

67185



**SUSTAINABLE AGRICULTURE AND ENVIRONMENTAL  
REHABILITATION PROGRAMME (SAERP)  
UNECA**

**BASIC GUIDE  
ON  
ENVIRONMENTAL IMPACT ASSESSMENT IN  
SAERAR PROGRAMME**

**Volume VI**

**Joint Production of the Regional Council of the  
Amhara Regional State and  
The United Nations Economic Commission For Africa**

**August 1996**

## Abstract

The purpose of this Project document/guideline is to assist the SAERAR's policy makers, authorities and professionals to enable them to incorporate the environmental protection parameters into the project preparation process. Sustainable agriculture development is achieved most efficiently when negative environmental impacts are identified and addressed at the earliest possible study stage. Thus the project staff will be in a better position to strengthen the overall project context through improvements in aspects relating to environments by providing fundamental information and common baselines on environmental considerations for small scale agricultural development projects, within the SAERAR frame work and focusing on those operations with potential negative environmental impacts.

The planning design and operation of water resources projects should be based on an overall assessment of impacts while considering the entire basin as a single unit. Some of the important direct environmental impacts caused by the absence of environmental mitigative measures in water resources development Projects are highlighted in this document. The direct and indirect impacts of dams and reservoirs and irrigation and drainage projects are issues related to resettlement, loss of agricultural land & forests due to flooding, health effects, water logging & salinity & sedimentation.

EIA is a procedure to determine the potential environmental effects of proposed development in a form that permits a logical and rational decision to be made. It has also evolved as a comprehensive approach to evaluation, in which environmental considerations are given their proper weight in the decision-making process. Attempts can be made to reduce potential adverse impacts through the identification of possible alternative sites and/or processes. EIA can therefore be thought of as a basic tool for the comprehensive assessment of development proposals.

The results of assessment can be found in a document called Environmental Impact Statement (EIS). This document contains a discussion of beneficial and adverse impacts considered to be relevant to the project plan. The completed report, or EIS, is one component of the information upon which the decision maker ultimately makes a choice. At this stage, other factors such as unemployment and food security may influence the outcome of the decision. A final decision can be made keeping in mind the likely consequence of adapting a particular course of action, and where necessary, introducing appropriate monitoring and auditing programs to reduce any adverse impacts that may have been identified in the assessment process.

Planning within the SAERAR frame work is a process which seeks solutions to problems and needs or which develops actions that will satisfy goals and objectives at a pre-implementation stage by critically examining and analyzing the inputs, potentials and

constraints. Normally the planning exercise is not accomplished as one continuous activity but is broken down into several steps. SAERAR has the following project planning process.

- Reconnaissance phase;
- Feasibility study phase;
- Detailed design phase;
- Construction Phase; and
- Operation Phase.

To be effective, an environmental assessment must be conducted parallel to other studies so that the environmental consequences can be examined at the earliest planning stage. Advice can therefore be given on the impacts of alternative approaches to the problem at hand.

For each stage of project planning, there should be a matching environmental planning. The reason for including an environmental quality objective in the planning exercise is that environmental quality then becomes an integral part of the whole planning process.

One of the main advantages of small scale irrigation is their relatively limited environmental impact. A statement on the environmental soundness of these projects is nevertheless required. The stage of the project cycle and the type of project under development determine the level and detail of the environmental assessment. For example, dams and reservoirs are assigned to category 'A' and 'I' of the world bank's and African Development Bank's environmental assessment, respectively, which obligate the application of EIA. Whereas small scale irrigation is assigned to category B, that means more limited environmental assessment is required. This document suggests overall procedures & methods to handle environmental considerations in project cycle. The two major level of environmental studies namely Initial Environmental Assessment (IEA) and Environmental Impact Assessment (EIA) during reconnaissance and feasibility study stage, respectively, are discussed in detail in this document.

## TABLE OF CONTENTS

	Page
1. INTRODUCTION .....	1
1.1. Geography .....	1
1.2. Climate .....	1
1.3. Health .....	2
1.4. Water Supply and Sanitation .....	2
2. SAERAR'S DEVELOPMENT OBJECTIVES AND PRIORITIES .....	3
2.1. Development Objectives .....	3
2.2. SAERAR's Project Selection Criteria .....	4
3. PURPOSES OF THE GUIDELINES .....	5
4. WATER RESOURCES DEVELOPMENT AND ENVIRONMENTAL IMPACTS .....	5
5. ENVIRONMENTAL ASSESSMENT .....	12
5.1. Introduction .....	12
5.2. Environmental Assessment in the Project Cycle .....	13
5.2.1. Environmental Consideration During the Identification and Reconnaissance Study Stage .....	14
5.2.2. Environmental Consideration During the Feasibility Study Stage .....	16
5.3. Main Stages of the EIA Process .....	17
5.3.1. Preparatory Stage .....	18
5.3.2. A Step by Step Procedure for Developing EIA .....	19

	Page
6. ENVIRONMENTAL IMPACT ASSESSMENT (EIS) .....	27
7. DECISION MAKING AND MONITORING .....	30
7.1. Decision Making and Monitoring .....	30
7.2. Monitoring .....	30
8. RESOURCES NEEDED FOR AN EIA .....	31
9. INSTITUTIONAL ASPECT .....	33
9.1. Work Organization .....	33
9.2. Training for EIA Team .....	33
REFERENCES .....	34

#### APPENDIX

Appendix I - Checklist of Environmental Effects Commonly Associated with Water Resources Development Projects .....	35-37
Appendix II - Questionnaire Environmental Impact Assessment .....	38 -45
Appendix III - Format for the EIA Report .....	46 - 47

# 1. INTRODUCTION

## 1.1 Geography

The Amhara Region has a total area of about 170752 Km<sup>2</sup>, of which 72 % is cultivated and homesteads, 20 % bushlands and forests, and 8 % grazing. The region shares borders with Sudan and Belshangul to the West, Tigray to the North, Afar to the East, and Oromia to the South. The location of the Region is shown in Figure 1.1

The region comprises 12 zones and 112 weredas and contains about 14.5 million people and of which the rural and urban population is estimated to be about 89 % and 11% respectively. The vast population of the region are employed in subsistence agricultural activities.

## 1.2 Climate

The Region lies within all three climatic zones namely Kolla(500 - 1600 masl), Woina Dega (1600 - 2500 masl) and Dega (2500 - 3200 masl).

**Temperature:** Average daily temperature in the region vary widely with a distinct temperature range between a mean maximum of 24<sup>0</sup> C and a mean minimum of 11<sup>0</sup> C.

**Rainfall:** The mean annual rainfall in the Amhara region ranges between 700 mm and 2000 mm. having more or less linear relationship to altitude. The rainfall hydrograph has bimodal feature representing, the short and long rain seasons known as Belg and Kiremt respectively.

### **1.3 Health**

Prevention and control of infectious and parasitic diseases are the major health problems in the region. The capacity of Regional health care centers to prevent and control communicable diseases is limited and most health care facilities suffer shortage of the most basic diagnostic and medical equipment to render appropriate.

### **1.4 Water Supply and Sanitation**

Access to safe drinking water is limited only to few percent of the Region's population and the rest of the population uses unprotected water sources for potable water supply coupled with a lack of proper sanitation.

## **2. SAERAR'S DEVELOPMENT OBJECTIVES AND PRIORITIES**

### **2.1 Development Objectives**

The Amhara region has an agricultural economic base which is characterized by perennial food grain shortages. Frequent famines resulting from inadequate or untimely rains are common features of the economy. The increase of population adds millions of new individuals to be fed, clothed and sheltered with the already limited resources. The increasing population in the region is currently facing food shortages because of primitive and backward agricultural practice coupled with shortage of moisture to sustain crop production. This has resulted in lower agricultural product in a given agricultural season and the Region's agricultural production to be insufficient and unreliable in the past few decades, as a result to be supplemented with food-aid by international Agencies, foreign governments and non-governmental organizations.

Therefore , considering the need for increased agricultural output through better agricultural practice and intensified small scale irrigation, a program called 'Sustainable Agriculture and Environmental Rehabilitation of the Amhara Region (SAERAR)' is designed. Under this programme the water resources projects would be led towards improving the agricultural sector by promoting a network of small scale irrigation facilities in a priority areas of the region thereby transforming the living standards of the broad rural population.

The objectives of SAERAR are summarized below:

- Drought alleviation in drought stricken areas through the development of water harvesting schemes.
- To integrate the development of agriculture and environmental rehabilitation so that the implemented projects can have long and sustainable life and sound economic impact.
- To increase the household income of beneficiaries so that the development program can contribute a considerable support to improve the living standards of individuals and the national income.

SAERAR, understanding the importance of environmental considerations in the implementation of programs and projects to achieve sustainable agricultural development in the region has integrated development studies with focus on the environmental aspects. In view of this emphasis on environmental issues has been made for sustainably implementing the projects. Hence, this guideline is prepared for the small scale agricultural development project studies with in the SAERAR framework.

## **2.2 SAERAR's Project Selection Criteria**

Based on its objectives SAERAR has developed two levels of project selection criteria. The first is a general criteria and is used to confirm whether the selected schemes are within SAERAR's frame work and area of interest which stipulates small size and choice of low cost appropriate technology. Moreover availability of basic resources like land and water including active participation of the beneficiaries in the decision making process will be closely examined. Drought proness and backwards status of a given particular area will also be considered as compelling parameters to select project sites. The second is specific criteria for water resources development projects to a large extent based on technical feasibility considerations while at the same time addressing the issue of social viability.

### **3. PURPOSE OF THE GUIDELINES**

The purpose of this Project document /guideline is to assist the SAERAR's policy makers, authorities and professionals enable them to incorporate the environmental protection parameter into the project preparation process. Sustainable agriculture development are achieved most efficiently when negative environmental impacts are identified and addressed at the earliest possible study stage. Thus the project staff will be in a better position to strengthen the overall project context through improvements in aspects relating to environment by providing fundamental information and common baselines on environmental considerations for small scale agricultural development projects, within the SAERAR frame work and focusing on those operations with potential negative environmental impacts.

### **4. WATER RESOURCES DEVELOPMENT AND ENVIRONMENTAL IMPACTS**

The planning, design and operation of water resources projects should be based on an overall assessment of impacts and considering the entire basin as a single unit. Some of the important direct environmental impacts caused by the absence of environmental mitigative measures in water resources development Projects are listed below to demonstrate the importance of environmental analysis. The direct and indirect impacts of dams and reservoirs and irrigation and drainage projects are listed in Table 1 and Table 2 respectively and some of the major issues are discussed below..

Table 1 Impacts of Dams and Reservoir Works

Potential Negative Impacts	Mitigating Measures
<p>1. - Negative environmental effects of construction:</p> <ul style="list-style-type: none"> <li>. Air and water pollution from construction and waste disposal</li> <li>. Soil erosion</li> <li>. Destruction of vegetation, sanitary &amp; health problems from construction camps</li> </ul> <p>2. Dislocation of people living in inundation zone.</p> <p>3. Loss of land (agricultural, forest, range ,wetlands) by inundation to form reservoir.</p> <p>4. Loss of historic, cultural or aesthetic features by inundation.</p> <p>5. Loss of wildlands and wildlife habitat</p> <p>6. Proliferation of aquatic weeds in reservoir and down- stream impairing dam discharge, irrigation systems, and fishers and increasing water loss through transpiration.</p> <p>7. Deterioration of water quality in reservoir.</p> <p>8. Sedimentation of reservoir and loss of storage capacity.</p>	<p>1. - Measures to minimize impacts :</p> <ul style="list-style-type: none"> <li>. Air and water pollution control</li> <li>. Careful location of camps, buildings, borrow pits, quarries, spoil and disposal sites</li> <li>. Precautions to minimize erosion</li> <li>. land reclamation</li> </ul> <p>2. Relocation of people to suitable area, provision of compensation in kind for resources lost, provision of adequate health services, infrastructure, and employment opportunities.</p> <p>3. Siting of dam to decrease loses, decrease size of dam and reservoir, protect equal areas in region to offset losses.</p> <p>4. Siting of dam or decrease of reservoir size to avoid loss; salvage or protection of cultural properties.</p> <p>5. Siting of dam or decrease of reservoir size to avoid/minimize loss; establishment of compensatory parks or reserved areas; animal rescue and relocation.</p> <p>6. Clearance of woody vegetation from inundation zone prior to flooding (nutrient removal); provide weed control measures; harvest of weeds, regulation of water discharge and manipulation of water levels to discourage weed growth.</p> <p>7. • Clearance of woody vegetation from inundation zone prior to flooding. • Control of land uses and agricultural chemical use in watershed. • Limit retention time of water in reservoir.</p> <p>8. • Control of land use in watershed (especially prevention of conversion of forests to agriculture). • Reforestation and/or soil conservation activities in watersheds</p>

Table 1 Contd.

Potential Negative Impacts	Mitigating Measures
9. Disruption of riverine fisheries due to changes in flow, and changes in water quality and liminology.	9. Maintenance of at least minimum flow for fisheries, aquaculture and development of reservoir fisheries in compensation.
10. Increase of water-related diseases	10. - Design & operation of dam to decrease habitat for vector. - Vector control - Disease prophylaxis and treatment
11. Conflicting demands for water use	11. Planning and management of dam in context of regional development plans, equitable allocations of water between large and small holders and between geographic regions of valley.
12. Social disruption and decrease in standard of living of resettled people.	12. Maintenance of standard of living by ensuring access to , resources at least equaling those lost, provision of health and social services.
13. Environmental degradation from increased pressure on land.	13. - Choice of resettlement site to avoid surpassing carrying capacity of the land. - Increase of productivity or improve management of land (agricultural, range, forestry improvements) to accommodate higher population.
14. Environmental problems arising from development made possible by dam (for example irrigation)	14. Basin-wide integrated planning to avoid overuse, misuse, and conflicting uses of water and land resources.
15. Poor land use practice in catchment areas above reservoir resulting in increased siltation and changes in water quality.	15. Land use planning efforts which include watershed areas above dam.

Table 2. Impacts of Irrigation and Drainage Works

Potential Negative Impacts	Mitigating Measures
1. Soil erosion (furrow, surface)	1. - Proper design and layout of furrows or field avoiding too steep a gradient - Land leveling - Design of terraces on hillside minimizing surface erosion hazard.
2. Waterlogging of Soils	2. - Regulation of water application to avoid over-watering (including controlled turn-out to allow cutting off water supply to irrigation ditches) - Installation and maintenance of adequate drainage system.
3. Salization of soils	3. - Measures to avoid waterlogging: . Leaching of salts by flushing soils periodically . Cultivation of crops with salinity tolerance
4. Impediment to movement of livestock and humans.	4. Provision of passage ways
5. Dislocation of populations and communities	5. • Sitting of projects to minimize effects • Resettlement scheme ensuring at least equal standard of living.
6. Sourcing of canals	6. Design of canal system to minimize risk and use of linear canals
7. Clogging of canals by sediments	7. • Measures to minimize erosion on fields • Design and management of canals to minimize sedimentation • Provision of access to canals for removal of weeds and sediments
8. Leaching of nutrients from soils.	8. • Avoidance of overwatering • Replacement of nutrient by fertilizers or crop rotations

Table 2 Contd.

Potential Negative Impacts	Mitigating Measures
<p>9. Algal blooms and weed proliferation.</p> <p>10. Clogging of canals by weeds</p> <p>11. Deterioration of river water quality below irrigation project and contamination of local ground water (higher salinity, nutrients, agro-chemicals)</p> <p>12. Introduction or increase in incidence of water-borne or water related disease (schistosomiasis, malaria, etc)</p>	<p>9. Reduction of input to and release of nutrients (nitrogen and phosphorous) from fields.</p> <p>10. • Design and management of canals to minimize weed growth.</p> <p>• Provision of canals for treatment or removal of weeds</p> <p>11. Improved water management; improved agricultural practices and control of inputs (particularly chemical fertilizers)</p> <p>12. Prevention measures:</p> <ul style="list-style-type: none"> <li>• Avoidance of stagnant or slowly moving water</li> <li>• Use of straight or slightly curving canals</li> <li>• Installation of gates at canal ends to allow complete flushing</li> <li>• Filling or draining of borrow pits along canals and roads</li> <li>• Disease prophylaxis</li> <li>• Disease treatment</li> </ul>

***i) Resettlement***

Although the primary objectives of most water resources development projects are to benefit the human subsystem by providing water for drinking, irrigation, etc., there are several adverse impacts which have to be considered. Many of the effects on the physical and biological subsystems also have impact on human subsystem. One of the inevitable consequences of flooding an area is Population relocation requirements of population that have settled there for generations. This is much pronounced particularly in inundated (reservoir) area. This problem has often been serious in many resettlement schemes because of lack of adequate compensation and resettlement on inferior lands.

***ii) Loss of Agricultural Land to Flooding***

The submergence of agricultural land will cause an enormous amount of loss and hardship to the local farmers.

***iii) Loss of forests to flooding***

Quite apart from causing the loss of agricultural land, dams have also caused the drowning of forest.

***iv) Health Effects***

Construction of a dam and creation of water bodies is known to have resulted in the introduction of new health problems or vector patterns that may arise due to changes in water velocities, temperature, quality or other physical change factors caused by water impoundment. Malaria and schistosomiasis epidemics have been known to occur because of disregarding the introduction of parasites and vectors through the creation of large stagnant water bodies.

v) ***Water -logging and salinity of irrigated soils***

Perennial irrigation invariably raises the water table. The over - use of irrigation water helps to raise the water table due to inadequate attention to the provision of drainage works in irrigation projects and hence further increase in waterlogging. As waterlogging sets in so does the inevitable process of salinisation.

vi) ***Sedimentation***

Water resources development projects of storage nature having reservoirs are mostly the end points for excessive sedimentation. Among the activities causing sediment is creation of new settlements, and destruction of forest areas which eventually may cause damage to the soil cover resulting in increased sedimentation, flash floods, and loss of land fertility. The rate at which a reservoir 'silts up' depends on the amount of silt carried by the river which feeds it and that, in turn depends on the rate of soil erosion in the river's catchment area. The detailed study to identify critical areas susceptible to erosion and methods of possible treatment can help to arrive at judicious solution where soil conservation and afforestation measures are intermeshed with engineering solutions to provide long-term stability. Due to sedimentation, expected water quality changes over time and their effect on river eco-system, both at the impoundment and downstream.

## 5. ENVIRONMENTAL ASSESSMENT

### 5.1 Introduction

EIA is a procedure to determine the potential environmental effects of proposed development in a form that permits a logical and rational decision to be made. It has also evolved as a comprehensive approach to evaluation, in which environmental considerations are given their proper weight in the decision-making process. Attempts can be made to reduce potential adverse impacts through the identification of possible alternative sites and/or processes. EIA can therefore be thought of as a basic tool for the comprehensive assessment of development proposals.

The results of the assessment can be found in a document called an Environmental Impact Statement(EIS). This document contains a discussion of beneficial and adverse impacts considered to be relevant to the project plan. The completed report, or EIS, is one component of the information upon which the decision maker ultimately makes a choice. At this stage, other factors such as unemployment, food security or national policies may influence the outcome of the decision. A final decision can be made keeping in mind the likely consequence of adapting a particular course of action, and where necessary introducing appropriate monitoring and auditing programs to reduce any adverse impacts that may have been identified in the assessment process.

When EIA is conducted several fundamental questions are being posed, such as:

- Is the development required?
- Are there relevant alternatives which could provide the same benefits, without causing adverse environmental consequence ?
- What degree of environmental protection should be guaranteed for areas of significant ecological and landscape value?

## **5.2. Environmental Assessment in the Project Cycle**

Planning within the SAERAR frame work is a process which seeks solutions to problems and needs or which develops actions that will satisfy goals and objectives at a pre-implementation stage by critically examining and analyzing the inputs, potentials and constraints. Normally the planning exercise is not accomplished as one continuous activity but is broke down into several steps. SAERAR has the following project planning process.

- Reconnaissance phase;
- Feasibility study phase;
- Detailed design phase;
- Construction Phase; and
- Operation Phase.

To be effective, an environmental assessment must be conducted parallel to other studies so that the environmental consequences can be examined at the earliest planning stage. Advice can therefore be given on the impacts of alternative approaches to the problem at hand.

For each stage of project planning, there should be a matching environmental planning. The reason for including an environmental quality objective in the planning exercise is that environmental quality then becomes an integral part of the whole planning process to be treated at each of the planning stages. Further, it helps to ensure that each member of the planning team has concern for environmental quality when formulating and evaluating strategies of projects.

One of the main advantage of small scale irrigation and micro dams scheme is their relatively limited environmental impact. A statement on the environmental soundness of these projects is nevertheless required. The stage of the project cycle and the type of project under development determine the level and detail of the environmental assessment. For example, dams and reservoirs are assigned to category 'A' and 'I' of the world bank's and African Development Bank's environmental assessment respectively which obligatorily requires EIA. Whereas small scale irrigation is assigned to category B, that means more limited environmental assessment is required. Table 3 suggests the environmental consideration in project cycle. In the following section the two major level of environmental studies namely Initial Environmental Assessment (IEA) and Environmental Impact Assessment (EIA) during reconnaissance and feasibility study stage respectively are discussed in detail.

### **5.2.1 Environmental Consideration During the Identification and Reconnaissance Study Stage**

Identification and reconnaissance is the first planning stage and includes an inventory and evaluation of human and natural resources guided by the developmental objectives and findings of the reconnaissance survey; identification and analysis of areas and projects of major interest; and sometimes very preliminary design of structures. It recommends studies to be undertaken in the feasibility stage. Reconnaissance studies usually offer alternatives to meet the objectives. Each alternative is examined in terms of economic, technical, social and environmental costs and benefits.

Table 3. Environmental Consideration in the Project Analysis Cycle

Project Cycle Stage	Activities	Environmental Activity Component
Reconnaissance	To determine if there is merit in the project. A short field trip is generally followed by a preliminary analysis indicating whether or not further work should be done. This will be followed by an elaboration of the reconnaissance in which more detailed analysis is carried out. Object is to further determine the likelihood of feasibility. The time required will depend on the volume of work expected and the degree of elaboration required.	An environmentalist accompanies the team and preliminary report on environmental issues is prepared. This stage involves the preparation of an IEA which should indicate whether problems are anticipated, whether they are soluble and what further studies including base line studies will be necessary.
Feasibility	Detailed study to determine technical, financial, economic, institutional and environmental feasibility. May take several years.	The "full" Environmental Impact Assessment (EIA) is carried out.
Detailed Design	This includes detailed design for selected options and is the stage in which based on feasibility, the final details of the project are prepared.	At this stage, the mitigation and monitoring procedures are developed implemented.
Construction	In which the plans and design of the project is actually converted into physical structure	For many projects this is the most sensitive part of the process and the period in which most disruption can occur. Environmental supervision is critical.
Commissioning	In which the physical components of the facility are tested and the project goes into operation.	The environmental equivalent is ensuring that appropriate pollution controls are operating and that the planned institutions are in place.
Operation	In which the project is operated and the goals of the project examined over time against actual performance. Actual benefits of the projects will materialize and routine activities will be performed to produce the expected output.	This stage includes the carrying out of monitoring programs as well as an overall audit to determine if environmental objectives have been met and if not, why not.
Decommissioning	Most projects have a limited life although in some cases a very long one. If heavy sedimentation will mean that a reservoir has to be closed down, a procedure to close down should at least be thought about, especially if the life is not much longer than a human generation.	A project that lasts only 30 years, and needs to be dismantled could be very disruptive; alternatively it could provide continuing local benefits and may even lead to the possibility of new opportunities that could be explored.

The reconnaissance stage findings should enable each project to be ranked in accordance with development objectives and should enable the selection of the projects to be studied in the feasibility stage. It formulates the terms of reference also.

Explicit treatment of environmental quality at this stage is necessary to assist in the identification and selection of potential areas and projects and provides additional information for the evaluation of projects. IEA is meant for inter-comparison of the development options and screening of alternate sites for locating the project. The purpose of conducting IEA is to screen out all of the environmental impacts except those which could be significantly affected.

A checklist of environmental parameters relevant to water resources development projects which are likely to experience Significant Environmental Impact (SEI) is prepared for identification of impacts. The checklist is presented in the Appendix I and will be used to screen out whether the project involves SEI or not. The IEA will make a preliminary assessment of the SEI of the proposed project and determine whether a follow-up EIA is required or not.

If not required, IEA will be the final report and if it is required, TOR to conduct EIA will be prepared.

### **5.2.2 Environmental Consideration During the Feasibility Study Stage**

The feasibility stage includes studies made to determine the overall balance between demand and supply with respect to each development project and to designate viable solutions for executions. Detailed maps of the existing and potential land use are made and technical and economic conditions are defined for achieving the potential. Project construction is planned and cost and benefits are calculated.

Since the purpose of the this study is to define the work program to fulfill the development objectives of the next planning stage, environmental concern should be included. During the feasibility study period the EIA has to be completed because the findings of the EIA team can be considered by the feasibility study project design team and the EIA team can also make effective use of the detailed information being prepared by the feasibility study project team.

### **5.3 Main Stages of the EIA Process**

In order to accomplish EIA, it is first necessary to develop a complete understanding of the proposed action in terms of what is to be done, the kind of materials, manpower, and/or resources involved. Second, it is necessary to gain a complete understanding of the affected environment. What is the nature of the biophysical and/or socio-Economic characteristics that may be changed by the action? A questionnaire for collecting relevant information for assessment of environmental impacts with regard to water resources development projects is provided in Annex II.

Third, it is necessary to project the proposed action into the future and to determine the possible impacts on the environmental characteristics, quantifying the changes wherever possible.

Fourth, it is necessary to report the results of the analysis in a manner such that the analysis of probable environmental consequences of the proposed action may be used in the decision making process.

### 5.3.1. Preparatory Stage

#### i) *'Screening'*

Screening is a preliminary assessment based on readily available information to answer the following questions. Is EIA process needed? What are the potential positive and negative impacts? Are significant impacts likely to be caused?

#### ii) *'Scoping'*

Scoping aims at an early stage to:

- Prepare a background information on the objectives and purpose of the proposed activity;
- Notify and involve other agencies, advisers and interested parties and collection of their views on the alternatives and their potential impacts that they feel should be studied.
- Identify important impacts (significant issues) and determine how these are to be predicted, evaluated etc. and in particular the depth of study required for different impacts;

Scoping is an important element in any environmental assessment for the following reasons:

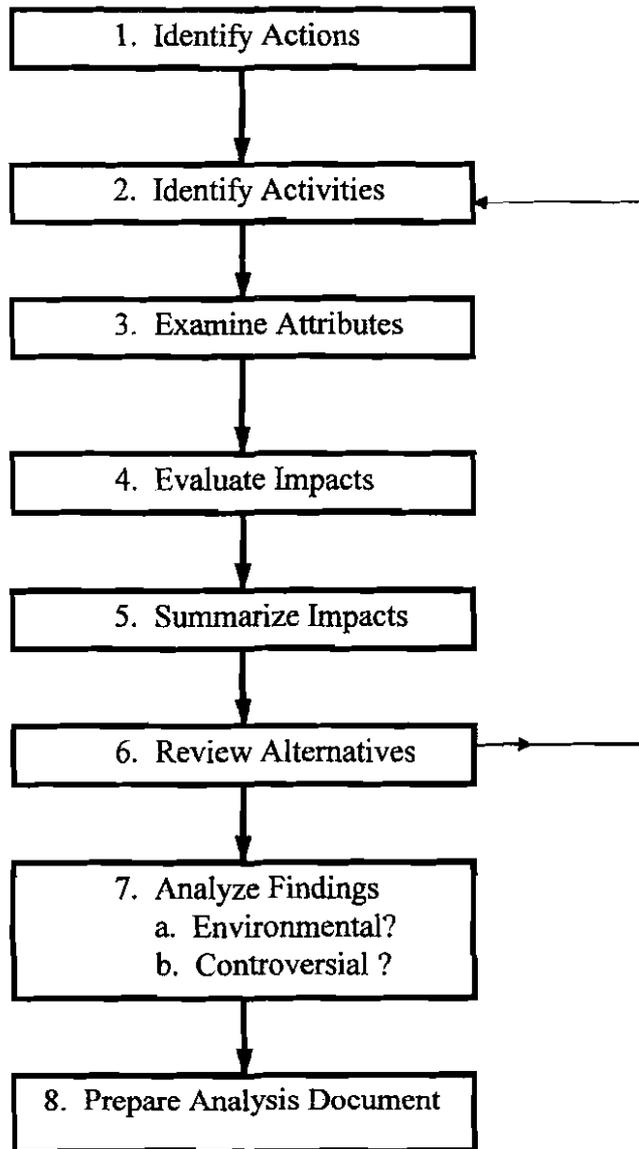
- It will provide the link between the users of the assessment (the decision - maker) and the proponent, in such a way that the user can ensure that the study address the relevant topics and presents the results in a form that will be useful in the final decision;

- It will enable other interested parties to make their concern known; the user can therefore ensure that the study is a comprehensive Assessment of alternatives and impacts that are of interest to all parties;
- By establishing agreement, at the outset, on the alternatives and issues to be examined by the proponent during the period in which the EIS is made, this procedure should help to reduce the possibility that the competent authority or other parties will request further information following completion of the EIS.

### **5.3.2 A Step by Step Procedure for Developing EIA**

There currently exist many methodologies for impact assessment and this section details a systematic approach to the development of an environmental impact analysis. The following steps, as shown in Fig 2 detail the procedure to be used in the preparation of an environmental impact analysis. The degree of consideration to be exercised within some of the steps may vary with project scope and magnitude, but the basic algorithm is applicable in all cases.

Fig. 2 Step by Step Procedure



### **Step 1 - Identify Action that Require Analysis**

We are required to consider the environmental effects of implementing our project. Therefore, it is first necessary to decide whether the action may produce significant effects on the environment or not.

If the project produces SEI which requires an environmental impact assessment, the user should proceed with Steps 2 through 6 in detail. If not, then no assessment or statement is required.

### **Step 2 - Identify Relevant Project Activities**

Identify detailed activities associated with implementing the project. or the program: agency activities may be categorized into functional areas. Use project description form (Table 4) to have a complete understanding of the project. A detailed activities associated with implementing projects or programs should be developed.

In the case of the construction of water resources development schemes, the construction activities in various stages of project development shown in Table 5 may be utilized. Those activities not applicable to the project should be crossed off and supplemental activities should be added to encompass the project-specific requirements. The user should supplements these activities with project-specific activities.

### **Step 3 - Examine Attributes to be Reviewed**

The user should examine and become familiar with the general nature of the individual attributes and the kinds of activities that may impact on them. In addition, identify areas where available technical expertise is deficient and additional assistance may be required.

Table 4 Project Description (Pd) form

<b>1. Study Title (The Project Name :)</b>
<b>2. Location</b> <ul style="list-style-type: none"><li>- Region</li><li>- Zone</li><li>- Wereda</li><li>- Altitude</li><li>- Longitude</li><li>- River</li></ul>
<b>3. Background Information and Objectives of the Project</b>
<b>4. Brief Description of the Project</b> <p>Outline of the Project Area:</p> <p>Beneficiaries and Benefited Area : _____ Persons _____ ha.</p>
<b>5. Major Components and Development Scale of Project</b> <ul style="list-style-type: none"><li><b>a) Dams and Reservoirs</b><ul style="list-style-type: none"><li>- Dam type</li><li>- Dam Height</li><li>- Full Supply Level</li><li>- Minimum supply Level</li><li>- Total Reservoir volume</li><li>- Active Storage</li><li>- Dead Storage</li><li>- Catchment Area</li><li>- Mean Annual Discharge</li><li>- Approximate Reservoir Area at FSL</li><li>- Approximate Reservoir Area at DSL</li><li>- Access Road Length</li></ul></li></ul>

**b) Irrigation Projects**

Summary of the Project

- i) Status of the Project (Evaluation of existing/expansion of existing/ rehabilitation of existing /modernization of existing / New).
- ii) Approximate map of the project showing water source, reservoirs, main roads, canals and drains areas irrigated, drained or reclaimed, project boundary and project. Indicate where further phases of development are planned in relevant.
- iii) Land area of the Project and any other planned phases of development in the same project area.
- iv) Give details of existing or planned Projects of similar type nearest to the project.

Name and Phase	Cultivated Area (ha)	Distance from Project (km)	source of Irrigation Water	construction Dates Actual or Planned

Irrigation System

i) *If some or all of the supply is surface water, what is its source?*

From new storage reservoir / Canal, from existing storage reservoir/ new controlled off-take (with weir); from river / new uncontrolled off-take; from river/water harvesting/ other...

ii) *Are there subsidiary (buffer) storage reservoirs within the Project boundary ?*

Number \_\_\_\_\_ Approximate Sizes \_\_\_\_\_ m<sup>3</sup>

iii) *Method of irrigation :*

**Table 5** Physical Activities Associated with Water Resources Development Projects

No	Category of Functional Area	Detailed Activities
1	Site Investigation and Preparation	Access roads, Site surveying, Soil testing, Hydrological testing, Site clearing Burning,, Excavation, Drainage alteration, Stream crossing
2	Construction Stage	Access roads, Site clearing, Excavation, Blasting and drilling, Demolition, Building relocation, Cut and fill, Erosion control, Drainage alteration, Stream crossing, Dams and impoundment, Equipment, Utilities, Reclamation, Reforestation
3	Operation and Maintenance	Forest clearing, Excavation, Dredging, Equipment operation, Operational failures, Pest control, Abandonment
4	Future and Related Activities	Urbanization, Industrial development, Transportation, Energy requirements

#### **Step 4. - Evaluate Impacts**

Identify potential impacts and collect baseline data on the impacted attributes. Quantify the impact where possible and use analytic rather than encyclopedic approach for impact analysis. The questionnaire presented in Appendix II shall be used to collect the required data to study the identified potential impacts.

#### **Step 5. - Summarize Impacts**

Summarize the impacts using Fig. 3 and shade the areas of net positive or net negative impacts and using the shading intensity indicate the significance of impact. For example, for impacts on erosion, suspended solids, and dissolved oxygen, determine the degree of severity of the impact on each attribute.

#### **Step 6.- Review Other Alternatives**

Identification and selection of alternatives, such as:

- Alternative ***Solutions*** for the problem (these may involve some redefinition of objectives);
- Alternative ***methods*** for achieving objectives (locations, processes, schemes etc.);
- Alternative ***ways*** in which impacts can be mitigated (e.g. pollution control measures);

Repeat the procedure for the alternatives considered.

Fig. 3. Summary of Identified Potential Impacts

HEALTH		Disease Control	
		Disease hosts	
		Disease ecology	
		Relocation effects	
		Health services	
		Water and Sanitation	
SOCIO-ECONOMICS		Regional effects	
		Heritage sites	
		Minority groups	
		Women's role	
		Resettlements	
		Income and amenity	
ECOLOGY		Aquatic plants	
		Natural vegetation	
		Threatened species	
		Fish and waterfowl	
		Large animals	
LAND		Land use pattern	
		Erosion	
		Soil salinization	
WATER		Fecal coliform	
		Aquatic life	
		Toxic compounds	
		Nutrients	
		Dissolved solids	
		Dissolved oxygen	
		Suspended solids	
		Flow variations	
		Aquifer safe yield	
	+ve impacts	Attributes	- ve Impacts

- 0 No significant impacts
- 1 Small impacts
- 2 Moderate impacts
- 3 Major Impacts

### **Step 7.- Analyze Findings**

Determine the answers to the following questions concerning the action:

- ◇ Will the implementation of the program have a significant adverse effect on the quality of the environment?
- ◇ Will the action be deemed environmentally controversial?

If the answer to any of these questions is “yes,” then it is required to prepare an EIS.

### **Step 8. - Prepare Analysis Document**

The content of the report is discussed in detail in section 5 of this report.

## 6. ENVIRONMENTAL IMPACT STATEMENT (EIS)

The purpose of EIA is to give a proper place for environmental aspects of a proposed activity and a proper place in the decision making process. In this respect, the two key elements of EIA are:

- The collection of information about the environmental effects of the proposed activity;
- The use of the acquired information in decision making.

Although the principle of EIA is a rather simple one, many environmental assessment studies which were carried out in the past failed to achieve their objectives. The reasons for this failure were principally caused by the fact that the assessments failed to provide the information required by the information user (the engineer or public authority) in a form that it could be used.

Environmental Impact Assessment (EIA) is to be followed by preparation of Environmental Impact Statement (EIS). An EIS is a final analysis to an environmental impact assessment. An EIS should provide a clear, balanced and understandable account of the impacts associated with proposed developments. (a proposed outline of an EIS is found in the appendix III). Decision-makers who read environmental assessments are unlikely to use them effectively if the resulting documents are too extensive or unstructured. They can not be expected to use information which is not properly analyzed or implications which are not clearly presented.

An EIS report should cover the following items:-

- An executive summary of EIA findings;
- A brief description of the proposed development project;

- Description of the existing environment: This requires identification of the project's area of influence. The study area for the project EIA should include water bodies where there will be significant effects on their beneficial uses, together with affected adjacent land areas. Thus, for a dam/reservoir or impoundment project it will include :

- i) The dam/reservoir vicinity,
- ii) The upstream watershed, and
- iii) The downstream users.

For agricultural / irrigation projects, the study area will include areas used for transmission and the consumption zones including distribution facilities. The major environmental and natural resource issues within the area of influence are to be assembled, evaluated and presented.

- Assessment of Predicted Effects of the project on the environment (in comparison with a baseline environment as it would be without the project), as adverse and beneficial, reversible and irreversible; and, where the impacts are likely to be short and/or long term including how these impacts were identified and predicted. This will include:

- Assessment of the impacts of the project on the people living in the project area, identification and assessment of the impact of the project on the hydrology of the catchment and to water users downstream, assessment of the impact of the proposed project on agricultural, forest and grazing land and wildlife and wildlife habitat. Describe and predict the impact of increased pressure on land and describe and predict the deterioration of water quality and the possible proliferation of aquatic weeds.

- Presenting Information about the Effects of Alternatives;

- Mitigation, protection and enhancement measures: this will identify and recommend the possible means for adopting environmental safeguards, minimizing detrimental impacts, enhancing beneficial aspects of the project and for effective management of environmental resources affected by the project. Identification of Crucial Issues and a discussion of options for mitigating adverse impacts and for shaping the project to suit its proposed environment, and an analysis of the trade-offs involved in choosing between alternative actions. Prepare a management plan including proposed work programs, budget estimates, staffing and training requirements and other necessary support services to implement the mitigating measures;
- An overview of gaps and uncertainties in the information;
- Prepare a detailed plan to monitor the implementation of mitigating measures, and include in the plan an estimate of capital and operating costs and description of other inputs need.
- A summary of the EIS, which is understandable to the non-expert.

## **7. DECISION MAKING and MONITORING**

### **7.1 Decision Making and Monitoring**

The decision-making procedure is the part of EIA and the decision is the result of a complete process with many interests involved, it should be clear to interested parties with considerations of the competent authority playing a role in the decision.

Whenever a positive decision is made by a competent authority, the proposed activity will be carried out and impacts on the environment will follow. As EIA is based on the assumption that impacts can be predicted and should therefore be taken into consideration as such by a decision maker, it can be important to evaluate the impacts when they actually occur. This may help in discovering unexpected or non-predicted impacts and in checking the prediction made in the EIS. One of the techniques to discover those impacts is the set-up of monitoring system.

### **7.2 Monitoring**

Before monitoring starts, the following questions should be answered:

- Which impact should be monitored?
- Who will be responsible for monitoring?
- On what time scale should the monitoring be carried out?
- What will be the consequences, should the impacts be much more harmful to the environment than was predicted in the EIS.

## 8. RESOURCES NEEDED FOR AN EIA

As an independent starting point for each EIA, an inventory should be made of the resource base of the area concerned. An extensive inventory and description of natural, human and economic potential should be made. The inventory and description of the resource base should be carried out according to well defined, uniform guidelines. Clear methodology for the assessment of the base information, keeps us in touch with the overall target of each EIA.

Because of the EIA's acknowledged importance in planning a country's sustainable economic growth, EIA is now undertaken throughout the world, even in places with very few resources to give to planning initiatives. There are, however, certain minimum resources needed to perform EIA that can successfully shape the projects of SAERAR.

***Qualified multi-disciplinary staff:*** This includes skilled coordinator within the SAERAR framework (to coordinate the activities, communicate with a decision maker, and motivate the study group), trained specialists in fields such as environmental science, rural /regional planning, economics, pollution control, landscape design, sociology and cultural anthropology), and communication experts;

***Technical guidelines:*** Agreed with the competent authority for carrying out the various phases of the EIA process;

***Information about the environment:*** Especially relating to the impacts being concerned which can be evaluated.

***Analytical capabilities:*** For doing field work, laboratory testing, library research, data processing, surveys and predictive modeling.

***Administrative resources:*** For the day-to-day running of the EIA Process: including office staff, meeting rooms and support, communication facilities and records management.

***Institutional arrangements:*** Including a formal procedure for consultation with the decision-makers and other interested groups, the authority to obtain the necessary information of the proposed project, and a formal process for integrating the EIA into decision-making about projects.

***Review, monitoring and enforced powers:*** To ensure that accepted mitigation measures are included in the development.

Among the resources needed to perform an EIA, money and time. also constitute important place.

## 9. INSTITUTIONAL ASPECT

### 9.1. Work Organization

The task of handling the environmental studies will be handled by the environmentalist in association with each group of the SDPS (Study and Design Preparation Section). The environmentalist will be obliged to work as team member of the water resource, watershed management and irrigation group of the SDPS.

In all the activities and levels of project cycle of the SDPS, the environmentalist will be expected to produce pertinent report as outlined under Chapter 5.

### 9.2. Training for EIA Team

To strengthen the capabilities of SAERAR to undertake environmentally sound development and to manage their resources, trained personnel are needed. To carry out Environmental Impact Assessment (EIP) for all identified potential projects, formal training is recommended for the team.

The following table summarizes the type, duration and scale of training.

Trainee	TRAINING			
	Duration	Scale	Type	Place
Environmentalist	6-12 months	Advanced	Formal	Abroad
Sociologist	6-12 months	“	“	Abroad
Public Health Specialist	6-12 months	“	“	In country or abroad

## References

1. Environmental Assessment Sources Book (Vol. 2) World Bank Technical Paper No. 140, 1991.
2. Environmental Guidelines on JICA Development Study for Agricultural and Rural Development Projects, December 1992.
3. Jain, R.K, Urban , L.V and Stacey, G.S, Environmental Impact Analysis, A New Dimension in Decision Making, Second Edition, 1981.
4. Environmental Guidelines for Selected Agricultural and Natural Resources Development Projects, Asian Development Bank, November, 1991.

**Checklist of Environmental Effects Commonly Associated With Water Resources Development Projects**

Name of Project : .....

Possible Environmental Impact	Initial Environmental Assessment (IEA)			
	No Significant Impact	SEI		
		Small	Moderate	Major
<p>1. Socio-economic Issues</p> <p>1.1 Social issues</p> <p>a. Planned residential settlement</p> <p>b. Involuntary resettlement</p> <p>c. Substantial change in way of life</p> <p>d. Conflict among communities and peoples</p> <p>e. Impacts on native peoples</p> <p>f. Social acceptability</p> <p>1.2 Demographic Issues</p> <p>a. Population increase /overcrowding</p> <p>b. Drastic change in population composition</p> <p>c. Other</p> <p>1.3 Economic Activities</p> <p>a. Change in bases of economic activities</p> <p>b. Occupational change and loss of job opportunities</p> <p>c. Increase in income disparities</p> <p>d. Other</p> <p>1.4 Institutional and custom related issues</p> <p>a. Water rights conflicts</p> <p>b. Changes in social &amp; institutional structures</p> <p>c. Change in existing institutions and customers</p> <p>d. Other</p> <p>1.5 Effects on public and private services</p> <p>a. Drinking water</p> <p>b. Hospital/health care facilities</p> <p>c. Education / schools</p> <p>d. Transportation</p> <p>e. Housing facilities</p>				

Possible Environmental Impact	Initial Environmental assessment (IEA)			
	No Significant Impact	SEI		
		Small	Moderate	Major
<p><b>2. Health and sanitary issues</b></p> <p>2.1 Increased use of agrochemical 2.2 Outbreak of endemic diseases 2.3 Spreading of epidemic diseases 2.4 Residual toxicity of agrochemicals 2.5 Other</p> <p><b>3. Cultural Asset Issues</b></p> <p>3.1 Impairment of historic remains, religious and cultural assets 3.2 Other</p> <p><b>4. Biological and Ecological Issues</b></p> <p>4.1 Changes in vegetation 4.2 Impacts on important or indigenous fauna and flora 4.3 Degradation of ecosystems with biological diversity 4.4 Proliferation of exotic and / or hazardous species 4.5 Encroachment into natural forests 4.6 Wildlife reserve 4.7 Valuable fish species 4.8 Other</p> <p><b>5. Soil and Land Resources</b></p> <p>5.1 Soil Resources a. Watershed erosion b. Soil salinization c. Degradation of soil fertility d. Other</p> <p>5.2 Land Resources a. Devastation or desertification of land b. Ground subsidence c. Other</p>				

Appendix I Contd.

Possible Environmental Impact	Initial Environmental Assessment (EIA)			
	No Significant Impact	Small	Moderate	Major
<p><b>6. Hydrology and Water Quality</b></p> <p>6.1 Hydrology</p> <ul style="list-style-type: none"> <li>A. Changes in surface water hydrology</li> <li>B. Changes in groundwater hydrology</li> <li>C. Inundation and flooding</li> <li>D. sedimentation</li> <li>E. riverbed degradation</li> <li>F. Other</li> </ul> <p>6.2 Water Quality</p> <ul style="list-style-type: none"> <li>A. Water contamination and deterioration of water quality</li> <li>B. Water eutrophication</li> <li>C. Other</li> </ul> <p><b>7. Other (list appropriate)</b></p>				

**QUESTIONNAIRE FOR ENVIRONMENTAL IMPACT ASSESSMENT**

**FORM I. REQUIRED FROM THE LOCAL ADMINISTRATION OFFICE**

Name of the Organization

1. Location of the Project

- 1.1 Place
- 1.2 Wereda
- 1.3 Zone
- 1.4 Region

2. Population

2.1 Population density per Sq.km

- a) catchment
- b) submerged area

2.2 Population size in the catchment and submerged area

Peasant Association	Catchment		Submerged Area		Command Area	
	No. of families	Total Population	No. of families	Total Population	No. of families	Total Population

### 2.3 Number of Peasant Association Affected and Population Displaced

Peasant Association	Size of Affected PA (ha)	Population	Occupation of the Affected People				
			Agri-culturalist	Forest Labour	Industrial Labour	Any other	Estimated Annual Income

### 2.4 Land Ownership in the affected Villages/PA

Name of the PA	Small Farmers	Medium Farmers	Big Farmers

### 2.5 Number of households to be displaced at Project site

	Urban	Rural
Inundated Area		
Command Area		
Total		

3. State if there is any investment in the Project Area.
  
4. Indicate Industrial and other Development Projects in the Project Area.
  - a- In the catchment area
  - b- In the submergence area
  - c- In the command area
  
5. To what extent the surrounding urban/rural centers depend
  - a - On the catchment area:
  - b - In the submergence area
  - c.- In the command area
  
6. Details of development activities in the affected area
  - a. Drought prone area programme
  - b. Small farmer development programme
  - c. Rural development programme
  - d. Tribal development programme
  - e. Other programmes
  
7. Social Services

Social Services	Catchment Area	Reservoir Area	Command Area

8. Resettlement:
  - a. Details of rehabilitation committee, if any
  - b. Existing guidelines for resettlement, and compensation in cash and/or kind, if any
  
9. Is it possible to resettle the displaced people in a new village? If yes,
  - a- distance of the new settlement from the present habitat:
  - b- facilities to be provided
  
10. What is the attitude of the local authorities about the project?
  
11. What is the attitude of the local residents about the project ?

**FORM II. REQUIRED FROM THE OFFICE OF THE :**

- i) Ministry of Agriculture and / or
- ii) \_\_\_\_\_

Name of the Organization: \_\_\_\_\_

Address : \_\_\_\_\_

**I. Basic Information Affecting the Environment**

1.1 Break-up of land-use pattern in the catchment and submerge area:

Land-use Type	Catchment area (ha)	Submerged area (ha)	Command area (ha)
a) Forest land			
b) Cultivated land			
c) Shrubs and fallow			
d) Wet land			
e) Grazing land			
f) Water bodies			
g) Rocky outcrop			
h) Other uses			
TOTAL			

1.2 Forest type in catchment, submerged and command areas (indicate type of trees, whether sparser thickly wooded and other details)

1.3 Is downstream area subject to flooding?

1.4 Ground water

a) Depth of GW table/

i) Maximum

ii) Minimum

b) Quality of GW/SW

i) Potable /non potable

ii) Fit for irrigation / industry / both

1.5 Present ground water use pattern in the catchment:

1.6 Based on the experience of similar projects in the area, specify the interaction between the altered surface water patterns and underground aquifer and their recharge.

1.7 What is the method of farming in the project area ?

1.8 Rate of fertilizer and pesticide use in the catchment area in 199 \_\_.

Name of the Peasant Association	Fertilizers (qt)	Pesticides (qt)

1.9 Total production rate in the catchment, command and submerged area in 199 \_\_\_\_.

Type of Crops	Catchment Area			Submerged Area			Command Area		
	Area	Yield	Value	Area	Yield	Value	Area	Yield	Value

1.10. Average land Holding

i) In the catchment : \_\_\_\_\_ ha.

ii) In the project / submerged : \_\_\_\_\_ ha.

1.11 How many times in a year do farmers in the project area harvest ?

1.12 Livestock population in the catchment , submergence and command area

Peasant Association	Livestock Population (No)		
	Catchment area	Submergence area	Command Area

## **II. Environmental Status**

- 2.1 a) Does the area support economically viable aquatic life like fish ?  
b) Are there any fish breeding grounds in the river ?
- 2.2 Wild animal and birds
  - a) Does the site contains wildlife (including birds)
  - b) Indicate the number of wildlife available in the area
  - c) Breeding feeding area
  - d) Migration route
  - e) Is the area a potential wildlife sanctuary ?
- 2.3 Flora and fauna in the submerged area
  - a) Specify if there are any rare or endangered species of flora and fauna found in the project area.
  - b) What measures do you propose to salvage /rehabilitate
- 2.4 Is the area a tourist resort ?
- 2.5 Are any monuments / sites of cultural, historical, religious or recreational importance likely to be affected by the proposed project ? if so, details thereof.
- 2.6 Indicate known pollution sources in the catchment area.

## **III. Environmental Impacts**

- 3.1 Will the project help in flood control or reduction of flood have downstream ?
- 3.2 What is the potential loss in aquatic production on site, up and downstream (fish, and other aquatic animals and plants)
- 3.3 Will the impounded reservoir lead to :
  - a) Noxious aquatic weeds like savinia and water hyacinth etc ?
  - b) Intermittent hosts (vectors) like snails, mosquitoes ?
- 3.4 Indicate the magnitude of the impact due to population pressure on:
  - a) Felling of trees for firewood;
  - b) Forest fires, and
  - c) Overgrazing

**FORM III                      REQUIRED FROM THE OFFICE OF MINISTRY OF HEALTH**

1. What type of medical facility exists in the proposed project area?
  
2. Give information about the following water related diseases:

Disease	Disease Never occurs	No available Information	No of recorded cases	Approximate % of Population believed to have been affected last year
<u>Waterborne</u> Cholera Bacterial dysentery Typhoid Amoebiasis				
<u>Water Washed</u> Ascariasis				
<u>Water Based</u> Schistosomiasis Dracunculiasis				
<u>Insect Vector-borne</u> Malaria Trypanosomiasis Leishmaniasis Lymphatic filariasis Loaiasis Onchocerciasis				
<u>Faecal disposal related</u> Anchyllostomiasis				

3. Give details of existing or planned control programmes of any of the above discuses

Name of Disease	Method of Control	Year Control Began/planned	Who is Responsible	Annual Cost	Remarks on Effectiveness

4. Describe existing programmes of regular health education, vaccination and treatment in village.

5. How many health officers are employed in the project area?

Doctors  
Nurses  
Health assistants

6. List the discuses which you consider most serious in this region and give reasons why?

7. Describe any other health risks which occur in the region as the result of agriculture (poisoning with agro- chemicals, pollution of water sources, etc) estimate the number of cases per year if possible.

## FORMAT FOR THE EIA REPORT

Following is a proposed outline to organize the report. The sub-headings may be modified in the document according to progress made or issues identified during the study.

1. EXECUTIVE SUMMARY
2. INTRODUCTION
3. DESCRIPTION OF THE PROPOSED STUDY
4. DESCRIPTION OF THE EXISTING ENVIRONMENT
  - 4.1. Natural Resources
    - Landuse
      - catchment area
      - Reservoir / command area
    - Soils and geology
    - Climate
    - Hydrology
    - Fisheries
    - Minerals
    - Terrestrial environment
      - forest and vegetation
      - wildlife
  - 4.2. Socio-economic Environment
    - Population and settlement
    - Agriculture
    - Physical infrastructure and social services
    - Water supply and sanitation
    - Archaeological, religious and historical sites
  - 4.3. Public Health
    - Public health status
    - Health infrastructure
5. ANALYSIS OF ALTERNATIVE APPROACHES
6. ASSESSMENT OF POSITIVE ENVIRONMENTAL IMPACTS

## 7. ASSESSMENT OF POTENTIAL NEGATIVE ENVIRONMENTAL IMPACTS

### 7.1 Environmental Impacts Relate to Project Location

- Resettlement of families displaced by the project
- Loss of agricultural land
- Loss of forest lands and forest procedure
- Loss of grazing land
- Destruction of wildlife habitat or impediment to movement of wildlife
- Loss of historical and cultural monuments
- Impediments to movement of wildlife /cattle/ people
- Impact on water resources
- Impacts on infrastructure and social services
- Impacts on aquatic flora and fauna
- Watershed erosion and reservoir sedimentation
- Impact on mineral resources
- Loss of historical and cultural monuments
- Conflicts in water supply rights
- Land tenure problems

### 7.2 Impacts Related to Project Construction

- 7.2.1 Soil erosion
- 7.2.2 Terrestrial environment
- 7.2.3 Aquatic
- 7.2.4 Air quality
- 7.2.5 Noise and vibration
- 7.2.6 Health risks

### 7.3 Impacts Related to Project Operation

- 7.3.1 Downstream flow variation
- 7.3.2. Eutrophication (aquatic weeds)
- 7.3.3 Downstream water quality
- 7.3.4 Adverse soil modification
- 7.3.5 Incidence of water related diseases

## 8. ENVIRONMENTAL MITIGATION PLAN

## 9. ENVIRONMENTAL MONITORING PLAN

## 10. COST ESTIMATES FOR THE ENVIRONMENTAL MITIGATION, AND MONITORING PLANS

## 11. CONCLUSIONS AND RECOMMENDATIONS

## APPENDICES

Persons and organizations consulted