Guidelines for the Project Impact Assessment System of the Rural Access Project

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LIST OF ACRONYMS

BEA	Bureau Environmental Advisor
DNEP	National Directorate of Roads and Bridges
DNFFB	National Directorate of Forests and Wildlife
EA	Environmental Assessment
EPAT	Environmental and Natural Resources Policy and Training Project
ES	Engineering Survey
ESF	Economic Support Fund
FAO	Food and Agricultural Organization
FEA	Focused Environmental Analysis
GIS	Geographic Inventory Survey
GRM	Government of the Republic of Mozambique
INIA	National Institute for Agricultural Research
IRR	Internal Rate of Return
IUNC	International Union for the Conservation of Nature
MEA	Mission Environmental Advisor
MOA	Ministry of Agriculture
MSI	Management Systems International
MSU	Michigan State University
NDI	National Democratic Institute
NGO	Non-Governmental Organization
NMS	New Management System
NPV	Net Present Value
ODS	Origin and Destination Survey
PIAS	Project Impact Assessment System
PVO	Private Voluntary Organization
RAA	Rural Access Activity
REA	Regional Environmental Advisor
RENAMO	National Resistance Movement
RHS	Rural Household Survey
RIZ	Road Impact Zone
ROCS	Roads and Coastal Shipping
SME	Small and Medium Enterprise
STD	Socially Transmitted Disease
UNDP	United Nations Development Programme
UNHCR	United National High Commissioner for Refugees
USAID	United States Agency for International Development
VOC	Vehicle Operating Costs

Section I

Monitoring the Impact of the Rural Access Project

A. Introduction

The USAID/Mozambique Mission has designed and is about to execute a project to rehabilitate rural roads in provinces the Mission has identified as focus areas. The roads are to increase rural incomes through improved agricultural marketing and off-farmer employment opportunities to be opened with improved access to rural areas. The purpose of this report is (a) to present guidelines for systematically assessing the appropriateness of projected road segments under the Rural Access Project (RAP) and (b) for identifying potential results from the roads and for monitoring over time the achievement of those impacts. The monitoring methodology is referred to as the Project Impact Assessment System (PIAS).

B. Overview of Mozambican Rural Development

In October, 1992 the Government of the Republic of Mozambique and National Resistance Movement (RENAMO) signed a Peace Accord which ended almost two decades of civil war. Providentially, a two year drought in Southern Africa ended the same month. Between the civil war and drought almost 4 million Mozambicans became displaced persons and another 2 million became refugees. By 1993, with apparent peace and rain, they began to return home.

In the next two years, 1994 and 1995, Mozambique's GDP grew by 5.4 percent and 2.9 percent respectively. USAID/Mozambique reports the following: the agriculture sector grew by more than 5 percent; the transport sector grew by more than 17 percent; commercialized smallholder agriculture grew by more than 18 percent; overall volume of commercialized smallholder production grew by 38 percent; while emergency food beneficiaries decreased from 1.5 million in 1993 to 0.6 million in 1995. (Results Review, FY 1995)

The strengthening of income earning potential is what is needed in Mozambique in order to sustain development in rural areas. Agricultural production at the smallholder level and microenterprises represent the major sources of increased rural incomes and each depend, in their turn, on better roads. "Agriculture comprises 60 percent of the country's GDP and is responsible for 80 percent of both employment and export earnings...With the coming of peace in the countryside for the first time in two decades, perhaps restoration of reliable and efficient rural transport services is the most important requirement now for enhancing national food security through recovery of agricultural production and the efficient distribution of marketable surpluses (USAID/Mozambique, Rural Access Project Paper, 1995)".

The World Bank estimates that as of 1994 only 10 percent of the network of primary, secondary and tertiary roads in Mozambique could be qualified being in "good" condition, while more than one third were not transitable on a regular basis and many feeder roads are impassable. "Together this constitutes a major constraint to the transport of farm produce to the points of consumption and export. Consequently, road user operating costs are high and vehicular traffic is currently very low and sporadic in much of the network." (World Bank, Staff Appraisal Report, Second Roads and Coastal Shipping Project, 1994) The World Bank has supported

Mozambique's National Roads Program through its funding of two Roads and Coastal Shipping Projects - ROCS-1 and ROCS-2 "to remove transportation bottlenecks to agricultural production, distribution and marketing, the rehabilitation and proper maintenance of basic transport infrastructure in selected priority districts." (World Bank, Staff Appraisal Report, First Roads and Coastal Shipping Project, 1992)

USAID/Mozambique has similarly responded to this need. First, in 1993, USAID commissioned emergency road rehabilitation for selected rural roads in Sofala, Tete and Zambezia Provinces under the Rural Access Activity (RAA) within the Regional Drought Emergency Relief Project (656-0237). USAID is now planning continued road rehabilitation, to higher standards, in central Mozambican provincs under the Rural Access Project (RAP).

C. The Rural Access Project (RAP)

1. Rationale of the RAP Project

The Rural Access Project (RAP) was formulated to address one of Mozambique's critical development needs -- access to rural areas. After seventeen years of civil war and intermittent drought, much of Mozambique's rural population fled to urban areas or to refugee camps. With peace, getting Mozambique's agriculture sector productive again required getting people resettled in rural areas. Moreover, the demobilization process also sought to move former soldiers back to rural areas.

The resettlement process has proceeded to near-completion. It is thought that much of the pre-war population has returned home. It is now necessary to provide opportunities for increasing rural income through increased agricultural output and off-farm employment. In order to stimulate agricultural production and promote off-farm employment, Mozambique needs to rehabilitate its rural roads. With agricultural production strengthened, improved market infrastructure and improved microenterprise employment opportunities, incomes for rural populations can increase.

The USAID Mission in Mozambique has chosen to address the problem of rural development and agricultural production primarily through its Strategic Objective Number One for increased rural income. The Results Framework for SO 1 is shown in Exhibit 1 on the following page.

SO 1 Results Framework

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2. Description of the RAP Project

The Rural Access Project has, as its goal, the same objective as the Mission=s Strategic Objective One: Aincreased income for rural households in targeted areas.@ The purpose of the RAP Project is to achieve Aincreased access and reduced costs of transportation in targeted rural areas with a high potential for agricultural growth and large population concentrations.@ The project will achieve its goal and purpose through the rehabilitation of rural roads in USAID's selected geographic focus areas. It will extend over seven years at an estimated cost of $53.0 million. Under RAP approximately 1,400 km. of rural roads in segments ranging up to 247 km will be rehabilitated to all-weather standards in four provinces which have historically experienced high agricultural productivity.

The criteria for the selection of each segment have been the following:

- criteria included under USAID/Mozambique=s earlier Rural Access Activity (RAA) for Aemergency road opening;@
- location in areas of significant agricultural production potential;
- location is areas of high population concentrations within a Mission strategic target area;
- inclusion in the GRM=s National Roads Program financed by the World Bank under ROCS-2; and
- linkage with another facility or another road activity under ROCS-2.

The project outputs, expressed as intermediate results, will be:

- Approximately 1,400 km of rehabilitated roads;
- Strengthened GRM capacity to plan contract for and supervise road rehabilitation and maintenance works;
- Strengthened ability of the private sector and/or community bodies to undertake road rehabilitation and maintenance; and
- Strengthened GRM capacity to finance routine and periodic road maintenance.

3. The RAP Project Development Hypothesis

The primary intermediate result of SO 1 which is supported by the RAP Project is IR 1.1: Increased access to markets. The relationship of the RAP Project and its outputs with IR 1.1 is shown in Exhibit 2 on the following page.

Extended SO 1 Results Framework

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This extended results framework clarifies the RAP Project development hypothesis, which could be expressed in the following way. (Note that the bolded conditions represent the line of causally related intermediate results included in the RAP results framework.)

Rural household income in targeted areas will increase
- if there is increased access to markets,
- if rural enterprises expand and
- if increasing agricultural output can be sustained.

There will be access to markets
- if there is an improved enabling environment for market activities,
- if there is improved transportation infrastructure,
- if there is expansion in the capacity of the private sector to transport and market goods and
- if there is expanded dissemination of improved market information.

Transportation infrastructure will improve
- if roads are rehabilitated.

Roads will get rehabilitated
- if the GRM=s capacity to plan, contract for and supervise road rehabilitation and maintenance is strengthened and
- if the capacity of the private sector and local entities to undertake road rehabilitation and maintenance activities is also strengthened.

The GRM=s capacity to plan, contract for and supervise road maintenance will be strengthened
- if the GRM=s capacity to finance routine and periodic road maintenance is strengthened.

D. Monitoring RAP Project Impact

1. Overview

There will be four forms of results assessment in the RAP Project: project monitoring. special assessments, environmental monitoring and project evaluation. These are briefly described below in order to understand the relationships between them and to clarify the role of results monitoring as it will be carried out under the PIAS through these guidelines.

Project Monitoring will be carried out at the program and project levels and will include implementation and results monitoring. The former will track project inputs, outputs and milestones while the latter will focus on the achievement of program and project purposes and intermediate results, particularly those flowing from RAP output # 1: "rehabilitated roads."

Special Assessments will be conducted as needed to resolve implementation problems and issues, to review assumptions and to reach decisions regarding phased or performance disbursements or design modifications. The tracking of institutional strengthening indicators associated with RAP outputs 2, 3 and 4 for the counterpart institution, the National Directorate of Roads and Bridges (DNEP), and the private sector will be conducted through Special Assessments.

Environmental Monitoring will focus on direct and indirect environmental impacts; the former being conducted by DNEP and RAP consulting engineers, while the latter will be carried out by firms contracted by the Mission.

Project Evaluations will be conducted to answer questions regarding such issues as the relevance, effectiveness, efficiency and sustainability of the RAP Project.

2. Results Monitoring and the Project Impact Assessment System (PIAS)

Results monitoring of the RAP Project will include many of the program level results contained in the SO 1 Results Package 1.1. It will also include more detailed project level results, considered to be generic to rural roads rehabilitation projects, which will be analyzed according to their economic impact, social soundness and environmental effect. It will also monitor impacts in each area which have been found to be peculiar to each road segment rehabilitated. These anticipated results will be focused and expressed as indicators which will be largely quantitative in nature.

Results monitoring will be based upon an initial analysis of the feasibility of the selected road segments which will collect baseline data for results indicators and, periodically after the roads have been rehabilitated, be carried out through the collection and analysis of impact data.

The relationship of the feasibility analysis and results monitoring phases of the PIAS to the overall flow of RAP Project rehabilitation activities is shown in Exhibit 3 on the following page. The Exhibit also includes the design phase of the two monitoring methodologies. The feasibility analysis and impact monitoring phases of the PIAS are described in general terms below while the guidelines for conducting them are presented in detail in Sections II and III respectively. (Description of the process by which the PIAS was developed is presented in Attachment A.)

RAP Monitoring Flowchart

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a. Feasibility Analyses

For each road segment analyses of economic impact, social soundness and environmental effect will be implemented by the institutional contractor (IC). These *ex ante* analyses will draw conclusions regarding the feasibility of rehabilitating the road segments on economic, social and environmental grounds. They will identify the specific impact indicators to be monitored for each road segment. Finally, they will gather baseline data for those impact indicators. With the exception of the first year, the feasibility analyses will be carried out during the months of April, May, and June in order that road rehabilitation can be carried out during the subsequent dry season.

Although the feasibility analyses will be broken out by economic, social and environmental impacts, they each will carry out the same general tasks.

Viability assessment, which will guide USAID/Mozambique by either confirming or recommending modifications to the road segments initially selected, should be carried out during the feasibility analysis phase. The form of these analyses will vary depending on whether their focus is economic, social or environmental. It is possible that one or more of these analyses will find that a particular road segment should not be rehabilitated, in which case another potential road will be identified and analyzed.

Impact hypotheses development, identifying potential results along with their causal and temporal relationships, should be elaborated during the feasibility analysis. These will allow USAID/Mozambique to extend out the RAP development hypothesis as it is applied to each road segment. These hypotheses of economic, social and environmental impact will also facilitate the identification of impacts which might be peculiar to each road segment. Furthermore, they will perhaps identify crucial interventions or mitigative actions which USAID should consider for each road segment.

Verification of the applicability of the generic impact indicators, identified as a set of common program and project level indicators to be tracked for all road segments, should be conducted during this phase. Although it is expected that the generic impact indicators, described in Section II below, will be important measures of RAP success, some may not be applicable to all road segments.

Identification of additional impact indicators, which might be peculiar to each road segment, should also be carried out during this phase of work. It is anticipated that the generic set of impact indicators may not completely reveal the extent of RAP's achievement of its objectives and results, or potential negative impacts that should be monitored. There may be conditions peculiar to a road segment with potential of particular impacts. These will be identified during the feasibility analysis and added to the set of indicators to be tracked.

Gathering of baseline data on impact indicators and the setting of targets will also be carried out during the feasibility analysis phase. This work will be conducted under the guidelines for impact monitoring with the PIAS described in the next section and in Section III that follows.

Developing a monitoring plan in which any concerns or issues, such as timing, topography, political circumstances which might be particular to each road segment, will be described and planned for in the subsequent PIAS impact monitoring efforts.

Section II below presents the detailed frameworks for conducting the feasibility analyses. They are presented in the form of scopes of work and are addressed explicitly to the RAP Institutional Contractor (IC) which will perform the work. Since their specific methodologies vary, the guidelines for economic feasibility, social soundness and indirect environmental impact analysis are broken out and presented separately in sub-sections B, C, and D respectively.

b. Impact Monitoring

After road rehabilitation has been carried out, the anticipated results will be monitored by the USAID Mission. The impact monitoring phase of PIAS is to be primarily conducted at the same time of year as the feasibility analyses. This will allow for gathering impact data during comparable periods and under similar conditions. In this way, the PIAS is intended to monitor "before and after" circumstances and results. It will also permit the longitudinal analysis of results and to measures increasing or decreasing levels against prescribed target levels. Data on certain key indicators which are seasonally sensitive will be, however, collected at different times of the year.

PIAS monitoring will be used to provide much of the impact data which will be reported by USAID/Mozambique in its annual resource request and results review (R4) process. It will also provide important project evaluation information as well as lessons learned feedback which may affect the re-design of out-year road rehabilitation.

The PIAS has been designed to be a freestanding data gathering methodology. It does not rely on PVO or local NGO partners to gather impact data. It is designed to be contracted and carried out using locally available human resources. Although secondary data sources are to be utilized for contextual and interpretive information, impact data are to be gathered, for the most part, through primary data gathering methods.

The impact monitoring phase of the PIAS is designed in coordination with the feasibility analyses. Since baseline data and subsequent impact monitoring data must be gathered in similar ways, under similar conditions and at the same periods of time, they must utilize the same methods. In order for baseline data and impact monitoring data to be comparable is these ways, precise guidelines for carrying out impact monitoring have been elaborated in some detail and are presented in Section III below.

It is anticipated that all PIAS impact data can and should be gathered through the following data gathering instruments. These instruments for data gathering are introduced and described briefly below and are described in more detail in Section III.

An Engineering Survey for assessing the proposed roads and for gathering data necessary to verify the applicability of road rehabilitation standards.

An Origin and Destination Traffic Survey which will collect information on traffic counts, commercial and passenger transport vehicle use, and data for computing vehicle operating costs using DNEP's model.

A Road Transport Sector Market Survey to provide data for determining the competitiveness of the road transport sector and induced passenger and freight transport cost reductions.

A Rural Household Survey directed at the household level and through which it is anticipated that most impact data will be gathered. The Household Survey will collect primary data for economic, social and environmental analyses such as migration, access to and use of services, agricultural production, on and off-farm incomes, and commercialization of agriculture.

A Focus Group Interview designed to provide in-depth interpretive information from a selected group of rural beneficiaries (customers) which will help USAID more fully understand the intricate relationship of RAP intermediate results. The Focus Groups will include occupational categories of beneficiaries in the project area and are intended to ascertain the concerns and interests of the project customers.

A Rural Commerce and Industry Survey designed to collect information from and about market and business activities both within the immediate area affected by the roads as well as in freight and passenger transport businesses and wholesale markets in a wider region of impact.

An Infrastructure Survey will record changes in the inventory of infrastructure and services in the delineated road areas of influence, including number and location of schools, health posts, markets, mills, warehouses, etc.

Videography, a tool used to identify changes in the immediate physical environment of the roads, such as cropping patterns and pasturing, paths and track roads and roadside business, settlements, and vegetative cover as well as the condition of the rehabilitated roads and their maintenance. Videography will track both positive as well as negative impacts of the roads such as soil erosion, deforestation, and forest cover depletion.

Secondary Data Review from sources such as studies and surveys carried out by PVOs, local NGOs, donors and GRM/DNEP will provide contextual information on the roads and their catchment areas as well as to provide verification or explanation of impact assessment and monitoring findings.

Data gathering will be carried out through these instruments by the institutional contractor (IC) during baseline data collection. The Mission will execute a separate contract for conducting the impact monitoring phase of work. A more detailed presentation of the specific indicators for which data will be gathered and the sources of each is given in Exhibit 5 in Section II below.

As has been suggested above, the timing of data gathering will be important, particularly for data on agricultural production and prices. The suggested timing and relationship of the administration of these instruments is shown graphically in Exhibit 4 on the following page.

Exhibit 4: Timeline and Coordination of Data Gathering Instruments

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Section II

Feasibility Analysis Frameworks

A. Common Analytic Tasks and Concerns

1. Introduction

The purpose of this section is to provide guidance for carrying out the feasibility analysis of the PIAS for each road segment proposed for rehabilitation under the RAP Project. The guidelines are separated into economic, social and environmental impact analytical methodologies. These are the categories of project impact that USAID/Mozambique is most interested in capturing. The guidelines also include, in this sub-section, description of and guidance for analytic tasks to be carried out which are common over the three sectors.

The feasibility analyses are to be carried out by the RAP Institutional Contractor (IC). They should be understood as scopes of work for carrying out, *ex ante* studies of the viability and appropriateness of the proposed roads along economic, social and environmental dimensions. They are to be used to guide the IC in analyzing the feasibility of the road segments and in gathering baseline data on impact indicators. They are designed to provide the IC or his consultant with standardized methodological procedures and references to important analytical and data sources.

2. Methodological Overview

The feasibility analyses should fulfill the following purposes:

(1) Identify impacts particular to each road segment (in addition to generic impacts identified in Exhibit 5 below);

(2) Gather baseline data for each road segment and provide the basis for setting results targets; and

(3) Provide assessments of, and conclusions regarding the feasibility of rehabilitating proposed road segments, which will be used in final road selection by USAID/Mozambique and DNEP.

The feasibility analyses, and their relationship with the followup impact monitoring phase of the PIAS, have been generally described above. Before entering into more detailed description of each particular framework, however, it is important to give an overview of the common methodological tasks which will be carried out in all sector analyses.

The feasibility analysis will be carried out through three general phases of work.

> **The implementation planning and secondary data analysis phase** will include carrying out a summary analysis of the road segment in question, based on secondary data, to provide a general overview of its physical, demographic, economic, social and environmental features. The purpose of the summary analysis will be to provide the IC with a general sense of the road. The implementation planning phase will result in an

Implementation Plan for carrying out each feasibility analysis: economic, social and environmental. This will be reviewed by USAID/Mozambique and DNEP prior to initiating the feasibility studies. During this initial phase of work the IC will gather data available in Maputo which will expand the IC's understanding of the potential impacts of the road segment in question, amplify and give detail to the development hypothesis as it focuses on the road segment and, in some cases, may provide direct data for impact monitoring. Depending on the sector analyzed (economic, social or environmental), this phase of work will include carrying out the following general types of tasks:

- Identification of the sources of secondary data and review of the data;
- Expansion of general and sectoral development hypotheses;
- Gathering of baseline data where available;
- Identification of important communities along the road segment;
- Development of preliminary Community Profiles;
- Preliminary determination of the road impact zone (described below in Subsection 4); and
- Coordination with the PIAS team carrying out impact monitoring for other road segments beginning in year three.

The field based primary data gathering phase will include the major tasks to be carried out in each feasibility analysis. Baseline data to be gathered for the analysis of road feasibility and subsequent impact monitoring will be gathered through primary data sources which, in the majority of cases, will be in the field. Field data gathering will further enhance the development hypotheses, confirm the relevance of the generic impact indicators to the road segments and identify additional impact indicators particular to the road segments. Data gathering will be carried out through the instruments described above:

- Engineering Site Surveys;
- Origin and Destination Traffic Survey;
- Road Transport Sector Market Studies;
- Rural Household Survey;
- Focus Group Interview;
- Rural Commerce and Industry Survey;
- Videography; and
- Infrastructure Survey.

These will be described in greater detail in the sub-sections below and, particularly in Section III.

The feasibility analysis and baseline data reporting phase will present the conclusions of the economic, social and environmental feasibility analyses. It will also include identification and description of any new impact indicators which might have been found applicable to the road segments. This reporting phase will also identify and describe any additional interventions which might be important for project success as well as mitigating actions necessary to avoid negative effects. Finally, it will include the baseline data set for subsequent impact monitoring. Baseline data will be categorized, organized and filed in a manner compatible with USAID/Mozambique's other program level

indicator monitoring data sets. Where possible all data elements will be mapped in such a way that their location is shown in relation to the road segment in question.

3. Rural Access Road Generic Indicators

The foundation of the PIAS is a set of economic, social and environmental indicators which have been found to be common to USAID-funded rural access roads in Africa. This set of indicators includes program and project level impact indicators for USAID/Mozambique's Strategic Objective No. 1 and for the RAP Project. These indicators have been selected to measure those impacts considered most important by USAID/Mozambique. They were selected from a more extensive list, identified by a literature search of USAID rural road projects. They are listed, along with descriptions of what they are meant to measure and sources of data, in Exhibit 5 on the following pages. Throughout these guidelines they are referred to as the RAP generic indicators.

Baseline data on all RAP generic indicators will be gathered for all road segments, unless the feasibility analyses indicate that some particular indicator is irrelevant. It is anticipated, however, that each generic indicator will apply to some road segment and that data on them will represent the majority of data to be gathered for any given road segment. Decision on what generic indicators shall apply to a particular road segment will be made by USAID/Mozambique. Followup monitoring data will be gathered on this same set of indicators in order to identify project impact.

Exhibit 5 Summary of the Road Rehabilitation Impact Indicators

Indicators	Definition and Measurement Unit	Data Sources	How to Manipulate or Manage Data	Context, issues for individual farmers, traders, vehicle operator follow-up
Economic Impact Indicators				
1. Economic Costs				
C Road rehabilitation cost per road-km	Cost of reconstructing existing road infrastructure. It may include construction new segments that replace existing roads. Cost is measured in terms of US $ equivalent.	Engineering Survey; Origin and Destination Traffic Volume Count Survey (ODS); DNEP Standards;	The HDM-III model	
C Routine maintenance cost per road-km	Grass cutting, ditch and culvert cleaning, grading, pothole patching, etc. Cost is measured in terms of US $ equivalent.	DNEP Costs	The HDM-III model	
C Periodic maintenance cost per road-km	Resealing of paved roads, re-graveling of gravel roads, and recompacting of dirt roads. Cost is measured in terms of US $ equivalent.	DNEP Costs	The HDM-III model	
C Km of road rehabilitated	Total number of kilometers of rehabilitated road including bridge work	Project document; and DNEP	Project Contract Document	
2. Economic Benefits - Vehicle Operation Cost Savings				
C Average Vehicle Operating Cost per Vehicle-Km before and after Road Rehabilitation by class of vehicle - Heavy Trucks - Light Trucks - Pick-up Trucks - Cars - Buses - Vans	Vehicle operating costs do not include routine vehicle maintenance costs. It includes only costs incurred while traveling along the target road segment -- cost of incremental fuel and oil consumption, wear and tear replacement cost, repairs for mechanical breakdowns, loss of revenue and increased labor cost due to longer transit time. Cost measured in US $ equivalent. Survey taken over one month period.	ODS Vehicle Operators Survey	The HDM-III model	

Economic Benefits - Road Transport Cost Reduction Related Benefits				
C Average daily vehicle traffic volume by class of vehicle as defined above.	Number of vehicles traveling over the target road segment. Number of vehicles. Measurement over one month.	ODS; and Spot traffic count for on-going monitoring; DNEP traffic counts	Observed count adjusted for market days and seasonality	
C Average daily freight tonnage hauled - selected agricultural produce - Cotton - Sugar Cane - Maize - Rice - Cashew - Millet - Sun Flower Seeds - Other	Volume of commodities hauled over the target road segment. Volume measured in tonnage. Measurement over one month period.	ODS; and Spot traffic count for on-going monitoring data	Same as above.	Data gathered adjusted for seasonality
C Average daily freight tonnage hauled - Selected Consumer Goods - Cloth - Pots & Pans - Cooking Oil - Fuel - Salt - Soap - Other	Volume of goods hauled over the target road segment over one month period. Unit of measurement determined by item.	ODS; and Spot traffic count for on-going monitoring data	Observed counts adjusted for seasonality - more goods should be expected during high income times like right after harvest	
C Average daily passenger traffic	Number of passengers traveling over the target road segment. Number of passengers over one month period.	ODS; and Spot traffic count for on-going monitoring data	Observed traffic adjusted for holidays and seasonality	
Economic Benefits - Increased Value of Freight Hauled				
C Value per ton hauled - selected agricultural produce	The total market value of the selected commodities hauled over the target road segment divided by the total tonnage of the commodity. Value expressed in US$ equivalent. One month period.	ODS; and Spot traffic count for on-going monitoring data	Market value is estimated using the prevailing wholesale prices in destination market. Retail prices may be used where wholesale prices are not available	Data adjusted for seasonality
C Value per ton hauled - selected consumer goods	Market value of consumer items at destination market. Measured in terms of US$ equivalent. One month period.	ODS; and Spot traffic count for on-going monitoring data; Rural Commerce and Industry Survey	Market value determined in terms of quantity times retail price at destination market	
Economic Benefits - Reduced Freight and Passenger Transportation Costs				

C Freight transport cost per ton-km - selected agricultural produce	The cost charged to shippers by freight-vehicle operators along the target road segment per ton-equivalent. Tariff in constant meticais terms.	Same as above		Data adjusted for seasonality
C Freight transport cost per ton-km - selected consumer goods	Same as above	Same as above		
C Passenger transport cost per passenger-km - Trucks - Pick-ups - Buses - Vans	Fares charged to per passenger per kilometer of travel along the target road segment. Fare expressed in constant meticais terms. Average per type of vehicle and measured over one month period.	Same as above		
C Concentration ratio for the freight transport sector C Distribution of freight transport vehicles by type of ownership - private individuals - private firms - state-owned firms - international	The proportion (or %) of total freight tonnage hauled by the two largest freight haulers by volume. Number of vehicles owned and operated along the target road segment by: - private individuals - private firms - state-owned firms - international operators	Transport sector market studies		
C Concentration ratio for the passenger transport sector C Distribution of passenger transport vehicles by type of ownership	The proportion (or %) of total passengers carried by the two largest passenger transporters by number of passengers. Number of passenger-vehicles owned and operated along the target road segment by type of ownership	Same as above		
Economic Benefits - Reduced Freight Damage and Losses, while waiting for transportation and while in transit				
C Tonnage of damages and losses - selected agricultural produce	Percent of marketable production surplus lost through spoilage while waiting for transport plus amount lost or damaged while in transit or lost for lack of ability to market. Losses and damages expressed in ton-equivalent.	Rural Household Survey; Vehicle Operators Survey		

C Value of damages and losses - selected agricultural produce	Market value of amount spoiled, damaged or lost.	Rural Household Survey; Vehicle Operators Survey SIMA	Estimated quantity of damaged is priced using wholesale prices in destination market. Retail prices used when wholesale prices are not available	
Economic Benefits - Increased Agricultural Productivity and Marketed Surplus				
C Hectares under cultivation - selected crops	Number of hectares (or fractions of hectare) planted with a specific crop	Rural Household Survey Videography		
C Yield per hectare - selected crops	Farmer reported yield (kg/ha)	Rural Household Survey		
C Total crop production - selected crops	Total area planted times farmer reported yield per hectare (tons) or Farmer reported total production	Rural Household Survey		
C Total value of crops produced - selected crops		Rural Household Survey	Total production evaluated using farmgate prices	
C Crop diversification ratio	Value of staple food crops as a percent of total value of crop production	Rural Household Survey		
C Livestock herd size (Cattle, Goats, Sheep, Pigs, Chicken, Ducks, Pigeons, Other)	Farmer Reported Size of Herd by type of animal	Rural Household Survey	Change in livestock herd size	
Economic Benefits - Increased Adoption of Agricultural Technology and Shifts Toward Higher Value Crops				
C Agricultural technology adoption rates - Inter-planting - Planting in rows - Thinning - Irrigation - Fertilizer application - Crop rotation - Use of improved seeds - Improved on-farm storage - Other	Farmer reported technology use	Rural Household Survey	Households interviewed based on a check list of agricultural technologies introduced in the target RIZ	Observation on sustainability of the technology and its environmental impact should be noted.
Economic Benefits - Enhanced Agricultural Marketing				

C Farmgate price- selected crops	Farmer reported farm gate prices	Rural Household Survey	Farmgate prices per unit of local measurement unit which is then converted to kg	Seasonality of farmgate prices should be recognized and noted -- how many farmers sell their produce immediatel after harvest and at what price; how many farmers store and sell later and what price
C Farmgate price as % of retail price in first market - selected crops	Observed retail prices	Rural Household Survey Rural Commerce and Industry Survey Market Survey - SIMA and PVO's	Retail prices collected from first retail market	Seasonality of retail prices also shoul be noted and adjusted -- in which months is retail price lowest and/or higher.
C Prices of basic agricultural inputs - Fertilizer - Pesticides - Seeds by type of crop - Tools - Other	Farmer reported prices and observed market prices	Rural Household Survey Rural Commerce and Industry Rapid Appraisal Survey Market Survey - SIMA and PVO's	Local measure converted into kg	
C Number of traders disaggregated by gender - selected crops		Rural Commerce and Industry Rapid Appraisal Survey		
C Food price variations among (road specific) market towns -selected crops		Rural Household Survey Market Survey - SIMA and PVO's		
C Marketed surplus - selected crops	Farmer reported marketed production surpluses ton equivalent.	Rural Household Survey		
Rural Commerce and Industry				
C Number of retail and service enterprises - shops - traders		Rural Commerce and Industry Rapid Appraisal Survey		
C Diversity and availability of basic consumer goods - Retail Stores		Rural Commerce and Industry Rapid Appraisal Survey Focus Groups Rural Household Survey		

C Diversity and availability of basic consumer goods - Markets		Rural Commerce and Industry Rapid Appraisal Survey Focus Groups Rural Household Survey		
C Diversity and availability of basic consumer goods - Itinerant Traders		Rural Commerce and Industry Rapid Appraisal Survey Focus Groups Rural Household Survey		
C Average retail prices - selected consumer goods		Rural Commerce and Industry Rapid Appraisal Survey Focus Groups Rural Household Survey		
C Development of market infrastructure - Number of warehouses - Number of storage facilities - Number of consolidators		Rural Commerce and Industry Rapid Appraisal Survey Physical Infrastructure Survey		
Rural Household Incomes				
C Income from agricultural production and marketing C Value of own-production consumption C Income from microenterprise related activities C Income from wage-labor	Household reported incomes and employment opportunities	Rural Household Survey Rural Commerce and Industry Rapid Appraisal Survey Focus Group		Seasonality of household income should be recognized and smoothed
C Income proxies - Number of school-age children in the household attending school - boys - girls - Household asset possessions - furniture - latrines - bicycles - utensils - masonry - metal roof - other - Number & size of fields owned - Land tenure security/status		Rural Commerce and Industry Rapid Appraisal Survey Focus Groups Rural Household Survey	Typical regional items seen as a measure of wealthiness should be included in the list of household possessions	
Social Soundness				

Household and Demographic				
Population - disaggregated by gender	Population, by number of households in RIZ	Key Informants, Infrastructure survey	To be processed/ analyzed for Social Soundness Assessment / Archived with Baseline data set and updated PIAS and on-going monitoring	
Average household size - disaggregated by gender	Average size of household, Household defined as number of people eating communally	Household Surveys	As above	
Adult equivalent disaggregated by gender	labor output by children as expressed as an adult equivalency	Household Surveys	To be used in calculation of agricultural labor productivity	
Size of land holding by family unit	Amount of land cultivated by household	Household Surveys / Focus Groups / Secondary Sources	To be processed/ analyzed for Social Soundness Assessment / Archived with Baseline data set and updated for PIAS and on-going monitoring	
Population density	Increase over time in population of RIZ. Population divided by area.	Infrastructure Survey	As above	
Migration to/from larger towns - disaggregated by gender	Number of people/households in RIZ who have returned to the area following displacement or migration to urban centers. Number who have returned within the last two years, one year, six months.	Household Survey	As above	
Land tenure security and current status	Process of customary land allocation Perception by residents of security of tenure	Household Survey / Focus Groups	As above	

Roles of family members - disaggregated by gender	Functional division of tasks by household members by role and gender	Household Survey / Focus Groups	As above	Under-employment refers to idleness (not engaged in an incom generation activity)
Income and Employment Income and employment indicators to be used jointly between the Social Soundness and Economic Assessments.				
Average real household income - disaggregated by gender	Gender disaggregated total household income including cash-value of on-farm production consumed, income from marketing of agricultural produce Small and Micro Enterprise (SME) related activities and wage labor	Household Surveys	As above	
Average real household expenditures	Total household cash expenditures	Household Surveys	As above	
Off-farm employment, labor allocation and income	Number of household members engaged in off-farm employment / Frequency of and income from wage labor. Labor allocation patterns according to agricultural calendar and major livelihood activities. Time-specific periods of labor surplus or under-employment.	Household Surveys	As above	
Household assets, possessions	Household assets, possessions as proxies of wealth including Households with bicycles, radios, homes with zinc sheet roofs, constructed of bricks etc.	Household Surveys	As above	
Health				
Number of health facilities	Number and location of health facilities in RIZ	Infrastructure Survey	As above	

Average travel time to health facilities	Average time/distance walking to nearest health facility	Household Survey	As above	
Population per health facility	Population per health facility in RIZ	Infrastructure Survey	As above	
Number of visits to health facilities/towns by health practitioners	Average number of times household members have made visits to health facilities in past year	Household Survey	As above	
Population per health practitioner	Population per health practitioner broken down by type of practitioner. i.e.,: Nurses, Doctors, etc.	Infrastructure Survey	As above	
Availability of basic medicines	Number and type of basic medicines available in the RIZ at clinics or private outlets	Infrastructure Survey	As above	
STD prevalence rates along the impact zone	Rates of STD's in RIZ disaggregated by gender	Infrastructure Survey	As above	
Education				
School Enrolment	Total school enrolment in RIZ disaggregated by gender. Average number of school age children per household attending school	Infrastructure Survey / Household Survey	As above	
Political Participation **Population having contact with:**				

National political leaders	Number of visits to RIZ by national political leaders. Communities with contact with national political leaders. National political leaders to include the executive, members of the Assembly.	Key Informants/Focus Groups	To be processed / archived with Baseline data set and updated for PIAS and on-going monitoring	
Local political leaders	Number of visits to RIZ by local political leaders. Communities with contact with local political leaders. Local political leaders defined as district level officials, including the District Administrators, Provincial Leaders, and Religious leaders or PVOs involved in political or civil society issues.	Focus Groups	As above	
Amount of political information received	Knowledge of political events. Including a sample checklist of : the government, name of local member of the Assembly, name of district administrator.	Household survey	As above	
Sources of Political Information	Households identifying the following as sources of political information: political leaders, truck drivers, household member, regulos, religious authorities, radio, newspapers	Household survey / Focus Groups	As above	
Environmental Impact				
1. Indirect environmental impacts following from improved access				
Volume of timber transported along road	Number of trucks hauling timber Metric tons transported	Vehicle origin and destination/traffic count survey (ODS)	Numeric data, disaggregated by road	
Volume of meat, skins, etc. in markets and on roadsides	Number of items, by species	Rural commerce and industry survey (RCIS)	Numeric data	

Volume of fuelwood, charcoal sold	Number of standard-size bundles of fuelwood C on roadside C in markets Estimated volume of charcoal (kg) C on roadside C in markets C carried by truck	C observation C RCIS C observation C RCIS C ODS	Numeric data, keyed to location Show concentration of sales on maps (road segments or market areas showing increases in volume)	One of the families included in long term follow up should be involved in fuelwood or charcoal enterprises. Questions should be structured to get information not only about their own practices (source of wood, volume harvested, etc.) but about the growth and competitiveness of th market they operate in. Seeking insight about potential for deforestation.
C Tourism to protected areas	visitor/days	DNFFB or PVO data	Numeric data	
C Agricultural best practices	Mostly general, qualitative data	Farming systems and extension based research. PVOs	Narratives (note that other SOs are picking up adoption of good practices)	Environmental impact/ consequences of farming practice must be flagged by researchers
C Protection and enforcement activities in protected areas number of enforcement actions -- data from DNFFB, PVOs)	Mostly qualitative data but may include person/days of enforcement personnel in area	Secondary sources (PVOs, DNFFB, local authorities)	TBD upon examination of data available	
2. Indirect environmental impacts following from changes in settlement patterns and population density				
C natural vegetation cleared or converted a. relatively undegraded tropical forest; b. non-forest natural vegetation or ecosystems including wetlands and lagoons, grasslands etc.	Hectares	Base maps overflights on-site observation aerial photos	Overlays showing successive changes (GIS applications) Numeric data, by district	

C Consumption of wood for building materials, fuelwood, and charcoal C Consumption of wild animals for subsistence C Wildlife destruction for protection of crops and livestock depredation	C number of trees cut C number of animals, by species C number of animals, by species	C household surveys C household surveys C household surveys	Calculate average household consumption, then, based on population of area, estimate total offtake.	Consult with experts (DNFFB, university, IUCN, etc.) for opinions about whether assumed level is consistent with sustainabl harvest.
Incursions into protected areas	C Number of settlements and inhabitants C Hectares of natural vegetation altered	C overflight, PVO data C overflight, aerial photos, PVO data	Numeric and map data	Any increases should trigger focused study and mitigative measures
3. Indirect environmental impacts following from changes in agricultural patterns				
(Clearing of natural vegetation is covered under changes in settlement patterns.)				
Soil erosion, siltation from secondary development	Hectares of soil affected Number of streams affected Hectares of wetlands affected	observation, overflights (data will be estimates)	Maps	
4. General environmental indicator (This is not a separate indicator, but a recommendation to aggregate some of the indicators above into a "big picture.")				
Changes in vegetative cover in road influence area	Hectares converted	overflights, interpretation of satellite and aerial photos, secondary sources	If a GIS system is developed, it should be able to generate this generalized map from the data inputs described above. Would be a very useful visual presentation of the cumulative change in the road influenc area.	

4. Road Impact Database

The IC will develop an interactive database for archiving baseline and subsequent impact monitoring data collected and input by others. The PIAS database shall be structured and developed as a component of the Mission's overall program performance monitoring system. The data element definitions and measurement units must be compatible with the Mission's program-level results monitoring system and it must provide the Mission the capability to extract baseline and monitoring data for reporting progress toward the achievement of related results under Strategic Objective No. 1. The institutional contractor will develop the database using the following criteria.

- The database must include all generic indicators plus all those additional indicators found to be unique for each proposed road segment during the feasibility analyses phase and for which baseline data were collected.

- The software that the contractor chooses to use should be a relational database, such as FoxPro, dBase, Paradox, or Oracle to allow for the cross referencing and sorting of data. In this way the data can be sorted and analyzed in different ways.

- The database must be identified by each road segment specified in the RAP project as modified by the feasibility analyses. A geographic code shall be defined and each road segment impact zone shall be assigned a unique geographic code.

- The data elements shall be tagged according to whether they describe an economic, social or environmental dimension or a combination of effects. The contractor may wish to classify the data even more closely, distinguishing, for example, engineering and physical data.

- Data collected in PIAS must be recorded quantitatively; expressed and stored so that it can be manipulated mathematically. The level of precision of measurement of all generic indicators has been refined in these guidelines to a significant extent. Once baseline data are gathered the feasibility of that level of precision will be tested. In some cases quantitative precision will be lost according to the realities of data collection in rural areas. Once the level of precision has been established, e.g., nominal, ordinal, integral or decimal, the database must be arrayed and formatted to accommodate it.

- The contractor should study and consider a software which will apply geographic references to each data element so that they can be mapped, i.e. shown geographically.

5. Road Impact Zone (RIZ)

For the purposes of the Rural Access Project the zone of influence, or Road Impact Zone (RIZ), will be considered to be the catchment area for each road segment within which USAID expects impacts, either positive or negative, from road rehabilitation to become manifest. The RIZ for each segment will be treated as a "best guess" or hypothesized area of impact. It will serve to establish a geographic area within which data on potential impact should be gathered. There are many factors which will determine how far off the road alignment impact is, in fact, felt. It will be the job of the economic, social and environmental feasibility analyses to estimate the RIZ prior to baseline data gathering. It will be the job of the PIAS phase of subsequent impact monitoring, to determine if the anticipated impacts have occurred.

The RIZ that USAID considers proper will be different for each road and will depend on its economic, social and environmental characteristics. Its determination will result from consultation and coordination between the economic, social and environmental assessment analysts on the contractor's team. The PIAS team will develop a method for exchanging information and for consulting on the area of influence of each road. Moreover, it will develop a method for making a combined judgement regarding determination of the RIZ. Some particular considerations which will be made in determining the RIZ of any given road segment will include the following.

Regarding economic impact: The institutional contractor will develop criteria for determining the economic impact for each proposed road segment. Such criteria shall take into account the key market centers with which the road links as well as market towns along its alignment. In this sense, economic impact could have a regional dimension. Major market centers might include cities such cities as Quelimane and even Beira. Major market centers are defined with respect to where the target population chooses to market its goods and services and with respect to where traders come from to buy and sell their goods and services. However, for the purpose of defining the RIZ a smaller area is required. It will take into account from how far away farmers come, by foot or other means, to the road segment to market their produce or to buy farm inputs and consumer goods. The farthest day-trip farmers make from both sides of the road segment will determine the extent of the RIZ. The major market centers should be plotted on a map to show the destinations the road provides linkage to.

Regarding social impact: The road impact zone for the social soundness analysis will be a more localized area in the sense that it will not follow the wider area identified for measuring economic impact. Techniques for defining the depth of the RIZ from this point of view would include rapid assessments at progressively greater distances from the road in which households would simply be asked where and how they gain access to needed services or make commercial transactions.

Regarding indirect environmental impact: The road segment should be plotted on a map to show both the road to be rehabilitated, and its feeder roads and trails. If information is available from the social or economic analyses or other sources to indicate where major markets are expected to develop or settlement changes are likely to occur, these should be sketched in as well. Areas of environmental significance should be added to the map, using data obtained from existing maps and other secondary sources. A site visit, including physical observation and interviews with local sources of data, should be made at the conclusion of the feasibility analysis

to update and verify the map. The map should be of a scale to show clearly where areas of potential concern are located, their size, distance from the road and feeder roads and trails, etc.

Determination of the RIZ will have to be done in the early stages of the feasibility analyses. This is because the identification of points for the gathering of baseline data will depend on that determination. Primary data gathering can't take place until the RIZ has been established. It will, therefore, have to be initially established on the basis of secondary information and perhaps adjusted during the initial site visits.

It is anticipated that the best and most generally consistent general demographic data on RAP road segments are available from district administrative posts. Consequently, road impact zones will be defined by and along district jurisdictional lines.

6. Interdisciplinary Skill Needs

The team of analysts used by the RAP/engineering institutional contractor and PIAS contractor conducting the feasibility analyses and baseline data gathering should be interdisciplinary. The specific skills needed on the team to carry out the data collection and economic, social and environmental studies are described below.

The common skills which either contractor should include on the team are:

- Team Leader/Development Planner/Monitoring and Evaluation Specialist with a graduate degree in economics, sociology, environment or a related field and having extensive field experience in Africa;

- Survey research specialist/statistician, with knowledge of survey research field methods including sampling and stratification methods for dwellings in rural settlements and working experience in rural Africa. (Individuals with this expertise and field experience in rural Mozambique are regularly employed by USAID PVOs and should be available to the institutional contractor.) and

- Data gathers/enumerators and field supervisors, familiar with the target areas -- local customs, tradition and dialect and in numbers which will be conditional on the sample size and the number of days allocated for the survey.

The economic feasibility studies require a mix of skills. Data gathering and data analysis to determine road rehabilitation and maintenance costs will require the services of a skilled road engineer. Data gathering and data manipulation to estimate vehicle operating costs and transportation costs require the services of an experienced transportation economist. Work related to assessing agricultural potential and the agricultural marketing systems requires the services of a skilled agricultural economist who is also able to estimate rural farm budgets.

The social soundness analyses will require an interdisciplinary team of researchers to implement the methodologies described in these guidelines. While survey staff may form a collective pool for the three assessments, the social soundness analyses would require a rural development expert and a sociologist/social scientist. These specialists should have between them skills and experience in the following.

- Rural sociology and gender relations
- Agricultural Economics/Farming Systems Research
- Rapid and/or Participative Rural Appraisal techniques.
- Implementation of Impact Assessments
- Empirical research and data gathering

For the environmental analyses it is imperative to include on the study team at least one person (ecologist, botanist, or forester) cognizant of the distinct vegetation types of the area and experienced in interpreting map and photographic data. The hierarchy of land uses and vegetation cover developed by DNFFB is sufficiently precise to define the universe of potential types; however, the true difficulty of applying a vegetative cover indicator lies in the expert judgment required to say of a particular area, "20 percent closed mountain forest, 40 percent partially closed mountain forest, 10 percent water bodies, 30 percent agriculture." The team leader should identify additional expertise required for the on-site studies during the preliminary mapping and secondary source exercise. This expertise will be specific to each area.

7. The Importance of Initial Baseline Data Gathering

The first iteration of PIAS baseline data gathering will set the entire context for subsequent impact monitoring data gathering. These guidelines are designed to achieve two fundamental purposes: first, to establish what results the Mission wants to monitor and, second, to insure, as much as possible, consistency and comparability in the results data that are gathered. They are broad enough to allow the IC to modify the details of PIAS based on the "reality" of the moment and on the best judgement of the IC, in consultation with the Mission. The final precision in indicator definition and exactness in data gathering methods will be established during the collection of baseline data for Year One roads.[1] All subsequent data gathering efforts must follow the methods and definitions used in the initial iteration.

Because the initial iteration of baseline data gathering methods is so important, the team designing these guidelines is making the following recommendations:

> The team responsible for designing the PIAS has traveled to and studied the Year One and portions of Year Two road alignments. Based on that study, a specific scope of work for baseline data gathering for those roads has been elaborated and is included as Attachment B to this report. **It is required that this scope of work, which provides as much precision as is possible for the collection of initial baseline data, be used by the IC and hence, the contractor selected by USAID/Mozambique to perform the impact monitoring.**
>
> As has been mentioned above, the way in which initial baseline data are gathered will establish the way in which subsequent baseline and monitoring data will be gathered. **It is mandatory, in order to insure comparability, that the institutional consultant**

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1 As of the writing of these guidelines, it is anticipated that initial baseline data gathering will be for Year One and Year Two roads, as shown in Exhibit 4 above.

document his data gathering methods and that they be attached to these guidelines for subsequent data gathering guidance.

There are several entities - PVOs and universities - currently working in Mozambique that have developed, tested and used similar data gathering techniques. These are referred to extensively in the guidelines to assist the contractor. **It is necessary that the institutional contractor use the highest standards of data gathering methods, including those referenced in these guidelines, for initial baseline data gathering.**

B. Economic Impact Assessment Methodology

1. Introduction

The following scope of work provides a methodological framework for assessing the economic feasibility of rehabilitating proposed road segments targeted under the Rural Access Project (RAP). It also defines analytical methods for assessing local and regional economic impacts induced by the rehabilitated roads. The economic feasibility analysis will serve as a screening device by which DNEP and USAID/Mozambique can screen out uneconomic road segments. In addition, it will provide criteria for prioritizing and scheduling road rehabilitations for maximum impact in USAID program focus areas.

2. Purpose

The purpose of the economic feasibility studies are to:

- define the road impact zone (RIZ);
- validate, for each proposed road segment, the development hypotheses, expected results and the indicators (both "generic" and "special") for measuring those results;
- identify and quantify the economic benefits expected from each road segment targeted for rehabilitation;
- identify and quantify the economic costs associated with the rehabilitation and maintenance of each proposed road segment;
- develop criteria and determine the economic viability of each road segment targeted for rehabilitation taking into account kilometers of road to be rehabilitated, the initial cost of rehabilitating the proposed road segment, and cost of routine and periodic road maintenance over a twenty year period;
- document the baseline and projected data for each indicator used in the economic viability studies of proposed road segments; and
- provide insights and recommendations for specific complimentary interventions to enhance/optimize the economic benefits derived from rehabilitated road segments and how they might be implemented. For example, in many rural areas. The availability of market information is very limited, there by undermining access to markets even after rehabilitation of a particular road segment. A recommendation of the economic feasibility study could be to expland market information services into the survey.

3. Identification of Economic Impact

The institutional contractor, based on literature search, document reviews and other local data sources shall identify and validate the direct and induced economic impacts from rehabilitation of proposed road segments. One method of defining the economic impacts emanating from rehabilitated road segments is to identify the beneficiaries. For example, the first level beneficiaries of any given road work are the local people employed on the road work. Where used, labor-intensive road work provides employment to more people and gives a boost to the local economy. The second level of beneficiaries include vehicle operators who benefit from reduced vehicle operating costs. The third level of beneficiaries are freight shippers, traders, farmers and passengers who benefit from lower transportation costs resulting from lower tariffs, shorter waiting time and shorter transit time. The road induced benefits include:

- increases in rural household productivity and incomes resulting from increased access to agricultural inputs, frequent visits from agricultural extension workers, frequent visits from wholesalers and itinerant traders and easier access to markets for production surpluses;

- expansion and intensification of rural small and microenterprise activities and employment; and

- availability of more and wider range of consumer goods and services.

While incomes from road work employment are immediate and savings on vehicle operating costs are realized immediately after the rehabilitation of the proposed road segments, decreases in freight and passenger transportation costs may depend, among other factors, on scale economies (tonnage of freight to be hauled and number of passengers to be transported) and competitiveness of the road transport sector. Induced benefits may have longer gestation periods -- two to three years or more. They also are dependent on other mitigating factors such as the host country=s legal and regulatory framework including policies on land use rights, business licensing[2] and the climate for private investment.

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[2] One of the constraints in rural markets is the absence of wholesalers and consolidators. This partly due to the onerous business licensing requirements. For example, as documented by a World Bank sponsored study: by Jonathan P. Coulter, Natural Resources Institute, Kent , England, @Maize Marketing and Pricing Study - Mozambique@, May 1995, the main types of traders involved in internal trade are wholesalers (grossistas) and retailers (retalhistas). To become a wholesaler a trader has to provide the following to the local office of the Ministry of Commerce:

- Certification from the Commercial and Land Registry
- Certification of a clean police record
- Certificate of literacy
- Bank statement showing balance of Mt 27 million ($3,375)
- Plan of installations accompanied by a written description including location plan
- Fiscal stamp for Mt 27,500 ($3.50)
- Declaration that the applicant is not a civil servant

On the other hand, economic costs are defined in terms of the cost of rehabilitation and maintaining the targeted road segment. These costs are determined by DNEP's rehabilitation and maintenance standards, degree of road deterioration, terrain, and usage.

4. Identification of the Road Impact Zone

For each road segment targeted for rehabilitation, the road impact zone (RIZ) is delineated in terms of the following criteria.

- The farthest day-trip farmers make, or could make, from both sides of the road segment, by foot or other means, to market their produce or to buy farm inputs and consumer goods.

- The first major market centers to which the target road segment provides linkage to. Major market centers are defined with respect to where the target population chooses to market its goods and services and with respect to where the majority of traders come from to buy from, and sell their goods and services to the local population. If smaller market centers are more than 20 km from the end of the road segment, the IC shall consult with USAID/Mozambique to identify appropriate boundaries of the RIZ.

5. Definition of Hypothesis, Indicators and Data Sources

The main purpose of the economic feasibility analysis is to develop the economic costs and economic benefits and test the development hypothesis that A Economic benefits from rehabilitation and maintenance of each targeted road segment exceed the economic costs of rehabilitation and maintenance.@ The RAP project was initiated on the hypothesis that rehabilitation of targeted rural road segments will reduce transportation costs, enhance access to output and input markets and stimulate agricultural production and productivity, encourage formation and development of rural commerce and industry and expand employment and income opportunities. Exhibit 5 contains the indicators of economic costs and benefits and the related data sources.

6. Decision Criteria

The institutional contractor shall use the following criteria for validating the development hypothesis:

- the Net Present Value (NPV) of the stream of net economic benefits;
- the Internal Rates of Return (IRR) of the stream of net economic benefits; and
- break-even vehicle traffic level for the net economic benefits.

In general, a positive NPV, whereby the stream of net economic benefits over a twenty year period adjusted for time value of money using appropriately determined discount rate or cost of capital, is an indicator of economic viability. Similarly, an IRR, the discount rate that reduces the net present value to zero or the discount rate that equates the discounted values of the stream of economic benefits with the discounted value of the stream of economic costs, greater than the cost of capital is an indicator of economic viability. A break-even vehicle traffic volume (a

vehicle traffic volume level that equates the stream of economic costs with the stream of economic benefits) significantly lower than the expected level of vehicle traffic volume on the proposed road segment is also a good indicator of economic viability.

7. Methodology and Tasks

The institutional contractor shall test the development hypothesis using the analytical methods and procedures suggested below. The assessment methodologies are iterative and are carried out in phases. For example, while increased vehicle traffic volume is an indicator of economic viability, it is also a key determinant of road rehabilitation and maintenance costs. As discussed below, vehicle traffic volume is projected using two alternative approaches. One approach is to take the baseline observation and increase the vehicle traffic volume by an assumed multiplier (e.g., 5%, 10% or 15% annual increases in vehicle traffic volume). DNEP should be consulted to determine the appropriate multiplier. Another approach is to project the expected freight (mainly marketed agricultural production surplus) and passenger traffic volume and to determine the required number of vehicles for carrying the estimated traffic volume.

a. Familiarization with Field Conditions

Through document review, site visits and interviews of various data sources, including farmers, traders, vehicle operators, community leaders and non-governmental organizations (NGOs) in the target area, the institutional contractor shall familiarize itself with local economic conditions, the agro-ecological environment, land tenure systems, availability of rural credit, government policies, regulations and procedures governing business licensing, taxes and fees, as well as with road conditions including roughness and terrain.

b. Identification of Economic Costs

The economic costs associated with targeted road segments relate to the work effort and material costs used in rehabilitation and maintenance of the proposed roadway. They may also include imputed costs related to inconveniences created, while the road is under rehabilitation/construction, to passengers, vehicle operators, farmer and traders. However, for purpose of this study, only costs of rehabilitation and maintenance are to be considered. The institutional contractor shall use DNEP's road rehabilitation and maintenance standards and the World Bank-sponsored, AHighway Design and Maintenance Standards Model (HDM-III)@, which is currently being fine-tuned by a Swedish consultant at DNEP, for estimating *the average cost of rehabilitation and maintenance per road-km* including bridge reconstruction, culvert and drainage work.

Through engineering surveys, consultations with DNEP engineers, road users and local community leaders and interviews with key data sources mentioned above, the institutional contractor shall first determine if current routing of the proposed road segment is appropriate and if there are preferred alternative routings. For example, the new road leading from Mutarara to Chire River, originally proposed for rehabilitation under RAP, is built on low lying land which is vulnerable to flooding during rainy seasons, as compared to the old site which is on higher ground. Second, the institutional contractor shall collect and develop appropriate input data for the HDM-III model.

The HDM-III model uses the terrain, soil, rainfall, geometric design, pavement design, DNEP's road rehabilitation standards, and unit cost assumptions in the estimation of rehabilitation costs per road-km. It uses road deterioration (road roughness) assumptions, DNEP's maintenance standards, and timing of maintenance to develop road maintenance costs per road-km. The main data collection instrument implemented by the IC shall be the Engineering Survey, which is conducted once for each proposed road segment.

c. Identification of Economic Benefits[3]

i. Vehicle Operating Cost Savings

The institutional contractor shall use the HDM-III model for determining *vehicle operating cost (VOC) savings per road-km* by type of vehicles using the proposed road segments. VOC is, in general, influenced by roughness of road surface, vehicle load, vehicle fleet age structure, horizontal and vertical alignment of the road, transit time, and normal vehicle speed, which in turn influence consumption of fuel and lubricants, wear and tear and mechanical break down. The VOC calculations shall be carried out for the set of vehicle types considered representative of the whole fleet of vehicles using the proposed road segment as observed during the Origin and Destination (ODS) traffic survey. The institutional contractor shall use road condition data used in estimating rehabilitation and maintenance costs supplemented by data gathered through the road transport sector market survey.

ii. Reductions in Freight and Passenger Transportation Costs

The institutional contractor shall develop analytical methodologies for determining reductions in freight and passenger transport costs induced by rehabilitation and maintenance of targeted road segments. Reductions in transportation costs arise from two sources -- cost reductions from reduced vehicle operation costs and cost savings from reduced losses from shorter waiting and transit time. Improvement of a route previously closed would also factor in if it shortens the distance compared to existing routes.

1. Reduction in Transport Cost Due to Lower VOC

The contractor shall determine how much of vehicle operating cost savings are expected to be reflected in reduced transportation cost for both passengers and freight along each proposed road segment. In general, the degree to which vehicle operating cost savings are passed along to freight shippers and passengers, among other factors, depends on the competitiveness of the road transport sector. In a non-competitive market savings from lower vehicle operating cost may not translate into lower freight and passenger transport costs. The institutional contractor shall determine the competitiveness of the transport sector from data gathered through the road users survey and analysis of what percent of road traffic is carried by the top two vehicle operators.

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3 The instruments and methodologies used for gathering the data sets used for estimating economic benefits are discussed in Section III, pages 66 to 82.

The IC can use the following assumptions as a rule of thumb. If the top two vehicle operators carry 80% of the road traffic, the IC should assume a zero percent reduction in transport costs from current levels. If, on the other hand, the top two vehicle operators carry less than 30% of road traffic, the IC should assume a 50% reduction. Guidance on data collection using the Road Transport Sector Market Survey is provided in Section III, pages 69 to 71.

2. Reduction in Transport Cost Due to Shorter Waiting and Transit Time

The benefits/savings from reduced damage and loss of goods and wages while waiting for transportation and while in transit can be significant for some crops -- perishables. The literature suggests that for African smallholder farmers, damages and loss from longer (four to seven weeks) waiting and transit time (two to four days) are approximately 2% to 5% of the total marketed surplus. The IC shall use this rate for adjusting the total transportation cost saving.

iii. Increases in Agricultural Productivity and Rural Household Incomes

The institutional contractor shall determine potential expansion in agricultural output and productivity within the road impact zone resulting from rehabilitation of the proposed road segment taking into account expansion of cultivated area and increases in yield for selected staple food and cash crops due to improved access to markets. The contractor shall project the expected increase in marketed agricultural produce. Marketed agricultural production is determined by changes in cultivated area (number of farmers times the average size of farm cultivated by each farmer), change in yield per hectare (by selected commodities), changes in per capita consumption of farm production. Guidance on data collection using the Rural Household Survey, Focus Group and Videography is provided in Section III, pages 71 through 79 for the Rural Household Survey and Focus group, and pages 80 through 82 for Videography.

For the purpose of this study, the institutional contractor shall assume that cultivated area will expand in direct proportion to the adult (marriage age and above) population growth rate.[4] The IC shall also assume a 10% yield growth rate for the first four years; a 7% yield growth rate for the subsequent three years, a 5% yield growth rate for the following three years, and zero yield growth rate thereafter from use of improved seeds.[5] These yield growth rates, although arbitrary, represent the rate of technology diffusion in Sub-Saharan African rural communities. The relationship between farm production and own consumption should be expected to change over time. In general, holding household size constant, as farm output goes up, the share of own consumption goes down once the household reaches 80% of the WHO recommended minimum average daily caloric intake (about 1800 k-cals for Mozambique).

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4 In the northern provinces, the average cultivated land area, (during 1993 - 1995) was reported as ranging from less than 1.0 ha to 3.5 ha per household.

5 Current estimates of average crop yield per hectare are very low -- maize about 390 kg/ha; sorghum 180 kg/ha; rice 150 kg/ha; millet 95 kg/ha; cowpeas 60 kg/ha; and peanuts 100 kg/ha.

Rehabilitated roads provide mobility to households to partake in employment and income opportunities resulting from expanding rural commercial and industrial activities. The institutional contractor shall estimate, using baseline data, household incomes from the various sources. Increases in agricultural production determine increases in farm income, assuming stable wholesale market prices. For example, if agricultural production goes up by 5%, the farm income should be assumed to increase by the same amount. Expansion in rural commercial and industrial activities and employment can be indexed to the growth rate in farm income (a measure of rural household purchasing power) and the population growth rate. And off-farm rural employment income can be based on the region's minimum wage rate.

iv. Increased Variety and Availability of Basic Consumer Goods

The institutional contractor shall determine the increase in volume, value and variety of consumer goods and marketed agricultural produce induced by decreases in transportation costs. An index of availability of basic consumer goods can be developed as a way of quantifying the increase in variety and volume.

d. Identification of the Appropriate Cost of Capital

The institutional contractor shall select an appropriate cost of capital in the Mozambique context. In general, the cost of capital is determined on the basis of the opportunity cost or alternative uses of funds available for road rehabilitation. Available funds, for example, could be used for paying off debt, expanding irrigation systems, health services and basic education. The World Bank, as recently as 1993, had suggested use of a 12% discount rate for development projects. However, if Mozambique were to borrow the funds from the international financial market it would have to pay interest rate of approximately 22%. The institutional contractor shall use a discount rate of 18% as both the hurdle rate and the discount rate for the stream of net economic benefits.

e. Determining Economic Viability

For each road segment targeted for rehabilitation, the institutional contractor shall apply decision criteria developed for assessing economic viability and make recommendations on whether or not the proposed road segment should be rehabilitated, and if so, to what standard. Here, a step-wise analysis is suggested. First, the contractor computes the stream of economic benefits as only the savings in vehicle operating costs, which is derived from the HDM-III model. The stream of economic benefits from vehicle operating cost savings is calculated as 0.5 times base year vehicle traffic volume plus the year (t) vehicle traffic volume times, the difference between base year VOC and year (t) VOC, times kms of road rehabilitated.

Second, the institutional contractor shall add the benefits accruing to freight shippers and passengers from lower transportation and shipping costs. The stream of economic benefits from lower transportation costs are calculated as the average of baseline freight traffic tonnage and year (t) freight traffic tonnage, times the year (t) change (from baseline) in freight transport cost per ton-km, plus the average of the baseline passenger traffic volume and the year (t) passenger traffic volume, times the change (from baseline) in passenger transport cost per passenger-km, times kms of road rehabilitated.

Third, the contractor shall add the induced increases in household incomes. The induced increase in household income is computed as the average of the baseline number of households and the year (t) number of households within the RIZ, times the year (t) change (from baseline) in rural household income.

8. Deliverables

The institutional contractor=s reports to USAID/Mozambique and DNEP shall include:

- Map of the road, its RIZ and key market centers lying outside of it;
- Analysis of the cost of rehabilitation and maintenance of each proposed road segment;
- Analysis of the direct and induced economic benefits from rehabilitation and maintenance of each proposed road segment;
- Analysis of the economic feasibility of the proposed road segments and the contractor=s recommendation on whether to go ahead with the rehabilitation, and if so, to what level, of each proposed road segment;
- Identification and documentation of additional indicators that have been added to the selected generic indicators of the baseline data;
- Analysis and contractor=s recommendations on needed interventions in order to significantly enhance the economic benefits from roads proposed for rehabilitation; and
- Baseline data for all indicators[6].

6 Baseline data will not be documented and archived if a road segment will not be rehabilitated.

C. Social Soundness Assessment Methodology

1. Introduction

The social soundness assessment study will serve to identify social impacts of potential road segments as part of a series of feasibility studies within the USAID Rural Access Project. The following scope of work will provide an analytical and methodological framework for the undertaking of these studies.

The purpose of the studies will be to demonstrate the suitability of proposed road locations. As well as acting as a screening process by which to focus indicator based and qualitative data collection for the baseline data set and ongoing monitoring operations, the studies will identify potential or predicted impacts. In this way the ability of the project to achieve positive impacts as contained in the RAP hypothesis or avoid negative consequences arising from the same will be clearly identified. Positive impacts include the ability of the target population to benefit from changes which are likely to be induced by road activity.

The assessment will:

1. Identify social impacts peculiar to each road segment
2. Develop hypotheses of induced change
3. Gather baseline social impact data for each road segment
4. Make an independent assessment (conclusion) of the social soundness of each road segment

The results of the work will inform decision making on selection of road segments, highlighting problems USAID should be aware of and recommending change or modification necessary.

2. Identification of Social Impacts

The RAP hypothesis which is outlined in Section I of this document should be taken as the starting point for identification of impacts and development of hypotheses. Taking the generic indicators contained in the PIAS as a base, the social soundness assessment will identify predictable impacts arising from the road activity. The type of social impact registered as a result of project activity will follow from one of the three following groups which represent initial branching of the RAP development hypothesis into streams of social impact:

- **!** change in income (direct and by proxy) farm and non-farm income, household expenditure, indices of wealth.

- **!** demographic/social change population, land holding size and security, migration, gender relations, nature and patterns of household labor, employment and access to information.

- **!** change in service access/infrastructure access to health facilities, schools.

Social impacts, and corresponding beneficiary groups, will be direct and indirect. Direct beneficiaries of impacts include the immediate population within the RIZ in general and individual occupational or livelihood categories in particular. This includes: households, small holder farmers, artisans, crafts producers and those participating as wage laborers in road

construction and maintenance. Direct impacts, as covered in the generic indicators, include income, non-farm employment, and proxies of household wealth. Indirect beneficiaries will include through traffic, transporters and those outside the RIZ benefiting from increases in commercial activity including millers, processors and urban groups benefiting from increased and more reliable food supplies. The assessment will identify any additional direct and indirect beneficiary groups.

3. Contextual Analysis of the RAP Roads

The social soundness assessment study will be an elaborative process, expanded as it progresses by available information. Initially the institutional contractor will formulate the hypotheses in outline. This should make extensive use of secondary sources, as described elsewhere in this document, where strong research and analysis is already available. To aid this process, the study will require that a well researched descriptive analysis of the area/road segment, be undertaken in the form of a contextual analysis.

The institutional contractor will conduct a review of available secondary sources to produce an understanding of the social, demographic characteristics of the roads. The resulting contextual analysis will be used to refine and expand the hypotheses providing narrative detail of current conditions and recent history of the area in terms of the following:

- patterns and extent of in/out migration during the war and subsequent resettlement with estimate of number/percentage of returnees, internally displaced;
- agro-ecological description/potential, common crops;
- presence of important local or regional markets;
- physical description of the road segment in question including topography.
- ethnography, forms of social organization;
- strategic or historical importance (or potential) of the area in general i.e.,: tradition of production and marketing of agricultural surplus, importance as a transport route linking parts of the country, economic activity, constraints to the realization of same;
- level and type of services available;
- presence / operation of Private Voluntary Organizations, government agencies or other development agents;
- type and description of livelihood activities, incomes;
- commercial activity in the area (formal and informal);
- patterns and extent of commercialization of agriculture;
- patterns of land holding;
- accessibility to markets, services, information; and
- the agricultural calendar.

The contextual analysis can be drafted by the contractor from available information prior to the initiation of field work and expanded upon subsequently. Several contributory data sources will be available for the writing of the foregoing analysis. In addition to secondary literature, this would include PVO personnel, key informants and direct observation. The contextual analysis should be in addition to, or synthesized with, a descriptive analysis of the information gained from the combined baseline data collection instruments implemented by the institutional contractor, (Infrastructure and Household Surveys, Focus Groups).

4. Construction of Hypotheses

A central element of the study is developing and testing assumptions of how and whether change will occur as a result of project activity. Drawing on the generic indicators which are illustrative of the processes of change inherent to the project, the institutional contractor will elaborate around them hypotheses based on an understanding of local level conditions gained, primarily from the contextual analysis. This will be an iterative process drawing upon the information and data gathered during the course of the study.

The basis of the RAP is the hypothesis that lack of road access, or the high cost of transport, causes isolation, market fragmentation, restricts access to service and information, inhibits agricultural expansion and income generating activities and encourages out-migration or discourages the return of displaced populations. The associated level of poverty and negative indicators of social well-being reflected in income, health and education are variables which are expected to improve over the life of the project due to its intervention. Clearer, site specific, detail of the state of these conditions and understanding of the degree to which they are amenable to change from RAP or other factors should be a tangible outcome of the study.

Critical assumptions about the variables should include identifying pre-conditions to the achievement of desired or expected outcomes. The presence, or lack, of complimentary inputs, services and conditions should be noted in explaining the status of commercial and livelihood activities, communities, and occupational groups. The resulting constraints analysis would have a number of uses: identifying to what degree opportunities created by the project can be capitalized upon; providing contextual information for the hypotheses; and identifying means by which positive impacts can be maximized. For example, the presence of road transport may be a necessary, but insufficient, condition for eliciting an agricultural supply response where intermediary services and infrastructure is not present. The existence of serious levels of food insecurity in parts of rural Mozambique is an obvious constraint on the ability of households to respond to market opportunities.

For the social soundness assessment, hypotheses relate to the three categories of social impact earlier identified: Income, Demographic/Social, Service Access/Infrastructure.

The income and employment indicators relate to the hypothesis that providing reliable all-weather road transport will expand market relations and thereby increase the scale and opportunities for income earning activities. Expected outcomes (impact) would be covered by direct and proxy indicators of increased household income. The assumption of improvement to income will be testable in the monitoring data concerning increased production and marketing of agricultural produce, development of non-farm income sources (livelihood activities and wage employment) and indirect impacts such as indices of household wealth and expenditures. Demographic/Social changes will relate to a broad group of indicators with a diverse range of causation. Some are illustrative of processes of commercial intensification (population density, size of land holding), qualitative change (gender disaggregated income, access to information, land security), or simply descriptive of demographic conditions and socio-cultural norms (land tenure, household roles). Improved road access can be expected to trigger intensification along the corridor with associated negative side affects. Competition for land and insecurity of tenure may increase while rates of STD's (sexually transmitted diseases) may rise due to increased through-traffic - a result for which ample precedent exists elsewhere in Africa. Increases in mobility from the road project will also be tracked from the perspective of changes to political participation and exposure.

For some indicators the line of causation with project activity may be indistinct or irrelevant in which case the indicators will be barometers of qualitative change or well being in their own right. A clear understanding of socio-cultural conditions and forms of organization and the conditions under which change may occur should arise from the indicators.

Service access / infrastructure indicators relate to physical change in number and type of facilities and use of the same. While both are tracked, change in the latter can be imputed to project activity; without physical increase in their number, the use of facilities will rise due to increased access.

Intervening Variables

The line of causation between the intervention (road access) and social impact variables will not be exclusive. The institutional contractor should attempt to identify anecdotally, and from secondary and baseline information and analysis, the affect of other sources of causation. While it will not be possible to disaggregate these other variables, the assessment should identify and describe them in some detail. For example, given the time investments necessary for agricultural re-integration, and clearing of land among returning populations, agricultural expansion and improvement to household income may proceed independently of (although be amplified by) RAP. Such processes should be clearly identified in the assessment and form part of the change hypotheses.

Where a weak linkage exists between intervention activity and indicators (and associated hypotheses) these should be noted. The tracking of indicators will serve an objective in their own right which provides contextual information for the project.

Indicator Selection

Assessing and verifying the applicability of the indicators will be achieved by preliminary research using secondary sources and, once field work has been initiated, by ground-truthing (observation and key informants) prior to the collection of baseline data. The generic indicators provide a basic scope of analysis. While a strong case would need to be made to de-select an indicator, the institutional contractor should readily identify additional indicators (or provide greater precision to existing ones) to more accurately capture the changes earmarked. Based on the results of initial research, the contractor should focus the scope of analysis, flagging areas of concern where necessary.

The institutional contractor can then proceed to the stage of baseline data collection once the utility of the indicators, and how they relate to the change hypotheses, is established.

Indicator Definitions

In collecting data on the generic indicators some level of re-definition by the institutional contractor will be allowable in establishing a workable means to access the information identified. Certain of the indicators are explanatory of complex social relations and may need to be disaggregated further to assess them accurately. While most indicators are self-explanatory, some clarification is provided for the following.

Adult Equivalent is intended to establish what number of children can be considered equivalent to adult agricultural labor and at what age they become active in agricultural labor. This is of use for the agricultural productivity yield per unit of labor (under the agricultural production heading) indicator. Similarly the **Roles of Family Members** indicator is needed to provide an understanding of household labor allocation patterns among family members, including division of tasks, type and control over income earning activities. Change in these indicators may come about through increased mobility. **Gender Relations in Household** will be tracked as a qualitative objective in its own right.

5. Field Data Gathering

Data collection instruments to be used by the institutional contractor for the social soundness assessment have been developed and are clearly specified and described in Section III of this document. Reference to them in Section III should be made for questions of methodology, implementation and coordination with the Economic and Environmental assessments of the PIAS. The instruments include: Infrastructure Survey, Household Survey, Focus Groups and methodology for delineating the RIZ. The Focus Group, which has particular import for the social soundness is described in somewhat more detail below.

Following the compiling and expansion of the hypotheses and contextual analysis in draft, site visits will next need to be made to delineate the RIZ in coordination with the Economic and Environmental analytical studies. Initial field work would gather information using the techniques of observation and key informants to validate and expand upon the draft hypotheses and indicators with existing (or new) indicators of particular importance focused for further enquiry.

Following the consolidation of available information, the social soundness study should proceed to the stage of preparation and implementation of the baseline data collection instruments. In sequence this would include the Infrastructure Survey, Household Survey and Focus Groups. A list of hypotheses and corresponding data sources is contained in Exhibit 6 on the following page.

The drafting of the questionnaires and areas of research will be informed by the hypotheses which have been developed and should be coordinated with the economic and environmental assessments.

Focus Groups

The social soundness analysis makes particular use of the Focus Group information gathering methodology. Concurrent to the assessment, an exercise will be undertaken to access community perceptions. The implementation of the Focus Groups, a qualitative instrument particular to the Social Soundness Analysis, should draw from the hypotheses and the results of the Household Survey in order to both fill information gaps not covered elsewhere and follow up particular areas of enquiry. The Focus Group would cover needs ranking, hindrance to livelihoods, and perceptions of how the road project features in these concerns. In addition to qualitative information, quantitative data on income will be collected and tracked for the PIAS. The focus group would involve representative occupational groups and track perceptions and conditions in the community. This extractive technique should provide contextual information to guide the hypotheses of the social soundness assessment as well as being an interpretative information

source for ongoing monitoring which facilitates explanation of the processes of change within communities. The focus group will provide an opportunity to access local knowledge regarding the alignment of the roads and other aspects of the project.

Exhibit 6: Hypotheses and Data Sources

Indicators	Data Sources
Household and Family Demographic	
Hypothesis:: Affects of road access will include intensification of land use inside RIZ	
Population density	! Socio-Economic Profile Survey ! Videography
Size of land holding by family unit	! Household Survey ! Videography
Land tenure security and current status	! Household Survey ! Focus Groups
Population	! Socio-Economic Profile Survey / Key ! Informants
Hypothesis:: Road access will stem out-migration/stimulate in-migration	
Migration to/from larger towns	! Household Survey ! Focus Groups
Explanatory Indicators	
Gender disaggregated	! Household Survey ! Focus Groups
Average household size	! Household Survey
Adult equivalent disaggregated	! Household Survey
Roles of family members/ Labor allocation and agricultural calendar	! Household Survey
Gender relations in household	! Household Survey
Income and Employment	
Hypothesis:: Benefits of Road Access will include an increase in income in RIZ	
Average real household income (disaggregated by gender)	! Household Survey ! Focus Group
Average real household expenditures	! Household Survey
Off-farm employment and income	! Household Survey
Household assets, possessions	! Household Survey
Health	
Hypothesis:: Benefits of road access will include an increase in access to health care.	
Number of health facilities	! Socio-Economic Profile Survey
Average travel time to health facilities	! Household Survey
Population per health facility	! Socio-Economic Profile Survey ! RIZ delineation
Number of visits to health facilities/towns by health practitioners	! Household Survey
Population per health practitioner	! Household Survey
Availability of basic medicines	! Socio-Economic Profile Survey
Hypothesis:: Dis-benefits of road access could include.	
Incidence of land tenure insecurity, smuggling, STD or prostitution within the RIZ increases	! Socio-Economic Profile Survey
Education	

Hypothesis:: Benefits of Road access will include an increase in access to Education	
School Enrollment	**!** Socio-Economic Profile Survey **!** Household Survey
POLITICAL PARTICIPATION	
Hypothesis: Access to information and participation, or exposure, to the political process increases.	
National political leaders	**!** Key Informants **!** Focus Groups
Local political leaders	**!** Focus Groups
Amount of political information received	**!** Household survey
Sources of Political Information	**!** Household survey **!** Focus Groups

6. Analysis of Results

The information gathered and processed through the data collection instruments should be synthesized, evaluating the hypotheses and conclusions reached about the expected social soundness of the proposed road activity. The study results will not test the hypotheses but, where a positive recommendation on social soundness impact is made, they will be archived with the baseline data set for testing in subsequent data collection and impact monitoring. Analysis of the results will evaluate reasonable predictions of change as defined in the hypotheses.

In an analytical summary drawing upon all available information, an overall assessment of the suitability (social soundness) of the proposed road activity should be made based upon the net expected benefits, capacity to maximize positive potential impacts and identification of potential negative consequences. The conclusion should draw upon the hypotheses developed, and evaluate to what extent the project may prove them. Criteria include what constraints exist to the achievement of positive social impacts outlined in the indicators and to what degree they are amenable to change through the road project. Potentially negative consequences which have been identified by the research will need to be clearly defined, evaluated and mitigation measures recommended.

The primary basis for determining a road's social soundness will be that opportunities are created by the project to which beneficiary groups have a reasonable chance to respond. Intermediary factors which obstruct or hinder the achievement of the indicator based hypotheses will be clearly identified. Customer perceptions, priorities, ability to benefit, and suitability of the proposed road alignment should be evaluated in the conclusions of the social soundness assessment.

7. Deliverables

Deliverables from the social soundness assessment to include a final report in hard copy and diskette (word perfect) making use of all consolidated information sources with sub-sections on the following:

- statement of the hypotheses developed and to be tested in relation to site-specific conditions in the RIZ as uncovered by the research;
- description of conditions in the project area including recent history, livelihood patterns, demographic conditions, socio-cultural norms, gender and household relations;
- estimate of projected impacts and their expected magnitude;
- constraints analysis assessing the factors which will impact on the ability of the intervention to achieve intended results including intervening variables and mitigative actions which can be considered;
- presentation of the baseline data set with accompanying analysis; and
- delineation and explanation of the RIZ.

Main report to be supplemented with annexes such as the following illustrative examples:

- statement and explanation of methodologies and instruments used;
- list and explanation of any additions to the generic indicators;
- list of organizations/ people consulted;
- number, duration of field trips;
- household survey results ;
- infrastructure survey results;
- focus group results with identification of individuals to be monitored; and
- photographs / video of focus groups.

D. Indirect Environmental Impact Assessment

1. Background

The methodology for analytical studies as applied to indirect environmental impacts covers the three-phase process included in the Environmental Analysis contained in the RAP Project Paper (PP). That process of phased environmental analyses, developed by the Mission Environmental Advisor (MEA) with the assistance of the Regional Environmental Advisor (REA), and approved by the Bureau Environmental Officer (BEO), is consistent with requirements of USAID environmental regulations (22 CFR Part 216, also known as Reg 16). The main steps of the review process which comprise the analytical studies are presented below. (For further information, consult the PP.)

USAID has prepared the ESF (Attachment C) to guide the first phase of the review process. DNEP staff, with the assistance of the IC, will complete the ESF for each road segment under consideration for rehabilitation. During preparation of the ESF, it will be critical for preparers to understand that if the answer to any question is unknown, some effort to obtain available information and/or to consult with other government agencies, researchers or other knowledgeable individuals should be undertaken or the lack of information may result in the need for further environmental analysis. DNEP staff will be trained in how the forms are to be completed and how information is to be sought. For example, if no adverse impacts are anticipated , the preparer will be expected to document why; conversely, if adverse impacts are anticipated, the preparer will be expected to indicate what mitigative measures can be employed to avoid or reduce such impacts. These might be routine mitigative measures often associated with road rehabilitation, which would follow the standardized procedures discussed in the RAP PP, or they might be more specialized and require further environmental (and/or engineering) analysis.

During reconnaissance and with the possible assistance of a local expert, locations that are environmentally unique, unusual or especially sensitive and worthy of protection may be identified. Examples might be a significant wildlife habitat, a critical part of a watershed, an undegraded or dense forest, a significant wetland or the like. Considering the somewhat unusual nature of this road rehabilitation project, in areas from which population has fled but is expected to return, opportunities to encourage and pursue sustainable land use planning should not be ignored. Any areas of this type will be flagged for further study to determine what levels of protection from development would be suitable, as noted below.

Reviewers of a completed ESF for a particular road rehabilitation will include: the MEA, who will determine completeness of the ESF, review, agree/revise and/or do scope for follow-on analyses, if any, and approve; the REA and/or Regional Environmental Officer (REO), who will be sent an information copy; and MICOA, who will review only, in an advisory capacity. The Mission will impose specified time periods (with extensions to accommodate circumstances) during which review of the ESF must be completed and during which MEA will approve and REO/REA will concur, if needed. It is advisable to set a specific time period in which the ESF is examined sufficiently to find that it is incomplete, e.g. return to DNEP within 30 days with instructions to complete.

The results of review of a completed ESF are anticipated to be one of the following outcomes:

1) Road rehabilitation segment is approved to proceed, as no significant adverse environmental impacts are predicted, there are no unanswered questions regarding impacts, and mitigation and monitoring techniques will be of the type routinely associated with road rehabilitation; or

2) Road rehabilitation segment is approved to proceed into the next study stage with a Focused Environmental Analysis (FEA), either to investigate the issues surrounding unknown impacts or potentially adverse impacts of which the extent and severity are indeterminate, and/or to formulate mitigative measures specific to the road segment and devise appropriate monitoring procedures; such focused environmental analysis will be conducted at the same time that the economic and social soundness analyses are undertaken; or

3) Road rehabilitation segment is deemed to have potential, significant adverse environmental impacts and an Environmental Assessment (EA) pursuant to USAID Regulation 216 will be conducted; or

4) USAID/Mozambique will choose, based upon the results of the review, not to fund that particular rehabilitation, whether because of the types of impacts that trigger the EA or because of other environmental concerns revealed during the review.

In the event of outcome #1, no further environmental analysis will be necessary. Requirements for routine mitigative measures associated with construction-related direct environmental impacts will be incorporated into bid solicitations, specifications and construction contracts, as described in the Environmental Analysis. Monitoring of direct environmental impacts, and mitigation measures identified to address them, will be the responsibility of the IC. Given the nature of the impacts, standard civil engineering mitigative measures and monitoring will suffice, but special procedures will be developed if unique direct impacts are identified. All special mitigation measures and monitoring procedures will be reviewed by the MEA, the REO/REA, and Regional Engineer to ensure that they are appropriate and adequately thought out.

In the event of outcome #2, FEA procedures described in Section 4.2.2 of the Environmental Analysis will be followed. In the event of outcome #3, EA procedures described in Section 4.2.3 of the Analysis will be followed and notification will be made in accordance with 22 CFR 216.3(a)(9) that new information has become available. In the event of outcome #4, no follow-up is necessary.

If, after the completion of a FEA, the recommendation is to proceed, the results of the FEA will establish baseline data for the areas of concern requiring long-term monitoring, and establish a timetable for the gathering of monitoring data. If the recommendation is to carry out a full-scale EA, and the EA resulted in a recommendation to proceed, then the baseline data set for long-term monitoring would be established by the EA. If the environmental review is completed with the results of the ESF, then, since the review concluded there would be no significant indirect environmental impacts, no long-term environmental monitoring is required.

The methodology presented below expands the environmental review process by defining the road's area of impact as the area made accessible by the road, as opposed to a somewhat arbitrary one, two, or five kilometers on either side. It explicitly requires consideration of impacts that may follow road rehabilitation indirectly and over relatively long periods. Indirect impacts can be defined as the environmental outcomes, positive or negative, resulting from intermediate or longer-term changes attributable to road rehabilitation. Unlike direct impacts, some indirect impacts can result in design and/or routing changes, significant mitigation measures, or in even de-selection of a particular road segment,. The same kinds of areas that pose special concerns relative to impacts of the rehabilitation and operation of the road itself may be affected over a wider area, over the long term, as the road's changes in markets and commerce, settlement patterns, and agricultural practices. If any of these areas -- habitat of species of special concern[7], undegraded (primary) natural forests, or protected areas -- may be threatened, the environmental review must include a FEA of the probable impacts and potential mitigation, which may conclude in a recommendation for a full-scale EA.

During the first phase of the analytical study (identification of potential areas of concern, if any, through the ESF), the investigations required to determine potential direct and indirect environmental impacts should form a seamless web and be carried out together. This is essentially a mapping exercise, as described below. With this phase completed, the resulting map and ESF questions relevant to most of the direct impacts of construction and operation can be handed off to the engineering personnel of DNEP and the IC, while the continuing analytic study, the FEA and possibly EA, concentrates on responding to concerns arising from potential indirect impacts.

Most indirect environmental impacts will result from three categories of intermediate changes: improved access (both to markets and to formerly inaccessible areas), changes in population and settlement patterns, and changes in land use patterns, particularly agricultural uses. The literature search, interviews, and site visits that led to this conclusion suggest that the major areas of concern are as follows:

- Deforestation (particularly of primary tropical forests, but also cumulative) that may result from logging, conversion of forest lands to agriculture, or cutting for fuelwood and charcoal;

- Further reduction of wildlife populations already devastated by war and poaching, that may result from denser settlements in wildlife areas, loss of habitat,

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7 Defined by law as "endangered, threatened, rare, or endemic." Unfortunately, the current state of information on Mozambique's flora and fauna does not permit a precise elaboration of what these are. At a minimum, any list would include species known to be globally threatened (DNFFB identifies Mozambique's endangered species as rhinoceros, zebra, cheetah, waterbuck, wildebeest, giraffe, ostrich, wild dog). Given the number of institutions and projects currently collecting data on flora and fauna, a more comprehensive list can be expected to develop, and investigators doing analytical studies should make consultations on this subject part of their methodology.

destruction of wildlife for food or trade, or because of human-wildlife conflicts such as depredation of crops and livestock; and,

- Soil depletion and erosion, siltation and pollution that may result from changes in cropping patterns, or bringing unsuitable lands into production.

Beneficial environmental impacts that might be associated with road rehabilitation include increased tourism and hence economic benefits to protected areas and surrounding communities, and the adoption of beneficial agricultural technologies (agroforestry, terracing and soil conservation, tree planting, etc.) that might come with increased access to markets, higher value crops, and better coverage by extension workers.

The full list of hypotheses about cause-and-effect relationships leading to potential indirect environmental impacts is included as Attachment D. Based on these hypotheses, a set of indicators was selected for monitoring of impacts following the road rehabilitation. These form the environmental "core" of the Project Impact Assessment System (PIAS). The final phase of the analytic study to be carried out prior to construction (assuming that the recommendation is to proceed) is selection of the PIAS indicators applicable to the road segment in question, identification of other indicators based on the findings of the FEA and EA, if conducted, that may be appropriate for long-term monitoring, and collection of baseline data on those indicators.

The analytic study should be carried out with reference to the entire road (i.e., in the case of Year 2 roads, covering the entire length from Gorongosa to Caia and not separated into segments). A negative determination (no serious adverse impacts likely) would relieve USAID and DNEP from responsibility to undertake mitigation measures since there are no serious impacts foreseen to mitigate. Although there would be no mitigation measures to monitor the effectiveness of, the long-term socio-economic monitoring effort associated with all road segments should "keep an eye out" for the emergence of unforeseen indirect environmental impacts; for example, unexpectedly significant population movement into an area which began to result in significant deforestation. Of course, a negative determination with conditions, or a positive determination would clearly place responsibility upon USAID and DNEP to both attempt to mitigate potential impacts and monitor the success of those efforts.

2. Purpose

The purposes of the environmental review is to:

- in the context of the ESF exercise, define the road segment's area of influence, taking into account its "watershed" of feeder roads and trails, and areas where new ones may develop;

- identify sites within the area of influence of the road segment proposed for rehabilitation where special concerns exist, e.g., protected areas, rare or threatened wildlife and their habitat, relatively undegraded natural forest, etc.;

- upon identification of any such sites, target such areas for monitoring based on the ESF, or where appropriate, conduct a FEA to identify probable impacts, likelihood, degree of severity, etc.;

- provide insights and specific recommendations on how potentially adverse impacts might be mitigated, with sufficient detail so that any required mitigation costs can be included in cost-benefit analyses of the road segment in question;

- arrive at a finding as to whether the road segment can be constructed without serious adverse impacts to the identified areas, with or without specified mitigation activities. If no such finding is possible, a full scale EA is to be undertaken if another road routing is not selected;

- establish, for each road segment, the indicators and monitoring activities that will be employed to track indirect environmental impacts (and by extension the effect of mitigation measures), encompassing all applicable generic indicators that are part of the PIAS as well as any special indicators uniquely applicable to the road segment in question; and,

- document the baseline status of each indicator.

3. Methodology

a. Identification of Areas of Concern

Areas of environmental significance should be added to the map, using data obtained from existing maps and other secondary sources. A site visit, including physical observation and interviews with local sources of data, should be made at the conclusion of initial data gathering to update and verify the map, as well as to continue the study as described in the following section. Delineation of the RIZ and coordination with the social soundness and economic assessments is described in Section III of this document.
The map should be of a scale to show clearly where areas of potential concern are located, their size, distance from the road and feeder roads and trails, etc. The information should be presented as a single master map, with overlays if necessary to show detail.

Analysis of map data will identify where in the area of influence there are reasons to be concerned about potentially adverse indirect impacts. The areas of concern, as identified on the ESF, include: *protected areas, *forest reserves, *relatively undegraded forests, *endangered, threatened, rare, or endemic species, *significant wetlands, *herds of game animals, landslide or subsidence-prone land, *steep slopes, aquifers and recharge areas, flood-prone areas, drinking water supplies, culturally significant areas, *protected areas or areas deemed to merit protection. Those marked * are the types of areas or conditions likely to be subject to indirect impacts, and should be marked wherever they exist within the road's area of influence, or where the area of influence cannot be determined, for approximately 15 kilometers on either side of the road, and a day's walk (35 kilometers) down any existing feeder road.

Sources of information for the mapping phase include those on the following page.

Factor	Sources for base maps/information	Comments
Vegetative cover	Direccao Nacional de Geografia e Cadastro	Has remote sensing center with GIS and satellite image interpretation capability. Has aerial photos (old) for entire country, recent (post 1990) for selected areas.
	Direccao Nacional de Florestas e Fauna Bravia	Has vegetative cover maps at various scales
Land use	Institutos de Planeamento Fisico (national & provincial), Desenvolvimento Rural	Planeamento Fisico is preparing a master plan for Gorongosa District and collecting much potentially useful baseline data
	DNFFB/FAO	FAO technical advisors have assisted with analysis of land use via comparison of satellite images 1970-3 and 1990-1. Forestry Inventory Department in DNFFB
Soil types	Instituto Nacional de Investigacao Agronomica (INIA)	Has soil maps at 1:250,000 for entire country, 1:50,000 for selected areas. Note that for purposes of environmental analysis, it is not necessary to map all soil types, merely those most vulnerable to environmental impacts (i.e. marginal and fragile types not suitable for dense settlement, intensive agriculture). Requires some additional technical expertise to define.
Wildlife habitat	Mozambique: The Present Environmental Situation	Very general national map. May also be inferred from vegetative cover.

Wildlife occurrence		This information will have to be constructed from consultations with experts, best guesses, and local knowledge. IUCN surveys will be useful in Gorongosa area.
Protected areas	DNFFB, IUCN, FAO all have maps	
Population and settlements		
Surface water	various	Should pick up (a) bodies important to wildlife, particularly seasonal watering areas, and (b) potential for recreation/tourism or other economic uses.

Upon completion of the mapping phase, the ESF work should be undertaken in regards to both an analysis of direct impacts from construction,[8] and analysis of potential indirect impacts. The ESF may identify environmental conditions which have a bearing on direct construction impacts, e.g., the presence of wetlands, in which case the findings will subsequently be used by the engineers in the design of the road segment, if construction of the road in question is approved. However, the FEA and EA methodology described below refers overwhelmingly to indirect impacts associated with road construction.

b. On-site Environmental Screening

The site visit will serve to "ground-truth" the identification of areas of concern uncovered during preliminary analysis; to identify the need for focused analysis in those areas of concern, either if the need was flagged during the mapping step or determined as a result of the site visit; and in general, to provide the information and early analysis necessary to arrive at a finding (whether

8 Environmental impact analysis of direct impacts of construction and operation should be analyzed following, as nearly as possible, the procedures established for ROCS-2 roads. Although detailed analysis of the draft guidelines submitted by SWECO was not possible during the course of this assignment (and indeed, is relevant primarily to the contractor analyzing direct impacts only), the guidelines are said to conform with typical environmental impact assessment procedures and are likely to be consistent with USAID procedures.

serious adverse impacts are likely to result from rehabilitation), and in the case of direct impacts, recommendations for prevention or mitigation of foreseen adverse impacts. Although it is anticipated that the ESF will be conducted solely by DNEP and the IC, data gathered during preliminary analysis may have identified a need to contract specialized technical experts (wildlife biologists, foresters, etc.), who would join DNEP and the IC for the field screening.

During the site visit, the team should complete the relevant sections of the ESF with reference to the base map, which will be updated as the visit proceeds. The site visit should include an overflight of the road segment in question, including any potential alternative routes; aerial photography or videography during the overflight; driving all accessible sections of the road for physical inspection; and interviews with local authorities and residents, PVOs, donors, and others working in the area. To reiterate, during the screening phase, the main concern is to identify any possible impacts which could occur in areas identified as sensitive. Comments on the methodologies to be employed can be found in section (4), below.

If the site visit produces evidence that there is potential for adverse impacts to species of concern, migratory wildlife, or undegraded forest, the team should proceed to conduct a FEA in the affected area, or recommend a full scale EA if warranted. There may be cases that while a FEA is not warranted, concerns about specialized impacts could result in identification of areas to be monitored. For example, the ESF might identify locations of likely truck stops along the route which should be monitored for soil and water contamination from vehicle fuel and lubricant linkage and/or discard. The ESF could also recommend potential mitigative actions should adverse impacts begin to appear during monitoring.

c. Focused Environmental Analysis

The FEA will be the second stage of the environmental review process in any case where the screening indicates potentially serious adverse impacts, or that information is lacking which would discount such a possibility. The objective of the FEA is to follow-up on questions and issues raised in the ESF process. In some cases, the analysis will focus largely on specific mitigative measures in order to avoid, reduce or compensate for negative environmental impacts as well as specific or specialized monitoring techniques, where mitigative measures need to be examined periodically or where monitoring is desired, because the particular extent of some impacts depends on unknown and uncontrollable factors. In other cases, the analysis will focus on specific issues, which need to be investigated in greater detail. For example, if the possibility of affecting rare or endangered species cannot be ruled out at the ESF stage or an expert determination of "undegraded tropical forest" is needed, the FEA would focus on those issues. In all cases, however, the FEA will address specific mitigative measures and monitoring needs that might be specific to a particular road segment.

Assuming that the issues were identified during the ESF procedure, that the MEA has approved the ESF, including the appropriate scope of issues to be addressed, the components of the FEA will have been specified. If the issues to be addressed are largely engineering-related mitigative measures and monitoring for portions or all of a road rehabilitation segment, then it will be appropriate for DNEP with the IC to pursue and complete the analysis. If, however, one or more of the issues to be addressed deals with a specialized, environmental topic, e.g. forest

composition, wildlife habitat, mangrove impacts or the like, then it is possible that DNEP and/or IC will not have the appropriate expertise. Thus, university experts or researchers or consultants would need to be contracted to perform such analyses; maximum use of expertise available in Mozambique or the region will be made in order to strengthen the capacity for performing such analyses. Such consultants will be contracted by USAID on behalf of DNEP.

Specially contracted environmental experts will need to work closely with DNEP and the IC in the development of mitigative measures to ensure that they are feasible and cost-effective; the IC will be expected to play a key role in bringing the experts together as a team so that appropriate solutions can be formulated. Similarly, monitoring procedures will need to be realistic and feasible as well as targeted. The Mission will utilize the resources of the REO/ REA to assist the team with the development of mitigative measures and monitoring procedures on those roads which are analyzed in the first year(s) of the project.

The format and basic contents of the focused environmental analysis will be standardized. DNEP with the IC will provide an outline of the analysis to the MEA and the REO/REA, who will review and approve the format for use. A preliminary outline for the FEA follows.

- Background

- Description of Road Rehabilitation Activity

- Scope of Issues Addressed and Why - The area affected and the concerns raised based on results of the ESF phase of the environmental review, including for each issue:

C The nature of the potentially affected area, what species, habitats, or other physical features it encompasses.
C The nature and source of potential threats, and how these threats might be created or exacerbated by road rehabilitation.
C The degree of impact that might occur, and the likelihood of its occurrence. Would it occur even if the road were not rehabilitated?
C If adverse impacts are foreseen, what preventive or mitigative measures could be taken? This question should be answered in sufficient detail to allow calculation of the cost of prevention or mitigation.

- Rehabilitation Construction-Phase, i.e., Direct Impacts
  Mitigative Measures
  Monitoring Procedures

- Long-Term Operational Impacts
  Indirect/Induced Impacts
  Mitigative Measures
  Monitoring Procedures

- Opportunities to Protect Unique/Fragile/Sensitive Areas with Sustainable Land Use Planning

- Summary of Mitigative Measures

- Defining the Long-Term Monitoring Framework and Procedures

In general, the indicators to be monitored are those contained in Exhibit 5 above. The FEA should refine this list, noting any that are inappropriate to the segment in question, and adding any that may be important to this site but are not contained in the generic list. For any indicator added to the list, definitions, units of measure, and sources of data should be indicated.

One example of the types of indicators that may be specific to a particular area is monitoring of impacts to protected areas, where those occur. Although the generic PIAS indicators do not include sub-categories of indicators for incursions into protected areas, in cases where such indicators might be appropriate, the following are suggested.

Habitation	Number of dwelling units inside area
Roads	Number and length of roads inside area (check official sources to exclude official area roads)
Cutting, clearing	Map location and estimate size of many cleared area

- Establishing The Timetable for Future Monitoring

Because indirect environmental impacts follow social and economic impacts of road rehabilitation, it will be necessary to establish monitoring plans with both geographic and time dimensions defined precisely. The geographic dimension encompasses two main considerations. One, the "following" nature makes it reasonable to look for environmental impacts mainly in areas where intermediate variations have occurred. Two, some indicators of environmental change are relevant only in certain areas. For example, the conversion of vegetation to agricultural use is, in many areas, environmentally neutral in and of itself. Unless the natural vegetation is significant as natural forest, wildlife habitat, is erosion-prone, or otherwise sensitive, conversion itself is not an indicator of environmental impact until other factors come into play.

Therefore, the plan for monitoring should identify locations (the areas of concern highlighted in the preliminary screening) and approximate time frames where environmental impacts are expected and relevant. In general, impacts dependent on improved access could be expected to begin to appear as soon as a road was completed, while impacts dependent on social and economic factors (population and settlement, agricultural patterns) would be expected to lag for at least a year. The environmental analysis team must be well coordinated with social and economic analysts to coordinate with plans for monitoring of social and economic variables in order to guarantee that these plans, particularly in the sample selection phase, are geared to pick up the occurrence of intervening variables in areas of environmental concern. In some cases, over-sampling of environmental priority areas will be required.

- Collecting Monitoring Baseline Data

Having identified areas of concern in which impacts should be monitored, and defined the indicators to be monitored, the team will proceed with gathering baseline data. A full description of the baseline data collection instruments to be used under the PIAS, in coordination with the social soundness and economic assessments is contained in Section III of this document.

Some baseline data will already have been captured in the mapping exercise (i.e. hectares of existing primary tropical forest, hectares of significant wetlands and other natural habitats, protected area extent and location, extent of erodible land, extent of land occupied by human settlements). Data on levels of commerce in forest products, tourism, subsistence consumption of forest and wildlife products, wildlife depredation, protected area incursions, soil erosion, etc. should be recorded, when required, in the most appropriate format. (See Exhibit 5 above which includes the PIAS indirect environmental impact indicators.)

Standard definitions, units of measure, and data collection methodologies will be applied for all "generic" (PIAS) indicators. Site-specific issues may be addressed as locally appropriate, although use of standard methodologies and data that can be aggregated with that from other areas is encouraged. Maps should follow standard categorizations such as the Department of Agriculture's hierarchy of land uses and vegetative types (cited in Winrock/EPAT report), and soil types as classified by INIA.

- Preparation of finding/recommendations

Based on the above analysis, the analytical study will conclude with a finding as to whether the road segment can be rehabilitated without significant adverse environmental impacts, either with or without mitigative measures. If the latter are required, the findings should highlight their nature. If such a finding is not possible, a full scale EA must be recommended.

DNEP, the IC, MEA and REO/REA will re-examine the FEA format after the first few studies are completed to determine if format modifications or revisions are needed.

4. Comments on methods for data collection

i. Observation

Physical observation of the route of the road segment in question should include an overflight, preferably with videography keyed to GPS latitude-longitude coding, and on-the-ground transit of the section. Videography during overflights offers the opportunity for later and repeated examination and interpretation by skilled professionals of segments where questions arise. This is particularly important when the need for skilled interpretation becomes apparent as the analytical study proceeds. For road segments with a large RIZ, satellite imagery may be more cost effective and practical than videography.

For those road segments in which the environmental review has identified increased use of wold products as a potential impact, market observation and surveys should record the wild plant and animal products offered for sale in local markets served by the road segment, by volume (total plant products, animal products by species and type of product, e.g. meat, skin, craft product with animal component). The detailed methodology is described in the PIAS, "Rural Commerce and Industry Survey."

ii. Other primary sources

Household Surveys (see PIAS, "Rural Household and Income Production Survey") should include questions designed to elicit information about the following environmental indicators:

- Consumption of wood for building materials, fuelwood, and charcoal (by volume, per household);
- Consumption of wild animals for food and subsistence (number of animals, by species);
- Approximate land area converted for cultivation per family per year. The definition of conversion is cutting, burning, tilling, draining, filling, or otherwise altering natural vegetation or wetland areas; and,
- Incidence of wildlife depredation of crops or livestock. Include number of wildlife destroyed by species during the past 12 months.

Vehicle Origin and Destination Surveys should include questions designed to elicit information about the following indicator:

- Volume of timber transported along road.

iii. Secondary sources

Both maps and tabular data should be reviewed with local authorities, donors, and PVOs working in the area, who are a rich source of local knowledge both to fill in gaps and to provide supplemental data and insights to cause-and-effect relationships.

5. Deliverables

The analytic study team's report should consist of:

- Completed Environmental Screening Form; (See Attachment C)
- Map of the road, its area of influence, and location of areas of concern;
- List of areas requiring focused analyses;
- Focused Environmental Analysis reports for the above. These should be narrative reports beginning with a description of the concerns identified, and the assessment questions, summarizing the assessment findings, and in particular that a particular road rehabilitation requires EA, and listing any recommendations;
- Table of indicators for long term monitoring, with definitions, units of measure, and sources of data identified;

- Baseline data on the selected indicators, in the appropriate format; and,
- Timetable or recommendations for future monitoring.

6. Conclusions

USAID is concerned with the direct and indirect environmental impacts of rural road rehabilitation -- not only in the sense of monitoring impacts as they occur, but also proactively seeking to identify, prevent, and mitigate environmental degradation that might occur. USAID has a particular charge, based on Sections 118 and 119 of the Foreign Assistance Act, to endeavor to protect tropical forests, tree cover and, and biological diversity and a stautory obligation not to take any action that would significantly degrade protected areas, or introduce exotic species into such areas. The preservation of animal and plant species through the protection of wildlife habitats is an important objective of U.S. development assistance.

Although the indicators included in this methodology touch on various human-environment interactions that will determine the ultimate impact of the road, one "super-indicator" would serve as a measure of the environmental impact of road rehabilitation: changes in vegetative cover within the "watershed" of the road. The importance of this indicator cannot be overstated. Vegetative cover analysis will pick up the status of forest cover; wildlife habitat (and loss of habitat is the single most important factor leading to endangerment); conversions to agriculture; and most if not all of the other environmental concerns. So it is recommended that the various indicators monitoring changes in vegetative cover in this methodology finally be aggregated into an overall calculation of the total change of natural vegetative cover in the road's area of influence.

The indicators and study areas focused on human behavior (commerce, agricultural practices, consumption of biological products, etc.) although perhaps included or subsumed in the vegetative cover indicator, are important because they will serve to enlighten the cause-effect relationships leading to changes in vegetative cover and wildlife habitat. Monitoring these will pick up changes before they are evident at the gross level, and will provide information about potentially effective mitigation measures if it appears that such will be needed.

Environmental analysis and monitoring is particularly suited to the advancing technologies of computerized Geographic Information Systems. USAID/Mozambique may want to look at the GIS-based environmental analysis done by Conservation International for Madagascar, whose objective was identifying priority areas for conservation, and should certainly follow the development of the GIS capabilities of the national geographical and mapping directorate. GIS technology is well advanced, and can be combined with GPS (Global Positioning Systems) for "live" mapping of roads, trails, boundaries, even as they are walked or driven. However, it is important not to let the technology drive the system, but to first identify the information needed and the most effective format for analysis and presentation, and then select appropriate and affordable systems. It is also important to bear in mind that the best system is only as advanced as its users, and for a monitoring system, it is imperative that data be readily accessible in a user-friendly form to multiple users who need it for decision making purposes.

Section III
Impact Monitoring Guidelines

A. Overview

The Rural Access Project (RAP) targets several rural road segments for rehabilitation. As discussed in the feasibility analysis section, rehabilitation of rural roads in targeted areas is expected to enhance the incomes and the quality of life of rural households. It is posited that better roads reduce costs to and enhance productivity of rural households. At the same time, the road project may introduce undesirable environmental and social impacts which need to be monitored and mitigated.

The Project Impact Assessment System (PIAS) is designed as a freestanding system. Except for the periodic Origin and Destination Traffic Volume Count Survey (ODS), which will be implemented under a different contract, and the Engineering Survey (ES), which will be carried out by the RAP/Engineering institutional contractor (IC), the PIAS contractor is responsible for gathering and updating data for the impact indicators described in Section II. The PIAS contractor will, however, have complete access to data gathered through the ODS. The PIAS contractor and the ODS contractor shall work very closely and collaborate with each other and with the IC as appropriate. The IC may specify and give guidance as to the types and quality of data elements it needs to be incorporated in the respective baseline data collection instruments.

1. Purpose

The purpose of the PIAS is to capture and archive data. First it contains indicator data used for the economic, social and environmental feasibility studies of each targeted road segment. Second, it aggregates and consolidates monitoring data from each rehabilitated road segment to obtain project-level monitoring data that can be used for evaluating whether or not progress is being made on achieving the project goal and purpose. Third, PIAS links into the overall Mission program performance monitoring system and will provide program-level monitoring data. For example, it will provide the component data for measuring the related indicators under the Mission's Strategic Objective No. 1. Exhibit 7, below identifies the specific program-level results and the performance indicators to which RAP contributes. The PIAS contractor must ensure that the data elements required by those program-level performance indicators are collected and reported.

2. Impact Indicators

For each proposed road segment, PIAS shall monitor, update and archive the data associated with both selected generic impact indicators and specific indicators identified by the economic, social and environmental feasibility analyses discussed in Section II above. The generic impact indicators covered by the economic, social and environmental feasibility analysis are summarized in Exhibit 5 in Section II. For each indicator, the matrix summarizes the definition, the measurement unit, the data sources and data collection instruments, and how the data is manipulated and managed. It also identifies specific issues and considerations regarding

application and measurement of selected indicators. The data for each indicator is collected from within each road impact zone.

Exhibit 7. RAP's Relationship to USAID/Mozambique's Program-Level Results

Project-Level Results - RAP	Program-Level Results	Program-Level Performance Indicators
Project Goal: Increased income for households in targeted areas.	**Strategic Objective No.1:** Rural household income increased in targeted areas	C Change in average rural household income C Income proxies
Project Purpose: Increased access and reduced transportation costs in targeted rural areas.	**Intermediate Result No. 1.1:** Increased access to markets	C Change in volume and value of marketed goods C Change in the variety of goods traded
	Intermediate Result No. 1.1.2: Improved transportation infrastructure	C Change in transport costs C Change in traffic count by type of vehicle
	Intermediate Result No. 1.1.3: Private sector capacity in the transportation and marketing of goods expanded	C Change in the number of private truckers C Tonnage on the road
	Intermediate Result No. 1.1.4: Expanded dissemination of improved market information	C Traders qualitative assessment of availability and prices of selected commodities in key market centers C Food price variations between traditionally deficit and surplus areas (measure of market efficiency) C Change in farmer prices as a % of retail prices - selected commodities

3. Baseline, Monitoring and Target Data

PIAS is designed to serve as data depository for baseline, monitoring and target data. The baseline data are collected by the IC prior to rehabilitation of targeted road segments. Collection of the monitoring data begins one year after rehabilitation of the targeted roads is completed and data collection may be repeated as frequently as necessary thereafter (currently envisioned as every other year).

4. PIAS Database Design and Management

The PIAS contractor shall update the database created by the institutional contractor and maintained by USAID/Mozambique. The PIAS database will be integrated with the Mission=s overall program-level monitoring database. It is mandatory that the structure and design of the PIAS database be compatible with the Mission's overall results monitoring system. Indicator definitions and measurement units must be consistent with the overall program-level structure. The PIAS database structure and design must provide USAID the capability to extract and aggregate the information with other program-level results for its R4 reporting.

The contractor must be familiar with USAID's New Management System (NMS) and its database requirements. Although these have not, as of this writing, been finalized, USAID is designing an Agency-wide information system capability in which all SO activity monitoring data are archived and filed in standardized formats such that they can be integrated and used throughout the Agency. For now the Agency has chosen to use the Oracle platform for developing the results database.

Once a decision has been made on which database platform to use, the contractor shall document the database structure, data element definition and the database dictionary, the procedures for data entry, data validation and error control, data security, data compilation, data sorting and report generation. All embedded formulas and algorithms used for adjusting and manipulating data sets must be documented and described -- what they are, how they are used, and why they are used. The database should be designed to be user friendly, providing data entry screens that are simple and easy to follow by data entry personnal.

B. Data Sources and Data Collection Instruments

As indicated in Section II above, PIAS uses several primary data collection instruments. The purpose and the methodological framework of each of the primary data collection instruments are discussed below. In general, the methodology for designing and administering survey instruments involves several steps -- pre-survey site visit to collect preliminary data for the sample design; establishing the survey/interview schedule; developing the survey questionnaires; recruiting and training enumerators and field supervisors; implementing the survey; and data entry, data compilation, data interpretation and reporting.

PIAS uses secondary data sources only for the purpose of validating the data gathered through these primary data-gathering instruments. A summary of an annotated list of sample secondary data sources is presented in Attachment F.

1. The Origin and Destination Vehicle Traffic Count Survey

Purpose

The main purpose of the Origin and Destination Vehicle Traffic Count Survey (ODS) is to gather data on the volume of road traffic along each of the road segments targeted for rehabilitation and to observe and report the road-users preferred routing of the rehabilitated/new class 1 north-south highway connecting the highway between Beira and Zimbabwe, and the Zambezi River.

Methodology

The methodology for the ODS, which will be undertaken by another contractor, is specified in the attached scope of work. (see Attachment E).

Result/Output

The ODS collects data on vehicle, passenger, and freight traffic hauled on roads targeted for rehabilitation and provides the traffic volume information. The first ODS also will provide information on the road-users preferred travel routing through southern Sofala to major market centers southern of the Beira Corridor and north of the Zambezi.

Scheduling

The ODS will be conducted initially in the second half of 1996, and every other year thereafter.

Implementor

The origin and destination survey is designed and implemented by the ODS contractor, who will provide information to USAID which will input into the PIAS.

2. Road Transport Sector Market Survey

Purpose

The purpose of the **Road Transport Sector Market Survey** is to provide data for determining: (a) the structure and competitiveness of the passenger and freight road transport sectors; (b) vehicle operating costs per vehicle-km by type/class of vehicle; and (c) transportation cost reductions, both for passenger travel and freight, induced by lower vehicle operating costs.

Methodology

A survey questionnaire is developed to gather data from road-users, i.e., vehicle operators, passengers, freight shippers, traders and farmers, traveling along the road impact zone. Randomly selected vehicle operators are interviewed to gather data elements needed for estimating vehicle operating cost per vehicle-km using the HDM-III model. The data elements collected include:

- vehicle transit time - longer transit time due to bad road condition and /or un-optimal routing will increase vehicle operating costs
- age of vehicle
- average vehicle speed
- fuel & oil consumption
- transit charges & tolls
- wages for daily labor employed on the vehicle
- vehicle repair and maintenance costs
- lost revenue resulting from downtime while vehicle is under repair

Randomly selected vehicle operators and passengers are interviewed to collect data elements for estimating passenger transport cost per passenger-km. The data elements collected include the following variables.

- Passenger transport costs (tariffs) per passenger/km by type of transport -- buses, vans, passenger cars, trucks, etc.
- Average distance traveled
- Average travel time, including waiting time, to key destinations (markets, health facilities, schools, jobs, etc.) -- which may translate into lost wages, work or income

Randomly selected freight shippers, traders and farmers are interviewed to gather data required for establishing freight transport cost per ton-km by type of cargo and for estimating the type and average daily value and volume of freight hauled over the proposed road segment. The data elements gathered include the following variables.

- Freight transport cost /ton-km --by type of commodity
- Average distance to key market centers -- by type of commodity
- Average travel time to key destinations along the rehabilitated road segments

The contractor shall develop criteria for evaluating the competitiveness of both the passenger and freight road transport sectors. For the passenger transport sector, the evaluation criteria shall take into account the:

- Average daily passenger traffic disaggregated by gender
- Number of public and private passenger transport vehicle operators
- Percent of passengers transported by the largest two operators (concentration ratio)

And for the freight transport sector it shall take into account the following variables.

- Average daily tonnage of freight hauled
- Number of public and private freight transport vehicle operators
- Percent of cargo hauled by the largest (the two firms that haul the biggest volume of freight) two operators (concentration ratio)

The contractor shall develop a methodology for determining if reductions in vehicle operating costs are translating into reduced transportation costs. Price elasticity coefficients may be developed from a cross-sectional analysis correlating vehicle operating costs with freight and passenger transport costs using data collected from across the major road segments in Mozambique. Price elasticity coefficients greater than zero suggest that transportation costs go down with the decline in vehicle operating costs.

Result/Output

The road transport sector market studies provide data on the competitiveness of the road transport sector within the RIZ. In addition, it collects data vehicle operating cost per vehicle-km by class/size of vehicle, passenger transport cost per passenger-km and fright transport cost per ton-km by type of freight hauled along the proposed road segments for estimating reductions in transport cost resulting from lower vehicle operation costs.

Scheduling

For each road segment, the road transport sector market survey shall be conducted at least once every other year. The data collected is then calibrated and adjusted to reflect the seasonality of cargo and passenger movement.

Implementor

The road transport sector market survey for baseline data shall be implemented by the IC and the impact monitoring shall be conducted by USAID/Mozambique contracted PIAS contractor[9].

3. Rural Household Survey

Purpose

The purpose of the Rural Household Survey (RHS) is to collect data on rural household productivity, income and social well-being. It collects data for testing the generalized development hypothesis that Avillagers within the road impact zone are more productive and well-off as measured by their average annual incomes and their ability to access key consumer goods and social services.@

Methodology

Pre-Survey Site Visit

The contractor shall conduct a pre-survey site visit and collect contextual data relevant to the road impact zone. The data gathered during this pre-survey site visit should give the contractor sufficient information for constructing the region's agricultural calendar, which includes identification of the months in which farmers are busy -- preparing the land, planting, weeding, applying fertilizers, insecticides and pesticides, harvesting, and marketing key staple foods and cash crops. For the cotton belt[10], Michigan State University (MSU) has identified the land preparation period as Sep-Oct-Nov; planting period as Nov.-Dec.-Jan; weeding and chemical application period as Jan-Feb-Mar-Apr; harvesting period as Apr-May-Jun; and the commercialization and marketing period as Jun-Jul-Aug. According to MSU, in the cotton belt, for maize and cotton, the agricultural calendar extends from September of the current year to August of the following year. When the agricultural year begins and ends depends on the type of crop. For example, cashews are harvested earlier than maize and cotton. Dry season crops are harvested and marketed much earlier than wet season crops. Using various methods including drive-by observations, the contractor should collect data, including data on the following

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9 The Road Transport Sector Market Survey and all subsequent survey instruments are initially implemented by the IC to gather baseline data. Impact monitoring, on the otherhand, is carried out by a USAID contracted PIAS contractor.

10 The cotton belt includes parts of Nampula, Zambezia, and Sofala and Cabo Delgado provinces

indicators, to familiarize itself with local conditions and the primary rural activities within the road impact zone.

- census of villages and households within each village;
- social/demographic patterns;
- distance of existing villages from both sides of the proposed road segment;
- key economic activities of households in the region;
- agro-ecological condition of the region;
- agricultural year of the region;
- cropping systems and cultural practices; and
- land use and tenure patterns.

Sampling Technique

The contractor shall define the appropriate survey design. In general, comparisons of household conditions require a stratified random cluster sample applied to villages within the road impact zone. The data gathered in the pre-survey site visit may be used for stratifying villages and randomly selected cluster of households.

Village & Household Stratification

The contractor shall determine the village (a community) and household stratification on the basis of the development hypotheses being tested. For example, all villages within 20 km, on both sides of the proposed road segment are selected. Statistically representative number of households are randomly selected from each village. The household sample size should be determined on the basis of the size of the village. The sample survey will require a sample size greater than 17 households in order to produce a statistically significant or representative result, at the 95% confidence level. Therefore, villages with very few households or no smallholder farmers are excluded from the sample frame.

Developing Survey Questionnaires

At this stage, the contractor shall carefully develop the survey questionnaire. The survey questions should be short, clear and direct. They should be focussed on obtaining direct and clear responses on indicators. The questions asked should be uni-dimensional. The questions should be phrased so as to solicit short, clear and direct responses.

Questions should be structured to allow numerical coding wherever appropriate. For example, a Yes/No response can be coded as 1 for Yes and 0 for No. Questions should be structured to allow the respondent to choose his/her response from among a list of choices or items. For example, in inventorying household asset possession, typical (for the region) household assets should be listed and the enumerator should then check-off those items the respondent says he or she has. Questions should be structured to solicit precise answers. For example, instead of asking AHow much of this year=s maize harvest did you sell?@ asking AHow many kg of maize did you sell from this year=s harvest?@ will result in a precise answer. Instead of asking, AWhat agricultural technologies did you use?@ asking AWhich of the following agricultural technologies did you use?@ results in a more accurate information recall. The list of agricultural technologies

promoted and observed in the region are listed and the head of the household is asked to identify the technologies used by that household. For example, the question can be presented to the head of the household as follows.

Agricultural Technologies Adopted	Maize	Sorghum	Rice	Cowpeas	Peanuts
Which of the following agricultural practices did you use? Identify the once that apply to your household. 1. Planted improved seed variety 2. Plant in straight line 3. Rotate crops 4. Inter-crop legumes with 5. Interplant with tree crops 6. Use compost on field 7. Use manure on field 8. Use chemical fertilizers 9. Use pesticides 10. Other _____					

A series of questions may have to be asked in order to collect a relevant information. For example, school enrollment is used as a proxy for income. However, it serves as a proxy for income only if enrollment at school can be correlated to household income. Since in many countries households are required to pay for uniforms, laboratory supplies, and rental of textbooks, poor families cannot afford to send their children to school. In other cases, the opportunity cost of sending children to school could be higher than the chores they perform for the household -- collecting fuelwood, tending animals, helping in the farm, fetching water, etc. To establish school enrollment as an income proxy one may asking a series of questions. The head of the household may be asked the following questions: How many children are there in the household? What is the age of each child? Which of these children are currently in school? Do you pay school for school uniform, school supplies and rental of textbook? How much school related expenses do you incur per child?

The contractor should structure the survey instrument in a manner that reflects the agricultural calendar to enhance information recall. The first section of the questionnaire should contain core questions that describe the characteristics of the household. It should contain questions on demographic breakdown of the household, information on the fields owned by the household and the types of agricultural products produced by the household -- vegetables, fruits, nuts, livestock, cereals, etc. -- agricultural production roles of household members and on and off-farm sources of income for the household. It should address some of the environmental indicators such as fuelwood burned and charcoal produced and sold, vegetation and field clearing, terracing and other erosion prevention methods used, and wild animals killed for consumption or sale. These questions are answered during these initial survey visits.

The second section of the questionnaire should relate to the household economic activities during the land preparation, planting and weeding period in the agricultural year. It should contain

questions on area cultivated, outside labor used for land preparation, cultivation and harvesting, amount and type of fertilizer used, prices of fertilizer, seeds and tools, cropping patterns, tools used for preparing the land, seed varieties used, pesticides, insecticides; farm technology employed including inter-planting, crop rotation, mulching, etc. Enumerators may repeat questions related to the household income to determine the sources of income during this period of the agricultural calendar.

The second survey visit should ask questions related to household economic activities during the harvest, processing and storage period. The questions asked should also relate to the volume of production, field productivity, and processing and storage technologies. The questions asked should also relate to the volume of own-produce consumed, volumes marketed, prices obtained and where and how production surpluses are marketed.

During each of the two visits, households are interviewed only on the relevant sections of the questionnaire. However, during each visit, corrections and changes can be made on prior visit responses. The survey instrument should be structured in a manner that facilitates the respondent's information recall according to the agricultural calendar. For the most part, the survey questions are structured to ask households to recall information about their economic activities over the preceding 3 to 4 months. However, for food consumption data, the literature suggests a 12 to 24 hour information recall.

Conducting the Survey

At this stage, the contractor determines how many enumerators and field supervisors will be required to conduct the survey. In general, the ratio of enumerators to households is one to twenty and the number of field supervisors to enumerators is one to five. It will determine how long each survey visit will be. The contractor shall develop criteria for selecting enumerators and field supervisors -- familiarity with the area and local customs, speaking fluency of the local dialect, number of years of education, and familiarity with rural life. On the basis of these criteria, the contractor shall recruit, select and train prospective enumerators and field supervisors. A final selection is made after the training and enumerators and field supervisors are assigned to villages. It is recommended that the same enumerators and field supervisors be used for each visit. The same enumerators should visit the same households for each survey.

Enumerators will interview the randomly selected cluster of households on the relevant sections of the survey questionnaire and fill in the respondent's answers in the space provided in the questionnaire. Field supervisors will visit the enumerators and review the completed questionnaires for logical and internal consistency and obtain clarification from the enumerators and households while still in the field. The cleaned-up and corrected questionnaires are then forwarded by the field supervisor to the contractor=s field office for data entry.

Data Entry, Compilation and Interpretation

At this stage, the contractor=s field office shall review the completed questionnaires for completeness, and consistency. The data is then entered into a database, cleaned and processed. The data shall be archived in an interactive database.

Result/Output

The rural household survey provides household-level socio-economic data for use in the economic, social and environmental feasibility analyses and subsequent impact monitoring.

Scheduling and Timing of Survey Visits

The contractor shall determine the appropriate timing of the survey visits. In general, the timing and the scheduling of survey visits are determined by (a) how accurate household information recall is required to be, (b) accessibility of the target area, (c) seasonal availability of respondents and (d) cost of data collection. Visits corresponding to household economic activities over the agricultural year and requiring information recall over a shorter time interval (e.g., the preceding three to four months) yield better quality data than surveys that use longer information recall period. During the wet seasons, regions that do not have all weather roads are harder to access and of necessity survey visits have to be scheduled for when the roads are passable. While survey visits over shorter time interval can provide higher quality data, the cost of conducting the repeat surveys maybe prohibitive. The contractor shall, in consultation with USAID, decide on the most optimal information recall time interval, the number of survey visits, and the appropriate timing for the visits corresponding to each targeted road segment. The following table illustrates the breakdown of household economic activities over the agricultural year, the timing of the survey visits, and the types of data that can be collected in each round of household visits.

Illustrative Survey Schedule

Visits	Timing of Survey	Key Data Collected
First Survey Visit	Prior to land preparation period or	C Household income (disaggregated by gender): - cash-value of own-production consumed, - income from sell of agricultural produce - income from SME related activities, and - wage-labor C Number of household members engaged in non-farm employment C Number of school-age children in the household enrolled in schools by gender C Household asset possessions (income proxies typical for the region)-- number of wives, herds of cattle, masonry, zinc roofs, latrines, radios, bicycles, lighting, furniture, pots & pans, etc. C Number & size of fields owned C Land tenure security/status
	During land preparation, planting & weeding periods	C Number of fields cultivated C Size of cultivated fields, C Composition of household labor for preparing the land C Adoption of improved agricultural technologies - including planting in rows, thinning, mulching, inter-planting, fertilizer application, irrigation, extension visits, etc. C Cropping pattern -- it should show whether cultivation is permanent or shifting (long or short fallow periods) C Crop diversification -- shift from food crops to cash crops C Price of basic agricultural inputs --fertilizer, pesticide, seeds and tools
Second Survey Visit	During harvest and storage period or	C Kg of crops harvested -- selected crops including cereals, pulses, oil seeds, cashew, root crops C Crop yield per hectare -- selected crops C Yield per unit of labor (adult equivalent) C Livestock herd size -- heads of cattle and small ruminants including poultry C Type of on-farm storage technology used

Second (cont'd)h	Agricultural produce marketing period	C Number of itinerant traders and commercial buyers buying from the target area C Volume (kg) of agricultural produce saved for own consumption C Volume (kg) of agricultural produce marketed -- selected crops/produce C Farm-gate prices received -- selected crops/produce C Farmgate prices as % of retail prices (1st retail market) -- selected crops/produce C Food price variations among market towns -- selected food crops/produce and selected markets along impact zone

Implementor

The rural household survey for baseline data shall be implemented by the IC and for impact monitoring it hall be implemented by the PIAS contractor.

4. Focus Groups

Purpose

The purpose of the Focus Groups are to gather data on perceptions and interests of beneficiaries (customers) selected including representative occupational groups such as smallholder farmers, traders, millers, retailers, and artisans living or operating within the RIZ. The result will provide qualitative information for the feasibility analyses and the on-going monitoring which is interpretative of changes registered by the impact of the road intervention.

Methodology

The process of selecting groups and designing a checklist of questions or vector of enquiry should be closely related to the development hypotheses. The occupational focus group members once identified are to be updated in subsequent monitoring exercises although additional members can be added as when judged necessary. Inquiry can make use of the soft data gathering techniques of rapid and participative rural appraisal particularly for smallholder households although the exercise is to be targeted at the Focus Group members and is not an inclusive community wide exercise. An extensive amount of literature is available covering the methodology of, and case for, rapid and participative rural appraisal. A basic premise is the primacy of beneficiary perceptions and ability to contribute to projects which affect them. As the researcher cannot anticipate all the "right" questions in advance interview techniques are intended to be open ended processes in which tangential enquiry is followed up. The National Democratic Institute (NDI), which undertakes Focus Group activities, can be contacted by the institutional contractor for further information on methodology.

Result/Output

The results of the Focus Groups will be used to inform the hypotheses of the economic, social and environmental feasibility analysis, and subsequently to the rural household survey. The type of information the Focus Group will provide covers self-perception needs ranking, hindrance or constraints to livelihood activities and the bearing of road transport on these concerns.

Scheduling

Implementation will take place at the same time as household surveys i.e., immediately following the results, from which may further narrow the focus of enquiry. Several days should be allocated for identification of members and interviews/meetings. A second round of interviews will be warranted to follow up certain thematic concerns. The Focus Group will be updated every year following rehabilitation each road segment.

Implementor

Impact monitoring using the Focus Group instrument shall be implemented by the PIAS contractor.

5. Rural Commerce and Industry Rapid Appraisal Survey

Purpose

The purpose of the Rural Commerce and Industry Rapid Appraisal Survey is to gather data for demonstrating that rehabilitated rural roads are stimulating and expanding rural commerce and industry.

Methodology

The instrument uses a combination of observation and interviews of randomly selected traders, shop keepers and micro-entrepreneurs. Through observation the contractor shall count the number of commercial establishments and the number of traders in the markets within the RIZ. Enumerators drive through each road impact zone and count the number of fixed-structure shops, warehouses, storage facilities, and processing plants such as maize mills. They randomly select fixed-structure shops and count and list the number and type of items stocked. The number of itinerant traders will also be counted, and their trade products surveyed.

To ensure that enumerators are collecting relevant data, the contractor shall provide proper training. It shall provide each enumerator with a check list and blank forms for counting and recording fixed structures and consumer items.

Result/Output

The rural commerce and industry survey gathers and reports data on the:

- number of retail & service enterprises -- shops and traders selling basic consumer goods and services with sellers of fuel wood and/or charcoal identified separately
- availability and diversity of consumer goods (range of goods offered and volume of each good)
  - in retail shops
  - in markets
- prices of selected consumer goods -- kerosene, clothing, utensils, soap, matches, battery, etc.
- development of market infrastructure -- number of warehouses, mills, storage facilities, etc.

Scheduling

The instrument is implemented during the commercialization period of the agricultural year. Surveys for impact monitoring purposes will take place every other year.

Implementor

The rural commerce and industry rapid appraisal survey is implemented by the PIAS contractor.

6. Infrastructure Survey

Purpose

The purpose of the Infrastructure Survey is to provide a physical inventory of infrastructure and services within the road impact zone. While roughly corresponding to the generic indicators, it will also collect other relevant information regarding conditions/services as defined by the contractor. This data will be tracked as part of the baseline for change over time and will contribute to the hypotheses of the Social Soundness and Economic Impacts.

Methodology

Based on field visits and observation in the project area, a simple questionnaire will be designed by the contractor. Indicators to be tracked would include number and location of schools, health posts, credit services etc. Data for the survey will primarily be available from key informants in the project area including the District Administrator, Education and Health staff, and traders. A secondary source of information will be provided by the UNHCR/UNDP District Profiles although this information will need to be updated and

verified by primary data collection. Where appropriate, the level and type of service or infrastructure should be described in detail.

Result/Output

Results from the survey will be used for the creation of a Community Profile which will be a narrative and analytical account of the level and type of services available in the RIZ.

Scheduling

The Infrastructure Survey will be conducted during the pre-survey visit of the rural household survey. The Infrastructure survey will be updated every other year after the target road segment has been rehabilitated.

Implementor

The physical infrastructure survey will be implemented by the PIAS contractor.

7. Videography

Purpose

The purpose of Videography is to systematically gather observational data on the physical conditions and circumstances in the RIZ.

Methodology

It is a methodology which has been used in, among other areas, environmental assessment, famine early warning, and food production and security by USAID. It has also been used in road construction and maintenance monitoring. It should be employed to gather data on certain indicators in the PIAS.

The institutional contractor will utilize some form of low altitude Videography to visually record and document changes in the physical environment of proposed RAP roads.

Following methods used recently by USAID in Senegal, for which documentation is available in USAID/Mozambique, a small airplane, equipped with a commercially available, yet specialized, video camera attached to the undercarriage will overfly the road alignment. A specially trained pilot will be required. Overflight photography should be vertical rather than oblique in order to map and mark, via GPS referencing, desired physical characteristics. Vertical photography also has the advantage over oblique angle photography of keeping the road alignment in view, particularly when the un-rehabilitated road is overgrown. Vertical photography can cover a width of 500 meters or more of the road alignment. In this manner the immediate environment of the road can be systematically monitored. If necessary, an

additional overflight of the same road using oblique photography can be carried out to capture topographical features.

Result/Output

Videography will provide data for the monitoring of indicators related to the following:

environmental features

- vegetative cover
- forest land and deforestation
- settlement encroachment
- incursions into protected areas
- land erosion
- rivers, creeks and hedges

social and infrastructural features

- villages and settlements
- roads and the state of road maintenance
- tracks and paths
- bridges and fords
- health posts and facilities
- schools

economic and agricultural features

- cropping patterns
- size of fields
- crops
- hectares under cultivation
- commercial structures, including
    - mills, warehouses, markets, stores, etc.
- market accessibility

Scheduling

Videography as described here should be conducted during the gathering of baseline data in order to establish the specific physical characteristics of the proposed road alignments. It should also be carried out whenever additional impact monitoring data gathering is carried out.

Implementor

If requested by USAID in the SOW, videography will be implemented by the PIAS contractor.

8. Secondary Data Sources

Purpose

Documentation from secondary sources will be an important area of information for the undertaking of the feasibility analyses and the creation of baseline data. Secondary sources will provide contextual information with which to identify and focus areas of research and enquiry particularly for forming the hypotheses of for the feasibility analyses. In addition, their methodologies should be closely followed by the contractor for reference in implementing primary data collection instruments. It can also be useful during the impact monitoring portion of the PIAS.

As the PIAS is a free standing system, both during the baseline development and monitoring phases, secondary sources will be a means to augment the baseline data anecdotally. Reference can be made to data complimentary to the PIAS. In this way the results of primary data collection may be validated by secondary information sources; for instance where the presence of intervening variables (such as PVO interventions) impact on the results being monitored.

Secondary information would include documentation from PVO's, government departments and the multi-lateral and bi-lateral donor agencies. Baseline surveys, evaluation reports, etc., of PVO's operating in the road project areas will be a potentially rich data source. In addition, academic papers based on empirical research (MSU/MOA) and PVO project papers and surveys will provide valuable insights.

The contractor should familiarize itself with the documentation available covering the sectoral areas which affect the vector of research as outlined in the PIAS and to be further developed in the Assessments. Prior to the initiation of field work, or in the case of a foreign contractor prior to arriving in Mozambique, a thorough review of the literature should be undertaken. The following are presented as a (non-exclusive) example of the quality and quantity of documentation the Contractor may want to draw upon. Annotated list of secondary sources is provided in Attachment F.

ATTACHMENT A

Methodology for Formulating the Project Impact Assessment Sysyem Guidelines

ATTACHMENT A

Overall Parameters of the PIAS Design Assignment

The Project Impact Assessment System (PIAS) for the USAID/Mozambique Rural Access Project was carried out under an IQC Work Order by Management Systems International (MSI) between early March and early May, 1996. The objective of the assignment was

> To develop analytical methodologies (for) an economic analysis, social soundness assessment and an environmental impact review process. USAID will utilize the monitoring and information system which will allow for the identification and analysis of trends toward achievement of the (RAP) project goal, purpose and outputs. This system, to be known as the Project Impact Assessment System (PIAS) will track indicators associated with the goal, purpose and outputs and other relevant project impacts, expected and unexpected, of interest to USAID.

Work in Mozambique took place between March 19 and May 5 during which time the team members were engaged to the following extent.

Team Leader/Social Analyst	7 weeks
Economist	5 weeks
Social Analyst	3 weeks
Environmental Analyst	3 weeks

The team worked closely with the Mission RAP Project Development Officer, the Evaluation Officer, a Transportation Officer and the Environmental Officer.

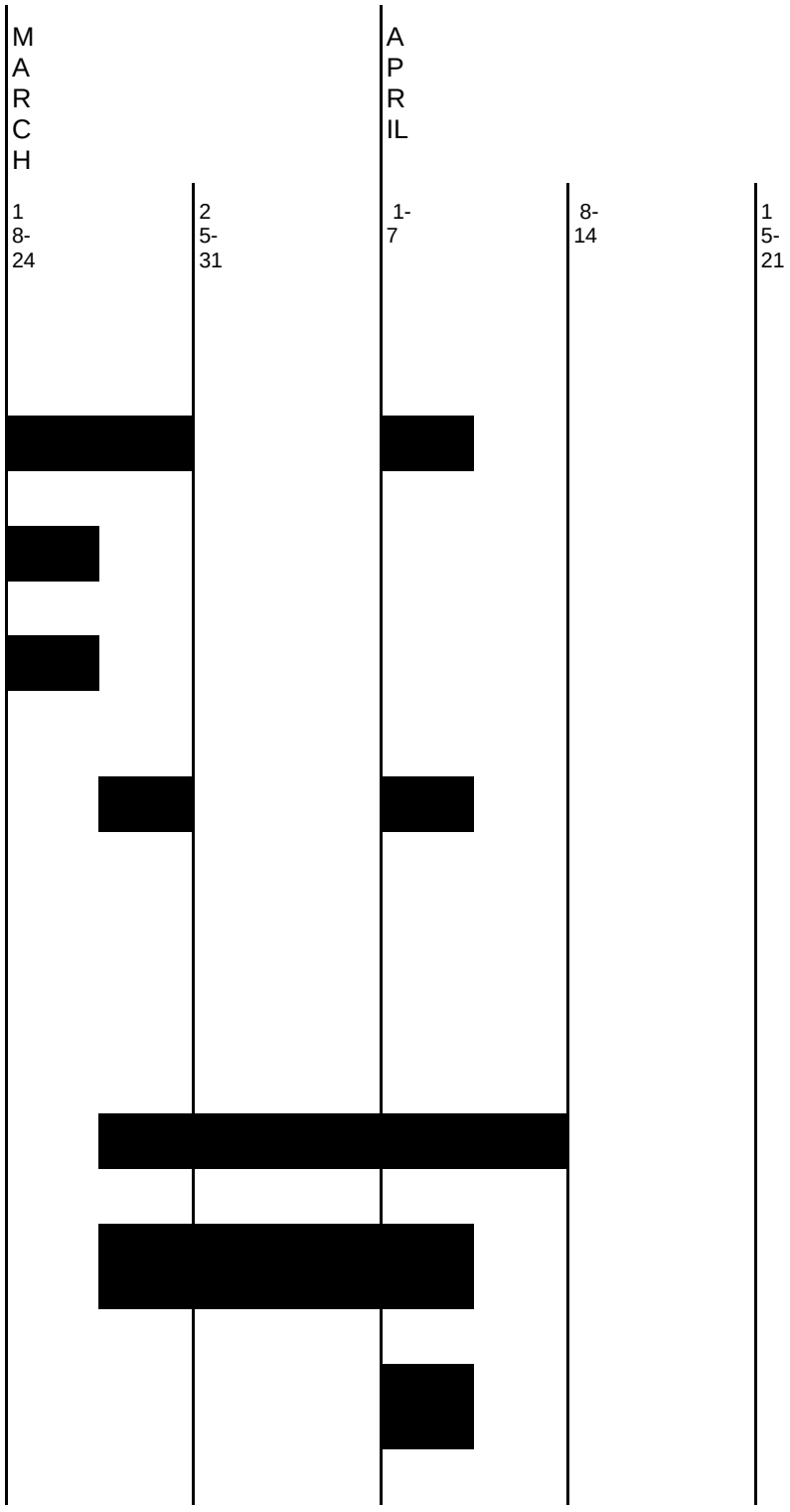
Planning for the Assignment

Beginning before arrival in Mozambique, the PIAS team planned for the RAP roads impact assessment system design assignment by reviewing project documents, USAID and World Bank reports on rural roads and the Scope of Work. A day-long Team Planning Meeting was held and an implementation plan was elaborated by the team and forwarded to the Project Officer prior to taking to the field.

Once in-country, the team met with the Project Officer and all related Mission, World Bank and Government of Mozambique officials. The implementation plan was reviewed and revised. Moreover, the Scope of Work was revised based on these initial conversations and considerations of the scale of work that was required. The resulting Work Plan is shown on the following page.

MOZAMBIQUE RURAL ROADS IMPACT METHODOLOGY

WORK PLAN



Facilitate one-day workshop with USAID

1) Identify goal/purpose/output indicators
2) Identify other indicators
3) Environmental impact review

Develop Analytical Work Methodologies

Study econ./envir. review process SOWs and other documents

Develop preliminary analytical methodologies

Interview/gather data on econ/soc/envir aspects

Prepare manual for conducting analytical work

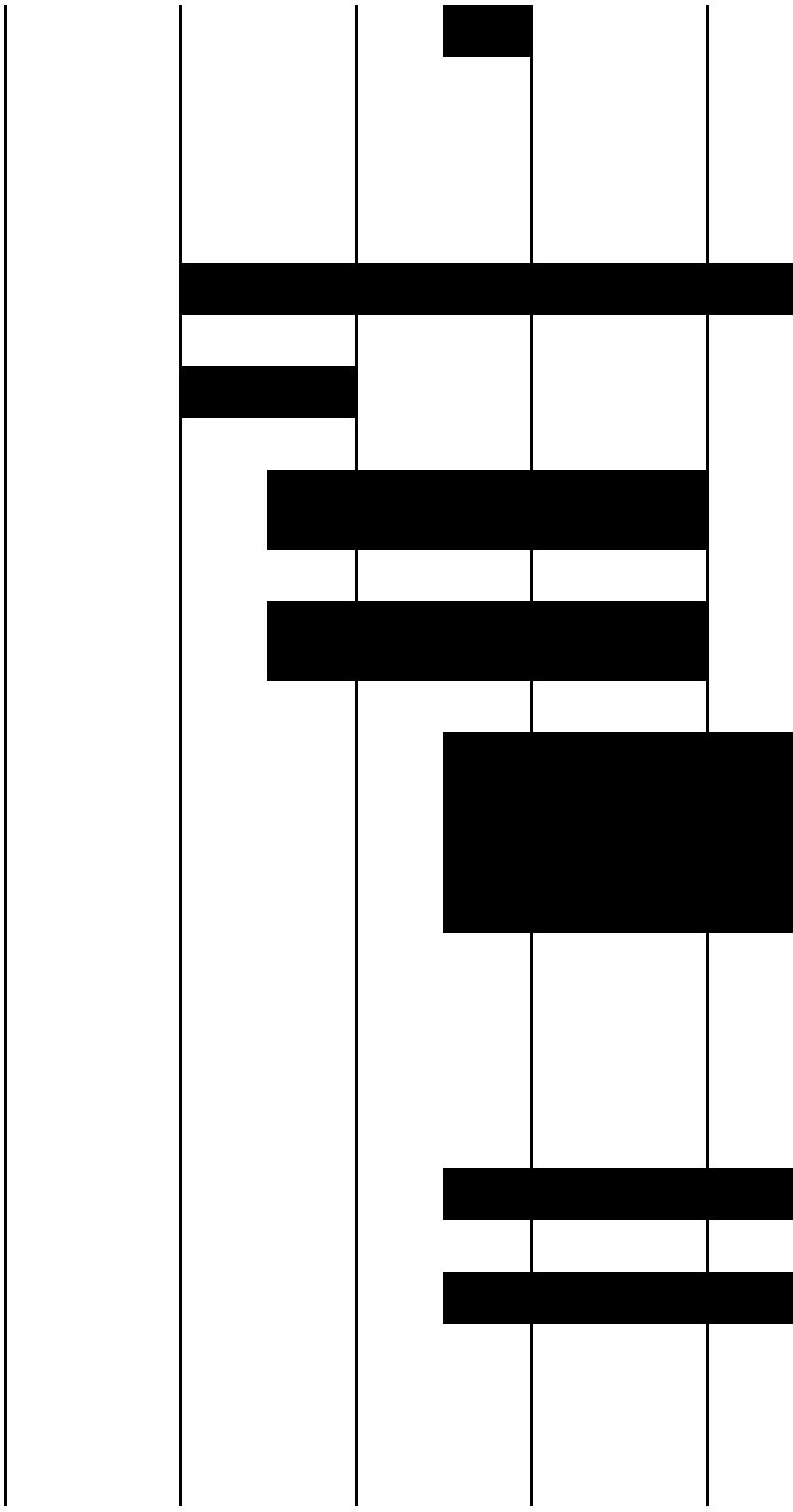
1) Economic analysis
2) Social soundness assessment
3) Environmental impact review

Design and Establish a PIAS

Identify methods for data collection

Field visit to Construction Year One road sites

(Same field visit as shown below)



Prepare manual for implementing PIAS

Design Environ. Impact Monitoring System

Interview/gather data on ROCS-2 impact system

Preliminary monitoring system design

Environmental field visit to Const. Yr. Two roads

Prepare input for PIAS manual

Collect Baseline Data

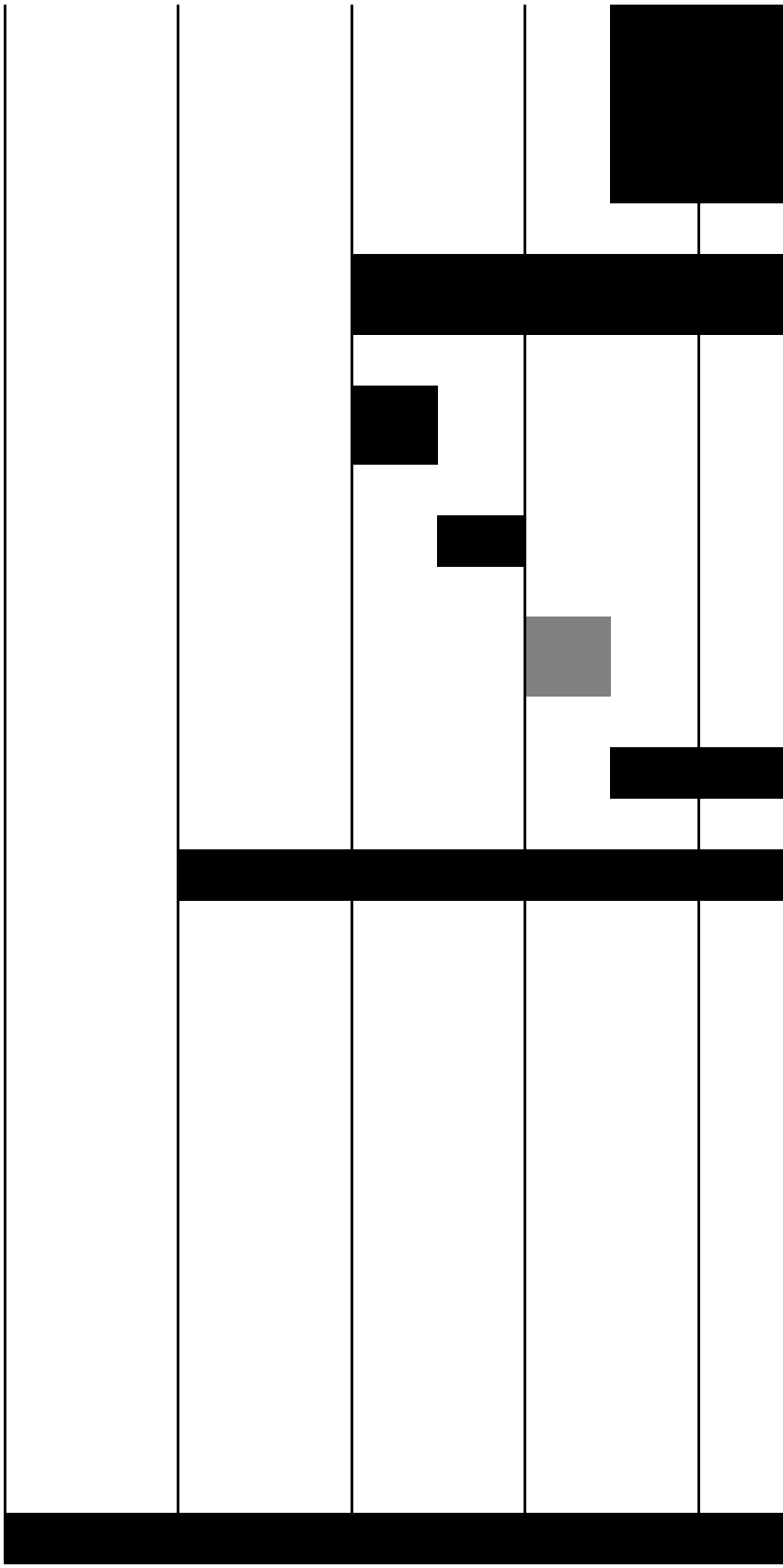
Field visit to Construction Year One road sites

Prepare comprehensive baseline data set

Mission De-Briefing on Project Deliverables

Staff Schedule

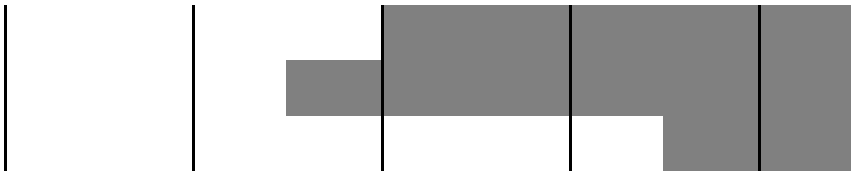
Hap Carr



Sam Taddesse

Ruth Norris

Doug Mason



Review of the Literature

The PIAS design team carried out an extensive review of the literature on rural roads and their economic, social and environmental impacts. Evaluations, impact assessments, and evaluation reviews of USAID and World Bank funded rural road projects in Africa were studied in order to identify common impacts, necessary interventions, effective assessment methodologies and other lessons to be learned. These studies dated back more than twenty years, including the development of a tracking system for economic and social impacts of two rural roads in Liberia done in 1974, on the one hand, and an evaluation of impacts derived from a national rural roads construction program in Tanzania in 1995. World Bank studies regarding the design and assessment of its ROCS-1 and ROCS-2 rural roads projects as well as Government of Mozambique documents on its National Roads Program were studied. The literature reviewed also included current local level PVO agricultural and rural development projects in the Mozambican districts where RAP roads will be rehabilitated. It included literature on the environmental impact of rural roads in Africa in general as well as a 1994 environmental assessment of Mozambique and recent reports on environmental resurgence in Mozambique after the civil war and draught.

Development of the Theoretical Approach of the PIAS

Based on the general approach contained in the Scope of Work and RAP Project Paper and also based on the results of the literature review, the PIAS team developed a conceptualization of the PIAS information system.

The PIAS is based on an approach in which potential road impacts, and the indicators which will be used to measure them, are identified through evolving and ever expanding hypotheses. Impacts may be positive or negative. If they are positive, they form the Aresults@that USAID wishes to achieve through the road rehabilitation. If they are negative USAID will design mitigating actions in the project to diminish their impact. These hypotheses of road impact are developed as the system's design advances, to be tested, although not formally or statistically, over time through impact monitoring. The hypotheses begin with the Adevelopment hypothesis@ of the RAP Project and are expanded along economic, social and environmental branches as new information about the roads and their impact zones is acquired. Data used to expand the hypotheses come first from secondary sources and then, as field work takes place, from primary sources. When a final set of potential impacts have been identified and refined for each road segment, baseline data are gathered on those indicators. Then, at two-year intervals, followup monitoring data are gathered on the same indicators in order to ascertain if expected impacts have taken place.

Elaboration of Generic Impact Indicators

Based on the review of the literature and interviews with transport authorities in Maputo and also based on the RAP development hypothesis, a list of the generic impacts which have been found to result from rural roads projects in Africa was drawn up. This list was reviewed, discussed and revised several times, based on the iterative process of expanding the hypotheses into economic, social and environmental dimensions, by all Mission RAP related officers, including those identified above working with the PIAS team.

The indicators on the list were then refined in definition and measurement by the PIAS team. Traditional PRISM criteria for indicators were used in refining the indicators. Moreover, in many cases more rigorous criteria for sound social research were sought for the impact indicators. Some of the criteria that were particularly important to the PIAS team were:

> Verifiability - has the occurrence of the impact been verified and is it measured accurately;
>
> Quantification - can the indicator to be measured in interval or decimal form or, if more appropriate to the nature of the variable in question, ordinal or only nominal form; and
>
> Attribution - to what extent can the occurrence of the impact, through measurement of the indicator, be fairly attributed to the rehabilitation of the roads.

These became important concerns to the PIAS team in the selection of the final generic indicators. Furthermore, recognizing that these concerns will need to be addressed as the system is implemented, the PIAS system has been designed to Aground truth@ indicator precision and measurement in several ways as it is carried out.

Preliminary Design of the PIAS Framework

The design of the PIAS framework was continually refined as field trips were completed and greater understanding of the system's requirements were gained. There were, however, three main stages the design went through.

> The RAP Project design included much of the overall framework of the PIAS. The overall parameters of the system were thought through by the Mission and then incorporated into the Scope of Work for the design of the PIAS.
>
> Preliminary design of the PIAS was carried out prior to the field trips. This stage was carried out over several meetings with Mission staff in order to clarify how the framework was evolving, answer clarification questions and refine certain assumptions and parameters where necessary. The system has many components and "wrinkles" in how it will be implemented. The process of integrating the components and smoothing the implementation process, on the one hand, while

leaving the necessary flexibility for the institutional contractor to carry it out in "the real world" took place, roughly, in weeks two and three of the work.

Final design of the PIAS, clarifying final questions and concerns regarding implementation and resource availability, took place between the team and the Mission staff after the field trips and prior to writing the draft final report.

Review of Environmental Concerns

Particularly close attention was paid to capturing indirect environmental impacts. During the design of the RAP Project itself the REDSO Environmental Adviser assisted the USAID/Mozambique Mission in preparing for indirect environmental impacts. For several reasons, environmental concerns had to be handled in special ways in the PIAS. Principal among these concerns were the following.

USAID requires that an environmental assessment be performed if serious environmental impacts are suspected as a result, directly or indirectly, of the proposed activities.

The RAP institutional contractor's Mozambican counterpart, the National Directorate for Roads and Bridges (DNEP), was to be responsible for identifying and tracking direct environmental impacts.

The DNEP staff person responsible for environmental analysis participated in the Gorongosa Field Trip and also coordinated with the PIAS team Environmental Specialist in all phases of the system's design.

Field Work

Field visits were made by the PIAS team to areas of Year One and Year Two RAP road segments. The field trip to Year One road segments focused on potential economic and social impacts while the trip to Year Two roads near Gorongosa National Park, concentrated, although not exclusively, on environmental impacts. The schedule of activities carried out on these visits is summarized in Annex One below. Field reports on each trip are attached as Annex Two and Annex Three.

ANNEX ONE

Trip Reports

GORONGOSA DISTRICT

Tuesday, April 9, 1996

Air Travel:	Maputo to Beira	6:00 AM to 9:00 AM
	Beira to Gorongosa	11:00 AM to 12:30 PM
Gorongosa		
Interview	Baldeo Chande	IUCN/EU Park Ranger Re. Impact of settlements on park
	Jean Paul Vermeuleu	PRRS/GTZ Project Director
	Victor Rodriquez	GTZ Regional Director Re. Community dev. infrastructure

Wednesday, April 10, 1996

Rio Muerva		
Interview	Gova community	Re. Agriculture and employment
Gorongosa		
Interview	District Administrator	Re. Development projects/markets

Thursday, April 11, 1996

Gorongosa National Park		
Interview	Baldeo Chande	Park Ranger Re. Park encroachment data
Air Travel:	Gorongosa to Beira	9:00 AM to 12:30 PM
Beira		
Interview	Abdula Taybo Hassam	Re. Gorongosa Development Plan
Air Travel	Beira to Maputo	9:00 AM to 1:00 PM

CAIA and MUTARARA DISTRICTS

Wednesday, April 17, 1996

Air Travel:	Maputo to Beira	7:00 AM to 11:00 AM
	Beira to Caia	12:00 to 1:30 PM
	Caira to Sena	1:45 PM to 2:15 PM
<u>Sena and Mutarara</u>		
Visit		Commercial center
		Corn mill
		MutararaRiver market
		Sena market
Interview	Carlos Pasqual	Doctor,Action Internationale Contra la Faim (AICF) Re. Health status/facilities
	Dona Anna Official	Re. Traffic count data

Thursday, April 18, 1996

<u>Mutarara</u>		
Interview	Dep. Dist. Admin.	Re. Local development/population
	Health Center Tech.	Re. Health facilities/diseases
	Joao Jamal	Businessman/entrepreneur Re. Local business opportunities
<u>Rio Shire</u>		
Observe		River ferry rehabilitation
Interview		Three local business leaders Re. Local market access/transport
<u>Chemba</u>		
Interviewed	AISPO representative	Re.health facilities/access

Friday, April 19, 1996

<u>Villa Nova da Frontera</u>		
Interview		Customs and immigration officials Re. Vehicle count data
	Store owner	Re. Business opportunities/market
Visit		Mission with school and health post

Mutarara

Visit		Mutarara River Market
Interview	Produce seller	Re. Prices and produce market
	Store owner	Re. Basic goods market/prices
	Distiller	Re. market for spirits
	World Vision off.l	Re. Agricultural production

Saturday, April 20, 1996

Air travel	Mutarara to Beira	7:30 AM to 11:30 AM
	Beira to Maputo	1:30 PM to 5:30 PM

ANNEX TWO

Report on Field Trip to Caia, Mutarara and Chemba Districts April 17-20.

Field Trip Participants:

Harry Carr MSI
Sam Tadesse MSI
Douglas Mason MSI
Gastao Mendes USAID

Purpose of Trip:

The field trip was undertaken by MSI staff for the purposes of observing the alignments of year one RAP roads in the Zambezi Valley and gathering information on socio-economic conditions in the project area. The team evaluated available data sources to be accessed under the PIAS and undertook rapid assessments and key informant interviews. The road segments driven by the team were: Sena to Chemba, Mutarara to the Chire River crossing, Mutarara to Villa Nova da Fronteira and, by over flight, Caia to Sena.

Profile of Project Area

Transport

The Sena/Mutarara area sits on an important axis connecting to Malawi, Tete city, Zambezia and Beira. Sena and Mutarara, on opposite banks of the Zambezi river, are linked by the Dona Anna Bridge, reopened by USAID in January 1996. Under RAP the bridge will be a major link in improved access between the north and south of the country connecting to the EN 1 and relieving the bottleneck at the Caia ferry.

The condition of the RAA roads has deteriorated seriously and at present Sena and Mutarara are cut off from the rest of the country for months at a time during the rains. The Caia - Sena and Mutarara - Cambulasitsi roads were impassable to heavy truck traffic at the time of the field trip and PVO and commercial sources state that most heavy truck traffic has ground to a halt. Truck traffic from Tete must make a long detour through Malawi to reach Mutarara. PVO personnel and commercial operators both stated this option is costly and time consuming.

History and Conditions

Mutarara was seriously affected by the war and an estimated 80% of the District's population fled either to Malawi or to refuge in urban centres. The bulk of return and resettlement took place during 1994 and 1995 and few further arrivals are now reported. The district has been among the more vulnerable in Mozambique in terms of food insecurity conditions and the area has received blanket food distribution from the PVO World Vision up to April 1996 when it was terminated. MSF-CIS food security monitoring now indicates stable conditions with proxy indicators such as food availability and price comparing well with other parts of the country which can be taken as a sign of success for the large scale food operations.

The exact population of Mutarara is controversial. An estimate of 250, 000 is used although may be as low as 220,000 while World Vision food ration card numbers are close to 300,000. Returnees from Malawi are thought to have returned several times and collected multiple ration cards. The area received blanket distribution due to the break down of a targeting scheme aimed at returnees following threats and disruption including the looting of a relief truck and a warehouse being broken in to. In the coming year distribution will be replaced by a targeted food or cash for work scheme. World Vision is currently implementing a distribution of ground nuts as an antidote to the nutritional deficiency Pellagra targeted to 100,000 people.

Service and Administration

The district is broken down into three administrative areas or localities. There are six health posts and centers and 43 schools although only one is an EP2. The PVO's World Vision, MSF- Belgium and Vet-aid are operating in the area.

Markets

There are active markets in Sena and Mutarara with a range of goods on offer including, bicycles, used clothing, capulanas and assorted consumer goods. The presence of expensive items including refined vegetable oil and wine indicate a limited demand for higher value products. Malawi is the main source market due to the impassability of the roads. Due to increased vigilance in customs collection at the Malawi frontier both markets are reportedly shrinking as higher prices narrow the available market. Food stuffs on offer include; maize, dried fish, bread, ochra, sorghum, and garlic. No yellow maize was seen and almost no fresh vegetables although year round cultivation takes place in the river margins. Most sellers were exchanging small amounts. Maize is sold by the tin, roughly one kilo.

Market Access and Commercial Activity

Sena and Mutarara are fragmented markets. Due to the impassability of roads access to external food markets, particularly the large Beira market, as buyers or sellers is cut off. Traders who had formerly used the RAA roads to come up from Beira are held up although this situation will ease as the roads dry up. Food shipments to Malawi were reported to be small with almost no large commercial shipments. An active passage across the border is apparent both by foot and truck, mostly small bakkies or pick-ups, carrying passengers to Malawi and returning with consumer goods. Small amounts are head loaded in the fluid informal cross border traffic.

Commercial operators in Mutarara stated that Beira is the preferred market for most goods particularly those in bulk such as fuel, given the price of import tariffs. Malawi is turned to as an option of last resort. An active trade with Zambezia is also reported. At present this is restricted by the Chire River ferry which was inoperable at the time of the field visit. However, several of the Mutarara merchants had pooled resources to repair the cable and this work was observed in progress. An earlier donation to the District Administration for the same purposes had not been effected.

The number of commercial operators in Mutarara is small and their activities are limited. The largest of them represents the interests of a relative who is a businessman in Maputo. He

is not reported to be making profit and is cross-subsidized by the Maputo operations. Demand and commercial activity is extremely weak in the area and the capacity for accumulation and investment from internal resources is low. For an upturn in commercial activity to take place, investment would have to come from outside the area. This crucial link is restricted by lack of reliable road access. Interest from external operators is apparent as evidenced by their swift entry to the area following the rehabilitation of the RAA roads opened up temporarily for the refugees resettlement period. This activity can obviously be expected to resume one transport is re-established.

Other than lack of road transport, other constants to commercial activity include the lack of financial intermediation and the laborious and restrictive regulatory environment. The closest bank is Tete city and gaining credit is restrictive with short term loans with high levels of collateral routine. None of the actors interviewed by the team claimed to qualify or found the terms on offer attractive enough to enter into transaction.

A well documented outcome of the civil war and heavy handed regulatory environment in Mozambique has been the collapse of the rural marketing network (Counter, 1995). As well as the lack of physical road access infrastructure the entire class of intermediaries including traders, wholesalers, processing and credit services has collapsed and is being redeveloped from scratch in the post war period. For areas such as Mutarara isolated by the war, road access is a crucial element and indeed a pre-condition to the restarting of trading networks and the rural economy. Progress, while dramatic given the currently flat levels, will be a slow process and re-establishment of pre-independence levels of commercial activity a distant goal.

Small Farmer Markets

Commercial activity among small holder producers is low. For returning populations the time investments to agricultural re-integration, such as clearing sufficient land, will take several years to show significant results. The ending of long term food aid, a traditional component of household survival strategies will also need to be absorbed into decision making. Among farmers interviewed by the team in rapid assessments, most stated they did not intend to sell large amounts at harvest and planned to hold onto surpluses for as long as possible as a marketing strategy. Pressed further, most responded that this was a reaction to previous experience in having to buy maize back again during the "lean" season when prices are highest. Among farmers who did have significant surpluses in what is expected to otherwise be a bumper crop season, their ability to sell surpluses was limited by the absence of buyers. Farmers from both categories sold small amounts, by the tin, in the Mutarara market to fund small purchases.

ANNEX THREE

Comments on the Application of the PIAS Methodology to the

Inchope-Caia Road Segment

Two members of the PIAS design team (R. Norris, H. Carr) inspected portions of the proposed Year 2 roads (Inchope to Caia) April 9-11, 1996, accompanied by Robin Mason of USAID/Mozambique and Deolinda Mabote, the DNEP civil engineer assigned to cover environmental issues. The group overflew existing roads, both the route crossing to the northwest of Gorongosa Mountain (Gorongosa-Canda) and the route crossing between the mountain and Gorongosa National Park (Gorongosa-Casa Banana-Inhaminga). The visit also included driving 35 kilometers of the route from Gorongosa toward Canda, to the last point passable by 4WD vehicles, and interviews with a representative of the district administrator, donor agencies, and PVOs working in the region.

Background information about Gorongosa National Park is appended to this report in the form of two annexes from a recent FAO report describing all of Mozambique's existing and proposed national parks and conservation areas. The Inchope-Caia road also approaches the area that would be included in a proposed expansion of Gorongosa National Park to include the mountain as part of the park, and transects a controlled hunting area (Coutada No. 6) in the area beyond the mountain, which was not visited by this team. For purposes of the legal requirements of screening and environmental assessment, the hunting area (coutada) may not be significant, as it is, according to the local IUCN representative, a Class V protected area.[11]

Selection of the Road Alignment to be Rehabilitated

Information gathered during the site visit leads to the conclusion that rehabilitation of the road alignment currently selected (Gorongosa-Canda-Caia, to the northwest of Gorongosa Mountain) is clearly preferable to available alternative routes (Gorongosa-Casa Banana-Inhaminga or the route along the old railroad line, Dondo-Muanza-Condoe-Inhaminga).

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. IUCN's Commission on National Parks and Protected Areas established the generally accepted global classification of protected areas, with national parks and equivalent representing Class I. Classes II, III, IV, and V represent progressively greater levels of permitted uses and less significant levels of protection. In common usage, classes I and II are what is generally referred to as "parks and protected areas." However, until more is known about the status of Mozambique's wildlife, to say that an area is "only" a Class V begs the question of whether it might more appropriately be assigned greater protection.

The Gorongosa-Canda-Caia route does not approach closer than 5 kilometers to Gorongosa National Park, although it does tangentially touch a proposed extension of the park on the northeast side of the mountain. Generally this existing road runs 10-20 kilometers distant from the park boundary, including proposed boundaries for expansion. The local authorities professed a preference for this route because it would serve more inhabitants than the Inhaminga route (a fact that seemed to contradict visual observations indicating denser settlement along the Inhaminga route). There are fewer rivers to cross on this section than on alternative routes. This route, if rehabilitated would provide good access for management and tourism to the west side of the park.

Disadvantages of the Gorongosa-Canda-Caia route (areas of potential environmental concern) include the crossing of Coutada 6 and the possibility that illegal hunting and logging activities in that area might be facilitated by road access. This is also a potential problem in the Coutada 13 area, but the alternative routes are all much worse for Coutada 13 in terms of potential impact. Perhaps the most serious concern is the close approach to the west side of Gorongosa Mountain. Settlement here is already "working its way up the mountain." Both subsistence and commercial uses are reported to be causing deforestation. This area is clearly primary tropical forest and, given the physical characteristics of the mountain and surrounding landscape, likely to contain a good number of endemic plants. The team was told that this side of the mountain is already quite intensively farmed, and rain forest is cleared right up to the high plateau.

The Gorongosa-Casa Banana-Inhaminga alignment is closer to the park in what appears to be a more densely settled area, and if the proposed extension of the park to include the mountain is achieved, this road will bisect the park. The park once extended to the road in this area, but its boundaries were changed in the 1970s to reflect more accurately the actual range of wildlife, eliminating the strip from the current northwestern boundary to the road, and adding lands extending almost to the rail line on the east.

Although this route would provide good access to the park for management and tourism, it has the potential to pose numerous threats. It would cross all the major rivers flowing from the mountain to the park. If settlement follows the improvement of the road, higher population could negatively affect the feasibility of current plans for integrated management and sustainable development in the "vigilance zones" and surrounding communities. The planned management of the mountain and the park as an integrated unit would be disrupted. This route would also cut across Coutada 6, with the same potential for impacts discussed above.

There is a third possible route along the Mwanza-Cherimonga plateau, following the rail line and currently impassable road from Muanza to Inhaminga. This route is a bad alternative from an environmental point of view because it cuts across an area that is not currently settled, and that would be more vulnerable to illegal incursions for timber extraction, given the richness and value of the forests along this route, and the difficulty of enforcing wildlife and forestry laws due to more difficult terrain, denser forest cover, etc.

Preliminary Application of Environmental Screening Form

The team used the environmental screening form as a framework for field observations and interviews with secondary sources of information. In practice, we found the form to be adequate to capture all of the information necessary to predict, prevent, and/or mitigate environmental impacts of rehabilitation of rural roads in this area. It should be particularly useful in case it becomes necessary to compare the potential environmental impacts of different alignments that may be proposed for rehabilitation.

A few minor adjustments would be in order: for example, protected areas should be identified within a wider radius (10-20 km) than currently suggested; the use of the term "significant" as it applies to wetlands needs to be defined. In general, "distance from the road" is not particularly useful as a measure of whether a particular forest, wetland, etc. is likely to be affected. It would be more appropriate to think in terms of the road's zone of influence. This includes the road itself, its immediate environs, and the "watershed" of feeder roads and trails that currently or in the future may bring people and goods onto the main road. For practical purposes, this might be estimated as a distance approximately one day's walk (20-30 kilometers) down each of the "tributaries."

The recommended process for screening -- both direct and indirect impacts -- is described in the main body of the text, that is, comprehensive mapping (at least 10 of the items on the screening form require an accompanying map), followed by physical observation and local consultations (both "ground-truthing" and capture of information not discernible from mapping), and concluding with identification of areas where focused analysis or EIAs would be appropriate, as well as pinpointing areas for post-construction monitoring. It would be quite useful for an IC-AID-DNEP-road contractor team to carry out the screening and analytical study for this road segment together.

It was observed during the site visit that a preliminary meeting with local authorities (chefes) would be both good politics and a potentially useful source of local knowledge at the beginning of any visit. DNEP now requires this as part of its formal process for road improvement.

This visit was carried out to identify appropriate methodologies and not to actually gather environmental data, and only a portion of the roads to be rehabilitated were observed. However, the following observations may be useful as a preliminary inventory of environmental concerns in the area. Numbered points follow the order of the environmental screening form.

1.(background data)

2.Land use/land cover: Immediately past the village of Gorongosa, the land is extensively settled and fields of maize, millet, and other crops are the predominant vegetation. Nearer the mountain, the vegetation is savanna and open woody vegetation that appears from the roadway to be uninhabited, but which colleagues from FHI informed us is in fact settled by people who subsist hunting and gathering rather than cropping, and who live farther from the

road. The soil or climate conditions in this area were said to be unsuitable for agriculture. However, we were told that the tsetse fly is not present and it is possible for cattle to be introduced.

National parks, reserves, and other protected areas: As noted above, the road crosses two coutadas in addition to approaching Gorongosa National Park. Although the team did not visit this area (the road becomes impassable at a significant distance from them) it is possible that there are populations of species of special concern, and that road access could contribute to illegal hunting and deforestation. In interviews with IUCN and other secondary sources, we were struck by how little is known about the status of wildlife in these areas. If there are vulnerable populations of rare or threatened species, it would be appropriate to consider support for increased law enforcement as a mitigative measure.

Relatively undegraded forest: By observation, there did not appear to be any within sight of the road. The overflight shows a good deal within the park and on and around the mountain. Physical, photo, or video interpretation by a qualified forester is required. The concern about further incursion up the mountain is probably grounds to require a focused environmental assessment. Although a number of mitigative activities are already planned in the area (see below), paving this road, which is not currently passable by truck, does raise questions about illegal traffic and whether it can or will be controlled.

3.Wetlands: There are a few small lagoons and wetlands within 100 meters of the roadway, and a few areas where muddy spots in the road seemed to indicate localized flow rather than rainfall catchment. Nearby wetlands may be important to local wildlife, particularly as water sources during the dry season. If additional settlement follows the road, it is possible that wetlands may be converted to agriculture or that watering wildlife may be vulnerable and exposed to hunters.

Herds of game animals: From the roadway, very little wildlife was sighted (one monkey, a few small rodents dead and alive on the roadway, about 50 birds of 5 or 6 different species). No evidence of scat, tracks, or road kill was observed. No wildlife was spotted from the air. This requires a more detailed pursuit of local knowledge.

4.Geology/soils: Some steep slopes were observed, particularly at river crossings.

6.Surface water: Much surface water was visible from the air in the region of the eastern parts of the road to Inhaminga. If analytical studies and monitoring are done in April, it may be difficult to distinguish seasonal from permanent surface water.

Current status of protection of Gorongosa National Park

About 4,500 people currently live inside the park boundaries, in 20 to 30 settlements. The current park plan does not foresee resettlement, but rather managing the inhabited zone as a sustainable use area.

The European Union is financing an 18-month "emergency program" to restore management in the park. Administered by IUCN/DNFFB, the project has established 10 guard posts, each of which is used as a base by a 4-man team patrolling its environs. These patrols record all wildlife sightings (species, number of adults and juveniles of each sex, location of sighting, behavior observed) as well as all sightings of evidence indicating people are in areas where they should not be or are performing illegal activities. (The park at the moment is closed to entry except by people actually living within its boundaries.) If one or more individuals is encountered, photographs are taken, identification requested, and any weapons confiscated and turned over to police. Other evidence (e.g. a net or snare, a bicycle) is recorded in a log.

This survey, if it is continued as planned when financing from the African Development Bank takes over the support of the project beginning in early 1997, could provide interesting data relative to road proximity and wildlife dynamics. Data from the control posts nearest the road could be compared with data from posts farthest from roaded areas could be compared to see if there are significant differences in wildlife sightings and trends, as well as incidence of illegal activities.

IUCN/DNFFB are also cooperating with the Ministry of Physical Planning for the Gorongosa District, which is preparing a master plan for the district, including an extensive household survey that will capture data on natural resource use, attitudes, and knowledge, among others. It was noted that data on local consumption of bush meat, for subsistence or trade, will be extremely hard to come by because villagers are not likely to provide accurate information about their own activities. Likewise, since sales of wild meat are illegal, it may be difficult to detect "back-door" commerce.

Necessity of EIA/Mitigation Activities

In this consultant's opinion, the potential indirect environmental impacts of rehabilitation of the road segment extending from Gorongosa-Canda-Caia do not appear to be problematical, with the exception of the potential for deforestation on Gorongosa Mountain. Although application of the screening and analytical study processes may turn up local areas warranting focused assessment in the areas not visited, what we observed was that the road crosses already inhabited areas and currently carries vehicle traffic for approximately 35 kilometers beyond Gorongosa.

The European Union emergency project, to be succeeded by the African Development Bank project, supporting IUCN/DNFFB protection activities in Gorongosa National Park and its environs, encompasses most of the types of activities that might normally be considered as mitigation for improved access. Baseline data is being gathered about wildlife occurrences and community awareness of the park, as well as natural resource use patterns that may pose a threat in the medium to long term. "Zones of special vigilance" have been established in the areas immediately surrounding the park, its proposed extension, and for 50 meters on either side of rivers flowing from the mountain into the park. A ranger force of 59 (9 DNFFB, 50 community recruits) patrols and monitors access to the park, and promotes enforcement actions against persons carrying out illegal activities. This force is due to be

substantially increased under the ADB project. The program also assists "fiscais" responsible for enforcing DNFFB wildlife policies, for example, the prohibition against sale of wild animal meat. The fiscais have been trained and armed (with 30/30 weapons, so their access to ammunition is limited to what is officially distributed to them).

Plans for long-term monitoring of the park and its surrounding zones have been developed, so it should not be necessary for USAID to mount extensive efforts of its own to determine road impacts. A tourism program foresees six to ten "camps" accessible by secondary roads or fly-in operators, with community participation elements that should encourage local acceptance and vigilance of the park, in addition to providing economic benefits. The possibility of community-based conservation activities is under investigation. Some are already under way: for example, a program that provides chickens and goats as substitutes for wildlife consumption. Local people are permitted controlled access to the park for fishing, collection of honey, wild fruits, and medicinal plants. An apiculture program may be developed. Paralleling this project, Red Barna has an environmental education project in the area that also has mitigative value.

At present, the main entrances to the park have been demined. Chalets for park personnel will be constructed/rehabilitated once the sites have been finally approved.

In other areas, PVO activities in and around Gorongosa are also focusing on programs that might be considered promotion of the beneficial impacts expected from road rehabilitation and mitigation for potential adverse effects. Many agricultural extensionists are working in the area. Several PVOs are fostering community-based road maintenance on tertiary roads and tracks. An environmental education program may get under way soon. Thus, even if the road rehabilitation does bring some adverse impacts, there is a considerable balancing weight of resource-conserving and sustainable use activities in the area.

ATTACHMENT D

Hypotheses About Indirect Environmental Impacts of Rural Roads Rehabilitation

ATTACHMENT D

Hypotheses About Indirect Environmental Impacts of Rural Road Rehabilitation

Depending on improved access,

- Trade in animal products (meat, skins, etc.) may increase, with the potential to cause depletion of species populations.
- Timber extraction may increase, with the potential to cause deforestation.
- Commerce in non-timber forest products may increase. If fuelwood and charcoal are sold to urban markets, there is cause for concern about deforestation. However, the establishment of markets for fruits, nuts, and other sustainably harvested products may actually serve as a deterrent to deforestation.
- Tourism to protected areas should increase.
- Extension visits to promote sustainable agricultural practices may increase.

Depending on changes in population density,

- Consumption of wood for building materials, fuelwood, and charcoal may cause localized deforestation.
- Consumption of wild plants and animals for food and other subsistence purposes may locally deplete populations.
- Parks and other protected areas may be invaded for colonization.

Depending on changes in agricultural patterns,

- Natural vegetation is likely to be cleared for cultivation. This is cause for concern if the natural vegetation is (a) classified as relatively undegraded tropical forest; (b) inside a protected area; or (c) important habitat for an endangered species or other species of special concern. Wetlands and lagoons as well as forests and grasslands are included in this category.
- Domestic livestock may displace wildlife in grazing lands.
- Wildlife that prey on livestock or crops are likely to be destroyed.
- Exotic species (including livestock parasites, viruses, or bacteria) may be introduced that will kill or displace native plants or animals.
- Soil erosion may result from cultivation or over-grazing of fragile lands, with downstream effects in streams and rivers.
- Shortened fallow periods may deplete soils.
- Shifts toward higher value crops may result in improved soil conservation practices.

ATTACHMENT E

Scope of Work for an Origin and Designation/ Vehicle Traffic Count Survey

ATTACHMENT E

SCOPE OF WORK FOR AN ORIGIN AND DESTINATION/VEHICLE TRAFFIC COUNT SURVEY

I. BACKGROUND

The Rural Access Project (RAP) is a $53.0 million, seven-year long activity whose Goal coincides with the Mission Strategic Objective of"increased income for rural households in targeted areas." The goal will be met through achievement of the activity's Purpose, "increasing access and reducing the cost of transportation in targeted rural areas with a high potential for agricultural growth and large population concentrations." The extremely poor condition of the current rural road system is a major impediment to increased access, with associated high economic and social costs. RAP supports Government of the Republic of Mozambique (GRM) priorities, including the recently completed National Poverty Reduction Strategy, and other donor road sector activities under the World Bank's ROCS-2 project.

Under RAP an estimated 1,400 kilometers of rural roads in four key agricultural provinces located in central Mozambique will be rehabilitated to an all-weather standard. The criteria for preliminary road selection includes securing prior USAID "emergency road opening~ investments under the previous Rural Access Activity (RAA) project, location in an area of significant agricultural potential and high population concentration within the Mission's overall strategic target area, inclusion in the GRM's National Roads Program financed under ROCS-2, and linkage to an existing facility or another road activity under ROCS-2. Detailed economic, social soundness and environmental analyses following methodologies discussed in the Project Paper will be performed on all proposed road segments, except those opened under RAA, prior to final selection, design and construction. See table on next page for presentation of proposed roads to be rehabilitated.

The project goal is increased income for rural households in targeted areas, with the following measurable indicators:

a) percent increase in average rural household income;

b) off-farm income as a percent of total household income.

TABLE 1 -- Initial Roads Proposed For Rehabilitation

Road Segment	**Class**	**Km**	**Est'd. Cost** (US$ Million)	**Contract** (Number)
YEAR I				
Cambulatsitsi-Mutarara	2	222	3.0	1.1
Mutarara-VN da Fronteira	2	40	0.5	1.1

Muturara-Chire River	2	30	0.5	1.1

Road Segment	**Class**	**Km**	**Est'd. Cost** (US$ Million)	**Contract** (Number)
Sena-Caia-Chemba	2	100	1.0	1.2
SUBTOTALS		**392**	**5.0**	**2**

NOTE: Year 1 roads were improved under RAA (656-0237).

YEAR 2				
Caia-KM 13 South of Caia	1	13	0.4	2.1
Inchope-Gorongosa	1	70	2.2	2.1
Gorongosa-Inhaminga	1	112	3.9	2.2
Inhaminga-Caia (13km S)	1	72	2.5	2.2
SUBTOTALS		**267**	**9.0**	**2**
YEAR 3				
Pinda-Morire	2	110	4.0	3.1
Morire - Milange	2	95	3.3	3.1
SUBTOTALS		**205**	**7.3**	**2**
YEAR 4				
Morrurnbala-Derre	3	75	2.6	4.1
Ribaue-Lalaua	3	77	2.7	4.2
SUBTOTALS		**152**	**5.3**	**2**
YEAR 5				
Malema-Vacha-Molocue	3	106	3.0	5.1
Iapala-Vacha	3	83	2.3	5.1
SUBTOTALS		**189**	**5.3**	**1**
YEAR 6				
Cava-Nampuecha-Muhula	3	126	0.8	6.1
Netia-Nacala Velha	3	82	1.3	6.2
SUBTOTALS		**208**	**2.1**	**2**
GRAND TOTAL		**1,417**	**34.0**	**11**

The project purpose is to increase access and reduce the cost of transportation in targeted rural areas, with the following measurable indicators:

a) volume of marketed goods on rehabilitated roads increase by 10 percent per year;

b) percent decrease in transportation costs along rehabilitated roads in the first year after work completion:

- 25 percent decrease in cost per ton/km
- 20 percent decrease in cost per passenger/km;

c) use of selected social service facilities accessed by rehabilitated roads increases by 20 percent in the first two years after work completion; and,

d) the percent share of farm-gate prices in wholesale prices for selected commodities in rehabilitated road catchment areas increased by 15 percent in the first year after work completion.

As noted above, under RAP a roadway between Inchope and Caia, on the Zambezi River, is tentatively planned for major rehabilitation/construction to an all-weather (paved) standard. Although long-planned, this section of EN-I (the main north-south highway) was never completed. The 70 km between Inchope and the town of Gorongosa to the north is paved, and in the early 1970s work was begun on extending the highway north, via Canda and Nhamacholomo, to the paved highway between Matondo and Caia. This routing was originally planned as it connects with EN-I to the south at Inchope, and an alternative transport route to the east, from Dondo to Matondo via Inhaminga, was served by a railway line to the bridge over the Zambezi River at Vila de Sena. However, the railway line is no longer in use and a significant proportion of existing truck traffic originating in Beira, including its port, travels to the north via Inhaminga.

II. STATEMENT OF OBJECTIVES

The major objective of the work is to determine the best possible routing of a rehabilitated/new class 1 north-south highway connecting the highway between Beira and Zimbabwe, and the Zambezi River, and the appropriate level of improvement/construction. The specific objectives of the work include:

A) determining existing vehicle movement between central and northern Mozambique in terms of numbers, types of goods hauled, costs, origin and destination, and routing;

B) projecting future vehicle movement between central and northern Mozambique; and

C) based on future projections of usage, and an associated economic cost-benefit analysis, recommendation of the preferred routing between the Beira corridor and the Zambezi River.

III. SPECIFIC WORK REQUIREMENTS

A) Preparation. Prior to commencing any substantive work, the Contractor shall meet with the Director of the Planning Division of the National Directorate of Roads and Bridges (DNEP), the RAP implementing institution, to discuss the effort and existing DNEP procedures for similar work, and review and existing traffic count and origin and destination survey data.

B) Survey Design. The survey design shall include, but not necessarily be limited to, the following elements:

1) Origin and destination of traffic
2) Daily vehicle counts
3) Owner of vehicle
   a) private individual
   b) private firm
   c) state firm
   d) international
4) Cost per:
   a) truck-kilometer
   b) ton-km hauled
   c) passenger-km
5) Type, volume and value of goods hauled[12]
6) Type of vehicle
   a) truck
   b) bus
   c) automobile
7) Axle-weight (trucks only)
8) Favored routing

C) Work Plan. Concurrently with the development of the final survey design, the Contractor shall produce a draft work plan for review and comment by DNEP and USAID, to be submitted along with the final survey design.

D) Field Work. The O&D field survey shall be conducted daily at up to 5 posts over a four month period beginning O/A April 1, 1996. Proposed survey posts shall be submitted with the draft survey design for review by DNEP and USAID. Final posts will be specified in the final survey design. Likely survey posts include:

-Inchope

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* AVolume@ shall be measured in metric tons or number; "Value" to be calculated in USS equivalent; "Goods" include: agricultural produce, staple food, agricultural inputs, kitchen utensils, kerosene, soap, clothing, tools, etc.

-Caia
-Dondo
-Kangaroo
-Vila Nova da Fronteira (Border with Malawi)

In addition to daily vehicle surveying, including axle weights, conducted at field posts, the Contractor shall conduct a representative survey of transport operators and users, e.g., independent truckers and trucking firms, import/export firms, bus companies, etc., in up to five major O&D points. These sites are expected to include: Beira, Maputo, Vila Nova da Fronteira, and Mutare. The purpose of this survey is to gain further insight into the prospective demand for a year-round road link between the Beira corridor and the Zambezi River.

IV. PROPOSED STAFFING

The Contractor will provide the following personnel:

A) Transport Economist (Team Leader) - 40 workdays
B) Statistician - 20 workdays
C) In-country Project Manager - 120 workdays
D) Field Surveyors (5) - 80 workdays each
D) O&D Surveyor - 30 workdays

V. TIMETABLE AND DELIVERABLES

A) Timetable. Work should begin o/a June 15, 1996, with completion o/a November 15, 1996. The Team Leader will travel to Maputo/Beira two times: at the beginning of the effort, and when the results of the survey are being written into the report. The Statistician will travel once to Maputo/Beira: when the survey results are being tabulated.

B) Deliverables.

1) Within fifteen (15) working days of the start of work, the Contractor shall submit a draft survey design to DNEP and USAID for review and comment (3 copies each), who will have five (5) working days to respond. Within another ten (10) working days the Contractor shall produce a final survey design (3 copies each) for approval by DNEP and USAID.

2) At the conclusion of the work, the Contractor shall submit a final report written in English, except that an executive summary not exceeding three pages shall be written in both English and Portuguese. Three copies of the report shall be submitted to USAID's Office of Project Design and Management (PDM), and three copies to DNEP.

VI. REPORTING RELATIONSHIPS

A) The Contractor shall report to Thomas Johnson, Project Development Officer, USAID/Mozambique.

VII. OTHER PROVISIONS

A) Language: Fluency in written and spoken English by the Team Leader, Statistician and In-country Project Manager is required. The in-country Project manager and O&D Surveyor shall also be fluent in Portuguese.

B) Logistics:

1) The Contractor is expected to arrange office support, provide any secretarial assistance, administrative support (communications, transport, etc.)

2) The base of operations shall be the city of Beira

ATTACHMENT F

ANNOTATED BIBLIOGRAPHICAL REFERENCES

ATTACHMENT F

ANNOTATED BIBLIOGRAPHIC REFERENCES

The following bibliographies are a reference source available to the RAP institutional contractor and to the PIAS contractor implementing RAP update monitoring. The material is organized into three sections and includes the following: secondary data sources for the economic and social soundness; road sector and RAP related documents, including those consulted by the team contracted to draft the PIAS; and an environmental bibliography.

The material will be of particular importance in undertaking research for the feasibility analyses of the PIAS (social soundness, economic and environmental) where a literature review of secondary sources is to be executed. Material is presented in the format of an annotated bibliography for the social soundness and economic assessments (only) .

Secondary Data Sources for the Economic and Social Soundness Assessments

The following is a non-exclusive example of the range of documentation the institutional contractor may draw upon in implementing the PIAS, particularly the assessments. Development agencies, including the PVO's and multi-lateral and bi-lateral donors undertake an extensive range of reporting and documentation including baseline surveys, project reports and other documents. This documentation includes extensive data collection and analysis on a range of indicators including income and expenditure, agricultural production and commercialization, displacement and resettlement and livelihoods. As these are much the same type of impacts which the PIAS will describe and track extensive reference should be made to these data sources both for information and methodology.

World Vision

World Vision, "Report of the Socio-Economic Survey District of GuruJ Zambezia". May 1995
Carried out in a range of districts in which World Vision is operating in Tete, Sofala, Zambezia and Nampula Provinces. Utilizing a Farming Systems Research approach the report includes data collection and analysis of results covering social structure, gender related division of labor, farming activities and constraints to production, availability of labor, external inputs, commercialization patterns and strategies, non-farm income etc.

---, "Survey of Household Wealth prior to Veg-pack Distribution Tete Province" May 1995
Survey of household income, assets and expenditures among returning populations prior to seed and tool distribution.

---, "Agricultural Recovery and Development Program Baseline Survey" 1995
Baseline survey report covering agricultural production and cropping patterns, use of inputs, constraints to production, livestock holdings, household wealth, etc.

---, "Food Security Impact Assessment System Baseline Data" April 1996

Presentation and analysis of selected food security indicators drawn from World Vision sources and the Guelph University Food Sufficiency Report. Includes, at household level, agricultural production, yield per unit of land, amount of land under cultivation, diversification/number of crops cultivated, sources of household food consumption, number of months of food stocks, frequency of food consumption, food sufficiency status. Report to be updated every two years.

---, "Farming Systems and Natural Resource Survey Tete Province June 1994"
FSR research study undertaken in Tete province for WV programming exercise. Includes household and resource survey results and FSR constraints analysis.

CARE

CARE International, "Mozambique: Food Security in a War Economy A Rapid Livelihood Security Assessment for Machaze, Mabote and Massingir Districts" April 1995
Report of a rapid assessment exercise undertaken in three districts of Gaza and Manica Provinces. Survey summary report and three detailed annex reports one of each district surveyed. Using data collection and situation analysis, the report examines localized conditions and livelihoods in the post-war rural economy outlining changes to crop diversity and income patterns, dietary and consumption patterns, (lower production/consumption of cereals increased use of wild or hunger foods, reliance on own production and low participation in food markets as buyers) population movements and service availability. Includes nutritional assessment based on anthropometric measurement and dietary patterns.

---, "Oil Press Enterprises in Nampula Project", Baseline Survey Report, CARE, 1996
Report covers conditions in the sector, including demand for the product (strong), profitability vs a vis formal sector, demand (milling service) by small scale growers and expansion potential.

Food For The Hungry International

FHI, ASofala Rehabilitation Project Project Impact Survey@ Prepared for Food for the Hungry International, February 1994
FHI Project impact survey report covering activities since 1990 in seed and tool distribution, agro extension and micro- enterprise development in three districts of Sofala province (Dondo, Buzi, Maromeu). Contains a constraints analysis of small holder production, prescriptive intervention activity and evaluation of same.

---, ASofala Province Extension and Agricultural Rehabilitation Project Baseline Survey@ January 1995 Prepared for Food for the Hungry International, (Tracey L. Henderson) June 1995
FHI baseline survey report containing data on smallholder agriculture, farm and non-farm household income, market access and constraints to expansion of production.

Medicins Sans Frontiers Celula Inter Seccoes

MSF-CIS, "Boletim Mensal da Seguranca Alimentar". (Monthly Bulletin)
Monthly report of food security conditions based on primary data collection with an expansive coverage of districts throughout the country. Provides up to date information on local level food access, crop conditions, market availability and price fluctuation, population movements and

other variables. The most detailed and comprehensive source of information for food insecure areas/numbers. Via sentinel standardized data collection, tracks emerging areas of scarcity. Effective establishment of priority districts, food insecurity concentrations and numbers.

---, AMSF-CIS Rapid Food Security Assessment@ November 1995
Rapid food security assessment in 9 high priority districts of Gaza, Inhambane, Manica, Sofala, Niassa and Zambezia Provinces. Undertaken as an exercise to prioritize and target assistance to vulnerable populations. Random sample survey instrument and rapid situation analysis of livelihood systems. Data collection covering household wealth indices (livestock, consumer goods), and nutritional surveys. Combined with MSF-CIS monthly Asentinel@ data collection, report used to prioritize intervention, identifying high vulnerability areas and making recommendations for increase in beneficiary numbers.

Academic Research Papers

MSU/MOA
Michigan State University together with the Ministry of Agriculture undertakes an extensive range of focused empirical research on the agricultural sector. The following is a selection of the papers available.

MOA/MSU/UA Research Team "The Determinants of Household Income and Consumption in Rural Nampula Province: Implications for Food Security and Agricultural Policy Reform" Working Paper No. 6E, August 1992.
The paper concerns the degree to which small scale farmers are able to respond to incentive signals in the PRE (structural adjustment program) policy environment. Household survey findings (Nampula) in the study show that market participation in food purchases and % of off-farm income is lower than the SSA average indicating the poor development of food markets and rural non-farm income opportunities. The expensiveness or non-availability of food markets has, in turn, produced survival strategies marked by unusually high levels of reliance on own production food sources. Opportunities for expansion into cash crop participation are constrained by food market instability. The authors identify the size of land holdings as a large determinant of household income and identify stable food markets, combined with increased demand via cash crop or off farm income as the medium to long term solution to current constraints on expansion of income.

MOA/MSU Research Team "A Socio-Economic Survey in the Province of Nampula: Agricultural Marketing in the Smallholder Sector" Working Paper No. 4E January 1992.

The end to entry barriers for buyers in the trading system and de-control of prices under the PRE was undertaken with the objective of allowing free movement of goods, improving producer prices and providing production incentives to farmers. Report concerns marketing behaviour of smallholder producers regarding food purchases/sales and empirical evidence of impact of sectoral deregulation in terms of emergence of new market actors (buyers) and the prices paid to producers. Despite ongoing war conditions since the reforms, survey data collected for the study shows that: farmers have continued and even increased their participation in food markets; that market integration is higher than expected; the reforms have stimulated the entry of new buyers

(ambulantes) who in general have tended to pay higher prices although rural stores (lojistas) paying lower prices continue to dominate rural marketing. The report concludes that in order to move toward a truly competitive rural marketing system, GRM policy should create a favourable enabling environment for expansion of the sector.

MOA/MSU Equipa de Pesquisa " Diagnostico da Estrutura, Comportamento, e Desempenho dos Mercados Alimentares Rurais de Mocambique" Relatorio Preliminar No. 19. 4 Julho, 1995
Rapid assessment survey of the structure and performance of rural food markets. Particular emphasis on white maize and associated marketing channels and agents. Notes reversal of war time food marketing from ports (imports) outwards to current trend of re-establishing linkage of areas of local surplus production with district and urban markets.

PSA MA/MSU Equipa de Pesquisa, APadroes de Distribuicao de Terras no Sector Familiar em Mocambique: A Similaridade entre duas Pesquisas Distintas e as Implicacoes para a Definicao de Politicas@. Artigo apresentado a conferencia Nacional Sobre a Terra em Mocambique, Maio de 1994
Results of inquiry into patterns of land holding in rural small holder sector. Tests hypothesis of land abundance in Mozambique particularly in context of large scale population movements induced by war related displacement and subsequent return. Outlines areas for further research.

MSU/MOA "Smallholder Cash Cropping and Food Security in Mozambique: Research Methods," 1996

Government Of Mozambique Publications

"The Poverty Reduction Strategy for Mozambique". The Poverty Alleviation Unit, Ministry of Planning and Finance. March, 1995
Poverty strategy framework document produced by GRM Ministry of Planning. Outlines nature and extent of poverty in Mozambique and establishes a prioritized policy and intervention framework covering GRM and donor activity. Prescribes priority strategy in maximizing competition in rural markets; investment in priority rural infrastructure using labour intensive methods; increasing the share and expenditure level of primary education and primary health care; and establishment of a Disaster Response Safety Net.

---, "Rural Livelihoods and Poverty in Mozambique" The Poverty Alleviation Unit, Ministry of Planning and Finance. February, 1995
Descriptive analysis of rural poverty. Overview of current conditions, war related disruption to rural livelihoods and survival strategies. Establishes priority framework for intervention. Basis for subsequent drafting of the APoverty Reduction Strategy@ document (as abvove).

MOA, Directorate of Ag. Economics, "DEA National Household Survey on Agricultural Production", 1994

Multi-Lateral Donor Publications

World Food Programme-Mozambique, "Country Strategy Outline Mozambique 1995-2001", Final Draft June 1995

Mission strategy document outlining activity and projected beneficiary needs.

---, "Emergency Food Aid 1995/96 Document for Planning/Information", August 1995
Mission report of food aid needs, beneficiary numbers, tonnages and implementing partners. Broken down by district.

---, AWFP/FAO Crop and Food Supply Assessment - Mission Report". May, 1995.
Annual crop assessment exercise used as basis for prediction of emergency/non-emergency food aid imports.

UNDP / UNHCR District Profile
An inventory of physical infrastructure and statistical data on population, school enrolment, number of medical staff, rates of literacy etc., broken down by District. This will be of use for the Assessments and Infrastructure Surveys although the infrastructure inventory would need to validated through the Infrastructure Survey.

A series of World Bank funded sectoral studies on the constraints to agricultural marketing may be of use to the contractor of which are the following.

Coulter, Jonathan "Maize Marketing and Pricing Study - Mozambique" Main Report and Appendices, Report No. R2247. Natural Resources Institute Kent England May 1995
One of four World Bank sub-sectoral studies on constraints to agricultural expansion. Definitive descriptive and prescriptive analysis of staple food (maize) marketing in Mozambique. Uses a constraints analysis of operation of marketing system, market development, regional and national market integration, and binding constraints in the smallholder sector. Focuses on regulatory environment and government intervention in the sector via ICM, identifies actors involved in the marketing system and outlines the extensive array of controls which govern commercial activity and food marketing. Evaluates practical limitations to effective public sector involvement in the sector and makes recommendations for enhancing market efficiency and development including deregulation/liberalization of pricing and marketing controls.

Fok, Michel AThe Cotton sub-sector in Mozambique: Institutional Diversity, Performance and Prospects for Improvements@ (Draft) Republic of Mozambique Ministry of Agriculture and Fishing, Directorate of Agrarian Economics, May 1995
One of four World Bank agriculture sub-sectoral studies. Records historical structure and performance of the cotton sub- sector from the colonial period to the present including the Aconcessionaires@, larger producers and small holders. Overview of current performance of the sector including the players, regulatory environment, competitiveness, technical options and summary of recommendations. Particular focus on marketing network performance, constraints to expansion and growth projections.

Himarsson, Hilmar. T ACashew Pricing and marketing in Mozambique@ (Second Draft) World Bank Working Paper

One of four World Bank sectoral studies on constraints to agricultural expansion. Records historical structure and performance of the cashew industry. Overview of current performance of the sector including output, actors, regulatory environment, local pricing and export controls, competitiveness of production and local processing. Summary of recommendations including export liberalization as means of raising producer price and expanding output. Source of intense controversy between Bank, Government and cashew processors resulting in a staggered 4 year export tariff reduction plan.

Road Transport and RAP Documents

The following documents have been identified covering the Mozambican road transport sector including the RAP related project documents as well as a selection of rural road intervention studies.

Studies for RAP and ROCS-1 and 2 roads:

World Bank, "ROCS-2 Staff Appraisal Report", 1994

DNEP, "Consultancy Services for a Feasibility Study for the Rehabilitation of the EN1 Between Inchope and Caia," (tender document) 1995

USAID/Mozambique "RAA Project Paper", 1994

USAID / Mozambique "Mozambique: Rural Access Project" August 1995

Mott McDonald, "Appraisal on Rehabilitation of Rural Feeder Roads in Zambezia Province," 1994 (feasibility study of RAA Roads)

Morrison Knudsen, "Mozambique Rural Roads Interventions Study", 1995 (Study for RAP road)

Review of Non-Mozambican Rural Roads Studies

Lyon Associates, James R. Switzer Associates "Tanzania Rural Roads Feasibility Study" Prepared for USAID

Louis Berger International, "Bangladesh Rural Roads Study: Phase I Report," 1978

Brokensha, David and Riley, Bernard "Rural Access Roads in Western Kenya: Socio-Economic and Environmental Impact Studies 1979-1983", 1980

USAID "Impact of Rural Roads in Liberia", Project Impact Evaluation Report No.6 1980.

Devres, Inc. "Socio-Economic and Environmental Impacts of Low Volume Rural Roads" - Review of the Literature, (Report for USAID) 1980.

USAID/PPC, "Rural Roads Evaluation Summary Report", 1982

EPA, "Evaluation of Ecological Impacts from Highway Development", 1994

MSI, "Agricultural Transport Assistance Program (Tanzania) Impact Study,"1996

MSI, "Institutional Assessment of Food for Work and Feeder Programs in Bangladesh" May, 1987. For USAID-Dhaka

USAID/Mozambique Studies

Chemonics International, "Programmatic Environmental Assessment of USAID/Mozambique Transition Program", 1993

USAID "Origin and Destination/Vehicle Traffic Count Survey, Year One and Two RAP Roads", Scope of Work

GRM

"Plano de Reconstrucao Nacional" 1994 - 96 (3 Vols.)

DNEP, "Guidelines for the Inception Report of Feasibility Studies" May 1994

Visual Records, Videos

USAID video about the roads and the Dona Anna Bridge
Videos (2) of the Mutarara RAP road alignments

Bibliography for the Environmental Assessments

Anon. "Programmes of the National Directory of Forestry and Wildlife in the Area of Gorongosa-Marromeu". Document dated march 1996 from files of Environment Officer. With attachment, "Alignment of Estrada Nacional no. 1 in Sofala Province."

Asian Development Bank. "Environmental Guidelines for Selected Agricultural and Natural Resources Development Projects". Environment Unit, Infrastructure Department, 1987.

Booth, Greg A. "Biological Diversity Monitoring Indicators Within a Natural Resources Management Framework for Sub-Saharan Africa". Prepared for USAID AFR/ARTS/FARA and the Forestry Support Program USDA/FS/IF, April 1993.

Code of Federal Regulations. 22CFR Ch.II (4-1-89 Edition) Part 216 -- Environmental Procedures. U.S. Government, 1989.

Direccao Nacional de Florestas e Fauna Bravia. "Estrategia de Desenvolvimiento Forestal & Programa Provisorio para o Sector Florestal e de Vida Silvestre". Plan prepared with assistance from UNDP and FAO, 1991.

Direccao Nacional de Florestas e Fauna Bravia. "Elephant Conservation Plan for Mozambique". Plan prepared by African Elephant Conservation Coordinating Group, UK, 1991, and endorsed by DNFFB in covering letter dated 19 September 1991.

Environmental Consultants, Inc. "Environmental Assessment: Panama Rural Access Roads Project". Prepared for USAID/Panama, May 1978.

Environment Working Group (GTA). "Mozambique: The Present Environmental Situation 1990". Study financed by NORAD. Preliminary survey, with annexes.

EPAT Project (Winrock International Environmental Alliance). "Environmental Issues Relevant to the Preparation of USAID/Mozambique's Country program Strategic Plan". Report to USAID/Mozambique, August 1994.

Ministerio para a Coordenacao de Accao Ambiental. Programa Nacional de Gestao Ambiental. Maputo, August 1995.

Galli, Rosemary. "Gorongosa: A Report". 23 July 1995 trip report.

SIDA Consultancy Services for Preparation of Evaluation Guidelines for Road Work in Mozambique (Inception Report) March 1996

USAID/Madagascar. "Environmental Monitoring, Evaluation, and Mitigation Plan. CAP Project". In MAD Road PEA 1/96, Section 7.

USAID/REDSO. "Project Environmental Impact Checklist: A Reference for Environmental Assessments". REDSO Mission Environmental Officers Training, March 9-11, 1992.

World Bank. "Roads and the Environment: A Handbook". Report TWU 13, September 1994.

Sources that should be followed up by institutional contractor

_Peter Tilley, IUCN (did doctoral thesis in Gorongosa area).
_Oswaldo Manzo, head of forestry department, and Erico Cruz, DNFFB, for information about activities promoting use of alternative fuels.
_GERFFA office in Beira, African Development Bank, for information about household surveys, knowledge and use of wildlife, occurrence of endangered species and Aida Taju.
_ Forest inventory department at DNFFB, which has done some remote sensing and GIS interpretation, as well as technicians at FAO.

Interviews

John Hatton, Department of Biological Sciences, University of Eduardo Mondlane.
Judy Oglethorpe, IUCN.