

# LIST OF DELIVERABLES

The Baro-Akobo-Sobat Multipurpose Water Resources Development Study Project has generated a set of deliverables which are summarised in the table below. This deliverable is highlighted in grey below.

<b>THE BARO-AKOBO-SOBAT MULTIPURPOSE WATER RESOURCES DEVELOPMENT STUDY PROJECT</b>	
<b>A. The Integrated Water Resources Development and Management Plan</b>	
<b>A.1</b>	Inception report
<b>A.2</b>	Consultation and Communication Plan
<b>A.3</b>	Scoping report
<b>A.4</b>	Baseline, Development Potentials, Key issues and Objectives report
<b>A.5</b>	Strategic Social and Environmental Assessment
<b>A.6</b>	Integrated Water Resources Development and Management Plan
<b>B. Medium and Long Term Projects: Terms of references for feasibility studies</b>	
<b>B.1</b>	The Integrated BAS Hydropower, Irrigation and Multipurpose Development Programme - Phase 1. Baro-Sobat component
<b>B.2</b>	The Akobo-Pibor Transboundary Multipurpose Development Project
<b>B.3</b>	<b>Livelihood-based Watershed Management - Taking to Scale for a Basin Wide Impact</b>
<b>C. Short Term Project: Feasibility studies</b>	
<b>C.1</b>	Feasibility Study for the Kinyeti River Multipurpose Development Project
<b>C.2</b>	Feasibility Study for the Majang Multipurpose Project
<b>C.3</b>	Design Details for the Akobo-Gambella floodplains Transboundary Development Programme
<b>D. Project brochure</b>	
<b>D.1</b>	The Baro-Akobo-Sobat Multipurpose Water Resources Development Study Project: General overview
<b>D.2</b>	The Baro-Akobo-Sobat Multipurpose Water Resources Development Study Project: Medium and Long Term Projects



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# **LIVELIHOOD-BASED WATERSHED MANAGEMENT – TAKING TO SCALE FOR A BASINWIDE IMPACT**

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## ACRONYMS AND ABBREVIATIONS

BAS	Baro Akobo Sobat
EMP	Environmental Management Plan
ENCOM	Eastern Nile Council Of Ministers
ENSAP	Eastern Nile Subsidiary Action Plan
ENTAC	Eastern Nile Technical Advisory Committee
ENTRO	Eastern Nile Technical Regional Office
ESIA	Environmental and Social Impact Assessment
IDEN	Integrated Development of Eastern Nile
IWRDMP	Integrated Water Resources Development and Management Plan
IWRM	Integrated Water Resource Management
kV	Kilo Volt
MASL	Meters Above Sea Level
MEDIWR	Ministry of Electricity, Dams, Irrigation and Water Resources
MoWIE	Ministry of Water Irrigation and Electricity
MW	Mega Watt
NBI	Nile Basin Initiative
NBS	Nile Basin System
NCOM	Nile Council Of Ministers
SNNPR	Southern Nations, Nationalities and Peoples' Region
SSEA	Strategic Social and Environmental Assessment
SVP	Shared Vision Programme
ToRs	Terms Of References

# 1. BACKGROUND

## 1.1 INTRODUCTION

The proposed project is part of implementation of the Baro-Akobo-Sobat Integrated Water Resources Development and Management Plan (BAS-IWRDMPlan). This Plan was completed and accepted by the participating countries in 2017 (respectively Ethiopia, South Sudan and Sudan). The plan includes the identification and detailing of priority projects for rapid implementation.

The “**Livelihood-based watershed management – taking to scale for a basinwide impact**” is one of the three “medium/long-term” projects selected by the participating countries. While the IWRDMPlan has a regional focus, it would be wrong to assume that catchment management plans for large basins and sub-basins, because they are supposed to be strategic in nature, do not need to include the micro-level IWRM-style interventions that are critical to a sustainable approach to natural resources management at the local level. The objectives of the project are twofold:

- ▶ Prepare a basinwide plan on watershed issues such as erosion and deforestation. The plan should describe the current situation and demonstrate the relevance of scaling up small scale livelihood based watershed management projects in the sub-basin.
- ▶ Identification of small-scale livelihood-based watershed managements projects with an emphasis on the development of sustainable multi-sectoral opportunities.

The proposed project is based on the following:

- ▶ **Application of Integrated Water Resources Management (IWRM) principles** to ensure a sustainable development of the different sectors. Emphasis should be given to the development of multisectoral opportunities.
- ▶ **Transboundary planning and benefit sharing** between Ethiopia and South Sudan.

## 1.2 THE BARO-AKOBO-SOBAT SYSTEM

### MAIN FEATURES OF THE BAS SUB-BASIN

The Baro-Akobo-Sobat (BAS) River system is a sub-basin of the White Nile and one of its main contributors. The BAS has a catchment area of around 260,000 km<sup>2</sup> and is shared by Ethiopia, South Sudan and to a lesser extent, the Sudan. The main rivers of the BAS take their source in the Ethiopian and South Sudan highlands and join the River Sobat in the plains.

The location of the sub-basin within the Nile basin is shown in Annex 1.

### BIO-PHYSICAL ENVIRONMENT

#### Hydrological features

The Baro-Akobo-Sobat sub-basin consists of the Baro River (and its tributaries such as the Birbir), the Akobo river and the Pibor river. After the confluence of the Baro and Akobo, the river is called Sobat in South Sudan. The river makes its way from an altitude of over 3,000 masl in the Ethiopian highlands to about 400 masl when the Sobat crosses into South Sudan on the way to its junction with the outflow from the Sudd wetlands on the White Nile.

The seasonal rainfall pattern and large flat areas have resulted in the formation of many wetlands. The Machar Marshes are located north of the Baro River upstream of its confluence with the Pibor River. This

wetland system in a depression has a hydrology primarily driven by evaporation and local rainfall. Some of the flow that goes from the Baro river system to the wetlands during high flows comes back into the Baro and White Nile rivers downstream (through an extended grassy channel called Khor Adar) although flow estimates vary.

The mean annual outflow of the BAS sub-basin where the Sobat River joins the White Nile is estimated at around 12.6 billion m<sup>3</sup>/annum and contributes to half of the White Nile flow at their confluence.

The main features of the hydrographic network are shown in Annex 2.

### Bio-physical areas

Four biophysical areas are present in the sub-basin:

- i. **Highlands** are mainly situated in the eastern part and to a lesser extent in the southern part of the basin at an elevation varying from around 1,800 masl to 3,000 masl (Mount Kinyeti in the Imatong mountains reaches up to 3,187 masl).
- ii. **Escarpments** are generally situated between 1,100 and 1,800 masl. These areas are characterized by very steep slopes (much more important than in the highlands and foothills). Some parts are also flatter like the Boma Plateau, situated between 1,100 and 1,300 masl.

Highlands and escarpments are characterized by very high rainfall (from 2,000 to 2,500 mm per year) and moderate evapotranspiration compared to floodplains. The rainy season lasts from May to October. Highlands and escarpments are the source areas for significant rivers such as the Baro, Alwero, Gilo, Akobo and Kinyeti and the population density is very high.

- iii. **Foothills or Piedmonts** are situated between 700 and 1,100 masl. They form a transition area between escarpments, characterized by very steep slopes and flood plains which are extremely flat. The rainy season lasts from April to September.
- iv. The **Floodplains and wetlands** biophysical area covers more than half of the BAS sub-basin. It is situated between 370 and 700 masl. It consists of very flat clay plains that stretch from northwards South Sudan foothills and westwards from Ethiopia foothills to the Sobat river. The rainfall reaches between 600 and 800 mm/year, falling between April and September.

### Potential for development

The BAS lowlands host one of the most important mammal migration of the world (especially in the Boma and Gambella national parks). The main migratory species is the White-eared Kob, estimated to up to 1.2 million. Apart from the White-eared Kob, the migration consists of Tiang, Mongalla gazelle and East African eland all followed by Lion, Jackal and Hyena, Zebra, Bright's Gazelle, Giraffe and Beeisa Oryx, etc.

These natural assets bring a huge potential for ecotourism in the area as wildlife experts consider that the mammal migration of the BAS is equal to that of the Massai Mara – Serengeti, which gathers around 400,000 visitors annually.

There is also a great potential to develop ecotourism in other parts of the sub-basin, more especially for the following:

- ▶ Machar marshes (South Sudan)
- ▶ Badingillo natural reserve (South Sudan)
- ▶ Kidepo game reserve (South Sudan)
- ▶ Mount Kinyeti (South Sudan)
- ▶ Kafa biosphere reserve (Ethiopia)
- ▶ Sheka biosphere reserve (Ethiopia)
- ▶ Yayu biosphere reserve (Ethiopia)

► Etc.

## SOCIO-ECONOMIC ENVIRONMENT

### Principal livelihood activities in the sub-basin

**Rain fed crop cultivation** is the principal livelihood activity in most of the basin **where adequate rainfall is available**. The economy, which is largely based on traditional cultivation methods, is subsistence oriented. Production is dominated by cultivating crops such as maize and sorghum for local consumption. The lowland population practise shifting cultivation, mainly for growing sorghum. In South Sudan, more than 95% of households are categorized as subsistence-level rain-fed farmers cultivating small areas using simple manual agriculture implements.

**In the semi-arid to arid areas of the sub-basin pastoral livestock becomes predominant.** Livestock as a source of livelihood is more important for the South Sudan side of the basin where there is a high concentration of cattle, sheep, and goats.

**Farm employment (combining crop and livestock production) constitutes the primary form of employment for the population.** The communities in the sub-basin basin (both in Ethiopia and Sudan) appear to have very limited experience in accessing cash income due to the remoteness and inaccessibility of the region from regional market centres

**Fishing is also an important component** of the livelihood strategies of communities that live along the rivers and wetlands in the sub-basin. The Baro-Akobo-Sobat sub-basin has a high potential for flood plain aquaculture, but lacks efficient aquaculture technologies.

### Potential for development

The high rainfall, fertile lands, and rivers of the basin offer significant potential for agricultural growth. Furthermore, the potential for large-scale hydropower development has already been identified in the highland areas.

## KEY ISSUES AND CHALLENGES

The general key issues and challenges encountered in the sub-basin are summarised in the table below.

*Table 1-1: Key issues and challenges encountered in the sub-basin*

<b>Bio-physical environment: key issues identified</b>	<b>Socio-economic environment: key issues identified</b>
<ul style="list-style-type: none"> <li>• Stress on Wetlands</li> <li>• Loss of biodiversity</li> <li>• Unsustainable hunting of wildlife</li> <li>• Loss of natural forest</li> <li>• Soil erosion</li> <li>• Scattered settlements</li> <li>• Poor agriculture extension and poor credit facilities</li> <li>• Flood and drought</li> <li>• Lack of peace and security</li> <li>• Poor physical and social infrastructure</li> <li>• Climate change</li> <li>• Lack of knowledge</li> </ul>	<ul style="list-style-type: none"> <li>• Poverty and Food Insecurity</li> <li>• Low level of well-being</li> <li>• Lack of peace and security</li> <li>• Low level of provision of social services</li> <li>• Vulnerable groups</li> <li>• Gender inequality</li> <li>• Scattered settlements</li> <li>• Poor agriculture extension and poor credit facilities</li> <li>• Recurrence of various forms, intensity, duration and impacts of conflicts</li> <li>• Potential for influx of people</li> <li>• Flood and drought</li> <li>• Land security/land tenure issues</li> <li>• Basin population dynamics place heavy pressure on natural resources</li> <li>• Climate change</li> </ul>

## 1.3 ETHIOPIA COUNTRY BACKGROUND

### DEMOGRAPHIC FEATURES

The Ethiopian part of Baro-Akobo-Sobat sub-basin includes Gambella Regional State and parts of Oromia, SNNPR and Benishangul-Gumuz regions. The combined current population of the these parts of Ethiopia in the BAS sub-basin is estimated at 3.04 million. The majority (i.e. 88.4%) of the people live in rural areas and the rest 11.6% are urban residents.

The highlands of the BAS sub-basin in Ethiopia (in Oromia and SNNPR) are relatively densely populated with average crude density varying from 43-70 people per km<sup>2</sup>, whereas areas the Gambella and Benishagul-Gumuz regions are less populated, with the average crude density varying from 10-16 people per km<sup>2</sup>.

### SOURCES OF INCOME

The main occupation of rural households in Ethiopia are farming and livestock rearing. Some households are also engaged in non-agricultural enterprises. Main sources of income are crop and livestock sales. A rural socio-economic survey indicated that at national level, 79% of households cultivate land, 76% rear livestock, 72% are engaged in both livestock and farming.

Non-farm enterprises (NFE) are important in the lives of households and their number is increasing. Nationally, about 28% of households have one or more NFE. About 60% of households in small towns and 34% of households in large towns reported having one or more NFE, compared with 26% among rural households (ERSS, 2015). The three most important NFE activities are non-agricultural businesses or services from home including shops (about 8% of households), selling processed agricultural products including food and local beverages (6% of households), and businesses such as selling goods on a street or in a market (about 5% of households).

### ACCESS TO ELECTRICITY

Ethiopia has a considerable renewable energy endowment, with an abundant hydropower potential, solar and geothermal, as well fossil fuels. Hydropower constitutes almost 92.5% of the total energy mix and thermal energy comprise of 7%. Currently, Ethiopia has around 2,000 MW of installed power generating capacity, out of which 1,980 MW (99%) is generated from hydropower plants. The remaining 12 MW (0.6%) and 8 MW (0.4%) comes from thermal and geothermal sources respectively. In the coming five years the electricity generating capacity is expected to reach 10,000 MW from the current level of 2,000 MW thereby, the electricity coverage of the country will be 75%.

### OTHER ENERGY SOURCES

In rural Ethiopia, 85% of the population uses biomass energy sources. The biomass sources comprise firewood (90.7%), animal dung crop residues and others (8.1%) and charcoal (0.2%). All these energy sources are used for cooking, baking, heating, lightening etc. The main sources of energy in the Ethiopian part of the BAS Sub-basin are firewood (56%), animal dung (16%), charcoal (8%). While 6% of the households use kerosene, less than 1% of households use electricity and gas.

## 1.4 SOUTH SUDAN COUNTRY BACKGROUND

### DEMOGRAPHIC FEATURES

The South Sudan part of Baro-Akobo-Sobat sub-basin includes Jonglei, Upper Nile and Eastern Equatoria states. The estimated current population of the these parts is 2.7 million. (Central Bureau of Statistics, 2012). The population is also overwhelmingly rural, with between 85 and 90% of the population

living in rural areas. (NBS, 2010). The highest densities of population are found along rivers, in particular the area along the Sobat River.

## SOURCES OF INCOME

Crop production (agriculture) is one of the natural resources practices, as means of earning cash and foodstuff for sustaining livelihoods. Rainfed agriculture is the most common farming system. Mixed cropping, poultry and livestock production are other common practices, along with shifting cultivation. In both highland and lowland areas, the use of agricultural inputs such as fertilizers, agro-chemicals, improved seeds, tractors and other machinery is still minimal. Fishery is another important source of income, especially in the lowlands.

A significant proportion of the population is extremely vulnerable to food insecurity due to direct and indirect impact of conflicts, disruption of livelihoods, high dependence on markets and exposure to food price volatility. According to the Comprehensive Agriculture Master Plan (CAMP), over 95% of the total area of South Sudan is considered suitable for agriculture, 50% of which is prime agricultural land where soil and climatic conditions allow for production of a wide range of agricultural products, including annual crops such as grains, vegetables, tree crops such as coffee, tea, and fruits, livestock, fishery and various forest products. Despite of this potential, only 4% of the total land is under cultivation most of which are rain fed while the largest part of the country is still under trees and shrubs (62.6%).

## ACCESS TO ELECTRICITY

Only about 1% of the population of the country has access to grid electricity. Most of these consumers are in Juba, with the remaining in Wau and Malakal. Installed capacity for the country is about 30 MW, of which about 22 MW is currently operational.

## OTHER ENERGY SOURCES

Current energy needs in South Sudan are predominantly met by biomass, consisting of the burning of charcoal, wood, grass, cow dung and agricultural residues. According to the National Baseline Household Survey in 2012, over 96% of the population use firewood or charcoal as the primary fuel for cooking (which typically constitutes 90% of the energy used in a rural household).

# 1.5 THE BAS IWRDMPLAN

## ORIGIN OF THE BAS MULTIPURPOSE DEVELOPMENT STUDY PROJECT

**The Nile Basin Initiative (NBI)** is a partnership for regional cooperation initiated and led by the riparian states of the Nile River through the Council of Ministers of Water Affairs of the Nile Basin states/countries (Nile Council of Ministers, or NCOM). The NBI started with a consultative and participatory process of dialogue among the riparian countries that resulted in their adoption of a “Shared Vision” - to “achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile Basin water resources” through sustainable and equitable development; efficient water management and optimal use of resources; cooperation and joint action between the riparian countries, seeking win-win gains; and targeting poverty eradication, and promoting economic integration.

The NBI has developed two sets of complementary and mutually reinforcing programs to translate the Vision into concrete actions that benefit all peoples in the basin. One program is the basin-wide **Shared Vision Programme (SVP)** aimed at creating and sustaining the enabling environment for cooperative management and development of water resources; the other is the **Subsidiary Action Programmes (SAPs)** aimed at identifying and cooperatively developing projects to realize physical investments that yield win-win gains to all riparian states. For operational purposes the SAP is divided into two sub-basin programmes, one covering the Eastern Nile sub-basin, consisting of states Egypt, Ethiopia, South Sudan and Sudan (see location map – Annex 1); and the other is the Nile Equatorial Lakes sub-basin covering Burundi, Democratic Republic of the Congo (DRC), Kenya, Rwanda, Tanzania and Uganda.

**The Eastern Nile Technical Regional Office (ENTRO)**, established by the **Eastern Nile Council of Ministers (ENCOM)** of water affairs in the Eastern Nile countries, is responsible for managing the **Eastern Nile Subsidiary Action Program (ENSAP)**, whose overall objective is the cooperative development of the water resources of the Eastern Nile Basin, which include the Baro-Akobo-Sobat River Basin, in a sustainable and equitable manner to ensure prosperity, security, and peace for all its peoples. In pursuit of this objective, ENTRO has formulated the **Integrated Development of the Eastern Nile (IDEN)** as a suite of integrated development projects including hydropower, irrigation and drainage, flood control, watershed management, and water resources management. Because of its regional water and land resources potentials and the role it can play in regional peace, stability and security, the Baro-Akobo-Sobat Multipurpose Water Resources Development Study Project became one of the seven (7) projects identified in the IDEN.

## THE BAS IWRDMPLAN AND THE DEFINITION OF THE PROPOSED PROGRAMME

The main objectives of the plan are to:

- ▶ Establish a shared vision of the future development of the sub-basin as well as the strategic objectives required to reach this vision;
- ▶ Identify principles of water resource management as well as water-linked ecosystem management and,
- ▶ Review, evaluate and recommend the institutional framework required for the implementation of the plan (roadmap).

As part of the plan, nine potential priority medium/long term projects were defined. Out of these nine projects, three projects were selected by the countries. They are the following:

- i. The Integrated BAS hydropower, irrigation and multipurpose development programme – phase 1. Baro/Sobat Component
- ii. The Akobo/Pibor transboundary multipurpose development project
- iii. The livelihood-based Watershed Management – Taking to Scale for a Basinwide Impact

For these projects, a more detailed analysis of the key features of the projects has been carried out to compile terms of references for their implementation.

The current terms of references relate to the third priority medium term project: iii. The livelihood-based Watershed Management – Taking to Scale for a basinwide Impact

## 1.6 THE LIVELIHOOD-BASED WATERSHED MANAGEMENT – TAKING TO SCALE FOR A BASIN WIDE IMPACT

The proposed “programme “of local level interventions is based on small-scale livelihood-based watershed management demonstration projects, which, when taken to scale, represent real basinwide solutions to some of the key environmental and socio-economic challenges such as high levels of sediment transport, ecosystems degradation and deforestation, lack of food security, poor access to electricity, etc.

This project will support the identification of small-scale livelihood-based watershed management projects with an emphasis on the development of sustainable multisectoral opportunities followed by the design and implementation of a programme to take the approach to scale.

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## 2. LOCATION OF STUDY AREA

The study area is the entire BAS sub-basin. However, as part of the BAS integrated water resources development and management study project, three feasibility studies have been carried out, one of which offers opportunities for replication as part of the current proposed project:

**“The Majang multipurpose development project”** is centred around micro-hydropower generation, small scale irrigation, aquaculture and livelihood based watershed management (such as bee keeping activities and fruit production). This project is located in the Majang woreda where four small catchments have been identified for implementation. For one of these, the Dunchaye kebele (Godere Woreda), a detailed feasibility study has been carried out with the aim of moving forward rapidly into implementation in pilot demonstration mode. Implementation for the other three adjacent small catchments will proceed very soon (+/-12 months) afterwards. Implementation should lead to the reduction of deforestation in the catchment which is located within a biosphere reserve. There is a great potential for replication in the area and further afield in the highlands of the BAS sub-basin.

### 3. OBJECTIVES OF THE ASSIGNMENT

#### 3.1 GENERAL OBJECTIVES OF THE ASSIGNMENT

The overall objective of the assignment is to define the best practices and opportunities for livelihood-based management interventions based on lessons learned, and to implement the successful scaling up to the entire BAS basin.

#### 3.2 SPECIFIC OBJECTIVES OF THE ASSIGNMENT

The assignment will comprise four components:

- ▶ Component 1: Review and lessons learnt of past projects
- ▶ Component 2: Creation of a basin wide plan including feasibility studies and monitoring and evaluation framework
- ▶ Component 3: Design studies and tender documents
- ▶ Component 4: Implementation of the basin wide plan to high priority areas (including monitoring and evaluation and adaptive management)
- ▶ Component 5: Implementation of the plan to all suitable areas (including monitoring and evaluation and adaptive management)

The overall organisation of the project is shown on the figure below.

Table 3-1: Roadmap for Implementation of the Project

Components	Years									
	1	2	3	4	5	6	7	8	9	10
<b>1. Review and lessons learnt of past projects</b>										
Inception and scoping	■									
Data collection from targeted small-scale multipurpose projects	■									
Data analysis and recommendations	■									
Communication strategy for dissemination of Component 1 reports	■									
<b>2. Basin wide plan including feasibility studies and monitoring and evaluation framework report</b>										
Stakeholder consultation		■								
Development of a 10 years basin wide plan		■	■							
Feasibility studies		■	■	■						
<b>3. Design studies and tender documents</b>										
Design studies				■	■					
Institutional arrangements				■	■					
Monitoring and evaluation framework				■	■					
Tender documents				■	■					
<b>4. Implementation of the basin wide plan to high priority areas</b>						■	■	■	■	■
<b>5. Implementation of the plan to all suitable areas</b>						■	■	■	■	■

	Fully covered by ToR
	Only partly covered by ToR
	Not covered by ToR

These terms of reference cover Component 1 to 3. The Implementation of the plan will be done under a separate contract.

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## 4. GENERAL SCOPE AND METHODOLOGY OF THE STUDY

### 4.1 COMPONENT 1: REVIEW AND LESSONS LEARNT OF PAST PROJECTS

#### PHASE 1 - INCEPTION AND SCOPING

The Inception and Scoping phase is included in Component 1 but covers the 5 Components of the Project.

##### Task 1. Inception

During this phase, the consultant is expected to revise and refine the proposed methodology, incorporating whenever relevant new information and/or comments. In addition, a clear schedule of activities, responsibilities and work plan should be proposed for validation by the Client during the inception workshop. The Project Inception Phase is to cover all components (1 to 4) of the project.

Consultation of key stakeholders is recommended during the Inception phase, before the Inception workshop.

##### Task 2. Scoping

The main purpose of the scoping exercise is to identify the existing data and information, assess the gaps and propose actions to fill in the gaps. The Scoping and Inception exercises should be performed in parallel as the methodology may be modified in response to the data gap analysis.

In addition, the consultant shall thoroughly review the documents delivered during the Integrated Water Resource Development and Management study project (ENTRO, 2017) especially the following deliverables:

- ▶ The Strategic Social and Environmental Assessment (SSEA)
- ▶ The Integrated Water Resources Development and Management Plan (IWRDMPlan)

From the review, the consultant should identify main data deficiencies, and incorporate within the work plan and activities a detailed strategy and schedule for an on-field data collection programme.

The expected duration for the Project Inception/Scoping is 3 months. This should be adequate to carefully prepare.

**Deliverable: Inception and scoping report (month 3)**

**Workshop 1: Inception workshop (month 3.5)**

#### PHASE 2 - DATA COLLECTION FROM TARGETED SMALL-SCALE MULTIPURPOSE PROJECTS

##### Task 1: Comprehensive review of small-scale multipurpose projects implemented in the sub-basin

This task includes the review of livelihood based watershed management projects which have been implemented in the last 10 years in the sub-basin. Consultation of the Ministries (MoWIE and MEDIWR especially) in Ethiopia and South Sudan to identify the projects should be the point of departure. This should also include review of the Eastern Nile Watershed Management Project carried out by ENTRO (2016).

## Task 2: Field visits in priority areas of the sub-basin

### **Sub-task 2.1: Proposition of projects that could be visited**

In consultation with relevant stakeholders of the sub-basin, the consultant is expected to propose a comprehensive list of existing small-scale multipurpose IWRM projects that will be visited. These projects should be projects which have been completed and are now operated on an ongoing basis by the communities. This list should include the Majang multipurpose project.

The consultant must justify the choice of projects included in the comprehensive list ensuring that they all fall within the strategic objectives of the IWRDMPlan/SSEA.

### **Sub-task 2.2: Data collection**

During field visits of the targeted projects, the consultant must gather relevant data for the thorough assessment of these projects. Aspects to consider should include:

- ▶ Impact on food security;
- ▶ Impact on local employment;
- ▶ Impact on energy access and sources;
- ▶ Sustainability of the project (incl. maintenance and upkeep, capacity and skillsets required);
- ▶ Changes in biodiversity and habitat quality in adjacent areas;
- ▶ Potential impact on the reduction of deforestation in the catchment;
- ▶ Water quality and safety;
- ▶ Infrastructure development surrounding the project;
- ▶ Resilience to climate change;
- ▶ When relevant, impact on conflict resolution.

When possible, the main source of data must be obtained directly from stakeholders during the field missions.

**Deliverable: Comprehensive list of existing/operated small-scale multipurpose projects in the basin (month 6)**

## **PHASE 3 - DATA ANALYSIS AND RECOMMENDATIONS**

Using the collected data, and supplemented by secondary sources whenever necessary, the consultant shall present a full analysis of each of the selected small-scale projects.

The analysis should include the following for each project:

- ▶ Project description and main components (including project background and implementation modalities);
- ▶ General objective of the project;
- ▶ Specific objectives of the project;
- ▶ Benefits of the project and potential issues
- ▶ Project progress and status (should include consultation of people concerned by the project);
- ▶ Financial and economic analysis;

The conclusions should provide a number of recommendations and improvements for the different projects. Based on this, lessons for the new projects to be proposed should be given.

**Deliverable: Report on selected existing/operated small-scale multipurpose projects (month 10)**

## PHASE 4 - COMMUNICATION STRATEGY FOR DISSEMINATION OF COMPONENT 1 REPORTS

The consultant will ensure that all relevant stakeholders are made aware of the results of the review.

**Deliverable: Short note (20 to 30 pages) presenting the main results of Component 1 (month 10)**

**Workshop 2: Presentation of the key results of Component 1 for moving forward to Component 2 (month 11)**

## 4.2 COMPONENT 2: BASIN WIDE PLAN INCLUDING FEASIBILITY STUDIES AND MONITORING AND EVALUATION FRAMEWORK

### PHASE I: STAKEHOLDER CONSULTATION

The main objective of Phase I is to get key stakeholders to help define priority areas for project development. For this, stakeholders need to provide their knowledge of the area, in particular priority zones in terms of environmental degradation and socio-economic deprivation.

Phase 1 should include the following:

- ▶ Rapid stakeholder analysis
- ▶ Plan for stakeholder consultation
  - Objectives of consultation
  - Elaboration of the consultation plan
- ▶ Implementation of the consultation plan and meeting with the relevant stakeholders

**Deliverable: Consultation plan including minutes of meeting with the stakeholders (month 18)**

### PHASE II: DEVELOPMENT OF A 10 YEARS BASIN WIDE PLAN

Task 1: Compilation of the draft plan

#### *Sub-task 1.1: Background situation in the sub-basin*

Based on previous studies and data collected as part of Component 1, the Consultant should describe the current situation in the sub-basin (bio-physical and socio-economic). Then, the current status of the watersheds in the sub-basin should be characterised.

#### *Sub-task 1.2: Strategic and specific objectives of the plan*

Based on a thorough review of the IWRDMP and SSEA and based on the work carried out as part of Component 1, the Consultant should define the strategic and specific objectives of the plan for the next 10 years. These objectives should be defined according to the key issues and challenges encountered in the sub-basin which require the development of livelihood based watershed management projects.

Moreover, a review of existing national (South Sudan and Ethiopia) and regional strategies and policies relevant for livelihood based watershed management projects should be carried out. The proposed projects (refer to sub-task 1.4) should be in line with the existing strategies and policies.

#### *Sub-task 1.3: Lessons learnt from past projects*

The main results from Component 1 should be provided for in the plan.

**Sub-task 1.4: Proposed actions and projects**

- ▶ Proposed actions: Based on the background situation in the sub-basin and specific objectives defined above, major interventions (strategic actions) required to improve, protect and maintain the watershed in a healthy and sustainable manner should be proposed.
- ▶ A long list of projects should be proposed (around 30-50 projects) based on the review and lessons learnt of past projects, data collection and stakeholder consultation within the scope of the strategic actions. A preliminary envelope of 46 million USD for implementation of the 30-50 projects is proposed. Criteria to define the projects are the following:
  - The scale of the project is small and beneficiaries of the project are local communities;
  - The project can be easily implemented and operated by the local communities;
  - The project is multipurpose in nature
  - The project can be easily replicated
  - The project shall participate in reducing gender inequalities
  - The project should aim at diversifying and enhancing livelihood in the project area thus reducing the existing pressure on ecosystems. This can include the following activities: micro-hydropower, small-scale irrigation, water supply, sanitation, fruit and other value added products plantations (such as spices, coffee, etc.), honey production, improvement of access to market, fisheries and aquaculture, livestock watering, etc.
  - Long-term sustainability

General information for each project should be provided in the plan. Details of the projects will be given in the projects portfolio (refer to Task 2).

Moreover, the following should be included in the plan:

- ▶ Cumulative impacts of implementing all the projects: on watershed issues such as erosion and deforestation but also in term of livelihood improvement. This should demonstrate the relevance of scaling up small scale livelihood based watershed management projects.
- ▶ Investment costs to implement the plan, and economic (cost/benefit) and financial analyses.

Then, a minimum of 15 projects should be shortlisted to be taken to feasibility. Close attention should be paid to further replication of the “Majang short term project”. A brief description of the Majang project is given in the box below. More information can be provided by ENTRO.

The Majang multipurpose development project will be piloted in the Dunchaye catchment in accordance with the priority needs of Dunchaye Kebele, in Majang zone, Ethiopia. In this remote area, there is a need to improve food security and develop the economy particularly through access to the market. The project also includes extensive livelihood based watershed management activities to protect the remnant forests threatened by deforestation for charcoal making (the Dunchaye kebele is located within a biosphere reserve). The Majang Project makes allowance for the rapid replication of the Dunchaye pilot demonstration project for three further adjacent catchments in or close to the Majang woreda as part of the Majang short-term project.

Direct benefits of the project (figures are for the Dunchaye pilot) include the following:

- ▶ Micro-hydropower generation with a production estimated to be around 1 GWhrs/annum. This is particularly important as this remote area is not going to be connected to the national electric grid.
- ▶ Small scale irrigation and development of 220 ha for maize, sorghum, potatoes, soybeans, dry beans, avocados and vegetables.
- ▶ Aquaculture: an initial development of 20 ponds is proposed
- ▶ Watershed management: livelihood based watershed management activities are proposed such as bee keeping, reforestation and fruit production.

**Sub-task 1.5: Implementation of the plan**

An institutional framework and monitoring and evaluation framework should be elaborated in view of implementing the plan.

**Task 2: Portfolio of projects**

The plan should include a portfolio of projects (around 30 to 50 projects depending on total cost) which can form an annex. This portfolio should include the following, for each project:

- ▶ Location of the project
- ▶ Overall objective of the project
- ▶ Main components of the projects
- ▶ Socio-economic and bio-physical situation in the area
- ▶ Need for livelihood based watershed management projects in the area
- ▶ Benefits associated with the project
- ▶ Potential issues related to project implementation
- ▶ Preliminary budget and timeline.

The consultant is expected to compile a comprehensive set of high quality maps for the understanding of the characteristics of the area and selection of projects (the same is expected for the subsequent phases of the project). The consultant will be asked to provide the all the data and maps in shapefile format in order to facilitate its future use by the client.

**Deliverable: Draft version of the basin wide plan including projects portfolio (month 24)**

**Workshop 3: Presentation of the draft plan and selection of 15 priority projects (month 25)**

**Task 3: Compilation of the final report**

The Consultant should compile the final report based on the comments received by the key stakeholders during workshop 3. This may include refinements of some components of the projects. Moreover, this workshop should include extensive group sessions to select the 15 priority projects to be taken to feasibility. This will be included in the final version of plan.

**PHASE III: FEASIBILITY STUDIES**

The objective of this task will be to prepare bankable feasibility studies for the 15 short-listed projects. Each feasibility study should include:

- ▶ Baseline study of the bio-physical, socio-economic and institutional environment
- ▶ Needs and potential of the area and justification for the project
- ▶ Resilience of the project to climate change (if relevant)
- ▶ Impact of the project on conflict resolution (if relevant)
- ▶ Project design
- ▶ Environmental and Social Impact Assessment (ESIA): assessment of the potential positive and negative impacts of the projects and proposition of i. avoidance/enhancement ii. reduction iii. Mitigation iv. Offset measures. These measures should be costed.
- ▶ Economic (cost-benefit analysis) and financial analyses (both analysis should include a sensitivity analysis).

Regarding the “Project design”, the following analyses are expected, when relevant:

- ▶ **Assessment of Water Resources availability/quality:** The objective is to assess the water resources availability to satisfy the estimated uses and demands related to the project and to annually match the water availability with the annual demands. The Consultant shall: (i) determine the current and potential future water uses and demands for the identified water uses at the project area; (ii) assess and quantify any upstream water uses (abstractions/diversions) and their impacts on the proposed project; (iii) assess both the surface water and groundwater availability and examine the potential for their conjunctive use in a sustainable manner; (iv) undertake water quality assessment of surface water (when relevant).
- ▶ **Hydrological Analysis** such as rainfall-run-off modelling (using existing data) to facilitate the design of the potential infrastructure (micro-hydropower, small-scale irrigation, water supply, etc.). Impacts on existing water uses should be assessed as well. Impacts downstream on ecosystems and water users should be assessed.
- ▶ **Sediment Analysis:** if the proposed project is **addressing erosion issues** in the catchment, then a sediment analysis should be carried out. The Consultant will assess the current sediment regime and total sediment transport of the river system in the project area. Then the consultant should estimate sediment load changes with the implementation of the project.
- ▶ **Topographical Surveys/Use of existing topographic data** for the design of the different infrastructures.

The feasibility studies should include layouts and preliminary costing of the different infrastructures.

**Deliverable: Feasibility studies for 15 priority projects (month 33)**

**Workshop 4: Presentation of the 15 feasibility studies for moving forward to Component 3 (month 34)**

## 4.3 COMPONENT 3: DESIGN STUDIES AND TENDER DOCUMENTS

### PHASE I: DESIGN STUDIES

Each feasibility study should be taken to design.

#### Task 1: Confirmation of project layout, construction plans and implementation scheduling

Based on the preceding tasks and the comments received during workshop 4, the consultant will confirm the projects layouts, and prepare the final desk projects layouts (for the relevant components included in each project). Then, for each project, The Consultant shall establish construction schedules for their implementation. This should include mobilisation of the local communities, construction of access roads, mapping and information, work methods and preliminary labour force requirements. Finally, the project schedule should be detailed.

If relevant, a capacity building programme should be designed.

#### Task 2: refinement of the ESIA's

Based on the above task (task 1), the Consultant shall refine the ESIA's.

#### Task 3: refinement of the economic and financial analysis

Based on the above task (task 1), the Consultant shall refine the economic and financial analysis.

## **PHASE 2: INSTITUTIONAL ARRANGEMENTS**

The objective of this task is to design institutional arrangements for the proposed projects. This will cover (i) detailed assessment of the institutional (including environmental and social) capacity of local agencies relevant for implementing (or concerned by) the project. (ii) implementation and operation and maintenance arrangements for the projects. The consultant will explore opportunities for various social groups, to participate in decision making processes.

## **PHASE 3: MONITORING AND EVALUATION FRAMEWORK**

For each project, the Consultant will prepare a monitoring and evaluation framework.

## **PHASE 4: TENDER DOCUMENTS**

Under this task, the Consultant will prepare tender documents which should follow international standard guidelines.

**Deliverable: Design studies and tender documents for 15 priority projects (month 43)**

**Workshop 5: Presentation of the 15 design studies for validation and finalisation (month 44)**

# **5. METHODOLOGY, STANDARD AND DESIGN CRITERIA**

The Consultant will be expected to employ the most effective methodology and standards to achieve results with optimal national stakeholder involvement. In addition, the Consultant will be expected to: (i) collect most data from review and analysis of existing secondary sources of information such as assessment reports and various other regional and relevant global publications; (ii) prepare clear, concise and focused reports; and (iii) ensure reports are delivered in time as per the agreement. International standards (example British/American/French Standards) shall be used for the feasibility studies, and their application shall be appropriately referenced.

# **6. LIST OF REPORTS, SCHEDULE OF DELIVERIES AND PERIOD OF PERFORMANCE**

The Consultant will produce the reports and attend the related meetings as given in Table 6-1. The anticipated date (from the beginning of the project) for delivery of the reports and workshops is given.

Additional meetings/workshops with the Client and Ministries may be required to ensure the smooth progress of the study and should be proposed by the Consultant in his methodology.

Table 6-1: Preliminary schedule of deliverable and workshops

Deliverable and Workshops/Meetings		Month (from the beginning of the project)
<b>Component 1: review and lessons learnt of past projects</b>		
C-1	Inception meeting with the Client	Month 1
	Meeting with relevant Ministries in Ethiopia and South Sudan	Month 1
	Draft Inception and Scoping report	Month 3
	Inception workshop	Workshop 1 – Month 3.5
	Comprehensive list of existing/operated small-scale multipurpose projects in the basin	Month 6
	Report on selected existing/operated small-scale multipurpose projects	Month 10
	Short note (20 to 30 pages) presenting the main results of Component 1	Month 10
	Presentation of the key results of Component 1 for moving forward to Component 2	Workshop 2 – Month 11
	Final report on selected existing/operated small-scale multipurpose projects	Month 12
<b>Component 2: Basin wide plan including feasibility studies and monitoring and evaluation framework</b>		
C-2	Consultation plan including minutes of meeting with the stakeholders	Month 18
	Draft Basin wide plan including projects portfolio	Month 24
	Presentation of the draft plan and selection of 15 priority projects	Workshop 3 – Month 25
	Draft feasibility studies for 15 priority projects	Month 33
	Presentation of the 15 feasibility studies for moving forward to Component 3	Workshop 4 – Month 34
	Final feasibility studies for 15 priority projects	Month 36
<b>Component 3: Design studies and tender documents</b>		
C-3	Draft design studies and tender documents for 15 priority projects	Month 43
	Presentation of the 15 design studies for validation and finalisation	Workshop 5 – Month 44
	Final design studies and tender documents for 15 priority projects	Month 48

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## 7. DATA AND SERVICES TO BE PROVIDED BY THE CLIENT

Data and documentation relevant for the project should be made available to the Consultant. However, the Consultant has the ultimate responsibility for collecting all the required data and documentation which cannot be made available by the Client.

The Client will:

- ▶ Facilitate communication with the relevant institutions,
- ▶ Liaise and assist the Consultant in obtaining any other information and documents required from government agencies
- ▶ Provide assistance for visas applications and work permit (if required) for staff of the Consultant
- ▶ Provide assistance in obtaining Customs and Tax Exemptions as detailed in Special Conditions of the Consultancy Agreement and General Conditions of Service,
- ▶ Arrange consultative meetings and ensure linkage with relevant regional authorities,
- ▶ Provide any document listed in the annex on request that the consultant may require either for purposes of preparing bid documents or in the course of the feasibility studies. The Consultant shall operate their own project office and shall bear all accommodation, local transportation, visas, and other costs necessary to carry out the assignment.

## 8. QUALIFICATIONS OF THE CONSULTANT

The study team should comprise experienced professionals, and include national/regional/international consultants as necessary to ensure study relevance and effectiveness in light of prevailing local conditions. The team should reflect an appropriate mix of disciplines, education, skills and experience, an understanding of underlying development issues, and regional experience. The specialists should have postgraduate qualifications and at least 10 years of experience in undertaking studies related to irrigation, hydropower and water resources development and watershed management. The areas of expertise required include: irrigation engineering and agriculture development, civil/infrastructure/hydraulic engineering, watershed management, rural development, hydrology, financial and economic analysis, geotechnical engineering, institutional analysis and environmental and social impact assessment. It may be necessary to include non-key experts covering agronomy, institutional aspects, livestock production and other areas. The Consultant may optimize their personnel to demonstrate the competences required for the assignment. The qualifications of the key experts are summarised as follows:

*Table 8-1: Qualifications of the key Experts*

<b>Position</b>	<b>Skills</b>
IWRM Expert (Team Leader)	The Team Leader will be responsible for the overall planning and implementation as well as coordination and management of the consulting team.  He/she should be a graduate in in water resources or a related field with proven experience in integrated water resources planning. She/he shall have a minimum of fifteen (15) years overall experience and five (5) years relevant experience in preparing integrated water resources management and development plans, plan implementation strategies and action plans. As Team Leader he/she should demonstrate leadership skills and experience in managing a dynamic and multidisciplinary team of international and local experts. Recognition for additional relevant experience and/or relevant post-graduate qualifications may be given.
Watershed management Expert	He/she should be a graduate in natural resources management or a related field with at least 10 years relevant experience in land use planning, soil conservation, and rural development. Recognition for additional relevant experience and/or relevant post-graduate qualifications may be given.
Dam Design/ Civil Engineer (TL)	He/She should be a graduate in Civil/Hydraulic Engineering, with at least 10 years' experience in water resources planning and design and construction supervision of hydraulic structures including dams and hydropower projects and associated ancillary structures. Recognition for additional relevant experience and/or relevant post-graduate qualifications may be given.
Hydrologist/Modeller	He/She should be a graduate in hydrology/water resources engineering with at least 10 years of overall experience in the field of competence and five (5) years relevant experience in modelling hydrologic systems. She/he must have experience in East African region. Recognition for additional relevant experience and/or relevant post-graduate qualifications may be given.
Soil Specialist/Pedologist	He/She should be a graduate in soil sciences with at least 10 years' experience in soil investigation for irrigation and watershed projects. Recognition for additional relevant experience and/or relevant post-graduate qualifications may be given.
Hydrogeologist	He/She should be graduate in hydrogeology sciences with at least 10 years of overall experience in the field of competence. Recognition for additional relevant experience and/or relevant post-graduate qualifications may be given.

Environmentalist	He/She should be graduate in Environmental Engineering with at least 10 years of overall experience and five (5) years relevant experience in environmental assessments. Recognition for additional relevant experience and/or relevant post-graduate qualifications may be given.
Sociologist	He/She should be graduate in Sociology or related field with at least 10 years of overall experience and 5 years relevant experience in social and livelihood assessments. Recognition for additional relevant experience and/or relevant post-graduate qualifications may be given.
Economist	He/She should be a graduate in economics with a minimum of 10 years of overall experience and 5 years relevant experience in economic assessment of water resources in different sectors and in financing patterns. Recognition for additional relevant experience and/or relevant post-graduate qualifications may be given.
Water Supply Engineer	He/She should be a graduate in water engineering with a minimum of 10 years of overall experience and 5 years relevant experience in water supply-planning. Recognition for additional relevant experience and/or relevant post-graduate qualifications may be given.
Irrigation Engineer	He/She should be a graduate in water engineering with a minimum of 10 years of overall experience and 5 years relevant experience in planning and development of irrigation systems infrastructure, Agricultural Sector Development Programme, Agricultural Sector Development Strategy, and National Irrigation Master Plan. Recognition for additional relevant experience and/or relevant post-graduate qualifications may be given.
Hydropower Expert	He/She should be a graduate in Hydropower engineering with a minimum of 10 years of overall experience and 5 years relevant experience in planning and development of hydropower systems, National Power Master Plan, and interconnection. Recognition for additional relevant experience and/or relevant post-graduate qualifications may be given.
Fisheries Expert	He/She should be a graduate in Fisheries sciences with a minimum of 10 years of overall experience and 5 years relevant experience in inland fisheries and aquaculture. Recognition for additional relevant experience and/or relevant post-graduate qualifications may be given.
GIS — Remote Sensing Expert	He/She should a graduate in GTS - Remote Sensing with a minimum of 10 years of overall experience and 5 years relevant experience in preparation of GIS based databases and maps. Recognition for additional relevant experience and/or relevant post-graduate qualifications may be given.

## **9. COST AND CONTRACT DETAILS**

It is estimated that the work will commence in January 2018 and take 4 years. Whilst all the Consultant's costs incurred in their participation, supporting the arrangement and running of report review workshops must be included in the Consultant's financial proposal, the costs of holding the workshops themselves (costs of venue, participants' expenses such as transport and accommodation, materials, etc.) will be met by the Client and should not be included in the Consultant's financial proposals. The costs of all other consultations, etc. required to complete the assignment must be included in the financial proposals.

## **10. SUPERVISION ARRANGEMENTS**

The Client is the Nile Basin Initiative / Eastern Nile Technical Regional Office (NBI/ENTRO). The Consultant will be directly supervised and report to the Project Coordinator responsible for this study within ENTRO on behalf of the ENTRO Executive Director. At the national levels, the Consultant shall closely work with the Project National Project Coordinators with support of the Regional Project Steering Committee (RPSC) and Nile Equatorial Lakes Technical Advisory Committee (ENTAC) members of both countries. Results from the study will be regularly communicated to the funding agencies through ENTRO. ENTRO will ensure close coordination with other regional projects, to ensure effective information exchange. The Client will hold discussions with the Consultant at various stages of the consultancy to assess work progress, discuss constraints and possible interventions to ensure quality and meet deadlines.

## **11. QUALITY ASSURANCE AND CONTROL**

The Consultant will be required to demonstrate in their proposal evidence of adoption of the use of a Quality Assurance System (ISO 9001 or equivalent), as well as describe how quality control will be implemented during the assignment

**ANNEXES**

# **Annex 1: Location of the BAS sub-basin within the Eastern Nile system**



## **Annex 2: Baro-Akobo-Sobat sub-basin, relief and drainage**

