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TECHNICAL REPORT

PROGRAMMATIC ENVIRONMENTAL ASSESSMENT
GUINEA-BISSAU

PRESENTED TO
UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT/GUINEA-BISSAU
UNDER CONTRACT NO. LAG-4200-I-00-3056-00, DELIVERY ORDER 22

PRESENTED BY
TROPICAL RESEARCH AND DEVELOPMENT, INC.
7001 S.W. 24TH AVENUE
GAINESVILLE, FL 32607 USA

April 1997

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ACRONYMS

AEXP-GP	Associação de Exportadores da Guiné-Bissau (National Exporters Association)
AFD	African Development Fund
AFDB	African Development Bank
AGRHYMET	Agrometeorological/Hydrological/Meteorological Project
AGUICOB	Associação Guineense de Comerciantes de Bandim (Guinean Association of Bandim Businesses)
AGUIPEC	Associação Guineense do Pequenos Comerciantes (National Association of Small Businesses)
AIM	AssociaçãoIndústria da Madeira (Wood Industry Association)
AMAE	Associação das Mulheures de Actividade Economico (Women's Economic Activity Association)
ANAG	Associação Nacional de Agricultura (National Agriculture Association)
ANEP	Associação Nacional dos Empresas de Pesca (National Fishing Association)
ANFGB	Associação Nacional das Ferreiros do Guiné-Bissau (National Blacksmith Association of Guinea-Bissau)
ANP	Assemblia Nacional Popular (National Assembly)
ASDI	Swedish Agency for International Development
ASTRA	Associação Transportadores para Agricultura (Private Transport Operator Association)
CASP	Comissão de Associacões do Setor Privado (Commission of Private Sector Associations)
CCIA	Câmara de Comércio Industrial e Agricultura (Chamber of Commerce)
CNA	National Commission on the Environment
DGFC	Direcção Geral do Floresta e Caça, MDRA (General Directorate for Forestry and Wildlife)
DPV	Divisão de Protecção Vegetal, MDRA (Division of Plant Protection)
DSNVA	Direcção dos Servicos Nacionais de Vulgaricação Agrícola (National Directorate for Agricultural Extension)
EEC	European Economic Commission
EEZ	Exclusive Economic Zone
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FSIF	Food Securities Initiatives Fund (Africare)
FY	fiscal year
GAPLA	Gabinete de Planeamento Agrário, MDRA (Planning Office for the Ministry of Rural Development and Agriculture)
GDP	Gross Domestic Product
ICCAT	International Commission for the Conservation of Atlantic Tunas
IEE	Initial Environmental Examination
INPA	National Agricultural Research Institute

INEP	National Research Institute
IR	intermediate result
IUCN	International Union for the Conservation of Nature
MEY	maximum economic yield
MDRA	Ministério do Desenvolvimento Rural e Agricultura (Ministry of Rural Development and Agriculture)
MTAA	Ministério do Turismo, Ambiente e Artesanato (Ministry of Tourism, Environment, and Art)
NGO	nongovernmental organization
PASP	Agro-Silvo-Pastoral Project
PEA	Programmatic Environmental Assessment
RGB	Republic of Guinea-Bissau
TIPS	Trade and Investment Promotion Support Project
TSRIP	Tombalí Sustainable Rural Initiatives Project
USAID	United States Agency for International Development
USAID/Bissau	USAID in Guinea-Bissau
USEPA	United States Environmental Protection Agency
WHO	World Health Organization

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EXECUTIVE SUMMARY

USAID/Bissau's program goal is market-oriented economic growth that is broad-based and sustainable. It strives to accomplish this goal through one strategic objective: to increase private sector trade and investment. The Trade and Investment Promotion Support (TIPS) Project and the Africare program are the major activities of USAID/Bissau, accounting for 85 percent of its program effort. TIPS focusses on improving understanding of market-oriented economics to promote trade and investment in six critical growth sub-sectors (rice, cashew nuts, fruits, vegetables, forestry, and fisheries). Africare focuses on the promotion and support (through technical assistance, training, and credit) of small-scale producer and processor associations in the south of Guinea-Bissau. In addition to TIPS and Africare, USAID/Bissau supports eight small programs which provide training, public education, and limited funds for small scale projects.

The objective of this programmatic environmental assessment (PEA) is to examine the direct and indirect environmental impacts of all USAID/Bissau programs. The PEA focusses primarily on TIPS, but includes a brief examination of non-TIPS projects. The significant issues which are addressed in the PEA are grouped into four areas: agriculture, fisheries, forestry, and environmental management. Particular issues of concern within each of these areas are: deforestation, sustainable resource management, pollution emissions, and institutional authority and capacity.

This PEA differs from most other PEAs in that it is being prepared for activities which are already being implemented, rather than for a proposed activity. As a result, instead of assessing the potential impacts of alternative program designs, the PEA assesses observed impacts of current activities and recommends mitigation measures to improve their environmental performance.

Conclusions

Agriculture

Land clearing for production of rice, cashews, and fruits is destroying natural forests. The rates of growth of areas planted with cashews and mangos have increased significantly since 1993, whereas the rate of growth for rice planted in the forest region (*sequeiro* rice) has remained relatively constant. Cashews and fruits are being planted in addition to, not in place of, *sequeiro* rice.

Soil erosion and pollution from agricultural chemicals are not a current problem in Guinea-Bissau. The flat terrain of agricultural areas limits the potential for soil erosion, and, because of lack of income, very few agricultural chemicals are purchased and applied. Agricultural chemicals could become a problem in the future as more areas are planted to fruits and vegetables. These crops generally require more agricultural chemical inputs than rice and cashews, and they have the potential to generate the income necessary for chemical purchases.

Processing of agricultural products is only done on a cottage industry level. Emissions from agricultural processing are not a current problem, but if large scale cashew and fruit processing are developed, disposal of liquid and solid wastes will most likely be a serious problem, due to the lack of environmental standards and adequate waste management facilities.

Fisheries

The fishery resource of Guinea-Bissau is one of the richest of the West African coast. Exploitation of the fishery resources is primarily conducted by foreign fleets and operators, under license agreements with the Government of Guinea-Bissau. It appears that shrimp, cephalopods, and demersal fish are overexploited and that future fisheries management plans will have to require a reduction in harvest of certain stocks or impose seasonal closures.

Prior to 1995, the Government of Guinea-Bissau did not manage its fishery resource. In 1996, with the encouragement and support of TIPS, the Ministry of Fisheries began to develop and implement fisheries management plans. The plans represent a significant leap forward in resource management; however, they still fall short of what is required for long-term sustainable management. The plans manage for species and type of fleet (industrial and artisanal), rather than for the resource as a whole. Current data collection and analysis do not allow for accurate calculation of maximum sustained yield or sustainable economic yield.

A small but growing land base processing industry is developing. There are currently no environmental controls or effluent guidelines for these industries. As a result, they are and will continue to be sources of pollution.

Procedures for licencing and the payment of port and export fees are not well understood at either the government level or by private industry, leading to confusion and noncompliance.

Forestry

Although Guinea-Bissau has a forest law and a General Directorate of Forests and Wildlife, there is no effective forest management in Guinea-Bissau. As a result, deforestation and forest degradation is occurring, although the exact rate of deforestation is unknown. The principal cause of deforestation is slash and burn agriculture. Most of the burning is done for expansion and regeneration of pastures and hunting grounds, but slash and burn is also used to clear land for rice, cashews, mangos, and other crops.

Fuelwood and timber harvests contribute to the degradation of forests. It is estimated that 1.3 million cubic meters of wood is cut each year for fuelwood and charcoal. An additional 13,000 cubic meters of timber are cut by 10 logging concessions. Removal of trees for fuel and timber is selective, in that only certain species are desirable. The result is a reduction in biological diversity

of the forest and, in the case of logging where only trees with desirable forms are removed, reduction in the quality of the genetic stock of the timber species.

Although the initial design called for TIPS to work in forestry, it has done very little work in this sector. The action memorandum authorizing TIPS required that the initial environmental examination (IEE) be amended before TIPS implemented activities in forestry. The IEE was never amended.

Environmental Management

There is no systematic monitoring of organic or inorganic pollution in surface or groundwater in Guinea-Bissau. The country has no pollution control or environmental quality standards, nor any requirements for environmental impact assessment. To address these deficiencies, the newly created Directorate General for the Environment plans to produce two strategies, one for the urban environment and the other for natural resources.

Great uncertainty exists in Guinea-Bissau concerning land tenure. The debate on land tenure centers on the reconciliation of modern property rights with traditional use. A draft law was developed in 1993, but it was tabled by the ANP in 1996. At the same time, the ANP established a special commission, with broad representation from public and private entities, to develop a proposal for a new land law. The law is supposed to be brought back to the ANP by the summer of 1997. The uncertainty about land tenure has contributed to deforestation, as individuals cut forests to plant tree crops in an effort to claim land.

TIPS has focused almost exclusively on the first part of the USAID/Bissau program goal -- market-oriented economic growth -- almost to the exclusion of the last half -- that is broad-based and sustainable. In its considerable efforts to help decision makers understand and accept market economics it has almost completely ignored market failures, such as externalities and the existence of public goods, which cause environmental degradation.

Recommendations

Agriculture

1. TIPS should undertake a study to better understand what forest types and ecological systems are being cleared for the production of cashews and fruits.

2. TIPS should initiate policy dialogues on developing capability criteria for land use decisions regarding the choice of sites for the production of cashews and fruits.

3. Training and technical assistance for the production of fruits and vegetables should continue to include components on nonchemical treatments for disease and pest problems.

4. TIPS should develop information and training materials on the safe use of pesticides and incorporate them into its training and technical assistance activities for fruits and vegetables.

5. Training and technical assistance for cashew processing should include information on the potential hazards of cashew nut shell liquid and methods of reducing hazards to workers and the environment.

Fisheries

1. Future fisheries management plans should focus on the resource rather than the user groups.

2. TIPS should encourage the Ministry of Fisheries to conduct regular stock assessment cruises for the industrially targeted species.

3. Stock assessments should also be conducted for the species targeted by the artisanal fleets.

4. Future fisheries management plans should be designed to allow for multi-species management.

5. The Ministry of Fisheries should collect hard data and conduct real time analysis which would allow for the development of responsive fisheries management plans.

6. TIPS, in the course of its fisheries development activities, should educate the Ministry of Fisheries on plausible impacts of the shrimp fishery on marine turtles.

7. TIPS should continue to sponsor round table discussions to develop awareness of new fisheries laws, procedures, port fees, and export taxes.

8. TIPS should assess the environmental impacts of the land based fish processing activities it promotes.

Forestry

1. TIPS should not participate in activities that will lead to increased trade in timber and lumber.

2. USAID/Bissau, to the extent possible, should support the Government of Guinea-Bissau in improving forest management.

3. USAID/Bissau should support efforts by the Agro-Silvi-Pastoral Project (PASP) to develop a sound policy environment for development and implementation of community-based forest management and local-national community forestry partnerships.

Environmental Management

1. TIPS should include understanding of market failures in its policy briefings and build local capacity to identify and assess market failures and to design interventions to correct those failures.

2. USAID/Bissau and TIPS should provide training and technical assistance to the Directorate General for the Environment on development of environmental policies, legislation, and regulations.

3. USAID/Bissau and TIPS should support the development of a fair and just land and resource tenure policy which clearly defines modern rights without destroying traditional systems.

4. Activities receiving credit from Africare or funded through its Food Securities Initiatives Fund, as well as projects funded by the United States Agency for International Development's (USAID's) Self-Help Fund, Small Project Assistance program, and Disaster Assistance program should be screened for environmental impact.

1.0 PURPOSE

USAID/Bissau's program goal is market-oriented economic growth that is broad-based and sustainable. It strives to accomplish this goal through one strategic objective: to increase private sector trade and investment. The Trade and Investment Promotion Support (TIPS) and Africare projects are the major activities of USAID/Bissau, accounting for 85 percent of its program effort and activity (66 and 19 percent respectively). TIPS focusses on improving understanding of market-oriented economics to promote trade and investment in six critical growth sub-sectors (rice, cashews, fruits, vegetables, forestry, and fisheries). Africare focuses on the promotion and support (through technical assistance, training, and credit) of small-scale producer and processor associations in the south of Guinea-Bissau.

The Initial Environmental Examination (IEE) for TIPS provided a negative determination [United States Agency for International Development (USAID) 1992a]. The policy reform activities of the project were not foreseen to have a direct impact on the environment. The IEE, however, recognized that the overall objective of TIPS, to increase private sector trade and investment, was liable to have long-term indirect impacts on the natural resource base. It therefore recommended that a baseline environmental review be carried out by USAID/Bissau and an Environmental Monitoring, Evaluation, and Mitigation Plan be developed to identify and mitigate potential long-term impacts of TIPS activities. Unfortunately, these monitoring activities were never implemented. Africare, funded primarily by P.L. 480 Title II, was not subject to USAID's environmental procedures (Code of Federal Regulations 216) at the time it was established in 1991. New guidance, however, requires that all Title II programs comply with those procedures.

1.1 Objectives and Scope of the Assessment

The objective of this programmatic environmental assessment (PEA) is to examine the direct and indirect environmental impacts of all USAID/Bissau programs. The PEA focusses primarily on TIPS and its six critical growth sub-sectors (rice, cashews, fruits, vegetables, fisheries, and forestry), but includes a brief examination of non-TIPS projects. It is not the purpose of the assessment to develop detailed environmental reviews of each of the six sub-sectors, but rather to review available information and data on the environmental impacts of activities in each sub-sector and recommend mitigation measures which could be incorporated into USAID/Bissau's activities to facilitate environmentally sound development.

The scope of work for the PEA fulfilled the scoping requirements of Code of Federal Regulations 216.3 (a) (4) and served as a scoping statement. Preparation of the scope of work extended over a year and involved consultation with representatives of the Government of Guinea-Bissau and private institutions as well as the staff at TIPS and

USAID/Bissau. The scope of work determined the scope and significance of the environmental issues to be analyzed, identified and eliminated from detailed study the issues that are not significant, described the timing and format of the PEA, and described the analysis and disciplines which would participate in the assessment.

1.2 Significant Issues

The scope of work identified three categories of significant issues which are addressed in this PEA: agriculture, fisheries, and forestry. Some of the issues raised in these categories, however, cut across two or all three categories. In the PEA these cross-cutting issues have been placed in a new, fourth category, environmental management. The significant issues for each of the four categories are summarized in the following sections.

1.2.1 Agriculture (Rice, Cashews, Fruits and Vegetables)

Agriculture Practices Are current agricultural practices causing soil erosion? What efforts are being made to promote improved agricultural management practices which would reduce the demand for new land clearing or reduce soil erosion? Are USAID program actions likely to lead to increased forest clearing for the planting of agricultural crops?

Agriculture Policies Are current policies aimed at increasing agricultural productivity, including export promotion and production incentive, impacting the environment? Will proposed policies impact the environment? To what extent would, or do, such policies encourage additional land clearing for the planting of export crops?

Agricultural Strategy Paper Does the national agriculture strategy incorporate adoption of sustainable agricultural practices? If not, how could such practices be incorporated into the document?

Chemical Inputs To what extent are chemical pesticides, herbicides and fertilizers currently being used in the production of rice, cashews, fruits and vegetables? To what extent have or will USAID activities encouraged such use? What is the probability that such chemicals will need to be used in the future due to soil depletion/erosion, disease susceptibility, monocropping, etc? How do farmers acquire agricultural chemicals and how are they regulated?

Institutions What are the capabilities of governmental and nongovernmental organization (NGO) institutions to deliver effective extension services, which promote sustainable development?

Agriculture Processing Will actual and/or proposed processing activities pose potential problems with respect to waste and pollution? If so, what new and/or additional uses of processing products would make efficient use of wastes and reduce pollution.

Crop diversity loss To what extent have USAID interventions led to monocropping? What are the probable outcomes of monocropping?

1.2.2 Fisheries

Ministry of Fisheries What is the institutional structure of the Ministry of Fisheries? Does it have any responsibility or capability for preparing or reviewing environmental assessments? How could environmental assessment responsibilities be include into its program?

Fisheries Management Plan To what extent are environmental assessment and monitoring measures covered in the fisheries management plans? Do the plans contain provisions for the assessment and monitoring of catchable stock and identification of designated non-fishing zones for the protection of breeding stocks? To what extent have USAID activities encouraged incorporating environmental assessment and monitoring measures into the fisheries management plans?

Fishing Agreements To what degree do the fishing agreements provide for environmental impact assessment and monitoring measures to protect fishery stock and fish and shellfish breeding grounds? Is it advisable or practical to include such measures? If so, how?

Proposed Fishing Laws and Regulations To what extent do current and proposed fishing laws and regulations address environmental impacts? How could these laws be improved in regards to environmental protection?

Pollution What, if any, are the sources pollution of coastal and marine fishing waters? What actions are being taken to control or mitigate the pollution? Are the foreign fishing fleets a source of any particular pollution problems? Are there particular concerns to artisanal fishermen regarding pollution?

Commercial Fisheries Vs. Artesinal Fisheries Has the increase in commercial fishery activities affected the quantity and quality of fish available for local consumption by competing with local fishermen? To what extent are local fishermen from Guinea-Bissau in competition with artesinal fishermen from Senegal or Guinea? Does the government's fishery management plans and/or laws and regulations provide for actions which reduce this potential conflict? Have USAID activities tended to increase or decrease the level of conflict between commercial and artesinal fisheries?

Depletion of Fishing Stocks and Degradation of Coastal Ecosystem To what extent have USAID activities to support promotion of investment in the fishery sub-sector encouraged the over-exploitation of fishing stocks or otherwise adversely affected the marine environment and coastal ecosystem?

1.2.3 Forestry

Conversion of Forest Land/Forest Depletion To what extent is forest land, including mangroves, being cleared for the production of agricultural crops? To what extent is logging causing forest depletion and degradation? What ecological zones are most at risk from agriculture and logging? What reasonable measures can, or should, be taken to prevent the conversion of forest land to other purposes? What is necessary and sufficient to prevent the depletion/degradation of the forest lands?

Local Community Rights How will local community access and use of forest resources be affected through potential program support to government policy measures and private enterprises which are clearing and/or logging forest lands?

Plantations[1] What types of criteria should be used to identify the primary or biologically important secondary forest sites that should be excluded from clearing for the purpose of establishing timber plantations? What types of criteria should be used to identify potential sites for plantation establishment for commercial planting and harvesting of tropical forest trees?

Coastal Zone Impacts How can USAID assist the Office of Coastal Planning and the International Union for the Conservation of Nature (IUCN) with improving and implementing the coastal management plan?

1.2.4 Environmental Management

Institutions Where within the government does responsibility lie for the conduct of environmental assessments?

Land Laws What is the status of the proposed new land law? Will the new law provide for greater security for landowner to increase investment? What are the implications of

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[1]The original scope of work called for identifying forest sites for protection and for plantations. Given the general lack of forest management in Guinea-Bissau, the lack of interest in establishing forest plantations, and the limited time and resources available to the PEA team, this issue was modified with approval of USAID/Bissau to identify criteria for site selection. This change was reflected in the Work Plan for the PEA submitted to USAID on February 3, 1997.

the land laws with regard to logging concessions? To what extent will the new land law and the National Parks Law permit the involvement of local communities in the management of public lands? To what extent have USAID activities encouraged passage of elements within the land law which would impact positively or adversely on the environment?

Surface and Groundwater Quality To what extent is information available on water quality? Is there any concern about water quality and agricultural practices, fisheries, and/or forest management?

Environmental Monitoring What type of environmental monitoring is being conducted in Guinea-Bissau? How can AGRHYMET activities in Guinea-Bissau and the region contribute towards providing information, training or resources for the purpose of environmental monitoring. What measures can be created to monitor the impact on the environment of USAID activities to support agricultural practices? What measures can be created to monitor the impact of USAID activities on fishing stocks and the marine environment? What measures can be created to monitor the level of conversion of forest land and forest degradation due directly or indirectly to USAID activities?

1.3 Non-Significant Issues

The scope of work identified five non-significant issues which the PEA does not address: greenhouse gas increase, agricultural mechanization, increase in malaria, increase in schistosomiasis, and climatic impacts.

1.4 Contents of the Assessment

This PEA differs from most other PEAs in that it is being prepared for activities which are already being implemented. Because this PEA is occurring well into project implementation, the format within some of the sections is slightly different than in a PEA prepared during project design. The Alternatives Including the Proposed Action section describes current USAID/Bissau activities and recommends mitigation measures for those activities, rather than presenting specific alternatives for program design. The Affected Environment section presents information on resource condition, resource management, and associated environmental issues for agriculture, fisheries, and forestry. This section also includes a description of current environmental management laws, institutions, and capabilities within Guinea-Bissau. The Environmental Consequences section assesses the extent to which current USAID/Bissau's activities impact the environment or may impact the environment in the future.

5

2.0 PROPOSED ACTION, ALTERNATIVES, AND MITIGATION MEASURES

For a PEA prepared during project design, this section would describe the proposed action and its alternatives and recommend mitigation measures. Because this PEA focusses on programs already being implemented, this section cannot present a proposed action and alternatives. Rather, the current programs are described and mitigation measures are recommended for reducing their impacts on the environment.

2.1 USAID Programs in Guinea-Bissau

The USAID program in Guinea-Bissau consists of the following initiatives: TIPS Project; Africare program work; African Training for Leadership and Skills (ATLAS) Project; Human Resources Development Assistance (HRDA) Project; Program Development and Support (PD&S) Project; Small Project Assistance (SPA); Democracy and Human Rights; Self-Help Fund; Disaster Assistance; and Special Program Objectives on HIV/AIDS.

2.1.1 Trade and Investment Promotion Support Project

TIPS is the largest USAID/Bissau program, accounting for 66 percent of total program funding. It is a six-year $19.98 million effort to promote private sector trade and investment in Guinea-Bissau. The project began in 1993 and its activities are scheduled for completion in the second quarter of 1998. It is managed by a consortium composed of Labat-Anderson, Incorporated (Prime Contractor); Management Systems International; State University of New York at Albany; Africare; and the Land Tenure Center of the University of Wisconsin, Madison.

TIPS was initially designed to stimulate trade and investment in six critical growth sub-sectors (rice, cashews, fruits, vegetables, forestry, and fisheries) through the following four types of activities (technical components).

> Policies and Implementation Strategies This component includes policy briefings with senior government and private sector officials to help them understand and accept market economics; assistance in the development and implementation of policies to promote private trade and investment; analysis of constraints on trade and investment; and development of action plans, with appropriate private and public interest groups, to remove the constraints.
>
> Trade and Investment Statutes and Regulations Through this component, TIPS surveys, catalogues, and proposes changes in investment statutes, commercial laws, and the code for commercial societies; increases the capacity of the Ministries of Finance, Justice, and Commerce and the National Assembly to -

develop statutes and regulations; enhances the ability of private interest groups to participate in the development of statutes and regulations; and improves the transparency and dissemination of laws, regulations, and procedures.

Legal and Administrative Adjudication Activities in this component are designed to reduce legal and bureaucratic constraints on trade and investment and facilitate efficient, fair, and impartial adjudication of conflicts regarding trade and investment transactions. Specific activities include assistance in the development of an independent judiciary and creation of small claims courts; improved capacity of executive offices to adjudicate trade and investment disputes; increased transparency of the judicial and adjudication systems; improved expertise of judges and lawyers; and incorporation of traditional dispute resolution systems (as appropriate) into the judicial and adjudication systems.

Direct Private Sector Support Through this component, TIPS directly supports the private sector by strengthening the capacity of private associations to represent their members' interests and enhance their business and managerial skills; expanding the capacity of private sector entities to provide trade and investment promotion services; and increasing private sector production through direct training and technical assistance.

From 1993 through 1996, TIPS organized its activities under the four technical components. In 1996, USAID/Bissau underwent reengineering and developed a new results framework which has six intermediate results (IR) categories (Box 1). TIPS has restructured its program to reflect the new results framework, replacing the four technical components with the six IR categories. It has also reduced to four the number of sub-sectors it is working in, removing rice and forestry from its 1997-1998 program. TIPS has project activities responding to all of the IRs except numbers 5 and IR 5.1. Its programed activities in IRs 5.2 and 5.3 for 1997-1998 are limited to assistance to the Government of Guinea-Bissau in fisheries management and maritime surveillance.

1

Box 1
RESULTS FRAMEWORK FOR USAID/BISSAU

Program Goal: Market-Oriented Economic Growth that is Broad-Based and Sustainable

Strategic Objective: Increased Private Sector Trade and Investment

Intermediate Results

IR 1 Improved Trade and Investment Policies Implemented
- IR 1.1 Obstructive Behavior of Government in Policy and Implementation Reduced and/or Eliminated
- IR 1.2 Improved Trade and Investment Laws and Regulations Enacted

IR 2 Contracts Enforced and Business Conflicts Resolved by Independent Judiciary
- IR 2.1 Improved Physical Infrastructure for Court System
- IR 2.2 Increased Capacity of Courts, Judges and Lawyers in Trade and Investment Dispute Resolution
- IR 2.3 Increased Public Knowledge of Uses of Judicial Systems

IR 3 Number of New Investors Increased
- IR 3.1 Information on Investment Opportunities and Climate Reaches Potential Investors
- IR 3.2 Timely, Efficient Processing of Investment Proposals

IR 4 Private Business Profits Increased
- IR 4.1 Increased Number of Private Associations Effective at Promoting T&I
- IR 4.2 Improved Management of Private Sector Enterprises
- IR 4.3 Increased Private Sector Productivity and Production
- IR 4.4 Increased Access to International Markets
- IR 4.5 Broad-Based Savings and Financial Facilities Extended to Private Sector Producers
- IR 4.6 Revamped Fiscal System within (Government) Development Framework

IR 5 Natural Resources Managed in Sustainable Manner
No TIPS Responsibility for IR 5, 5.1
- IR 5.1 National Environment Action Plan Implemented
- IR 5.2 Environmental Legislation Enacted
- IR 5.3 National Resource Management Technologies and Policies Implemented

IR 6 Infrastructure that Adequately Supports Growth in Production, Marketing and Export
- IR 6.1 Major Public Works Paid for or Coordinated by Government
- IR 6.2 Aggregated Infrastructure Improvements from Private Sector Development
- IR 6.3 Selected Private Sector Services Privatized

(See Annex A for a comprehensive listing of Intermediate Results.)

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TIPS pursues its objectives and results through three general mechanisms: promotion of understanding and acceptance of market economics, direct support to government entities, and direct support to private sector associations. TIPS promotes understanding and acceptance of market economics by decision makers through briefings to senior government and private sector officials, speeches by TIPS principals, and media interviews. The topics covered by these briefings, speeches, and interviews have included taxes, decentralization and debureaucratization of government, trade and investment policy, fisheries reform, and intragovernmental policy coordination. TIPS has been quite successful in gaining access to decision-makers, having given over 140 briefing to high government officials (including several meetings with the President, Prime Minister, and Ministers). It has also promoted understanding and acceptance of market economics by the general population through dissemination of information via television and radio programs.

TIPS has given direct assistance to several ministries in the Government of Guinea-Bissau. To facilitate efficient, fair, and impartial adjudication of conflicts regarding trade and investment, TIPS has assisted the Government of Guinea-Bissau in establishing an independent judiciary, including creation of small claims courts, training of magistrates and court officials, and simplification of notarization. It has also supported compilation and production of an annotated penal code. To facilitate the development and implementation of policies, legislation, and regulations enabling trade and investment, TIPS has worked directly with the National Assembly (ANP), the Ministry of Commerce, and the Ministry of Fisheries.

TIPS assisted the ANP in constituent communications, development of a modern system for recording its deliberations, and creation of a legislative data base. It sponsored a legislative study tour for eight ANP members and two ANP administrators to the United States and Brazil. TIPS also supplied furniture and equipment to the ANP administrative offices.

Since 1994 TIPS has worked with the Ministry of Commerce to help it develop legislation to enable free commerce and to decentralize and debureaucratize its dealings with the private sector. TIPS has assisted in drafting several laws dealing with commercial registration, commercial transactions, commercial establishments, and pricing systems. It has supported the decentralization of the Ministry of Commerce through training and providing furniture and equipment for regional offices.

TIPS has also worked with the Ministry of Fisheries since 1994, when it began its research into trade and investment constraints on the fishing industry. In 1995 TIPS provided data and document backup for the Government of Guinea-Bissau renegotiation of fishing agreements. It has worked closely with the Ministry of Fisheries to reform policies and laws affecting fisheries and has helped the ministry produce annual fisheries management

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plans. Most recently, TIPS has assisted the Ministry of Fisheries in creating licencing and port fee incentives for nationally registered boats and investment in on-shore facilities, and the establishment of local committees to assist in licensing and managing artisanal fisheries.

In 1996, the president and prime minister requested help from TIPS to study the need for a high-level government body to coordinate policy formulation and implementation. Since then TIPS has been working with an interagency group to develop a proposal for such a body to be housed under the prime minister. TIPS has also begun to work with the Ministry of Finance on tax reform.

The previously described activities create an enabling environment for improvements in trade and investment, but TIPS also directly supports the private sector through assistance to private associations. TIPS is currently working with 11 private sector associations (Table 1). It initially assisted these associations with developing organizational structures, business skills, and action plans, and provided furniture and equipment. During this period, TIPS directly provided training, technical assistance, and research to the associations. The associations have subsequently gained the capacity to provide training and technical, so that now most of the technical assistance and training supported by TIPS is implemented by the associations. In partnership with ANAG and AMAE, TIPS has trained over 300 people in cashew nut processing at the Quinhamel cashew nut processing training center. TIPS has also assisted ANAG in training over 500 people in the production and commercialization of exportable mangos and in the creation of four mango training centers on existing *pontas*. With AMAE, TIPS trained farmers in the use of foot powered treadle pumps for irrigating vegetables and has assisted with installation of pumps at 18 horticultural projects.

TIPS assistance to associations has also allowed some associations to develop to the point that they are preparing position papers on trade and investment issues which concern their members and presenting them to the government. TIPS also initially supported the associations by creating a market information system (SIMA) which is now being operated by the National Agriculture Association (ANAG).

Table 1
Associations Working With TIPS

Acronym	Name in Portuguese	Name in English
AEXP-GP	Associação de Exportadores da Guiné-Bissau	National Exporters Association
AGUICOB	Associação Guineense de Comerciantes de Bandim	Guinean Association of Bandim Businesses
AGUIPEC	Associação Guineense do Pequenos Comerciantes	National Association of Small Businesses
AIM	AssociaçãoIndústria da Madeira	Wood Industry Association
AMAE	Associação das Mulheures de Actividade Economico	Women's Economic Activity Association
ANAG	Associação Nacional do Agricultores da Guiné-Bissau	National Agriculture Association
ANEP	Associação Nacional dos Empresas de Pesca	National Fishing Association
ANFGB	Associação Nacional das Ferreiros do Guiné-Bissau	National Blacksmith Association of Guinea-Bissau
ASTRA	Associação Transportadores para Agricultura	Private Transport Operator Association
CASP	Comissão de Associacões do Setor Privado	Commision of Private Sector Associations
CCIA	Câmara de Comércio Industrial e Agricultura	Chamber of Commerce

2.1.2 Africare

The other major USAID/Bissau activity is managed by Africare. Africare activities account for 19 percent of total USAID/Bissau program funding. Africare has been implementing a P.L. 480 Title II program in Guinea-Bissau since 1991. The program is operated under a Host Country Food for Peace Agreement which is valid through September 30, 1998. Through this program, Africare imports wheat flour and vegetable oil for sale to local wholesalers and uses the local currency generated from these sales along with the funds from a Section 202(e) grant to support the Tombalí Sustainable Rural

Initiatives Project (TSRIP) in the south of Guinea-Bissau. FY 1996 expenditures for the program were $1,186,524, with $923,231 coming from the sale of commodities (monetization) and the remaining $263,293 from Section 202(e) funds[2].

The objectives of the Africare program are to:

- increase regional income-generating capabilities by promoting the organization of producer and processor associations through the provision of business and management training;
- support the economic activities of the producer and processor associations through the creation of a permanent credit structure that will respond to the financial needs of the small business sector in the Tombali region;
- promote diversification of production and increases in revenues of the associations through the provision of technical assistance and support in marketing activities;
- strengthen the enabling environment for food security of villages in the region; and
- improve access to and use of foods at the household level.

TSRIP meets these objectives by supporting small rural producer and processor associations through technical assistance, training, and credit. It also manages a Food Securities Initiatives Fund (FSIF) through which it funds small projects which improve the enabling environment for commerce and marketing in the project area.

The associations supported by TSRIP are engaged in a wide variety of economic activities including fruit orchards, vegetable gardens, fishing, animal husbandry, carpentry, and marketing. TSRIP has established two agricultural and agribusiness training centers in the project area and has 23 association advisors who provide training and technical assistance to the participating associations. The technical assistance and training provided by TSRIP has focused primarily on association administration (e.g., bookkeeping, accounting,

[2]Beginning in 1995 Africare also began to pay funds into a counterpart fund for development projects in food security. The fund is co-administered by Africare and the Government of Guinea-Bissau. Payments into the fund are made in leu of import duties and are equal to the amount which would have been paid in duties (12 percent). In the absence of the agreement, these funds would have been paid directly to the Government of Guinea-Bissau and would have gone into the government's ordinary revenue pool. Because of the special nature of these funds, they are considered to fall outside of USAID requirements and are therefore not included in this PEA.

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organization, decision making, and resource planning). In FY96 TSRIP added a pilot basic literacy and numeracy program to its training component, which it is extending project-wide in FY97. The purpose of the training in administration, literacy, and numeracy is to facilitate organization and legalization of the associations. An association must be legal and develop a business plans before it can participate in the Africare credit program. TSRIP currently works with 81 associations, only five of which were legalized when TSRIP began to work with them. In November 1996, TSRIP completed the last round of legalization, so that now all 81 associations are legalized.

In addition to the training and technical assistance in administration, TSRIP has provided or facilitated limited training in agricultural production and processing. It has sent associate advisors and association members to courses at the TIPS cashew processing training center and to visit gardening projects. Its FY97 work plan calls for technical training in mango/banana drying and preserving, fruit and tuber processing, cashew nut processing, and horticulture, all of which will be supported with technical assistance from TIPS. Now that the associations have been legalized, it is likely that Africare will devote more of its training and technical assistance to production and processing.

The credit program is operated through the TSRIP revolving credit fund which was established in 1995. Prior to 1995 Africare had a less structured credit program which did not perform well. It spent much of FY95 establishing a comprehensive and practical credit system with the assistance of expatriate consultants. Participating associations can borrow money for production, processing, and commercialization[3] projects. Loan applications are screened by TSRIP staff to identify those which are ready for review (those from legal associations with well written business plans). The applications which survive the screening are reviewed by a Sector Review Committee composed of TSRIP staff and local community leaders. Associations must provide 20 percent of total financial needs from other sources.

The revolving credit fund made its first loans in March 1996 to 16 associations. Thirteen of the loans were for product commercialization, one was for honey production, one was for oil extraction, and one was for rice hulling. The loans ranged from 17 to 155 million GP ($486 to $4,429) with an average 42.75 million GP ($1,221). Only two of the loans, both for commercialization, were for more than 45 million GP ($1,286), one for 132 million GP ($3,771) and the other for 155 million GP ($4,429). Thirteen of the original loans have been repaid in full, with an average 15 percent profit margin. Two of the three

[3]Commercialization loans provide money to associations to purchase, store, and transport products, thus eliminating the associations dependence upon middlemen and increasing its members profits.

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associations which have not fully repaid their loans have established a payoff program with Africare. One is repaying the loan with commodities (rice and honey).

Africare has received 43 loan applications for the first semester in 1997, over half of which are for production and processing, including horticulture, cashew processing, oil production, and artisanal fishing. Africare staff are just beginning to review these applications.

The FSIF provides small grants for community development projects which improve access to and availability of food. Activities funded by FSIF include road grading, bridge construction, well drilling, and health projects. In FY95, for example, a total of $7,540 was granted for two road repair projects, and the construction of two bridges and a community center. The goal for FY97 is to fund 60 projects identified by local village food security action plans. In 1996 TSRIP staff developed action plans for the 30 villages that have been supported by the project.

2.1.3 Others

Three of the other eight USAID/Bissau projects have the potential to impact the environment: Small Project Assistance, the Self-Help Fund, and Disaster Assistance. All of these projects provide funding for construction activities. Small Project Assistance is managed by the Peace Corps and provides volunteers with a source of funding for small community projects. In FY 1996 Small Project Assistance spent $19,260 on construction of schools, seed storage facilities, latrines, and wells and development of small-scale agricultural projects. The largest single project was a rice pearling project which received $6,604.

The purpose of the Self-Help Fund is to demonstrate U.S. interest in the welfare of local communities. It is managed by the Ambassador and designated embassy staff and is directed primarily at projects which foster education, health, and income generation. Funding is only available to projects sponsored and implemented by a community organization. The community organization is required to contribute a portion of the total cost of the project (usually in the form of materials and labor). Embassy staff solicit applications for funding annually. Applications which fulfill the basic requirements are ranked by embassy staff based on feasibility, number of people served, and worthiness (degree to which they support education, health, or income generation). In FY96 the Self-Help Fund supported four projects with a total expenditure of $40,000. The projects included a rice milling project with a women's group, a women's sewing project, construction of a school, and drilling and development of a community well. The projects funded in previous years were similar to those funded in FY96. Individual project awards during the last three years have ranged from $4,000 to $19,000 with an average award of $8,000.

The Disaster Assistance fund allows USAID/Bissau to assist the Government of Guinea-Bissau in response to a disaster. These funds are used primarily for the reconstruction of destroyed or damaged infrastructure. Disbursement of these funds requires a commitment of local or national funds to the proposed activity.

The other five projects have no potential for environmental impact and are not considered in the PEA. The African Training for Leadership and Skills and Human Resources Development Assistance are training programs, providing funding for academic and professional training in the country, region and abroad. Program Development and Support funds the identification, design, support, and evaluation of programs, projects, and activities which cannot be appropriately charged to an individual project. The Special Program Objectives on HIV/AIDS is a small program which donates condoms used in a social marketing strategy. The Democracy and Human Rights Project promotes civil and political rights and is managed by the Ambassador and designated embassy staff.

2.2 No Action

In the context of this PEA, no action is continuation of the TIPS and Africare activities as currently provided for in project plans and submissions. In the cases of Small Project Assistance, the Self-Help Fund, and Disaster Assistance, no action is continuation of current project management.

2.3 Mitigation Measures

Because the USAID/Bissau activities which are the subject of this PEA are already being implemented, the PEA presents no design alternatives. Rather, recommendations are presented in the form of mitigation measures which would improve the environmental performance of the activities and reduce their environmental impacts.

2.3.1 Trade and Investment Promotion Support Project

<u>Agriculture</u>

Although TIPS activities have stimulated forest clearing for the production of cashews and fruits, the major cause of deforestation in Guinea-Bissau is itinerant agriculture and expansion and maintenance of pastures and hunting grounds, activities which TIPS does not support. Production of cashews and fruits represent a major source of income for Guinea-Bissau, one of the poorest countries in the world. Very little nonforest land is available in the country for planting cashews and fruits, so that if the citizens of Guinea-Bissau are to realize the economic benefits of increased production, some forested

areas will have to be cleared. Nonetheless, this PEA recommends mitigation measures for reducing the impacts of the production of cashews and fruits on deforestation.

Mitigation measures are also recommended for TIPS activities in fruit and vegetable production and cashew processing, to reduce the potential environmental effects of pest control and processing waste disposal.

1. TIPS should undertake a study to better understand what forest types and ecological systems are being cleared for the production of cashews and fruits. The study should include land clearance for other crops, in those cases where cashews or fruit production has shifted other crops into previously forested areas.

2. TIPS should initiate policy dialogues on developing capability criteria for land use decisions regarding the choice of sites for the production of cashews and fruits. These dialogues should include the private and public sector including representatives from ANAG, MDRA-Soils, DGFC, and DGA. The dialogues could be coordinated with the development of land tenure policies by the ANP and the natural resource management strategy being developed by DGA.

3. Training and technical assistance for the production of fruits and vegetables should continue to include components on nonchemical treatments for disease and pest problems.

4. TIPS should develop information and training materials on the safe use of pesticides and incorporate them into its training and technical assistance activities for fruits and vegetables.

5. Training and technical assistance for cashew processing should include information on the potential hazards of cashew nut shell liquid and methods of reducing hazards to workers and the environment. The training should include techniques for properly disposing of liquid and solid wastes. TIPS should support analysis of the nutritional value of cashew skins as a potential source of animal feed.

Fisheries

To effectively manage the fisheries resources of Guinea-Bissau, the calculation of catch quotas and sustainable yields must take into consideration the impact of both the industrial and artisanal fleets on the resource. Both these groups exert different pressures (gear, area, age, and effort differences); however, the yields come from one resource. The effect of over fishing in the industrial zone is a decline in the abundance in the stocks which should, over time, lead to a decline in the availability, the catch per unit effort, and the landings of the artisanal fleets targeting the same species. The currently proposed artisanal

fisheries management plan does little for resource management. It essentially promotes the sale of licenses and the collection of landing statistics. The following mitigation measures are aimed at improving fisheries resource management.

1. Future fisheries management plans should focus on the resource rather than the user group, integrating the establishment of quotas and allowable harvests and the development of other management requirements for industrial and artisanal fleets.

2. TIPS should encourage the Ministry of Fisheries to conduct regular stock assessment cruises for the industrially targeted species. If planned correctly, this research could be incorporated into the licensing agreements and should be monitored on-board by scientists from the host and foreign countries.

3. Stock assessments should also be conducted for the species targeted by the artisanal fleets. In the event that these stocks are the same as those targeted by the industrial fleet or are by-catch species, combination research cruises operating in industrial and artisanal zones should be conducted.

4. Future fisheries management plans should be designed to allow for multi-species management. This is important because of the level of by-catch associated with the shrimp fisheries.

5. The Ministry of Fisheries should collect hard data on landings, areas of capture, size-age-weight distribution of species captured, associated species, fishing effort by gear type, and drag time. It should expedite the analysis of this data. Such real-time analysis would allow for the development of responsive fisheries management plans which would give the ministry the ability to modify catch quotas and seasonal closures, as needed.

6. TIPS, in the course of its fisheries development activities, should make the Ministry of Fisheries aware of plausible impacts of the shrimp fishery on marine turtles and introduce the notion of using turtle exclusion devises by the shrimp fleet.

7. TIPS should continue to sponsor round table discussions to develop awareness of new fisheries laws, procedures, and fees.

8. Since the TIPS activity has led and will continue to lead to the development of on-shore fish processing activities, increases in port usage, and the development of related support industries, it is imperative that TIPS assess the environmental impacts of these activities. Areas of concern are: effects of increased port use; pollution associated with fish processing; increased risks of fuel spills and port

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response capacity; potential pollution due to increased use of repair facilities; solid waste disposal needs; and effects of transport-related activity.

Forestry

Given the near total lack of forest management in Guinea-Bissau and the uncertainty about future land tenure, any work to improve trade and investment in timber or wood products would most likely encourage further forest degradation. Therefore, TIPS should not participate in activities that will lead to increased trade in timber and lumber.

Environmental Management

TIPS has focused almost exclusively on the first part of the USAID/Bissau program goal -- "market-oriented economic growth" -- to the exclusion of the last half -- "that is broad-based and sustainable." In its considerable efforts to help decision makers "understand and accept market economics" it has almost ignored market failures, such as externalities and the existence of public goods.[4] Yet it is these market failures which lead to significant environmental impacts and can prevent sustainable development.

1. TIPS should include understanding of market failures such as externalities and the existence of public goods in its policy briefings and build local capacity in identifying and assessing market failures and designing interventions to correct those failures. The capacity building activities could be incorporated into the support TIPS is providing for the development of a high-level policy office. Annex B presents an example of a policy analysis framework which incorporates environmental issues into policy development.

2. TIPS should provide training and technical assistance to the Directorate General for the Environment on development of policies, legislation, and regulations for environmental standards for activities in the six critical growth sectors and for environmental impact assessment.

3. TIPS should support the development of a fair and just land and resource tenure policy which clearly defines modern rights without destroying traditional systems.

[4]The only reference to market failures is in a draft 1997 TIPS fisheries publication, which includes a two page section on market failures and government intervention.

2.3.2 Africare

Africare activities are primarily in the agricultural sector. Mitigation measures are recommended for TIPS activities in fruit and vegetable production and cashew processing, to reduce the potential environmental effects of pest control and processing waste disposal. The following measures are also recommended for incorporating environmental impact assessment into the credit and grant activities of Africare.

1. Training and technical assistance for the production of fruits and vegetables should include components on nonchemical treatments for disease and pest problems and the safe use of pesticides.

2. Training and technical assistance for cashew processing should include information on the potential hazards of cashew nut shell liquid and methods of reducing hazards to workers and the environment. The training should include techniques for properly disposing of liquid and solid wastes.

3. Activities receiving credit or support from the FSIF should be screened using the Environmental Screening/Report Form for NGO/PVO Activities and Grant Proposals which is provided as Annex B in Environmental Guidelines for Small-Scale Activities in Africa (Knausenberger et al. 1996)[5]. Africare should reserve funds for conducting environmental assessments if such a need is identified during activity screening.

4. Africare should train its personnel in the use of the screening procedures.

2.3.3 Other USAID Programs

Three of USAID's other eight programs have the potential to create environmental impacts: Self-Help Fund, Small Project Assistance program, and Disaster Assistance. All of these programs fund small-scale activities which probably have minimal impacts. Nonetheless, they should be screened to ensure that the impacts are minimal. In addition, USAID/Bissau should take some actions to improve forest and environmental management in Guinea-Bissau.

1. Projects funded by USAID's Self-Help Fund, Small Project Assistance program, and Disaster Assistance program should be screened using the Environmental

[5]Although the Africare/Government of Guinea-Bissau counterpart fund is not covered by this PEA, Africare should encourage the Government of Guinea-Bissau to use the Environmental Screening/Report Form for projects funded by the counterpart fund.

Screening/Report Form for NGO/PVO Activities and Grant Proposals which is provided as Annex B in Environmental Guidelines for Small-Scale Activities in Africa (Knausenberger et al. 1996).

2. USAID/Bissau, to the extent possible, should support the Government of Guinea-Bissau in improving forest management. Any assistance or training given to the GOGB in the forestry sector should be focussed on achieving long-term sustainable forest management, such as mapping, measurement, inventories, tree identification, fire management, and silviculture. Although improving timber utilization is an important component of sustainable management, such training in isolation can lead to greater forest degradation, and should be avoided.

3. USAID/Bissau should support efforts by the Agro-Silvi-Pastoral Project (PASP) to develop a sound policy environment for development and implementation of community-based forest management and local-national community forestry partnerships. Where developed properly, community-based forest management has proven to be an efficient ecologically-sound mechanism for establishing sustainable forest management in resource-poor countries with weak public sectors, such is the case in Guinea-Bissau. It is also highly beneficial to local populations.

4. USAID/Bissau should provide training and technical assistance to the Directorate General for the Environment on development of policies, legislation, and regulations for environmental standards for activities in the six critical growth sectors and for environmental impact assessment.

5. USAID/Bissau should support the development of a fair and just land and resource tenure policy which clearly defines modern rights without destroying traditional systems.

3.0 AFFECTED ENVIRONMENT

Guinea-Bissau is among the least developed nations of the world. World Bank data indicate that in 1994 the per capita income was only $234, and Guinea-Bissau had an official external debt of $813 million, more than three times its gross domestic product (GDP). The economy of the country is heavily dependent upon agriculture and fisheries which employ 90 percent of the workforce and represent almost 50 percent of the GDP. About 75 percent of the country's 1.1 million inhabitants live in rural areas where the primary economic activity is subsistence agriculture.

3.1 Physical Environment

3.1.1 Geography, Climate, and Soils

Guinea-Bissau is located on the western coast of Africa, between Senegal to the north and Guinea to the south. The total area of the country is 36,120 square kilometers. This area is dissected by a system of rivers, lakes, lagoons, and estuaries, so that the total land area is only 28,000 square kilometers, including the Bijagos Archipelago. Topography is generally flat in the coastal areas with rolling hills in the east. The highest point in the country is the Boé Sector in the southeast with elevations up to 300 meters above mean sea level. Most arable land is found under the 40 meters elevation level. The principal soils are laterites and poorly consolidated quaternary sediments (Teixeira 1960).

Guinea-Bissau is a tropical country with an average temperature of 26.9°C and average relative humidity greater than 50 percent. There are two seasons. The rainy season begins in June and ends in October, during which the country will receive 1,000 to 2,000 millimeters of rain, with the amount of rainfall generally decreasing from the southwest to the northeast. Most of the rain falls during July through September. The dry season lasts for 7 months, from November through May.

In 1970, the country entered a dry period. Since then, annual rainfall has been 10 to 25 percent less than in previous years. During this period, the rainfall pattern has also shifted, with more rainfall concentrated in the July through September period. Average temperatures have also increased over the past 40 years.

3.1.2 Water Resources

The country has seven major river systems: Cacheu, Mansoa, Geba-Corubal, Buba, Tombali, Cumbija, and Cacine. All of them flow into estuaries on the Atlantic Ocean. The Buba, Tombali, Cumbija, and Cacine rivers are almost totally estuarine, under the influence of tides. The largest river system in the country is the Geba-Corubal, which

drains the eastern interior of the country. The Cacheu and its tributaries drain most of the northwestern interior.

The construction of a dam in Senegal on the Kayanga river reduced the amount of water flowing in the Gebu river and contributed to ecosystem degradation downstream. The reservoir has a storage capacity of 46 million cubic meters. It was designed to supply water for the irrigation of 5,000 hectares of rice during the rainy season and 300 hectares during the dry season. It has been estimated that downstream aquatic ecosystems require 10 percent of average streamflow to function at a minimal level. Unfortunately, in an 8-year period since the dam was built, the floodgates have been opened only once, although only 1,365 hectares of land have been irrigated. There is a current proposal to construct a dam on the Corubal river in Saltinho for the production of 18 mv of electrical energy.

The western half of the country is estuarine and under the influence of tides. There are limited shallow groundwater resources in this area. The deeper substrata, however, correspond to the southernmost point of the Senegalese and Mauritania sedimentary basins, with multi-layered aquifers which are exploited by numerous wells. The structure of the aquifers south of the Geba River estuary are notably less developed and less known. The aquifers below the Bijagos Islands can include salt water layers. Groundwater quality in this region is generally good north of the Geba. Salt water intrusion, however, is a problem with salinity increasing toward the west.

In the east, the substrata is a fractured shield covered by alterites, in which there are free (discontinuous) aquifers. Wells in this region are generally 20 and 50 meters deep and have low productivity. Groundwater quality in this region is generally good, except the iron content which exceeds the local limit for drinking water. This poses a nuisance problem, but not a public health problem.

Almost all of the drinking water in the country comes from groundwater. Bissau's water supply, as well as that for some semi-urban centers, comes from deep aquifers. Most of the other drinking water wells in the country are in the upper aquifers. To some extent, groundwater is also used for irrigation and stock water. Most irrigation, however, relies on surface water. Rice is the principal irrigated crop. *Salgada* rice (salt water paddies) is irrigated in the estuarine areas, and *doce* rice (freshwater paddies) is irrigated in upland river valleys. Surface water withdrawals for rice cultivation in the estuarine areas during 1991 were estimated at 132 million cubic meters (MEIRN, 1995).

Data on water quality in Guinea-Bissau is almost nonexistent. The Public Health National Laboratory in the Ministerio de Saude Publica can perform bacterial and basic cation and anion analysis, but it has no monitoring program. The laboratory only takes samples and does analyses when wells are drilled or when requested by consumers who are suspicious of drinking water quality. There are no systematic, continuous water quality monitoring

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programs for drinking water, surface water, or groundwater. No studies have been conducted on pesticide or fertilizer contamination.

A study of the quality of water supplies in Bissau, Gabu, Bafata, and Bolama was conducted by Tecsult, a private company, in 1996. The study concluded that the main sources of pollution are latrines and sewers. Another indication that bacteriological contamination of drinking water is a problem is the large number of cases of water borne diseases in the country. Life expectancy in Guinea-Bissau is only 42 years and infant mortality is 139 per 1,000 births (GDUR, 1995). Water-related diseases are responsible for 9 percent of all deaths in the country and nearly 50 percent of child deaths.

A review of the literature and a nonquantitative assessment of sources of coastal pollution identified the following potential sources:

- point source effluent discharges of petroleum by products from boats and power plants;
- limited organic effluent from fish processing activities;
- household discharges of washing water containing detergents; and
- fecal coliform from human and animal wastes.

Accidental release of fuel oil and leaking storage tanks at the power plant in Bissau have contaminated the adjacent mangrove ecosystem. Severe oil plumes were observed in the areas adjacent to the plant by the PEA team. The level of contamination is such that local entrepreneurs use contaminated waters from around the plant effluent canal to oil and protect wood on houses and fishing canoes. Local artisanal fishermen (women with hoop nets) who harvest fish and shellfish in the saline wetlands around the plant have complained that products harvested, when cooked, smell like diesel fuel (personal communication with Carlos Rui Ribeiro, Directorate General for the Environment).

3.2 Agriculture

Agriculture is the most important sector in the economy of Guinea-Bissau, employing 80 percent of the labor force and accounting for about 50 percent of the GDP and 90 percent of exports (World Bank, 1992). Seventy-five percent of the population live in rural areas and depend on subsistence agriculture. Most of the crops are planted for domestic consumption, including rice, millet sorghum, cassava, and peanuts. Cashews, peanuts, palm kernels, and mangos are grown for export.

Guinea-Bissau has close to 1.2 million hectares of arable land. Less than 300,000 hectares is currently under cultivation. Much of the arable land is pasture used for grazing by livestock or areas dominated by natural stands of oil palms. Livestock production is low,

with an estimated 410,000 cattle; 465,000 goats and sheep; 67,000 pigs; and more than 473,000 chickens [Ministry of Rural Development and Agriculture (MDRA), 1996].

3.2.1 Resource Condition

Rice

Rice is the most important subsistence crop in the country, occupying about 25 percent of the total cultivated area (Table 2). Three different systems are used to grow rice in the country.

Bolanha salgada is practiced in rice paddies reclaimed from mangroves. Growth in this system is constrained by the high initial cost of land clearing and building water systems and dikes. Since 1990, there has been a decrease in the area of *salgada* rice due to salinization and acidification of old paddies. Reclamation of *salgada* areas abandoned or partially destroyed during the war of independence is a potential source of growth for this system. Current production in *salgada* is about 2,000 kilograms per hectare per year. Paddy rice production can be doubled with improved seed (TIPS, 1994).

Bolanha doce is practiced in freshwater rice paddies on alluvial soil of river valleys and floodplains. Like *salgada* rice, placing new areas into production is costly. *Doce* rice, however, has less problems with salinization and acidification, and in some areas it can be practiced even during the dry season, using surface water irrigation. The area of *doce* rice has been increasing since 1990. Current production for *doce* rice is equivalent to *salgada*, about 2,000 kilograms per hectare per year, and like *salgada* rice, production could be doubled with improved seed and cultivation techniques.

Sequeiro (pam-pam) cultivation is upland rice. It is usually planted on sandy soils in previously forested areas which have been cleared using slash and burn techniques. *Sequeiro* rice is an itinerant culture. Once an area is cleared, it is generally cultivated to rice for only 2 to 3 years, after which it may be rested for 5 to 6 years. The area planted to *sequeiro* rice has been increasing since 1990, at a faster pace than *salgada* or *doce* rice. Current annual production of *sequeiro* rice is about 1,500 kilograms per hectare.

Almost every rural family has some land planted to rice. Rice is not grown commercially by large farmers. Although there are large areas of continuous rice paddies, these areas are actually divided into many small family plots. In most of the country, an average household will have 0.6 hectare in rice production. In the south, with its extensive *bolanhas salgadas*, the average area cultivated in rice is three to five hectares per household. Given current technology, capital, and labor, the average area of production cannot be easily increased. Without a change in these conditions, future growth in the area cultivated in rice will be limited to population growth.

Table 2
Area Under Cultivation by Principal Crops, 1990-95 (Hectares)

Crop	1990	1991	1992	1993	1994	1995	Average Annual Change	
							1990-93	1993-95
Cashews	40,211	48,488	58,504	70,632	83,323	103,000	10,140	16,184
Rice, *Sequeiro*	15,245	16,750	21,529	21,255	23,851	24,616	2,003	1,681
Rice, *Agua Doce*	24,275	27,694	29,009	32,917	27,932	29,368	2,881	(1,775)
Rice, *Agua Salgada*	13,722	12,569	10,898	10,851	12,005	11,306	(957)	228
Rice, TOTAL	53,242	57,013	61,436	65,023	63,788	65,290	3,927	134
Millet	NA	23,253	26,633	30,754	37,205	38,086	3,751	3,666
Peanut	20,020	18,080	10,410	15,588	18,173	15,681	(1,477)	47
Sorghum	11,102	12,750	13,110	12,491	15,456	15,427	463	1,468
Corn	13,505	12,807	14,275	10,797	13,400	14,839	(903)	2,021
Bean	2,289	2,543	3,970	4,796	4,995	3,491	836	(653)
Cassava	1,010	1,665	1,130	881	1,172	1,412	(43)	266
Mango	70	76	155	190	NA	900	40	355
Tomato	96	95	66	86	85	86	(3)	0
Lettuce	54	55	52	72	68	69	6	(2)
Okra	24	25	27	31	33	NA	2	2
TOTAL	141,623	176,850	189,768	211,341	237,698	258,281	16,739	23,488

Source: Cashew data, Filiere Anacardier en Guinee-Bissau 1996. Mango, Tomato, Lettuce and Okra data, Food and Agriculture Organization of the United Nations (FAO). All other data, GAPLA 1996.

Rice is generally grown during the rainy season,[6] although clearing for *sequeiro* rice begins in April. Rice is planted in June, tended and weeded through September, and harvested from October through December. Almost all of the harvested rice is milled by hand by women. Farmers and small processors do not have the capital to construct long-term storage, so rice is often sold or traded shortly after harvest. Later, when cashews are picked, they are traded for rice, because of lack of food.

It takes an estimated 90 days of labor to produce 2,000 kilograms of rice per hectare of *salgada* or *doce* rice or 1,500 kilograms of *sequeiro* rice. The value of the rice to a producer is estimated at $107/ton (TIPS, 1995), or roughly $2.38 per day of labor in *salgada* and *doce* rice or $1.78 for *sequeiro* rice.

Cashews

Cashew is the most important cash crop in the country, accounting for 77 percent of total export income in 1995 (TIPS, 1995). Cashews were traditionally grown in the northwest, but have spread throughout the country. The area planted to cashews has been growing faster than for any other crop, surpassing rice in 1993 as the most widely planted crop. Although most *ponteiros* (private farmers) grow cashews, 90 percent of the production still comes from *tabancas* (traditional family farmers). About 42 percent of rural households grow cashews (USAID,1995). A family can manage about 5-10 hectares of cashews. Although the literature on cashew production in Guinea-Bissau reports production levels of over 900 kilograms per hectare (França, 1994), the manager of one of the largest plantations in the country reported that, with trees ranging from 4 to 9 years old, he was averaging about 250 kilograms per hectare, with his oldest trees producing about 400 kilograms per hectare. He anticipates that at maturity the plantation will average 500 kilograms per hectare with the best trees producing 700 kilograms.[7]

The area planted to cashews has grown for several reasons. Cashew farming requires less labor than rice farming and has a 98 percent higher return on labor than that for rice (TIPS, 1995). Because of uncertainty about the land law, planting cashews is perceived as a means of establishing land claims (Tanner, 1991). Cashews are planted so that they can be exchanged for rice at the end of the dry season (Lekberg, 1996). Finally, the cashew fruit is used locally to produce a wine.

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[6]Only a small area of doce rice is irrigated, allowing dry season cultivation.

[7]Personal communication with Dag Rune Hauglund with Ajoda de Desenvolvimento de Povo para Povo (ADPP) in Bissora. ADPP has 320 hectares of cashews in production and plans to develop up to 600 hectares.

Cashews are usually planted in old crop land, including abandoned *sequeiro* rice land, or on cleared forest land, using slash and burn techniques. Cashews cannot be planted on old *bolanhas* (*doce* or *salgada*) because of high salinity and flooding in the rainy season.

Cashew trees are planted from seed. The trees do not produce fruit and the associated nut until they are 5 years old. During the first couple of years after planting, other crops such as peanuts, cassava, corn, or beans can be and often are planted in the orchards. A tree will produce fruit for more than 25 years, with peak production occurring when it is 8 to 20 years old (França, 1994). Although cashews are initially planted in the rainy season, subsequent cultivation and harvest is primarily a dry season activity.

Fire is a major threat to cashew trees, and reducing that threat requires hand cutting the grass which grows around the planted area and between the trees. This cleaning begins in October and continues through the dry season. Many of the cashew orchards in the country are planted with 6 by 6 meter spacing. In these orchards, the trees eventually form a continuous closed canopy, beneath which grass does not grow, so cleaning inside the orchard is not necessary. Optimal spacing for cashews, however, is 12 by 12 meters. In those orchards, grass does not grow within the drip line of the tree, due to toxic properties of cashew leaf litter, but grass does grow between the trees.

Cashew harvest begins in March and ends in July, with May being the most productive month. Harvest is almost exclusively done by women and children, who collect the fruits and seeds as they fall from the trees.

In the countryside, cashew fruits are used to make wine, and unshelled raw cashew nuts are generally traded for rice on a 1:1 ratio by weight. Almost all of the cashews are exported in their shells. Nut processing is done only on a small scale.

Fruits

Fruit is produced throughout Guinea-Bissau. Bananas, citrus, and pineapples are produced in the south and papaya and citrus are produced in the north and east. Mango trees can be found throughout the country, but large-scale production did not begin until 1992. The large citrus orchards are primarily on *pontas* (private farms). The main fruit-producing *pontas* are located within 120 kilometers of Bissau. Although fruit production is more profitable than rice or cashew production, it requires a greater investment and technical skill.

Compared to rice and cashews, fruit crops occupy much less land, but some estimates put land occupancy by fruit crops on *pontas* alone at as much as 15,000 hectares (TIPS, 1995). The area planted to mangos increased by 580 percent from 1992 to 1995 (Table 2).

Most of the fruit produced is consumed in the domestic market, although there are some regional exports. Exports of mangos and papaya to Europe is small but growing.

Vegetables

Vegetables have not traditionally been an agricultural crop in Guinea-Bissau, but in recent years, the area under cultivation for vegetables has increased. Table 3 presents information on hectares under vegetable cultivation from 1990 through 1994. TIPS estimates that during the 1994/1995 season, 560 hectares of vegetables were under cultivation (TIPS, 1995).

Vegetables can be grown year round in Guinea-Bissau, but most production takes place from November through March, in small, irrigated plots. In the rainy season, labor demands in rice increase, resulting in reduced vegetable farming. The average size of a vegetable plot is 450 square meters, although there are some larger commercial farms near Bissau. Vegetables are produced almost exclusively by women. In 1995, TIPS estimated that about 10,000 women in the country were involved in vegetable farming (TIPS, 1995). Vegetable farming is the main source of income for these women.

Most of the vegetables produced are consumed in the domestic market. The international community in Bissau is a major source of demand. There is a small, informal export trade to neighboring countries in the border regions.

Table 3
Area Cultivated for Vegetables

Crop	1990/91	1991/92	1992/93	1993/94
Carrot	5.0	9.0	5.0	11.0
Cabbage	14.0	15.0	24.0	24.0
Chili Pepper	7.1	5.8	8.6	9.5
Cucumber	0.4	0.2	1.2	1.3
Eggplant	0.9	0.8	0.9	1.8
Garlic	0.4	0.1	1.0	1.1
Green Beans	0.8	0.5	1.0	3.3
Green Pepper	10.0	7.0	15.0	13.0
Hibiscus	28.3	19.4	22.2	21.0
Lettuce	55.0	52.0	72.0	68.0
Okra	24.7	27.0	31.2	33.4
Onion	40.0	40.0	58.0	64.0
Parsley	2.0	0.6	1.4	1.6
Radish	0.4	0.8	0.9	1.0
Tomato	95.0	66.0	86.0	85.0
Turnip	1.5	1.1	2.2	3.1
Other	26.0	18.5	26.8	31.0
TOTAL	176.0	145.8	203.0	216.6

Source: MDRA/SAAB/Projecto Cintura Verde de Bissau (FAO)

3.2.2 Resource Management

Agricultural Chemicals

The current use of agricultural chemicals on rice, cashews, fruits, and vegetables is very low. Generally no agricultural chemicals are used on cashews. Some fertilizers and pesticides, however, are used on rice, fruits, and vegetables. Because of the high cost of these chemicals, however, they are not widely used, and as a result, it is unlikely that they are causing significant environmental problems. As farmers' incomes increase, however, the demand for and use of agricultural chemicals may also increase, as well as their potential for causing environmental impacts.

Table 4 shows the common diseases and pests for rice, cashews, fruits, and vegetables in Guinea-Bissau. Pesticides are not currently used on cashews, and are infrequently used in rice. The species of cashew grown in the country is resistant to most pests. The two biggest problems are a fungus (anthracnose) and stem borers, both of which can be readily treated without chemicals. Branches with anthracnose are cut and burned and stem borers are hand picked. Most rice farmers cannot afford to purchase pesticides.

Pesticides are more commonly used to treat disease and pest problems in fruits and vegetables. Table 5 presents a list of the most commonly used pesticides in Guinea-Bissau. Almost all of these pesticides are used exclusively on fruits and vegetables. The major exception is phosphorate of aluminum (Phosphoxin), which is use for fumigation of stored products, including raw, unshelled cashew nuts.

In the absence of pesticides, farmers rely on manual systems of pest control. However, there have been no scientific studies of nonchemical treatment in the country.

Table 4
Principal Diseases and Pests for Rice, Cashews, Fruits, and Vegetables

CULTURE	DISEASES	PESTS
Rice	Pyriculariose (*Pyricularia oryzae*)	Spodoptera
	Cercospoporiose (*Cercospora oryzae*)	Termites
	Bacteriose (*Xanthomonas campestris*)	Diopsisthoracia
	Podridao da bainha (*Scarocladeum oryzae*)	*Heteronyctrus oryzae*
		Nympula stagnatis
Cashews	Anthracnose (*Collectotrichum gloeosporoids*)	Thrips (*Selenothrips rubrocinctus*)
	Oiduim (*Oidium anacardium*)	Capricorne (*Raphidopsis melalenca*)
	Pestalotrase (*Pestalotia spp.*)	*Analeptes trifasciata*
	Algas (*Cephaleuroi virensis*)	Plunaise (*Helopetis amarcadii*)
		Oligonycheer coffeae
		Coptotermes intermedius
		Euproctis spp.
Fruits	Fumagina (*Fumago vagans*)	*Planococus citri*
	Tristeza (*Citriviv viatoris*)	*Ceratitis capitata*
	Rachamento do fruto (*Doenca abiotica*)	Destructor
	Mal da Sigotoka (*Mycosphaerella musiola*)	Leucotreta
	Mal de Panama (*Fusarium oxyporum*)	Leptoglossus
	Murcha de verticilium (*Verticilium*)	Australis
	Alternariose (*Alternaria spp.*)	*Aonidiella aurantii*
	Antracnose (*Colletotrichunn gloeosporioides*)	*Polyphagotar sonemuslatus*
	Gloesosporoides	*Rastrococcus invadens*
	Fusariose (Fusarium)	*Selenothrips rubrocinctus*
Horticulture	Murcha da planta (Verticillium)	*Heliothis armigera*
	Requeima (*Phytophothora parasitica*)	*Spodoptera tittoralis*
	Fusariose vascular (*Fusarium oxysporum*)	*Thrips tabaci*
	Murcha bacteriana (*Pseudomonas solanacoeurum*)	*Plutella xylostella*
	Mosaico (Virus)	*Aphis craccivora*
	Galhas nas raizes (Meloidoginae)	*Tetranychus spp.*
	Podridao negra (*Xanthomonas campestris*)	*Polyphagotarsonemus latur*
		Mastomys spp.
		Agrotis ipsilon

Resource: MDRA/Division of Plant Protection (DPV)

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Table 5
Most Commonly Used Pesticides

COMMON NAME	COMMERCIAL NAME
Fenvalerate	Sumicidin
Fenvalerate 30 percent CE	Sumicidin 30 percent CE
Chlopyrifos	Dursban
Chlopyrifos 24 ULV	Dursban 24 ULV
Alphacypermethrin	Fastac
Malathion	Zithiol
Malathion 96 percent ULV	Zithiol 96 ULV
Malathion 50 percent CE	Zithio l50 percent CE
Fenitrothion 3 percent	Sumithion 3 percent
Fenitrothion 50 percent ULV	Sumithion 50 percent ULV
Fenitrothion 50 percent CE	Sumithion 50 percent CE
Fenitrothion 36 percent ULV	Sumithion 96 percent ULV
Fenitrothion + Fenvalerate 1,8 percent	Sumithion + Sumicidin
Propoxur 75 percent	Unden
Dazomet G	Basamid
Carbaryl	Sevin
Lindano 90 percent PM	Lindafor
Deltamethrin	Decis
Benfuracab 5 percent G	Oncol
Sumicombi 8 percent PP	-
Phosphoxin	Phosphoreto of aluminium
Resource: Project KR2	

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The DPV in MDRA is the principal source of pesticides in the country. It also is responsible for regulating pesticide use. DPV is currently receiving pesticide donations from the Government of Japan under the KR2 project. When a farmer has a pest problem, he or she can contact the DPV agent in the area to evaluate the problem and, if necessary and available, provide pesticides to combat the problem. The DPV charges the farmers a symbolic price for the pesticides -- a price well below the market value.

The private sector is allowed to import and sell pesticides, provided they comply with the regulatory requirements of the DPV. The provision of subsidized pesticides by the DPV, however, has limited private importation. Potential investors have not entered the pesticide distribution market because of lack of demand and inability to compete with subsidized government prices (TIPS, 1995).

Pesticides are regulated by DPV under Decree No. 1-A/91. This decree restricts pesticide imports to those which have been authorized by the DPV; prohibits the import of pesticides on the World Health Organization's (WHO's) list of extremely toxic pesticides; requires labeling on imported chemicals in Portuguese, French, or English; and provides general language for the regulation of storage, transport, and use of pesticides.

In accordance with the decree, DPV has established a list of pesticides which it has authorized for importation. DPV has established four classes of pesticides: highly toxic, moderately toxic (WHO Class II), slightly toxic (WHO Class III) and minimally toxic. DPV relies upon WHO information and product registrations in other countries for making its determination of what pesticides will be allowed on the list and how they should be classified. Although some laboratory technicians in the country have been trained abroad in pesticide testing, no laboratories in the country have equipment capable of testing pesticides or pesticide residues.

An individual or company wishing to import a pesticide not on the list must apply with DPV and submit registration information with its application. If DPV approves registration, the pesticide is classified and added to the list.

According to the regulations, all of the pesticides on the DPV list, except those with a highly toxic classification, can be applied by DPV technicians or their delegates, provided they are used according to the instructions given by DPV (based on the label instructions). In practice, however, due to lack of resources in DPV, instructions for use are seldom given, so that anyone on a *tabanca* or *ponta* can apply pesticides as they see fit.

DPV does a better job of regulating the application of highly toxic pesticides, which require the use of protective clothing and calibrated application equipment. However, only two chemicals are registered as highly toxic: fosforeto de aluminio and fosforeto de magnesio.

Extension

Agricultural extension in Guinea-Bissau has been primarily provided by development projects, private sector associations, and NGOs. Within MDRA, there have been various departments and directorates with extension responsibilities, but they have not been operational. In the 1980s, the Government of Guinea-Bissau, through its integrated projects, trained many extension agents, many of whom are now working for development projects, associations and NGOs such as CECI, SNV, IUCN, AD, ALTERNAG, and TINIGUENA.

Most of the agricultural extension is provided for fruit, vegetables, and rice. ANAG, with the support of TIPS, has the most active program in fruit. Groups that are providing extension services for vegetables include Cintura Verde, IUCN, TINIGUENA, Africare, the Women's Economic Activity Association (AMAE) (with TIPS support), and ICAAP. Many of the vegetable extension programs have been aimed at women. The Peace Corps has provided training for local communities in nonchemical pest control.

Three organizations have done extension work in rice. RADI in the north allowed an exchange of experiences between the traditional rice grower population, the *balantas*, and another with less knowledge in this matter, the *mandingas*, that gave the *mandingas* feasibility to successfully exploit a big *bolanha*. The GUI-ARROZ project to produce irrigated rice during the dry season was not successful because of the lack of fertilizers and fuel for the water pump. The project may have benefited from the experiments being done by the National Agricultural Research Institute (INPA) in natural fertilizing techniques. Unfortunately, there was no effective collaboration between the institutions that could have created better conditions for the sustainability of the project. The Chinese rice project in the eastern part of the country is experiencing the same sustainability problems.

The Government of Guinea-Bissau sponsored the First National Seminar on Agricultural Extension in Bulà in 1992. Later, in preparation for development of the National Agriculture Strategy, MDRA published a report which reviewed and assessed extension activities in the country. The paper identified eight limitations of extension as it had been practiced in Guinea-Bissau. These are:

1. Different extension intervention methodologies and agents with varying competence and knowledge;

2. Lack of coordination and exchange between research and extension.

3. Excess of agrarian specialization: divisions between animal husbandry, forestry, and the environment

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4. Lack of coordination among projects resulting in projects doing the same work in the same zone.

5. Absence of a national agrarian extension policy.

6. Experience not capitalized on

7. Actions distant from farmer priorities.

8. Not enough budget in the General-Direction of Rural Animation Promotion to fulfill the described duties.

The MDRA responded to these concerns in the National Agricultural Strategy, which calls for the government to coordinate the extension activities being provided by projects, associations, and NGOs, and support them through regional agricultural research. To implement the strategy, the Government of Guinea-Bissau created the National Directorate for Agricultural Extension (DSNVA) in 1996 and gave it the responsibility to coordinate and improve agricultural extension in the country. The DSNVA reports directly to the Minister for Rural Development and Agriculture and is linked to INPA and the general directorates within MRDA responsible for forestry and wildlife (DGFC), plant protection (DGPV), and domestic stock (DGAP). The DSNVA has three objectives (all of which were established in the National Agricultural Strategy). These are to: promote coordination at a regional level among the various private sector and NGO organizations which provide extension services in the country; supply extension services nearer to and in concert with the beneficiaries (farmers, the interest groups, associations, and NGOs); and establish an effective union between the agricultural research and extension services.

To meet these objectives, the DSNVA will have an extension coordinator, a coordinating committee, and a regional research committee in each of nine regions. The regional extension coordinator will be responsible for convening and coordinating the activities of the committees. The coordinating committee will be composed local organizations which supply or receive extension services, including ANAG, local agricultural projects, *tabança* associations, and NGOs. It will be a forum for coordinating the extension services provided and used by the local beneficiaries.

The regional research committee will have the same membership plus local technicians from government departments who are involved in and capable of doing agricultural research. It will identify local research needs and solicit assistance from INPA to meet those needs. INPA will conduct research at its centers in Bachile, Caboxanque, Contuboel, Quebo, and Bissora, and conduct field tests in the region in conjunction with the research committee members. INPA will be responsible for creating a data base on agricultural projects and research in the regions.

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Unfortunately, the DSNVA is not fully functionable. Only some of the national positions have been staffed and none of the regional offices or committees are functioning. The national office has developed a work plan and is currently recruiting staff, but funding for the activity is not secure.[8]

National Agricultural Strategy (*Carta Agricola*)

In 1994, the MDRA began to develop a National Agricultural Strategy with assistance from the FAO. In November 1996 it published the strategy. The objectives of the strategy are to guarantee food security, increase and diversify agricultural exports, secure rational forest management, and improve the quality of life of rural residents. To accomplish each of these objectives, the strategy proposes economic and technical actions. Among the economic actions are improved transportation, markets, credit, and market information systems. Among the technical actions are land classification, integrated pest management, improved extension services, and introduction of modern farming practices. The strategy contains many components of sustainable agricultural production, but it lacks priorities and an action plan, so it is not clear which actions will be implemented and how they will be implemented.

Agricultural Processing

Almost all processing of agricultural products in Guinea-Bissau is done at the household or cottage industry level. The PEA team investigated only one agricultural process, cashew nut processing. Small-scale cashew processing involves the following seven steps.

1. spreading the nuts, in their shells, to dry in the sun;
2. boiling the nuts in water to loosen the nut from the shell;
3. spreading the nuts, in their shells, to dry in the sun;
4. shelling the nuts, one at a time, by hand with a small mechanical device;
5. separating the shells from the nuts;
6. cooking the nuts for six hours in a 70°C wood-fired oven; and
7. peeling the skin from the from the nuts.

The nut produced by this process is a white "raw" nut. Roasting and salting for retail sales requires additional steps.

Small scale cashew nut processing produces four waste streams: wastewater from boiling, cashew shells, cashew skins, and smoke from the fires used to boil the water and heat the

[8]The information about the extension services reorganization was obtained on an interview given by the DSNVA Director, Mr. Rui Andrade.

ovens. The pollutant of primary concern is cashew nut shell liquid which is present in the wastewater from boiling and the cashew shells. Cashew nut shell liquid is 90 percent anacardic acid. It also presents a worker safety issue associated with handling the boiled nuts during shelling and sorting. Cashew nut shell liquid can burn workers' hands, requiring protective measures. In the small processing centers visited, workers dipped their hands into oil prior to handling shells (they had tried wearing gloves but found that they were too awkward to use with the shelling machines and sorting). The cashew nut shell liquid present in the wastewater and discarded shells does not pose a significant environmental issue. Only a small amount of wastewater is generated during small-scale processing. It is disposed of on the ground, and the small amounts of anacardic acid in the water is most likely neutralized by the soil. Discarded shells are burned in the fires for boiling or in the ovens. Although the PEA team does not have information on fate of the acid when burned, workers reported no discomfort in the vicinity of the burning and the small amount of acid probably presents no significant problem.

Cashew skin does not contain cashew nut shell liquid. It is currently being discarded, but the TIPS cashew nut processing center is currently investigating its value as an animal feed.

Large-scale cashew processing could generate significant amounts of liquid wastes and cashew shells containing cashew nut shell liquid. Although the one commercial plant in Guinea-Bissau has never operated commercially, when the manager was asked what would be done with the liquid and solid wastes, he responded that he would just dump it somewhere. There is a market for cashew nut shell liquid as a resin (used in brake linings). Its by-products have been used to prepare paints, varnishes, enamels, pesticides, adhesives, and glues. It has also been used in medicine and to control slugs in some irrigation districts in South Africa (Nomisma, 1994). The commercial viability of cashew nut shell liquid extraction depends on a nearby chemical industry. It competes with synthetic phenolic resins which perform better for some uses and are readily available.

3.2.3 Environmental Issues

Land clearing for production of rice, cashews, and fruits is causing the destruction of natural forests. *Sequeiro* rice and other upland grain crops have traditionally been identified as the major cause of forest clearing for crop production, but data indicate that forests are also being cleared for cashew and mango production. There has been some speculation that the increase in cashew cultivation represents a shift away from *sequeiro* rice production which would reduce the impact on forest clearing. Both crops compete for the same type of land, so it would seem logical that the higher-value cashews would displace lower-value rice. Also, because cashew is not an itinerant crop like *sequeiro* rice, it would require less land clearance over time. But government data indicate that the area planted to both *sequeiro* rice and cashews has increased overtime (Table 2).

The rates of growth of cultivated area of cashews and mangos have increased significantly since 1993, whereas the rate of growth for *sequeiro* rice has remained relatively constant (Figure 1). Apparently, forests are being cleared for cashew and mango cultivation in addition to those being cleared for sequeiro rice. This conclusion is not surprising because of the labor requirements and production calendars for rice and cashews. Other than during the first year when cashews must be planted, the demand for labor for cashews and rice occur at different times of the year -- during the rainy season for rice and during the dry season for cashews. Labor earns a higher return for cashews than for rice, but the labor inputs are not in competition because of the timing of labor needs.

The growth in areas cultivated in cashew has not necessarily led to monocultures. As noted above, cashew cropping is generally being done in addition to other cropping. Some areas which had previously been peanut nonocultures are now cashew monocultures, but these areas were planted ten years ago, well before the inception of TIPS.

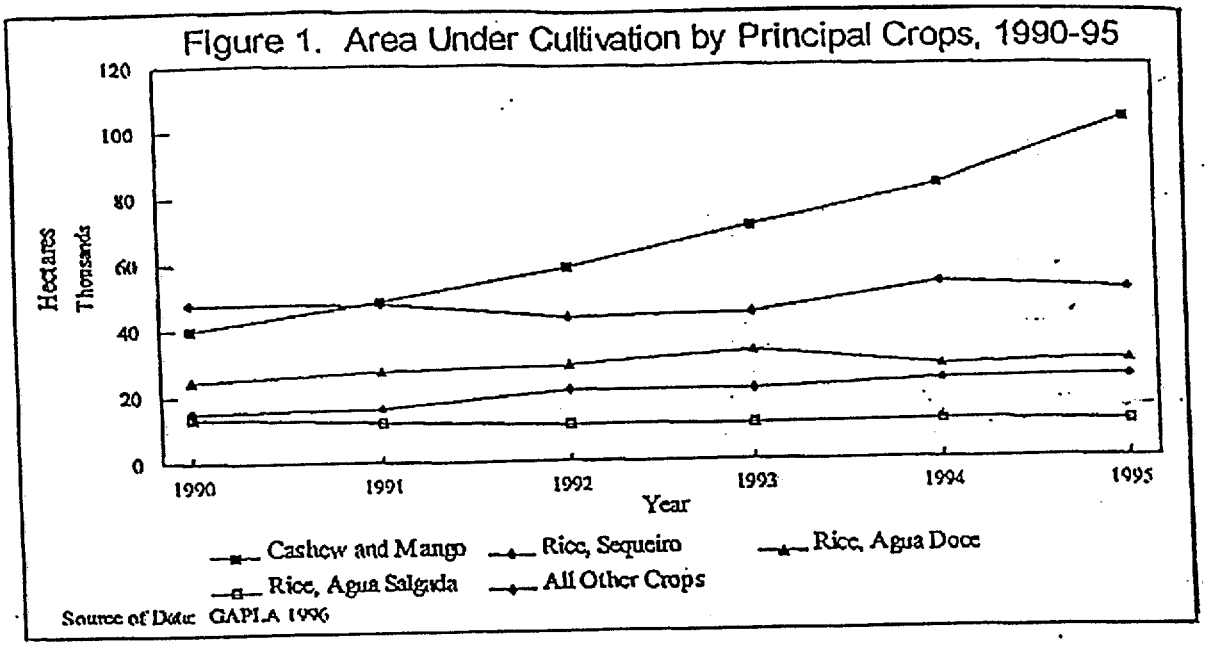
Figure 1. Area Under Cultivation by Principal Crops, 1990-95
Hectares
Thousands
120
100
80
60
40
20
0
1990
1991
1992
1993
1994
1995
Year
Cashew and Mango
Rice, Sequeiro
Rice, Agua Doce
Rice, Agua Salgada
All Other Crops
Source of Data: GAPLA 1996

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Soil erosion and pollution from agricultural chemicals are not a current problem. The flat terrain of the agricultural areas limits the potential for soil erosion. Agricultural chemicals are not a current problem because so little is currently applied. They could become a problem in the future with the growth of fruit and vegetable cultivation, which generally require more agricultural chemical inputs than rice and cashew production.

Emissions form agricultural processing are not a current problem, but if large-scale cashew and fruit processing is developed, disposal of liquid and solid wastes will most likely be a serious problem, due to the lack of environmental standards and adequate waste management facilities.

3.3 Fisheries

3.3.1 Resource Condition

Information regarding fisheries in Guinea-Bissau is found mostly in published and unpublished technical documents and study reports prepared on behalf of the Government of Guinea-Bissau. Most have been produced by the in-house staff of local government ministries and agencies, consultants from international development agencies, and short-term studies by fisheries commissions [Fisheries Committee for the Eastern Central Atlantic and International Commission for the Conservation of Atlantic Tunas (ICCAT)].

Because of the economic importance of the large-scale, mostly foreign based, industrial fishery in Guinea-Bissau, data on its activities dominate the available published literature. Most of the available information is based on declared information reported by licensed foreign vessels. It is widely recognized that these national catching and landing statistics do not reflect either the strength of the fisheries resource or the fishing effort expanded in the Exclusive Economic Zone (EEZ) of Guinea-Bissau.

References to the small-scale artisanal fishery is mostly found in unpublished Government of Guinea-Bissau documents. These statistics are probably unrepresentative of the actual resources and fishing effort but not to the same degree as the industrial fishery. Inaccuracies in the data are due to a combination of unquantifiable factors such as interventions by migratory fishermen from neighboring countries and the exportation of unrecorded catches, the at-sea-sale of catch by guinea-Bissau fishermen, the common practice of bartering fish for other staples, the catches for in-house consumption, and the loss of landed product due to poor handling procedures.

<u>Marine Environment</u>

The fisheries resource of Guinea-Bissau is one of the richest of the West African coast because of the extent of the continental self and the rich upwelling that occurs in this

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region. However, fishing was never a traditional occupation for Guineans. Throughout the Portuguese occupation, and in the years following independence, exploitation of the fishery resources was primarily conducted by foreign fleets and operators, including those of adjacent African countries.

The Government of Guinea-Bissau EEZ encompasses an estimated 70,000 square kilometers which is about twice the country's land surface area. Coastal waters have high primary productivity due to the following factors:

- strong coastal upwelling that takes place from December to April;
- the seasonal existence of frontal zones which are caused by interactions between the Canary Islands currents and warmer tropical currents off the coast; and
- the seasonal release of nutrients from the inland rivers and estuaries during the rainy season.

All of these factors contribute to the enrichment of the marine area and to the concentrations of exploitable marine stocks within the EEZ.

Marine Zone

The species of economic importance found in the marine zone can be classified into five major categories: pelagic fish stocks; demersal fish stocks; shrimp stocks; cephalopod stocks; and other economically important stocks (lobsters, crabs, bivalves). Within each category certain major species are targeted, due to either their availability or high value or both. A brief description of the targeted species follows.

Pelagic Stocks

The species of major commercial interest collectively are referred to as small pelagics. The most important species are sardines, *(Sardinella aurita)*, abundant during March and April; *Sardinella maderensis*, present year round; the anchovies and silversides, mostly *Ethmalosa fimbriata*; the mackerels *Trachurus treccea* and *Caranx rhoncus*, which are migrants into offshore waters; and the Spanish mackerel *(Scomber japonicus)*.

In addition, there are several species of tunas (*Thunnus albacares*, *Thunnus obesus*, and *Ketsuwo pelamis*) which are harvested in local waters. These larger, highly migratory species seasonally enter the EEZ of Guinea-Bissau.

Demersal Stocks

The demersal populations are made up of numerous species. Their distribution and abundance depend on the nature of the substrate and the prevailing hydrographic

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conditions. Seasonal abundances and availability of certain species from this stock occur due to coastal migrations. The main taxa of interest are the catfishes *(Aurius spp)*, soles and other flatfish *(Solea and Cynoglossus spp.)*, trigger fish *(Baliste spp.)*, angel fish *(Drepane africana)*, grunts *(Pomadysis jubelini)*, croakers *(Pseudotolithus spp.)*, seabreams *(Pagellua spp.)*, groupers *(Epinephelus* and *serranidae spp.)*, and numerous members of less common species.

Shrimp Stocks

Four shrimp species make up the bulk of the catch off the coast. These are the *Penaeus notialis, P. kerathurus, Parapenaeus longirostris, and Parapenaeopsis atlantica.* The *P. notialis* makes up the bulk of the landings. Penaeid shrimp have an amphibiotic life cycle which includes spawning near the coast, a juvenile phase in coastal and/or estuarine zone, and an adult phase in deeper marine waters (Nash and Vergne, 1993).

Cephalopods

Cephalopods make up a significant portion of the marine catches within the EEZ. Several species are grouped in the landings, including Illex coindetti and Sepia orbignyana. Small quantities of octopus Octopus vulgaris are also captured.

Marine Resources and Yield Potential

Studies conducted since the 1980s [Department of Artisanal Fisheries, 1989, African Development Fund, 1991, Epler, 1983, FAO, 1984, Tropical Research and Development (TR&D) 1993] indicate that the total biomass of fish, shellfish and crustaceans in the EEZ could be as high as 1.5 million tons. From these preliminary biomass survey it was estimated that the permissible catch yield level of all species within the EEZ should be between 200,000 and 300,000 tons per year. In a 1990 project feasibility study by the African Development Fund, it was estimated that 140,000 to 160,000 tons of fish, shrimp, and cephalopods were being harvested annually within the EEZ by the national and international fleets (licensed and unlicensed), and mostly landed overseas (African Development Fund, 1991).

An estimated 58 percent of the Atlantic tuna catches, some 300,000 plus tons a year, are caught off the coast of West Africa, of which an estimated 15 to 20 thousand tons are caught off the waters of Senegal and the RGB (FAO/ICCAT Madrid, 1995, Foucher, 1994, Dept. de Estadisticas MF, 1995). As a result, the Guinea-Bissau's traditional fisheries resources have been declining, and over-exploitation is the norm. Shifts and increases in the abundance of certain species in the marine environment, such as trigger fish (*Baliste spp.*), are indicators of over fishing and stock depletion on other competing species.

However, since most tuna resources are heavily exploited or depleted, ICCAT has recommended general curbs in the fishing effort off the coast of West Africa. Most of the countries involved in the Atlantic tuna fishery have ignored the ICCAT recommendations since ICCAT as an international management body has no enforcement capability.

3.3.2 Resource Management

Fishing Laws and the Licensing System

The Republic of Guinea-Bissau General Fisheries Law (Decree-law # 2/86) applies throughout the EEZ, the territorial sea, and interior waters of Guinea-Bissau. Nationals and foreigners must be authorized to fish, and fishing licenses are issued through the Ministry of Fisheries. Several additional decrees relating to fisheries have been used to complement the initial Fisheries Law and/or to handle specific situations.

The law establishes two fishing zones with different licensing, production, and marketing systems. One is an industrial zone, for vessels operating within the 200-mile EEZ outside of the 12-mile territorial limit. The other is the artisanal zone comprising all the inland waters and territorial waters up to 12 miles beyond the Bijagos Islands.

Industrial vessels (above 30 GWT) are prohibited by law from operating within the 12-mile territorial limit. Foreign industrial vessels are required to communicate their entry and departure into national waters to the Ministry of Fisheries, and to report their catch.

However, due to the lack of enforcement capabilities foreign vessels have been observed fishing within the 12-mile limit, are under reporting catches and are known to purchase product from artisanal fisherman, within the 12-mile limit, for sale overseas (Djassi, 1995).

The sale of fishing licenses has been and continues to be an important, albeit not equitable, source of hard currency for the nation. Foreign currency revenue generated by the sale of licenses has fluctuated from a high of 22.8 million dollars in 1990 to a range of from 10 to 13 million dollars in recent years. The 1996 income from license sales was estimated at 13 million USD. An additional 1.6 million USD was levied as fishing fines, bringing the total amount generated to 14.6 million USD for 1996, or about 40 percent of the total tax revenue for the Government of Guinea-Bissau (Barnett,1996).

The sale of tuna licenses appears to be one of the underused source of funds which could be available to the Government of Guinea-Bissau, especially if regional management agreements can be arrived at by the West African countries where the bulk of this resources are harvested. The bulk of tuna landings off the coast of Guinea-Bissau are recorded between June and December.

Because of the Government of Guinea-Bissau's dependency on the revenues from industrial fishing license sale, up to 1995 no effort was made by the Ministry of Fisheries to manage the resource to assure long-term sustainable yield or harvest potential. It is apparent that the Government of Guinea-Bissau needs for foreign currency dictated the sale of licenses without taking into consideration the state of the fishery resources and the stock's ability to sustain the level of fishing effort exerted against it.

There is no provision in the existing fisheries laws and regulations that address the need for environmental assessment or mitigation measures. The inclusion of environmental assessment and mitigation measures requirements, for fisheries-related projects, in the to-be-proposed environmental law could assist the Ministry of Fisheries in making management decisions.

Overview of Industrial Fishing Agreements

Foreign fishing/Licensing Agreements have been signed with numerous countries and the European Community. For the 1995 through 1997 period the countries whose vessels have actively fished in the waters of the Government of Guinea-Bissau are the European Union (EU) countries of France, Italy, Portugal, Spain; Cape Verde, Cote D'Ivoire, China (PRC), Honduras, Japan, Morocco, Panama, and Senegal. The agreements with the EU and China are up for renegotiation in 1997.

Prior to 1996, the Government of Guinea-Bissau partners in negotiating international fishing agreements have taken advantage of the country's lack of scientific information, the need for foreign currency, and its limited capacity to manage the resource to receive extremely favorable terms (Kaczynski, 1994, 1995). The individual foreign operators are interested in obtaining maximum profits and show little interest in the conservation of the Government of Guinea-Bissau natural resources. This attitude, coupled with years of bad policy and ineffective management by the Government of Guinea-Bissau, has led to a sharp decline in industrial fishing catches and a serious deterioration of the fishing stocks.

The Fishing Agreements made between the Government of Guinea-Bissau and other countries do not provide for any environmental impact assessment to protect fisheries stocks or breeding grounds. The foreign partners to the agreement are not required, nor do they, conduct any environmental assessment of their activities. Limited monitoring measures in the form of reporting of catch statistics and a poorly run observer program are part of the agreements, and one of the only sources of data on the international fleet.

A review of the fishing agreements made shows that those made with the Republics of Cape Verde, Gambia, Guinea, Mauritania and Senegal make vague references to the need for monitoring and control of pirate ships fishing in the West African waters to protect the

resource (Convention Sous-Regionale en Matiere de Poursuite Maritime des Navires de Peche, 1988).

A separate 1995 fishing agreement with the Republic of Senegal, in Article 16, mentions the need for joint research campaigns to evaluate the shared stocks of Senegal and Guinea-Bissau. To date, no useful environmental or stock assessment studies have been performed as part of these agreements.

Since 1995, the Government of Guinea-Bissau, under the direction of the Ministry of Fisheries, is slowly recognizing the importance of sustainable exploitation and is leaning towards the sustainable resource management concept. This has been apparent in the Ministry of Fisheries development, with assistance from TIPS, of Fisheries Management Plans for 1996 and 1997 and an attempt to introduce Total Allowable Catch limits as part of the Fisheries Management Plans. In the absence of hard data, the use of Total Allowable Catch in setting catch limits, is the first step toward resource management.

In view of this management effort, the EU, the main user of the resource, has given the Government of Guinea-Bissau a total of $600,000 for completion of the 1996 Fisheries Management Plan and an equal sum was promised for completion of the 1997 Fisheries Management Plan (Blacken and Ministry of Fisheries personal communication.).

Industrial Fleet

Reported/official Government of Guinea-Bissau catch statistics for the period of 1990 to 1996 paint a very different picture than what was estimated in the African Development Fund study. Reported landings of all species, other than tuna, ranged from a high of 115,800 tons in 1990, to a low of 26,000 tons in 1993 (Table 6, Figure 2). The traditional resources of shrimp, cephalopods and demersal fish have been overexploited. This fact becomes apparent when the catch per vessel day, or catch per unit effort, data are analyzed. These data indicate that a trend of diminishing catch per unit effort has been observed for the traditional species for the 1990 to 1995 period, with an increase in catch per unit effort for all species for the 1996 period (Figure 3).

Table 6
Industrial Fleet Catch Statistics, 1990-95 (1,000 MT)

Year	Number of Vessels	Shrimp	Cephal-opods	Small Pelagics	Demeral Fish	Other	TOTAL
1990	208	4.3	14.5	50.3	37.9	8.6	115.6
1991	213	3.7	10.3	41.7	31.2	4.2	91.1
1992	162	4.0	3.1	14.8	18.9	4.0	44.8
1993	120	2.8	3.8	6.3	11.2	1.8	25.9
1994	108	2.5	4.9	0.7	19.0	2.4	29.5
1995	142	1.3	4.8	1.6	25.0	4.7	37.4

Source of Data: Ministry of Fisheries, Department of Statistics Documentation

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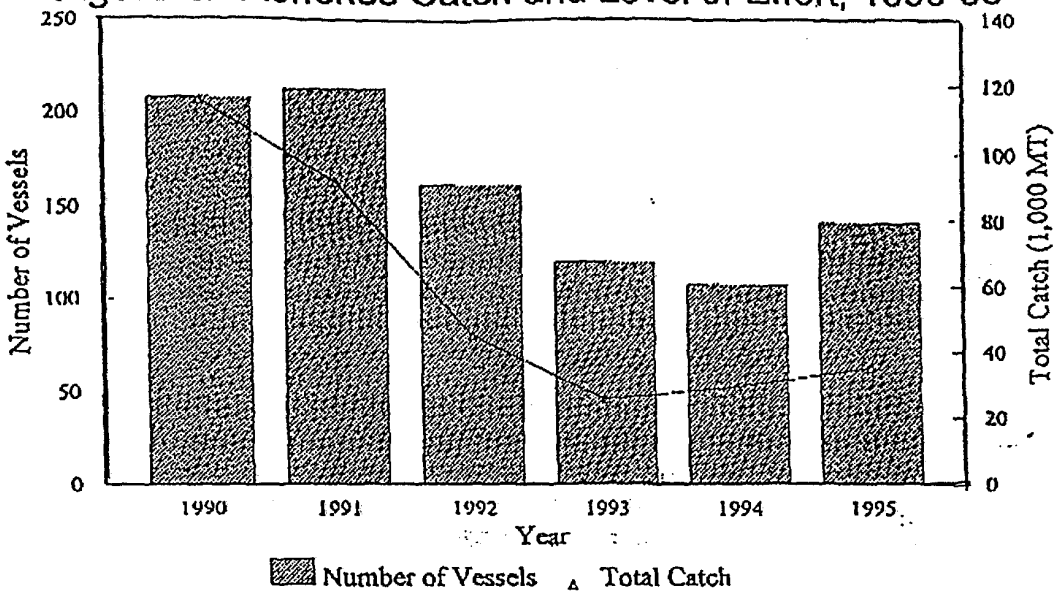
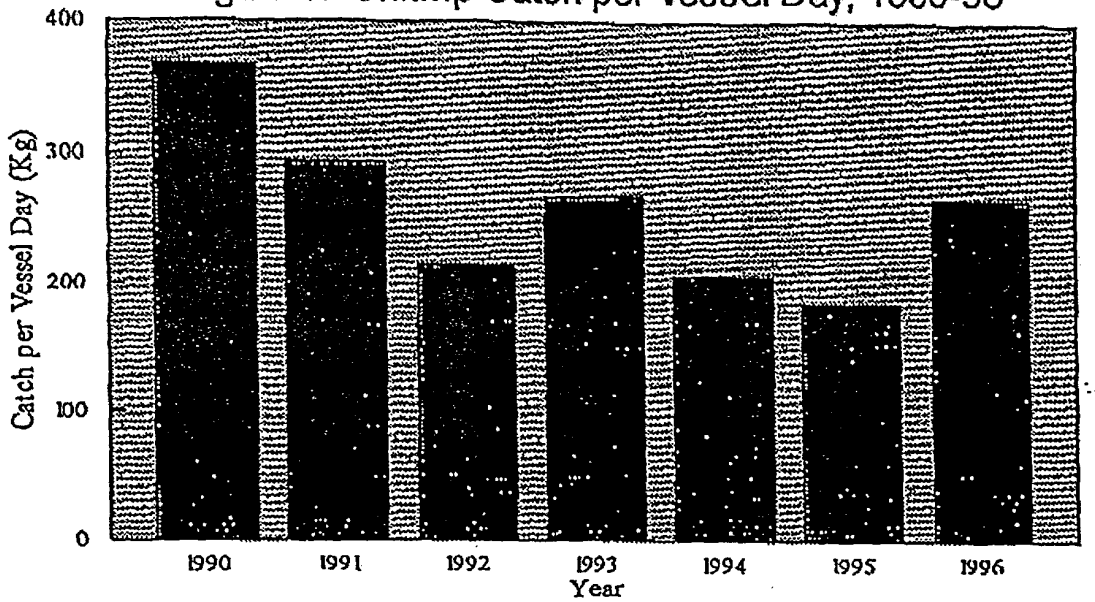
Figure 2. Fisheries Catch and Level of Effort, 1990-95



Source of Data: Ministry of Fisheries, Department of Statistics Documentation

Figure 3. Shrimp Catch per Vessel Day, 1990-96



Source of Data: Ministry of Fisheries, Department of Statistics Documentation

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As the catch per unit effort for the targeted species drops, the economic efficiency of the vessels is reduced. This usually leads to an increase in effort, and a harvesting of a higher percentage of younger stock than would be advisable under maximum sustainable yield management. This could be observed in the Government of Guinea-Bissau reported 1995 and 1996 shrimp landings where a predominance of the catch was smaller shrimp.

The 1996 increase in catch per unit effort could be a sign that the stocks are recovering or that the oceanic conditions for the previous year(s) favored spawning and survival rates for the targeted species. A continuing trend in the increase of catch per unit effort or a stabilization of that indicator over a 5-year period could indicate a harvest around the maximum sustainable yield.

Review of yearly catch per unit effort for targeted species and sustainability of total catch volumes over time (5 year trends) can be used as indicators in monitoring the impact of fishing activity and the status of the commercial stocks.

Since the traditional resources are believed to be overexploited, any future realization of the 200,000-to-300,000 tons annual yield will have to come from the under exploited pelagic or semi-pelagic stocks (African Development Fund, 1990, FAO 84). Said low value ($ MT) stocks will more than likely be exploited by foreign fleets until land based processing (fish meal and/or canning) can be developed in Guinea-Bissau. Some of the stocks could also be used if land-based facilities with individually quick frozen capabilities were built. The product could be marketed in West Africa and would compete in already established markets for similar products originating in Senegal and selling in most of West Africa.

Artisanal Fishing

The artisanal fisheries in Guinea-Bissau are characterized by a degree of mixing of foreign and domestic participation from harvesting to final product sale. As with the rest of the information for this sector, a high degree of conflicting information is noticed in the literature.

A significant portion of the marine resources are harvested by the artisanal fisherman. The artisanal fleet landings are estimated at 30,000 tons of fish and 15,000 tons of shrimp for a total of 45,000 mt per year (Dept. of Statistics, Ministry of Fisheries, Vaz J.T. Ministerio de Pescas). Due to the problems associated with the collection of data from that sector, the general feeling is that catches are actually much higher than reported in the official statistics.

Lifton (1992) documented in a census of 7,311 peoples involved in artisanal fisheries that almost 90 percent of the people surveyed were indigenous to Guinea-Bissau. The

remaining 10 percent is divided between fisherman from neighboring countries, with the Senegalese representing the highest number of migrant fishermen. A 1993 summary table from the Ministry of Fisheries indicates that out of 7,301 fishermen operating in the country (wet/dry season average), about 1,751 (24 percent) were foreigners mostly from Guinea-Conakry (10.8 percent), Senegal (9.8 percent), and Sierra-Leone (3.3 percent), with the rest being from Cabo-Verde, Gambia and other West African countries.

Senegal, Guinea, Mali, Sierra Leone, and Ghana dominate the processing and export of most of the artisanal catch (Crowley,1993). This marketing of artisanal product is conducted in one of the following three ways: foreign dominated production of smoked and dry fish; fresh and frozen product for urban markets, with a female dominated distribution system (*bideiras*); and seasonal small scale production for local markets.

There is a major push by FAO to develop new artisanal fisheries approach and legislation in West African countries, including Guinea-Bissau. The thrust of the FAO initiative is to provide for more participation in fisheries management by artisanal fisherman and a decentralization of fisheries decision (Kaczynski, 1996). This approach is sound only if the central government, in this case the Ministry of Fisheries, maintains the authority to accept and reject, for technical and not for political reasons, the decisions made by the regional councils. This would allow for a more responsive system and still facilitate the management of the resource as a whole.

Observer Program

To formulate a viable Fisheries Management Plan, a reliable data source needs to be developed. Data on catch, catch per unit effort, distribution and availability of the resource, and basic information on size, age class composition of the stocks must be collected.

The use of trained observers for at sea and biologists for at the dock data collection, is the most efficient way to collect reliable information from fishing fleets (NMFS 1994 annual report).

Although an observer program for at sea data collection was implemented for the Government of Guinea-Bissau, that program met tremendous implementation and management constraints and the usefulness of the information collected prior to 1996 is extremely limited.

The objectives of the observer program were to create a useful data bank to be used by the Centro de Investigacao Pesqueira Aplicada. These data could then be analyzed to better manage the resources.

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Program performance was impeded by a series of constraints (Suleimane, 1995) including the: low level of education of the observers; low technical capacity of statistic department personnel; outdated hardware and software used by Department of Statistics; use of observers as fishermen by vessels; observers would not board vessels and would turn in fake logs; and poor methodology for data collection

It appears that because of the limited resources available that the observer program failed to attract capable personnel and that the information collected is unreliable, not representative of the fishing fleet activities due to the small sample size, and of little scientific use for management purposes.

Environmental Assessment

The Ministry of Fisheries does not have environmental assessment review responsibility or capacity, nor does it currently conduct environmental assessments in the development of fisheries harvest and/or processing projects. Ministry personnel are aware of the need for environmental protection only as a concept. Currently, neither formal processes for conducting environmental assessments nor in country regulations for the protection of the coastal and fisheries environment exist.

The current difficulty in covering environmental assessment as part of the Ministry of Fisheries current activities is because the Government of Guinea-Bissau does not have an Environmental Policy, and impact assessments processes are not a required step in the development of fisheries or fish processing-related projects.

Fisheries Resource Management

To understand the current status of marine resource management in the Government of Guinea-Bissau it is necessary to look at the constraints that are faced by the Ministry of Fisheries in trying to develop Fisheries Management Plans. Some of the constraints mentioned in the section that follows continue to restrict the Ministry of Fisheries' capacity to effectively manage and protect the fishing stock resource.

Pre-1995 management of the marine resources in the Government of Guinea-Bissau did not exist. The development and implementation of management activities post-1995 represented a significant leap forward in resource management, but severe constraints still exist. These contraints are listed below.

1. Little quantifiable information about standing stock biomass is available after the 1980s estimates. The original estimates have limited current validity in that they were derived from surveys carried out by countries whose fleets were operating fishing vessels

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in the area, the estimates were based on one-time studies of limited scope, and the surveys are over 10 years old.

2. Little analysis is done using available catch data. Most of the work conducted by the Ministry of Fisheries is in the form of tabulated data. Harvestable limits for maximum sustainable yield or sustainable economic yield are not currently set or calculated.

3. The reported catch by the industrial fleets has to be much lower than the actual landings. The reality of the situation is that if catch levels are really as low as the vessels are reporting why would the EU maintain a fleet capable of maintaining a level of effort that is four times the level needed to capture the reported tonnage of shrimp reported (Kacsynski, 1995; Nash and Vergne, 1993).

4. The Government of Guinea-Bissau was/is dependent on revenues generated by the sale of fishing licenses for its day-to-day operation. Pressure is exerted upon the Ministry of Fisheries by the Ministry of Finance to maintain these sales at the highest level possible.

5. A severe lack of institutional capacity in data analysis and resource management capabilities exists at the institutional level.

Industrial Fisheries Management Plan

Nevertheless, the Ministry of Fisheries, in the 1996 Fisheries Management Plan, managed to set limits on the total tonnage of the fishing fleet (TAB[9]) and Total Allowable Catch for shrimp, demersal fish, cephalopods, and small pelagics targeted by the industrial fleet (Table 7).

Table 7
Level of Effort and Catch in the Fisheries for 1996 (Tons)

SPECIES	Suggested TAB	Actual TAB	Total Allowable Catch	Reported Catch
Shrimp	10,200	8,432	3,400	3,257
Demersal	6,253	2,001	33,000	18,093
Cephalopods	2,276	1,194	1,375	2,437
Small Pelagics	6,000	NA	30,000	NA

[9]TAB is often used as an indication of the level of effort of the fishing fleet.

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As can be seen in the Table 7, suggested TAB for all species were respected by the Ministry of Fisheries in selling fishing licenses for 1996. This will at least maintain the effort on the resource at the reduced current level until sustainable plans can be developed.

One constraint in managing the shrimp fisheries involves the dual targeting by both the industrial and the artisanal fleets on the same stocks at different stages of development. Additionally, there is an overlap with fin fish fisheries as the by-catch of shrimp trawling operations is significant, ranging from 10 to 20 times the actual shrimp catch by weight. This overlap in effort on targeted species, as well as indirect effort on associated species, points to the need for a multi-species management plan to effectively manage the activities of the shrimp fleet.

Another impact of the shrimp fisheries relates to the taking of marine turtles while trawling for shrimp. Although little quantifiable data exists on the actual take, the fishing grounds off the coast of Guinea-Bissau are located near the Bijagos Islands which are one of the most important turtle nursery grounds off the West Coast of Africa (IUCN personal communication.). Under law 216.5 it is USAID policy to conduct its assistance programs in a manner that is sensitive to the protection of endangered or threatened species and their critical habitat. Therefore, the turtle take issue needs to be addressed.

Proposed Artisanal Fisheries Management Plan

The Ministry of Fisheries has drafted an Artisanal Fisheries Management Plan which essentially establishes different fishing zones and a licensing system based on whether the artisanal canoes have motors or not, and whether the motors are less than 40 horsepower or more.

Current conflicts in the artisanal fisheries seem to be more closely linked to resource availability than abundance. By delineating fishing zones by boat type, the new Artisanal Fisheries Management Plan will limit the gear/conflict issues. These fishing zones are delineated by distance from the coast as follows:

1. maritime zone from the 12 miles for vessels up to 60 horsepower;
2. coast to 12 miles zone for 40 horsepower or smaller vessels; and
3. inland waters and estuarine zones for 15 horsepower or smaller vessels.

There exists little conflict between the artisanal and industrial fisheries as to harvesting of the resource since by law each group is supposed to operate in different areas. The reality is that some conflict exists due to illegal entry by industrial vessels within the 12-mile territorial waters.

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Pollution from Fleet and Processing

The foreign fleets operating in the EEZ operate under general maritime laws and guidelines with regards to discharge of waste, cleaning of holds, and at-sea transfer of fuels. The source of pollution from these fleets (oils, petroleum distillates), barring catastrophic accidents, should be minimal considering the low number of vessels, the cost of fuel, and the extent of the fishing grounds.

The increase in organic loading by the dumping of by-catch and processing offal at sea should be of little concern as they are spread out over a large fishing area and contribute to feeding the benthic community.

However, the development of a small but growing land-based processing industry, without environmental or effluent guidelines or norms, has and will continue to contribute to point source pollution problems associated with processing. There are currently 19 small-scale national companies (Table 8) which are, or which at some point will, unload some of their catch in Guinea-Bissau for processing. In 1996 they unloaded, processed and exported an estimated 2,336 tons of product worth an estimated $3 million (Ministerio de Pesca 1997 Table). Some of the plausible pollution sources from fish processing are:

- solid waste disposal of offal and poor quality product;
- effluent discharges with suspended solids and high BODs due to processing and cleaning activities;
- chlorine and detergents in effluent from washing process;
- increases in solid waste associated with packaging and marketing of product; and
- lack of zoning regulations leading to some visual, noise and air pollution.

The level of pollution in the port of Bissau due to all vessel traffic (fishing, transport) and repair should be of concern as oil slicks can be observed around the docks.

Table 8
List of National Fisheries Companies

Name of Company	Total Number of Vessels *	Total Volume Landed (MT)
1. Actapesca Bissau Ltd.	1	11
2. Afrimar	1	5
3. Arquitur	4	121
4. Caravela Ltd.	1	105
5. Copegui Ltd.	1	13
6. Complexo Frig. Bolola	3	41
7. Estrela do Mar	4	1,104
8. In Aqua Ltd.	2	75
9. Josemar Ltd.	2	89
10. Guialp	3	5
11. Mar Pesca	1	37
12. Norte Pesca Ltd.	2	427
13. Otramac	1	41
14. P. Pesca	2	60
15. Propesca Ltd.	1	31
16. Rio Grande Ltd.	2	32
17. Simar Ltd.	2	33
18. Truk-Bissau	1	54
19. West Africa Trading	1	15
TOTAL	35	2,337

* Some vessels are joint ventures and others operate under the Guinea-Bissau flag.

Other Donors Fisheries-Related Activities

Since the early 1990s, there have been numerous fisheries projects which have been funded by donor agencies or NGOs. These include the ASDI Project (1991 to 1994) (institutional assistance); FAI Boloma Project (processing); ADB Cacine Project (training and gear, resource management component); CECI (Bijagos Islands Resource management); FAO/PNUD (a four year project (1989-1992) funded by FAO whose objective was to enable the Ministry of Fisheries Artisanal Fisheries Statistical Department to establish data collection methodologies and training); IUCN project in the Rio Buba (integrated resource use and management project).

Most of these projects have dealt with development of the artisanal fisheries. A central point to the development projects is that they did not reach economic viability and they failed miserably once the donor funds ceased to exist. An exception is the IUCN project which appears to be self sustaining. That project has within its operating framework assisted the local fisherman in developing a self-regulated approach to harvesting with self-imposed gear restrictions, area restrictions and seasonal closures.

3.3.3 Environmental Issues

Although the 1996 and 1997 Fisheries Management Plans are a step in the right direction as far as resource management is concerned, the Fisheries Management Plans and the current data collection and analysis fall short of what is ultimately required for long-term sustainable management of the resources. The following description of key needs for sustainable management and current constraints illustrates the difficulty of the task faced by the Ministry of Fisheries in its effort to move towards maximum sustainable yield management

Real-time data analysis capacity. The Ministry of Fisheries needs to continue to evaluate the number of licenses sold, the levels of fishing effort, the catch per unit effort, and total landings from foreign fleet and domestic fleet, including the artisanal landings in terms of real time.
Constraint: Review of data not done on real time basis. Available data not shared between departments of same Ministry or between Ministries.

Responsive Management Plan which allows for yearly modification of catch quotas and seasonal closures. This requires the collection of hard data on landings, areas of capture, size-age-weight distribution of species captured, associated species, fishing effort by gear type and drag time.

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Constraints: Collection of data limited to species composition and overall catch per day of fishing, or landing information. This is useful for the production of summary tables but not very useful for analysis and management purposes.

Development of Multi-species Management Plan
Constraint: Data needed for implementation of multi-species management plans is not currently collected. Therefore, the Fisheries Management Plans are using Total Allowable Catch and TAB to allocate licenses and manage the resource.

Transparency of licensing, port, and export fees.
Constraints: Procedures not yet well understood at either the government level or by private industry leading to confusion and non compliance problems.

3.4 Forestry

Guinea-Bissau is endowed with forests which are rich in valuable timber, fruit, oils, fuelwood, resins, traditional medicines, wildlife, and biological diversity. Currently, the country is in a far more advantageous position than Senegal, Mali, and Guinea-Conakry, with respect to its forest resources and potential. But the lack of forest management is putting the forest resource at risk.

3.4.1 Resource Condition

About 70 percent of the land area of Guinea-Bissau is occupied by forests. The forests consist of tropical dry forests and savannas in the north and east, tropical sub-humid forests in the south, and mangrove forests on the banks of the estuaries in the west.

There has been no on-the-ground inventory of the forest resources in Guinea-Bissau. Estimates of forest inventory have been made using satellite imagery in 1976 and 1987/90 and aerial photography with limited ground truthing in 1985. The 1987/1990 estimates were made using Landsat imagery from 1987 for the eastern part of the country and 1990 for the west.

The methodology and nomenclature used in the three inventories differed, so it is difficult to be precise about the extent of deforestation or forest degradation in the country. Table 9 presents two attempts at reconciling these differences. Both comparisons indicate a decline in total forested area. In addition, the comparison between 1978 and 1987/90 shows a major shift from dense forests to degraded forests, most likely due to human activities. The table, however, also illustrates the difficulty in quantifying the rate of change. Comparisons of the 1985 and 1987/90 inventories seem to indicate an increase in the area occupied by some forest types and in the total forested area, although forest professionals in the country believe that the overall trend is a decline in forested area.

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Information on the methodologies used in the inventories is not readily available or understood, and the numbers reported in secondary publications often differ for the same forest type from the same inventory (e.g., mangroves for 1978 in Table 9).

Table 9
Comparisons of 1978, 1985, and 1987/90 Inventories (1,000 Hectares)

Forest Type	1978	1985	Forest Type	1978	1987/90
Sub-Humid	177.5	135.4	Total Deciduous Closed	178.8	172.8
			- Dense	*129.0*	*90.4*
			- Degraded	*25.1*	*62.4*
			- Transition	*24.7*	*20.0*
Dry	885.6	885.0	Total Woodland	858.3	936.8
			- Dense	*436.8*	*189.6*
			- Degraded	*421.5*	*747.2*
Savanna	1,107.5	997.0	Wooded Savanna	1,128.0	926.0
Evergreen Sub-Tropical		48.6			
Regeneration		4.3			
Mangrove	302.0	287.0	Mangrove	287.1	248.4
Palm	112.2		Palm	112.7	80.0
Gallery	79.5		Gallery	80.0	93.2
TOTAL	2,664.3	2,357.3	TOTAL	2,644.9	2,457.2

Sources: 1978-1985 Comparison: DGFC/MDRA, 1992, Table 6, Page 36.
1978-1987/90 Comparison: Hummel, 1996, Table 2.4, Page 8.

Although the rate of decline cannot be quantified, the general indication is that deforestation and forest degradation is occurring, with the greatest impacts in the Gabú, Cacheu, and Tombali regions. The latest official government estimate is that slightly over two million hectares are forested (GAPLA, 1996), which would indicate a 24 percent decrease in forested area since 1978.

The principal cause of deforestation in Guinea-Bissau is clearing for agriculture, particularly small holder itinerant agriculture (shifting cultivation) and expansion and regeneration of the pastures and hunting grounds. Forests are cleared for agriculture by girdling large standing trees, piling fuelwood at the base of the trees, and then burning the area. Estimates of burned over areas range from 50 to 80 thousand hectares per year. Forest ecosystems in Guinea-Bissau appear to be quite vigorous in terms of regeneration capacity. The PEA team observed areas burned a year or two ago with vigorous grass and shrub regrowth. But continual burning will suppress some species and favor others, and it certainly will not favor the regrowth of valuable timber species to commercial sizes.

Removal of trees for logging and fuelwood are not directly contributing to deforestation, but they are contributing to forest degradation. Logging by the wood industry does not cause deforestation because it involves extensive selective harvesting of a few valuable species over a large area, removing only one to five trees per hectare. It does, however, reduce the species and structural biodiversity of the forests. In the absence of a silvicultural system, current logging also removes the best individuals of the most valuable species (high-grading) which will have a serious detrimental effect on the future supply and genetic stock for those species.

It is difficult to assess to what extent skid trails and logging roads are creating easier access for populations to move into forest areas, accelerating deforestation. In the northern and eastern regions of Guinea-Bissau, where much of the logging is done, the woodlands and savannah ecosystems are already crisscrossed by networks of paths which connect *tabancas*, hunting areas, forests, and rice fields. Skid trails create new paths, but the PEA team inspected two year old skid trails which were completely covered by high grass and regenerating shrubs.

Wood harvested for fuelwood and charcoal are also cut selectively. Only certain species are desirable. Fishing villages use mangrove to smoke fish, but the mangroves are cut selectively. None of the fishing villages visited by the team showed signs of deforestation due to fuelwood harvests. The equipment used by fuelwood and charcoal wood cutters (machetes) limits the size of the trees they can remove, thus limiting their potential for deforestation.

3.4.2 Resource Management

The forests of Guinea-Bissau supply an estimated 1.3 to 1.4 million cubic meters of wood for fuelwood and charcoal each year and an additional 13,000 cubic meters for timber[10]

[10]Most of the timber is from eight species: *Khaya senegalensis*, *Afzelia africana*, *Pterocarpus erinaceus*, *Daniella oliverii*, *Prosopis africana*, *Chlorophora regia*, *Ceibā*-

(Table 10). By and large, fuelwood and charcoal harvests are unmanaged. Timber harvests are regulated by the Forestry Law (Decree No. 4-A/91) which is administered by the DGFC via timber concession contracts. There are currently 10 timber concessions in the country (Table 11).

Table 10
Timber Production by Year, 1991-96

Year	Export (Tons)		Total Cut (m^3)
	Logs	Sawn Wood	
1991	5,420	122	19,275
1992	5,201	204	10,000
1993	3,360	240	9,192
1994	1,280	140	15,628
1995	5,260	910	16,963
1996	2,623	231	8,544
Avg.	3,857	308	13,267

Source: DGFC, Secçao de Exploracaçao Floréstal

pentandra, and *Antaris africana*.

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Table 11
Existing Timber Concessions

	Company	Sawmill Location	Cutting Area
Group I (Sawmill equipment 25+ years old)	Guimadeiras	Contuboel	Bafata
	Carminda Roque	Mansaina	Bafata
	Mando Sano	Bafata	Bafata
	SETRAM	Mansaba	Oio
Group II (Modern, automatized sawmill equipment, with a capacity of 2,000+ m3/year)	CUP	Bissora	Oio
	SOCOTRAM	Gambiel	Bafata
	Manuel Brandao	Bambadinca	Bafata
	Benicio Silva	Gabu	Gabu
	STM	Canjufa	Gabu
Group III (Plywood plant)	FOLBI	Buba	Quinara

Source: Personal communication with Antonio Joao Pinheiro, DGFC

Only logging companies with sawmills can receive timber concessions[11]. To receive a concession contract, the potential concessionaire must submit an application with a sketch of the area in which he wishes to cut and a description of the volumes to be cut by timber specie. The proposed cutting area must be within an expansion area -- large areas, up to 30,000 hectares, established for each concessionaire and in which the concessionaire will be granted exclusive concession contracts. Cutting areas are limited by law to 5,000 hectares and are defined by natural or human made land features. Concession contracts are written for one year, although they can be renewed annually.

Once DGFC receives a concession contract application, it is supposed to send a local forestry guard into the area with the logger to verify the volume requested. The guard is also supposed to inspect the previous area logged by the concessionaire to ensure that he has complied with his contract. If the concessionaire has complied with previous contract

[11]The sawmill, however, does not have to be operational. Neither of the two sawmills visited during the mission were operational, although the concessionaires were cutting timber, either for export as logs or for sale to other, operational sawmills.

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requirements and the proposed area has sufficient timber, the cutting area map and requested volume can be approved by DGFC. The concessionaire must then pay in advance for the timber. During logging, the forestry guard is supposed to record the volume of wood removed and enforce contract requirements.

In practice, most concession contracts are awarded without meeting these requirements. Previously logged areas are seldom inspected before awarding a new contract. Areas which are proposed for logging are not inventoried, rather, the forestry guard does a visual inspection of volume available. Forestry guards are usually dependent upon the concessionaire for transportation to the logging area, and often cannot be on-site during logging. DGFC does not have maps of expansion areas and even lacks maps of many cutting areas. It can therefore not monitor cutting. Concessions can be canceled by DGFC if contracts are violated, but because of lack of control by DGFC, this is seldom the case.

Even if the concession contract procedures were followed, the forest resource would not be managed. Concession areas and allowable harvest volumes are determined by consultation between the concessionaire and DGFC, without inventory information. *Tabancas* are not consulted in establishing expansion areas or cutting areas, so their is little potential for community involvement in forest protection or use. There is virtually no reforestation of exploited species and natural regeneration is weak due to burning.

Decree No. 4/82 required concessionaires to reforest 4 hectares for each 100 cubic meters of timber harvested. Under a new decree, the DGFC has assumed the reforestation responsibilities, adding the cost of reforestation to the in advance stumpage fee. In practice however, the only reforestation which takes place is during arbor month when tree saplings grown in the national nursery are distributed around the country and everyone is expected to plant a tree. The reforestation is not in the cut areas or by the same species. A visit to the national nursery revealed that only exotic agroforestry species were being grown.

Community Forestry

One of the recommendations from the 1991 Bula seminar on land tenure was to create a forest reserves for community use and development. The Forest Law contains provisions for the establishment of community forests which would be managed by *tabancas* (Decree No. 4-A/91, Article 22), but the Forest Law delegates delineation of community forests to the Land Tenure Law. In the absence of a Land Tenure Law, no procedures exist for establishing and managing community forests.

The Agro-Silvo-Pastoral Project (PASP) is assisting two *tabancas* in the preparation of applications for community forest concessions. PASP helped the *tabancas* demarcate

their community forest areas and prepare land use plans, including forest management plans. They are waiting for the MDRA to approve the applications. If these *tabancas* are successful, eleven other tabancas are ready to begin the process. The outcome of these activities could shape, and will certainly influence, the community forestry components of the land tenure law.

Institutional Structure of DGFC

DGFC is a general directorate in the MDRA. It is divided into two divisions: the Forestry Division and the Wildlife Division. Although the DGFC has 253 employees (Table 12), only five of them have bachelor degrees in forest science.

Table 12
Staffing in the General Directorate for Forestry and Hunting

Location	Prof. Forester	Forest Tech.	Agric. Tech.	Forest Guard	Nursery-men	Admin. Staff
Headquarters	2	5	8	-	-	11
SAB	-	-	-	7	7	-
Cacheu	1	1	6	18	-	1
Oio	-	2	5	32	15	1
Bafata	2	1	10	28	-	3
Gabu	-	2	7	19	5	1
Quinara	-	3	4	16	-	-
Tombali	-	1	1	9	-	1
Bolama/Bij.	-	-	2	4	2	-
Biombo	-	1	-	9	-	-
TOTAL	**5**	**16**	**43**	**142**	**29**	**18**

Source: Renate, 1994

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3.4.3 Environmental Issues

Although Guinea-Bissau has a forest law and a General Directorate of Forests and Wildlife, there is no effective forest management. As a result, deforestation and forest degradation is occurring, although the exact rate of deforestation is unknown. The principal cause of deforestation is slash and burn agriculture. Most of the burning is done for expansion and regeneration of pastures and hunting grounds, but slash and burn is also used to clear land for rice, cashews, mangos, and other crops.

Fuelwood and timber harvests contribute to the degradation of forests. It is estimated that 1.3 million cubic meters of wood is cut each year for fuelwood and charcoal. An additional 13,000 cubic meters are cut by 10 logging concessions. Removal of trees for fuel and timber is selective, in that only certain species are desirable. The result is a reduction in biological diversity of the forest and, in the case of logging where only trees with desirable forms are removed, reduction in the quality of the genetic stock of the timber species.

Tabancas are not involved in forest management. They are prohibited by the law from securing timber concessions because they do not have sawmills. This precludes local involvement in forest management, reduces the benefits of forest products to local communities, and encourages deforestation.

There are no incentives for the private sector investment in forest management at the concession level, due to the short term of contracts and nonenforcement of contract requirements. Consequently high-value species are being indiscriminately mined.

The scope of work asked for criteria to be used for identifying forest sites for protection and for plantations. Annex C presents general criteria for these purposes.

3.5 Environmental Management

3.5.1 Environmental Laws and Institutions

Although activities relating to the development of a national environmental management strategy have been pursued by the Government of Guinea-Bissau since 1985 (World Bank, 1993), no official strategy exists. The country has no pollution control or environmental quality standards (e.g., air and water), nor requirements for environmental impact assessment.

In 1992, the Government of Guinea-Bissau established the National Commission on the Environment (CNA) and charged it with developing a national environmental strategy. During that same year, the World Bank began to assist the CNA in the development of a

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national environmental action plan. Due to the high cost of producing a national environmental action plan, the lack of capacity in the CNA, and uncertainty about its role and authority, neither the environmental strategy or the national environmental action plan were ever produced.

In 1996, the CNA was abolished and replaced by the Directorate General for the Environment in the Ministry of Tourism, the Environment, and the Arts (MTAA). The Directorate General for the Environment is responsible for developing national environmental policies and programs. To ensure coordination across sectors, the MTAA was directed by the Council of Ministers to establish a Ministerial Council on the Environment and an Interministerial Technical Committee on the Environment. The Ministerial Council will be composed of the ministers from 12 ministries and will be chaired by the Prime Minister. It will meet every 3 months to coordinate the development of environmental policies. The Technical Committee will be composed of technical staff from the ministries represented on the Ministerial Council on the Environment. It will be chaired by the director of the Directorate General for the Environment and will be responsible for advising the Council and coordinating the development and implementation of environmental policies. MTAA has prepared a proposal for the operation of the Council and Technical Committee, but they have not become operational.

The Directorate General for the Environment is staffed by 12 people. It plans to pursue environmental policies through the production of two environmental plans, one for urban environment and the other for natural resources. These plans will be developed during 1997. The Directorate General for the Environment is beginning by working on the urban plan, and in March 1997, will host a symposium on urban environmental management. The symposium is being supported by the Global Environment Fund. It hopes to have an urban plan by August 1997, and a natural resource plan by January 1998.

The Directorate General for the Environment, with the support of the UE, has begun work on legislation requiring environmental impact assessment. Further work on this activity is on hold, pending the development of the Ministerial Council on the Environment and the Interministerial Technical Committee on the Environment.

The National Research Institute is the only government institution with experience in environmental impact assessment. The National Research Institute has created an environmental unit which has received training from the IUCN. The environmental unit has conducted an environmental impact assessment at the Cufada Lagoon.

3.5.2 Land Tenure

The national debate on land tenure began at independence and continues today. In 1975 the newly independent government of Guinea-Bissau nationalized all land (Law No. 4/75

of May 5, 1975). In that same year, a land law commission was established to draft a land law, but the commission never produced a draft law. In 1981, responding to pressure for the creation of private farms (*pontas*), the Council of Ministers created a new land law commission. The draft law produced by this commission was rejected by the ANP in 1985.

In 1990 the ANP created another land tenure commission. This commission, assisted by USAID (Tanner, 1991, Bruce *et al.*, 1992, and Belknap, 1992), produced draft laws which were the subject of seminars in Bula in 1991 and Cacheu in 1993. After the Cacheu seminar, a final draft was produced, but to prevent the land tenure issue from becoming a political issue in the national elections, the final draft law was not presented to the ANP until 1996. The law was reviewed by the Permanent Committee of the ANP for Agriculture, Fisheries, Natural Resources, Tourism, and Environment. The commission declared that the law should provide for balanced and sustainable economic growth and provide a tenure framework for other land and resource laws, such as those governing forests and national parks. Apparently, the 1993 draft did not fulfill these requirements, and the ANP subsequently tabled it and established a Land Law Tenure Technical Commission, charged with developing a proposal to come before the ANP in the summer or fall of 1997.

The Land Law Tenure Technical Commission has over 20 members representing governmental and nongovernmental entities and interests. The commission includes members of the Permanent Committee of the ANP for Agriculture, Fisheries, Natural Resources, Tourism, and Environment, which will be the vehicle through which the Commission's proposals will be brought to the ANP. The commission plans to use a participatory process to develop a new proposal.

In the absence of a land law, land tenure has been regulated by traditional systems and by Decree No. 43.894, of September 6, 1961 (Land Occupation and Concession Rules) and the Joint Normative Dispatch of MDRA and the Minister of Public Works Constructions and City Planning (MOPCU) of August 12, 1992 (Tax Rules and Occupation Land Discipline). Under the traditional system, all of the land in Guinea-Bissau is recognized as being under the control of a village or *tabanca*. The precise boundaries of each *tabanca* are not on maps, but the *tabancas* generally know where their land is located. Within each *tabanca*, land is allocated to members by the *tabanca* leaders according to local customs and needs. A custom which appears to be common throughout the country is that planting trees which produce an agricultural crop secures land tenure. With the uncertainty about future land tenure, many rural residents are clearing land and planting trees in an effort to stake a land claim.

In 1981 the Council of Ministers reinstituted the concession process authorized by Decree No. 43.894. Under this decree, private individuals (*ponteiros*) can secure concessions for

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land use. The process to secure concessions involves consultation with local traditional authorities (*tabancas*) as well as approval by local government. The *ponteiro* is required to prepare a land use plan, and if the plan is not implemented within five years, the concession can be withdrawn (Articles 98 and 100 of Decree No. 43.894 and Article 11 of the Normative Joint Dispatch of 1972). Although a traditional rights and concessions grant use rather than ownership, members of *tabancas* and *ponteiros* seem to consider the area they use as their real property.

The major issue which must be addressed by any land tenure policy or law is balancing the needs of the traditional (*tabanca*) system with the needs for modern land law (ownership). The current land tenure regime recognizes traditional rights and local customs, but because it does not grant title to land, it is viewed as insufficient for stimulating investment in agriculture or natural resource management.

The need also exists to expand the debate beyond the narrow issue of a land tenure law to the broader issue of resource tenure. Resource tenure includes issues involving forest management, and the designation and management of national parks and reserves. Decree No. 43.894, Article 17, allows for the creation of reserves for resource management or protection. The reserves are excluded from the use and occupation except as necessary for resource use, maintenance, scientific research, or recreational use. These provisions, however, have not been operationalized. "Use it or lose it" requirements, which are part of the current concession system, also raise resource tenure issues regarding a landowner's ability to preserve natural resources.

National Parks

A national parks law was passed by the ANP in the Summer of 1996. The law provides general guidelines for park designation and management to safeguard ecosystems and promote sustainable use of the resources within those ecosystems. National parks are divided into two zones: protection zone and utilization zone. In the protection zone, only recreational and scientific activities are allowed, including regulated hunting and fishing. Resources in the utilization zone are managed to meet the spiritual and material needs of the resident communities, including sustainable use of the natural resources.

The law requires that residents of communities within the boundaries of proposed national parks be consulted concerning the creation of the park. It also requires preparation of studies of the impacts of creating a national park on the ecosystems and villages within the boundaries of the proposed park.

To manage the national parks, the law creates a National Parks Institute. How this institute will function, including how (or if) it will share park management with local communities has yet to be established.

Neither the National Parks Institute or any national parks have been created. It is anticipated, however, that the ANP will soon pass legislation establishing the first national parks.

4.0 ENVIRONMENTAL CONSEQUENCES

The previous section identified existing environmental conditions and resulting environmental issues for agriculture, fisheries, and forestry. It also described the current state of environmental management. This section attempts to identity to what extent USAID activities have contributed to the environmental issues or affected environmental management.

4.1 Trade and Investment Promotion Support Project

It is impossible to quantify the impact of TIPS activities on the environment of Guinea-Bissau. All of its activities have been in education, training, technical assistance, institutional support, and policy development. These activities do not directly impact the environment, but they may support or facilitate activities or actions which do impact the environment.

The strategic objective indicators for TIPS are almost all measures of national economic development. They include: number of commercial firms registered, export earnings from the six critical growth sub-sectors, and level of private investment. Since the inception of TIPS, there has been significant increases in nearly all of its strategic objective indicators. TIPS has contributed to these improvements by encouraging changes in policies, laws, and regulations, improving judicial and adjudication systems, and supporting private sector associations. In particular, TIPS has stimulated economic activity in cashews, fruits, vegetables, and fisheries.

4.1.1 Agriculture

Shortly after project inception, TIPS identified rice as having a low potential for stimulating trade and investment. It consequently focused its support to private sector productivity on the other three sub-sectors (cashews, fruits, and vegetables).

To stimulate the production of cashews, TIPS has focussed on changing export policies, providing market information, and stimulating value added processing. In 1994, TIPS successfully encouraged the Ministry of Commerce to remove the 10 percent export surtax for cashews. It also encouraged the Government of Guinea-Bissau to change cashew export rules which restricted access to markets, which the government did in 1995. TIPS supported the development of a system (SIMA) which provides cashew producers with market information. The system is now operated by ANAG, with continuing support from TIPS.

TIPS can take full credit for the creation of small-scale cashew nut processing in Guinea-Bissau. In 1995 TIPS, in partnership with ANAG and AMAE, opened the Quinhamel

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cashew nut processing training center. Prior to opening the center, TIPS sponsored a study tour to Brazil to observe small-scale cashew nut processing operations. The Quinhamel Training Center's programs have created national interest in small-scale cashew nut processing. By the end of 1996 it had spawned 18 independent processing units and five independent training centers. TIPS has also helped develop local manufacturing capacity for the production of cashew shelling machines, which previously had been imported from Brazil.

The increase in locally processed nuts has saturated the local market. TIPS, ANAG, and AMAE are trying to establish an international market for the nuts, but have not yet been successful. Once an international market is established, however, income from cashew processing may become an important component of cashew production.

TIPS' work in fruits and vegetables has focussed on training and technical assistance. In 1994, TIPS supported CCIA and ANAG in the development of a mango export promotion program. TIPS sponsored a training for trainers program in which it trained local producers and agricultural technicians in the identification and selection of mango varieties for commercial production, nursery management, and fruit tree grafting. In 1995, TIPS and ANAG expanded their training programs to include pre- and post-harvest handling and export procedures. They also provided 800 "shoots" of commercial varieties to participants in their training events, to create germoplasm banks of commercial varieties. In 1996, TIPS expanded its fruit program to include citrus. Through ANAG, TIPS provided training on identification of commercial citrus varieties, grafting, and nursery and orchard management. It is also supporting ANAG in the creation of fruit nurseries and the distribution of seedlings.

In 1995, TIPS, in cooperation with AMAE, introduced simple foot powered treadle pumps for vegetable irrigation. TIPS and AMAE offered several training courses in the use of treadle pumps in early 1996. project. The materials distributed at these courses included information on nonchemical treatment of pests, but also included recommended pesticides, with suggested doses (Santos, 1996). The insecticides listed in the handouts are: deltamethrin, malathion, methamidiphos, methomyl, mevinphos, and pirimicarb. Three of these insecticides (methamidiphos, methomyl, and mevinphos) are classified as restricted use pesticides by the United States Environmental Protection Agency (USEPA) due to their extremely hazardous nature. The fungicides listed in the handouts are: benomyl, captan, chlorothalonil, copper oxychloride, enxofre, mancozeb, metalaxil, thiram, and trifonine. Trifonine is classified as a restricted use pesticide by the USEPA. The training materials did not include information on safe or proper use of pesticides to avoid impacts on human health and the environment.

TIPS initially planned to assist the MDRA in the development of a national agriculture strategy. In 1994 it produced a discussion paper on agricultural policy, referred to as the

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"Vias Paper." TIPS sponsored working group meetings attended by representatives from the private and public sector to discuss the Vias Paper and develop recommendations for a national agriculture strategy. One of the conclusions of the Vias Paper was that there was not a need for preparation of a grand, agricultural strategy. Rather, some specific policy actions should be undertaken such as strengthening private sector extension, privatizing the sale of production inputs, and privatizing some of MDRA's functions (e.g., animal protection and soil and water services). In 1995, MDRA decided to move ahead with a national agricultural strategy, and declined direct assistance from TIPS, turning instead to the FAO. Subsequent involvement of TIPS in the development of a national agricultural strategy has been only as a participant in public meetings held by the MDRA.

TIPS activities in cashews, fruits, and vegetables have increased production of these crops. In the case of cashews and fruits, this has included the conversion of natural forests to orchards. As Table 2 indicates, the area cleared annually for cashews and fruits has increased by 60 percent since the inception of TIPS. Although TIPS is not solely responsible for this increase, it has certainly has contributed to it.

TIPS sub-sectoral studies for agricultural crops have not addressed environmental concerns. For example, the study "Cashews in Guinea-Bissau: Potential and Contraints" (França, 1994) does not identify the clearing of forest land for new plantings as a constraint.

TIPS activities in fruits and vegetables has or will increase the use of pesticides.

4.1.2 Fisheries

TIPS work in the fisheries sector has mostly been in the areas of development of plans and recommendations for legislative changes to promote the development of the local fisheries industry.

TIPS has worked in close association with the Minister of Fisheries, his staff at the Ministry, the Ministry of Finance, the Port Authorities, and knowledgeable private sector representatives. Specifically, TIPS involvement in the fisheries sector has produced:

- a Fisheries Sector Study which provided the data base for future TIPS activities in that sector;
- a Fisheries Sector Action Plan;
- a series of Industrial Fisheries Management Plans for the 1995 to 1997 years;
- strategy documents to be used by the Government of Guinea-Bissau in re-negotiation of fishing agreements;

- round table discussions on need for and recommendations for legislative, tax and management procedural changes to stimulate the development of a Guinea-Bissau based fishing industry;
- recommendations which have led to changes in the sale of fishing licenses, calculations of total allowable catch quotas, changes in the export and import procedures and tax structures, and reduction of license fees and port fees for Guinea-Bissau based fishing vessels and land based processors; and
- capacitation of private and institutional sector through workshops and seminars.

TIPS has been a major player in guiding and assisting the Ministry of Fisheries in the development and implementation of the Fisheries Management Plans for 1995, 1996 and 1997. The Fisheries Management Plan for 1995 was never really implemented as TAB and Total Allowable Catch quotas were exceeded. The Fisheries Management Plans for 1996 and 1997, with set gross tonnage and total catch limits, are a step in the right direction towards the development of sustainable marine resources harvesting in the waters of the Government of Guinea-Bissau.

Other TIPS activities aimed at the development of a Guinea-Bissau fishery industry have had no impact on the stocks since the fisheries management plans work on a total Total Allowable Catch system. Essentially this means that the effort on the resource by the domestic fleet is coming out of the total allowable landings that used to be given to the foreign-based industrial fleet.

For the most part, TIPS did not report on or consider the environmental consequences of their fisheries related activities in developing their strategies. Other direct activities proposed by TIPS should have, but did not, follow required environmental assessment procedures.

Fortunately, most of the TIPS activities appear to have had little environmental impact to date, but the long-term impacts could become significant if proper actions are not taken. This last issue is extremely important since there are no appropriate laws or enforcement capabilities pertaining to environmental pollution in Guinea-Bissau.

Some of the main activities, such as the development of Fisheries Management Plans have or will have a positive impact on the resources.

The proposed removal of three sunken vessels in the Port of Guinea-Bissau entitled Improving the Institutional Capabilities and Environmental Management Plan in the Port of Guinea-Bissau (TIPS, 1995) has no analysis of the environmental impact of proposed activities. This is curious since, as part of the removal work, a training seminar will be held to make the port and harbor administration personnel aware of the ecological consequences of shipwreck salvaging (oil and chemical spills, handling and environmental

safe disposal of solids, aquatic ecosystem response to chemical stress and environmental solids).

No analysis has been reported in TIPS fisheries-related reports as to the environmental impacts of proposed/modified legislation, laws, tax reductions, and policies aimed at promoting the development of the private sector.

Other activities such as training and seminars may or may not have potential impacts depending on the nature of the courses. A training workshop in the use of computers would probably have no adverse impact on the environment, while a workshop on new methods of processing or handling of fish product might have potential impacts. It is up to TIPS to review and report on the potential impact of their activities in the scope of work.

4.1.3 Forestry

Although the initial design of TIPS identified forestry as one of the six critical growth sub-sectors, it has done very little work in this sector. The action memorandum authorizing TIPS required that the initial environmental examination (IEE) be amended "prior to the commencement of any implementation activities related to forestry and before there is any irreversible commitment of project funds to the forestry sector." (USAID, 1992b) The IEE has never been amended, and as a result TIPS has limited its activities in forestry to research,[12] provision of office equipment and organizational planning assistance to the Wood Industry Association, institutional support for a cabinetmakers association, and proposed support in 1997-98 of honey producer associations with training on improved production techniques (IR 4.3).

TIPS has recently produced drafts of Trade and Investment Guides for Guinea-Bissau. The audience for these guides are potential investors. One of the guides, "Guia do Investidor," lists several timber companies, such as SOCOTRAM and FOLBI, as immediate investment opportunities. The guide also identifies other forestry sector investment opportunities including charcoal production. Because of the lack of forest management in the country, logging and charcoal production are not sustainable activities. Encouraging investment in these sectors will only increase forest degradation.

In addition to this minimal effort in the forest sub-sector by the contractor, USAID/Bissau has used TIPS and HDRA funds to support the participation of a DGFC forester in two international seminars on forestry, sponsor a study tour of cabinetry factories in Senegal,

[12]TIPS has published two documents on forestry: a review of the forestry sector as a section in its Primary Objectives Report of 1995 (TIPS, 1995) and a report on non-timber forest products in 1996 (Hummel, 1996).

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and partially finance a course on forest harvesting. The 15 day course was co-hosted by the Wood Industry Association and held at Embunhe in 1995. The 17 participants included concessionaire and DGFC employees. The course included classroom instruction on forest ecology and field instruction in cartography, orienteering, tree identification, tree measurement, chain saw operation, and directional felling. Similar courses have been offered in other countries as part of a sustainable forest management program, but offered in isolation, and given the lack of forest management in the country, the course could contribute to forest degradation.

4.1.4 Environmental Management and Monitoring

TIPS has made a considerable effort to educate high level private and public officials in Guinea-Bissau on the operation of a market economy. Its education efforts, however, have not included information on market failures, such as externalities and the existence of public goods. Because of externalities, a market economy will produce pollution. The existence of public goods (such as a fishery) prevents a market economy from rationally managing those goods. Addressing these issues requires some government intervention.

By assisting the Ministry of Fisheries in the development of fisheries management plans, TIPS has helped it address the issue of managing a public good. TIPS, however, has not worked with the Government of Guinea-Bissau to improve its ability to address externalities which have and will cause environmental degradation.

Prior to TIPS, USAID had supported the development of a land tenure law through studies and seminars, and even assisted in the development of the 1993 draft law. TIPS has attempted to build upon that work, but until recently has not found the government responsive to its offers of assistance. TIPS, however, has developed a relationship with the new land tenure commission, and it appears that through the Land Tenure Center at the University of Wisconsin-Madison (a TIPS consortium member), TIPS will be assisting the Government of Guinea-Bissau in the development of a land tenure policy. TIPS efforts will be within the framework established by the ANP and the commission, but to the extent possible, TIPS will strive to expand the process to address the broader resource tenure issues, and slow the process down, to allow for greater public participation and more reasoned consideration of alternatives. If TIPS is successful in its efforts, the new land tenure policy will clearly define resource tenure issues which should improve the situation for sustainable development.

4.2 Africare

Africare has only been involved in the agricultural sector. It has no activities in fisheries or forestry, however, it is possible that it could receive credit requests from associations involved in artisanal fishing.

The monetization component of the Africare program has no impact on the environment. Vegetable oil is the only commodity for which there is a locally produced substitute (palm oil). Palm oil is traditionally hand-extracted to meet household needs. Hand extraction is a difficult, time-consuming process. Tanner (1994), in his evaluation of the monetization program, concluded that oil imports did not reduce palm oil production. Although household consumption of palm oil may go down in response to the availability of cheaper vegetable oil, the export market is growing with high demand in Senegal. There is no indication that the current level of palm oil extraction is an environmental issue in Guinea-Bissau.

Africare's credit, training, and technical assistance through TSRIP has increased the production of vegetables and cashews in the southern part of the country. Increased production of fruits and vegetables will increase the use of pesticides. TSRIP has also recently begun promoting small-scale cashew nut processing, which will generate some issues concerning worker safety and waste disposal. Much of the training and technical assistance it has offered in fruits and vegetable production and small-scale cashew nut processing has been supported by TIPS.

Some activities receiving credit or support from FSIF may have direct impacts on the environment. For instance, the FSIF has funded bridge construction and road repair, which, if not properly conducted, could cause sedimentation of waterways. The potential environmental impacts of these activities could increase if Africare begins to support more production-related activities and the FSIF supports larger scale projects, as recommended in Africare's mid-term evaluation.

4.3 Other USAID Programs

Only three of the other eight USAID/Bissau projects have the potential to impact the environment: Small Project Assistance, the Self-Help Fund, and Disaster Assistance. All three of these programs fund projects which could impact the environment. Most of the projects funded, however, are very small and probably pose minimal environmental impacts.

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ANNEX A

RESULTS FRAMEWORK FOR USAID/BISSAU

Program Goal: Market-Oriented Economic Growth that is Broad-based and Sustainable

Strategic Objective: Increased Private Sector Trade and Investment

Intermediate Results

IR 1 Improved Trade and Investment Policies Implemented

IR 1.1 Obstructive Behavior of Government in Policy and Implementation Reduced and/or Eliminated

- IR 1.11 Decision-making and authority decentralized
- IR 1.12 Public Administration Transparency Increased
  - IR 1.121 Improved Dialogue Between Public and Private Sectors
    - IR 1.1211 Enhanced Capacity of Private Sector Associations to Aggregate, Articulate and Lobby for Interests

IR 1.2 Improved Trade and Investment Laws and Regulations Enacted

- IR 1.21 Improved Trade and Investment Policies Formulated by Executive Branch
  - IR 1.211 Trade and Investment Policy Coordinated by an Interministerial Committee
- IR 1.22 Legislature Influenced by Constituent Trade and Investment Interests

IR 2 Contracts Enforced and Business Conflicts Resolved by Independent Judiciary

IR 2.1 Improved Physical Infrastructure for Court System

IR 2.2 Increased Capacity of Courts, Judges and Lawyers in Trade and Investment Dispute Resolution

IR 2.3 Increased Public Knowledge of Uses of Judicial Systems

- IR 2.31 Improved Dissemination of Laws, Regulations, Procedures and Policies

IR 3 Number of New Investors Increased

IR 3.1 Information on Investment Opportunities and Climate Reaches Potential Investors

IR 3.2 Timely, Efficient Processing of Investment Proposals

IR 4 Private Business Profits Increased

IR 4.1 Increased Number of Private Associations Effective at Promoting T&I

- IR 4.11 Strengthened Private Sector Organizations
  - IR 4.111 Private Sector Associations' Organizational Capacity Developed
  - IR 4.112 Improved Coordination and Networking of Private Sector Associations
  - IR 4.113 Private Sector Organizations' Technical Capacity Increased

IR 4.2 Improved Management of Private Sector Enterprises
- IR 4.21 Increased Use of Business Information
  - IR 4.211 Increased Commercial Information Available
- IR 4.22 Increased Number of New Businesses

IR 4.3 Increased Private Sector Productivity and Production
- IR 4.31 Technical Transfer System Developed

IR 4.4 Increased Access to International Markets
- IR 4.41 Trade Agreements to Expand Markets Adopted and Promoted
  - IR 4.411 Increased Understanding of Benefits to be Accrued from Regional Integration

IR 4.5 Broad-based Savings and Financial Facilities Extended to Private Sector Producers
- IR 4.51 Appropriate Financial System Developed
  - IR 4.511 Monetary Policy Implemented that Promotes Trade and Investment

IR 4.6 Revamped Fiscal System within (Government) Development Framework
- IR 4.61 Fiscal Policy that Promotes Trade and Investment Implemented
  - IR 4.611 Improved Understanding in Private Sector and Government of Market-Oriented Economics

IR 5 Natural Resources Managed in Sustainable Manner

No TIPS Responsibility for IR 5, 5.1

IR 5.1 National Environment Action Plan Implemented

IR 5.2 Environmental Legislation Enacted

IR 5.3 National Resource Management Technologies and Policies Implemented

IR 6 Infrastructure that Adequately Supports Growth in Production, Marketing and Export

No USAID Responsibility except for 6.21, 6.3

IR 6.1 Major Public Works Paid for or Coordinated by Government

IR 6.2 Aggregated Infrastructure Improvements from Private Sector Development
- IR 6.21 More Private Sector Involvement in Infrastructure Provision Through Policy Dialogue and Analysis

IR 6.3 Selected Private Sector Services Privatized

ANNEX B

A PROPOSED POLICY ANALYSIS FRAMEWORK[13]

Policy analysis should provide the decision maker with information on the problem or opportunity which the policy addresses, the feasible policy alternatives, and the positive and negative impacts of the feasible alternatives. This proposed approach incorporates environmental issues into the analysis. This is an analytical approach, but it does not preclude the use of a participatory approach. Indeed, the analysis could inform those participating in policy development, whether they are decision-makers or interested parties.

The process consists of six steps.

1. Problem Identification

2. Description of the Existing Situation

3. Identification of Feasible Alternatives

4. Assessment of Impacts of Each Alternative
   - Environmental
   - Social
   - Cultural
   - Economic
   - Institutional

5. Comparison of Alternatives

6. Selection of Alternative

The first five steps should be implemented by an interdisciplinary team which could be housed in a policy office or secunded from public and public sector institutions. The sixth step is the responsibility of the decision maker. The interdisciplinary team can provide the decision maker with information and compare alternatives. The ultimate decision, however, remains with the decision maker.

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[13]This framework is a modification of "A Proposal for a Regulatory Impact Assessment Procedure for Pollution Control in Central America" prepared by the Project in Development and the Environment (PRIDE) for USAID's Proyecto Ambiental Regional para Centro América (PROARCA).

Step 1. Problem Identification

This policy analysis process is designed to assess the ability of alternative policy options to address a specific problem or achieve a desired goal. It is necessary to clearly identify the problem or goal to be addressed and to define the purpose of the policy. The purpose will be used to guide the development of alternatives and to assess their impacts. For instance, if the purpose of the policy is to reduce emissions from vehicles in a metropolitan area the options and impacts may be quite different than if the purpose is to improve air quality in the same metropolitan area.

Step 2. Description of Existing Situation

To design and assess the impacts of alternatives, the existing situation must be understood. The description of the existing situation serves as a baseline against which the alternatives will be measured. The description of the existing situation should include environmental, social, cultural, economic, and institutional components. Environmental information should include a description of potentially impacted ecosystems as well as potential sources of contamination associated with the policy.

The description of the existing social and cultural situations should include information on who is impacted by the problem and how they are impacted. This should include the identification of stakeholders -- those who will be positively or negatively impacted by the proposed policy. The description should also identify any specific cultural activities or behavior which may be impacted by the policy.

The economic description should include information on the current economic benefits and costs associated with the problem or goal, including an analysis of the economic incentives created by the current situation.

The analysis of existing institutional structures should include information on existing policies, laws, and regulations dealing with or affecting the problem or goal, an assessment of their effectiveness, and an analysis of the capabilities of the responsible institutions. The institutional analysis should also identify policies in other sectors which affect the current problem or may affect the viability of alternatives.

To the extent possible, the description of the existing situation should include a predication of future conditions if no action is taken.

Step 3. Identification of Feasible Alternatives

For this process to be a decision-making tool, it must be applied to alternatives, and not just to one way of addressing a problem or achieving a goal. Feasible alternatives are those:

which have the potential to achieve the purpose of the policy, law, or regulation;

for which a known technology exists at a reasonable cost; and

for which the country has the potential institutional capacity for implementation.

Each alternative should provide the decision maker with a different means of meeting the purpose of the policy, law, or regulation.

Step 4. Assessment of Impacts of Each Alternative

This step involves assessing the environmental, social, cultural, economic, and institutional impacts of each alternative. These impacts should be measured as changes from the existing or projected situation. Many techniques are available for assessing the potential impacts of alternatives including mathematical modeling, simulation modeling, statistical analyses, graphical overlays, risk assessment, behavior assessment, benefit/cost analysis, Delphi techniques, and professional judgement. The techniques used will depend upon the type of problem being addressed, its impacts, and the size of the budget available for the analysis. No matter what techniques are used, they must be applied equally to all alternatives.

Environmental

The assessment of environmental impacts should include both positive and negative impacts. To the extent possible, environmental impacts should be quantified. The analysis should assess both the direct and indirect environmental impacts for each alternative.

Social

The social assessment should address changes in quality of life and changes in social equity associated with each alternative. It should identify how the benefits and costs of each alternative will be distributed among social classes and ethnic groups.

Cultural

The cultural assessment should identify and assess changes in cultural (traditional) behavior or activities which will be caused by each alternative. The assessment should

also identify traditional activities which could hinder implementation of each alternative or which could be encouraged to foster implementation.

Economic

The economic assessment should focus primarily on the economic impacts of each alternative on the affected community -- those who will be either positively or negatively affected by the policy, law, or regulation. Social and institutional costs should be addressed in their respective sections of the assessment. The economic assessment should include estimates of the financial and economic costs and benefits of each alternative, including impacts on small businesses, employment, investment, and trade. It should also identify any potential adverse economic incentives which may be created by the alternative.

The estimates of benefits and costs should include the capital, operation and maintenance costs of equipment, the costs of monitoring and reporting, and labor costs associated with each alternative. The assessment should identify individual facility costs as well as aggregate costs for the affected population. The assessment should clearly state the assumptions used for making the cost estimates. If the assessment is for a performance standard or economic incentive, assumptions will have to be made, and clearly stated, about how the regulated community will respond.

The economic assessment should identify any potential perverse or inadequate economic incentives associated with each alternative. Perverse economic incentives are those which stimulate behavior which results in greater social, economic, or environmental impacts than the status quo. Inadequate economic incentives are those which are designed to change a behavior, but are set too low to generate the desired response.

Institutional

In developing countries, institutional analysis may be the most important component of policy analysis. Many economic, social, and environmental policies in these countries are not implemented because of lack of institutional capability. Institutional analysis includes analysis of ability to enforce and monitor as well as the identification of information, training, and resource needs for implementation.

The analysis of ability to enforce and monitor should include identification of the types of enforcement and monitoring which will be required, the technical requirements and costs of their implementation, and the institutions which will be responsible. For each institution which will be responsible for enforcement or monitoring, an assessment should be made of its technical and financial ability to fulfill its responsibilities. Staffing and budget needs for implementation should be estimated. This portion of the analysis should also identify

other institutions which could or should be involved in implementation and identify opportunities and constraints for coordination among the implementing institutions and these other institutions.

Step 5. Comparison of Alternatives

The results of the analysis should be presented in such a way as to facilitate comparison of alternatives. Although some analyses may lend themselves to risk assessment or benefit/cost techniques, in most cases the results of the assessment will be presented in matrices with the alternatives on one axis and environmental, social, cultural, economic and institutional impacts on the other axis.

Step 6. Selection of Alternative

The participants in the policy analysis may recommend an alternative, but the ultimate decision will rest with the decision maker. This policy analysis process will not guarantee that the best decision will be made, but it will ensure that the decision maker is provided with the best information available on the potential impacts of the decision.

ANNEX C

GENERAL CRITERIA FOR IDENTIFYING SITES FOR TIMBER PLANTATIONS

Given the demands for fuelwood, timber and non-wood products in Guinea-Bissau, tropical tree plantations may be one way to diminish pressure on the natural forest resource. To ensure commercial viability and environmental sustainability, site selection for a commercial tree plantation should take into account certain economic, social and environmental criteria. (Note: the following are generic criteria which should be made more specific to the reality in Guinea-Bissau, by the local forester and social scientist).

Economic:
Economic viability is critical to ensure long-term plantation management and conservation of surrounding forested areas. The plantation owner must have a sufficient economic incentive for implementing long-term forest or tree plantation management. Planning should thus select sites and species which will render revenue (i.e., rent, stumpage, other payments) which is at or above average in the region based on local experience and markets. Revenue should also be sufficient to cover the costs of plantation management, including silvicultural interventions (pruning, thinning, acceptable pest control), environmental protection measures (e.g., against fire and erosion)

-Site and species selection should be based on a realistic assessment of market and/or subsistence use, costs of plantation establishment, maintenance and projected production.

-Growth and timber/forest product yields are highly dependent on site quality. Site-specific characteristics such as soil quality (e.g., drainage, pH, CEC), and precipitation should be considered for the species in question prior to making capital and labor investments.

-Site selection should take into account distance to market for intended product to ensure that transportation costs are not prohibitive.

-Size of plantation site must be sufficient to render an adequate yield of product at the established stocking rate of the species, to cover costs of plantation establishment and maintenance, including environmental protection measures (fire and erosion protection), monitoring and re-investment in management activities (silvicultural interventions).

Environmental:

All operations should strive to maintain hydrological and soil conservation functions and maintain biological diversity, both within the identified site and in the surrounding areas.

-Previous or current vegetative cover/ecology: Is the site currently primary natural forest, woodland or savannah? To conserve the forest resources, plantation sites should not include areas currently covered by primary, degraded primary or secondary tropical forest, dense woodlands, savannah, mangrove or gallery forest ecosystems. Plantations should be established on unused or degraded lands or on unproductive agricultural lands.

-In cases of degraded open forested ecosystems, tree planting to enrich wood or forest product production should supplement natural regeneration, fill gaps, and contribute to genetic resource conservation, rather than replacing the natural ecosystem. An effort should be made to use species native to the area to maintain ecosystem functioning and wildlife habitat.

-Does the site fall within any of the areas identified by the Government of Guinea-Bissau as a current or future protected area or national park? Conservation areas within established national parks or natural parks of high biological diversity value should not be converted for commercial plantations. Exceptions for smaller plantations or woodlot might be made where the objective is to diminish pressure on natural forest by communities already residing within the park or to restore degraded areas. However, all efforts must be made to avoid the introduction of exotic species which can have devastating impacts on the ecosystem. In all cases, mixed native species which occur in the immediate area should be utilized, and all activities should be in accordance with regulations governing the protected area.

-The habitats and food sources of threatened, rare, endemic and endangered species should be taken into account when selecting sites for reforestation and plantations.

-Stream and riparian areas should be excluded from areas to be planted and adequately protected with adequate buffer vegetation (left in its natural state or rehabilitated with vegetation) to avoid erosion and create a micro habitat for wildlife.

-If plantation site will involve the opening of new roads through a forest or natural ecosystem, efforts should be made to mitigate the immigration of settlers who would move into and clear the forest.

-During plantation establishment and management, an effort should be made to minimize the use of chemicals and consider alternative uses of integrated pest management where appropriate. Proper use and application of chemicals should always be practiced.

-When selecting species, native species are preferable over exotic species. Exotic species which are known to be aggressive colonizers should be avoided. Where exotic species are used, management should include mitigation of seed dispersal and regeneration of exotics outside plantation area. This should include regular monitoring and elimination of exotic regeneration outside immediate plantation site.

Social:
Social criteria are extremely important for environmental sustainability of any land use activity. Plantation establishment and management should respect local land use and tenure systems, be consistent with national land use plans and laws, and have a positive impact on the well being of local communities. (note: in Guinea-Bissau, there is currently a conflict between the traditional land tenure/use systems and the "modern systems" in practice or proposed. This will require the resource manager to seek "win-win" solutions and attempt to create or identify innovative partnerships which are consistent with both local village and national norms. Local participation and acceptance of plantations is considered critical as it is often a primary criteria for success, particularly given the long term nature of forest plantations).

-Land or tree tenure is clear and secure.

-Land is dedicated by owners or managers to long-term plantation management.

-A formal process should be established for consultation with local communities before site selection begins.

-Agreements on plantation site, establishment and long-term management made with local village chiefs, in some kind of written form which is recognizable and acceptable to the national, regional local governing bodies. This should include a clear demarcation of plantation site on a map, which local communities understand and agree to, and which national governing bodies recognize, and a work plan for long term plantation management, which clearly defines local involvement.

-Just compensation is provided to local communities for damage to crops, game, trees land and other managed resources and for impairment of essential environmental functions.

-Laws and regulations governing protected areas, natural parks, national parks, protection of rare, threatened and endangered species are respected in identifying site selection.