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# The Baro-Akobo-Sobat Multipurpose Water Resources Development Study Project

Medium and Long Term Projects

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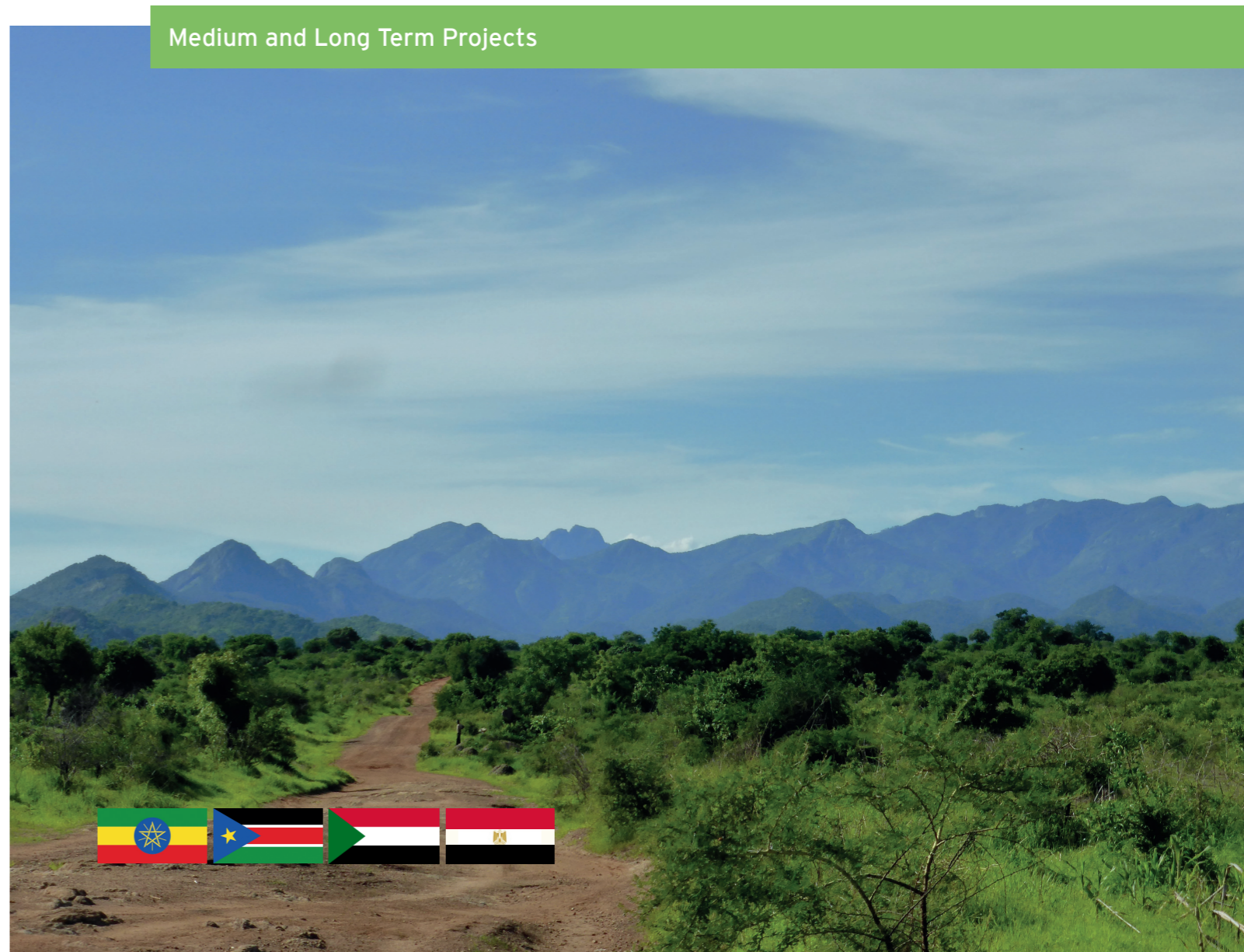
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## Introduction

This brochure presents the nine medium and long term projects which have been profiled and included in the Integrated Water Resources Development and Management Plan (IWRDMP) developed for the Baro–Akobo–Sobat (BAS) sub–basin. The BAS Multipurpose Development Study Project falls within the Integrated Development of the Eastern Nile (IDEN Project) being implemented by the Eastern Nile Technical Regional Office (ENTRO), one of the three centres of the Nile Basin Initiative (NBI).

The nine medium and long term projects are planned for implementation within the next 10 years, but most of them should be implemented without delay. These projects are the following:

- i. Akobo – Pibor Transboundary Multipurpose Development Project.
- ii. Integrated BAS Hydropower, Irrigation and Multipurpose Development Programme: Baro/Sobat component.: Phase 1
- iii. Livelihood–based Watershed Management – Scaling up for a Basinwide Impact.
- iv. Flood–Risk Mapping and Early–Warning System.
- v. Machar Marshes Integrated Water Resources Management Plan.
- vi. Cingaineta River Multipurpose Development Project.
- vii. Regional Transport and Navigation Development Project.
- viii. Transboundary Hydro–Meteorological and Environmental Monitoring System and Environmental Flows Assessment.
- ix. Boma–Gambella Transboundary National Park.

For the first three projects, terms of reference for feasibility studies and environmental impact assessments have been prepared to ensure that they can move forward rapidly.

It is worth mentioning that the nine projects have been defined in consultation with the key stakeholders of the sub–basin, as part of the strategic objectives defined in the plan. Implementation of these projects ultimately aims at reaching the vision for the sub–basin which is as follow:

### VISION FOR THE BARO–AKOBO–SOBAT (BAS) SUB–BASIN

*“A sustainably managed and developed BAS River sub–basin with prosperous, connected, peacefully and mutually co–existing societies.”*

## Project overview

The project aims at building on ongoing activities to designate the Boma–Gambella parks as one contiguous transboundary national park to strengthen cooperative management and enhance effective conservation and protection. A management plan will be developed to improve the current understanding of the features of the park and propose adequate measures especially for i) livelihood enhancement through eco–tourism development, fisheries activities, shea nuts production and ii) Biodiversity conservation.

This project should be built based on ongoing activities in the area. Preliminary activities have been implemented as part of the project of transboundary cooperation between South Sudan and Ethiopia led by the HoA–REC for the management of Boma and Gambella national parks.

## Main components

### Component 1: Designation of the transboundary national park

The designation of a transboundary national park will be reached through a Memorandum of Agreement (MoA) outlining common objectives between Ethiopia and South Sudan, especially regarding: extension of the limits of the two national parks to establish one transboundary park, conservation objectives, institutional arrangements, funding, timeframes, community engagement etc. This task should rely on the Boma–Gambella Transboundary Steering Committee (TBSC) which was constituted in October 2015 (a tripartite agreement between IGAD and the Ministries of Foreign Affairs in South Sudan and Ethiopia was finalised).

### Component 2: Management Plan for transboundary national park

Emphasis in the plan should be put on integrating the enhancement of livelihood activities and the conservation of ecosystems and biodiversity. An extensive study of the potential to develop ecotourism should be carried out and measures to develop the activity should be proposed (required investments and benefits associated should be assessed). Depending on the available budget, limited infrastructure in the park could be included. Finally, the plan should take into account upstream and downstream development.

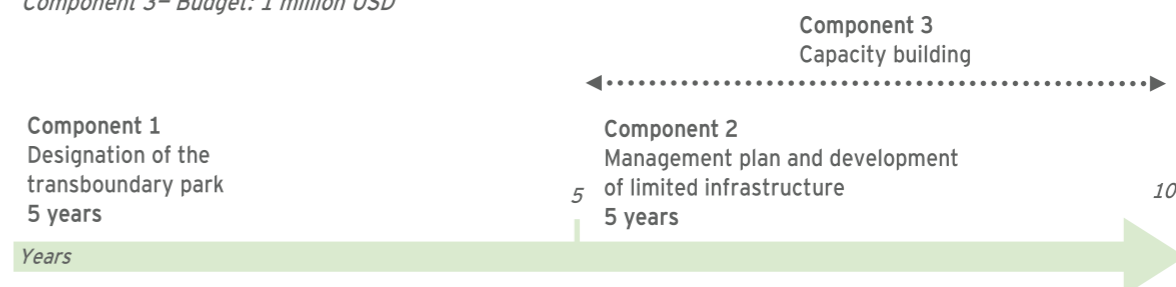
### Component 3: Capacity building programme

A capacity building programme should be implemented as part of the development of the management plan.



## Timeline and budget

Component 1– Budget: 5million USD  
 Component 2– Budget: 10 million USD  
 Component 3– Budget: 1 million USD



## Programme overview

There is a critical shortage of hydro-meteorological and natural resources data throughout the sub-basin. The proposed project will see the sustainable operationalisation of a monitoring system for meteorology, hydrological, water quality, sediment transport and land use. As a second step, making use of the new data collected, the environmental flow requirements at all critical points around the sub-basin will be proposed.

The study is of importance with respect to ensuring that the transboundary benefits of development are maximised and the impacts minimized. Most of the proposed developments that will result in changes to the flow regime are upstream in the form of either large-scale hydropower schemes in the highlands or irrigation schemes with significant abstraction requirements. Optimizing the operation of upstream storage and assessing the limits of abstraction for irrigation and other requirements can only be achieved once the hydrology and related ecological requirements and services are properly understood.

## Main components

### Component 1: Implementation of the monitoring system

It is proposed to implement an extensive monitoring system (rehabilitation of existing stations and implementation of new ones) for the following:

- Hydro-meteorological monitoring
- Environmental monitoring and especially water quality, sediment loads, erosion, land use/land cover. Biodiversity and fish surveys should also be carried out at regular intervals.



Workshop session BAS study

### Component 2: Environmental flows assessment

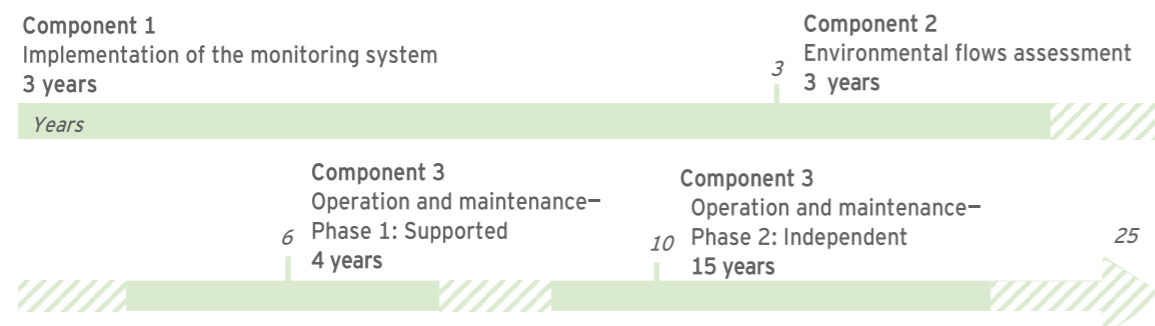
A method for defining the environmental flows should be proposed, discussed and validated by the riverine countries of the sub-basin. This assessment will be based on an improved understanding of the environmental flow requirements at all the critical points around the basin. Moreover, emphasis should be put on consultation throughout the process.

### Component 3: Capacity building / Operation and maintenance of the system

The capacity-building programme, to be delivered at both the transboundary and national levels will aim at ensuring that the entire system can be run by the national organisations responsible for hydro-climatic and environmental monitoring. There will also be a specialised capacity-building component, including on-the-job training, on the assessment of environmental flow requirements.

## Timeline and budget

Component 1- Budget: 3 million USD  
Component 2- Budget: 5 million USD  
Component 3- Budget: 4 million USD



## Project overview

There are areas of potential for the development of water resources in South Sudan which have not been adequately investigated due to the prevailing security situation. The objective of the project is to fully investigate the feasibility of a multipurpose water resources development project in the Akobo-Pibor basin potentially comprising a dam and reservoir, associated hydropower plant, irrigation scheme(s) making use of the regulated flow, potable water supply, livestock watering and production, fisheries and aquaculture. There may also be opportunities for supporting navigation and tourism. The study will include a diagnostic analysis of this hitherto poorly studied region and environmental impact assessments for the relevant proposed infrastructure.

→ Terms of reference for implementation are available for this project.

## Main components

### Component 1: Baseline and Feasibility of the Akobo-Pibor Multipurpose Development Project

Component 1 will lead to the preparation of the overall integrated programme. It will include a flyover reconnaissance of the area for a preliminary identification of dam sites to be further investigated on the ground. A project portfolio will be developed and will include potential dam sites and irrigation command areas. The combination of dam/irrigation perimeters on other auxiliary uses and crosscutting themes, such as small to medium irrigation, fisheries, tourism, livestock rearing, power connectivity, sanitation and maintenance will be included. Based on a consultative process, the project portfolio will be screened to select the appropriate overall integrated combination of interventions. Activities under Component 1 will continue through to implementation and will include the overall operation and management of the integrated project, ensuring optimisation of benefits across all sectors and for all stakeholders.

### Component 2: Main Hydropower Dam and Reservoir

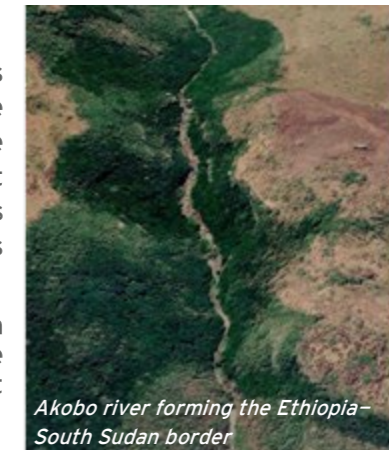
Based on the reconnaissance work and stakeholder consultations, this component will include the detailed work required to evaluate the feasibility of the hydropower scheme and associated multipurpose reservoir. It will also include a social and environmental impact assessment with clear, detailed and costed mitigation measures, as well as consideration of land acquisition and human resettlement plans where applicable.

→ Component 2 will lead to the construction of the multipurpose dam and reservoir to be operated and managed within the context of the overall Akobo-Pibor multipurpose water resources development project.

### Component 3: Akobo-Pibor Irrigation Development

Based on the reconnaissance work and stakeholder consultations, this component will include the detailed work required to evaluate the feasibility of the proposed irrigation schemes and will include a social and environmental impact assessment.

→ Component 3 will lead to the implementation of the irrigation scheme and directly associated multipurpose opportunities.



Akobo river forming the Ethiopia-South Sudan border

## Timeline and budget

Component 1- Budget: 4 million USD  
Component 2- Budget to be determined during feasibility  
Component 3- Budget to be determined during feasibility



## Programme overview

The objective of this programme is to make ready for implementation the first Phase of the project (10 years), which would see the installation of 2,070 MW of hydropower (TAMS and Geba Dams) and the development of around 100,000 ha of irrigation (first package of Baro and Sobat rivers “no regret” irrigation projects as defined in the IWRDMPan), which would benefit from the regulated flow in the rivers. The programme would also include the development of fisheries and aquaculture, livestock watering, tourism and the supply of potable water, as well as supporting the development of river transport and interconnection of electricity. The assignment will be to assess the overall feasibility of the multipurpose programme and its main components (including associated environmental and social impact assessments) and thereafter prepare detailed design and tender documents.

→ Terms of reference for implementation are available for this project.

## Main components

### Component 1: Overall Integrated Development Programme

Component 1 is an overarching component aimed both at preparing the overall integrated programme and also supporting its integrated design and implementation bearing in mind the interdependence of the different components. It will include a baseline study of the hydro-environmental characteristics of the Baro and Sobat rivers, relying on the collection of the necessary hydrological, environmental and socio-economic data where significant gaps are identified. Planning, design and operation and management of the overall programme will be based on a suite of models making use of the data collected.

### Component 2: TAMS's dam and reservoir

Component 2 will run in parallel with Component 1 and will include design studies, the preparation of tender documents and the construction of the multipurpose dam and hydropower scheme in line with the overall programme.

### Component 3: Geba Reservoir and Diversion Systems

As for Component 2, this Component will run in parallel with Component 1 and includes design studies, the preparation of tender documents and the construction of the multipurpose dam and hydropower scheme in line with the overall programme.

### Component 4: Baro River Irrigation Development

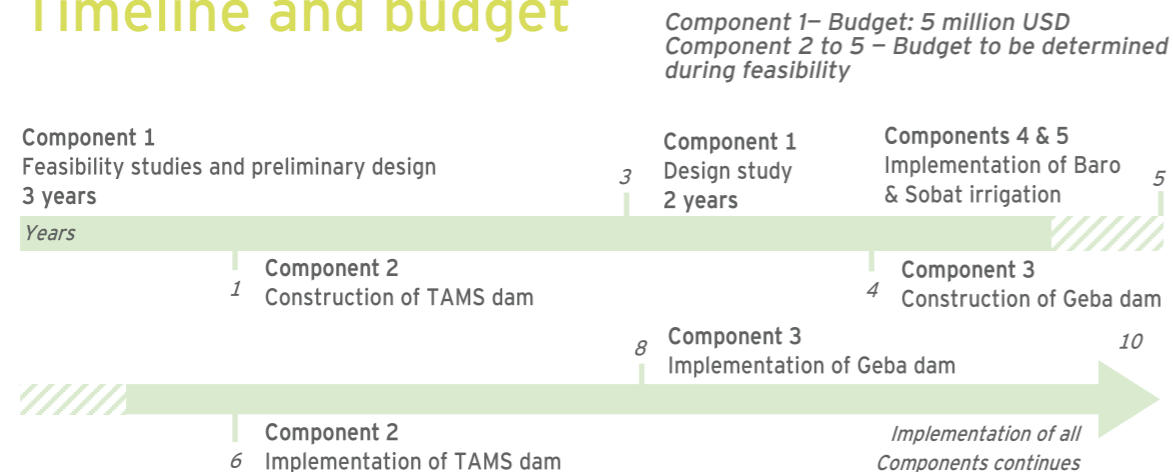
Component 4 will include the feasibility studies at the project level, design studies, the preparation of tender documents and finally implementation of the irrigation schemes on the Baro river (60,000 ha over 5 years).

### Component 5: Sobat River Irrigation Development

Component 5 will include the feasibility studies at the project level, design studies, the preparation of tender documents and finally implementation of the irrigation schemes on the Sobat river (40,000 ha over 5 years).



## Timeline and budget



## Project overview

An important focus of the project will be on the Baro River and its connectivity to the Sobat and the White Nile/Main Nile system but the study will also i) investigate and evaluate the feasibility of investments to improve navigation in the sub-basin within the context of regional transport and access to markets as a whole, ii) carry out the necessary planning and design work to get the project ready for implementation and iii) implement the project itself. The study will look carefully at the transport needs that will be generated by accelerated development within the sub-basin, assuming that a major driver in this accelerated development will be the rapid expansion of commercial irrigation in both the Gambella Region in Ethiopia and on the Sobat River in South Sudan.



for implementation and iii) implement the project itself. The study will look carefully at the transport needs that will be generated by accelerated development within the sub-basin, assuming that a major driver in this accelerated development will be the rapid expansion of commercial irrigation in both the Gambella Region in Ethiopia and on the Sobat River in South Sudan.

## Main components

### Component 1: Reconnaissance work and feasibility study (including capacity building)

Component 1 will first include a reconnaissance study to assess the possible approaches to maintaining a navigable river from Gambella to Sobat mouth. Based on this analysis, different scenarios will be proposed and screened through a consultation process.

→ Component 1 will go until feasibility study of the preferred option.

### Component 2: Project design

Based on the most feasible option, Component 2 will lead to the preparation of design for all aspects (regulation, dredging, port infrastructure, development of support infrastructure and services).

### Component 3: Project implementation

The project would be jointly developed by South Sudan, Ethiopia and potentially Sudan. This will be carried out under a separate contract.

## Timeline and budget

*Component 1 – Budget: 3 million USD  
Component 2 – Budget: 1.5 million USD  
Component 3 – Budget to be determined during feasibility*



## Programme overview

A major driver of flooding in the low-lying downstream areas such as the Gambella Plains, are the large river flows originating from the highlands in Ethiopia. The project will analyse the relationship between upstream flows and flooding extent in priority risk areas. It will include an analysis of the relationship between rainfall in the source areas of the main rivers and floods generated in these rivers and will investigate the potential impacts of climate change. A real-time or quasi-real-time early warning system will then be developed aimed at providing early warning of high discharge levels in the rivers while these flows are still some distance from the areas susceptible to flooding.

## Main components

### Component 1: Flood risk mapping

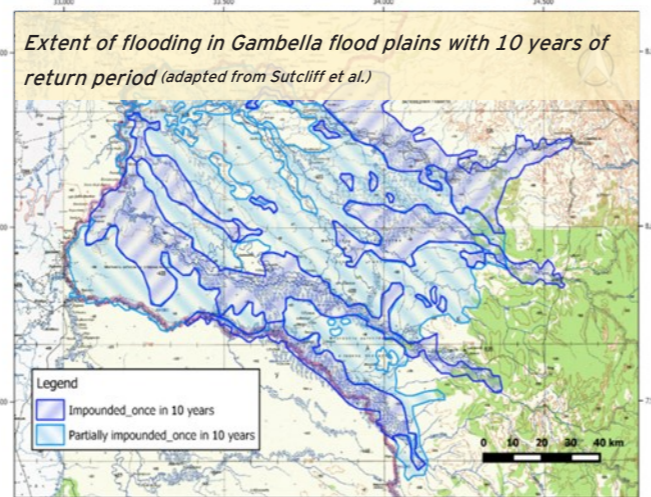
Component 1 will include the mapping of flood prone areas using topographic mapping, satellite imageries, Lidar and topographic surveys. A flood frequency analysis based on existing information and field investigation will be carried out.

→ Component 1 will lead to the setting up and calibration of flood routing models for each of the river systems. Flood risk maps for range of return periods will be developed.

### Component 2: Design and Implementation of Early warning system

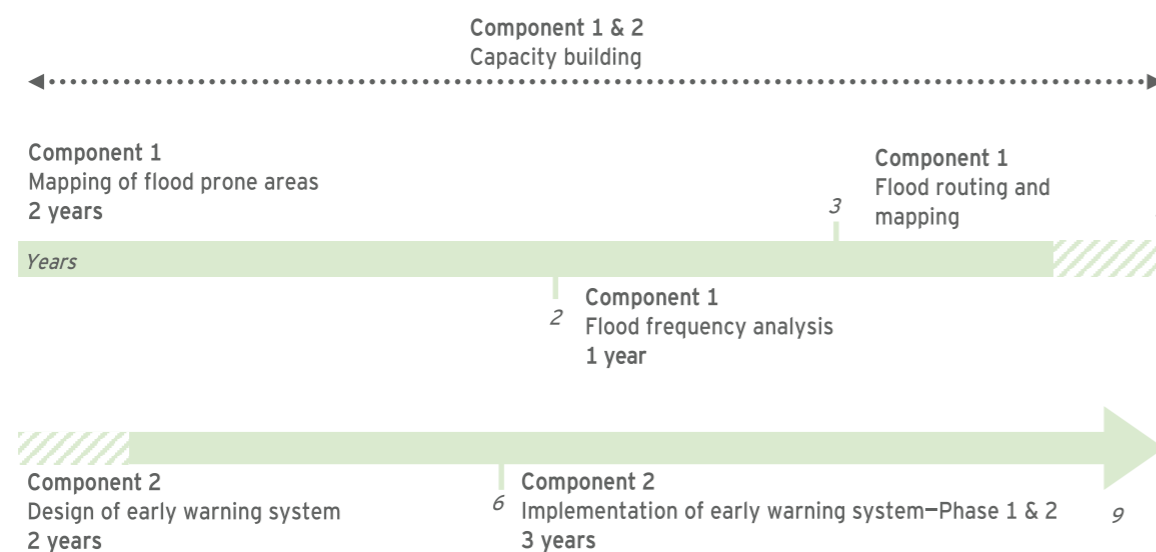
Component 2 will include the design of an early warning system based on the collection of real-time data such as precipitation and river flows. An assessment of options for communication and sharing information on real time basis will be carried out. This should be based on an extensive stakeholder consultation

→ Component 2 will lead to the implementation of the early warning system, first for priority areas as identified during the flood risk mapping and then for all flood prone areas.



## Timeline and budget

Component 1 Budget: 5 million USD  
Component 2 Budget: 5 million USD



## Project overview

The Machar Marshes are poorly understood in terms of both their existing socio-economic conditions and hydro-environmental functioning. Their status is highly dependent on flows coming from the Baro River upstream which are likely to change over time in the future as upstream development proceeds. An integrated water resources management plan for the Machar Marshes should be established to make adequate provision for the sustainable development of livelihoods in this area where there are highly vulnerable communities who rely on environmental and ecosystem services provided by the marshes.

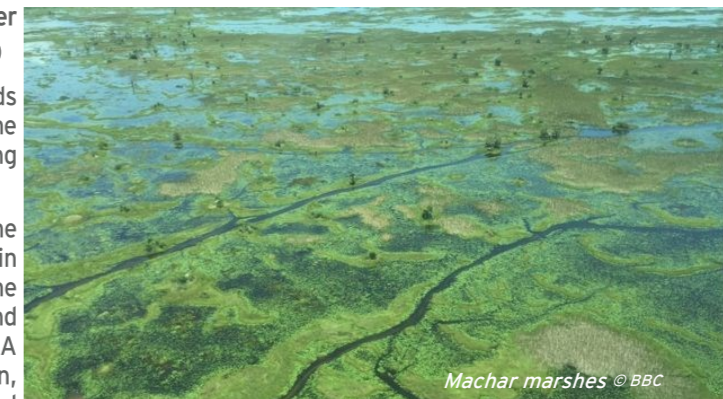
This project should be guided by the strategic objectives of the « Wetland Management Strategy » published in 2013 by the NBI. Moreover, one objective of the ongoing NBI project « Conserving biodiversity in the Nile Basin transboundary wetlands » is to develop management plans for some key wetlands. The Machar marshes, as one of the major wetlands of the region and yet barely known is a very relevant candidate.

## Main components

### Component 1: Integrated water resources management plan (IWRM Plan)

Component 1 will first be geared towards strengthening the knowledge base on the wetlands, their hydrological functioning and the eco-services they provide.

→ Component 1 will lead to the elaboration of the IWRM Plan. Emphasis in the plan should be put on integrating the enhancement of livelihood activities and the conservation of the wetlands. A basinwide approach should be taken, including upstream developments and downstream needs. To this end, the project should include the definition of adequate river flows and spills to satisfy water requirements based on socio-economic and environmental needs.

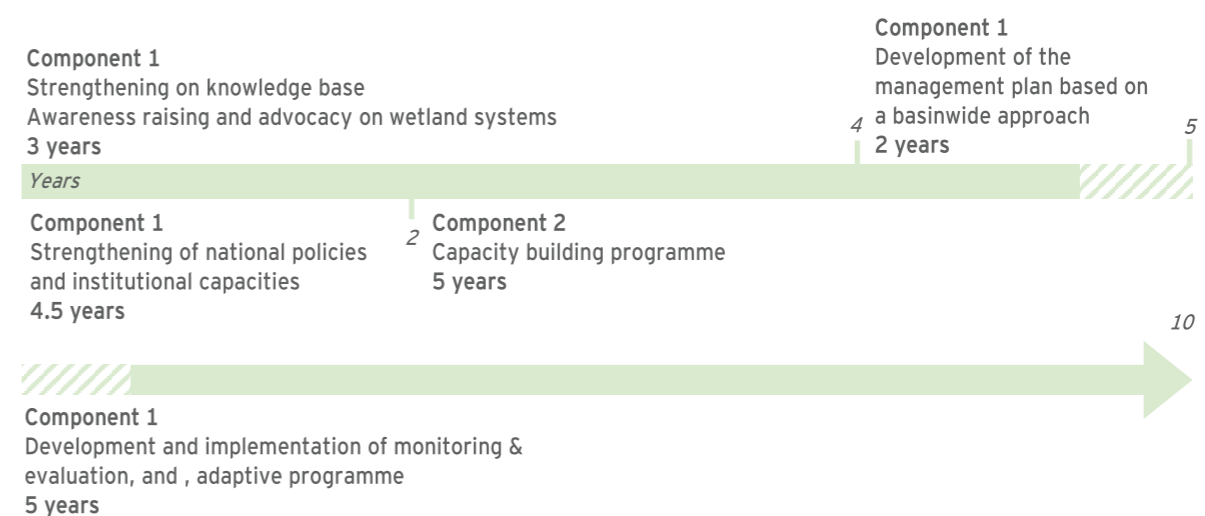


### Component 2: Capacity building programme

A capacity building programme should be implemented as part of the entire project cycle.

## Timeline and budget

Component 1 – Budget: 5 million USD  
Component 2 – Budget: 1 million USD



## Programme overview

The overall objective of the project is to improve the livelihoods of both agro-pastoralists and pastoralists living in the Kapoeta North, South and East counties (South Sudan) through actions in the Cingaineta River catchment aimed at reversing environmental degradation, increasing the availability of water during the dry season, improving food security and developing opportunities for livelihood enhancement. Water resources of the Cingaineta River and its tributaries are still untapped and the project will investigate options for the development and management of these resources in order to provide a more reliable water source for those living in and around Kapoeta.

Project activities will include reconnaissance and baseline surveys, prefeasibility and feasibility studies, project design and implementation over ten years and capacity building.

## Main components

### Component 1: Baseline and Feasibility of the Cingaineta Multipurpose Development Project

Component 1 will first include a baseline study of the hydro-environmental characteristics of the river. This will rely on the collection of relevant hydrological, environmental and socio-economic data where significant gaps are identified. A project portfolio will then be developed and will include potential components for the project. Based on a consultative process, the project portfolio will be screened to select the appropriate integrated project.

→ Component 1 will go until preliminary design of the selected project

### Component 2: Capacity building

A capacity building programme should be implemented as part of the entire project cycle.

### Component 3: Project design and implementation

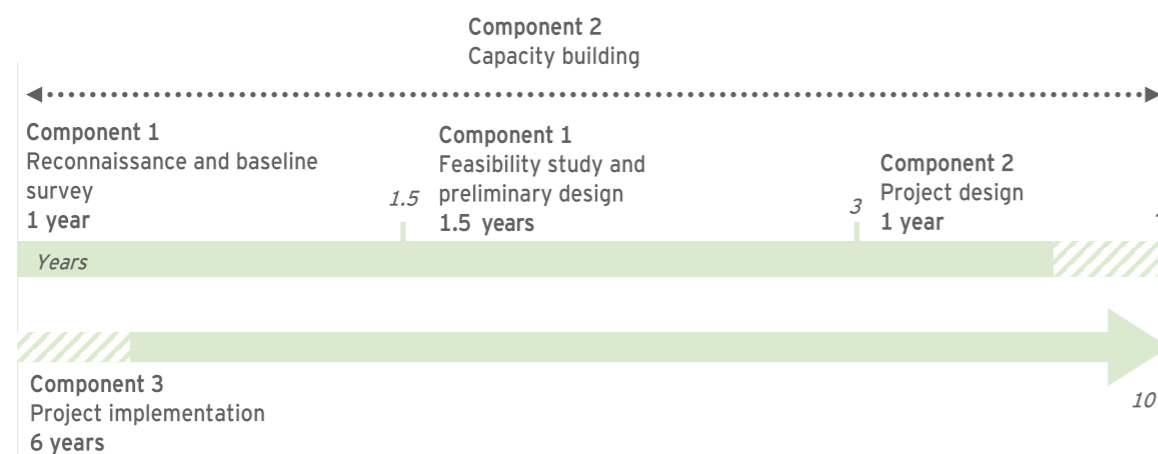
Based on the preliminary design study and stakeholder consultations, the project will be finalised and tender documents prepared. Prior to validation of the final project, a final social and environmental impact assessment will be undertaken. There must be clear, detailed and costed mitigation measures, as well as consideration of land acquisition and human resettlement plans if applicable.

→ Component 3 will lead to the implementation of the project. This will be carried out under a separate contract, under the administration of South Sudan.



## Timeline and budget

Component 1 – Budget: 1.1 million USD  
Component 2 - Budget: 0.2 million USD  
Component 3 - Budget: 12 million USD



## Programme overview

The proposed programme of local level interventions in the form of small-scale demonstration projects, will, 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, lack of food security, deforestation, etc. This programme will support the identification of small-scale livelihood-based watershed management projects (such as the Majang proposed short term project) followed by the design and implementation of the programme to take the approach to scale.

→ Terms of reference for implementation are available for this project.

## Main components

### Component 1: Review and lessons learnt of past projects

Component 1 will lead to the comprehensive analysis of existing small-scale multipurpose IWRM projects in the sub-basin. This list will include the Majang short term multipurpose project. Conclusions of this analysis should provide a number of recommendations and improvements to be taken on board in the scaling up process.

### Component 2: Basin wide plan including feasibility studies and monitoring and evaluation framework

Based on stakeholders' consultation, a number of priority areas for projects development will be defined. This should lead to the selection of a large number of projects which will be included in the 10 years basin-wide plan. The plan should aim at achieving Strategic Objective 1 and contributing to the vision for the BAS sub-basin as defined in the IWRDMPan.

→ Component 2 will lead to the compilation of the plan for scaling up and preparation of feasibility studies for the first round of selected priority projects.

### Component 3: Design studies and tender documents

Based on the feasibility studies (Component 2), Component 3 will include design studies and tender documents for the first round of selected priority projects.

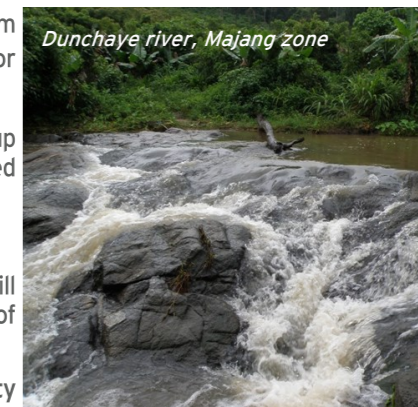
### Component 4: Implementation of the basin wide plan to high priority areas

Component 4 will be the implementation of selected high priority projects. It will include monitoring, evaluation and adaptive management.

### Component 5: Generalisation to all suitable areas

Component 5 will be the implementation of the remaining projects. It will include monitoring, evaluation and adaptive management.

Component 1 to 3 – Budget: 2.3 million USD  
Component 4 – Budget: 16 million USD  
Component 5 – Budget: 30 million USD



## Timeline and budget

