impact is dependent, to a large degree, on the quality of activities conducted by other entities which are not directly amenable to its control. Therefore SENARAV must select collaborating entities carefully and help make them effective.

1. Selecting the Collaborating Entities

SENARAV will designate two different classes of collaborating outreach entities. Primary Collaborators will receive the greatest attention. Each field unit can only expect to work with a few (five at the most) Primary Collaborators. The obligations and responsibilities of Primary Collaborators and SENARAV are described below, while those of Secondary Collaborators follow.

Primary Collaborators: the collaborator should be willing to sign a formal agreement with SENARAV which includes all of the items described below; the collaborator should share SENARAV's priorities in terms of agro-ecological zones and clientele group; and

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the collaborator should be capable of supplying logistic support (transportation, per diem, salaries, housing, etc.).

SENARAV's institutional support for collaborators will consist in part of providing "training for trainers," that is, training for agronome level personnel. These trainers will, in turn, be responsible for training field level personnel (para-professionals, village level workers, farmers, etc.). In view of this, SENARAV will need to consider carefully the number and level of training of supervisory personnel in selecting Primary Collaborators.

The design team observed that some outreach entities, currently collaborating with SENARAV, or with SENARAV-assisted projects, actively discriminate against women. In one case, for example, an outreach entity provides training for men in the use of animal traction -- but not to women. In several cases, "the women's component" of outreach programs consists of "cook and sew" training in which women are taught how to be better mothers and housewives. In yet other cases, on-farm trials are placed in women's fields -- but the women clearly feel that this is yet another form of "forced culture," in which they are manipulated into providing the labor for trials which do not address their problems.

SENARAV will, therefore, insist that Primary Collaborators participate in training programs in gender issue analysis, and agree to train their field level personnel as well. SENARAV will also give priority to working with outreach entities which have established mechanisms for working with women farmers (e.g., training programs for women para-professionals, employment of women extension agents, programs for women's groups, etc.).

SENARAV must achieve farm-level impact with large numbers of farmers. Priority will be given to collaborators with large geographic spread and/or those working with larger numbers of farmers. Where appropriate, this will include collaborators working with organized groups of farmers.

Many outreach entities are based overseas and/or financed internationally. The long-term sustainability of SENARAV depends on building Zaire's internal capacity to support research and extension. Priority will, therefore, be given to working with national institutions where possible. This includes the SNV. SENARAV will specifically explore the potential for working with the World Bank-funded pilot project. In addition, at least two agents will be selected as Primary Collaborators at each outreach site. Finally, during the initial six months of project life, during which time SENARAV will finalize its selection of Primary Collaborators, additional means for interaction with SNV will be explored with a view to moving towards increased interaction in the future. Recent organizational changes in the DOA have sig-

nificantly increased the potential for interaction between SENARAV and SNV. The design team views this development in the most positive light and feels that the major issues to be resolved involve methods of interaction and levels of responsibility for each institution. Nonetheless, SNV remains poorly funded, and SENARAV should not be expected to undertake responsibility for providing resources for SNV activities above and beyond those that SENARAV will be providing to Primary Collaborators in general.

SENARAV will work closely with two USAID-funded projects, the Central Shaba Project (Project 105) and PROCAR (Project 102). In these cases, the projects themselves will be treated as Primary Collaborators, who will, in turn, coordinate SENARAV's direct interaction with NGO's and farmers' organizations which participate as partners in these projects.

The design team spent considerable time discussing potential interaction with the Peace Corps. The nature of potential interactions between SENARAV and Peace Corps varies from site to site. In the case of the Central Shaba Project, for example, Peace Corps volunteers work directly with that project. In this case, SENARAV would expect to cooperate with Peace Corps under the guidelines established for the utilization of Peace Corps volunteers within Central Shaba Project. The same principle would hold true for Project 102.

However, in Kasai Oriental (Gandajika), Peace Corps volunteers have been directly assigned to SENARAV. This arrangement has met with only moderate success, partly because of conflicting responsibilities and demands on Peace Corps volunteers' time, partly because of the limited mobility of volunteers (who use only bicycles), and partly because, with the limited training and experience of many volunteers in agricultural production, the Outreach Team has provided inadequate supervision and backstopping. The design team recommends that this arrangement be reconsidered within the first six months of project start-up.

In general, the design team makes the following recommendations:

* To the extent possible, any Peace Corps volunteers who are assigned directly to SENARAV should have prior experience in agriculture or hold a degree in the agricultural sciences;

* in those cases where Peace Corps volunteers are assigned directly to SENARAV, SENARAV personnel should work with the Peace Corps to decide on the physical placement (e.g., village location) and specific job responsibilities of volunteers in order to ensure that adequate supervision and backstopping are possible;

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* where volunteers are assigned directly to SENARAV, they should have no other major programmatic responsibility and should spend at least 75 percent of their time on SENARAV-related activities; and

* in cases where volunteers are not assigned to SENARAV (the vast majority of cases), SENARAV should be expected to provide the same services and support to Peace Corps that is provided to other Primary Collaborators (e.g., Peace Corps should not expect to receive special support in the form of housing, transportation, etc.).

Because of the special relationship that exists between Peace Corps and SENARAV in Kasai Oriental, where it may be expected that 10-20 volunteers will be permanently and directly attached to SENARAV, the project has a broader and more intensive set of responsibilities. In this region, volunteers assigned to the project should be incorporated as full participants into the Research-Development teams. They should, therefore, be supported directly through the R-D teams in terms of periodic technical training; provision of sufficient seed, planting materials, and other supplies necessary for carrying out on-farm trials; frequent technical supervision; and modest support to assure the adequacy of living conditions. Opportunities may exist for utilizing Peace Corps volunteers in new ways in the future, for example for data processing/analysis, training, publication production, library organization, or administrative/financial assistance.

Zaire's NGO community is a large one. As stated elsewhere, the size, level of staffing, level of internal resources, and commitment to involvement in agricultural development of these organizations varies greatly. SENARAV's commitment to Primary Collaborators represents a significant commitment of human and fiscal resources for each such collaborator. The criteria that are outlined above will be used to select NGO's as Primary Collaborators.

2. Making the Collaboration Effective

In the past, SENARAV's relationship with these entities has often been informal. The design team recommends that formal (signed) agreements be reached with each collaborating outreach entity.

While some differences in detail will exist in the agreements, SENARAV's responsibilities in all cases should include:

* providing in-service training for general skills improvement to at least two supervisory-level personnel in each

of SENARAV's two training programs that will be conducted each year, including providing per diem or lodging and meals and needed training materials;

* providing extension materials produced by SENARAV;

* giving priority access to new technologies developed by SENARAV, including access to planting materials and seeds for on-farm trials;

* helping analyze data from on-farm trials, surveys, evaluations, and monitoring activities;

* providing an opportunity to participate in the annual program review for SENARAV's national programs;

* organizing a two-day planning and review meeting of one designated representative from each Primary Collaborator in each region twice each year, including providing per diem or lodging and meals for representatives who must travel to attend the meetings;

* providing technical assistance (to identifying crop pests, for example); and

* providing recurrent technical training including the costs associated with sending trainers to the field sites selected for training events, and, (in some cases) per diem or meals and lodging for participants.

Each Primary Collaborator should agree to:

* designate a representative to serve as liaison with SENARAV's R&D Unit who will be expected to participate in annual program reviews and in the semi-annual review sessions;

* conduct a training needs assessment every two years and submit in writing to SENARAV a list of no more than three priority areas for training; support travel costs for two supervisory-level personnel to attend each of two general skills improvement training programs conducted by SENARAV each year;

* develop a program for training field-level personnel in the areas which are selected by SENARAV for general skills improvement, and participate in SENARAV's recurrent technical training program;

* utilize a standard monitoring and evaluation form developed by SENARAV to measure farm-level impact;

* participate in on-farm trials and demonstrations; and

* assign two upper-level people to participate in training in gender issues analysis (provided by SENARAV) and develop written objectives, methods, and evaluation criteria, in conjunction with SENARAV, stating how women will be incorporated as beneficiaries and how many will be reached.

Responsibilities of both parties should be considerably less in the case of **Secondary Collaborators.** Work with Secondary Collaborators represents a much more limited commitment of SENARAV resources. In general, resources will be diverted to work with Secondary Collaborators only insofar as doing so does not limit SENARAV's ability to meet its major commitments to Primary Collaborators. Specific support that SENARAV will offer to Secondary Collaborators includes:

* access to new technologies (including planting material, seed, publications, etc.) when those materials are available in excess of the quantities needed to meet the needs of Primary Collaborators;

* inclusion in the bi-annual training sessions offered at each outreach site (General Skills Improvement Training) when fiscal resources permit SENARAV to include participatnts from agencies other than Primary Collaborators;

* SENARAV will invite Secondary Collaborators to participate in the annual program review sessions for the three national programs;

* SENARAV will invite Secondary Collaborators to participate in bi-annual planning and review sessions, but will not be responsible for financially supporting their attendance; and

* SENARAV will provide recurrent technical training (on-site) and technical assistance to Secondary Collaborators to the degree possible.

Secondary Collaborators will participate in such activities as evaluation of specific training events in which they participate and may be asked periodically to evaluate the quality of backstopping in particular areas where they have been involved with SENARAV.

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In general, however, Secondary Collaborators are not expected to have the same responsibilities to SENARAV as Primary Collaborators.

3. In-Service Training: A Key Ingredient for Success

Both Mosher (1987) and Lionberger (1986) claim that in-service training and support to the local agent are more important in agent performance than is the agent's formative training. SENARAV will, therefore, focus on providing high quality, consistent, timely, and needs-based training to outreach entities.

SENARAV must meet two types of training needs: (a) recurrent technical training, associated with utilizing new technologies, and (b) general skills improvement training, associated with improving agent's overall capabilities to deliver information to clients.

Technical training needs will be met by the R&D teams, and is one of their primary responsibilities. This training is designed to provide the participant with the skills needed to conduct a particular agricultural activity. It is aimed at both supervisory- and field-level personnel, and may include advanced farmers as well. It will almost always be conducted in farmers' fields at a site selected by the Primary Collaborator, but may occur at SENARAV or at training centers when this is more cost effective and typical field sites are available for training exercises. This training stresses: (a) learning by doing, rather than classroom exercises; (b) acquiring immediately needed skills, rather than learning general principles; and (c) immediate reinforcement of the skill in the field at the time of training and immediately afterwards.

Technical training needs will vary from year to year, region to region, and outreach entity to outreach entity. Each R&D team should expect to spend three to four days per month on average in organized training activities; timeliness will dictate the periods of peak training demands. Annual training schedules should be developed with each cooperating outreach entity.

General skills improvement will provide supervisory-level personnel in outreach entities with general communications and scientific skills that their agents need to do their work more effectively. SENARAV will conduct only two training programs of this type in each year and region. Here, the major responsibility for training will often fall on SENARAV's research staff. The R&D teams should organize and coordinate these training sessions. Enrollment should generally be limited to two supervisory-level personnel per Primary Collaborator, but may be expanded at SENARAV's discretion.

The design team has identified six areas (in order of priority) where general skills improvement is needed;

* clientele identification and characterization;
* gender issues analysis;
* management of on-farm trials and data analysis;
* agro-ecology;
* communications methods; and
* program planning and evaluation.

H. Seed Multiplication and Vegetative Propagation

In contrast to RAV I, RAV II will emphasize the training of farmers in the basic principles of selection of planting materials. RAV staff will instruct outreach entities in selection principles for all program crops. Outreach entities, in turn, will train farmers. The dissemination of knowledge concerning selection is a critical element in sustaining improved agricultural production under current economic conditions in Zaire.

1. Maize

Open-pollinated and hybrid foundation seeds for maize will be produced by SENARAV at the Kaniameshi station with short-term technical assistance provided by an organization like the Seed Coop of Zimbabwe. Foundation seeds will be provided to selected certified seed farms. SENARAV will not be involved in the business of certified-level seed production and plant multiplication nor will SENARAV in any way invest in distribution of seed nor become directly involved in the establishment of seed multiplication enterprises. SENARAV's role will be limited to applied research, varietal development, and production of foundation seeds and disease-free planting material to be bulked and distributed by third parties. SENARAV will work closely with the Zairian national seed service (SENASEM) to coordinate the release of appropriate varieties.

Following initial training by SENARAV staff, NGOs will train farmers in the multiplication of open-pollinated maize seeds on their own farms.

RAV II will also conduct research on hybrid maize seed varieties at Kaniameshi. The project will collaborate with private seed farms, which will produce commercial hybrid seeds for distribution to farmers.

2. Cassava

Cassava cuttings will be multiplied by NGOs and by individual farmers. Participating outreach entities will set up multiplication fields in their areas for producing cassava cuttings for distribution to farmers. Outreach entities will encourage farmers to create their own multiplication fields. NGOs will train farmers in the selection of cuttings to prevent the transmission of cassava diseases.

3. Grain Legumes

Grain legume foundation seeds will be distributed by SENARAV to outreach entities. Outreach entities will set up their own grain legume multiplication fields. Outreach entities will also teach farmers basic principles of seed selection for grain legumes.

I. Monitoring and Evaluation

1. Farm-Level Indicators

Accurately predicting and evaluating the impact of technological change requires that correct indicators be utilized. In RAV I, yield per unit area was the primary factor that was utilized to predict the acceptability of new technologies to farmers. Few evaluations of economic impact were conducted, and "impact" was measured almost exclusively in terms of increased sales of a single target crop. While yield per unit area and revenues from project crops are important variables, they alone do not encompass all relevant farmer objectives. The impact indicators utilized by SENARAV should, therefore, be expanded.

a. Returns to Labor

Determining which input to agricultural production (land, labor, or capital) represents the most serious constraint to production is important because farmers normally first attempt to maximize returns to that factor which is the most limiting within their farming system. Labor is the single most important constraint in Zairian agriculture. Most farmers are almost completely dependent on family labor, and women supply the single largest labor input in most cases. SENARAV's technologies should, therefore, be evaluated in terms of increased returns to labor.

b. System productivity

Extensive research throughout the world has shown that farmers attempt to maximize the overall productivity of their farming system rather than the productivity of any single element. Where farmers produce only one or two commodities, yield per unit area

of a given commodity will provide an accurate representation of total system productivity. In Zaire, however, the vast majority of farmers produce a large number of commodities. Some are used primarily for home consumption. Others are used primarily for cash sale. Given the large number of commodities produced on a single farm and the diversity of uses of these commodities, yield per unit area from a single commodity does not accurately reflect system productivity and may, in fact, be a misleading impact indicator.

Using tuber yield of manioc as an indicator of impact provides an example. In Bas Zaire, revenues from sales of manioc leaves are often two to six times those from sales of tubers. Tuber sales are limited to that portion of the harvest which remains as surplus after basic consumption needs have been met. Further, sales of beans and/or groundnuts are often more critical to farmers than sales of manioc (leaves or tubers) because these crops are harvested just in time to procure cash needed to pay school fees. In this system, it is extremely doubtful that farmers are attempting to maximize either yields or sales of manioc tubers. In fact, farmers might be quite willing to accept constant total tuber yields if they could harvest more leaves, or harvest the same amount of leaves and tubers from a reduced number of manioc plants. Thus, adoption of a higher yielding variety might actually result in less area planted in manioc, constant total manioc tuber yield, and an expanded area planted in beans or groundnuts. In this case, measuring only yield per unit area and/or sales of manioc tubers would not adequately reflect project impact. Measuring total system productivity and sales, however, would show that introducing an improved manioc variety had positively affected farmer productivity and income.

The situation in Zaire is even further complicated by the fact that most farmers are shifting cultivators. The labor required to clear a new parcel of land is high. Given the importance of maximizing returns to labor, it is not just the total productivity of any given parcel in any given year that is important to the farmer, but rather the total productivity of the parcel over its lifetime (often three to five years). SENARAV's technologies should, therefore, be evaluated on the basis of their impact on the total productivity and revenue gained from a given parcel of land, preferably over the life of the parcel.

c. <u>Yield per unit area and revenue</u>

The more traditional measures of impact, yield per unit area and revenue from a given crop, are still important evaluation measures. They should be utilized by SENARAV, but in conjunction with the indicators described above.

Monitoring Activities at the Farm-Level

Monitoring farm-level activities is particularly important to SENARAV because the national programs are dependent on the quality, timeliness, and consistency of outreach activities carried out by outreach entities. SENARAV's impact on the quality of outreach comes through its institutional support for the outreach entities. To a large degree, the quality of the final "product" or "information package" that reaches the farmer is out of SENARAV's control. In a worst case scenario, SENARAV could "do everything right"--produce highly adoptable technologies, and provide excellent institutional support to outreach entities--and still have little farm level impact because the outreach entities themselves were not capable of delivering the technologies to large numbers of farmers. Monitoring farm-level activities is, therefore, designed to achieve three objectives: (a) determine whether outreach entities are delivering inputs and information to farmers in a timely and consistent manner; (b) evaluate changes in performance of entities over time; and (c) provide information for deciding which entities are most effective and, therefore, should receive more resources from SENARAV. To meet these objectives:

* SENARAV will monitor the activities of the R&D teams and Primary Collaborators through a monthly activities report;

* Each R&D team will keep a daily record of all farm-level activities and will prepare a monthly report to be submitted to the national coordinator and forwarded to the Central Coordinating Unit. The team leader will supervise daily recording activities and prepare the monthly reports; and

* SENARAV will be responsible for developing the reporting form and distributing it to Primary Collaborators.

The form's basic function is to provide the collaborator and SENARAV with a monthly log of activities which have been conducted by field-level personnel, including receiving training or providing training to farmers, disaggregated by geographic location (village) and sex of contact farmer. This log will be very simple. Basically, the respondent is asked to indicate: (a) who was contacted, (b) when, (c) where (village), (d) gender of contact, (e) nature of activity (e.g., delivered planting material, showed farmer correct planting distance, etc.), (f) primary commodity dealt with, and (g) date of next contact. Every effort must be made to keep this reporting form simple and non-time consuming.

* The Primary Collaborators will be responsible for providing a completed report to the regional R&D team leader

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each month. SENARAV's primary concern is field activities that are directly connected with dissemination of SENARAV technologies: progress with on-farm trials, surveys conducted, demonstrations, field days, training, and dissemination of planting materials from SENARAV, for example.

3. Evaluating Farm Level Impact

a. On-Farm Trials as a Source of Impact Data

The on-farm trials themselves will be a primary source of data on farm-level impact. Primary responsibility for data collection varies with the types of trial. Instruments for data collection will be prepared by the R&D teams and cooperating researchers for each on-farm trial.

* Researchers, with assistance from the R&D teams, will be primarily responsible for data collection in research oriented trials.

These trials will provide primarily bio-physical data and are unimportant from an impact perspective, though they do provide some indication of the potential yield increases that could be gained from adoption of a new technology.

* The R&D teams will be primarily responsible for data collection for production-oriented trials, but some of these trials will be conducted by Primary Collaborators, in which case they will have primary responsibility for data collection.

These trials will provide socioeconomic data and will provide SENARAV with much of the information needed to predict economic impact of technology adoption.

* Both the R&D teams and the Primary Collaborators will be responsible for data collection for pre-dissemination trials, depending on whether the R&D team itself conducts a trial or whether the trial is conducted by a Primary Collaborator.

These trials form a critical link in the data collection process. They are the primary source of information regarding system performance.

The pre-dissemination trials are especially important in measuring success for two reasons. First, in pre-dissemination trials, farmers are asked to assume all of the risks and costs associated with the new technology. Thus, the trial itself is a good measure of the "real" acceptability of solutions posed by

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SENARAV. Second, follow-up studies of cooperators in pre-dissemination trials provide estimates of the rate and level of technology adoption and diffusion.

b. Follow-Up Studies

This is a simple methodology. Farmers who cooperate in an on-farm, pre-dissemination trial (testing two improved manioc varieties, for example) in 1990 are not contacted at the beginning of the 1991 planting season. Later in the season, they are contacted to find out if they continued to utilize the new technology.

The number of farmers who continue to utilize a new technology in the year after pre-dissemination trial provides a fairly good index of the rate of adoption of the technology. However, farmers rarely replace a traditional technology, especially in the first year after pre-dissemination trials, with a new technology. The portion of the adopter farmers' total production that is subjected to the new technology, therefore, provides a good index for the level of diffusion of the new technology, e.g., the percentage of farmers' production that will utilize the new technology. It is sometimes necessary to conduct two-and three-year follow-up studies to develop a firm idea of the level of adoption since farmers often put higher portions of their production under the new technology as they gain confidence,or (in the case of manioc, for example) as the materials needed become available.

Based on the rates of adoption and diffusion among cooperators participating in pre-dissemination trials, SENARAV can develop a realistic prediction of how new technologies should spread to non-cooperator members of the priority clientele groups. Given the time and cost involved in conducting exhaustive, statistically valid surveys of farmers, these measures should be accepted as "best possible" indicators for project evaluation purposes.

SENARAV will also evaluate the effectiveness of the activities conducted by its Primary Collaborators through both the routine data collection described above and through periodic farm-level surveys. Such surveys will be conducted once every two years. Primary Collaborators will be expected to provide SENARAV with the information needed to conduct these surveys. The purpose of the farm-level survey is twofold: (a) to verify the information that is being submitted in monthly activity reports by collaborators and (b) to assess the overall impact of adoption of new technologies.

4. Evaluating Institutional Support to Outreach

a. In-Service Training

SENARAV will conduct participant evaluations for each semi-annual general skills improvement training program by means of a written evaluation form which asks each participant to evaluate:

* the performance of each trainer;

* the quality of training materials and/or exercises;

* the degree to which stated learning objectives were met during the training event; and

* the degree to which participants anticipate utilizing what they have learned in their daily jobs.

Trainers for each training session will submit a written report within 30 days of completion of the event which includes:

* a complete list of all participants and trainers and a planned and actual course schedule;

* a copy of session objectives and all pedagogic materials supplied to participants;

* an analysis of participant evaluations, including recommendations for future training sessions; and

* an evaluation on the trainers part of problems encountered, adequacy of support facilities, quality of materials, course content, and any other relevant information which can be used to improve the quality of training.

In addition, each entity which sponsors participants will be responsible for supplying to SENARAV an annual report which includes:

* the number of field-or village-level personnel, (enumerated by sex, geographic area of responsibility, and educational level within the entity) who received training from the supervisory-level personnel involved in SENARAV's training sessions; and

* a written evaluation form (supplied by SENARAV) from each participant, indicating the degree to which the materials taught by SENARAV were used.

A summary of these evaluation results will appear in annual SENARAV reports.

Technical training will be evaluated by the use of a pre- and post-test methodology in which gains in knowledge are measured. The post-test should be administered no sooner than 30 days after

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the field exercise. The annual report of the R&D teams will include an analysis of the results of the pre- and post-tests.

b. Other Support to Outreach

SENARAV will provide Primary Collaborators with a general questionnaire at least once every two years in which the overall performance of SENARAV's support is evaluated. This questionnaire will include information regarding:

* the timeliness of SENARAV's support activities (e.g., distribution of seed, provision of technical and general skills improvement training);

* the quality of SENARAV's support services (e.g., quality of planting materials or seeds, quality of extension publications); and

* the effectiveness of SENARAV's support services (e.g., utility of extension publications, importance of technical training to field level personnel).

Results will be analyzed and included in the R&D teams' annual report and bi-annual plan of work, along with a discussion of how support services will be improved in the following two-year period.

J. Phasing/Scheduling over Time

1. Months 1-6

* reorganize R&D teams on a regional basis.

* assign a national coordinator to the R&D Unit.

* develop monitoring forms.

* provide training to SENARAV personnel in clientele identification and characterization.

* conduct baseline survey in Bandandu, South Shaba, and Bas-Zaire.

* conduct consensus building sessions.

* produce written report which identifies priority agro-ecological zones, clientele groups, and problems to be addressed.

* collect information on potential Primary Collaborators.

* provide training to SENARAV personnel for the on-farm trials.

* review on-farm trials program, and continue those trials which are appropriate.

2. **Months 6-12**

* select Primary Collaborators and sign formal agreements.

* conduct first semi-annual planning session with Primary Collaborators.

* develop two-year workplan.

* initiate technical training for Primary Collaborators.

* initiate research-oriented, production-oriented, and pre-dissemination trials.

* provide SENARAV personnel with training in gender issues analysis and the analysis of data from on-farm trials.

* SENARAV provide training to Primary Collaborators in clientele identification and characterization.

3. **Months 12-18**

* SENARAV will provide training to Primary Collaborators in gender issues analysis.

* second semi-annual planning and review session with Primary Collaborators.

* provide training to SENARAV personnel in agro-ecology, communications methods, and in program planning and evaluation.

* conduct first general skills improvement training needs assessment.

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ANNEX I. INSTITUTIONAL/ADMINISTRATIVE ANALYSIS

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ANNEX I. INSTITUTIONAL/ADMINISTRATIVE ANALYSIS

I. THE INSTITUTIONAL SETTING

A. Agricultural Policy and Administration

Public administration dealing with services related to agriculture in Zaire is known to be weak. This is partly due to the fact that responsibility for the agricultural sector has been shared among four different departments (ministries): Agriculture; Rural Development; Lands, Environment and Conservation of Nature; and Higher Education and Scientific Research. (Under the recent GOZ reorganization, the Departments of Agriculture and Rural Development have merged to become the Department of Agriculture, Rural Animation and Community Development.)

The Department of Agriculture has six directorates: General Services; Studies and Planning; General Project Administration; Livestock; Crops; and Markets and Credit. The Department of Rural Development includes two directorates: Rural Infrastructure (rural roads and irrigation) and Rural Promotion (cooperatives). Forestry and fisheries are under the Department of Lands, Environment and Conservation of Nature, and agricultural research, Institut National pour l'Etude et la Recherche Agronomique (INERA) is located in the Department of Higher Education and Scientific Research. Also, the Regional Inspectorates of Agriculture promote agriculture and rural development activities in the field. They are administratively responsible to the regional governors.

Service National de Recherche Appliquee et Vulgarisation SENARAV was created by the Arrete Interdepartmental No. 0001/85 of December 10, 1983, in the Department of Agriculture. The service was placed under direct control of the Department of Agriculture. The Department of Scientific Research has the responsibility for all scientific research in Zaire. SENARAV's work is reviewed by both the General Project Administration Directorate (DAGP) of the Department of Agriculture and by the Scientific Coordination Directorate of the Department of Higher Education and Scientific Research. The director of SENARAV is the head of a division of the Department of Agriculture.

B. Agricultural Planning

The Department of Agriculture (DOA) has primary responsibility for agricultural planning. Since 1970, the GOZ has introduced a series of agricultural plans and policy initiatives aimed at reversing the decline of the agricultural sector. However, agricultural planning initiatives over the last 15 years have either been only partially achieved or poorly implemented.

The Plan de Relance Agricole 1982-84 advocated the creation of a think tank (Cellule de Conception) as a cabinet-level planning

unit in the Department of Agriculture. It was to be responsible for agricultural policy and for preparing monthly reports on agriculture for the Comite de Conjoncture. Many of the functions of the Cellule de Conception were vested in Service d'Etude et Planification SEP. SEP is building an analytical capacity for planning and policy-making and receives support from USAID (Project 660-0119, Agricultural Policy and Planning).

Planning and policy-making are handled by the Directorate du Plan (DOP), which coordinates all development-oriented activities. DOP, however, has a limited capacity to implement its functions. The Department des Finance, Budget et Portefeuille (DOPBP), has major responsibility for budgeting and investment. Coordination with the DOP is weak. In macroeconomic decision-making, the Bank of Zaire has more influence than the DOP.

C. Zaire's National Agricultural Research Institutions

Prior to 1960, Zaire's agricultural research was conducted by Institut National pour l'Etude Agronomique du Congo Belge INEAC at its 26 research stations and institutes. Research activities were conducted in virtually all fields of agriculture and in nearly every agro-ecological zone. After Zaire gained its independence in 1960, many of the expatriate staff left the country, leaving the research stations understaffed. The once-renowned INEAC began to falter.

By 1970, INEAC was deficient in all aspects; and the GOZ attempted to rehabilitate the institution. It was renamed INERA. However, because of the shortage of human, financial, and management resources, INERA remained a large, but nearly dysfunctional research organization with high overhead costs.

Supervisory responsibility for INERA has changed frequently. It was once under the Office of the Presidency, before changing to the Office of the Prime Minister. This was followed by another change to the Department of Agriculture and then to the Department of Higher Education and Scientific Research in 1983.

To help promote more effective agricultural research in Zaire, USAID funded SENARAV, which has regrouped existing commodity programs for cassava, maize, and grain legumes under one organization. SENARAV has begun to carry out well defined programs of agricultural research. SENARAV is limited in the scope of its activities to certain food crops and was, until recently, also limited to certain regions of the country. SENARAV was placed outside INERA because INERA was faced with severe management and financial problems.

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D. Technology Transfer in Zaire

Zaire's national extension service, Service National de Vulgarisation (SNV), is faced with many problems. SNV has about 5,000 employees, and would appear to be capable of providing technical assistance to a large proportion of the Zairian farm population. In reality, however, most of its extension agents have virtually no logistical support or operating budgets. They are poorly trained and there is no national program of in-service training. Few improved technologies or extension materials are available to SNV's agents. Farmers tend to distrust SNV's agents in many areas. In the past, they have been associated with government policies forcing farmers (on penalty of fine and/or imprisonment) to plant minimum acreages of certain crops (forced culture). Even though the "forced culture" policy has theoretically been eliminated at the national level, it continues to be practiced in some areas, and SNV agents apparently continue to play the role of enforcer.

Because of the ineffectiveness of SNV, NGOs are extremely important in Zaire. As discussed elsewhere in this document, the level of staff training, emphasis on agricultural development, resources, and stability of these entities varies enormously. A strategy for developing working relationships with them is discussed in the Technical Analysis.

Overlapping and poorly defined responsibilities clearly continue to plague the development of an effective technology development and transfer system in Zaire.

E. The RAV I Project

To offset the lack of agricultural research in Zaire, USAID funded the RAV I Project, which in the past several years has regrouped existing commodity programs for cassava, maize, and legumes.

The RAV I Project had two major objectives: (1) to create in the DOA the ability to undertake applied agricultural research activities, and (2) to increase village cultivators' production of food crops by means of the transfer of agricultural technology.

RAV I was designed to function outside of INERA because the Institute was a non-functional organization with severe management and financial problems. RAV I also supported ongoing DOA research in genetic selection and development directed by three national research programs: Programme National Manioc (PRONAM), Programme National du Mais (PNM), and Programme National des Legumineuses (PNL). These programs were also responsible for developing appropriate agronomic, management and cropping systems practices to increase productivity and income of farmers.

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Farming systems research was included so that a multidisciplinary approach to finding solutions to low productivity could be utilized. An outreach/extension component was initiated to develop linkages with public and private entities working directly with farmers, closely linked to the farming systems research component. A substantial training component provided an opportunity for 38 Zairians to obtain graduate degrees at U.S. Universities. RAV I also provided 35 short-term training activities in various scientific subjects for 70 project personnel.

SENARAV and IITA administered the project. Besides 13 IITA expatriates, 799 Zairians were employed, including five Ph.D.'s, 21 M.S.'s, 29 A0/L2 (five years of university study), 35 A1/G3 (three years of university study), 78 A2/D6 (U.S. high school equivalent in technical school), 133 A3/D4 (shortened high school program in technical school), and 498 support staff. In addition to 36 staff employed at the central coordinating unit, 367 were employed at PRONAM, 238 at PNL and 162 at PNM.

Each program is headed by a director, assisted by an IITA counterpart. Each program, in turn, consists of divisions of entomology, outreach, farming systems research, plant pathology, and plant breeding/genetics.

The research experiments are conducted at the headquarters site, plus sub-stations and antennes (field testing stations). M'Vuazi, the PRONAM headquarters site located in Bas-Zaire, administers the Kiyaka sub-station and the Gimbi, Kisantu and Kimpese antennes. PNL, located at Gandajika in Kasai-Oriental, provides technical assistance and personnel to INERA'S Kivu Region Mulungu Research Station. PNM, which uses Kaniameshi in Shaba as headquarters, administers the Kaniama antenne. All of the programs have representatives working at each program headquarter station, as well as at several antennes.

Several issues related to institutional development are addressed below, as well as the contributions that can be made by improving research-extension linkages during RAV II. Two of RAV II'S project components, research management and human resources development, are especially important to improved institutional performance, and are described below.

II. RESEARCH MANAGEMENT

Many cases of major agricultural research impact have been documented, including oil palm and coconut research in the Ivory Coast, hybrid maize research in Zimbabwe and Kenya, and research on groundnuts in Senegal and Nigeria. Estimated rates of return to investments in these and other programs have been in the 30 to 80 percent range, far higher than for any other form of capital investment. Keys to these successes have been the following:

* A strong national research/extension system that fixes (through a consensus-building process) a limited set of priorities, implements research in a cost-effective manner, constantly monitors progress, and feeds information back quickly and accurately from farmers to research personnel in a "research management loop" (RML).

* A research/extension system whose actions are reinforced by a national policy that motivates production, by a vigorous private sector, and by strong linkages with other national and international sources of information and technology.

* Teamwork at all levels of the system, continuity of scientific leadership, and stable funding.

These ingredients for success lead to a highly productive Agricultural Technology Management System (ATMS), of which the research/extension system is the hub. RAV II's research management component will support the rapid development of Zaire's ATMS, using "early wins" on a selected set of food crops in defined areas to point the way, exemplify, and provide leadership.

The Zaire setting for research presents challenges:

* Priorities need to be sharpened and reduced in number, implementation is halting and cumbersome, monitoring and evaluation mechanisms are lacking, and feedback circuits of all forms have been shortened.

* Agricultural research linkages with development policy, the private sector, and international sources of information and technology are not well developed.

* Funding is largely dependent on external sources and national funding is unstable; and

* Leadership continuity is uncertain and teamwork at all levels of the ATMS warrants improvement.

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A. Research Management and Organization

1. Current Status of RAV I

RAV I was able to combine three commodity programs, cassava, maize, and grain legumes, under a single coordinating structure within the DOA. This coordination was designed to improve research management in several key areas: (a) new technology introduction and improved varieties; (b) the integration of farming systems research and extension methods; and (c) strengthening the DOA's capacity to manage and conduct applied agricultural research. On-station research has introduced new technologies and higher yielding varieties. Farming systems research and extension programs are being integrated, and new approaches and methods are being developed and defined. Operating budget cuts and rapid inflation have created general sustainability problems for agricultural research in Zaire. Cost reductions and alternative public funding are needed immediately to strengthen the basic research management and administrative systems developed by RAV I.

2. Research Management Activities RAV II

The following management activities to be pursued under RAV II will strengthen and reinforce research planning, programming, budgeting, implementation, monitoring, and evaluation. The major focus of research management improvement will be at the SENARAV level, with lesser attention to improved planning and coordination of food crop research between INERA and SENARAV.

a. INERA and SENARAV Integration

Restructuring and management reinforcement at the national, SENARAV, and station levels are key to strengthening the agricultural research system in Zaire. In order to achieve this objective, it will be essential that SENARAV and INERA take specific steps to integrate research policy formulation, programming, budgeting, and GOZ financing. Providing civil service status to SENARAV employees is critical. It has already been agreed that a strategic and integrated plan for restructuring and implementation will be created and implemented, starting in 1990, with full adoption by all parties by 1993.

b. Improved Program Budgeting and Financial Accounting

Improvement of the current program budgeting and financial accounting of SENARAV, indicated by GOZ and USAID, suggests that it is feasible to construct a computerized and decentralized control system based on program budgets for both SENARAV and INERA. A single accounting manual will eventually be introduced and used by both SENARAV and INERA with the same accounting procedures, and eventually a common audit and control structure. The steps towards

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SENARAV and INERA integration will be conditioned by the availability of funds for strengthening and rehabilitation of INERA.

c. Stronger Linkages between Research and Outreach

Administratively, research management in RAV II will further the establishment of linkages between applied research and farmer adoption of improved technologies. It will improve research programming and resource use and facilitate the use of applied research results by outreach entities. A detailed strategic plan for the three national research programs will be developed, with research priorities based on a common set of criteria. Researchable problems within individual research projects will be identified, and the plan will establish clear program objectives, evaluation guidelines, and procedures. Program budgeting of research activities will be developed for each national food crop program. The budgeting process will include planning, organization, and implementation of research and outreach activities; station facility development; and supporting services, operations, and maintenance. Individual research projects will be peer reviewed by nationally recognized scientists.

d. Monitoring and Evaluation

The research management component of the project will assist SENARAV in the definition and evaluation of research programs, consolidation of SENARAV facilities and activities, and the establishment of a more effective management of research programs and research resources. For further details see Chapter VI on "Monitoring and Evaluation."

e. Consolidation of Research and Outreach at Selected Sites

Technical assistance in research management will be provided by the Title XII contractor to address the following key management areas:

1. Relocation of research, testing, and outreach activities to target areas. Major research activities for cassava, maize, and grain legumes will be assigned to the primary research sites.

2. Definition of both short- and long-term research objectives for each of the national food crop programs. This will include budgets, staffing requirements, and administrative procedures.

3. Establishment of a peer review process for the evaluation of individual research programs. The process will also involve internationally recognized scientists from US universities and the IARCs.

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4. Establishment of linkages between SENARAV commodity programs and US universities and the IARCs. Short-term training, funds for international travel, and short-term assistance in documentation will be provided.

f. Training in Cost-Effective Research Management

Combining the resources of U.S. universities and the technical assistance team, a regular series of short courses, seminars and workshops will be programmed periodically for the following GOZ and private sector client groups:

* Policy makers whose decisions bear on the research and extension system;

* Senior management of SENARAV, INERA, and cooperating agencies in Zaire;

* Middle-level managers concerned with budgeting, fiscal management, experiment station management, and human resources development; and

* Managers of private sector support services (e.g., bank credit personnel and input suppliers) and NGO field personnel.

A wide spectrum of training programs in research management, including financial management, will be provided. The technical assistance team, will provide management training, organize workshops and conferences, and new research management practices on research station administration, financial management, research planning, and program implementation and evaluation.

The specific content of these short courses, seminars, and workshops should be guided by a diagnosis of the Zairian research and extension system, prepared earlier-on in the implementation phase by the technical assistance team, working with Zairian counterparts and TDY personnel from U.S. universities. This diagnosis, already available in large part in the Plan Directeur developed with UNDP assistance, should be up-dated regularly and fed into a Zairian "Training and Continuing Education" unit.

At this stage, provision should be made for up to eight short courses, seminars, or workshops over the first two years, and for up to three each year thereafter. Short courses, workshops and seminars might deal with such subjects as:

* Priority-setting for research and extension;

* FSR methodologies;

* Monitoring and evaluation techniques and mechanisms;

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* Budgeting and fiscal management for cost-effective research;

* Experimental design and technical analyses;

* Research advances worldwide on such specialized topics as IPM, cassava, grain legumes, and corn; and

* Research station management.

Activities organized under this rubric should be conducted in those locations which minimize their cost and maximize their participation and influence. For example, a short course on "Advances in Cassava Research and Extension" might be held in Kinshasa to draw into it policy makers and senior management personnel of the DOA, SENARAV, SEP, and INERA.

Some part of the training program might be most effectively organized on the campuses of U.S. universities. Activities will need to be economical in the use of time, carefully crafted and planned, and rigorously evaluated.

To accelerate the "turnover" of these training activities, early-stage participants should include potential Zairian trainers who can take responsibility for planning, implementing, and evaluating activities which are at first supported largely by the technical assistance team. Seminar and workshop syllabi, and other resource materials, need to be prepared to serve future Zairian trainers. These short courses, seminars, and workshops should eventually form the core of an intensive continuing education program, complemented by a steady stream of research management publications and outreach publications relevant to research and extension activities. Every effort should be made to secure additional extra-project financing for these short courses, seminars, and workshops.

g. <u>The Research Advisory Council</u>

A Research Advisory Council (RAC), cross-ministerial in nature and co-founded by the GOZ, the World Bank, UNDP, and USAID, should be constituted. The design team observed that a similar organization, called the National Program Commission, has already been established, though apparently it has been inactive to date. This Commission could provide a platform for the functions and activities discussed here for RAC.

The proposed Research Advisory Council should include technical and administrative representatives of the GOZ's relevant ministries, of the donor and NGO communities, of producers, and of the private commercial sector. The RAC will serve in an advisory capacity to the founding GOZ ministries and formulate research/extension recommendations after periodic review of the plans and progress reports of SENARAV and cooperating programs and

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entities in the research/extension system. It should meet annually in a plenary session and a smaller Executive Group should meet quarterly. The RAV II technical assistance team and counterparts, working in cooperation with INERA and other agricultural research bodies, will serve as the Secretariat of RAC, ensuring that its agendas are productive and that important background materials and draft resolutions for its consideration are available.

RAC's purpose will be to provide high-level, high-quality attention to the scarce and potentially productive monies which are invested from all sources in agricultural research to ensure the highest possible rate of economic return. Toward this purpose, its agendas will focus on:

* strengthening activities of the national system, including the functioning of the research management loop, not only the technical flows within it, but constraints posed by accounting, human resources, and physical resources management practices;

* the reinforcement received by the agricultural research and extension system from national policy, the private sector, and the international technical and donor communities; and

* teamwork, scientific leadership, and funding stability and growth.

Annual meetings of RAC should be scheduled in August of each year, or just prior to each cycle of the research program. Quarterly sessions of RAC's Executive Group should be scheduled throughout the year to deal with topics of particular relevance to the conduct of the research and extension system. Roughly three days should be committed to all annual and quarterly meetings. RAC will be a national body, and the logical locus of its activities should be Kinshasa. However, in view of the commodity and regional priorities to be set by the research and extension system, quarterly meetings of RAC's Executive Group should be held at regional experiment stations. This will permit participants to review activities in the field.

B. Formalizing the Research Management Loop

A smoothly functioning Research Management Loop (RML) must be installed within SENARAV to ensure timely programming and accountability of the planning, implementation, evaluation and feedback functions of the research and extension system (Figure I-1). Accountability is ensured only when all actors in the RML clearly understand their roles within it, are delegated authority with sufficient lead time and resources to accomplish their tasks, and are then evaluated on their performance.

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The RAV II technical assistance team should lead the development of the RML by example. It may be necessary to conceptualize the RML as several RML's at different levels within the overall research and extension system--that is, a cylinder composed of many RML's (see Figure I-1.)

A Food Crop Research Advisory Committee (FCRAC) will be established within the first 120 days of the arrival of the technical assistance team. Its membership will include SENARAV researchers, the technical assistance team, INERA researchers and managers concerned with SENARAV crops, and representatives of outreach entities. The first meeting will be held just prior to the first main cropping season (Season A) in 1991, or no later than nine months after the arrival of the TA team. FCRAC will meet annually to review proposed research programs (two year research plans or updated annual research plans) and priorities, and to recommend changes in priorities.

A rapid appraisal of production constraints will be conducted by the RAV II team based on information already available and limited interviews with selected NGO/outreach entities and farmer groups in the five R&D target areas. This information will form the basis for the two-year research plan to be proposed by SENARAV and reviewed by FCRAC. This appraisal will be completed within the first 90 days of the technical assistance team's arrival.

A diagnosis of research-outreach system constraints will be completed within the first 90 days of project start-up. This diagnosis will include recommendations for a program of short courses and workshops to improve research management and review processes, research-outreach linkages, the nature of collaborative arrangements with research agencies (INERA food crop research units, agroforestry, etc.) and outreach entities (SNV, NGOs, church groups, and donor projects). Such an analysis will be essential for rational, cost-effective and sustainable collaboration beyond the life of the project. Part of this information will be collected during the appraisal of production constraints.

Six specific mechanisms should be made operational as part of the RML (see Figure I-1).

1. Research Planning (Strategic Plan and Two-Year Plans)

The project will assist SENARAV in developing an eight-year strategic plan. A tentative plan will be developed during the first 90 days of project life to allow rapid movement toward the implementation of project activities. Based on the strategic plan and the appraisal of production constraints, a two-year research plan will be developed. As the implementation proceeds, the strategic plan will be finalized during Year 2 of project life, but before the development of the second two-year plan for research.

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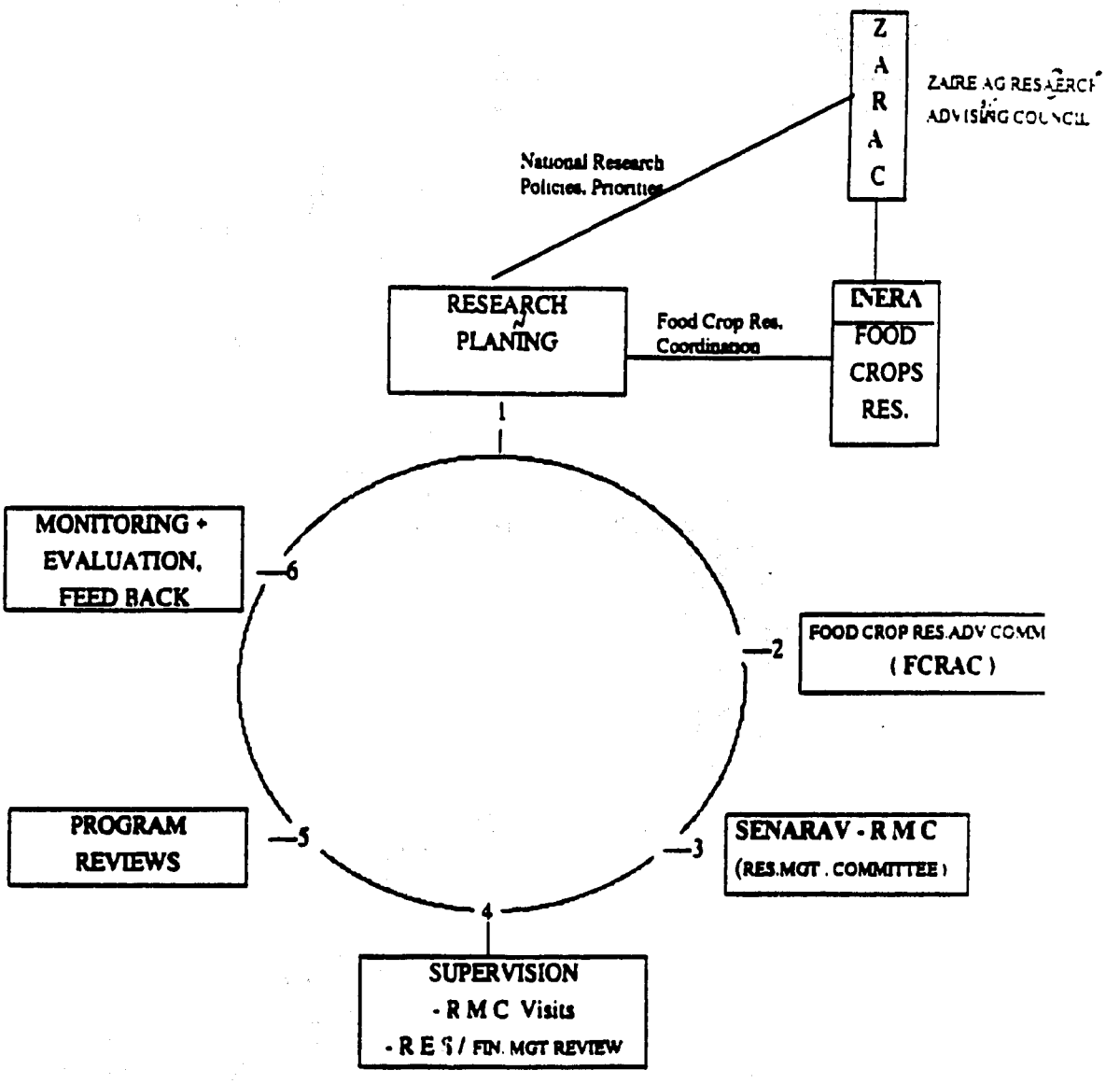
Figure I-1

RESEARCH MANAGEMENT LOOP (RML)
(Planning, Supervision, Evaluation



1,2 : Planning (coordination included)
3,4,5 : Supervision (continuing activity)
6 : Evaluation

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Two-year plans will be updated annually based on the strategic pla and the emerging circumstances.

2. Research Planning and Review Process

The FCRAC will meet annually to review research plans anc priorities and make appropriate recommendations. FCRAC will consist of SENARAV personnel, RAV II technical assistance team, INERA personnel dealing with research and management of food crops research, and representatives of outreach entities. Participation of the latter will serve as a high level research-outreach link and will improve the relevance of research to farmers' needs.

3. SENARAV Research Management Committee

The Research Management Committee (RMC) is internal to SENARAV itself, rather than to RAV II. It will consist primarily of Zairians: the RAV II project director, deputy director, chief accountant, and the programs leaders for PNM, PRONAM, PNL. Not more than four technical assistance team members should serve on the RMC. It will meet three times a year. The RMC will oversee the development of strategic plans, two year and annual research and outreach plans, program budgets, and implementation plans. It will assist SENARAV in developing criteria for research evaluation.

4. Program and Management Review

RAV II management will work with each national program to strengthen its planning, review and control processes. For example, before each program comes up for annual review by FCRAC, it will have met at the program level and sorted out problems and made plans for inter-program collaboration. This exercise will help smooth out the research review process at the FCRAC level.

The RMC, program review, and management exercise will strengthen research management processes at the program and middle management level and will contribute to the training of research managers.

5. Research Supervision and Control

Research supervision is a continuous process. Two specific actions are visualized under the Project. SENARAV research management personnel should visit the research stations and testing sites periodically. At least two visits are recommended per year. The first should occur half way through the implementation of the annual research program. The purpose of the visit is to review the quality of experimentation and testing and to ensure consistency between the program's approved plan and the plan that is implemented. The second visit should occur at the time of the program review and management exercises and will be restricted to program

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headquarters. In each case, observations and comments will be communicated in written form to the program leaders and researchers no later than two weeks after the visit. Similarly, the Financial Management Specialist and SENARAV Chief Accountant and Administrative Officers will work with program directors to help them manage, review, and control budgets and procurement. Program budgets should be monitored closely to ensure compliance with approved activities and budgeted levels.

6. Monitoring and Evaluation of Research

It is desirable to centralize the monitoring and evaluation system at the research management level. Monitoring should include an integrated budget of all resources coming into the system, including the GOZ budget, USAID support, other donors contributions, network contributions, and services in kind. Monitoring of research operations will include such activities as matching expenses against budgets; comparing programs planned to programs executed; reviewing station management costs, including end-of-year reviews to make the operations more cost-effective; assessing the cost of on-farm tests and outreach activities; determining vehicle costs to identify the most expensive units; evaluating the success rate of trials and experiments; and examining the extent of interdisciplinary research.

The evaluation system will include evaluation of research results, SENARAV research personnel, and social and economic impact of technologies. Evaluation of research results will determine if there exists a need to change direction, methodology, or approach. Also, the evaluation process should determine if the research results are significant enough for the technology to move to the outreach program. An evaluation system for SENARAV research personnel will be developed and implemented during Year 2 of the project. The project will analyze the existing system in SENARAV and INERA and will propose specific evaluation criteria with a set of salary and non-salary incentives for research personnel and support staff. Evaluation of social and economic impact of technologies will involve information that is collected and analyzed by the R&D Teams, which provides feedback into the research management system. Examples include: impact on labor, productivity, production and income at the farm level; number of farmers adopting new technologies after pre-dissemination trials; number of women farmers adopting new technologies; and constraints to adoption.

C. Phasing/Scheduling Over Time

The RAC should be established within the first six months of project life, and hold its first annual meeting within nine months of project start-up. Meetings of the full RAC will be scheduled annually, thereafter, to occur no later than August of each year. The Executive Group will meet quarterly.

A diagnosis of research and extension system constraints should be completed by the technical assistance team, working with Zairian counterparts and TDY personnel from Contractor and the IARCs, within the first quarter of project start-up. This diagnosis will include recommendations for a two-year program of short courses, seminars and workshops that will contribute to meeting the objectives of this component of the project. The diagnosis and recommendations will be reviewed and up-dated annually over the first four years of the project and (perhaps) semi-annually each year thereafter.

Research Management Loops should be identified and documented within the first six months of project life. The six mechanisms described above should be programmed as regular, annual activities of RAV II.

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III. HUMAN RESOURCE DEVELOPMENT

A. Rationale and Goal

A critical requirement for the generation and sustainability of outputs targeted in RAV II is the development of a national staff which can fully replace the technical assistance team in carrying out SENARAV's objectives after the RAV II Project Assistance Completion Date (PACD). Skilled and experienced personnel in food crops research and outreach are limited in Zaire. Currently most of this research is conducted by individuals trained only at the baccalaureate level. However, 20 SENARAV staff members are now in training for M.S. degrees. There are only four Ph.D.'s in SENARAV, all involved, at least in part, in program administration. INERA does not fare as well, with only two Ph.D.'s. In INERA, both Ph.D.'s, as well as all but one M.S., are also full-time program administrators. Research on commercial crops fares somewhat better, but is mostly done with expatriate assistance and little real involvement of nationals, most of whom do not receive academic training to conduct research on these commodities.

The critical mass of professionals has also not been developed for research management, outreach, research station management, and various support areas. The goal of RAV II with respect to human resources is to continue the development of an adequate number of nationals who can assume all responsibilities for carrying out SENARAV's objectives without continuing the need for technical assistance. The discussion below addresses the human resource development needs of SENARAV, identified by program components.

B. Current Status of Human Resource Development

Analyses of RAV I show that many of the initial goals of human resource development have been met. Much has been accomplished in training in specific commodity research areas. However, as of mid-April 1990, only one Ph.D. and seven M.S. candidates had finished their programs. Four of the M.S.'s are INERA employees and are now conducting research in collaboration with PNL at the Mulungu INERA station.

Project records show that 29 candidates for advanced degrees are still in training. Of these, three are scheduled to complete M.S. degrees and two are to complete Ph.D.s by September 1990. By January 1991, another 14 M.S. and one Ph.D. trainee are scheduled to complete their programs. This will leave four M.S. candidates and five Ph.D. candidates to complete their programs during 1991 and 1992, and who will continue to be supported by RAV II funds. A listing of disciplinary areas and degrees sought for candidates in training is given in Table I-1, along with training goals for RAV II.

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C. Problem Areas

Although RAV I made considerable progress in the development of SENARAV's human resources, most of the candidates for advanced degrees started their programs too late to finish before PACD. Also, as shown in Table I-1, most (20) of the trainees in RAV I entered advanced degree programs in entomology and the plant sciences. Fewer entered agronomy programs (soils included), and only one each in agricultural economics, engineering, extension (including FSR), rural sociology, and post-harvest technology. Degree training has only recently been initiated in the management areas, with three candidates for MBA degrees who departed in late April 1990, after completing prerequisite English language training in Zaire. They will be supported by RAV II funds through completion of their degrees. Trained personnel are also needed in biometrics and library science. Additional formal (in-country) or on-the-job training is also necessary in field plot techniques for on-station and on-farm research. Even though FSR/E teams have been formed, little formal training in farming systems and outreach methods has been provided.

Program support areas where training is needed include laboratory equipment installation, repair and operation; farm equipment and vehicle repair and maintenance (including shop management); budgeting, accounting and general office management procedures; and inventory management and procurement.

Three candidates trained for the National Food Crops programs, prior to the establishment of SENARAV, have left SENARAV. This may be a normal attrition rate, but means of reducing losses will be examined.

Although women play a major role in the production of food crops, they are not yet included as professionals in agricultural research and outreach. They are involved, however, as NGO outreach personnel.

D. Nature and Scope of Human Resources Development

Human resources development is a high priority for RAV II and one which merits dedicated programming and effort. The human resources development program will focus on the following areas.

1. Advanced Degree Training (Participant Training)

Some additional SENARAV employees, beyond those who began training in RAV I, need advanced degrees in technical areas. This will facilitate development of effective R&D teams and interdisciplinary research efforts. As indicated in Table I-1, the project will support 22 participants for M.S. and 9 for Ph.D. degree studies. Candidates will be selected for advanced degree studies in the disciplines shown in Table I-1. These include agricultural

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economics, soil science, rural sociology, extension (including communications), biometrics and food technology, in addition to the plant sciences. Candidates will also pursue advanced degrees in the management sciences, three of which started their programs near the end of RAV I and are included in Table I-1 and related budgets as RAV II participant trainees. Candidates, particularly in the plant and soil sciences and agricultural economics, will be encouraged to pursue minor courses in FSR, biometrics, computer sciences and others of need to the project.

2. Short-term participant training

The project will provide 75 person-months of short-term training outside of Zaire. Table I-2 lists the major subjects which will be included in the detailed external short-term training plan to be developed within the first three months of the project. The table also lists projected person-months designated for each subject over the life of the project along with costs estimates based on $8,000 per person-month for four-week regularly scheduled courses at various institutions, including airfares and expenses.

Subject areas for external short-term participant training courses will include FSR; extension; plant breeding, protection and nutrition; soil and natural resources management and conservation; and human, fiscal and physical resource planning and management.

3. In-Country Training Program

The initial training plan to be developed (during the first three months of the project) for in-country training will focus on areas such as research station management, research administration, library science, data management and computer sciences, budgeting, accounting, inventory management and procurement, vehicle and laboratory equipment operation, maintenance and repair. Training programs in technical areas will include research plot design; data analysis; design and analysis of monitoring and evaluation programs; recent advances in research for SENARAV crops; integrated pest management; nutrient deficiency identification; outreach methods; training for trainers, and gender issues analysis.

On-the-job training, provided by the long-term technical assistance team, will be a major emphasis. It will be regularly monitored and evaluated, and will be an important part of each technical assistance team member's performance evaluation. On-the-job training experiences will also serve as a means to identify additional training needs for Zairian counterparts.

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Table I-2. RAV II Off-Shore Workshops, Seminars and Short Courses.

Project Component/ Subject Matter Area	PROJECT YEAR 1	2	3	4	5	6	7	8	Totals
	----- Persons (four weeks each) -----								
Outreach									
FSR/E	1	1							2
Extension	2	2							4
Library/Documentation									0
Other			1	1	1	1			4
Research									0
Bean breeding pathology	2		1						3
Maize breeding pathology	1								1
Cassava breeding pathology	2		2						4
Tissue culture	2	1	1						4
Other		4		1	1	1	1		8
Sustainability									
Natural resource management		10							
Sustainable agriculture	10								
Soil conservation									
Other		3		1	1				
Management									0
Human resources	10								10
Other			10						10
									0
Total Persons	30	21	15	3	3	2	1		75
Total Costs ($000)	240	168	120	24	24	16	8		600

Explanatory notes:

Three kinds of workshops, seminars and short courses are programmed for RAV II:

- Specialized, off-shore events developed by the Contractor in field.
- Regularly scheduled off-shore events offered by Title XII or other institutions.
- Event scheduled in Zaire which are developed and/or implemented by SENARAV and the technical assistance team.

The latter kind will be a centerpiece of RAV II, but funded with resources projected elsewhere for the project. The first two kinds are the subject of this note and the proceeding table, which is incorporated into the overall budget and the budget summary for participant training.

Specialized off-shore events have been programmed sparingly since they are costly and require a minimum level of attendance. The following have been included:

- Natural resource management (Year 2)
- Sustainable agriculture (Year 1)
- Human resources planning and management for agricultural research/extension (Year 1)

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The first two will be organized in Title XII institutions, while the third will be organized by ISNAR for Zairians. With roughly 10 participants and four weeks for each event. Participant costs are extimated at $6000 (transport, per diem, and other essentials) and institutional costs at $20,000 for a total of $80,000. Also included in the budget is a fourth, currently unprogrammed event for Year 3, arbitrarily placed under the research management component.

Regularly scheduled off-shore events have been included, assigning $6,000 to each participant's cost for four weeks and $2,000 for instructional costs (or the institution's fee).

The target group for these events will be future trainers -- nationals who will later help organize and implement short courses in Zaire; administrators, and other key personnel in the research/ extension system. Every effort will be made by Contractor to ensure that these events are conducted in French.

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4. Training Women

Recruitment of women in technical areas will be pursued. They will also become candidates for baccalaureate and advanced degree training. SENARAV's policy of requiring two years service prior to eligibility for training should be waived for at least some women. Further, SENARAV will have to initiate an aggressive program of recruiting women employees in order to be able to meet its obligations for training women. As listed in Table I-1, three women will be trained to the M.S. level, with one at least continuing to obtain the Ph.D.

5. Special Features

In the design of RAV II, special considerations are included in the human resources development component and are listed below:

* women will be given high priority for training;

* dedicated efforts will be made to select training institutions which not only have strong academic training capabilities, but which have provisions and incentives for faculty to participate in the conduct of thesis research in Zaire, particularly for Ph.D. candidates;

* provisions will be made to integrate participant trainee faculty advisors into RAV as recurrent short-term consultants in order to (a) facilitate thesis research in Zaire, (b) increase faculty awareness and interest in trainees' concerns, and (c) utilize their expertise in conducting workshops and consultations for the benefit of other project personnel;

* mid-winter conferences will be supplemented or replaced by special field study experiences of relevance to the project--for example, short courses, such as the tropical agro-ecology field camp offered through the University of Florida and/or the Organization for Tropical Studies in Costa Rica, will be arranged.

E. Administration of the Program

1. Selection of Candidates for Participant Training

Criteria for selection of candidates for advanced degree training will be in accordance with SENARAV's policies. They stipulate that (a) the candidate be employed by the program for at least 24 months, (b) the candidate maintains a record of top performance, and (c) the candidate be recommended by the program director and associated technical assistance team members in consideration of program needs and potential for the candidate to meet academic and language requirements. Exceptions to the 24-month employment re-

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quirement may be made for special cases, including women candidates. Candidates for non-degree participant training will be selected similarly, but without reference to length of service. Upon acceptance by the technical director and the COP, the training director will assist in processing the application through USAID Zaire and the Contractor.

2. Training Sites

a. Advanced Degree Training

Zaire does not have institutions which can provide advanced degrees for SENARAV personnel. Therefore, advanced degree training will be contracted with U.S. universities, unless all requirements can be better served in a third country. It is desirable that thesis research be conducted in Zaire, or at an IARC, particularly in cases where relevant projects cannot be conducted at the training institution. Selection of training sites will take into consideration the availability of facilities and the presence of faculty advisors willing to direct thesis research which is relevant to program needs. Faculty advisors will be encouraged to travel to Zaire to supervise important aspects of thesis research and to serve as short-term project consultants.

b. Baccalaureate Degree and Long-Term Non-Degree Training

Baccalaureate degree and long-term non-degree training will be conducted in Zaire, unless requirements can be better met in other African institutions. English language courses for M.S. degree candidates and various other courses in management support skill areas will be taken in Zaire. Training at U.S. institutions may be approved in special situations.

c. Short-Term Training

Short-term training for large numbers of personnel, such as for outreach personnel, will be conducted in Zaire, where workshops and seminars will be organized with the advice of the technical assistance team, short-term consultants and senior SENARAV personnel. Seventy-five person-months of the specialized short-term training will be conducted in third countries (primarily at IARCs) and in the U.S., depending on project requirements and available short course offerings.

3. Responsibilities

An international training coordinator of the Title XII contractor will handle the placement of candidates, as well as the management and monitoring of participants as required by USAID Handbook 10. Particular emphasis will be given to team-building for the Zairians while they are in the U.S.

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The Washington International Center or other service centers may be contracted to handle arrival details and U.S. orientation. The American Language Institute at Georgetown University may be contracted to provide advanced English training. Assistance to conduct cultural programs for participants will be provided by the National Council for International Visitors and chapters of the National Association for Foreign Student Affairs. USAID Zaire will assist the technical assistance team with pre-departure orientation and with periodic monitoring and evaluation.

The SENARAV staff, assisted by the technical assistance team, will be responsible for the selection of candidates and the administration of activities in Zaire, as specified above. SENARAV, along with the technical assistance team, will be responsible for all in-country training, including English language training, and associated monitoring, evaluation and reporting.

4. Scheduling Over Time

Candidates for degree training will be identified during the first year of RAV II. Those requiring English language training will commence in-country English language courses at the Zaire-American Language Institute (ZALI) as soon as practical to achieve the minimum acceptable TOEFL score of 500 (usually requiring about nine months) prior to university application deadlines. Candidates for Ph.D. degrees will be matriculated as soon as possible after completing 24 months of service with SENARAV as M.S. degree holders so their programs can be completed prior to the PACD.

All degree training will be scheduled to allow those already in training to return before others from the same program are sent out in order to maintain program continuity. Table I-3 lists the number of SENARAV employees to begin studies during each year of the project. As scheduled in Table I-4, the number of employees away in training will not exceed 21, except during the period from May through December 1994, when the last group must enter somewhat early to graduate before the PACD. This table gives the number of candidates and person-months involved in degree studies for each year of the project. Candidates for M.S. degrees will depart in May to complete advanced English courses prior to Fall (August or September) matriculation. They will be allowed five regular semesters and two summer sessions to obtain their degrees. Thus, they will be away in training for 32 months. Ph.D. candidates will be allowed seven regular semesters and three summer sessions, thus requiring 41 months for all studies. Short-term training will be concentrated during the first three years of project life, as shown in Table I-2 for off-shore training, and will be phased thereafter to occur during off-peak work seasons.

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Table I-3. Number of Candidates Beginning Advanced Degree Studies and English Language Courses During Each Project Year.

CATEGORY	PROJECT YEAR 1991	1992	1993	1994	1995	1996	1997	1998	TOTALS
I. DEGREE									
MSC	8	3	6	5	0	0	0	0	22
PHD	2	2	0	5	0	0	0	0	9
YR TOTALS	10	5	6	10	0	0	0	0	31
II. IN-COUNTRY ENGLISH (MSC Candidates Only)									TOTAL
	11	6	5	0	0	0	0	0	22

NOTES:

One woman candidate to begin the M.S program during 1991 and three during 1992. One woman to continue for the PhD in 1994.

Most MSc candidates to begin after others finish, and will require 9-month in-country English language course prior to departure for studies.

Most MSc recipients to serve for 24-months before continuing for the PhD.

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Table I-4. Person-months for advanced degree candidates by year, degree and group

GROUP AND DEGREE	NUMBER OF PERSONS AND MONTHS FOR EACH YEAR OF PROJECT																TOTAL PERSON MONTHS
	1991		1992		1993		1994		1995		1996		1997		1998		
	PER	MO	PER	MO	PER	MO	PER	MO	PER	MO	PER	MO	PER	MO	PER	MO	
Group 1																	
MSc	8	5	8	12	8	12	8	3									
PhD	2	2	2	12	2	12	2	12	2	3							
Group 2																	
MSc			3	5	3	12	3	12	3	3							
PhD			2	2	2	12	2	12	2	12	2	3					
Group 3																	
MSc					6	5	6	12	6	12	6	3					
PhD																	
Group 4																	
MSc							5	5	5	12	5	12	5	3			
PhD							5	2	5	12	5	12	5	12	5	3	
YEAR TOTALS																	
Persons	10		15		21		31		23		18		10		5		
Person-months																	
MSc		40		111		162		157		141		78		15		0	704
PhD		4		28		48		58		90		66		60		15	369
Both degrees		44		139		210		215		231		144		75		15	1073

M.S. candidates to begin in May for advanced English (3 months), then entering 2-year + 1 semester program in August for a total of 32 months.

PhD candidates to begin 3 year + 1 semester program in August, ending in December three years later, totaling 41 months.

Project year begins October 1 and ends September 30 the following year.

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IV. PROJECT ADMINISTRATIVE ARRANGEMENTS

The DOA will implement RAV II under the direction of a Zairian Project Director and the COP of the technical assistance team. The Project Director and COP will be responsible for overall direction, management, and coordination of all elements of the project. They will be supported by a management unit consisting of co-deputies (Zairian and contract counterparts) who will assist with the development and direction of project management, including administration, clerical services, the personnel unit, public relations and information, the financial management and accounting services unit, the procurement and logistical support unit, the training coordination unit, and support services (housing, transportation, etc.) units. Zairian and technical assistance specialists (breeders, agronomists, etc.) will be assigned to each of the three main research stations (see Personnel and Staffing in the following section). Additionally, Zairian personnel will be assigned to other secondary stations.

The project Central Coordinating Committee, consisting of the Project Director, the national program directors, and the COP, will meet annually to establish and prepare annual work plans, allocate budgets to different activities, and review and evaluate the national programs. There will also be a Research Management Committee which will meet monthly.

A. Support to Other Programs and Activities

RAV II will seek to complement and support the activities of other USAID-financed projects and the activities of other donors involved with small farmers. The collaboration between PROCAR and RAV I provides a good example of this type of joint activity. RAV II will support and enhance efforts of the World Bank, UNDP and FAO. Further, the project will support efforts of the agricultural assistance programs of Canada, West Germany, Great Britain, France, Italy, and other bilateral and multilateral donors. USAID Zaire is in contact with more than 123 non-governmental organizations that provide agricultural support to small farmers. Some of these would be targeted for collaboration with RAV II.

B. Research Grants Program

RAV II will sponsor a grants program to provide funding to Zairian university researchers, other non-SENARAV researchers, and researchers from interested IARCs, CRSPs, and other U.S. and international organizations. Research topics eligible for funding under this program must be priority topics in the overall SENARAV research plan. The grants program is a vehicle for carrying out research projects for which SENARAV lacks sufficient numbers of qualified personnel, and for strengthening SENARAV's international contracts and networks.

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When specific research projects appropriate for grant funding are identified, the Coordination Unit, with the guidance of the technical assisitance team's Chief of Party (COP), will prepare a written statement defining the topic and requesting expressions of interest. This statement will be circulated to those non-SENARAV Zairian researchers, particularly university professors, capable of carrying out the identified research. A contract stating conditions of the grant and the level of remuneration will be prepared by the Coordination Unit, with the guidance of the COP. The contract will be signed by the selected researcher and the Director of SENARAV.

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V. PERSONNEL AND STAFFING

The COP, stationed in Kinshasa, will be the principal advisor for applied agricultural research. In addition, the COP will be assisted by a Financial Management Specialist, and an administrative officer.

The RDT Specialist, who will provide expertise in farming systems/outreach and training, will also be posted at Kinshasa. This individual will work with the R&D Teams and with the R&D Unit coordinator of SENARAV. The SENARAV R&D Unit will be composed of 1 Zairian national coordinator, four R&D Team leaders, and 33 Zairian technicians. The RDT Specialist will also be responsible for assisting the COP in programming short-term and long-term training in coordination with the contractor's state-side staff.

Each of SENARAV's national programs will have a National Program Director and Technical Assistant Principal Scientist who will serve as his/her advisor. Other long-term Technical Assistance Specialists will be assigned to one of the primary research sites. These long-term Technical Assistance Specialists will work largely across commodity lines. Additionally, all Technical Assistance Specialists will spend not less than 25 percent of their research efforts in on-farm trials.

Each principal position will be staffed by one or more senior-level Zairian scientists and one contract advisor. After three years, many of the long-term degree participants should be in place; therefore, there will be a reduced number of contract staff after the third year of the project. The Zairian researchers and administrators should be fully capable of managing the research system after the sixth year. Table I-5 lists the long-term TA positions for the life of the project.

A preliminary analysis of SENARAV's staffing requirements for the RAV II project was undertaken by the design team. It was estimated that a total of approximately 535 persons at all levels will be required to carry out all project activities--a substantial reduction from the nearly 800 positions currently funded under RAV I. Of the 535 total positions, it was further estimated that 70 higher-level positions should be filled by individuals at the A0 (approximately equivalent to a B.S. degree), M.S., and Ph.D. levels; 51 intermediate-level positions by individuals at the A1, A2, and A3 education levels; and 414 other positions by individuals with equal or lower education levels.

It is important to recognize, however, that the above estimates are indicative only. In order to delineate more accurately SENARAV's future staffing requirements, a human resource needs assessment will be carried out, with the assistance of a short-term specialist in this field, within the first few months

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of project startup (i.e., by October-November, 1990). It is suggested that this study be conducted in conjunction with a similar assessment planned for INERA as a step towards the harmonization of human resource development planning for the two institutions. This comprehensive study will provide more definitive information on SENARAV's (and INERA's) personnel needs, including an assessment of the adequacy of living conditions and employment incentives.

A. Relationships between Long-Term TA and National Staff

Table I-6 shows the relationships between the long-term technical assistance specialists and SENARAV staff.

B. Long-Term Technical Assistance Position Descriptions

A brief description of each long-term technical assistant position is given in this section, following Table I-7, which is a summary of the positions and the level of effort for each by program component over the first two project years.

Table I-5. RAV II U.S. Long-Term Technical Assistance Positions, 1990-1998.

Position	Year 1	2	3	4	5	6	7	8
COP/Res	X	X	X	X	X	X	X	X
RDT Spec	X	X	X					
Financial Management	X	X	X	X	X	X		
Plant Breeder (Maize)	X	X	X					
Plant Breeder (Legume) & Pathologist	X	X	X					
Agronomist (Soil Sci.)	X	X	X					
Agricultural Economist	X	X	X	X				
Entomologist	X	X	X					
Research Station Mgmt.	X	X						
FSR Extension Sp.		X	X	X				
Administrative officer	X	X						

This staffing pattern is based on the Contractor's commitment to building SENARAV's internal capacity. For this to occur, optimal staffing patterns will also have to be achieved within SENARAV.

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Table I-6. RAV II Program Relationships Between the U.S. Long-Term Technical Assistance Team and the SENARAV Staff.

ACTIVITIES	SENARAV PERSONNEL	LONG-TERM TA
General Management, Coordination & Training	*SENARAV Director *Tech. Director *R&D UNIT STAFF	*COP & STAFF
APPLIED AG. RES. M'VUAZI	*PROWAM DIRECTOR *AGRON *ENTOM *PLANT PATH *AG.ECON. *STAT.MGNT *R&D LEADER	*AGRONOMIST *STAT. MGNT
APPLIED AG. RES. GANDAJIKA	*PNL DIRECTOR *AGRON *ENTOM. *PLANT PATH *AG.ECON. *STAT.MGNT *R&D LEADER	*PLT BREEDER/ PATHOLOGIST
APPLIED AG. RES. KANIAMESHI	*PNM DIRECTOR *PLT.BREEDER *AGRON *ENTOM *R&D LEADER *FARM MGNT	*PLT.BREEDER *AG.ECON. *ENTOM *FSR EXT

Table I-7. Summary of Long-Term Assistance Positions and Level of Effort for First Two years.

	LEVEL OF EFFORT(%)				
POSITION	SUSTAIN-ABILITY	TRAINING	FSR/O	RES	MGNT
COP	10	10	20	30	30
RDT	10	20	50	10	10
FIN.MGT	40	20	--	--	40
AGRON	10	15	35	30	10
STAT.MGT	20	20	10	10	40
BREEDER	10	20	20	40	10
BREEDER	10	20	20	40	10
ENTOM	10	20	20	50	--
AG.ECON	10	20	40	20	10
FSR EXT	10	20	50	10	10
TOTAL	140	185	265	230	170

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1. Chief of Party/Research

a. Duties and Responsibilities

Reporting directly to the Project Director of the Title XII contractor's lead institution, the Chief-of-Party/Applied Research Coordinator (COP/ARC) serves as:

Chief Manager of the Technical Assistance Implementation Team

The COP/ARC is the field-level manager of the technical assistance/Implementation team and its programs of work. Specific tasks include:

* prepare all annual programming recommendations for the project for approval by the GOZ, USAID Zaire, and the contractor;

* implement all intra-year project activities included in the annual programming guidelines;

* coordinate contractor's participation in all project monitoring, evaluation, input assessment activities, and special studies;

* ensure the timely flow of communications among and between team members, USAID, and the contractor's home office;

* participate in periodic inspection visits to project sites, and in meetings with USAID, GOZ officials, and other donor community representatives, to assess progress and help coordinate activities.

* take leadership for preparing all narrative and financial field-based reports to comply with the prime contract, related sub-contracts and agreements;

* hire and fire all resident and TDY expatriate personnel, and make and execute other financial commitments which are consistent with the annual programming guidelines, advising, and consulting with (as appropriate) the GOZ, USAID Zaire, and the lead institution and contractor;

* evaluate annually the performance of all resident technical assistance personnel and recommend changes in their levels of compensation, consistent with the prime contract and policies of their base institutions/universities, and provide end-of-duty reports and evaluations of all TDY personnel; and

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* take leadership for other activities that support the essential purpose of the RAV II Project.

Applied Research Coordinator

Working both with biophysical and social scientists from Zaire and overseas, the COP/ARC is to ensure that, through the effective use of technical assistance and counterpart personnel, the applied research component of the project results in the generation of the largest possible number of farmer-relevant improved technologies for the selected food crops and priority regions of Zaire. The COP/ARC launches on-station and on-farm research programs under his/her direct supervision and active counsel, and serves to lead the overall applied research effort of the project by example, focusing on the cassava breeding program at M'Vuazi. The COP/ARC also takes the lead role in the technical assistance team's efforts to improve research management within SENARAV, which will involve, among other things, working closely with Program Directors to develop and implement improved Research Management Loops.

b. Appointment Term/Level of Effort

This is an eight-year position, beginning in August 1990 in residence in Kinshasa for a total of 96 person-months. The effort of the incumbent is allocated equally to the two principal functions described above.

Qualifications

The incumbent must possess:

* a PhD relevant to plant breeding and regular tenure status in a SECID institutions.

* an easily recognized record of accomplishments in plant breeding for food crops in the tropics.

* five or more years experience in Africa.

* university administrative experience at the level of department chair or dean.

* leadership experience in COP or equivalent posts in AID technical assistance projects.

* proven capability to monitor and advise Zairian researchers.

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* an easy, pleasant management style, strong interpersonal skills, and an ability to write and communicate cogently and clearly.

* independently certified French language capability at the FSI 3/3 level before full-time residence in Kinshasa begins.

2. R&D and Training Specialist

a. Responsibilities and Functions

Reporting directly to the Chief-of-Party, the Research and Development and Training (RDT) Specialist serves as technical advisor for research and development activities. Working in liaison with the technical assistance team members, the SENARAV R&D Unit Coordinator, and the R&D team leaders, this individual will:

* provide training in methods and concepts of farming systems research and extension;

* review field activities of the R&D teams on a regular basis;

* provide technical support to the R&D Unit as needed, including the development of plans of work, participation in annual review and planning sessions, and assistance in evaluating R&D Unit activities;

* take primary responsibility for the development of internal and external evaluations of RAV II;

* oversee the timely preparation and dissemination of appropriate outreach documents based on technologies developed by SENARAV; and

* provide routine backstopping for the Kikwit and M'Vuazi R-D teams.

In addition, this person will serve as the contractor's coordinator of academic and non-academic training efforts in Zaire. Working in liaison with the contractor's training personnel in the US and Zairian counterpart trainers, the RDT Specialist takes leadership for:

* performing periodic human resource assessments and skills inventories;

* preparing annual training plans for academic and non-academic participants;

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* organizing necessary resources for the implementation of non-academic training in Zaire and overseas and for the pre-departure, departure, and return of academic participants;

* programming annually, organizing and implementing project seminars and workshops with training, information exchange, and outreach goals; and

* assisting the COP with coordination of the Kinshasa office.

b. Appointment Term/Level of Effort

This position will be for a three-year term, beginning in July 1990, on a TDY basis and then on a resident basis for a total of 36 person-months. The total effort will be divided between the functions described above. The position will be based in Kinshasa, but will involve extensive travel in Zaire.

This position should be located in Kinshasha for a number of reasons. First, this individual is expected to travel to each of the five outreach sites at least once each quarter, and sometimes more frequently. Location at a site other than Kinshasha will increase both the human (time) and fiscal resources involved in this travel to such a degree that the individual would almost undoubtedly not be able to meet this travel commitment. Second, this individual must interface closely with his/her Zairian counterpart, the national R&D coordinator, who is located in Kinshasha. Third, this individual's responsibility for training requires that the individual be located at a site where training can be effectively planned for the entire Southern Bank, where training materials can be easily produced, and where logistic support for training for the entire region covered by RAV II can be easily organized. Fourth, much of the early training (Years 1 and 2) will be provided by TDY expatriate assistance. This individual must be located in Kinshasha to facilitate the organization of this support for SENARAV. Fifth, a significant portion of the training offered in RAV II will be aimed at middlelevel managers and policy-makers, who are themselves located in Kinshasha. Sixth, the preparation of outreach documents can be most effectively undertaken in Kinshasa.

c. Qualifications

The incumbent will possess:

* a PhD degree in a project-related discipline;

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* administrative experience as an international program leader;

* demonstrable achievements as coordinator and instructor for university-supported short course, seminar and workshop programs, including some held in Third World settings;

* significant outreach/extension accomplishments, working as the interface between technical project personnel and Third World farmers;

* a thorough understanding of FSR methodologies, their strengths and weaknesses, and related techniques for monitoring and evaluating the impact of research and extension systems in farmers' fields;

* experience working with PVO's and NGO's;

* the capability to mentor and advise Zairian professionals;

* an easy, pleasant management style, strong interpersonal skills, and an ability to write and communicate cogently and clearly; and

* independently certified French language capability at the FSI 3/3 level before assuming residence in Kinshasa.

3. Financial Management Specialist

The Financial Manager, based in Kinshasa, will report directly to the COP. The Financial Manager will serve as coordinator of the contractor's non-technical operations. The Financial Manager is responsible for the timely planning, efficient management, and oversight of project operations, including (for example) commodity procurement, cash management, accounting for project inventory and finances, and operations relating to local accomodations, logistical needs, efficient communications, and domestic and international travel. He will ensure that appropriate protocols, policies, and procedures are in place so the technical assistance team, including TDY personnel, can function smoothly in the field and dedicate most time to their subject matter specialties relevant to the project's overall purpose. The Financial Manager, working closely with relevant USAID Zaire staff, monitors contract compliance for the contractor and the flow of counterpart funding for the project as a whole.

The individual will also provide technical assistance for improving SENARAV's financial procedures. The Institutional/Administrative Analysis discusses some areas for improvement in budgeting and financial management for SENARAV. The

Financial Manager will assist SENARAV in its development of appropriate procedures, including establishment of computerized financial management systems, improved budget-tracking procedures, and the development of research activity level budgeting.

Finally, the Financial Management Specialist will provide SENARAV with expertise in the development of financial sustainability. Achieving financial sustainability is a major priority for RAV II and SENARAV. The Financial Manager will be responsible for coordinating efforts in this area, and for securing short-term technical assistance to assist in the development, if feasible, of the Zaire Food Crops Research Endowment, as described in detail in the Economic Analysis.

b. Appointment Term/Level of Effort

This position will be for a six-year term in Kinshasa, beginning July, 1990 on a TDY basis and then on a resident, full-time basis for a total of 72 person-months.

c. Qualifications

The incumbent must possess;

* a Ph.D or MBA degree, or equivalent level of formal training in management;
* five years of financial management experience;
* senior-level AID project-related management experience of at least five years duration;
* a thorough understanding of USAID contracting regulations, the FARs, and of USAID's policies and procedures and relevant handbooks;
* a demonstrably productive record of involvement with US universities and with consortia administration of overseas technical assistance projects;
* an easy and pleasant management style;
* the capability to mentor and advise Zairian counterparts; and
* independently certified French language capability at the FSI 3/3 level before full-time residence in Kinshasa begins.

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4. **Plant Breeding Specialist (Maize)**

a. Responsibilities and Functions

Reporting directly to the COP and stationed at Lubumbashi, this individual will act as a plant breeder and assist host country scientists in gaining the experience necessary to assume full responsibility for developing and managing maize plant breeding programs. The Maize Breeder will:

* assist in evaluating and updating the PNM maize breeding program;
* be responsible for maize improvement research programs in one primary research center;
* help design and implement on-station trials at testing sites and on-farm trials at outreach sites;
* work with Zairian counterparts to implement research activities in the PNL and PRONAM programs at the primary research center of his/her residence;
* participate in the development of recommendations;
* assist in the development of extension publications;
* design and monitor on-the-job training activities of Zairian scientists; and
* provide regular consultation for researchers as needed.

b. Appointment Term/Level of Effort

This position will be for a three-year term, beginning July 1990 on a TDY basis and then on a resident, full-time basis for a total of 36 person-months. This individual will be expected to develop research activities at sites other than Kaniameshi.

c. Qualifications

The incumbent must possess:

* an M.S. or Ph.D degree in plant breeding, with an emphasis in maize breeding;
* three years of experience as a lead maize breeder and experience with composites and hybrids;
* a proven ability to work effectively with host country peers;

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* a demonstrably productive record of involvement with US universities and with consortia overseas technical assistance projects;

* independently certified French language capability at the FSI 3/3 level before full-time residence in Zaire begins.

5. Plant Breeding Specialist/ Plant Pathologist (Legumes)

a. Responsibilities and Functions

Reporting directly to the COP and stationed at Gandajika, this person will act as a plant breeder and assist host country scientists in gaining the experience necessary to assume full responsibility for developing and managing grain legume breeding programs and for assisting national programs with plant pathological research. The Legume Plant Breeder/ Plant Pathologist will:

* assist in evaluating and updating the PNL breeding programs in soybeans, cowpeas, common beans, and peanuts;

* be responsible for grain legume improvement research programs in one primary research center;

* help design and implement on-station trials at testing sites and on-farm trials at outreach sites;

* work with Zairian counterparts to implement research activities in the PNM and PRONAM programs at the primary research center of his/her residence;

* assist the three national programs in designing disease resistance studies and crop improvement programs; perform comparative evaluations and screening of nurseries;

* monitor the implementation of the programs described above;

* participate in developing recommendations and development of extension publications;

* design and monitor on-the-job training activities of Zairian scientists; and

* provide regular consultation for researchers as needed.

b. Appointment Term/Level of Effort

This position will be for a three-year term, beginning July, 1990 on a TDY basis and then on a resident, full-time basis for a total of 36 person-months. The effort of the incumbent will be

allocated appropriately between the functions described above. This individual is expected to work closely with all three national programs.

c. Qualifications

The incumbent must possess:

* an M.S. or Ph.D. degree in plant breeding, with an emphasis in legume breeding and extensive experience in plant pathology, or an M.S. or Ph.D. in plant pathology with extensive experience in legume breeding;

* three years of experience as a lead scientist in either a grain legume breeding program or a major plant pathological program;

* experience in the tropics, (with particular experience) in grain legume and maize disease control;

* a proven ability to work effectively with host country senior and junior peers;

* a demonstrably productive record of involvement with US universities and with consortia administration of overseas technical assistance projects;

* independently certified French language capability at the FSI 3/3/ level before full-time residence in Zaire begins.

6. Agronomist (Soil Scientist)

a. Responsibilities and Functions

Reporting directly to the COP and stationed at M'Vuazi, the Agronomist (Soil Scientist) will provide technical support to multidisciplinary research/extension teams operating in conjunction with all three national programs. The Agronomist/Soil Scientist will:

* design and supervise a soil fertility research program with the objective of maintaining and improving soil fertility, conservation and sustainability;

* participate in the design and supervision of cropping systems sub-projects to be carried out on and off station;
* consult on the technology and propriety of soil classifications within the scope of the project;

* participate in developing recommendations and the preparation of extension publications;

b. Appointment Term/Level of Effort

This position will be for a three-year term, beginning July, 1990 on a TDY basis and then on a resident, full-time basis for a total of 36 person-months. The majority of the incumbent's effort will be allocated to the first two functions described above. Short-term technical assistance will be provided to assist in soil classification efforts.

c. Qualifications

The incumbent must possess:

* a Ph.D. in agronomy with emphasis in soil fertility and plant physiology, or an M.S. in soil science with a Ph.D. in general agronomy, or an M.S. in general agronomy with a Ph.D. in soil science;

* at least three years of experience in the study of tropical soils and crop management in the tropics;

* a proven ability to work effectively with host country senior and junior peers;

* a demonstrably productive record of involvement with US universities and with consortia administration of overseas technical assistance projects;

* independently certified French language capability at the FSI 3/3/ level before full-time residence in Kinshasa begins.

7. Agricultural Economist

a. Responsibilities and Functions

Reporting directly to the COP and based in Lubumbashi, the Agricultural Economist, will act as the senior-level economist for the Research and Development Unit, including:

* participating in R&D Team diagnostic surveys;

* developing recommendations and assisting in the preparation of extension publications.

* analyzing and comparing alternative technologies, using data collected in on-farm trials;

* advising and training employees in methods of economic analyses;

* assisting R&D teams throughout SENARAV's domain in the formulation of data collection instruments; and

* assisting SENARAV in predicting the regional and national impact from technology adoption;

This individual will also help SENARAV, INERA, SEP, and other GOZ agencies conduct analyses which:

* utilize farm-level and other data to develop macro-economic policy recommendations;

* show the rates of return on investments in agricultural research, particularly in SENARAV, and regularly distribute the results of such analyses; and

* interpret and integrate micro-level (farm level) data within a regional and national context.

b. Appointment Term/Level of Effort

This position will be for a four-year term, beginning July, 1990 on a TDY basis and then on a resident, full-time basis for a total of 48 person-months. The effort of the incumbent will be allocated about equally among the functions described above. This individual, although based in Lubumbashi, will travel regularly to Kinshasa and to research, testing, and outreach sites.

c. Qualifications

The incumbent must possess:

* a Ph.D. in agricultural economics, with multi-disciplinary studies preferred;

* at least three years experience working in multidisciplinary teams;

* training in or proven familiarity with, methodologies of farming systems research and extension;

* a proven ability to work closely with host country peers;

* a demonstrably productive record of involvement with US universities and with consortia administration of overseas technical assistance projects;

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* independently certified French language capability at the FSI 2/3 level before full-time residence in Kinshasa begins.

8. Entomologist

a. Responsibilities and Functions

Reporting directly to the COP and stationed in Lubumbashi, the incumbent will act as entomologist for three national programs and will assist host country scientists in gaining the experience necessary to assume full responsibility for developing and managing multidisciplinary research programs in which entomological research is a component. The entomologist will:

* design and implement integrated pest management research programs in each of the project's operational regions;
* evaluate on-farm, post-harvest losses of maize and grain legumes;
* design, test, and recommend integrated pest management practices;
* help design and implement on-station trials at testing sites and on-farm trials at outreach sites;
* monitor the implementation of the programs described above;
* participate in developing recommendations and preparing extension publications;
* provide training in pest management; and
* design and monitor on-the-job training activities of Zairian scientists.

b. Appointment Term/Level of Effort

This position will be for a three-year term beginning July, 1990 on a TDY basis and then on a resident full-time basis for a total of 36 person-months. Although stationed at Lubumbashi, this individual will travel regularly to other research, testing, and outreach sites,, spending half-time outside Lubumbashi.

c. Qualifications

The incumbent must possess:

* a Ph.D. in entomology;

* three years of successful experience in integrated pest management programs;

* prior experience in the tropics, preferably in maize and grain legume programs;

* a proven ability to work effectively with host country peers;

* a demonstrably productive record of involvement with US universities and with consortia administration of overseas technical assistance projects; and

* independently certified French language capability at the FSI 3/3 level before full-time residence in Zaire begins.

9. Research Station Management Specialist

a. Responsibilities and Functions

Research station management is a major project component of RAV II. The Station Manager will provide expertise in the area of research station management. Additionally, this person will assist in farm development and improvement of the project's primary research and testing sites, including fixed processing machinery, procurement of spares, and maintenance of inventory. The Station Manager will:

* provide short-term, on-site training in research and station management of SENARAV personnel;

* implement or organize the maintenance of all buildings, including residences, offices and stores; check all rehabilitation to conform with contracted specifications; and

* assist Zairian counterparts in the development and implemetation of management plans for station physical resources, including land use management, physical plant management, and inventory.

b. Appointment Term/Level of Effort

This position will be for a two-year term, beginning July, 1990 on a TDY basis and then on a resident full-time basis for a total of 24 person-months. The effort of the incumbent will be allocated appropriately among the functions described above. This individual will probably be stationed at

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Lubumbashi, but will travel regularly to other research and testing sites.

c. Qualifications

The incumbent must possess:

* an M.S. or Ph.D. in an agricultural field with strong experience or training in agricultural engineering and/or research station management;

* experience in research station management in Third World nations;

* physical plant management experience and service in a tropical experiment station are highly desirable;

* a proven ability to work effectively with host country peers; and

* independently certified French language capability at the FSI 3/3 level before full-time residence in Zaire begins.

10. Farming Systems Research/Extension Specialist

a. Responsibilities and Functions

Working directly with RAV II counterparts and reporting to the COP, the Farming Systems Research/Extension Specialist (FSR/E Specialist) will assist Zairian counterparts in designing and implementing project workplans for the outreach and farming systems programs, and participate in the planning and implementation of farming systems research and extension. This individual will also develop long-term in-country plans for training outreach agents and extension training and teaching materials; advise and supervise trainers in improved communication systems and other extension methods; monitor the implementation of the outreach service and assist in testing recommended packages of new and improved technologies; and provide routine backstopping for the Kaniameshi, Niembo and Gandajika R-D teams.

b. Appointment Term/Level of Effort

The position will be for a three-year term beginning July 1, 1990 on a TDY basis and then on a resident full-time basis for a total of 36 person-months. This individual will be stationed at Lubumbashi and will be expected to strengthen relationships with outreach entities as well as conduct on farm trials.

c. Qualifications

The incumbent must possess:

* A Ph.D. or M.S. in agricultural education or ar agricultural field, but with several years of FSR/E experience;

* five years of successful experience as an extension agent or extension specialist;

* a productive record of involvement with U.S. Universities; and

* independently certified French language capability at the FSI 3/3 level before full-time residence in Zaire begins.

VI. THRESHOLD DECISION EVALUATION: RECOMMENDATIONS

The RAV II design team reviewed the December, 1988 RAV I Threshold Decision Evaluation Report and provide the following responses on each of the five recommendations included in the report. The project has been designed to address each of the issues raised in the Evaluation.

Recommendation A: The Evaluation Team strongly recommends that USAID, the responsible agency, turn over responsibility for their procurement to IITA. A fallback recommendation would be to ask REDSO/WCA for help.

Design Team Response: In RAV II, the contractor (rather than USAID) will be responsible for procurement of all goods and services (except vehicles) and for the management of all USAID-financed project costs within the guidelines agreed upon by the project contractor, USAID, and appropriate Zairian agencies.

Recommendation B: Even if certain aspects of SENARAV management improve, with better cost management, the Team considers lack of local currency resources as a major constraint. The Evaluation Team strongly recommends that USAID and the GOZ jointly examine this problem and conclude what can reasonably be provided by the way of local currency support during this period. If analysis shows there will still be a significant shortfall, a decision should be made to adjust the substance of the project.

Design Team Response: The Design Team recommends that USAID and the GOZ examine this important constraint for successful project management and implementation. Both the GOZ and USAID must agree upon specific guidelines and procedures for allocation of local currency prior to project approval.

Recommendation C: IITA's performance is a major constraint to realizing project objectives. The Evaluation Team strongly recommends (i) USAID, GOZ, and IITA consult to determine what role(s) IITA should play from now to the PACD; and (ii) IITA replace the existing leadership with a senior member of IITA's permanent Nigeria staff, with a track record of demonstrated leadership and management capacities.

Design Team Response: USAID has consulted in some depth with IITA and SENARAV on the roles to be played by the technical assistance team and this has resulted in revised scopes of work and specified departure dates for all IITA staff.

RAV II will be implemented by a Zairian project coordinator and a counterpart project coordinator who will serve as Chief-of-Party of the technical assistance team. The performance of all staff personnel and technical assistance team will be monitored by

the COP and the contractor's home office. Project goals, objectives, work plans, strategic plans, and project achievements will be reviewed, monitored and evaluated on a regular basis according to the details provided in the monitoring and evaluation section.

Recommendation D: Apparently, the recommendations are mis-numbered because no Recommendation D is included in the executive summary of the Threshold Decision Evaluation.

Recommendation E: The existence of PNM is threatened by its shaky hold on its facilities at Kisanga. The Evaluation Team strongly recommends the GOA/USAID act to reestablish PNM on a secure footing at that location.

Design Team Response: PNM was developing superior varieties of hybrid and composite maize years before the existence of The Centre de Recherche sur le Mais (CRM). The major objective of PNM was, and still is, to identify-- through introduction and/or breeding-- high yielding maize varieties that are resistant to major pests and diseases. The creation of CRM was, indeed, an unnecessary duplication of an existing maize program (PNM) which has been very successful, and its sustainability is now threatened by CRM. However, the research mandate of CRM is unclear and linkages and agreement between CRM and PNM have not been well established. Therefore, it is recommended that SENARAV and USAID take immediate steps to clarify the CRM research mandate before providing funds and support for maize research in Zaire.

Recommendation F: The three national programs should be reduced to two, cassava and maize.

Design Team Response: The design team recommends that RAV II support three national programs, cassava, maize and grain legumes. Its research activities will focus on applied research, on-station testing of potential technologies, and on-farm testing. Multidisciplinary team research will build upon on-going subject matter research efforts and continue to develop improved varieties and technologies and to explore the plant, soil, and climatic relationships that affect production of the principal crops grown in Zaire.

Three national programs are recommended because they are already well established and have made significant progress in both research results and organization. The PNL program has, with very limited resources, conducted excellent research and achieved significant technology transfer. Further, the crops addressed by the program are highly significant both from a nutritional standpoint (they are major sources of protein in the Zairian rural diet) and from an income generating standpoint (they are often the highest value crops raised by farmers). The multidisciplinary approach and expanded on-farm testing in RAV II will achieve

significant improvements in efficiency, and will decrease the single commodity focus of all three national programs, thus reducing the effective costs of each program.

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VII. OTHER IMPORTANT ISSUES

A. The Integration of SENARAV and INERA

The research system in Zaire can be strengthened and become more productive by the integration of SENARAV and INERA. This will not be an easy process. The Plan Directeur De La Recherche Agronomique Au Zaire specifically stated that before integration occurs INERA should undergo restructuring and in both INERA and SENARAV certain policies and management systems must be harmonized. The World Bank has taken an active role in the coordination of donor support for INERA's restructuring and in developing the plan. The PID document for RAV II specifically stated that, to achieve project purpose, the roles of SENARAV and INERA in programming, research policy and execution must be clarified, additional personnel policy harmonized and the GOZ financing of agricultural research increased.

Although there have been formal decrees and written agreements for the collaboration and integration of SENARAV and INERA as early as 1984, no steps towards integration have been taken. Therefore, it is strongly recommended that immediate steps be taken--in fact, similar to the ones proposed by the ad hoc interdepartmental commission developed by the DOA and the Department of Higher and University Education and Scientific Research (DSR) on November 13, 1989. These are as follows:

* beginning in September 1990, establishment of a four-year action plan to be developed by a national ad hoc committee created by the DOA and DSR.

* creation of joint documentation and publication services in December 1990.

* harmonization of compensation policy in July 1990, with DSR Statut to be extended to RAV researchers and technicians in September 1991.

* establishment of common research programming and implementation procedures by July 1991 and full adoption by September 1991.

* implementation of a common human resources development strategy by July 1991.

* application of the same financial management system by September 1991; integration of financial management and control by 1993.

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* establishment of a joint internal audit service, covering financial, scientific, and facility matters by July 1992.

* organization of technical services in 1992.

* joint management and administration in September 1993.

B. Salaries and Research Incentives

SENARAV staff are involved in important research. They have built one of the most successful national research programs in Zaire. However, their salaries are among the lowest of those of any national research institution in the country. Immediate action by the GOZ is necessary to correct this discrepancy. If SENARAV salary levels are not adjusted to the norms of the country, its national research programs will continue to lose valuable personnel. The drain on SENARAV resources is doubled where individuals who have received long-term training in the United States and elsewhere are lost to other organizations because of low salary structures in SENARAV. The salary discrepancy threatens the long term sustainability of SENARAV.

It is further recommended that the GOZ move SENARAV personnel into civil service (rather than contract) status. Civil service statutes themselves need to be modernized to more effectively govern career advancement for researchers. One objective of RAV II is to assist in developing evaluation criteria for researcher performance and to provide opportunities for rewarding superior performance. The efficacy of an evaluation system is tied to promotion of researchers within the civil service system.

Research publications will be one of the criteria for evaluating researcher performance. Presently, there is no active journal in Zaire to serve as an outlet for research publications. Therefore, RAV II proposes to provide the seed funds necessary to reactivate the INERA/SENARAV Journal of Research and Extension.

C. GOZ Financial Commitment to SENARAV

SENARAV must receive regular increases in its GOZ budget. This must be tied to more effective management of fiscal resources within SENARAV. The success of a national research system depends on efficient and effective management of human and fiscal resources, and on receiving adequate fiscal resources in a timely fashion.

VIII. SUMMARY AND CONCLUSIONS

The conclusion of this analysis is that RAV II can be implemented successfully and that the proposed design will support research and institution building activities in Zaire. Based on the analysis of RAV I and existing capabilities of agricultural research, this report concludes the following;

* The increased emphasis on farming systems/outreach, research management, and financial sustainability provides an appropriate organizational base for Zaire's agricultural research system.

* The project provides adequate mechanisms and processes for the integration of on-station and on-farm research, feedback mechanisms, and enhanced technology transfer.

* The training plan will provide additional and well qualified researchers and administrators who can fully manage the research programs after the RAV II project ends.

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ANNEX J. ECONOMIC/FINANCIAL ANALYSIS

ANNEX J. ECONOMIC/FINANCIAL ANALYSIS
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ANNEX J. ECONOMIC/FINANCIAL ANALYSIS

I. INTRODUCTION

This Annex discusses the economic/financial analysis of the RAV II project. First, key economic issues in the design project are identified and presented. Here, discussion focuses on general factors limiting economic returns to agricultural research in sub-Saharan Africa, specific economic factors affecting returns to agricultural research in Zaire and sustainabilty of agricultural research in Zaire. Next, a review of economic analyses of RAV I is presented. This is followed by a discussion on economic return estimates to RAV II. Presented here are the methodology, prameter values and data, results, and a sensitivity analysis. After this, the Annex discusses improving linkages between farming system research and Zairian Agricultural Policy during RAV II. The Annex concludes with a presentation on estimated project cost for technical assistance which support summary tables found in the main body.

II. KEY ECONOMIC ISSUES IN THE DESIGN OF RAV II

A. General Factors Limiting Economic Returns to Agricultural Research in Sub-Saharan Africa

Limited available evidence suggests a weak relationship between research funding in sub-Saharan Africa and growth of agricultural output in recent decades. Lipton suggests that this weak relationship is caused by (1) lack of critical mass of researchers, (2) incongruence between research and crop mix, and (3) neglect of socioeconomic factors in research design. Some of these factors undoubtedly explain the limited impact of research under RAV I. Solutions proposed for RAV II are discussed below.

1. Lack of Critical Mass of Researchers

Agricultural researchers in sub-Saharan Africa tend to be dispersed across many small stations. Poor communications within countries exacerbates the problem. High turnover of research staff, which Lipton associates with poor technical and logistical support and limited career opportunities, further prevents the building of a critical mass of researchers.

The design of RAV II addresses the problem of critical mass and productive ties among researchers by concentrating resources and personnel at three locations, M'Vuazi, Gandajika, and Lubumbashi. This approach was begun under RAV I, but will be accentuated under RAV II. Placing project personnel together into three well-equipped stations is likely to result in more high quality research output than scattering the same expenditures and personnel across many locations. Coordination among researchers,

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especially for farming systems research, will be facilitated by this approach. Communications within the national agricultural system will be improved by training sessions and national conferences focusing on research issues.

2. Incongruence between Research and Crop Mix

Agricultural research in Africa has focused disproportionately on marketed and export crops. Much less has been invested on crops grown mainly for home consumption, such as cassava. For example, African expenditure on coffee research equaled 3.1 percent of product value during the period 1972-79 (Lipton). In contrast, only 0.9 percent of product value was spent on cassava research during the same period. Such incongruence between crop mix and research priorities limits the returns to research because adoption rates are generally lower for new crops than for improved varieties of old crops.

Congruence between research and crop mix is a central concern in the design of RAV II. The concentration on food crops is justified by the economic value of these crops. One of the strengths of RAV I was a major focus on cassava, the most important food crop in Zaire. This research will be continued under RAV II, with a greater share of expenditures on cassava being directed toward dissemination of technology developed under RAV I. Other SENARAV crops, maize and grain legumes, are also very important in the crop mix in the Southern Band of Zaire.

3. Socioeconomic factors in research design

The design of research under RAV I was commodity-oriented. Though FSR teams existed in principle, they were not successful in incorporating critical factors concerning the social and economic environment into the research that was conducted. The value of the commodity orientation can be increased greatly by incorporating socioeconomic factors facing target population groups.

RAV II will establish a baseline, including socioeconomic data, from the beginning of the project (see Chapter VI on Monitoring and Evaluation). Variables relevant to the adoption of new agricultural technologies include labor availability, regional wage rates (or opportunity costs), gender relations as they affect agricultural practices, prices of outputs and purchased inputs, marketing costs, and tastes. Farmer recommendations based on improved analysis and better understanding of these socioeconomic factors should result in considerably higher levels of adoption and, hence, higher returns to research investments.

4. Weak Research-Extension Linkages

Linkages between research and extension are generally weak throughout sub-Saharan Africa (Roberts). Strengthening these

linkages through improved communication from research to extension and improved feedback from extension to research will increase the economic benefits of the project. RAV II will strengthen such linkages through the Research Management Loop, activities of the R&D teams, contractual relationships with outreach entities, and seminars focusing on outreach skills.

B. Specific Economic Factors Affecting Returns to Agricultural Research in Zaire

1. Labor Scarcity

The design of RAV I was based on the assumption of surplus rural labor. This view is questionable on several grounds. First, it overlooks the seasonality of labor demand and bottlenecks that emerge during critical farming operations, such as planting and weeding. Second, the surplus labor assumption ignores non-farm competition for farm labor as reflected in local wage rates (or opportunity cost, in cases where labor constitutes an input into non-farm products sold or consumed by the household). Third, the surplus labor assumption ignores invisible labor inputs such as walking to and from fields, which are located at increasingly greater distances from home in many parts of Zaire. Contrary to the assumption of the RAV I project paper, the RAV II design team found a binding labor constraint in many areas.

Labor availability in agriculture varies geographically in Zaire. A principal factor determining availability of both household and hired labor is the presence of off-farm activities that affect the local wage rate (or opportunity cost of labor). In rural areas surrounding Idiofa in Bandundu Region, for example, the wage rate is approximately Z150 per day (Tollens). In Mbuji Mayi in Eastern Kasai Region, where diamond mining represents a high-paying alternative to agriculture, the wage rate is approximately Z1000 per day. RAV II will pay close attention to wage rates and labor availability in the choice of recommended farming technologies. For example, labor-intensive technologies for improving soil fertility may be recommended in Bandundu. The use of fertilizer may be recommended in Eastern Kasai, where they are available through SENAFIC (Service National de Fertilisants et Intrants Connexes) and PMKO (Programme de Mais de Kasai Oriental).

Much of the labor for tillage and food preparation in Zaire is provided by women (Shapiro). Adoption of labor-intensive technologies, such as planting in rows, is likely to increase their workload. Numerous observers report that the Kinuani variety of cassava developed by RAV I has a higher water content than other varieties. This increases the time women spend in cossette preparation and reduces time available for other household tasks and for leisure.

Research under RAV II will be oriented toward increasing

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returns to labor. Furthermore, indirect effects of new technologies on other household activities, such as food preparation, will be considered.

2. Land Use Patterns and Trends

Tollens argues that the analysis of land use in parts of Bandundu and northern Shaba is confounded by simultaneous processes of land extensification and land intensification (Tollens, 1990). Land extensification is seen in the rapid cutting of the tropical deciduous forest, which is then planted without tillage and with minimal labor in plots of 15-20 hectares per household. This practice is a likely response to the binding labor constraint, discussed above, since shifting cultivation generally imposes lower labor requirements and generates higher returns to labor than permanent systems.

In the same areas, land intensification is observed through shortening of fallow period (see the Technical Analysis, Annex H, for a further discussion of this issue). Growing population pressure in the Southern Band is contributing to a shortening of the fallow periods, lowering annual yields and threatening the environmental stability of these areas. The scarcity of domesticated animals in Zaire limits the availability of animal manure to improve soil fertility. Legume intercrops that fix nitrogen appear to be an option, though it is essential to evaluate the impact of such an approach on labor productivity.

The economic impact of shortened fallow periods can be enormous. In eastern Nigeria, for example, Langemann found that cassava yields dropped from eleven to two tons per hectare as the fallow period was reduced from five to one and a half years.

Both land extensification (through cutting of the forest) and land intensification (through shortening of the fallow period) can be remedied to some extent through the development and adoption of higher yielding crop varieties. Choice of cultivation practices, such as intercropping, represent a further solution. Intercropping appears to be an economically sound response to land pressure. Research elsewhere in sub-Saharan Africa shows that land productivity is often higher in intercrop systems even though yields of individual crops are lower (Norman). Though RAV I focused on monocropping, varieties developed under that project will be tested in an intercrop setting under RAV II. Yield advantages to intercropping are likely to occur even for (improved) varieties bred for monocropping (Ogunfowora and Norman).

3. Crop Priorities

The current crop priorities of RAV are justified by their relative importance in Zairian agriculture. Along with plantains,

these commodities--cassava, maize, and grain legumes--are the country's most important food crops. In the Southern Band of Zaire, the primary geographic focus of RAV, cassava, maize, and peanuts, are the three most important crops, as measured by the percent of households cultivating them (Shapiro, 1987). Clearly, RAV is focusing on the most important food crops from a production standpoint. Under projected funding levels for RAV II, other crops should not be added without careful consideration of the potential reduction that would likely occur in research effort devoted to the current program crops.

4. Environment as a Public Good

In RAV II, an attempt will be made to establish a fund for money transfers from industrialized nations (principally the United States) to Zaire in exchange for measures to reduce destruction of the forest (see Chapter III and the Technical Appendix, Appendix H). There are valid economic reasons, based on the theory of property rights and public goods, for the establishment of such a transfer mechanism.

The environment is an important determinant of plant and animal productivity and of human satisfaction. Rights to environmental quality are not well determined across individuals and nations. Vast and hard-to-control spillover effects are associated with environmental degradation. Destruction of the environment may be caused by few, but the costs are borne by many. Because Zaire's net benefits from preserving its rain forests differ from those of the world at large, the environment may be treated as a public good and environmental degradation may be treated as an international externality.

Transfers or fines are frequently proposed as solutions for control of negative externalities. If preferences for environmental quality are strong in industrialized countries, and if effective degradation control mechanisms can be devised, a transfer scheme will benefit all nations.

C. Sustainability of Agricultural Research in Zaire

1. Establishing an Objective Basis for Public Support for Agriculture Research in Zaire

Economic analysis under RAV II of research productivity will provide information concerning (1) ceiling "efficiency" levels for research investment; (2) returns to re-allocation of existing funding levels to alternative commodities; and (3) returns from alternative approaches to research (e.g., plant breeding versus what Javier calls "intelligent borrowing").

Studies demonstrating high rates of return may increase demand for agricultural research by generating support for research

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funding. Timely economic analyses of returns to RAV activities throughout the project can contribute to greater domestic support for research and extension funding. Such analyses are viewed as an important element in enhancing the long-term sustainability of Zairian agricultural research and technology dissemination.

2. Cost-Effectiveness of Participant Training Versus Technical Assistance

Levels of technical assistance (TA) will be kept to a minimum. The cost of a technical assistance position is approximately $200,000 per year. In contrast, sending a trainee costs approximately $90,000 for a Master's program and $110,000 for a doctoral program (for a trainee already holding a Master's).

TA is a critical step in a long-term process of building Zairian human capital for agricultural research. First, it will fill gaps in the existing supply of Zairian manpower in the early years of the project, Second, TA will provide training so that current SENARAV employees can plan and implement programs of agricultural research more effectively. Third, TA will assist in the re-integration of returning long-term participant trainees, who will ultimately replace all expatriates.

Participant training represents a capacity increase that is critical for long-term sustainability of agricultural research in Zaire. TA provides direct benefits to the Project and to the national economy for a period of limited duration. In contrast, participant training is an investment in human capital that will provide direct benefits for many years.

3. Zairian Food Crop Research Endowment

Annual governmental budgetary appropriations for agricultural research will be supplemented by income from a special fund to be created at the beginning of the project, if such a fund is deemed feasible. This fund will be referred to hereafter as the Zairian Food Crop Research Endowment. Income from the Endowment would be made available to SENARAV.

a. Debt Conversion

The most likely source of Endowment funds for Zaire is debt conversion, often referred to as debt-for-development or debt-for-nature. A Debt Broker will be hired during the first year of the Project to analyze debt conversion possibilities for Zaire. If debt conversion appears feasible, the Debt Broker, working closely with USAID Zaire, will facilitate negotiations with the GOZ.

A secondary market exists in industrialized countries for developing-country debt. This debt can be purchased at a discount,

so that hard-currency development funds can be leveraged. Following the debt purchase, the Central Bank of Zaire would then deposit the negotiated amount of local currency into a special account for agricultural research.

Debt conversions have already been arranged for a number of African countries, including Ghana, Madagascar, Malawi, Niger, Nigeria, Sudan, and Zambia. Similiar agricultural research funds or endowments have been created recently in the Latin American countries of Honduras, Bolivia, Jamaica, Ecuador, Peru, and the Dominican Republic.

Environmental groups in the United States contacted the design team both before and during the design period to express interest in debt-for-nature swaps with Zaire. These groups are interested in agricultural research that reduces the penetration of agriculture into forested areas, particularly in the Kivu Region.

In Zaire, an endowment was created recently to support the School of Public Health at the University of Kinshasa. The modalities employed to create and manage this endowment may be useful in attempting to establish the Zairian Food Crop Research Endowment. The School of Public Health has established two endowments, one chartered as a "Missionary Foundation" in Zaire to permit foreign board chairpersonship, member representation and control. The second endowment is a tax-exempt non-profit organization in the United States. It is recommended that a mechanism such as a "Missionary Foundation" be investigated initially in Zaire for the possible Zairian Agricultural Research Foundation. A U.S.-based fund seems less likely to attract funds for agricultural research than for public health. However, the possibility of establishing a U.S.-based fund should be considered if foreign contributors appear interested. It should be recognized that contributors to such a fund would lose the leverage offered by a Zairian-based fund and would lose the ability to negotiate for protection of the natural environment in Zaire.

While a debt swap appears to be a potential source of funds for the Endowment, caution in this matter is advised by the Design Team. Debt swaps are relatively new, particularly in Zaire. The bulk of Zaire's debt is government-to-government debt and is currently not available for swaps. Citibank is in the process of organizing a "Kinshasa Club" to coordinate sale of Zaire's privately-held debt.

As a result, an experienced debt broker, such as the Debt-for-Development Foundation, will be engaged, if appropriate, to handle technical details of a potential debt conversion. The Foundation is a non-profit organization located in Washington, D.C. Its parent organization, the Debt-for-Development Coalition, is supported primarily by USAID/Washington.

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During the first half year of the Project, the Debt Broker would undertake an initial feasibility assessment to determine the precise status of Zairian debt and whether it is likely to be available for conversion. If this assessment is positive, a debt conversion might proceed along the following lines:

1. Officials in the Central Bank, the Ministry of Agriculture, other ministries of the GOZ, as well as Citibank officials, would be contacted concerning debt conversion for agricultural research.

2. Non-profit foreign groups, especially conservation organizations, would be identified and contacted to determine interest in purchasing Zairian debt in exchange for agricultural research and conservation activities in Zaire.

3. Contractual details of the debt swap would be worked out by the debt broker in consultation with interested non-profit organizations and the GOZ.

4. The broker would identify a seller (most likely a foreign bank, such as Citibank) that is willing to sell Zairian debt.

5. The broker would verify with the Central Bank that this particular debt is eligible for conversion.

6. Non-profit organizations would transfer dollars to the broker which, in turn, would purchase the debt.

7. The broker would notify the Central Bank that the transaction is completed and would request the Central Bank to transfer the local currency equivalent to a local bank account designated for agricultural research in Zaire.

8. Local currency funds would then be available for agricultural research in accordance with a Memorandum of Understanding to be signed by USAID Zaire and the GOZ. The Memorandum would establish the Zairian Agricultural Research Endowment, guarantee preservation of its financial assets, and provide guidelines for use of Endowment income.

b. <u>Other Sources of Funds</u>

In addition to debt conversion, counterpart funds, sales of foundation seeds, royalties from patented germplasm, and royalties from patents related to potential medicinal uses of cassava may represent additional sources of capital contributions for the

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program in Zaire and form an integral part of financing this project. Potential medicinal uses of cassava extracts are discussed in the Technical Analysis, Annex H.

c. Management of the Endowment

Endowment capital would be invested in general revenue bonds issued by the Central Bank of Zaire. To prevent erosion of Endowment assets, the capital would be indexed to the value of the U.S. dollar.

The Zairian Food Crop Research Endowment, if it is established, will be managed by a Board of Trustees, who will accept responsibility to ensure that the capital of the Endowment is preserved and prudently invested. The Board of Trustees would consist of five members, two from the GOZ and three representing international agricultural research organizations or universities. The two Zairian trustees would be appointed by the GOZ. Each of the following international organizations would appoint one foreign trustee: the International Service for National Agricultural Research Systems (ISNAR), the South-East Consortium for International Development (SECID), and the International Institute for Tropical Agricultural Research (IITA).

Income from the Endowment would be made available to RAV II in the eighth year of the project. An annual budget for use of Endowment income would be prepared each year by the office of the Director General of RAV. This budget would be submitted to and approved by the Board of Trustees.

An Agricultural Research Endowment Specialist may be hired for short-term technical assistance. This individual would make two trips, one of two months duration and the other of one month duration. The first trip would occur during the first year of the project; the other would occur near the end when some of the Endowment income will be utilized. The remaining two months of the assignment would be spread throughout the project, and would be devoted to contacting potential contributors and devising financial plans for endowment income distribution.

4. Phasing/Scheduling Over Time

a. Months 1-6

An experienced debt broker, such as the Debt-for-Development Foundation, would be engaged to handle details of a debt conversion for agricultural research in Zaire. Officials in the Central Bank, the Ministry of Agriculture, and other ministries in the GOZ would be contacted about a debt conversion proposal. Non-profit foreign groups interested in purchasing portions of Zaire's debt would be identified and contacted.

b. Months 6-12

Financial details of the debt swap would be worked out by the debt broker in consultation with interested non-profit organizations and the GOZ. A Memorandum of Understanding concerning the creation of the Zairian Food Crop Research Endowment, the preservation of its financial assets, and the use of endowment income would be signed by the GOZ, SENARAV officials, and USAID Zaire. The debt broker would identify a seller willing to sell Zairian debt.

c. Months 13-24

The first non-profit organizations purchasing Zairian debt would transfer dollars to the debt broker who, in turn, would purchase the debt. The Central Bank would then transfer local currency to a local bank account designated for agricultural research in Zaire.

5. Resources Needed

The project would secure the services of an experienced debt broker to examine and possibly negotiate the technical aspects of a debt swap for Zaire. An Agricultural Research Endowment Specialist would also be needed to assist in organizational and legal arrangements for the Endowment. A total of five person-months is budgeted for these two short-term assignments. These individuals would work closely with the Financial Management Specialist and the Chief-of-Party on the technical assistance team.

III. REVIEW OF ECONOMIC ANALYSES OF RAV I

Estimated rates of return to public-sector agricultural research outside sub-Saharan Africa are high compared to returns on alternative public (or private) investments. In a survey of 50 studies of agricultural research productivity in both high- and low-income countries, Evenson (1984) found that average estimated returns were nearly 50 percent and that returns exceeded 20 percent in all but four studies. On the basis of these results, funding for agricultural research in many countries remains lower than would appear justified by the estimated returns.

Two separate unpublished studies of returns to RAV I research are available. The first is an ex ante estimate found in the RAV I project paper. The internal rate of return to research projected for the three national programs combined was 21 percent. The second is an ex post study by Ariza-Nino (May, 1989). This study provided separate estimates of benefits to cassava and maize research. For a research investment of $5 million in cassava, Ariza-Nino estimated an internal rate of return of 16 percent over a 20 year period. The study estimated that maize research is justified if the present value of research costs does not exceed $4.2 million. This is equivalent to a 10 percent internal rate of return for a $4.2 million investment.

IV. ESTIMATING THE ECONOMIC RETURNS TO RAV II

A. Methodology

An ex ante analysis of economic benefits from research on cassava, maize, and grain legumes was conducted. This analysis serves two primary purposes. First, it shows that the potential returns to agricultural research in Zaire are high under reasonable assumptions about diffusion rates and expected cost reductions brought about by new technologies. Second, the analysis demonstrates that the rate of diffusion is a critical factor in realizing gains from agricultural research. The nature of research benefits render them difficult to project precisely. For this reason, the estimates presented here should be interpreted as indicative rather than exact.

The economic surplus method was used to estimate the benefits of RAV II. This method is used widely in applied economic analysis and is a common way of estimating gain to agricultural research. Only a brief outline of the method is presented here. More detailed explanations are found in Schuh and Tollini and in Norton, Ganoza, and Pomareda.

New technologies are assumed to shift the supply curve for the product to the right. Consumers then have more of the product available and producers may benefit from reductions in production costs. Changes in the combined consumer and producer surplus represent the total economic benefit from the new technology. Costs of research are subtracted from benefits to derive net benefits. Both costs and benefits are estimated on an annual basis. Project benefits are calculated by using a standard discounting technique, such as net present value or the internal rate of return, to adjust future net benefits to their present value.

B. Parameter Values and Data

Potential benefits from research were estimated separately for cassava and for maize. Returns to grain legumes research were not evaluated formally because of the diversity of crops in this category and the consequent difficulty of estimating model parameters to implement the economic surplus method. Parameter estimates needed for the analysis include (a) the expected cost reductions if research is successful, (b) the probability of research success, and (c) the expected rate of adoption of new technologies. These estimates were developed for maize and cassava by polling agricultural researchers on the design team to obtain their expert judgement. Responses from these team members were averaged and the resulting values were used in the analysis.

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Parameter values are shown in Table J-1 and J-2. Estimated cost reductions due to research are 35 percent for cassava and 40 percent for maize. The probability of research success is estimated at 60 percent for cassava and 70 percent for maize. Adoption of cassava and maize technologies was assumed to follow a logistic curve over time, with 40 percent of crop area being devoted to the new technologies after 20 years. Demand and supply elasticities for cassava and maize were not available for Zaire, so estimates used for developing countries in other studies were employed. A supply elasticity of unity was assumed for both crops. Demand elasticities of -0.2 for cassava and -0.4 for maize were employed.

Initial quantities and prices of cassava and maize were estimated for the regions of Zaire's Southern Band on which RAV II will focus. These are the regions of Bas-Zaire, Kinshasa, Bandundu, Eastern Kasai, and Shaba. Recent production and price data for Bandundu and Bas Zaire were obtained from the ongoing Projet Commercialisation des Produits Agricoles conducted by the DOA and the University of Louvain. Production estimates, shown in Tables J-1 and J-2, for the remaining Southern Band regions were obtained from publications by SEP (Service d'Etude et Planification); these were updated to incorporate annual increases in production. Producer prices for Bandundu are adopted and are taken to represent average producer prices for the Southern Band.

Estimates of costs of research were taken from the project budget tables presented at the end of this annex. These costs were allocated to national programs on the basis of the design team's estimate of the appropriate crop emphasis. Following standard practice in project analysis, costs and benefits were estimated over a 20 year period. It was assumed that the GOZ will support 75 percent of the operating budget and 100 percent of the SENARAV personnel costs projected for the last (eighth) year of the project after USAID funding ceases.

Assumptions about the adoption rate, crop-production cost reductions due to research, and the probability of research were based on average estimates drawn from the experience of design team members in other African countries (see Tables J-1 and J-2 for a list of assumptions). Demand and supply elasticity estimates were based on values used in rate-of-return studies in other developing countries. Since empirical estimates of key parameter assumptions were not available, a sensitivity analysis of these assumptions was conducted to determine their impact on the results.

C. Results

The equations used to estimate economic surplus are found in Norton, Ganoza, and Pomerada, listed in the references at the end of the project paper. An internal rate of return is then calculated from the estimated stream of costs and benefits.

TABLE J-1: PARAMETER VALUES FOR ESTIMATING POTENTIAL BENEFITS OF RAV II CASSAVA RESEARCH PROGRAM

PARAMETER	VALUE
Demand elasticity	0.20
Supply elasticity	1.00
Initial market volume (kilotons of cossettes)*	3,728.00
Market (producer) price ($U.S./ton)**	90.00
Cost reduction if research is successful	0.35
Probability of research success	0.60
Maximum percent crop area under improved varieties	0.40

*Estimated production in regions of Bas Zaire, Kinshasa, Bandundu, Eastern Kasai, and Shaba. Derived from written report and verbal communication with Mr. Minten and Mr. Goosens of Project Commercialisation des Produits Agricoles, DMPCC/Leuven, and from Service d'Etude et Planification (1987).

** Based on average producer price for Bandundu region. Sources are the same as reported above.

TABLE J-2: PARAMETER VALUES FOR ESTIMATING POTENTIAL BENEFITS FROM RAV II MAIZE RESEARCH PROGRAM

PARAMETER	VALUE
Demand elasticity	0.40
Supply elasticity	1.00
Initial market volume (kilotons)*	781.00
Market (producer) price ($U.S./ton)**	139.50
Cost reduction if research is successful	0.40
Probability of research success	0.70
Maximum percent crop area under improved varieties	0.40

* Estimated production in regions of Bas Zaire, Kinshasa, Bandundu, Eastern Kasai, and Shaba. Derived from written report and verbal communication with Mr. Minten and Mr. Goosens of Projet Commercialisation des Produits Agricoles, DMPCC/Leuven, and from Service d'Etude et Planification (1987).

** Based on average producer price for Bandundu region. Sources are the same as reported above.

Tables J-3 and J-4 show the annual expected cost reduction, the rate of adoption, program costs, program benefits, net benefits, and the internal rate of return.

The estimated internal rate of return (IRR) for cassava research is 42 percent. The estimated IRR for maize is 31 percent. These rates of return represent a real (inflation-adjusted) return on investment that is considerably higher than returns on financial securities in Zaire and fully justify the project investments that are projected.

D. Sensitivity Analysis

The base-case assumptions for cassava and maize were altered in a sensitivity analysis to determine their effect on rates of return. Parameters whose values were altered are listed in J-5 and J-6. These parameters include:

* The maximum rate of adoption after 20 years;
* The extent to which successful research reduces the cost of crop production;
* The probability of achieving research success;
* The supply elasticity;
* The demand elasticity; and
* The initial price of the crop commodity.

Three of the assumptions concern factors over which the project has partial control. These factors are the rate of adoption, the extent of cost reductions, and the probability of success in research. For this discussion, we focus on the rate of adoption. Tables J-5 and J-6 show that the rate of adoption of new technologies is a particularly critical determinant of the returns on investment in agricultural research. Reducing the maximum adoption rate of cassava to 20 percent of planted area by year 20 decreases the IRR to 24 percent. Decreasing the maximum adoption rate for maize to 20 percent decreases the IRR to 16 percent.

Three of the assumptions concern factors outside the control of the project. Elasticities of supply and demand have relatively little impact on total economic surplus. However, these elasticities may have an important impact on the distribution of economic surplus between producers and consumers. It is suggested that analyses of this distribution be undertaken in detail during project implementation. The initial price of the crop commodity affects realized gains from research, as shown in Tables J-5 and Table J-6.

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TABLE J-3: INTERNAL RATE OF RETURN AND NET PRESENT VALUE FOR RAV II CASSAVA RESEARCH PROGRAM

YEAR	PROP.COST RED.	ADOPTION RATE	PRONAM COSTS	EC.SURP.	NET BENEFITS
1	.000	.000	3699600	0	-3699600
2	.004	.017	2464400	592153	-1872247
3	.009	.045	2528000	1580620	-947380
4	.016	.078	1876000	2751623	875623
5	.025	.120	1678800	4244930	2566130
6	.037	.174	1510800	6166733	4655933
7	.051	.241	1298400	8543277	7244877
8	.059	.280	1248800	9960071	8711271
9	.063	.300	682800	10678902	9996102
10	.066	.316	682800	11254677	10571877
11	.070	.332	682800	11831084	11148284
12	.072	.344	682800	12263803	11581003
13	.075	.356	682800	12696877	12014077
14	.076	.364	682800	12985790	12302990
15	.078	.372	682800	13274861	12592061
16	.080	.380	682800	13564090	12881290
17	.081	.388	682800	13853477	13170677
18	.082	.392	682800	13998230	13315430
19	.083	.396	682800	14143022	13460222
20	.084	.400	682800	14287853	13605053

Net Present Value of Economic Surplus at 10 percent: $58,548,029

Internal Rate of Return: 42.42%

TABLE J-4 : INTERNAL RATE OF RETURN AND NET PRESENT VALUE FOR RAV II MAIZE RESEARCH PROGRAM

YEAR	PROP.COST RED.	ADOPTION RATE	PNM COSTS	EC.SURP.	NET BENEFITS
1	.000	.000	2404740	0	-2404740
2	.005	.017	1601860	256725	-1345135
3	.013	.045	1643200	686131	-957069
4	.022	.078	1219400	1196219	-23181
5	.034	.120	1091220	1848867	757647
6	.049	.174	982020	2692328	1710308
7	.067	.241	843960	3740618	2896658
8	.078	.280	811720	4368718	3556998
9	.084	.300	443820	4688094	4244274
10	.088	.316	443820	4944298	4500478
11	.093	.332	443820	5201128	4757308
12	.096	.344	443820	5394160	4950340
13	.100	.356	443820	5587544	5143724
14	.102	.364	443820	5716662	5272842
15	.104	.372	443820	5845936	5402116
16	.106	.380	443820	5975366	5531546
17	.109	.388	443820	6104953	5661133
18	.110	.392	443820	6169805	5725985
19	.111	.396	443820	6234696	5790876
20	.112	.400	443820	6299626	5855806

Net Present Value of Economic Surplus at 10 percent: $25,703,404
Internal Rate of Return: 31.25%

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TABLE J-5: SENSITIVITY ANALYSIS FOR INTERNAL RATES OF RETURN FOR RAV II CASSAVA RESEARCH PROGRAM

PARAMETER	INTERNAL RATES OF RETURN
Maximum Rate of Adoption	
20.0%	24.14%
40.0%	42.42%
60.0%	57.02%
Cost Reduction if Research is Successful	
20.0%	27.18
35.0%	42.42
60.0%	62.72
Probability of Research Success	
40.0%	30.63
60.0%	42.42
80.0%	52.38
Supply Elasticity	
0.50	40.39
1.00	42.42
1.50	44.43
Demand Elasticity	
0.00	42.20
0.20	42.42
0.40	42.57
Initial Price	
$ 50.00	28.81
$ 90.00	42.42
$140.00	58.38

TABLE J-6: SENSITIVITY ANALYSIS FOR INTERNAL RATES OF RETURN FOR RAV II MAIZE RESEARCH PROGRAM

PARAMETER	INTERNAL RATES OF RETURN
Maximum Rate of Adoption	
20.0%	18.07%
40.0%	31.25%
60.0%	42.93%
Cost Reduction if Research is Successful	
20.0%	18.07
40.0%	31.25
60.0%	42.93
Probability of Research Success	
30.0%	23.29
70.0%	31.25
90.0%	36.17
Supply Elasticity	
0.50	28.15
1.00	31.25
1.50	33.30
Demand Elasticity	
0.20	31.08
0.40	31.25
0.60	31.38
Initial Price	
$100.00	23.40
$138.50	31.25
$200.00	41.28

IMPROVING LINKAGES BETWEEN FARMING SYSTEMS RESEARCH AND ZAIRIAN AGRICULTURAL POLICY DURING RAV II

The rudimentary state of Zairian agricultural statistics presents a significant hurdle to applied economic analysis. The current policy framework for all aspects of agriculture in Zaire is based on a shaky statistical foundation. Reliable estimates of crop areas, crop yields, crop production levels, and many other variables are still not available from the statistical service of the DOA. Tollens, who recently argued that no one knows for sure whether food production levels in Zaire are increasing or decreasing, and others are currently conducting a series of regional food marketing studies in Bas Zaire, Bandundu, and Shaba. RAV II will further strengthen the data base for Zairian agricultural statistics by providing improved farm-level and market-level information.

In particular, RAV II will collaborate with SEP (Service d'Etude et de Planification), the data collection and policy analysis agency of the DOA. USAID has provided technical assistance and training to SEP for over 15 years. Currently this support is provided under the Agriculture Policy and Planning Project (660-0119).

By strengthening the institutional linkages between RAV and SEP, farming systems research will provide a critical source of knowledge to the GOZ in its continuing efforts to create market-oriented policies and institutional incentives for agriculture. Currently the GOZ appears to have no regular sources of reliable farm-level production data. Stronger linkages between SEP and RAV will enhance the effectiveness of both agencies. Benefits to SEP include improved data quality and greater ability to conduct analyses reflecting current producer-level constraints related to input supply, credit, and prices. Benefits to RAV include greater production impact as GOZ agricultural policies are based on improved information concerning the actual constraints and incentive environment faced by farmers.

It is suggested that RAV and SEP each appoint one employee charged with fostering collaboration between the two agencies. Specific ways in which RAV and SEP can collaborate include the following:

1. A SEP employee will participate in the collection of farming systems baseline data during the first year of RAV II. This individual should be a Master's level economist who will have on-going responsibility within SEP for farm-level data collection and analysis. The SEP employee should be provided funds to travel with the FSR teams in each of the regions where the project is working for a period of time to assist in gathering

the baseline data.

An example of the benefits RAV would obtain from collaboration with SEP concerns the estimation of planted areas under intercropping. Dr. Suha Satana, the Data Collection Advisor for Project 119, has examined current RAV procedures for estimating cultivated areas.

2. Economists from RAV and SEP will collaborate in estimating production functions for major food crops. Estimated production coefficients will be valuable to RAV in developing farmer recommendations. These estimates will be valuable to SEP in developing aggregate estimates of production and input usage.

3. Joint conferences by RAV and SEP on topics such as (a) the sustainability of agricultural research in Zaire; (b) debt-for-development related to agricultural research and natural resource conservation; (c) agricultural research priorities in Zaire; (d) seed production in Zaire; and (e) agricultural policy reform.

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VI. Summary Data on Estimated Project Costs

RAV II is an eight-year project, with a total USAID contribution of $20.0 million. It is anticipated that the GOZ will contribute $21.5 million, with $12.2 million coming from commodity import- and PL 480-generated counterpart funds and the balance from GOZ regular budget resources. Hence, approximately $41.5 million will be available to the project.

As stated in Chapter V the process followed by the team to develop its financial analysis involved, first, designing RAV's program of work and some financial data bearing especially on USAID as a funding source. Results were then discussed with the Mission staff and SENARAV representatives, who provided generously relevant data and information available to them. A full budget was then estimated in at least three iterations, after each of which separate meetings were held by the team with USAID and SENARAV.

From this process Tables J-7 thru J-12 were prepared. Table J-7 presents estimated costs for long term personnel while Table J-8 presents costs for short term personnel. Collectively, these tables produce the overall personnel cost of $10.2 million. Table J-9 presents estimates on participant training costs utilizing target training efforts presented in Chapter IV and Appendix I Tables J-10, J-11 and J-12 present cost assumptions for equipment, vehicles and facilities.

TABLE J-7: RAV II PERSONNEL COSTS FOR CONTRACTOR'S LONG-TERM FIELD AND HOME OFFICE PERSONNEL

A. EXPERTISE AND PERSON-YEARS

POSITIONS	Year 1	2	3	4	5	6	7	8	SUBTOT
I. FIELD PERSONNEL									
COORDINATION									
COP/Research	1	1	1	1	1	1	1	1	8
RD&T Spec.	1	1	1						3
Financial Mgmt. Specialist	1	1	1	1	1	1			6
NATIONAL PROGRAMS									
Plant Br /Pathol.(Legumes)	1	1	1						3
Plant Breeder (Maize)	1	1	1						3
Agronomist (Soil Fert.)	1	1	1						3
Ag. Economist	1	1	1	1					4
FSR Specialist	1	1	1						3
Entomologist	1	1	1						3
Station Dev /Manager	1	1							2
TOTAL (Field Personnel)	10	10	9	3	2	2	1	1	38
II. HOME OFFICE PERSONNEL	1.5	1.5	1.5	0.5	0.3	0.3	0.2	0.2	6

B. COSTS IN THOUSAND USD

CATEGORIES	Year 1	2	3	4	5	6	7	8	TOTAL
FIELD PERSONNEL	2000	2000	1800	600	400	400	200	200	7600
HOME OFFICE PERSONNEL	180	180	180	60	36	36	24	24	720
SUBTOTAL (USG Pers.Costs)	2180	2180	1980	660	436	436	224	224	8320
Inflation @ 10%									830
TOTAL (USG Pers.Costs)									9150

NOTE: Field Personnel Person-Year = $ 200.000
Home Office Personnel Person-Year = $ 120.000
An expatriate administrative officer (Table I-5) has not been included in the above estimates. One person for two years, who could train a Zairian national, is strongly recommended. Assuming the contractor can achieve savings in personnel and other categories of the US dollar budget.

TABLE J-8: RAV II PERSONNEL COSTS FOR CONTRACTOR'S SHORT-TERM FIELD PERSONNEL

TYPE OF EXPERTISE	Year 1	2	3	4	5	6	7	8	In Country	On Campus	Total
					Person-months						
Biometrics/Statistics	2	1	1	0					4		4
Agricultural Economics	2	3	3	2	1	1	1		7	6	13
Soil Fertility/Conservation	2	1	1	1					5		5
Document/Information	2	2	1						3	2	5
Pathology	1	1							2		2
Postharvest/Storage/Util.	1	1	1	1	1	1			6		6
Gender Analysis	1	1	1						1	2	3
Outreach Methodologies	1	1	1	1					4		4
Research Station Mgmt.	3	2	1						4	4	8
Global Climate Change	1		1						2		2
Debt Conversion/Endowment	2		2						4		4
SUBTOTALS (Person Months):	18	13	14	6	2	2	1	0	42	14	56
In-Country	15	7	11	4	2	2	1	0	42		
On Campus	3	6	3	2						14	
					$1.000						
In-Country	300	140	220	80	40	40	20	0	840		
On Campus	30	60	30	20	0	0	0	0		140	
SUBTOTAL (Costs):	330	200	250	100	40	40	20	0			980
Inflation	0	12	15	7	3	2	3	-			
TOTAL (Costs)	330	212	269	107	43	42	23	0			1022

NOTE: In-Country Pers.month = $20.000
On Campus Pers.month = $10.000

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Explanatory Notes, Table J-8

Estimated levels of effort have been multiplied by $20,000 per person-month for in-country technical assistance and $10,000 for on-campus technical assistance/backstopping. The rationale for each category of expertise follows:

1. Biometrics/Statistics. Priority is placed on the M'Vuazi research station. Consultants will assist the contractor's resident team members with refining protocols and methodologies for research and experimental designs, and with developing an accelerated scheme for data analysis. Some computer programs may need to be written and software packages adapted. Most of this effort will be allocated to the project's first two years, and most will be contributed by a single individual under a recurring technical assistance arrangement.

2. Agricultural Economics. Only one M.Sc. was effectively trained in the field under RAV I; one Ph.D. will be returning from Ohio State in 1991. The project paper reduces to one the number of resident team members in agricultural economics, while two were called for by the PID. Therefore, the design team proposes short-term technical assistance in this field as a high priority, to assist with (a) the Year 1 baseline survey, (b) conducting subsequent technology-adoption and other farm-level surveys, (c) bridging microeconomic analysis to macroeconomic propositions of use to research/extension managers, (d) conducting periodic rate-of-return analyses of project impact, and (e) strengthening linkages between RAV II and SEP. A single university, which possesses qualified and highly committed faculty who can work with the project over most of its life, should provide this backstopping.

3. Soil Fertility/Conservation. Short-term consultants will be engaged to review and up-date the experiment station soils maps in Year 1; to support soil fertility work at Gandajika, Lubumbashi, and Mulungu, thus extending the arm of the resident agronomist/soil fertility team member at M'Vuazi; to advise on the establishment of the new soils laboratory in Kinshasa; and to assist with soil-conserving research for sustainable cropping systems.

4. Documentation/Information. Booklets and fact sheets must be published by RAV II for cassava, legumes, and corn; research accomplishments need to be widely known; and publication of a professional journal should be resumed in Zaire. While in early years of the project these publications can be most economically produced on campus in the U.S., a local capacity should be developed and placed "on stream" by Year 3 in the "Continuing Education and Outreach Unit" which this project paper proposes. The assistance projected here is for these purposes.

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5. Pathology. The contractor's nominees for Applied Research and Legume Breeding should have strong credentials in pathology; a Ph.D. Zairian pathologist will return from training in 1991. If most organisms are sent to the Commonwealth Microbiology Laboratory (at a cost of about $25.00 per analysis), the design team believes only very limited consulting assistance will be required during the initial years of the project.

6. Postharvest/Storage/Utilization. Just as RAV II will create new technologies and cropping systems options, it must create new options on the side of the demand for what is produced if production and rural incomes are, in fact, to increase. Consultancies in these three areas are intended to make a modest contribution to the demand side of the equation. CIAT will be invited to extend its innovative approaches to cassava utilization to RAV II; storage improvements for cassava, as well as beans and corn, will be investigated; and the potential for increased national seed production, including the use of tissue culture and meristem techniques for storing and multiplying cassava, will be examined. Limited work in the area of food technology may be undertaken, especially where questions concerning the nutritive value of new crop varieties are raised.

7. Gender Analysis. Follow-up work in gender analysis by the design team member responsible for this area of the project paper is recommended.

8. Outreach Methodologies. Though resident team members should be well versed in this area, and fully supported by the Title XII contractor, the design team anticipates here the occasional need for some specialized methodological skills in outreach and technology transfer--for example, in communications.

9. Research/Station Management. Research management is a major project component. The design team recommends that RAV II draw on the University of Maryland's expertise in the International Development Management Center for short-term assistance for the Year 1 diagnosis of constraints in Zaire's research management loop, and for related training and advisory help in reducing those constraints. Station Management has been included as an additional area, which will likely absorb very modest amounts of short-term technical assistance.

10. Global Climate Change. This is intended to position Zaire strategically to participate with AID and the international community in agriculturally-related measures taken to arrest (or reduce) global warming

11. Debt Broker/Endowment Specialist. This project paper proposes a a possible debt-for-development (or debt-for-nature) swap that could capitalize a new endowment fund for agricultural research. These related efforts would require individuals with somewhat different skills--some for debt conversion and others for establishment of the endowment--who can backstop the Title XII contractor's President Financial Management Specialist. Both efforts would be highly leveraged, i.e., contributions from the Debt-for-Development Coalition in Washington, D.C., and from other private and public sources, would be sought to complement the short-term consulting assistance projected here.

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Table J-9. Participant training costs by year and category*

CATEGORY COST	COST ($000)								
	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5	Yr-6	Yr-7	Yr-8	TOTALS
I. RAV II ADVANCED DEGREE TRAINING **									
MSc	100	291	446	454	428	249	50	0	2018
PhD	10	74	132	168	274	211	201	53	1123
MSc and PhD	110	365	578	622	702	460	251	53	3141
RAV I carry-over	193	176	25	---	---	---	---	---	394
II. IN-COUNTRY ENGLISH LANGUAGE COURSES ($9000 per person)									
MSc (Only)	99	54	45						198
Totals for All degree training	402	595	648	622	702	460	251	53	3733
III. SHORT TERM PARTICIPANT TRAINING									
* All short-term	240	168	120	24	24	16	8	0	600
TOTALS (participant training)	642	763	768	646	726	476	259	53	4333

*See table I-4 in Annex I for breakdown by man months of participant training.

**Monthly long-term training costs are estimated to be $2,500/person in Project-Year 1, increasing by 5% per year (to $3,518/person-month in year 8) throughout the life of project. An estimated 151 person-months of advanced degree training which was initiated under RAV I is included as a separate line item in this table.

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TABLE J-10: RAV II PROJECTED BUDGET DETAIL FOR OFFICE EQUIPMENT, LABORATORY EQUIPMENT, OFFICE SUPPLIES AND HOUSEHOLD FURNISHINGS ($000)

CATEGORIES	Unit Price	Quantity	SUBTOT
A. OFFICE EQUIPMENT			
Desks, Cabinets, Bookcases, and Lamps	1091	11	12000
Desktop Computers, Printers & Software (4)	6000	4	24000
Laptop Computers, Printers, Software (10)	4000	10	40000
Fax Machines	2000	4	8000
Typewriters	520	5	2600
Photocopy Machines	3500	4	14000
Transformers	33	30	1000
SUBTOTAL (Office Equipment)			101600
B. LABORATORY EQUIPMENT			
Maize & Manioc Programs			
Moisture Meters	1200	2	2400
Plot Harvesters	2300	2	4600
Microscopes	6000	2	12000
Grain Dryers	2200	2	4400
Field Plot Tools	1800		1800
Binoculars	250	2	500
Seed Shellers	1000	2	2000
Autoclaves	18000	1	18000
Transfer Hoods	10000	2	20000
Slide Projectors	500	4	2000
Desk Calculators	250	4	1000
Refrigerators	600	1	600
Freezers	700	1	700
Air Conditioners	1500	2	3000
SUBTOTAL (Maize & Manioc Prog.)			73000
Legume Program			
Thresher	1000	3	3000
Seed Cleaning Machines	6000	2	12000
Grain Dryers	2200	4	8800
Air Conditioners for Seed Storage	1550	2	3100
Refrigerators	600	1	600
Freezers	700	1	700
Slide Projectors	500	2	1000
Microscopes	6000	2	12000
Field Plot Tools	1800		1800
SUBTOTAL (Legume Program)			43000
Entomology			
Insect Cages	400	50	20000
Microscopes	6000	2	12000
Binoculars	250	2	500
Incubator Chambers	3000	6	18000
Heaters	200	2	400
Desk Calculators	250	1	250
Freezers	700	1	700
Refrigerators	600	1	600
SUBTOTAL (Entomology)			52450

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Soil Fertility			
pH Meters	2200	4	8800
Nitrogen Determinator	6000	1	6000
Spectophotometers	4000	2	8000
Electrical Conductivity Meters	1300	4	5200
Plant Sample Analyzers	4000	1	4000
Atomic Absorption Unit	12000	1	12000
Air Conditioning Units	1500	2	3000
Electrodes	250	12	3000
Air Compressor	1400	1	1400
Freezer	700	1	700
Refrigerator	600	2	1200
Ovens	1200	2	2400
SUBTOTAL (Soil Fertility)			55700
SUBTOTAL (Laboratory Equipment)			224150
C. SUPPLIES			
Journals X 4 Stations X 8 Years	300	320	96000
Books X 4 Stations X 8 Years	200	320	64000
Office Supplies			120000
Research Supplies			132750
Laboratory Supplies			150000
SUBTOTAL (Supplies)			562750
D. TECHNICAL ASSISTANCE HOUSEHOLD FURNISHINGS			
Furniture Set	13000	11	130000
Drapes	1000	11	10000
Refrigerator	600	11	6000
Freezer	700	11	7000
Fan	200	11	2000
Stove	600	11	6000
Air Conditioner	500	44	20000
Washer	500	11	5000
Dryer	500	11	5000
Water Filter	200	11	2000
Screens	1000	11	10000
Transformers	50	55	2500
Repair Work X 42 Person-Years	1000	42	38000
SUBTOTAL (TA Household Furnishings)			243500
TOTAL			1132000

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TABLE J-11: RAV II BUDGET DETAIL FOR PROJECT VEHICLES AND SPARE PARTS ($000)

A. LOCATION AND NUMBERS OF VEHICLES

VEHICLES/LOCATIONS	Year 1	2	3	4	5	6	7	8	SUBTOT
LAND CRUISER/STATION WAGON									
Kinshasa, Lubumbashi, M'Vuazi, Gandajika	10				2				12
LAND CRUISER/2-SEAT PU									
R&D Teams	4				4				8
Kiyaka Station	2				1				3
M'Vuazi Station	1				1				2
Gandajika Station	1				2				3
Lubumbashi Station	1				2				3
Mulungu Station	1				1				2
Subtotal	10				11				21
MOTORCYCLE/YAMAHA 125CC									
M'Vuazi Outreach	7				7				14
Kiyaka Outreach	7				7				14
Gandajika Outreach	7	3			7	3			20
Niembo Outreach		3				2			5
Kaniameshi Outreach	6	2			7	3			18
Subtotal	27	8	0	0	28	8	0	0	71

B. VEHICLE COSTS IN THOUSAND USD

VEHICLES/LOCATIONS	Year 1	2	3	4	5	6	7	8	SUBTOT
LAND CRUISER/STATION WAGON (1)	220	0	0	0	44	0	0	0	264
LAND CRUISER/2-SEAT PU (2)	150	0	0	0	165	0	0	0	315
MOTORCYCLES (3)	76	23	0	0	78	22	0	0	199
SPARE PARTS (4)	126	6	0	0	87	7	0	0	226
TOTAL Vehicles	572	29	0	0	374	29	0	0	1007

NOTE: (1) Cost of Equipped Toyota Land Cruiser Station Wagon, CIF, Matadi = $22,000
(2) Cost of Equipped Toyota Land Cruiser 2-Seat Pickup, CIF, Matadi = $15,000
(3) Cost of Equipped Yamaha 125cc. Motorcycle = $2,800
(4) Calculated at 25 pct. of vehicle (station wagon, pickup, and motocycle) costs

TABLE J-12: RAV II FACILITY REHABILITATION COSTS ($000)

LOCATIONS	SUBTOTAL	USG PORTION	GOZ PORTION
M'Vuazi Reseerch Station	100		
Kaniameshi Research Station	900		
Gandajika Research Station	700		
Kinshasa--Coordination Office	100		
TOTAL Cost	1800	900	900

NOTE: For details, see Chapter 5, "Cost Estimates and Financial Management"

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ANNEX K. ENVIRONMENTAL ANALYSIS

An Initial Environmental Examination was done for the PID. It recommended the technical assistance, training, research management, and financial sustainability activities for categorical exclusion. A negative determination was recommended for the production and sale of chemically treated and dyed breeder and foundation seeds, since they were determined not to result in significant adverse environmental impact.

The project design team and the mission reviewed project activities for their potential environmental impact. The major issue raised was the potential impact of agricultural technologies on the clearing of Zaire's forests and the conservation and use of fragile lands. In the RAV I project design, it was concluded that "... environmental problems from extensive (slash and burn) agriculture, have not yet become a significant threat to Zaire ... (p. 31)." More recently, environmental policy concerns have led AID to designate Zaire as one of the eight core Global Change countries. While having one of the lowest rates of deforestation in the world, the rapid build-up of urban populations, and the concentration of population along major transportation axes, have led to substantial degradative pressure on some gallery forest areas and to shortening of bush and grass fallow cycles in areas which are major providers of food to urban markets. Therefore, this project design features substantial allocation of effort to natural resource management, including maintenance of soil fertility and techniques to improve fallow to accelerate fertility and soil management. Extensive training of field staff in natural resource management under Zairian conditions will be carried out and specialized short-term assistance provided. In addition, the project will network with regional and international programs in natural resource management and will explore the use of debt-for-conservation swaps to provide resources for improving land use and management. In these ways, RAV II will contribute to farming system sustainability and help avoid the degradation of forest lands. The net environmental impact from technology development and outreach will be positive.

A risk-benefit analysis will be required before pesticides can be procured. The primary pest management system should emphasize traditional integration methods for naturally controlling pests.

The sale of chemically treated and dyed breeder and foundation seeds to seed multiplication firms and organizations under appropriate monitoring and audit is recommended for negative determination since it will not result in significant adverse environmental impact. Also, rehabilitation financed by the project has been thoroughly studied by the USAID engineering staff and determined to qualify for a negative impact determination.

INITIAL ENVIRONMENTAL EXAMINATION
or
CATEGORIAL EXCLUSION

Project Country: Zaire

Project Title: Applied Agriculture Research and Outreach II

Funding: FY(s): 1990-1997 US$: 20 million

IEE Prepared By: Donald G. Brown
Mission Enviromental Officer
USAID/Kinshasa

DATE: April 28, 1989

Environmental Action Recommendation:

Positive Determination _____

Negative Determination X

Categorical Exclusion X

The management and research component of the Applied Research and Outreach II Project are eligible and recommended for categorical exclusion pursuant to the provision of 22 CFR 216.2 (c)(1)(iii) and 216.2(c)(2)(ii) and (iii). The financial viability component of the project is eligible and recommended for categorical exclusion pursuant to the provisions of 22 CFR 216.2(c)(2)(iii). The technical assistance, training and commodities inputs of the outreach component are also eligible and recommended for categorical exclusion pursuant to the provisions of 22 CFR 216.2(c)(2)(i) and (iii). The sale of chemically treated and dyed breeder and foundation seed by RAV to seed multiplication firms and organizations under appropriate monitoring and audit is recommended for negative determination since it will not result in significant adverse environmental impact.

Clearance: Mission Director: _____ Date: 5/11/89

Concurrence: Bureau Environmental Officer
Bessie L. Boyd, AFR/TR/ANR
APPROVED: X
DISAPPROVED: _____
DATE: JUN 8 1989

Clearance: GC/Africa: _____ Date: 5/26/89

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ANNEX I. [illegible] ANALYSIS

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ANNEX L. SOCIAL SOUNDNESS ANALYSIS

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ANNEX L. SOCIAL SOUNDNESS ANALYSIS

This project will strengthen and improve the capacity of the DOA and collaborating institutions to develop and transfer sustainable agricultural technologies for selected food crops to farmers for increased production and income. Other project analyses have dealt with institutional and organizational structures and the economic environment within which the project will operate. This analysis discusses the social context within which the project will function, more clearly defines its beneficiaries, delineates the social constraints that the project will encounter, and makes specific recommendations for ensuring project success.

I. SOCIO-CULTURAL CONTEXT

A. Geographic Emphasis

The project will primarily reach farmers in Zaire's Southern Band. The Southern Band includes 40 percent of Zaire's total population, with a high population density in close proximity to major industrial centers. The concentration of major cities and towns, particularly mining centers, coupled with a high potential for agricultural production, makes the Southern Band an area in which both demand for agricultural products, and the potential for increased agricultural production come together. The Southern Band also includes a broad range of agro-ecological zones, which will facilitate RAV II's research and testing. The concentrated population decreases the costs of outreach, and helps ensure that spread effects are generated.

The Southern Band includes a wide range of ethnic and linguistic diversity in (as well as among) households. In the Bandundu Region there are 36 different spoken languages. Typically, multilinguality prevails, with Kituba as a trade language south of the Kasai River and Lingala to the north of the river. Shaba has a larger population than Bandundu with over 30 ethnic groups. The region is dominated by the Baluba, the Lunda, and the Bahemba. The Baluba and Lunda are ancient kingdoms that continue to wield powerful traditional authority. Swahili is the dominant spoken language, but Kiluba and Kilunda are also widely spoken. No overriding ethnic rivalries or tensions appear to exist that would interfere with the objectives of RAV II.

B. Kinship Structure

The kinship structure varies from place to place. However, it will reflect either matrilineal or patrilineal descent. Particularly in Bandundu and Bas-Zaire, lineages are matrilineal with virilocal residence and the mother's brother having authority over her children. Upon marriage, the woman moves to her husband's village where her children will grow up apart from their lineage.

In Shaba and Kivu, patrilineal descent is more common, with the woman also leaving her village upon marriage, but retaining strong ties with the extended family. Men remain among their families, thus sustaining a close-knit organizational structure within their communities. The same is not true for women.

The kinship structure creates strains which can affect efforts to promote development. A husband and wife have loyalties to different villages with concomitant demands on their time and finances.

C. The Village Household

Polygamy is common in the project areas. However, the law stipulates that only one wife can be registered at the collectivite (Russell, 1989). Consequently, many marriages are traditional unions, recognized by the community after the payment of a bride-wealth, usually payed in cash, goods, and/or animals.

The typical farm household has an average size of 6.7 persons who farm an area of about one hectare (Shapiro, 1987, preliminary results). There is, however, variability across regions in household size. This has important implications, as this may affect the workload for the household and access to labor.

Cassava is the staple diet throughout Zaire and is cultivated by 97 percent of all homes. This is followed by maize, 92 percent; peanuts, 44 percent; pumpkins/squash, 28 percent; and bananas and sweet potatoes, 19 percent. Beans, an important source of protein, are cultivated by only 11 percent of all households with 32 percent of that cultivated in Kasai Oriental (Shapiro, 1987).

II. BENEFICIARIES AND SPREAD EFFECTS

The direct beneficiaries of the project will be the rural population comprised of small farmers, most of whom are female. By producing new technologies that cater to client needs, RAV II seeks to provide the beneficiaries with a higher quality lifestyle, with lower work loads, and increased income levels. The indirect beneficiaries will be urban Zairians who depend on the small farmer for their food supply. An increase in food production through socially sound technology brings more and better food supplies for the nation as a whole.

A very critical group of beneficiaries will be those Zairians who will acquire professional training and experience as researchers, administrators, and extensionists as a result of their participation in this project. One ultimate objective of this project is to improve Zairian institutions' capacity to conduct and manage their own research programs. Thus, beneficiaries will include government ministries and collaborating agencies and research institutes and organizations that have a primary concern for sus-

tainable agricultural development in Zaire. These benefits should spread to other public and private research efforts as RAV II participants interact and collaborate with their counterparts around the country. Other beneficiaries will include those non-governmental organizations that work with SENARAV. These outreach entities will benefit by receiving training and technical support that will help improve their contribution to(and credibility in)the community.

III. CONSTRAINTS

The specific identification of socioeconomic, technological, and other environmental constraints will be a priority activity for RAV II. Through rapid reconnaissance surveys, project personnel will be able to identify, in detail, the major constraints faced by project beneficiaries. Some general constraints are addressed below.

A. Infrastructure

Lack of a good network of roads and markets has hampered the small farmer's ability to commercialize production. Poor transportation significantly reduces the farmer's share of the market price. Transportation costs are high and transportation is generally unreliable, making farm-gate demand and prices low. Spoilage at market sites is also high, due to the lack of adequate facilities, reducing the sale value of the product even more.

The inadequate infrastructure has important implications for RAV II. Without good market opportunities, farmers often have few incentives for increasing production above consumption needs, reducing their interest in production-increasing technologies. RAV II will include the level of commercialization, often directly related to infrastructure development, in its characterization of priority clientele groups.

B. Land

Two land tenure systems operate in Zaire, modern and customary. Under the modern system, all land belongs to the State and is acquired through prescribed titling and registration procedures. Land tenure under customary law varies from region to region, but generally is determined by the lineage, clan, or village group. Individuals reap the fruits of the land, but land itself is a sacred trust of the ancestors to a collective unit. This sacred trust is overseen or supervised by someone recognized by the group as serving as the connection with the ancestors in regard to matters pertaining to land use (Pruitt, 1984). Thus, individuals have a right to use land, but not to possess it.

Although land has not become an absolute constraint for farmers in much of Zaire, there are significant localized aspects of

the supply of land that could affect the adoption of new technologies. As described in the Technical Analysis, shortened fallow periods and increased travel time to parcels are both indicative of the growing problems of land availability. Competition for good land occurs, often resulting in disputes at the local level.

Most farmers in the project areas acquire land through customary law. It is possible to purchase land, but few farmers, particularly women, can afford it. As one female farmer near the Kiyaka station said, "Even if I could afford to buy land, I cannot afford to pay the yearly taxes on it." Generally, those who do manage to purchase land are male, but even the percentage of men who can buy land is not high. In general, men's access to land is more secure than that of women because the traditional land tenure system stipulates that land use rights are governed by males, making the great percentage of women farmers legally landless.

Access to land will affect the type of innovations that farmers are willing to adopt. Farmers who do not have legal title to their land, for example, are often unwilling to adopt technologies which provide only long-term payoffs. Reforestation, building retaining walls, or developing terraces, for example, are not technologies which are likely to be of interest to farmers who do not own their own land. Type and security of land tenure should be determined during the initial baseline survey planned for the first six months of the project. This factor may be an important one in characterizing priority clientele groups, particularly for women.

C. Labor and Time

Labor is probably the single greatest constraint faced by most farmers in Zaire. As the Technical Analysis points out, decreasing productivity of labor per unit area of land is a common phenomenon. In response, farmers place larger units of land under cultivation in an attempt to maintain total yields, which in turn increases effective man-to-land ratios. This, in turn, decreases the length of the fallow period, which completes the circle by producing even lower yields. Hence, the labor shortage and declining productivity are intimately intertwined. With continued rural-to-urban migration, the labor shortage can be expected to increase in the rural areas, coinciding with an increased demand for food in urban areas.

In RAV I, returns to labor were generally not utilized as an evaluation criterion for potential technologies, nor were labor data collected in on-farm trials for the most part. In RAV II, returns to labor will be a major evaluation criterion.

D. Socio-Political Factors

Elected officials with the Mouvement Populaire de la Revolution (MPR) play an active role in village life. Although unable

to determine the specific role, Jones-Burke (1986) found that these groups made up 72 percent of the village leadership. This would seem to indicate that they do have a lot of influence in what goes on in the village. The Pruitt 1984 study emphasized the continued importance of traditional authority in village communities. For both women and men who were asked whom they consulted for advice on farming, the most frequent response was the village chief. For women, the husband ranked second.

This pattern of authority has serious implications for RAV II. For certain critical issues which may impede the project's ability to achieve its purposes. For practices such as forced cultivation, forced work for the state, or land reform, the decision-makers are individuals, almost all men, whose primary role over the years has been to preserve the status quo and who may have a great deal to lose if these structures are altered. Project personnel should not dismiss the importance of these issues. Authority patterns are thoroughly interwoven with the problems of labor shortage, for example. EPIF/CAL (McGowan, 1990) has recommended that attempts be made to address the negative consequences of imposed culture on agricultural production and extension.

RAV II will have to address these issues. The social soundness analysis for RAV I recommended that activities not be undertaken in areas where such practices as imposed culture are dominant. This recommendation should be reconsidered in RAV II in its decision-making regarding priority geographic zones and clientele groups. All governmental officials, particularly the Chef de Terre and Chef de Collectivite, will need to be contacted in the villages where the R&D Teams work. The Chef de Terre has primary responsibility for allocating land and resolving land disputes in most areas. However, his influence may vary from region to region.

E. Outreach Entities

Some criteria which RAV II can utilize for selecting collaborating outreach entities are discussed in the Technical Analysis. RAV II, for sustainability, should give considerable attention to working with more indigenous associations. Although numerous foreign associations have existed in Zaire for many years, it is the goal of RAV II to have agricultural development activities placed more squarely in the hands of Zairians nationals.

IV. WOMEN: A CRITICAL CLIENTELE FOR RAV II

SENARAV's main purpose is the development and transfer of sustainable technologies for cassava, maize, and grain legumes. As is typical in Sub-Saharan Africa, food crops are the primary responsibility of the female population, while cash crops remain the male farmer's domain. In Zaire, particularly, the primary responsibility for cassava rests with women and, to a large extent, maize and grain legumes as well. The situation in Zaire conforms

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to the reality that "Africa is a region of female farming par excellence" (Boserup, 1970). Consequently, the target population of this project will be primarily small-scale female farmers.

The GOZ and USAID have both recognized the prominence of women in food production. The master plan (Plan Directeur) for agricultural research in Zaire states "... les femmes qui assurent l'essentiel de la production". Clearly, the GOZ realizes that women are very important to production. Likewise, the AID Policy Paper on Women in Development argues that women are a majority of the developing world's rural population; the farmer producing food is increasingly a woman. The PID for RAV II has confirmed that in Zaire women are the dominant labor and management force in many small farm households. Consequently, it instructed that the project design effort give adequate attention to women. Thus, this analysis will focus on an examination of the rural social context within which the women participants will function. It is important to emphasize that the discussion here applies generally to the population under study. A detailed, empirical study of any single group within this population may reveal various distinctions.

Project designers and implementers have often paid inadequate attention to the role of women in agricultural production. Extension services have largely been oriented toward the male farmer. As a result, generally speaking, productivity of men in agriculture has tended to increase, while the productivity of women has stagnated. RAV I was unable to address this problem adequately. Although women participated in on-farm trials, no apparent deliberate attempt was made to address their specific constraints. This will be corrected in RAV II.

A. Kinship Structure and Women

The kinship structure described above has serious implications for women. Even in matrilineal societies, a man has established authority over his wife, reinforcing patriarchal social relations. In such a system, men have the primary role in decisions regarding the allocation of resources. This affects women's access to productivity-increasing resources. They may face restrictions by virtue of their status in the household and gender. There is considerable variation and the degree to which the kinship structure reduces women's access to resources will vary among groups.

Women's position within the kinship structure will need serious consideration by RAV II. Although women put in the bulk of labor and make certain management decisions, women within the project areas must consult and follow the desires of males. These may often conflict with what the woman needs to improve her productivity and may limit women's ability to gain access to the resources needed to successfully adopt improved technologies.

B. The Village Household and Women

Women are, to a large degree, dependent on their husbands to acquire land and credit. A group of women farmers in Kivu agreed, "We cannot do without our men because we need to be married in order to get land and to get our houses built." A woman without a man, they emphasized, is not respected.

Yet, studies have shown that over 22 percent of all farm households in Sub-Saharan African are de jure headed by women. It is estimated that a high percentage of the households in the project areas are female headed households (Pruitt, 1984; Russell, 1988). The small farm surveys that have been completed in the Southern Band, particularly Bandundu, reveal that for the total population the sex ratio slightly favored women (Pruitt, 1984; Jones-Burke, 1986). Professor Verhulst's (1987) study of Kabondo-Dianda in Central Shaba showed that, in the 15 plus age bracket, there are 31 percent more women than men, including a high percentage of widows, divorced, and abandoned women. Much research has shown that female headed households are among the most disadvantaged. Headed by women who are widowed, divorced, or never-married, these households experience much more serious resource constraints than male headed households.

Because of their multiple roles within the household, women make constant tradeoffs in allocating labor, time and productive resources among their household and farm roles and obligations. United Nations data, based on small-scale studies and surveys of women's time use, suggest that women contribute two-thirds of all hours spent in traditional agriculture in Sub-Saharan Africa, three-fifths of hours spent in marketing, and over four-fifths of the hours spent in food storage and processing (United Nations, 1975). They also play the roles of childbearer, childcarer, homemaker, and worker. Although the organization of the household is the result of both socio-cultural norms and practices and the prevailing agro-ecological conditions and needs of the agricultural production system, cultural norms probably are more central. They are central in the patterns of authority, responsibilities, rights, and obligations assigned to household members.

In the division of labor within the typical farm household, women provide water, fuelwood, and health care, in addition to food for home consumption and market sale. Men are primarily responsible for hunting, gathering, house construction and other non-agricultural pursuits. Their primary agricultural duty is usually to clear the land for planting, although in some regions their agricultural responsibilities are much more extensive. This situation prevails within the project areas.

However, men are becoming increasingly involved in agriculture, particularly in those regions where traditional sources of income for men are declining. Very few sources of salaried income

are available in these areas. Women receive the bulk of their income from selling food surpluses, but this does not provide much income. Thus, as men's income is reduced, total household income decreases, with women remaining responsible for the bulk of household expenses in many areas. During field visits, farm women indicated that their primary expenses included health care, school fees, manufactured products, and taxes. Men have traditionally used their money for more social purposes, although there are many situations where men help pay domestic expenses. While pooling income can help meet domestic expenses, it can also lead to loss of control over income for women when men's and women's spending priorities differ.

The status of women within the household has serious implications for SENARAV. Because of women's multiple household responsibilities and the often limited nature of their access to and control over resources, their motivations and capacities to accept and adopt technology will often be different from those of men. At the same time, many studies have shown that women's income-earning abilities are closely related to well-being of the household and to children's welfare. These are important issues because they will directly affect SENARAV's ability to increase the economic wellbeing of the household and its nutritional status, both of which are goals of RAV II.

It has been argued that household organization is not static and can be modified by externally induced changes, particularly where role allocation results from negotiation between partners rather than being determined simply by gender. Shifts in both women's opportunities and demands imposed externally may lead to shifts in the organization of household production. This is mediated by changes in relative levels of resource access, which strengthen the decision-making capacity of individuals.

C. Women as Project Beneficiaries

Given women's pre-eminent role as producers of cassava, and their importance in maize and grain legume production, SENARAV must reach women to achieve its goals. Yet, as the discussion above has indicated, women have different constraints to increasing agricultural productivity than do men. Generally, women have less access to the resources needed than do men, and often have less control over both resources and benefits.

1. Land

Women face problems acquiring land on which to farm. If a woman has a separate field from her husband, as may be dictated by custom, she may have to walk long distances to find suitable land or be forced into cultivating marginal land. She may have to obtain land with chickens, goats, or goods from the village head (in some regions) or the landowner. Often, women who purchase land

with goods must share their crop yields with the landowner. This problem is much more critical for some women than others; particularly farmers in Kivu and Bandundu expressed serious constraints.

The technological packages introduced by RAV II will have to consider land availability constraints. Although many female farmers do make decisions about the use of the land they farm, control over the land often rests with their husbands, brothers, sons, village elites, and outsiders. A woman can easily lose the right to use land because of the death of a husband, divorce, or inability to meet the terms of the landowner. This problem is exacerbated for the female-headed household where there is no man to provide access to land or to help with farm work. This will affect productivity and economic independence.

2. Labor and Time

Women's patterns of time use differ from those of men. It is widely recognized that women provide the bulk of all household and farm labor. Thus, women's time is a scarce resource and its opportunity costs must be considered in project interventions. Although existing in varying degrees from region to region, women who were interviewed during the site visits expressed dismay over the constraints on their labor and time.

The imposition of forced cultivation is a major problem. This involves contributing unpaid labor to collectivite fields (and, often, also the groupement and village fields as well). Under this system of compulsory cultivation, each household must clear and plant an area decided by the monagris, who also has the authority to fine and jail. Women farmers in the Bandundu area, where the problem appears to be most prevalent, reported that although the field is assigned to each household, it is the woman who has primary responsibility for planting and harvesting. Additionally, women are obligated to participate in Salongo where they must engage in community labor, building government officials' houses, clearing roads, planting large fields in state projects, animation (performing for visitors), and cooking for and receiving visiting officials. These imposed duties can take up as much as four days of a woman's week, leaving very little time to work in their own fields. The rural-urban migration has caused women to participate more in activities traditionally dominated by men, such as clearing the land, increasing labor demands even more.

Women cannot devote more time to their already impossible schedule. Women complained that some RAV I technologies required more labor than their traditional methods. Therefore, they were not able to adopt them to the extent they desired, even though they produced higher yields.

Labor-saving options for a broad range of activities performed by women must be incorporated into the technologies developed by

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SENARAV. This includes post-harvest processing and storage and marketing, in addition to crop production activities.

3. Socio-Political Factors

Most communities do have women leaders, but this position may or may not be held by a woman. The person who holds this position is supposed to represent women's concerns. Usually, this person is selected by the entire village. The involvement of women leaders has been limited mostly to receiving visitors and relaying governmental decisions to women. Pruitt's (1984) study in the Central Bandundu area indicated that 76 percent of women leaders were identified as traditional healers, a position today that is illegal in Zaire.

Women play a minor role in leadership within the MPR. The Jones-Burke (1986) study showed that only 5.0 percent of the village leadership was female, with only one of these occupying a position in the local MPR. The majority of women were "Kapitas"--in charge of organizing women for community work and taking care of protocol matters for visitors, a typical role found throughout West Africa.

4. Technology Transfer and Women

The farming systems approach, a farmer-driven system, is one that can offer women the opportunity to participate as full partners in development. However, often farming systems projects have not adequately considered the role of women as decision-makers and agricultural producers, nor the household unit as a part of the total farm perspective. Gender and resource variances have been ignored. Data collection has been designed around the man as the head of the household. Additionally, many projects have paid inadequate attention to the last three stages of the food system--post-harvest distribution, preparation, and consumption. On-farm research has underestimated women's multifaceted contributions, primarily due to emphasis remaining on the field and usually one commodity.

RAV II will need to ensure the planning of multidisciplinary teams with both males and females at all stages of the research process--design, implementation, and evaluation. Critical to this process is that diagnostic or exploratory surveys include not only agronomic factors, but a broader focus on socioeconomic features. Data must be disaggregated by socioeconomic strata and gender and for an examination of inter- and intra-household processes, particularly in spheres of decision-making, responsibility, and labor input. This is necessary because of the importance of the extended family and community support systems.

FSR/E teams will need to take special cognizance of the fact that male extension agents have been found ineffective in reaching

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women farmers in many cases. Social norms and courtesies prevent male agents from talking directly with women farmers who are married and are not heads of household. Women have also reported that they are not always treated with respect by male extension workers (Reid, 1989).

At the same time, there are problems associated with training women as extension workers. They often face restrictions on the amount of time they can spend away from the household. Women have lower literacy levels than men. They often cannot travel outside their villages. One approach that uses farmer-to-farmer exchanges, and training of female farmer leaders, has met with success during the pilot phase (McGowan, 1990). RAV II should seriously consider this approach and determine whether this methodology could be successfully employed within the project.

5. Outreach Entities

Experience with the Central Shaba Project (660-0105) suggests that it will be much easier to reach women organized in groups. The religious nature of the groups helps to suppress problems of witchcraft and jealousy (Russell, 1988). This is a plus for this project, which will depend to some extent on the work of religiously oriented outreach entities. However, these entities have varying levels of commitment to development objectives. As one woman commented, "They just come for the gospel."

In the Technical Analysis, some guidelines for selecting collaborating outreach entities are suggested. These include (a) developing a written statement which describes how the entity will work with women and (b) giving preference to outreach entities which have a demonstrated ability to work effectively with women farmers.

The design team believes that CONDIFFA is an excellent point of departure for contact with indigenous organizations concerned about women. It is a national organization whose primary purpose is to bring integrated development institutions to women. Interaction with CONDIFFA could help SENARAV develop better methods for reaching Zaire's rural woman farmer.

6. Training Women Professionals

Meeting RAV II's commitment to include more women in its professional training component will be a formidable task. Attracting women to a male-dominated field will need considerable skill. Women with families may not find it easy to uproot and leave their husbands and children. Husbands may not want their wives to take advantage of this opportunity for increased visibility and economic independence. And single women may view the agricultural profession as one that will take them away from the amenities of urban life and a larger pool of eligible bachelors. There is a pool of

7,06

women in urban areas who have received training at the three-year institutes who remain unemployed. While these women represent a pool of potential trainees for SENARAV, care must be taken to select those genuinely interested in pursuing the agricultural profession and who show promise and potential as a leader, keeping the doors of opportunity open for other women.

RAV II will need to consider these constraints in devising a training program for women. Where to send these women, to other African countries or abroad, will be a critical decision in terms of social and educational adjustments. If sent abroad, institutions selected should be based not only on the reputation of its agricultural school, but top consideration should be given to the school's reputation for working with women and minorities. The Training Coordinator must be sensitive to these issues.

V. SOCIAL CONSEQUENCES AND BENEFITS

Because RAV II has the basic objectives of increasing staple crop production and income, it will be welcomed within the project areas. Regardless of the nature of the comments about RAV I, no farmer indicated that it was a bad idea, and most expressed the desire for more help. RAV II's objectives must be clearly communicated to all farmers, particularly women, and cooperators must understand the nature of the partnership that this project seeks to build.

With an increased emphasis on support to outreach entities, productivity among the primary food producers of this country can increase. Hopefully, this will have the effect of demonstrating that small-scale farming can provide a viable employment alternative. If farm incomes can be improved, this would also demonstrate that farm income may become comparable to that earned by semi-skilled urban dwellers. Such a shift in the structure of small farming will contribute to improving the quality of life in the rural areas and, in so doing, help stem the present high rate of rural-urban migration.

Social and agronomic benefits are expected to occur on both individual and collective levels. Individually, food consumption behavior and patterns are expected to change as a result of increased food production. Collectively, benefits are expected to accrue in:

* Decreased food imports;

* Improved income distribution as rural sector incomes increase;

* Improved quality of life in rural and urban sectors as incomes and consumption increase; and

* Most importantly, an improved professional group of highly trained Zairian individuals capable of managing their own research programs and institutions and who will control the destiny of agricultural development in Zaire.

Zaire is culturally, politically, and economically homogeneous enough to encourage the maximum spread of benefits from this project. The project has been designed to fit within the existing social structure and will make a positive impact on poor farmers, but particularly women farmers who have been ignored historically in agricultural development projects.

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[illegible] WAIVERS

to be [illegible] by USAID)

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ANNEX M.

REQUEST FOR WAIVERS

All waivers needed for project implementation are incorporated within the provisions of the blanket waiver for "Procurement of U.S. Goods and Services under the DFA"; the AID/W Blanket Transportation Waiver (to be renewed after August 10, 1990); and the Blanket Source/Origin Waiver for Project Procurement of Certain Vehicles and Motorcycles Plus Spare Parts Purchased with These Vehicles (to be renewed after March 6, 1990). No additional waivers are expected for this project.

ANNEX N. SCHEDULE OF MAJOR TASKS AND EVENTS

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Major tasks or events to be completed during project implementation are listed in this section as scheduled. These events are grouped into 5 classes: (a) contractual; (b) technical assistance; (c) training; (d) procurement and (e) evaluation. The Project Year and Fiscal Year are both assumed to span the period from October through September of the following year, beginning October 1, 1991 through September 30, 1998.

DATE/PERIOD	MAJOR EVENT/TASK	ACTIVE PARTICIPANTS
Month (-1)	Obligation of funds (Grant Agreement)	Contractor, USAID
Month 1	GOZ meets Conditions Precedent	USAID, GOZ
	Initial long-term participant trainees processed	Training Coordinator
Month 2	Arrival of whole TA team	Contractor
	Annual Scientific Review	SENARAV/Contractor
Month 3	M.S. and Ph.D. phase one trainees return to project	
	Review and implementation of initial commodity acquisition plan	Contractor/USAID SENARAV
	Review and implementation of initial facility rehabilitation plans	Contractor/SENARAV
JAN 91 MO 4 ----------		
Month 4	Human Resource Needs Assessment	Contractor/GOZ
	Review on-farm trials	FSR/TA
Month 5	Completion of R&D system constraints, with 2-year schedule of short-courses	Contractor
	Tenative two-year research plan completed	COP

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	Reorganize R&D teams regionally	FSR/TA, SENARAV
	Assign national coordinator of R&D unit	SENARAV
	Training in clientele identification	Contractor
	Conduct consensus building sessions with outreach units	FSR/TA
Month 6	RAC established	GOZ, Contractor
	Completion of production constraints appraisal study	Contractor /SENARAV
	Completion of study to delineate major agro-ecological zones in the southern band	Contractor /SENARAV
	Collect information on potential outreach collaborators	FSR/TA
	RML identified and documented	Contractor
	Workshop on conduction of on-farm trials	Contractor
	Develop monitoring form for outreach impact	Contractor
	Debt broker to begin development of debt conversion program for benefit of agricultural research	Contractor
Month 7	Select primary outreach collaborators and sign agreement	FSR/TA, SENARAV
	Training for SENARAV on gender issues analyses	Contractor
Month 8	First group of M.S. candidates depart for studies	Training Coordinator
	Complete two year plan of work for outreach activities	FSR/TA, SENARAV

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	Conduct first semi-annual planning session with outreach collaborators	FSR/TA,SENARAV
Month 9	Training on analyses of farm trial data	FSR/TA, SENARAV
Month 10	First RAC meeting	GOZ, Contractor
	Training to outreach collaborators on clientele identification and classification	FSR/TA, SENARAV
	Completion of training needs assessment for general skills	Contractor
Month 11	First group of Ph.D. candidates depart for studies	Training Coordinator
	Training in agro-ecology	Contractor
	MOU for creation of Zairian Food Crop Research Endowment Fund will be developed and signed	
Month 12	Training for outreach teams in communication methods, program planning and evaluation	Contractor
Month 15 12/91	Completion and implementation of monitoring and evaluation plan	Contractor
	Conduct second semi-annual planning session with outreach collaborators	FSR/TA, SENARAV
JAN 92 MO 16	----------	
Month 18	First review and update of R&D system constraint study	Contractor
Month 22	First internal evaluation	USAID
	Second RAC annual meeting	GOZ, Contractor
	Third semi-annual planning and review session with outreach collaborators	FSR/TA, SENARAV
	1 st cassava and legume	

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	technologies prepared for release	Contractor, SENARAV
Month 23	Second group of Ph.D. candidates depart of studies.	Training Coordinator
	First purchase of Zairian debt and currency transfer to Central Bank	
Month 24	Last group of phase one Ph.D. recipients return to project.	

JAN 93 MO 28 ----------

Month 28	Fourth semi-annual planning and review session with outreach collaborators	FSR/TA, SENARAV
Month 32	Second group of M.S. candidates depart for studies.	Training Coordinator
Month 34	Third RAC annual meeting	GOZ, Contractor
	Fifth semi-annual planning and review session with outreach collaborators	FSR/TA, SENARAV
	2nd cassava and legume technologies prepared for release with production package booklet	Contractor, SENARAV
	1st maize technologies prepared for release	"
Month 37	First group of M.S. degree recipients return to project	Lead Institution
Month 47	Third group of Ph.D. candidates depart for studies	Training Coordinator

JAN 94 MO 40 ----------

Month 40	Sixth semi-annual planning and review session with outreach collaborators	FSR/TA, SENARAV
Month 45	3rd cassava and legume technologies prepared for release	Contractor, SENARAV

	2nd maize technologies prepared for release	"
Month 46 9/94	Fourth RAC annual meeting	GOZ, Contractor
	First group of Ph.D. recipients return to project	Lead Institution
Month 50	Major external evaluation	USAID

JAN 95 MO 52 ----------

Month 57	4th and 5th cassava and legume technologies prepared for release	Contractor, SENARAV
	3rd and 4th maize technologies prepared for release	"
Month 58	Fifth RAC annual meeting	GOZ, Contractor
Month 59	Last (4 th) group of Ph.D. candidates depart for studies	Training Coordinator
Month 60	Second group of Ph.D. recipients return to project	Lead Institution
	Second group of M.S. degree recipients return to project	Lead Institution

JAN 96 MO 64 ----------

Month 70 7/96	Sixth RAC annual meeting	GOZ, Contractor
	6th cassava and legume technologies prepared for release	Contractor, SENARAV
	5th maize technologies prepared for release	"
	Upgrade of production package booklets for cassava, legumes and maize	"

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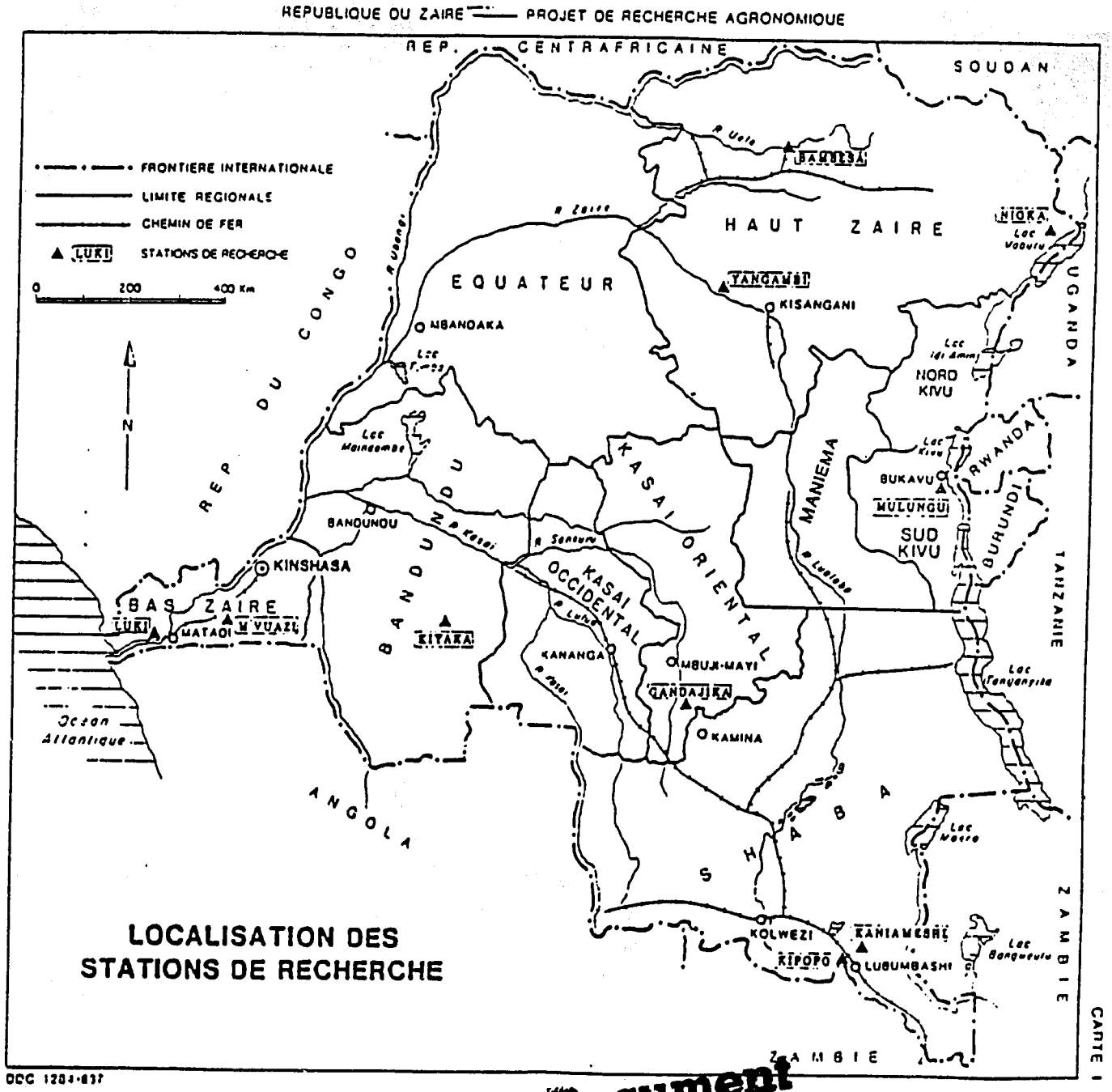
JAN 97 MO 76 ----------		
Month 82	Seventh RAC annual meeting	GOZ, Contractor
	7th cassava and legume technologies prepared for release	Contractor, SENARAV
	6th maize technologies prepared for release	"
JAN 98 MO 88 ----------		
Month 94	Eighth RAC annual meeting	GOZ, Contractor
	8th cassava and legume technologies prepared for release	Contractor, SENARAV
	7th maize technologies prepared for release	"
Month 85	Last (3 rd) group of M.S. degree recipients return to project	Lead Institution
	Third group of Ph.D. recipients return to project	"
Month 96 9/98 EOP	Last (4 th) group of Ph.D. recipients return to project	"
	Final evaluation	USAID

ANNEX O. MAP OF STATIONS

Carte des Centres et Stations:



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