African Water Facility
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Project Appraisal Report

FEDERAL REPUBLIC OF NIGERIA

Boosting Inclusive Water Management in Northern Nigeria

Preparation of Strategic Action Plan for Water Resources Development in the Komadugu-Yobe Basin

May 2014

African Water Facility I Facilité africaine de l'eau

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PROJECT INFORMATION SHEET

COUNTRY	Federal Republic of Nigeria
PROJECT NAME	Preparation of the Komadugu - Yobe Basin Water Resources Development Strategic Plan
LOCATION:	Komadugu – Yobe Rivers Basin
RECIPIENT;	Hadejia – Jama'are, Komadugu – Yobe Basin Trust Fund of Nigeria (HJKYB – TF)
EXECUTING AGENCY:	Hadejia – Jama'are, Komadugu – Yobe Basin Trust Fund of Nigeria
TOTAL COST:	Euro **2,690,940**
AWF COST:	Euro **1,995,315**
OTHER CONTRIBUTORS:	Euro **695,625**
ESTIMATED START DATE:	January 2015

List of Acronyms and Abbreviations

AfDB	African Development Bank
AMCOW	African Minister's Council on Water
AWF	African Water Facility
BCM	Billion Meter Cubic
CBDA	Chad Basin Development Authority
CMP	Catchment Management Plan
DFID	Department for International Cooperation
ESIA	Environmental and Socio-Economic Impact Assessment
FMARD	Federal Ministry of Agriculture and Rural Development
FME	Federal Ministry of the Environment
FMWR	Federal Ministry of Water Resources
GEF	Global Environment Facility
GIS	Geographic Information System
GPN	General Procurement Notice
HJKYBTF	Hadejia-Jama'are-Komadugu-Yobe Basin Trust Fund
HJRBDA	Hadejia-Jama'are River Basin Development Authority
HNWCP	Hadejia Nguru Wetlands Conservation Project
IUCN	World Conservation Union
IWRM	Integrated Water Resources Management
JMP	Joint Monitoring Programme
KYB	Komadugu Yobe Basin
LCBC	Lake Chad Basin Commission
NEAZDP	The North East Arid Zone Development Programme
NGO	Non-Governmental Organization
NHI	Natural Heritage Institute
NIWRMC	Nigerian Integrated Water Resources Management Commission
NPC	National Population Census
PAR	Project Appraisal Report
PCR	Project Completion Report
PMT	Project Management Team
PMU	Project Management Unit
PSC	Project Steering Committee
QCBS	Quality and Cost-Based Selection
RBDA	River Basin Development Authority
RBDAs	River Basin Development Authorities
SAP	Strategic Action Plan
SESA	Strategic Environmental and Social Assessment
SL	Short Listing
SPN	Special Procurement Notice
TAP	Technical Advisory Panel
TL	Team Leader
TRIMING	Transforming Irrigation Management in Nigeria Project (World Bank project
UNDP	United Nations Development Programme
SAPWRD	Strategic Action Plan for Water Resources Development

LOGICAL FRAMEWORK

Country and project name: Multinational: Nigeria - Preparation of the Komadugu - Yobe Basin Water Resources Development Strategic Plan					
Main Goal: The overall goal of the project is to engender sustainable development of the water resources of Komadugu-Yobe Basin for economic growth and social well being of the population of the basin.					
RESULTS CHAIN		**PERFORMANCE INDICATORS**			**MEANS OF VERIFICATION**	**RISKS/MITIGATION MEASURES**
		Indicators	**Baseline**	**Targets**		
IMPACT	*Improved socio-economic development and enhanced livelihood, environmental quality capacity of adaptation to impact from climate change and variability.*	• % of population with access to water supply & sanitation services • % increase in average per capita income • Improved livelihood from increased benefit from the river basin ecosystems services • Restoration of minimum environmental flow to Lake Chad from the KYB.	• National average WSS access in 2011: 61% of population to improved water and 31% to improved sanitation (JMP 2013 Country Update) • 63% of the population living on below $1 daily in 2012 (DFID, 2012). • Baseline for ecological services to be established in the study • Unpredictable flow for about 4 months in a year (CMP IUCN 2011)	• 100% WSS coverage by 2030 • Reducing by 100% the number of people living below poverty line by 2040 • Restoration of 100% of of benefits from ecological services value by 2030 • Restoration 15 m^3/sec of minimum flow to Lake Chad.	• JMP and AMCOW reports • UN Human Development Index • National statistics • Annual water reports • HJKYB Trust Fund annual report	***Risks:*** Conflicting inter-state and inter-institutional interest **Mitigation:** Adoption and implementation of river basin development strategy and action plan and and interstate river basin legal and institutional framework and organizational set-up **Risks**: Basin wide and local security conditions **Mitigation:** Full participation in the planning process to ensure inclusive development and growth restoring the livelihood and benefit to the population of the basin **Risk:** Scarcity of long-term investment resources **Mitigation:** Generate investment resources from efficient use of water for growth and development and mobilize State and Federal resources for infrastructure.
OUTCOMES	• Adoption of the KYB water resources strategic plan • Trail reoperation runs of the optimized operation model of the Tiga and Challawa gorge dams to restore lost ecosystem functions and livelihoods in the Komadugu-Yobe basin • Resources mobilized to finance the investment plan for the development of priority water resources projects over a period of 5 years from 2016-2020 • IWRM system implemented to deal with climate change impact and ensure long-term water security in the basin.	• Government approved the strategic plan for the development of the KYB water resources • Dams successfully re-operated under the new rules • Investment resources mobilised for implementation of the water resources development projects prepared • Basin wide water allocation put in place	• Multiplicity of State and basin wide organisations and integrated development plan • Dams operation focused on irrigation and water supply in the upstream reach • Sector specific investment dependent on State priorities • No implementable basin wide water allocation plan to meet competing requirements.	• Full implementation of the integrated water resources plan by 2040 • Multipurpose water use operation from the dams to satisfy developmental and environmental needs in place by 2020 • Annual investment requirement met and utilised by 2020 • Optimum water allocation for social, economic and environmental purposes achieved by 2020. Restoration of minimum flow of 15m^3/sec throughout the year	• National statistics • Annual water reports HJKYB Trust Fund annual report	**Risks:** Data required for simulation of water for irrigation, & eco-hydraulic systems will be inadequate, outdated or unavailable. ***Mitigation:*** Use of existing data supported by satellite imagery, GIS analysis, and regional correlations. ***Risks:*** Resistance from upstream users on the dam reoperation to meet downstream requirement ***Mitigation****: Plan adoption through an inclusive stakeholder process that involves community as well as decisions makers* ***Risks:*** Lack of human resources, investment and organizational capacity to implement and monitor complex system. **Mitigation:** Implementation of policy of incentive mechanism for a stable human resources and institutional framework

OUTPUTS	• Component 1: Preparation of Strategic Action plan • Strategic environmental and social assessment prepared • Strategic basin water resources development plan adopted • Component 2: Dams' Operation and optimisation of water use • Reoperation rules for flow restoration prepared and tested • Outline design of infrastructural changes on the dams for new operation prepared • Component 3: Priority Project preparation • Environmental and social impact assessment prepared • Priority investment projects for irrigation, WSS, wetland management etc prepared1 • Component 4: Project Management • Managing project implementation according to schedule • Establishment of inclusive stakeholders consultation • Investment resources mobilisation for priority project implementation	• SESA report prepared and adopted • The Komadugu - Yobe Basin Water Resources Development Strategic Plan prepared and adopted • The operational rules for the Tiga and Challawa dams established, tested and adopted • Design of changes on the Tiga and Challawa dams to facilitate new operational rules prepared • ESIA reports for priority projects prepared • Priority investment projects prepared for implementation • Project output and objectives achieved • Stakeholders input to the various project reports achieved • Commitment for investment on priority projects achieved	•	• Draft SESA report prepared 13 months after commencement. • KYB SAPWRD prepared 15 months after commencement. • New operational rules prepared and tested 19 months after commencement • Designed for dams infrastructure changes prepare 19 months after project commencement. • ESIA reports prepared 20 months after commencement • Priority projects prepared 22 months after commencement • Four stakeholders consultation forms held during the project implementation period • Investment mobilisation round table held 23 months after commencement	• Quarterly project reports • Supervision reports • Various thematic and technical reports • Final project report • Project audit • Midterm review report • Project completion report	

[1] **Type and nature of priority projects to be determine on completion of component activities.**

ACTIVITIES	**Component 1: Preparation of Strategic Action plan** • Data collection, survey and investigation • Thematic studies and analysis • Development of basin wide simulation and optimization modelling • Analysis of options and development strategies • Strategic environmental and social assessment • Legal and institutional framework • Preparation of strategic development plan **Component 2: Dams Operation and optimization of water use** • Establishing physical, thematic and statistical data base • Assessment of existing operational rules and reservoir condition • Establishing restoration objectives and flow requirement • Scenario analysis, simulation and optimization • Establishing reoperation rules and testing • Preliminary design of infrastructural changes on the dams for new operation	**Component 3: Priority Project preparation** • Survey and investigation for priority projects • Priority projects studies and analysis • Environmental and social impact assessment • Priority projects preparation **Component 4: Project Management** • Managing project implementation • Monitoring and reporting (progress reporting) • Stakeholders consultation workshops • Steering Committee meetings • Technical Advisory Panel meetings • Investment resources mobilization • Mid-Term Review and Project audit	**Input** **Total Project cost** **Euro** **2,690,940** **AWF Contribution** **Euro** **1,995,315** • Component 1: Euro **1,062,033** • Component 2: Euro **238,623** • Component 3: Euro **526,659** • Component 4: Euro **168,000** **Beneficiary contribution** **Euro** **695,625**

Executive Summary

Description: The ***Preparation of the Strategic Action Plan for Water Resources Development in the Komadugu - Yobe Basin (SAPWRD)*** project is the result of the reappraisal of 'The Reoperation and Reoptimisation of Tiga and Challawa Gorge Dams to Restore Human Livelihoods and Ecosystems Project' which was appraised in 2009. The approval of the project was put on hold until a similar complementary project approved in Ghana has taken off and the pioneering methodology and approaches adopted have been tested and proven to work. The current project is the result of a follow-up consultation between AWF and the Federal Government and Hadejia Jamaare Komaugu Yobe Basin Trust Fund (HJKYBTF) representing the six riparian States in the Basin. A stakeholders' workshop organized in August 2013 on the re-appraisal of the project recommended that there is a need to broaden the objective and scope of the project to encompass the wider water resources development challenges in the basin based on the emerging experience from the Ghana project.

Rationale: The project emerges from the need to launch a long-term development strategic approach centered on the use of the basin water resources for inclusive and sustainable growth for the basin population in six riparian Federal States in Northern Nigeria. The project seeks to establish basin wide water management system that is aimed at addressing livelihood issues with respect to food security, water supply and sanitation, energy availability, provision of ecological services with proper environmental safeguards put in place. The project will develop a water allocation plan based on optimum operation of the two dams for balancing the upstream water availability with the downstream water demands including the enhancement of the wetlands and other ecological services to meet the livelihood needs of the riparian population and ultimate release to Lake Chad.

Objectives: The objectives of the project is to prepare an integrated water resources development strategic plan for the Komadugu Yobe Basin (KYB) for the period of 2015-2040 based on the optimum water resources allocation and use in the basin including the reoperation of Tiga and Challawa Gorge dams and prepare investment plans for priority water resources projects in the basin. The main outputs of the project consists of the KYB water resources development strategic plan that provides short, medium and long-term actions spanning to 2040; modified reservoir operation rules for the reoperation of Tiga and Challawa Gorge Dams and projects preparation for implementation over the period 2015-2020.

Beneficiaries and impact: The project was proposed by the HJKYB-TF (Executing Agency) in partnership with Nigeria Integrated Water Resources Management Commission (NIWRMC). The river basin development will ensure the livelihood security of about 15 million people in the Basin while the reoperation of the dams will have immediate impact on the livelihood restoration of people, on the development on the wetlands and on other riverine ecological services; and will provide water for irrigation and urban and rural needs.

Activities and Implementation: The project consists of four components (i) Preparation of Strategic Action plan (ii) Dams Operation and optimization of water use study (iii) Priority Project preparation and (iv) Project management. The project will be implemented over a period of 22 months after grant effectiveness. A Project Implementation Unit will be established for coordination of project implementation. An international consultancy firm will be recruited to undertake the technical studies and preparation of the basin plan. A Steering Committee with an oversight function, a Technical Panel for technical oversight and a Stakeholders platform for ensuring inclusive participation will be formed as part of the implementation structure.

Cost and Financing: The total cost of the project is estimated at Euro **2,690,940** and will be financed by an AWF grant of Euro **1,995,315**, the balance totaling Euro **695,625** will be contributed in cash and in kind by the HJKYB-TF.

Recommendation: In view of the immense anticipated long-term benefits of the proposed project to the six riparian States and inhabitants of the basin in Northern Nigerian, it is recommended that the AWF approves a grant funding not exceeding Euro **1,995,315**to the HJKYB-TF to finance the project as outlined in this appraisal report.

1. Background

1.1 Origin of the Project

1.1.1 The Komadugu Yobe Basin (KYB) covers a land area of over 148,000 km^2, of which 57% (84,400 km^2) lies in north eastern Nigeria and 43% in the southeastern part of the Niger Republic. The KYB is the third largest river system representing 35% of the area of the conventional Lake Chad basin. The Nigerian portion of the KYB constitutes 95% of the contribution to the Lake. The KYB is entirely located within the Lake Chad Basin and is also shared with the Niger Republic underlining its importance as a transboundary water resources system. The project study area is limited to the Nigeria portion of the basin as shown in the basin map in Annex 1 and 2 and reference to KYB in the PAR pertain to this geographical area. The KYB covers four main sub-basins consisting of the Hadejia, Jamaare, Komadugu and Yobe river systems.

1.1.2 There are six riparian Federal States in the KYB namely Bauchi, Borno and Yobe in the North East; Jigawa and Kano in the North West and Plateau in the North Centre. The total population of the six states is estimated to be about 28 million (2006 NPC). The KYB supports the livelihood of over 15 million people who are critically dependent on its scarce water resources for their domestic supplies and livelihoods through agricultural water supply, fishing, livestock production and related activities. Kano city and other major urban towns and rural settlements make further demand on the water resources for human consumption and other urban needs. .

1.1.3 The -Komadugu Yobe Basin has two large dams, the Tiga and Challawa Gorge dams with a combined storage capacity of 2.2 BCM which deliver water for irrigation of 20,000 ha as well as are the source of water supply to Kano and other communities and other riverine needs. The economy of the basin which is highly dependent on freshwater resources, particularly on the livelihood generated from the wetland ecosystems has been critically affected by the water releases patterns from the two dams.

1.1.4 The problems include losses in environmental productivity, fish stocks, livestock production and general shortage of water in the lower part of the basin including inflow to Lake Chad. Studies conducted by IUCN and NIWRMC have concluded that unsustainable flow modification and uncoordinated reservoir operation are the primary cause for the severe fresh water scarcity that has affected the productivity of the basin ecosystem. The reoperation of the two dams, to optimise basin wide multipurpose use, was considered as primary solution to regain some of the livelihood losses in the basin.

1.1.5 The Federal Government and HJKYB Trust Fund representing the six State Governments and in partnership with several agencies operating in the basin submitted a project proposal to the AWF entitled "Re-operation and Re-optimisation of the Tiga and Challawa Gorge Dams" which was aimed at changing the operation of the dams to significantly contribute to the restoration of the ecosystem and improvement of livelihoods in the affected basins. The project was appraised by the AWF in 2009, however approval was put on hold until a similar complementary project approved in Ghana has taken off and the pioneering methodology and approaches adopted have been proven to work.

1.1.6 A follow-up consultation between AWF and the Federal Government and HJKYB Trust Fund as well as a stakeholders workshop in August 2013 concluded that there is a need to reappraise the initial project by considering the Ghana experience as well as broadening the objective and scope of the project to include the wider water resources development challenges in the basin. The main objectives of the reappraised project were set as the preparation of a basin water resources development strategic framework, the development of reoperation rules of the two dams for broader basin wide water use and the preparation of investment projects for immediate implementation.

1.1.7 This appraisal report contains the elements of the proposed project and the implementation arrangements based on the findings of the field appraisal and workshop outcomes of representatives of the six riparian states, represented by the HJKYB Trust Fund as well as the NIWRMC at the Federal Government level and other basin wide stakeholders.

1.2 Previous Assessment and Studies

1.2.1 The 2006 IUCN commissioned Water Audit study provides a basin wide water resources assessment and utilisation and the functionality of water related polices and institution from local to states level. The study has identified improved resource management practices and policies and provides a practical framework for more productive, sustainable use of the water resources of the basin. In 2011, the Water Audit study was extended to cover all parts of the Nigeria portion of the Lake Chad Basin. IUCN also produced the Komadugu Yobe Basin Catchment Management Plan (CMP) in 2006 parallel to the Water Audit study. The CMP elaborates strategies for the integrated land and water resources management of the KYB and proposes an action plan for implementation in the basin. The CMP was similarly extended to cover the Lake Chad Basin in Nigeria in 2011.

1.2.2 The World Bank is supporting the FMWR in the implementation of the Transforming Irrigation Management in Nigeria project (TRIMING) which includes studies and design of water resources management works in the upper portion of the KYB area under the operational responsibility of the HJRBDA. The KYB project comprises two main focus areas dealing with water resources management and dam operations and irrigation development and management. The water resources management work covers improvement in hydrological data generation in the Hadejia-Jama'are sub basin; dams safety and operation; operationalisation of IWRM plan of the HJKY basin and improving river training in the Hadejia River Basin up to the Hadejia-Nguru Wetlands.

1.2.3 The irrigation development and management component of TRIMING is concerned with the feasibility study and detail design for the Kano River Irrigation Project and Hadejia Valley Irrigation Project. The World Bank has commissioned a consulting firm to undertake the above studies and design work. The proposed project will comprehensively assess the work and results of the World Bank project and fully integrate the findings and recommendations in the strategic action plan for the whole basin. The dams reoperations analysis will consider the results of the World Bank Project, dams safety study and use data from their survey and investigation. There shall be strong synergies between the two interventions.

1.3 Sector Priorities

1.3.1 Nigeria is endowed with an annual water resources potential of 319 BCM which under optimal management conditions will significantly contribute to the socio-economic development of the country. The Federal Ministry of Water Resources (FMWR) entrusted with responsibility for the formulation of overall water resources management and development of water infrastructure has set the Water Sector Roadmap (2011) with specific targets for 2025 aligned with the African Water Vision 2025. The project is aligned with the strategic targets of the Sector Roadmap which include 100% coverage for water supply and sanitation, achievement of 95% of the hydropower potential and extension of irrigation to cover about 3.0 million ha. The Vision for 2020 sets an agenda for attaining national food security and reducing food import as key targets for achievement**.**

1.3.2 The project addresses water resources management issues in the basin by applying the integrated water resources management approach with the river basin as the basic spatial planning unit as promoted by NIWRMC established by the FMWR. The Integrated Catchment Management Policy of NIWRMC recognizes the socio-ecological and biophysical linkages within the river basin environment as basis for planning river basin development and

ensuring sustainable environmental safeguard. The River Basin Development Authorities (RBDAs) are the main organs of the Ministry charged with the responsibility of water infrastructure development and operation for the various social and economic uses within the Basin. The project is well aligned to current investment strategies and programmes of the Government such as the Nigerian Vision 2020. The dams reoperation proposals enjoys strong support from Federal and State water and irrigation agencies in the country

1.3.3 . The

1.4 Problem Definition

1.4.1 The main water management problems in the basin have been identified as absence of an overall water resources management strategy to foster rational development water resources of the Basin. A study conducted by the NIWRMC and IUCN lists the key water management problems as spatial and temporal scarcity of water over the basin exacerbated by fragmented, inequitable and uncoordinated surface water uses. The institutional responsibilities between various States and Federal agencies established to develop and manage the resources of the basin are ill-defined and often conflicting.

1.4.2 The shrinking and splitting of the Lake Chad at the downstream end of the basin is of immediate concern as the existing development on the Nigerian side of the basin is under critical threat. Other key considerations are the degradation in surface and ground water quality, the invasion of aquatic weeds hindering flow and diminishing ecological productivity and over-abstraction of groundwater resources in the basin.

1.4.3 Consultation with the key stakeholders as part of the field appraisal process underlined the need for "holistic, comprehensive, long-term, inclusive, integrated, and transparent strategic plan" to transform the social and economic development of the basin in a sustainable manner. The stakeholders identified the main challenges and problems to be addressed in the project as:

- The water resources development should be primarily aimed at addressing livelihood issues with respect to food security, water supply and sanitation, energy availability, provision of ecological services with proper environmental safeguards. These should address the socio-economic problems of the basin such as conflicting demands of farmers, pastoralists and fishermen. Long-term development should be centred on the use of the basin water resources for inclusive and sustainable growth and development. The reoperation of the Tiga and Challawa dams should be considered within this framework and tangible collaboration between the upstream and downstream riparian states and communities.
- A basin wide water management system that would address rational water allocation and use, proper dams operation centred on balancing the upstream water availability with the downstream water demands. The issues of basin wide operations and maintenance of the water system, flood management, climate change impact and ensuring the long-term water security of the basin should be addressed. Integrated data collection and information dissemination with monitoring and knowledge sharing should be an integral part of the water management system.
- It is necessary to put in place a comprehensive environmental management package to address the issues of bio-diversity, adaptation to climate change, habitat restoration and reclamation of degraded areas and water-borne diseases. Catchment degradation, degradation of ecological services, indiscriminate use of agricultural chemicals, and presence of invasive weeds affecting the smooth flows of water downstream are some of the key concerns that should be addressed.

- There is a need to strengthen and streamline institutional arrangement particularly the RBDAs to plan, implement and monitor water resources development in the basin. Capacity building in all aspects of water resources and catchment management at all the levels is essential. . Building and strengthening an inclusive stakeholders' platform at the community, river basin and political decision making level is considered as key success factor.
- River basin programmes should be in synergy with existing commitment made by Nigeria on transboundary water resources management with respect to Lake Chad and the basins shared with the Niger. Managing the KYB system to allow flows into Lake Chad as contribution to transboundary river system is considered to be essential.
- There is a need to build an inclusive and transparent advocacy and awareness promotion platform to mobilise the population in seeking solutions and participating in the developmental process. Building capacity and institutional mechanisms for mainstreaming gender participation in all aspects of water resources management decisions remains a challenge and thus indentified as key task in river basin planning process. Credible and up-to-date data and comprehensive information system on the water resources availability, developmental needs and uses will be made available for plan implementation and continued monitoring.

1.4.4 The project is designed to help address these challenges through an integrated trans-boundary water resources management approach. The reoperation of the two dams to restore lost ecosystems and livelihoods will enhance water resources allocation, utilisation and management in the basin.

1.5 Beneficiaries

1.5.1 The beneficiaries of the project are the 15 million people living in the riparian communities in the basin who will be supported to improve their livelihoods and thereby engender socio-economic growth from the integrated development of the water resources of the basin. The project will enable the six states and Federal Government to undertake long-term development activities that will fundamentally change the socio-economic conditions in the basin and spur sustainable inclusive growth. Development based on proper water resources management system and reoptimisation of existing uses will result in minimum flows restoration and availability of water for Lake Chad. This will benefit the Lake Chad riparian countries and communities living around Lake Chad including those on the Nigerian side of the lake by restoring and enhancing productive activities around the Lake. The project will strengthen the collaborative relationship between Nigeria and Niger on the joint management of the KYB water resources for mutual benefit for both countries.

1.5.2 The direct stakeholders in this project are the Federal Ministries responsible for water, environment, agriculture and rural development; the six state governments; the communities living along the river as well as in the river basin; the urban centres and other nongovernmental organisations operating in the basin as well as knowledge and research institutions directly concerned with the basin development. The project was fully developed and acceptable to all stakeholders in view of its approach to address the full range of basin wide developmental challenges and issues.

1.6 Justification for AWF Support

1.6.1 AWF strategic priorities as defined in the Facility's 2012-2016 Strategic Plan are to (i) prepare investment projects to "mobilise" investment funds; (ii) enhance water governance to create the conducive environment for effective and sustainable investments and (iii) promote water knowledge for the preparation of viable projects and informed governance leading to effective and sustainable investments. The project is directly aligned with the AWF

Strategic Plan and contributes to the objective of leveraging investments for implementation of staged basin develop plan spanning over a period of 25 years.

1.6.2 The project's output relating to the preparation of the KYB water resources development strategic plan meets the AWF priory area of facilitating sustainable investment for the short, medium and long-term water resources development programmes in the basin. Specifically, the component on the dams reoperation will provide an analysis of the physical changes with preliminary design for immediate implementation. Project preparation for the short term programmes and the resources mobilisation for implementation are directly tied to the AWF priority support area for investment project preparation. The additional outputs in terms of strategic environmental and social assessment, strengthening of river basin organisation and facilitation of transboundary cooperation are inputs to enhancing basin wide water governance. The project will create a GIS database from the water resources data and information that will be generated during the implementation of the project. Consequently, the strategic pillar on enhancing water knowledge is also met.

2. THE PROJECT

2.1 Goal and Impact

2.1.1 **Goal:** The overall goal of the project is to engender sustainable development of the water resources of Komadugu-Yobe Basin for socio-economic development the population of the basin. The project will enable optimisation of multipurpose water use over the basin through the participatory development and use of the strategic development plan. This will involve improving the body of knowledge and analysis of water use for various purposes, demands on water resources, an understanding of the social and environmental issues, in particular, the deteriorating ecological situation resulting from current suboptimal water use exacerbated by climate change impacts. The water resources development strategic plan will provide the investment road map from the short to long term period (2016-2040) and the institutional framework for implementing and managing the river basin development programme.

2.1.2 **Impact**: The long term impact of the project will be improved socio-economic development, enhanced livelihood and environmental quality improvements. The development of a programme for multipurpose use of water resources will enable the population to attain improved standard of living, inclusive growth , enhanced preparedness and adaptation to deal with vulnerability to climate change impact and variability and thereby ensure long term water security for social, economic and environmental purposes.

2.1.3 The degraded ecological services and the livelihoods that are dependent on the KY rivers systems will be regenerated by improving the reliability of water supplies for productive uses and restoration of environmental flows while reducing flood risks, and buffering the effects of climate change. The flow restoration resulting from the reoperation of the Tiga and Challawa Gorge dams will restore river basin connectivity, enhance aquatic ecosystems, improve health from access to water supply and increased incomes from revamped ecological services.

2.2 Objectives and Outcomes

2.2.1 **Objectives:** The objective of the project is to foster the rational development of water resources of the Komadugu-Yobe basin by creating the enabling environment through the preparation of (i) an integrated river basin strategic plan based on the optimum water resources allocation and use in the basin including the reoperation of Tiga and Challawa Gorge dams and (ii) investment plan for priority water resources projects in the basin. The optimisation of the operation of the existing Tiga and Challawa Gorge dams has been conceived as part of the overall strategy for increasing the total water service and

environmental benefits within the basin. Project preparation for priority investment programmes that will be implemented over the short term period of 2015-2020 will be undertaken. Priority investment areas are expected to include the physical changes needed for the optimum operation of the two existing dams.

2.2.2 **Outcomes:** The main outcomes of the project are (i) the adoption of the Komadugu – Yobe Basin water resources strategic plan; (ii) trail reoperation runs of the optimised operation model of the Tiga and Challawa gorge dams to restore lost ecosystem functions and livelihoods in the Komadugu-Yobe basin..(iii) resources mobilised to finance an investment plan for the development of priority water resources projects over a period of 5 years from 2016-2020.

2.3 Outputs

2.3.1 The main outputs of the project consists of (i) the Komadugu-Yobe Basin water resources strategic plan that provides short, medium and long-term development actions spanning to 2040, (ii) modified reservoir operation rules for the reoperation of Tiga and Challawa Gorge Dams for optimised water releases and improved river basin connectivity, and ecological health, and (iii) investment projects prepared for the implementation of short term priority actions of the strategic plan for the Basin. The areas for priority projects preparation includes improvement in dam operation, river training and flood protection, restoration of ecological services, irrigation, water supply and sanitation, livestock and fishery developments. The type and nature of priority projects shall be established through a participatory approach at the end of planning process.

2.3.2 Other related secondary outputs include basin wide strategic environmental and social assessment; river basin management modelling tools for hydrological analysis; optimisation and decision support system; GIS based data and information set-up; institutional and organisational framework for implementing the strategic plan; investment resource mobilisation for implementing the priority actions and an inclusive stakeholder platform for ensuring sustainable development and management of the basin.

2.3.3 The outputs from project management functions include project implementation in accordance with the proposed schedule and budget; facilitating the process for validation and adoption of the strategic plan, facilitation of an inclusive stakeholders' platform and facilitation of investment resources mobilisation for implementation of priority projects.

2.4 Activities

2.4.1 The project activities are conducted in overlapping stages under three components. Preparation of the water resources development plan is undertaken as component 1, where the main activities will be data collection, investigation and analysis; water resources assessment, river basin modelling and scenario analysis, strategic environmental and social assessment and formulation of short, medium and long term development plans. The planning horizon is from 2016 to 2040 with intermediary milestones comprising a short term period from 2016-2020; medium-term from 2021-2030; and long-term from 2031-2040.

2.4.2 The activities in Component 2 are focused on the re-optimisation and re-operation of the Tiga and Challawa Gorge dams with most of the activities emanating from the river basin strategic development plan. The main tasks in this component are review of the existing operations of the dams and the physical conditions, undertaking hydrological simulation and optimisation under different set of rules and operational scenarios and proposing the optimum reoperation of the dam to suit the overall river basin development objectives as set out under component 1. The data collection and analysis and the river basin modelling conducted under component 1 are linked with the specific requirement of the reoperation analysis. In

component 3, preparation of priority projects for implementation over the short term period of 2016-2020 will be undertaken.

2.4.3 The project management activities under component 4 include the establishment of effective project structure with staff and facilities as well as monitoring and reporting system to facilitate the work of the technical team and follow-up on execution in accordance with the implementation schedule. Other key activities under project management are facilitation of the meetings of the Steering Committee and Technical Panel and stakeholders' workshops. The specific activities under each component are elaborated in the following paragraphs.

2.4.4 **Component 1: Preparation of Komadugu - Yobe Basin Water Resources Strategic Action Plan (WRDSAP)** will commence with assessment of existing situation, identification of key issues and collection of data and information. This will be followed by the analysis stage on water resources development needs for the basin. The analysis of the basin needs will be built-up from the sub-basins constituting the Hadejia, Jamaare, and Komadugu-Gana sub-basins shown on basin map in Annex 2.

2.4.5 The final stage of this component is the formulation of the Water Resources Strategic Plan, which encompasses the short to long term development strategies with prioritised projects and programmes for socio-economic development of the basin. The analysis and plan formulation will be based on the application of GIS based simulation and optimisation exercise for each sub-basin, which will be consolidated into basin-wide development plan. The overview of the activities under this component is provided below with details included in the TOR for consultancy services attached as Annex 15 herewith.

(i) An assessment of the existing situation will be undertaken to establish the state of water resources availability and use; the national development framework; the existing Federal and State policies and strategies; sector governance issues; and proposed development plans. The status of existing data and information and gap will be assessed and the need for additional work identified. The requirement for site investigation, survey, and preparation of thematic maps of varying scales will be identified.

(ii) Selection of models and the GIS set-up will be undertaken. Data and information collected from existing sources and obtained from survey, investigation and basin wide assessment will be established in the GIS structure for analysis and use in the study and serves as an information and knowledge sources for project implementation and monitoring.

(iii) An inception report will be submitted which will include a situation assessment highlighting the key development issues and options for analysis, the need for additional data collection and mapping and detailed work plan for the following stages. This report will be a basis for the first review input from Federal and State governments and key stakeholders.

(iv) The Analysis stage will focus on thematic and sectoral studies, and the examination of development options and scenarios under different sets of assumptions. The thematic and sectoral studies will include physical characteristics, natural resources, water resources, infrastructure, socio-economic development and environmental aspects. Preparation of thematic maps needed for the elaboration of the strategic action plan will be undertaken. Hydrological simulation for preferred options will be undertaken. This aspect will be closely linked to the Tiga and Challawa Gorge dams reoperation analysis under component 2, particularly in relation to the situation analysis for the Hadejia sub basin. An interim report that elaborates the nature and outcomes of the analysis undertaken and key issues in the plan preparation will be submitted. The report will serve as a basis for the second consultation with the Federal and State governments and key stakeholders.

(v) The Plan Preparation stage involves the formulation of the **SAP** for the basin based on the sub-basin development plans. The SAP will incorporate multipurpose integrated development of water for social, economic and environmental purposes. The preparation of the Plan will be based on a systematic assessment of available water resources and existing and potential uses in the basins, and the formulation of development programmes and projects which take into account the characteristics of the three main sub-basins, including the socio-economic needs and socio-ecological conditions. The reoperation of the Tiga and Challawa Gorges dams will be integrated in the analysis and elaboration of the **SAP**.

(vi) The **SAP** will provide a prioritised list of development programmes and projects based on the outcome of the analysis and optimisation exercises that are to be implemented over a period of 25 years, comprising short (2016-2020), medium (2021-2030) and long term actions (2031-2040). The development plan may include projects in the field of hydropower, irrigation, flood management, enhancement of ecological services, livestock and fisheries development.

(vii) Sector governance frameworks will be defined as part of the plan, including institutional framework necessary for implementation of the proposed development plan. The institutional framework will elaborate the interstate and transboundary water resources management set-up; refinement of the existing policy, legal and regulatory system; information and knowledge management and monitoring and evaluation frameworks. The final report which elaborates the development plan will be submitted for review and finalised after review by Executing Agency and other stakeholders.

(viii) Strategic Environmental and Social Assessment will be undertaken on basin-wide scale to document the existing situation and assess the potential environmental and social impacts of proposed implementation of SAP in the basin. The SESA will develop proposals on mitigation measures to be incorporated as part of the strategic development plan. The SESA will amplify the environmental and social impacts on community livelihoods and mitigation measures adopted, particularly in relation to the enhancement of the ecological services, sustenance of the wetland environment and sustained flow to Lake Chad. Measures

(ix) Gender and social equity considerations will be mainstreamed into the **SAP.** Stakeholder involvement, consultation and communication are critical factors in the development of the plan. Adequate measures such as awareness creation and capacity building, empowerment of actors through institutional, legal, financial instruments etc, will be undertaken to ensure effective involvement of women and their representatives in all decision making processes. The SSEA process will focus on assessing specific impacts on women and other vulnerable groups and integration into the development process.

(x) Climate change and variability have a significant influence on availability of water resources, operations of water infrastructure, and invariably, on droughts and floods in the Basin. The impact of climate change and variability as well as impact of proposed development on climate change will be taken into account in the definition of **SAP.**

2.4.6 **Component 2: The dams' reoperation and optimisation** study involves the development of new operational rules that will meet the objective of multipurpose water resources development of the Tiga and Challawa Gorges Dams, particularly in the Hadejia sub-basin by optimising the existing uses. The analysis will be undertaken by applying mathematical models that will simulate the full range of physical processes in the Tiga and Challawa Gorge Dams system in order to evaluate the feasibility and efficacy of re-optimisation scenarios. The overall objective of the reoperation will be to mitigate adverse effects of the construction of the dams on the livelihoods, river basin health, ecosystems

services, floods and aquatic weeds and to sustain or improve the original purposes for irrigation and water supply.

2.4.7 The optimisation modelling analysis will identify tradeoffs among different developmental objectives in the basin and to determine the most optimum scenario for reservoir operation. The basin wide data and information assembled under Component 1 will be augmented by additional data collection needed for the analysis and development of reoperations rules. The data, information and results of the dams safety investigation and capacity survey, hydro-metrological analysis for flood routing and river training conducted through the World Bank project will be compiled and utilised for the reoperation study. The specific tasks that will be carried out under this component are as follows.

(i) The hydrologic modelling will be applied to simulate inflow scenarios upstream of the dams, reservoir capacity, hydropower production parameter values, and sediment transport. Floodplain modelling using topographic characteristics of the floodplain will be done, including any development on the floodplain. For the groundwater component of the system, estimates will be made of hydraulic conductivities, aquifer storage capacities; groundwater heads in relation to the stream elevations, recharge areas and rates, and other groundwater modelling parameters.

(ii) The ecological aspects will identify environmental indicators whose 'health' depends in part on how water flows and levels are managed over time, and quantify these relationships for use in simulation, and possibly optimisation models. The environmental flow requirement including release to Lake Chad and flow routing parameters and functional relationships between river flows, inundations and groundwater characteristics will be taken into account.

(iii) Cost-benefit analysis using socio-economic and technical data and production requirement taking into account environmental functions and associated costs will be conducted to determine the most optimum proposition.

(iv) Testing and demonstration of the most preferred operation will be conducted provided the physical reservoir and dams conditions allows for actual trial reoperation. Computer based simulation will be applied in the event of the physical condition not allowing the testing.

(v) The physical changes required on the two dams to implement the reoperation plan will be indentified. Preliminary designs will be undertaken to estimate the investment requirement and project proposals will be prepared for implementation as part of the priority projects.

2.4.8 **Component 3: Preparation of Priority Projects for Investment** will consist of the formulation of projects and programmes for short term implementation from 2016 to 2020. The preparation will include preliminary designs and cost estimates with terms of reference for subsequent design studies and implementation as well as detailed resources mobilisation strategy to implement the projects. The priority projects preparation activities include the following main tasks.

(i) Feasibility level studies for selected priority projects including preliminary design will be undertaken. The projects will generally consider multipurpose water use, integrated water resources development for water supply (rural and urban); livestock, sanitation and hygiene, and irrigation, hydropower, flood control, improvement in ecological services and environmental management.

(ii) Analysis of the technical, economic, financial and environmental aspects will be undertaken to ascertain economic and financially viability, as well as to assess the social and environmental impact and to identify climate change adaptation and

mitigation measures. The institutional arrangement required for implementation will be proposed in the framework of the broad institutional requirement for **SAP**.

(iii) Estimate of investment resources requirement and strategies for mobilisation will be elaborated. An investment planning report that elaborates the nature of the projects and programmes, the technical solutions, economic and financial viability, and environmental and social considerations will be submitted for review and validation.

(iv) A resources mobilisation roundtable will be organised upon the submission of the investment planning report.

2.4.9 **Component 4: Project Management** will consist of establishing a project implementation unit for the day to day operation, the establishment of a Project Steering Committee and a Scientific Advisory Committee to guide implementation of the project. The project management activities include the following activities:

(i) The Project Management Unit will be established by assigning the professional and support staff and recruiting a project manager. The PMU will undertake project implementation task and follow-up of implementation according to schedule and budget. The PMU will facilitate the work of the consultancy firm and ensure provisions of the support specified in the consultancy agreement. The PMU will also ensure the assignment of counterpart staff to work with the consultant.

(ii) The PMU will identify the communication and promotion needs of the project, develop a communication action plan and implement it. It will also organise meetings and workshops including that of the Steering Committee and Technical Advisory Panel. It will prepare reports on progress and performance as per the reporting schedule in this PAR.

(iii) The PMU will ensure proper participation of the counterpart staff assigned with the consultant. The consultant will provide capacity building activities such seminars on specialised subjects and undertaking analytic tasks such modelling and GIS operation. The PMU with the assistance of the consultant will prepare a structured approach to enable the full participation of the counterpart staff and gain knowledge and experience in river basin planning.

(iv) The PMU will organise, prepare and conduct a donors' roundtable to promote the short term project to mobilise investment for implementation. The donor roundtable is expected to draw commitments from potential donors to commence implementation of priority projects.

(v) Stakeholder consultations forum will be created by expanding the existing platform and mechanisms to cover community engagement and political discourse among the riparian States and the Federal Government. A stakeholders' consultation strategy that will set out the structure of the forum, membership, programme and output will be prepared and implemented by the PMU.

2.5 Risks

2.5.1 The river basin is shared between six Federal States with potentially conflicting development plan and interest. This Basin also constitutes 35% of the Lake Chad basin which accounts for 95% of the flow contribution from Nigeria to the Lake Chad system. There is an ongoing security situation that may divert the effort of State and Federal Governments and investment resources towards its mitigation.

2.5.2 . The provision of infrastructure and institutional set-up required for development needs large scale investment over the planning period. Climate change and variability contributes to deteriorating water security resulting in diminishing water availability for various developmental and environmental needs. The above are key risks that will affect the

achievement of the long-term basin development goals and bring about the envisaged social, economic and environmental impacts. The long term river basin strategic planning and development approach provides the most appropriate framework for addressing and internalising the perceived risks in the development process.

2.5.3 There adoption and implementation of river basin development strategy and action plan will enhance sustained long-term engagement in the development and management of the water resources of the basin and build adaptation capacity to withstand climate change impact. The rationalisation of interstate and river basin legal and institutional frameworks and organisational set-up to promote common visions, joint development and shared benefit is required. The project will assess the existing situation and propose the long term institutional requirement to address the common interest of development and sustainability of quality environment.

2.5.4 The stakeholders platform will facilitate engagement from the local to state and federal levels and ensure full participation in the planning process to ensure inclusive development and growth restoring the livelihood and benefit to the population of the basin. Development financing should be sustained by generating investment resources from efficient use of water for growth and development and mobilise State and Federal resources for infrastructure provisions.

2.5.5 The inadequacy of good data and information is a source of concern on quality of the simulation and optimisation exercise in relation to developing the SAP as well dams reoperation rules. The implementation of the reoperation rules could face resistance from upstream users on the dam reoperation to meet downstream requirements. The overall lack of human resources, investment and organisational capacity will be a cause for less than optimum implementation of the **SAP** as well it's monitoring.

2.5.6 Use of existing data supported by satellite imagery, GIS analysis, and regional correlations with adaptive management for continuous learning will facilitate the adjustment and updating of the **SAP** and the reoperation rules. The development and adoption of the **SAP** and the reoperation rules will be through an inclusive stakeholders' process that involves community and decisions makers. The stakeholders' platform will be sustained through the plan's implementation period. Implementation of policy of incentive mechanism for a stable human resources and institutional framework would be essential for the sustainable implementation of the plan.

2.6 Cost and Financing

2.6.1 The total cost of the project is estimated at Euro **2,690,940**and will be partly financed by an AWF grant of Euro **1,995,315.** Table 2.1 presents the proposed project cost estimate for the four main components with details provided in Annex 3 with estimates of consultancy and counterpart staff given in Annex 4 and 5.

Table 2.1 Estimated Project Cost by Components (in Euros)

Item	Description	Comp 1	Comp 2	Comp 3	Comp 4	Total
A	**Consultancy Services**					
1	International consultant	753,600	190,400	189,000	-	1,133,000
2	National consultants	153,000	17,000	263,500	-	433,500
3	Travel cost for field work	15,360	3,360	10,080	-	28,800
4	Survey and investigation	25,000	10,000	35,000	-	70,000
5	Maps, imagery and software	62,000	5,000	1,000	-	68,000
6	Report preparation	2,500	1,500	3,000	-	7,000
7	Counterpart staff	100,500	31,500	60,000	-	192,000

8	**Subtotal**	**1,111,960**	**258,760**	**561,580**	**-**	**1,932,300**
B	**Project Management**					
1	Project Implementation Staff	-	-	-	397,500	397,500
2	Workshops, meetings & seminars	-	-	-	81,000	81,000
3	Office equipment	-	-	-	40,000	40,000
4	Project Office and support	-	-	-	112,000	112,000
5	**Subtotal**	**-**	**-**	**-**	**630,500**	**630,500**
C	**Total**	**1,111,960**	**258,760**	**561,580**	**630,500**	**2,562,800**
D	**Contingency**	**55,598**	**12,938**	**28,079**	**31,525**	**128,140**
E	**Grand total**	**1,167,558**	**271,698**	**589,659**	**662,025**	**2,690,940**
F	**AWF Support**	**1,062,033**	**238,623**	**526,659**	**168,000**	**1,995,315**
H	**% AWF Support**	**91%**	**88%**	**89%**	**25%**	**74%**

2.6.2 The main project cost consists of the payment for the consultancy services to undertake the study, strategic plan preparation, dams' reoperation and preparation of priority investment projects. Tables 2.2 indicates summary of costs per category of expenditure. The cost for services which is mainly related to consultancy services constitutes 95% of the total project cost.

Table 2.2 Estimated Project Cost by Category of Expenditures (in Euros)

Item	**Category**	**Amount and Sources**		Total
A	**Goods**	AWF	HJKYTF	
1	Maps, imagery and software	71,400		71,400
2	Office equipment	42,000		42,000
3	Project Office and support		25,200	25,200
4	**Subtotal**	**113,400**	**25,200**	**138,600**
B	**Services**			
5	International consultant	1,189,650		1,189,650
6	National consultants	455,175		455,175
7	Travel cost for field work	30,240		30,240
8	Survey and investigation	73,500		73,500
9	Report preparation	7,350		7,350
10	Counterpart staff		201,600	201,600
11	Project Implementation Staff	115,500	301,875	417,375
12	Workshops, meetings & seminars	10,500	74,550	85,050
13	Project Office and support		92,400	92,400
14	**Subtotal**	**1,881,915**	**670,425**	**2,552,340**
C	**Total**	**1,995,315**	**695,625**	**2,690,940**

2.6.3 Table 2.3 summarises the sources of finance. The proposed funding from the AWF is Euro **1,995,315** or 74% of the total project cost. The cash and in-kind contribution from the HJKYTF is estimated as Euro **695,625** or 26% of the total cost.

Table 2.3 Estimated Costs by Sources of Funding (in Euros)

Item	Description	AWF	HJKYTF	Total
A	**Consultancy Services**			
1	International consultant	1,189,650		1,189,650
2	National consultants	455,175	-	455,175
3	Travel cost for field work	30,240	-	30,240
4	Survey and investigation	73,500	-	73,500
5	Maps, imagery and software	71,400	-	71,400
6	Report preparation	7,350	-	7,350
7	Counterpart staff	-	201,600	201,600
8	**Subtotal**	**1,827,315**	**201,600**	**2,028,915**
B	**Project Management**			
8	Project Implementation Staff	115,500	301,875	417,375
9	Workshops, meetings & seminars	10,500	74,550	85,050
10	Office equipment	42,000	-	42,000
11	Project Office and support	-	117,600	117,600
12	**Subtotal**	**168,000**	**494,025**	**662,025**
C	**Total**	**1,995,315**	**695,625**	**2,690,940**
D	Percent of total	74%	26%	100%

3. PROJECT IMPLEMENTATION

3.1 Recipient and Executing Agncy

3.1.1 The Hadejia - Jama'are Komadugu Yobe Basin Trust Fund (HJKYB-TF) will be the Recipient and Executing Agency of the project. The HJKYB-TF was established by the Federal and riparian State Governments to mobilise resources and implement IWRM in the basin. The Trust Fund is governed by a Board of Trustees comprising two representatives of each of the six riparian states and three representatives appointed by the Federal Government from the Water Resources, Agriculture and Environment sectors. The Board sets the policy and strategy of the Trust Fund and monitors progress of implementation.

3.1.2 The day-to-day activities of the Trust Fund is administered by a Secretariat headed by an Administrative Secretary supported by a technical and administrative staff located at the Trust Fund headquartered in Damatru, Yobe State. The Trust Fund is currently implementing the Catchment Management Plan prepared with the support of IUCN and other partners. The Trust Fund will administer the AWF funds and manage the project implementation through a Project Management Unit. The Nigeria Integrated Water Resources Management Commission will represent the Federal Ministry of Water Resources in the implementation of the project within the framework of Federal Government policies and strategies and thereby serve as a link with Federal Government organs and facilitate decisions needed at the Federal Government Level.

3.2 Implementation Arrangements

3.2.1 A Project Management Unit shall be established by the HJKYB-TF to implement the day-to-day functions of the functions of the project. This structure is shown in Annex 4. The Project Management Team (PMT) will comprise a Project Manager, Administrative, M&E and Communication officers with secretarial and logistical support staff. The PMT will be headed by a Project Manager who shall report to the Administrative Secretary of the

HJKYB-TF. The PMU will be responsible for the day-to-day coordination of project implementation. The proposed project implementation structure is depicted in Annex 6. The Project Manager will be recruited on competitive basis. The proposed TOR for the Project Manager is outlined in Annex 8.

3.2.2 **Consultancy services** to undertake the preparation of the strategic plan, dams' reoperation and priority project preparation will be provided by a reputable and qualified international consulting firm recruited on a competitive basis. The proposed staff complement from the consultancy services is shown in Annex 5 with draft TOR for the consultancy services outlined in Annex14. Counterpart staff will be assigned to work with the consultant to gain knowledge and experiences in all aspects of river basin planning and dam optimisation. The list of proposed counterpart staff is shown in Annex 4. The existing stakeholder consultation platform will be strengthened to meet the specific requirements of the project. A political dialogue platform consisting of States and Federal government agencies and community engagement will be facilitated as part of the stakeholders' consultative forum. The list of institutions relevant for project implementation is shown in Annex 7.

3.2.3 **A Project Steering Committee,** consisting of key Federal and State actors, basin organisations, civil society and community representatives will be constituted with an oversight function to provide strategic guidance and direction as well as validation of key outputs with recommendations to the next level of decision making. The Coordinating Director of the Nigeria Integrated Water Resources Management Commission under the Federal Ministry of Water Resources will be a member of the committee. The other proposed members of the PSC are given in Annex 11.

3.2.4 The **Technical Advisory Panel (TAP)** consisting of qualified and experienced professionals will support the PSC with respect to the technical and scientific integrity of the study. The TAP will be established to review and advice on the analytic and technical outputs delivered by the consultancy firm. This has been considered as necessary in view of the technical complexity of the project involving multifaceted scientific and technical outputs. The proposed members of the TAP are given in Annex 12.

3.2.5 The Project Management Unit is proposed to be located in Kano City. The HJKYB-TF will provide a fully furnished project office with adequate space for the PMU and the consultants' team. The HJKYB-TF will be responsible for the provision of logistical and operations of the office including transportation and communication facilities for the PMU.

3.3 Project Implementation Schedule

3.3.1 The project will be implemented over a period of 22 months from Grant Effectiveness as shown on the tentative project implementation and staff input schedule in Annex 9 and 10. The schedule consists of 4 months for project start-up activities related to establishment of project office and staffing, recruitment of project coordinator, procurement of consultancy services and 18 months of Strategic Action Plan preparation, dam reoperation and priority project preparation including the report preparation and review periods.

3.3.2 The main tasks and timing of events are presented in Table 3.1 below to guide achievement of the main outputs. The Executing Agency will initiate advanced procurement actions in the recruitment of the consulting firm and the project manager to fast track implementation of the project activities. This will allow launching of the project as soon as the Grant is declared effective.

Table 3.1: Performance Plan

Event	Timing [2]
Grant effectiveness	**M**
Recruitment of Project Manager	M+1
Contracting of Study Consultants	M+3
Project launching	M+4
Commencement of Strategic Plan preparation	M+5
Inception report	M+7
Interim report on thematic and sector analysis	M+11
Strategic Action Plan report	M+15
Commencement of dams reoperation study	M+9
Dams reoperation changes report	M+15
Commencement of priority project preparation	M+16
Project preparation report	M+21
Resource mobilization plan roundtable	M+21
Final project report	M+22
Project completion report	M+22

3.4 Procurement Arrangements

3.4.1 All project procurements will be made in accordance with African Development Bank Rules and Procedures for Procurement of Goods and Works and Rules of Procedures for the use of Consultants. The use of relevant Bank Standard Bidding documents is mandatory. The Executing Agency will be responsible for the procurement of goods and services. Procurement arrangements are summarised in Table 3.2 and described below.

Table 3.2: Procurement Arrangements (in Euro)

Item	Description	Source	Amount	Procurement mode
A	**Goods**			
1	Office equipment	AWF	40,000	Shopping
2	Project Office support	HJKYTF	24,000	Governments' Procedures
3	Subtotal (services)		64,000	
B	**Services**			
1	Consultancy services	AWF	1,740,300	Quality Cost Based Selection
2	Counterpart staff	HJKYTF	192,000	Governments' Procedures
3	Project Manager	AWF	110,000	SL Individual Consultants
4	Seminars for counterpart staff	AWF	10,000	Shopping
5	Workshops and meetings	HJKYTF	71,000	Governments' Procedures
6	Project Management staff	HJKYTF	287,500	Governments' Procedures
7	Project Office support	HJKYTF	88,000	Governments' Procedures
8	**Subtotal (services)**		**2,498,800**	
C	**Total**		2,562,800	
D	**Contingencies (5%)**		128,140	
E	**Grand total**		2,690,940	

[2]M : Month of Grant Effectiveness

Goods

3.4.2 Office equipment amounting to Euro 40,000 will be procured through national shopping. The HJKYTF will make in kind contribution of Euro 24,000 in the form of standby generator and office supplies.

Services

3.4.3 A consultancy firm will be recruited to undertake the basin water resources strategic plan, studies and design of the reoperation rules for the Tiga and Challawa Gorges dams and preparation of the priority projects. The procurement of consultancy services amounting Euro 1,740,300 will be through competition following Short-Listing (SL) procedures and utilising the Quality and Cost-Based Selection (QCBS) method. The cost of consultancy services is inclusive of fees, allowances, travel and reimbursable expenses for site investigation, mapping, satellite imagery, GIS and modelling and report preparation. Salary and allowance for counterpart staff amounting to Euro 192,000will be paid by the Executing Agency as part of recipient contribution.

3.4.4 The Procurement of the project manager, amounting to Euro 110,000 shall be on shortlist basis of an Individual Consultant method. The amount includes fees and allowance to cover accommodation and subsistence. Training seminars for counterpart staff will be organised by the consultant and procurement of training materials amounting to Euro 10,000 through direct shopping. Project management services provided by HJKYTF relating to workshops and meetings, staff salary, office provisions and operational cost amounting to Euro 446,500 will be covered by the HJKYTF using government procedures.

3.4.5 **Advertising:** General and Specific Procurement Notices (GPN and SPN) for goods, and services will be prepared by the HJKYTF for review and no objection by the AWF before submission for publication in the UNDB online and advertised in local media, in accordance with the Bank's procurement rules and procedures.

3.4.6 **Procurement plan:** The Executing Agency shall prepare and submit to the Bank a Procurement Plan based on Bank's template, before approval of the project. The Bank shall review the procurement arrangements proposed by the Grant Recipient in the Procurement Plan for its conformity with the financing Agreement and its Rules. The Grant Recipient shall update the Procurement Plan on an annual basis or as needed and submit to the Bank's prior no objection. The Grant Recipient shall implement the Procurement Plan in the manner in which it has been agreed with the Bank.

3.5 Disbursement Arrangements

3.5.1 The AWF support for consultancy services, estimated at Euro **1,827,315** (including 5% contingencies), shall be disbursed through the Direct Payment Method upon verification and certification of invoices by the PMU, in accordance with the Bank's disbursement rules and procedures.

3.5.2 The other AWF supported expenses related to payment for the Project Manager, training seminars and procurement of office equipment, estimated at Euro **168,000** (including 5% contingencies), will be disbursed through the Special Account method in two tranches. The Recipient will open a Special Account for the AWF grant, denominated in Euros in a bank and on terms and conditions acceptable to the AWF. The Special Account will be replenished on the condition that the first advance has been utilised and justified up to at least 50%, and that a work plan acceptable to the Bank is submitted. The proposed disbursement arrangement for the project as indicated in the Table 3.2 below will be under the Special Account Method.

Table 3.2: Disbursement Schedule for special account (Euro)

Item	Disbursement Tranches	Amount	% of Total	Proposed Timing
1.	1st Tranche	100,800	60%	M+0: Grant effectiveness and fulfillment of conditions
2.	2nd Tranche	67,200	40%	M+15: Preparation of Strategic action plan
3.	Total	**168,000**	100%	

3.5.3 The conditions precedent to first disbursement of funds are (i) the entry into force of the Agreement (ii) the opening of a special account in Euros to receive the resources of the Grant (iii) evidence of the establishment of the Steering Committee and (iv) provision of fully furnished office with adequate space for PMU and consultant staff and assignment of counterpart staff.

3.6 Financial Management Arrangements

3.6.1 The Financial Management of the project will be carried out by the HJKYTF, who shall be responsible for budgeting, accounting, internal control, funds flow and financial reporting. The HJKYTF will be required to produce Financial Reports for the project every quarter in a format to be agreed with the AWF. The reports will be submitted to the AWF for review no later than 30 days after the end of each quarter, as part of the quarterly progress report.

3.6.2 The project accounts shall be kept separately, indicating expenditure by component category and source of financing. Statements of expenditure and supporting documents should be kept for review by the Bank and for submission for justification during the request for replenishment. These documents, as well as the financial reports, shall be reviewed and audited twice by an independent auditor to ensure that the funds provided have been spent for the intended purpose. The AWF will recruit and retain an auditor for the project and will cover the cost from its administrative budget. Interim auditing is proposed 12 months after commencement and 2nd auditing at the end of the project. Financial Management will also be part of the AWF supervision missions.

3.7 Monitoring and Reporting Arrangement

3.7.1 The monitoring of the project implementation activities including that of the consultancy services will be carried out by the Project Manager under the Administrative Secretary of HJKYTF. The HJKYTF Administrative Secretary will have the overall responsibility of monitoring and of reviewing progress and providing guidance from time to time. The PM will submit quarterly progress reports which will serve as a basis for close and timely reviews of progress from AWF as well as HJKYTF, State and Federal Government actors as well as other key stakeholders. The Logical Framework matrix included in this PAR, and as modified in the Inception Report, shall serve as a basis for the results-based assessment of the outputs of the project during implementation and after completion.

3.7.2 The AWF will also monitor project implementation through communication and correspondence with the HJKYTF and project team, as well as review the progress reports. In addition, the AWF will undertake supervision missions as the need to do so arises. The AfDB Field Office in Abuja will assist the Facility in undertaking project supervision and the options for supervision support. The HJKYTF and the Project team will apply the AWF Communication and Visibility Guidelines as outlined in Annex 14 for project promotion, awareness building and other communication needs.

3.7.3 The project team shall adhere to the reporting requirements and schedule outlined in Annex 7 and as modified in the Inception Report. The timing for submission of reports, review requirement and final reports preparation will be clarified in the Inception Report. The technical reports prepared by the consulting firm shall be submitted through the PMU for review by the PSC, TAP, stakeholders and AWF and follow-up validation and adoption as appropriate. The HJKYTF is responsible for preparing the Project Completion Report at end of the project. The AWF Progress and PCR reporting formats will be used in preparing these reports. A mid-term review of project activities will be conducted in the second year of the project.

3.7.4 The main reporting requirements are summarised as follows. Details of the reports prepared by the consultant are provided in the draft TOR for the consultant attached as Annex 14.

(i) **Quarterly Progress Report**: The reports will cover technical, procurement, disbursement and financial progress, administrative issues and constraints affecting the project and suggested solutions.

(ii) **Inception Report:** Inception Report will provide review of the proposed implementation at project appraisal and present detailed work plan, reporting, staff composition and schedule and issues for guidance. The report will outline the consultants approach to the preparation of the strategic plan, dams' re-optimisation and priority project preparation, data and field investigation needs and details of the modelling analysis and establishment of GIS based data and information management system. The report will be submitted 3 months after commencement of the consultancy services or 7 months after project commencement for review by HJKYTF, AWF and the Project Steering Committee.

(iii) **Interim Report:** The interim report prepared on completion of the analysis stage will elaborates the nature and outcomes of the analysis undertaken and key issues that will be considered in the basin plan preparation. The report will be submitted 11 months after project commencement for review by PSC and other stakeholders.

(iv) **Basin Water Resources Strategic Development Plan Report:** The report, prepared by the consultant will be submitted 15 months after commencement of the study. It will provide the strategic development plan which will elaborate the short, medium and long term development action plans with investment estimate and implementation mechanisms. The report will be submitted in draft for review by PSC, TAP, stakeholders and AWF and finalised with review input for adoption by the State and Federal Governments.

(v) **Dams' Reoperation and Optimisation Report:** This report provides the analysis and consolidated results of the dams' reoperation analysis and tests with the proposed operation rules to optimise the use of the dams for multipurpose water development purposes. The report will be prepared by the consultants first in draft and then finalised after review input by the PSC, TAP, stakeholders and AWF. The final report is proposed to be submitted 15 months after project commencement.

(vi) **Priority Projects Preparation Report:** This report prepared by the consultant will elaborate the priority projects considered for implementation from 2016-2020 with the investment mobilisation strategy and implementation plan. The investment strategy will be prepared as standalone report for submission at the resources mobilisation roundtable. The investment strategy part should be ready by month 22 after project commencement and final report by month 22 after review input.

(vii) **Consolidated Final Project Report:** The report prepared by the consultant with input from the PMU will present the consolidated final output at the end of the project.

(viii) **Project Completion Report (PCR),** formatted according the AWF operational rules, will be prepared at the end of the project implementation.

4. EFFECTIVENESS, EFFICIENCY AND SUSTAINABILITY

4.1 Effectiveness and Efficiency

4.1.1 The project is designed as an effective measure to address the multiple developmental challenges in the Komadugu-Yobe Basin by applying the IWRM principles and approach over the basin boundary. The project will enable the State and Federal Governments to deal with the challenges arising from lack of an inclusive basin wide development strategy to facilitate sustainable uses of the water resources of the basin by all the riparian States.

4.1.2 It will provide an effective response of challenges arising from the impact of the existing upstream development in the Hadejia sub basin where the damming of the river at Tiga and Chalawa gorges has regulated the flow of water downstream in ways that have disrupted the flood plain connectivity, restrained flows to the Nguru wetlands and caused adverse ecological and environmental impacts. This situation has diminished the livelihoods of the downstream communities and has resulted in adverse impact on the downstream riverine and wetland water ecology. The dam reoperation plan will be developed based on the study of technical, social, ecological and economic feasibility of alternative measures that will lead to sustainable solutions that will optimise multipurpose water resources use.

4.1.3 There are challenges related to the impact of climate change and variability which will result in the deterioration of the long term water security of the basin. Meeting the increased water needs for food security, health, and environmental sustainability in the face of population growth and urbanisation will continue to be one of the major challenges of water management in the Basin. All of the above challenges are compounded with the need to meet flow requirement to Lake Chad which has come under sustained loss of its water resources. The proposed approach for preparing an operational strategic plan based on analysis of the interrelated and interlinked physical and socio-ecological factors is considered to be the most suitable approach for addressing the challenges over the long-term period.

4.1.4 The project formulation and implementation arrangement is based on understanding and examination of the challenges and developmental issues of the basin through field visit, consultation with key stakeholders and review of existing information and knowledge. All technical and implementation related alternatives were reviewed jointly with the Executing Agency and key stakeholders through participatory consultative process. The alternatives selected are deemed to be the most viable, effective and efficient method of proceeding with project implementation and attainment of the envisaged outputs.

4.1.5 The main components of the project with respect to the preparation of the strategic plan, dam reoperation and priority project preparation adhere to the priorities of the Strategic Plan of the AWF. The main thrust of the project is strategic planning and project preparation which is the main priority area for AWF. The project will also generate information and knowledge; investment resources mobilisation for priority projects; basin institutional consolidation and development and establishment of long-term monitoring system. It also addresses cross-cutting challenges of climate change, gender and social equity concerns and environmental sustainability at the strategic planning level as well as priority project preparation stage thus ensuring comprehensive and consolidated responses for addressing the challenges in the basins.

4.2 Sustainability

4.2.1 The sustainable availability of water resources over the long term time frame is a major development concern for the riparian States as well as the Federal Government with responsibility for transboundary water resources management. The deterioration of the ecological services and the changed water flow situation downstream of the Tiga and Challawa Gorge dams are attributed to the dams' operation that have serious limitations in meeting the objectives of the downstream riparian needs.

4.2.2 Climate change and population growth will exacerbate the already precarious water security situation. The proposed strategic plan is designed to address these issues with long term water needs for social, economic and environmental uses. The project will also address storage and use of scarce surface resources, especially where adequate groundwater is not available; demand side efficiency measures, water conservation and reuse; and water resources management needs for environmental protection, groundwater recharge and river/stream erosion. The new national water policy, strategy and legislation, which make river basins and safety of infrastructures the focus of water resources management in Nigeria, are an added assurance of sustainability.

4.2.3 The analyses prepared as part of the investment planning process, which will include river basin simulation and optimisation modelling, application GIS, environmental and social impact assessments, financial and economic evaluations, and assessment of risks and mitigation measures due to droughts, floods, climate change and variability; will help ensure sustainability of the strategic and priority investment projects. In addition, the analytical tools and databases that the project will create will endure long after the project ends. The river basin planners and dam managers will be availed with a state-of-the-art analytical and decision support tools/planning model.

4.2.4 The process of preparing the strategic plan, dam reoperation and preparation of priority projects is participatory and inclusive involving riparian States and Federal Governments, and project actors; oversight steering group; technical support expert team and including stakeholder consultations platform that involves local, national and regional actors including the State and Federal Government decision makers throughout the key stages of the study. A consolidated institutional framework with appropriate legal mandate and organisational setup will be put in place to ensure proper implementation of all aspects of the strategic plan and other project outputs. The stakeholder platform will be part of the institutional mechanism that will continue to ensure the interests of all actors in the implementation process.

4.2.5 The strategic environmental and social impact assessment (SESA) at the river basin level is the basis for selection of development options that eventually yield investment projects over the short to long-term time frames. The SESA ensures that environmental and social impacts of potential development options have been addressed and only those options that ensure social and environmental integrity can proceed up to investment stage. The environmental and social impact assessments related to the short term investment projects will ensure that mitigation measures are integrated as part of the overall development. Dealing with the environmental and social issues at the strategic and project level facilitates social and environmental sustainability of project outcomes.

4.2.6 Sustainability of investment resources for the implementation of the strategic plan is ensured as the riparian State and Federal Government are engaged in the development of the plan and its adoption as a framework for action for the development of the water resources of the basin with long-term time frame spanning to 2040. This will allow state and federal actors to plan timely mobilisation and allocation of investment resources from internal and external sources. Raising investment for the priority projects implementation is embedded in the project activity which allows for the preparation of resources mobilisation action plan and holding a donor roundtable to garner investment for immediate implementation.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

5.1.1 The project is well aligned to Nigeria's policies, investment strategies and programmes for achieving food security and poverty reduction while safeguarding both the aquatic and terrestrial ecosystems. At the same time, the project is in compliance with the objectives and priority areas of intervention of the African Water Facility – the project comprise mainly strategic planning, project preparation, generation and harnessing of knowledge uptake for improved sector investments.

5.1.2 The Project is demand driven having been jointly developed by riparian States and Federal Governments and other key stakeholders in the Basin. It is an important and well justified initiative for AWF funding considering the myriad of water resources management problems, including water shortage, unwanted flooding, ecological degradation, and water conflict challenges facing Komadugu – Yobe Basin and its communities. The communities have developed a strong sense of ownership and are committed to seeing the project implemented as they perceive it as an opportunity to improve/restore their livelihoods and health. Integrated water resources development in the Basin will strengthen community interrelationship and ensure sustainable security in the area.

5.1.3 Given the IWRM-compliant approach and the factoring into the hydrological models of projected climate change impacts, the project will promote adaptation to the effects of climate change and enhance long-term security of access to water supply, food production (crop and fisheries), river navigation as well as hydropower, while mitigating the impact of floods. The deteriorating water security situation in Lake Chad is expected to improve through sustainable minimum flow from the Komadugu-Yobe rivers to the Lake system.

5.2 Recommendations

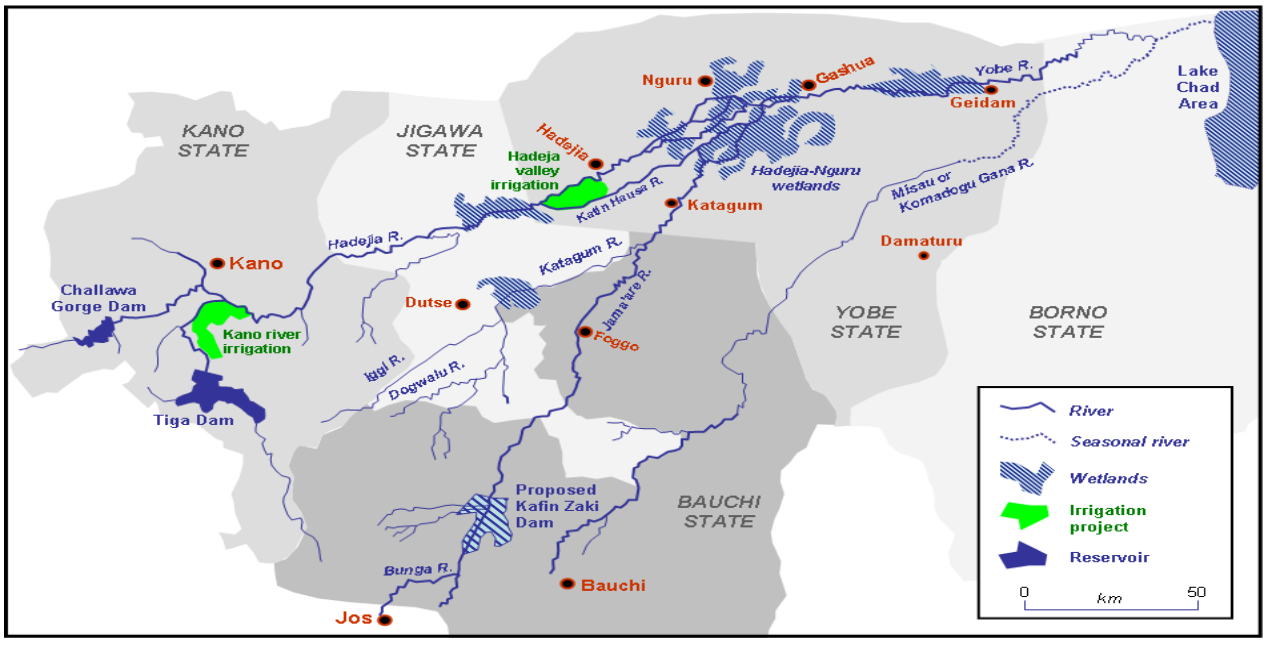
5.2.1 In view of the anticipated benefits that will accrue from the implementation of the project, it is recommended that the AWF approves the grant funding not exceeding Euro **1,995,315** to the HJKYB-TF to execute the project.

5.2.2 The conditions precedent to the first disbursement are: (i) the opening of a special account and (ii) evidence of the establishment of the Steering Committee. Other conditions for second disbursement are: (i) evidence of commitment of the cash contribution from the KJKYB Trust Fund (ii) assignment of counterpart staff; and (iii) establishment of an inclusive stakeholders' consultation forum.

ANNEX 1: MAP OF NIGERIA AND PROJECT LOCATION

Source:

Annex2 : Map of Komadugu-Yobe Basin



Source:

ANNEX 3: DETAILED COSTS BY COMPONENT AND ACTIVITY

Item	Description	Cost Estimate in Euro				Sources of Finance in Euro		Amount by Category in Euro	
A.	**Consultancy Services**	Unit	Quantity	Rate	Amount	AWF	HJKYTF	Goods	Services
A.1	**Component 1: Preparation of Strategic Action Plan**								
1	Fees for international consultants	Manmonth	48	12,625	606,000	606,000	-	-	606,000
2	Allowance for international consultants	Man days	1,380	100	138,000	138,000	-	-	138,000
3	Air travel for international consultants	tickets	12	800	9,600	9,600	-	-	9,600
4	Fees for national Consultants	Manmonth	18	5,500	99,000	99,000	-	-	99,000
5	Allowance for national consultants	Man days	540	100	54,000	54,000	-	-	54,000
6	Travel cost for field work	Veh days	384	40	15,360	15,360	-	-	15,360
7	Survey and investigation	sum			25,000	25,000	-	-	25,000
8	Maps and imagery	sum			17,000	17,000	-	17,000	-
9	GIS and Modeling	sum			45,000	45,000	-	45,000	-
10	Report preparation	sum			2,500	2,500	-	-	2,500
11	Counterpart staff	Manmonth	67	1500	100,500		100,500	-	100,500
12	**Total Component 1**				**1,111,960**	**1,011,460**	**100,500**	**62,000**	**1,049,960**
A.2	Component 2: Dams Re-operation and optimization								
1	Fees for international consultants	Manmonth	12	12,667	152,000	152,000	-	-	152,000
2	Allowance for international consultants	Man days	360	100	36,000	36,000	-	-	36,000
3	Air travel for international consultants	tickets	3	800	2,400	2,400	-	-	2,400
4	Fees for national Consultants	Manmonth	2	5,500	11,000	11,000	-	-	11,000
5	Allowance for national consultants	Man days	60	100	6,000	6,000	-	-	6,000
6	Travel cost for field work	Veh days	84	40	3,360	3,360	-	-	3,360
7	Survey and investigation	sum			10,000	10,000	-	-	10,000
8	Maps and imagery	sum			-	-	-	-	-
9	GIS and Modeling	sum			5,000	5,000	-	5,000	-
10	Report preparation	sum			1,500	1,500	-	-	1,500
11	Counterpart staff	Manmonth	21	1,500	31,500	-	31,500	-	31,500
12	**Total Component 2**				**258,760**	**227,260**	**31,500**	**5,000**	**253,760**
A.3	**Component 3: Priority Projects Preparation**								
1	Fees for international consultants	Manmonth	11	13,818	152,000	152,000	-	-	152,000
2	Allowance for international consultants	Man days	330	100	33,000	33,000	-	-	33,000
3	Air travel for international consultants	tickets	5	800	4,000	4,000	-	-	4,000
4	Fees for national Consultants	Manmonth	31	5,500	170,500	170,500	-	-	170,500
5	Allowance for national consultants	Man days	930	100	93,000	93,000	-	-	93,000
6	Travel cost for field work	Veh days	252	40	10,080	10,080	-	-	10,080
7	Survey and investigation	sum			35,000	35,000	-	-	35,000
8	Maps and imagery	sum			1,000	1,000	-	1,000	-
9	GIS and Modeling	sum			-	-	-	-	-
10	Report preparation	sum			3,000	3,000	-	-	3,000
11	Counterpart staff	Manmonth	40	1,500	60,000	-	60,000	-	60,000
12	**Total Component 3**				**561,580**	**501,580**	**60,000**	**1,000**	**560,580**
A.4	**Total**				**1,932,300**	**1,740,300**	**192,000**	**68,000**	**1,864,300**
A.5	**Contingency (5%)**				**96,615**	**87,015**	**9,600**	**3,400**	**93,215**
A.6	**Grand total Consultancy Services**				**2,028,915**	**1,827,315**	**201,600**	**71,400**	**1,957,515**

Item	Description	Cost Estimate in Euro				Sources of Finance in Euro		Amount by Category in Euro	
B	Component 4: Project Management	Unit	Quantity	Rate	Amount	AWF	HJKYTF	Goods	Services
B.1	**Project Implementation Staff**								
1	Project Manager	Manmonth	20	5500	110,000	110,000	-	-	110,000
2	Administrative officer	Manmonth	20	2000	40,000	-	40,000	-	40,000
3	Communication officer	Manmonth	15	2500	37,500	-	37,500	-	37,500
4	M&E Officer	Manmonth	20	3500	70,000	-	70,000	-	70,000
5	Accountant	Manmonth	20	2500	50,000	-	50,000	-	50,000
6	Secretarial support	Manmonth	20	1500	30,000	-	30,000	-	30,000
7	Office support staff (3 staff)	Manmonth	60	1000	60,000	-	60,000	-	60,000
8	**Subtotal**				**397,500**	**110,000**	**287,500**	-	**397,500**
B.2	**Workshops, meetings and seminars**								
1	Training seminars and workshops for counterpart staff	Sum	1		15,000	10,000	5,000		15,000
2	Steering Committee	Nos of meeting	3	2000	6,000	-	6,000	-	6,000
3	Technical Advisory panel	Nos of meeting	4	5000	20,000	-	20,000	-	20,000
4	Investment resources mobilization	Nos of meeting	1	10000	10,000	-	10,000	-	10,000
5	Stakeholders workshop	Nos of meeting	3	10000	30,000	-	30,000	-	30,000
6	**Subtotal**				**81,000**	**10,000**	**71,000**	-	**81,000**
B.3	**Office equipment**								
1	Workstations	no	2	2000	4,000	4,000	-	4,000	-
2	Laptops	no	5	1200	6,000	6,000	-	6,000	-
3	Plotters	no	1	3500	3,500	3,500	-	3,500	-
4	Printers/photocopier (large-scale)	no	2	4000	8,000	8,000	-	8,000	-
5	Printers small scale	no	5	1500	7,500	7,500	-	7,500	-
6	Desktop publisher	set	1	3000	3,000	3,000	-	3,000	-
7	software	sum	1	5000	5,000	5,000	-	5,000	-
8	Other items (UPS, Back-up etc)	sum	1	3000	3,000	3,000	-	3,000	-
	Subtotal				**40,000**	**40,000**	-	**40,000**	-
B.4	**Project Office and support**								
1	Furnished office space (300 sq m)	month	24	2000	48,000	-	48,000	-	48,000
2	Communication (tel, fax, internet)	month	20	300	6,000	-	6,000	-	6,000
3	Consumable (paper and other items)	month	20	200	4,000	-	4,000	4,000	-
4	Office running cost (electricity, water, etc)	month	20	200	4,000	-	4,000	-	4,000
5	Standby Generator (100 kva)	sum			20,000	-	20,000	20,000	-
5	Transport cost (vehicles allocated by HJKY TF)	month	20	1500	30,000	-	30,000	-	30,000
6	**Subtotal**				**112,000**	-	**112,000**	**24,000**	**88,000**
C.1	**TOTAL**				**630,500**	**160,000**	**470,500**	**64,000**	**566,500**
C.2	**Contingency (5%)**				**31,525**	**8,000**	**23,525**	**3,200**	**28,325**
C.3	**Total Project Management**				**662,025**	**168,000**	**494,025**	**67,200**	**594,825**
F	**Grand total**				**2,690,940**	**1,995,315**	**695,625**	**138,600**	**2,552,340**
	Percent of total					**74%**	**26%**	**5%**	**95%**

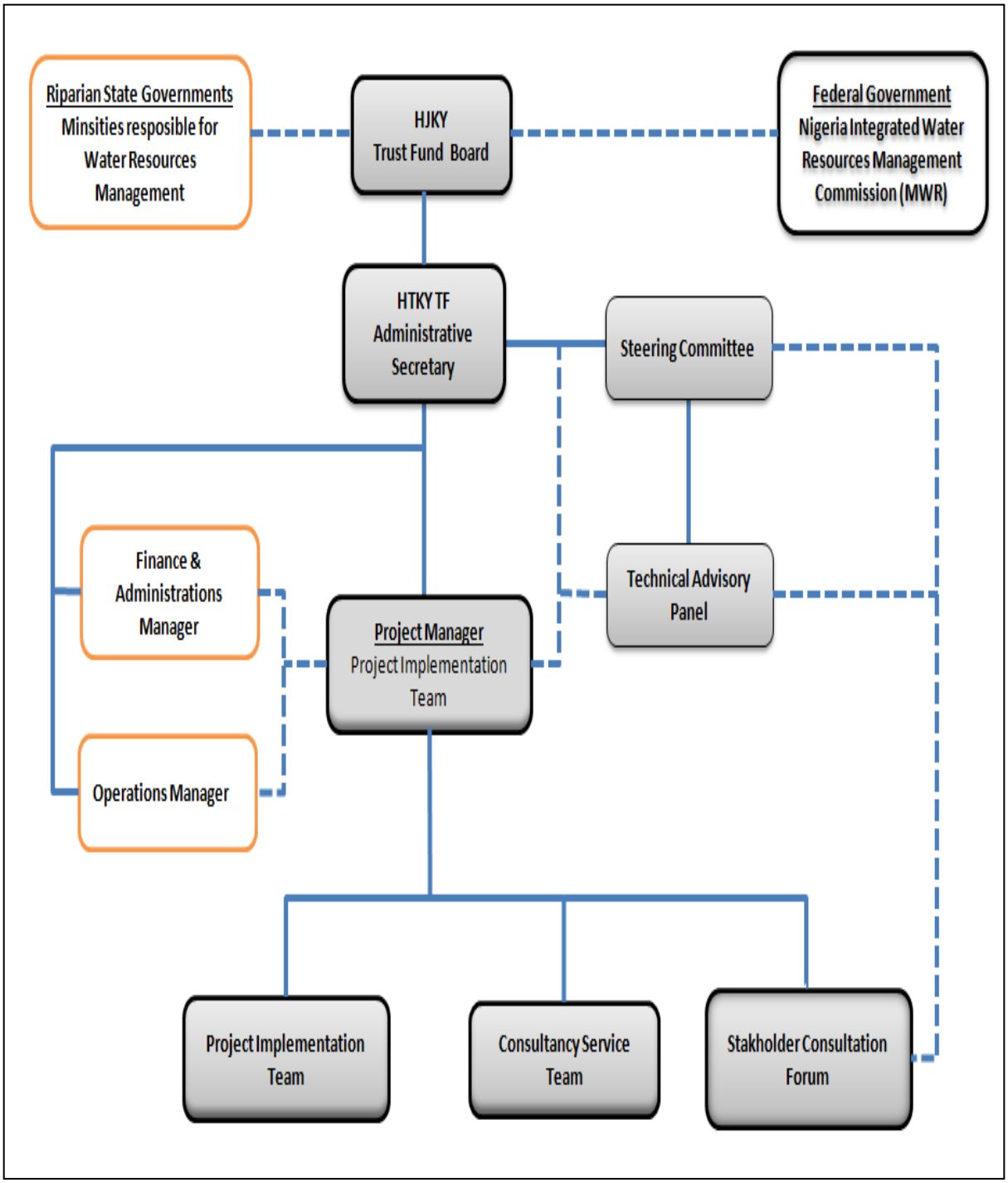
Annex 4: Estimate Counterpart staff input

Type of Professional Staff		Input in Manmonth			
	Unit	Comp.1	Comp . 2	Comp.3	Total
Water Resource Engineer	MM	10	3	3	16
GIS/ Remote Sensing Expert	MM	6	2	-	8
Hydrologist/modele	MM	7	3	-	10
Infrastructure Design Engineer	MM	-	2	8	10
Irrigation Engineer	MM	5	-	5	10
Water Supply and Sanitation Engineer	MM	4	2	6	12
Agronomist/Land use planner	MM	5	1	-	6
Fisheries Expert	MM	4	1	-	5
Livestock Specialist	MM	2	1	2	5
Environmentalist	MM	6	-	4	10
Institutional Specialist	MM	6	-	4	10
Economist	MM	6	2	6	14
Socio-economist	MM	6	4	2	12
Total (manmonth)		**67**	**21**	**40**	**128**

Annex 5: Estimate of Consultancy Staff Input

Proposed Expert	Proposed Input in Manmonth		
	International Consultancy firm	National Consultancy Firm	Total
Water Resource Engineer (Team Leader)	14	0	14
GIS/ Remote Sensing Expert	6	4	10
Hydro-geologist/Geomorphologist	4	0	4
Hydrologist/modeler	10	0	10
Hydraulic/Dam Engineer	3	3	6
Hydropower Engineer	2	0	2
Infrastructure Design Engineer	0	6	6
Irrigation & Drainage Engineer	0	10	10
Water Supply and Sanitation Engineer	0	5	5
Agricultural Expert	4	0	4
Soil Scientist/Land use Planner	3	3	6
Fisheries Expert	2	0	2
Livestock Specialist	0	5	5
Environmentalist	5	7	12
Health Expert	0	2	2
Wetland ecologist	2	0	2
Institutional Specialist	4	0	4
Economist	10	0	10
Socio-economist	2	6	8
Total proposed input	71	51	122

ANNEX 6: PROJECT IMPLEMENTATION STRUCTURE



ANNEX 7: INSTITUTIONS RELEVANT FOR PROJECT IMPLEMENTATION

INSTITUTION	ROLE AND RESPONSIBILITIES IN WATER RESOURCES MANAGEMENT
National Council on Water Resources	The NCWR is the highest water resources policy formulating body, chaired by the Federal Minister of Water Resources. It includes representatives from the Federal Ministry of Environment and all State Government Commissioners for Water Resources.
Federal Ministry of Water Resources	Responsibility for the formulation of Policy and Legal Framework and overall water resources management and development for the provision of water supply and sanitation; water infrastructure including dams and reservoir operations; hydropower generation, irrigation, fisheries development, etc.;
Nigeria Integrated Water Resources Management Commission	Water Regulation, Allocation and Management through CMP, and issuing of water rights for all purposes on behalf of MWR
Nigeria Hydrological Services Agency	Water resources data collection, monitoring and evaluation of water as a resource
The Hadejia-Jama'are River Basin Development Authority (HJRBDA)	The HJRBDA under the Federal Ministry of Water Resources is responsible for surface and underground water resources development in the upper part of the basin in Kano, Jigawa and Bauchi states. The HJRBDA is responsible for the operation of the Tiga and Challawa dams and control the downstream release.
Chad Basin Development Authority	Comprehensive development of both surface and underground water resources for multi-purpose use with particular emphasis on the provision of irrigation water for crops as well as portable water, the control of flood and erosion and watershed management in the lower parts of the basin in Borno and Yobe states.
Lake Chad Basin Commission (LCBC)	The LCBC was established in 1964 by Cameroon, Chad, Niger, and Nigeria and later expanded to include Central African Republic for the purpose of sustainable and equitable management of the water resources of the Lake Chad basin. The Lake Chad water charter adopted in 2012 is the legal instrument for the collaboration between the countries under the LCBC.
Nigeria-Niger Joint Commission (NNJC)	The NNJC is a bilateral body established to monitor and recommend the development in four common river basins between Nigeria and Niger Republic. The Komadugu-Yobe Basin is part of the four basins under the purview of the NNJC.
Federal Ministry of Environment	Responsible for environmental management and enforcement of legislation including environmental impact assessment.
Federal Ministry of Agriculture and Rural Development	Promote agricultural development and management of national resources, ensure, availability, affordability and sustainable access to adequate food security
Federal Ministry of Energy	Responsible for planning, design, construction and operation of hydropower facilities.
State Ministry of Agriculture	Development of water resources for irrigation and aquaculture,
State Ministry of Water Resources	Domestic urban water supply policy and investment projects, rural water supply and sanitation
The North East Arid Zone Development Programme	NEAZDP organises and assists farming communities within its operational area to abstract both surface and ground water in the basin for irrigation
The Hadejia Nguru Wetlands Conservation Project	The IUCN-managed Hadejia-Nguru Wetlands Conservation Project (HNWCP), which is based in Nguru, advocates the sustainable management of the water resources of the basin, with a more specific concern for maintaining the Hadejia- Nguru Wetlands

ANNEX 8: TERMS OF REFERENCE FOR PROJECT MANAGER

Main Responsibility

The main responsibility of the Project Manager would be to oversee the implementation of all aspects of the Project and be fully responsible for its day to day management. He/she will report directly to the Administrative Secretary of the HJKYB TF.

Specific responsibilities will include but not limited to the following:

i) Coordinate and supervise all activities of the PMT, and liaise with AWF;
ii) Meet with the Project Steering Committee (PSC) to receive guidance on project implementation policy;
iii) Liaise with the NIWRMC and other Implementing Partners (IPs) and AWF on matters of policy and project administration;
iv) Coordinate the activities of Implementing Partners to ensure effective delivery of project results;
v) Promote collaboration with other partners, including the private sector, in the implementation of the project;
vi) Appraise relevant PMT staff on regular basis on job performance and otherwise, in consultation with HJKYB-TF;
vii) Undertake procurement of goods and services in accordance with AWF procurement rules, procedures and guidelines;
viii) Prepare and submit Annual Work Plan and Budget (AWPB) for the upcoming year for approval by the Project Steering Committee and on the basis of the AWPB manage the PMT. Ensure timely and appropriate reporting on progress and problems of project implementation including Quarterly and Annual Progress Reports;
ix) Serve as Secretary of the Project Steering Committee and the Scientific Advisory Committee and ensure execution of any decisions approved by the Committees;
x) Ensure adequate monitoring and evaluation of the progress of the project; and,
xi) Undertake any other responsibility that will ensure smooth and effective implementation of project.

Qualifications

- At least MSc in water resources management, civil engineering or related sciences together with postgraduate qualification or proven specialised training in Project Management;
- At least ten years experience in the co-ordination of donor-funded projects entailing leadership qualities: Proven team building, networking, presentation and communication skills.

Remuneration: TBD
Job Location: Damaturu/Maiduguri.
Job Duration: 20 months, renewable yearly subject to satisfactory performance.

ANNEX 9: IMPLEMENTATION SCHEDULE

Item	Activity Description	Duration In Months																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
A.	**Completion of Preparatory Activities**																						
1	Grant Effectiveness																						
2	Establishment of Project Office & recruitment of PM																						
3	Procurement of consultancy services																						
4	Establishment of PSC																						
	Project launching																						
B	**Preparation of Strategic Action plan**																						
	Review and assessment of existing situation																						
	Situation overview and inception																						
6	Data collection, survey and investigation																						
7	Thematic studies and analysis																						
8	Development of basin wide simulation and optimization modeling																						
9	Analysis of options and development strategies																						
10	Strategic environmental and social assessment																						
11	Legal and institutional framework																						
12	Preparation of Strategic development plan																						
C	**Re-operation and optimization**																						
1	Analysis of existing operational rules and reservoir condition																						
2	Establishing restoration objectives and flow requirement																						
3	Scenario analysis, simulation and optimization																						
4	Establishing reoperation rules and testing																						
D	**Priority Project preparation**																						
20	Priority projects identification & analysis																						
19	Survey, investigation and design for priority projects																						
21	Environmental and social impact assessment																						
22	Priority projects preparation																						
E	**Project Management**																						
23	Managing project implementation																						
24	Monitoring and reporting (progress reporting)																						
25	Stakeholders consultation workshops																						
26	Steering Committee meetings																						
27	Technical Advisory Panel meetings																						
28	Investment resources mobilization																						
29	Project audit																						
	Reporting schedule																						
31	Inception report																						
	Thematic Analysis Interim Report																						
32	Basin Strategic Development Plan Report																						
33	Dams Reoperation and Optimization Report																						
34	Priority Projects Preparation report																						
35	Final Project Report																						

ANNEX 10: STAFF INPUT SCHEDULE

Item	Consultants staff	Duration in Months																					Input Manmonth		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	FC	LC	Total
1	Water Resource Engineer (IC -TL)																							14		14
2	GIS/ Remote Sensing Expert I (IC)																							6		6
3	GIS/ Remote Sensing Expert II (NC)																								4	4
4	Hydro-geologist/Geomorphologist (IC)																							4		4
5	Hydrologist/modeler (IC)																							10		10
6	Hydraulic/Dam Engineer I (IC)																							3		3
7	Hydraulic/Dam Engineer II (NIC)																								3	3
8	Hydropower Engineer (IC)																							2		2
9	Infrastructure Design Engineer (NC)																								6	6
10	Irrigation & Drainage Engineer (NC)																								10	10
11	Water Supply and Sanitation Engineer (NC)																								5	5
12	Agronomist/Land use planner (IC)																							4		4
13	Soil Scientist I (IC)																							3		3
14	Soil Scientist II (NC)																								3	3
15	Fisheries Expert (IC)																							2		2
16	Livestock Specialist (NC)																								5	5
17	Environmentalist I (IC)																							5		5
18	Environmentalist II (NC)																								7	7
19	Health Expert (NC)																								2	2
20	Wetland ecologist (IC)																							2		2
21	Institutional/legal Specialist I (IC)																							4		4
22	Economist (IC)																							10		10
23	Socio-economist/Gender Specialist I (IC)																							2		2
24	Socio-economist/Gender Specialist II (NC)																								6	6
24	Man month input per month					1	6	8	13	13	9	8	7	8	5	5	5	5	8	6	8	6	1	71	51	122

ANNEX 11: PROPOSED LIST OF PROJECT STEERING COMMITTEE

1. Coordinating Director, NIWRMC Proposed Chairperson
2. Executive Secretary, HJKYB Trust Fund, proposed Secretary
3. Federal Ministry of Agriculture and Rural Development
4. Federal Ministry of the Environment
5. Hadejia-Jama'are River Basin Development Authority
6. Borno Sate Ministry of Water Resources
7. Kano Sate Ministry of Water Resources
8. Jigawa Sate Ministry of Water Resources
9. Yobe Sate Ministry of Water Resources
10. Plateau Sate Ministry of Water Resources
11. Bauchi Sate Ministry of Water Resources
12. Chad Basin Development Authority
13. National Water Resources Institute
14. Representative of CSO[3]
15. Representative of Community Organization
16. Jamaare River Basin Development Association

ANNEX 12: PROPOSED LIST OF TECHNICAL ADVISORY PANEL

1. World Conservation Union
2. The Natural Heritage Institute[4]
3. Department of Dams & Reservoir Operations, Federal Ministry of Water Resources
4. Department of Irrigation & Drainage, Federal Ministry of Water Resources
5. National Institute for Fresh Water Fisheries Research
6. Abubakar Tafawa Balewa University
7. Bayero University, Kano
8. Federal University of Technology, Yola
9. River State University of Science & Technology

[3] Membership to be proposed by HJKYB TF
[4] Membership will rescinded in the event of any bidding for consultancy services in part or fully

ANNEX 13: AWF COMMUNICATION AND VISIBILITY GUIDELINES

Communication and brand visibility greatly matter to the AWF. The AWF views communication as a strategic function firmly tied to its strategies and business objectives. Steady communication with AWF stakeholders helps build credibility and secure their trust and esteem, which in turn, helps AWF build and protect its reputation. Communications is also about disclosure. The AWF is a multi-donor fund, and is accountable to a Governing Council that expects the AWF to hold itself to the highest level of accountability and transparency. The AWF is committed to making every effort to disclose, share and report information useful and relevant to its stakeholders and the greater public. This entails effectively communicating its achievements, progress, and results by using all means available, in a timely manner. All these elements are important for business and essential to attract and retain donors, and for AWF to maintain its social license to operate.

Brand awareness is about making sure the public knows AWF exists and can tell the AWF apart from other water funds or organizations. The brand is a visual, memorable trigger, or a logo, that embodies the AWF and captures its core identity. Brand awareness is achieved over time, through activities meant to increase brand visibility, by repeated use and exposure of the logo at strategic places and times. The AWF logo is used as a seal or a signature used to signal AWF financial support or special collaboration.

*The AWF has established **Communication and Visibility Guidelines** to the attention of partners, AfDB regional offices and grant recipients to help AWF more effectively achieve its brand and communications objectives, as laid out in the AWF Long Term Communications Strategy 2006 approved by the AWF Governing Council in 2006.*

1. GENERAL REQUIREMENTS

1.1 At an early stage, when preparing communication activities related to an AWF-supported event or project, contact the Communication Officer at AWF Secretariat, copying the AWF Project Manager.

1.2 At a minimum, and wherever possible, the AWF logo should be applied to outreach materials that pertain to AWF-supported projects or events. The proper use of the logo should be discussed with the AWF Communication Officer.

1.3 The AWF should be verbally mentioned as donor of the project it is funding at public speaking events where the project is discussed, and also be mentioned as donor in any PowerPoint presentations relevant to the project funded by the AWF, using the name and the logo of the AWF appropriately.

1.4 The logo is to be obtained upon request from the AWF Communication Officer.

1.5 Documents and publications related to an AWF-supported project or sponsored publication should contain the AWF logo, as well as this phrase on the cover page: "This project/program/study is funded by the African Water Facility".

1.6 Implementing and executing agencies should always have a link to the AWF website on the page of their website relevant to an AWF-funded project/activity. The website is: africanwaterfacility.org

1.7 The AWF asks that grant recipients report back to the AWF Secretariat any special mention, award nominations or recognition that the project may have received.

2 VALIDATION PROCESS

2.1 The AWF Management is responsible for the final clearance of AWF communications products/outputs.

3 PRESS RELEASES & MEDIA ADVISORIES

3.1 The AWF will issue an AWF-branded press release every time a project is approved and/or signed, and when completed (handover).

3.2 AWF press releases must always include a quote from the Coordinator of the AWF, which must be cleared by the Coordinator.

3.3 The AWF encourages and appreciates initiatives to issue joint press releases with its grant recipients. A standard joint press release can be issued at any time agreed by the AWF (between launch and completion).

3.4 When the grant recipient wishes to produce a press release, liaising with the AWF Communication Officer is required, as well as receiving a quote from the AWF Coordinator, as appropriate, and getting approval and clearance.

3.5 The AWF should be included in the title and/or first paragraph of the press release, as appropriate.

3.6 The press release should incorporate the AWF logo, mention that funding was provided by the AWF, and mention the amount of the AWF funding.

3.7 If a press conference is planned, the press release should include the name of an AWF senior representative who will be present at the press conference, when relevant.

3.8 All press releases must bear the name and contact information of the AWF Communication Officer, and if possible that of the communication/media representative from the grant recipient.

3.9 The AWF boilerplate text ("About the AWF") must be added to the text, including the AWF website address. Please contact the AWF Communication Officer for the latest version.

3.10 The AWF has final validation of all its press releases, following a review process.

3.11 The rules above also apply to media advisories.

4 PRESS CONFERENCES

4.1 Press conferences to launch projects funded by the AWF should be organised in cooperation with the AWF, as much as possible.

4.2 The invitations should bear an AWF logo.

4.3 The AWF logo of a visible size should appear on any banner or poster to be displayed at the site of the conference.

4.4 Press kits need to include a press release with the AWF logo.

4.5 Whenever possible, an AWF banner should be on hand and set up to serve as a backdrop for TV and photo purposes.

5 PRESS VISITS

5.1 When appropriate, journalists should be invited to visit the project funded by AWF, accompanied by representatives of the AWF or the AWF Focal Point in the respective authority / government of the grant recipient.

6 VISITS BY GOVERNMENT OFFICIALS, AWF DONORS

6.1 Visits to projects by government officials and AWF donors are encouraged. Those should be prepared in coordination with the AWF and the AWF Focal Points of the host government. This can include meetings with local beneficiaries.

6.2 These visits may also include government officials and AWF donors' participation to roundtables and other events, as relevant.

7 LEAFLETS, BROCHURES AND NEWSLETTERS

7.1 All leaflets and brochures relevant to the project/program financed by AWF should incorporate the basic elements of the AWF visual identity, i.e. the AWF logo – with or without tagline.

7.2 Leaflets and brochures produced by a grant recipient must also incorporate a definition of the AWF (boilerplate text).

7.3 The cover page of all documents pertaining to the project financed by the AWF must clearly identify the activity as being part of an AWF-funded activity.

7.4 Copies, including electronic copies of the publications, should be made available to the AWF.

8 ELECTRONIC COMMUNICATIONS

8.1 Electronic communication disseminating information on AWF-funded projects including websites, newsletter, and social media platforms, should link to the AWF website.

9 SIGNAGE

9.1 The grant recipient should produce display panels, posters or banners to promote their AWF-funded or AWF-related activities at exhibitions and other events, placed in strategic locations for all to see.

10 VEHICLES, SUPPLIES AND EQUIPMENT

10.1 AWF generally requests that vehicles, supplies and equipment funded by AWF be clearly identified, and visibly carry the AWF logo and the phrase "Provided with the support of the African Water Facility" in English, French or Portuguese, as relevant.

10.2 This requirement is subject to negotiation between AWF and the grant recipient as some supplies and equipment may be exempt.

10.3 The grant recipient must provide evidence of compliance with this rule (digital photos sent by email are recommended).

11 PHOTOGRAPHS AND AUDIOVISUAL PRODUCTIONS

11.1 Professional high resolutions (300 dpi) digital photographs of the project funded by AWF should be supplied to the AWF throughout the different phases of the project, to document the progress of actions and events related to these, and to be used in print and online publications.

11.2 All photos should be submitted with full caption and credit information.

11.3 The AWF will be entitled to use or reproduce photos submitted to it without payment of royalties.

11.4 Whenever relevant, audiovisual materials should acknowledge AWF support, by featuring the AWF logo at the beginning and/or end of the movie/documentary.

11.5 Copies of the movie(s) / documentary (ies) should be supplied to the AWF.

12 COMMEMORATIVE PLAQUES OR SIGNAGE

12.1 Whenever relevant, the grant recipient should place a permanent plaque, or some other type of large, commemorative signage, on the most visible part of the building, infrastructure or near the project site, which received funding by AWF, beside the name of the implementing agency and/or name of the project, for visitors to see.

12.2 When appropriate, the plaque or signage could contain the following sentence: "This [name of the infrastructure] was funded by the African Water Facility" alongside the AWF logo.

13 PROMOTIONAL ITEMS

13.1 Before taking any decision on the production of such items, the Communication Officer at the AWF should be consulted.

13.2 Promotional items bearing the AWF logo can be distributed to support communications activities related to the project funded by AWF. This may include T-shirts, caps, pens, notebooks, USB keys, etc.

ANNEX 14: DRAFT TERMS OF REFERENCE FOR CONSULTANCY SERVICES

1. Background

1.1 Water Resources Development

1.1.1 Nigeria is located within the tropical region of West Africa and covers land area of about 924,000 sq. km. Nigeria with an estimated population of 170 million is divided into 6 geopolitical zonal structures namely North Central, North East, North West, South East, South South and South West. The climate varies from semi-arid condition in the North to humid condition in the South with annual rainfall variation of over 4,000 mm in the South-East to below 250 mm in the extreme North-East. This has resulted in significant temporal and spatial variation in water resources availability with increasing scarcity in northern part of the country.

1.1.2 Nigeria is endowed with an annual water resources potential of 319 BCM consisting of 267 billion cubic metres of surface water and 52 billion cubic metres of groundwater. The development of this potential provides a significant opportunity for utilising the water resources to overcome poverty and bringing about socio-economic growth in the country. The country is drained mainly by the River Niger and its main tributary, the River Benue and their numerous minor tributaries as well as by the Lake Chad basin. The Komadugu Yobe Basin (KYB), the subject of this study, constitutes the main river system that drains to Lake Chad from Northern Nigeria. Past investment in water resources has focused on the construction of multipurpose dams for energy production, flood control and to ensure water availability for domestic and agricultural use.

1.1.3 There has been a steady growth in the nation's economy with an annual growth rate put at about 7% over the last decade. This encouraging growth has not manifested as much in the living standards of the people as poverty rate has only marginally declined in the past years thereby raising the question of inclusiveness of the economic growth. It is estimated that over 60% of Nigeria population live below the poverty line with rural dwellers particularly women being more affected. Income inequality has widened as result from the composition of Nigeria's economy, especially the energy and agriculture sectors. Oil exports contribute significantly to government revenues and about 15% of GDP, despite employing only a fraction of the population. Agriculture, however, contributes to about 45% of GDP, and employs close to 90% of the rural population who are mainly occupied with subsistence farming.

1.1.4 The main water resources challenges in Nigeria are related to ensuring sustainable water security needed for the growth and development of the country. There are increasing manifestations of water scarcity aggravated by poor water management, deteriorating water quality, increasing manifestation of drought and desertification. There is lack of sustainable investment to meet the needs of increasing population and urbanisation. Climate change is expected to adversely affect the welfare of millions of people from the impact of changing rainfall patterns, persistent drought and flooding, reduction in river flow and changes in the aquatic and wetland ecosystem. Building resilience and adaptation strategies to cope with the impeding impact of climate change is considered as an integral part of the country's water resources development strategy.

1.2 Policy and Institutional Framework

1.2.1 The 2010 Vision 2020 sets the overarching long-term development framework for Nigeria. It is designed to push the country to achieve socio-economic development status of the top 20 countries in the world thus enabling the country attain a high standard of living for its citizens. The Vision envisages increased investment in agriculture, industry and manufacturing and expansion of the infrastructure base for production. Water resources development will play an important role in agricultural production, energy security, industry

and improved livelihood. The Federal Government has the overall responsibility for providing secure water resources needed for the economic and social development and creating the enabling environment for sustainable water resources management.

1.2.2 The government has put in place the necessary policy and strategic frameworks and institutional mechanisms to develop the water resources potential and contribute to the realisation of the national Vision. The Water Resources Act of 2004 is the highest existing legislation governing water resources management in Nigeria. It confers on the Federal Ministry of Water Resources (FMWR) the responsibility for controlling the use of trans-state surface and groundwater resources throughout Nigeria. The Act represents the contemporary approach on water resources development, conservation, allocation and use that aims to optimise and sustain social, economic and environmental needs based on the IWRM approach.

1.2.3 The importance of eradicating poverty and enhance and improve public health, energy and food security and ensuring intergeneration water security in the face impending water crisis remains the central water resources development agenda of the Government of Nigeria. The river basin is taken as the spatial unit for conducting water resources development in Nigeria with specific Acts creating River Development Authorities for the major river basins in Nigeria. . The implementation of the Water Act is underpinned by the 2011 Water Sector Roadmap (2011) with specific targets for 2025 aligned with the African Water Vision including 100% coverage for water supply and sanitation, achievement the development of of 95% of the hydropower potential and extension of irrigation to cover about 3.0 million ha.

1.2.4 The Federal Government has established institutional frameworks at the national and river basin levels with responsibilities from policy setting to implementation and operation at the river basin and State levels. The National Council on Water Resources is the highest water resources policy formulating body. The Federal Ministry of Water Resources (FMWR) is responsible for policy implementation while the Nigeria Integrated Water Resources Management Commission under the FMWR deals with water regulation, allocation and management through catchment management programmes at river basins level.

1.2.5 The Nigeria Hydrological Services Agency has a mandate for water resources data collection, monitoring and evaluation of water as a resource. Other Federal level structures include the Ministry of Environment for environmental management and enforcement of legislation, the Federal Ministry of Agriculture and Rural Development for promoting agricultural development and management of national resources and the Federal Ministry of Energy responsible for planning, designing, constructing and operating hydropower facilities. There are parallel structures at States level for setting States policies and follow-up implementation within the States boundaries. The States Ministry of Water Resources are for example responsible for policy, investment and provision of water supply and sanitation.

1.2.6 Nigeria is a member of the Lake Chad Basin Commission (LCBC) established in 1964 for the purpose of sustainable and equitable management of the water resources of the Lake Chad basin. The other member states are Cameroon, Chad, Niger, and Central African Republic. The Lake Chad water charter adopted in 2012 is the legal instrument for the collaboration between the countries under the LCBC. The Nigeria-Niger Joint Commission (NNJC) is a bilateral body between Nigeria and Niger established to monitor and recommend the development in their common river basins including the KYB.

1.2.7 Within Nigeria, the KYB is managed by two river basin authorities established to undertake the comprehensive development of both surface and underground water resources for multi-purpose use. The Hadejia-Jama'are River Basin Development Authority (HJRBDA) is responsible for the upper part of the basin in Kano, Jigawa and Bauchi states and operates the Tiga and Challawa Gorges dams. The Chad Basin Development Authority manages the

lower parts of the basin in Borno, Yobe and Adamawa states bordering the Nigeria part of Lake Chad basin.

2. The Komadugu-Yobe Basin

2.1 The Physical Condition

2.1.1 The proposed project is in the Komadugu Yobe Basin which cuts across 6 states in the NW and NE zones of Nigeria. The Komadugu Yobe Basin (KYB) covers a land area of over 148,000 Km2 of which 57% (84,400 Km2) lies in north eastern Nigeria and 43% in the southeast part of the Niger Republic. The KYB is the third largest river system representing 35 percent of the area of the conventional Lake Chad basin. The Nigerian portion of the KYB constitutes 95% of the contribution to the Lake. The KYB is entirely located within the Lake Chad Basin and is also shared with the Niger republic. The project study area is limited to the Nigeria portion of the basin which covers four main sub basins consisting of the Hadejia, Jamaare, Komadugu and Yobe river systems.

2.1.2 There are six riparian Federal States in the KYB namely Bauchi, Borno and Yobe in the North East; Jigawa and Kano in the North West and Plateau in the North Centre. The total population of the six states is estimated to be about 28 million (2006 NPC). The KYB supports a population of over 15 million people who are critically and increasingly dependent on its scarce water resources for domestic supplies and agricultural, fishing, livestock production.. Kano city and other major urban and rural settlements make further demand on the water resources for human consumption and other urban and rual needs. .

2.1.3 The -Komadugu Yobe Basin has been the centre of major water and environmental challenges that has affected the lives of over 15 million people in the six States. The basin has two large dams, the Tiga and Challawa Gorge dams with a combined storage capacity of 2.2 BCM which deliver water for irrigation of 20,000 ha and serve as source of water supply to Kano and other communities. The economy of the basin which is partly dependent on freshwater resources with respect tothe livelihood generated from the wetland ecosystems has been critically affected by the water releases patterns from the two dams.

2.1.4 The construction of upstream impoundments on the Hadejia River has greatly altered the flow patterns of the river and has brought about changes to the environment and the livelihood of the communities throughout the course of the river. The altered flow pattern of the river has resulted in siltation particularly around Hadejia-Nguru Wetland areas. Poor management of the impoundments also often resulted in excessive flooding and widespread loss of lives and properties. Invasive Typha species was also observed as a problem afflicting the midstream section of the basin.

2.2 Socio-economic and Environmental Conditions

2.2.1 The socio-economic challenges are related to losses in environmental productivity, fish stocks, livestock production and general shortage of water in the lower part of the basin including inflow to Lake Chad. Studies conducted by IUCN and NIWRMC have concluded that unsustainable flow modification and uncoordinated reservoir operation as the primary cause for the severe water shortage that has affected the productivity of the basin ecosystem. The reoperation of the two dams to optimise basin wide multipurpose use was considered as primary solution to regain some of the livelihood losses in the basin.

The Federal Government and HJKYB Trust Fund representing the six State Governments and in partnership with several agencies operating in the basin has been considering the modification of the operation rules for the two dams aimed at changing the release patter from the dams to provide water and contribute to the restoration of the ecosystem and

improvement of livelihoods in the affected basins. The project for the preparation of the Komadugu Yobe Basin Water Resources Development Strategic Action is designed to address the basin wide water resources development challenges and address the specific issues of changes to the operation of the two dams. The project address water resources management issues in the basin by applying the integrated water resources management approach with the river basin as the basic spatial planning unit as promoted by NIWRMC. The Integrated Catchment Management Policy of NIWRMC recognizes the socio-ecological and biophysical linkages within the river basin environment as basis for planning river basin development and ensuring sustainable environmental safeguard. The project is well aligned to current investment strategies and programmes of the Government such as the Nigerian Vision 2020. The dam reoperation proposal also enjoys strong, support in the water and irrigation agencies in the country.

2.3 Challenges and Beneficiaries

2.3.1 The main beneficiaries of the project are the 15 million riparian communities living in the basin who will gain sustainable livelihood and socio-economic growth from the integrated development of the water resources of the basin. The project will enable the six states and Federal Governments to undertake long-term development activities that will fundamentally change the socio-economic condition in the basin and spur sustainable inclusive growth.

2.3.2 Development based on proper water resources management system will result in minimums flow restoration and availability of water for Lake Chad thus benefiting the Lake Chad riparian countries and communities living around Lake Chad including those on the Nigerian side of the lake. The project will strengthen the collaborative relation between Nigeria and Niger on the joint management of the KYB water resources for mutual benefit for both countries.

2.3.3 Ensuring water security in the basin will contribute to building resilience to climate change and buffer the effect of climate variability and related risks. This will provide for favourable environment for a sustainable inclusive livelihood provisions in the basin and hence greatly facilitate the resolution of inter communal conflict over the use of scarce water resources and related environmental products.

2.3.4 The reoperation of the two dams with multipurpose objectives connecting the upstream water availability with the down steam demands will greatly benefit riparian communities in the Hadejia sub basin whose food production, livelihoods, and access to groundwater will be markedly improved, and whose flood risks will be reduced. This will extend to the riverine communities' livelihood being supported by irrigation and downstream floodplain as well as Hadejia-Nguru wetlands in North-eastern Nigeria and Lake Chad

2.3.5 The key stakeholders of the project are Federal Ministries responsible for water, environment, agriculture and rural development; the six state governments; the communities living along the river as well as in the river basin; the urban centres and other nongovernmental organisations operating in the basin as well as knowledge and research institutions directly concerned with the basin development. This extends to the e riparian communities around Lake Chad and riparian countries of Lake Chad basin as well as the communities and government entities in the Niger portion of the Basin.

2.4 Previous Assessment and Studies

2.4.1 The 2006 Water Audit for Komadugu Yobe Basin conducted by IUCN is a comprehensive assessment of the water resources of the basin, allocation and utilisation and functionality of water related polices and institution from local to states level. The study has identified improved resource management practices and policies and provides framework for

more productive, sustainable use of the water resources of the basin. The Water Audit study was extended to cover the full portion of the Lake Chad Basin in Nigeria 2011.

2.4.2 IUCN also produced the Komadugu Yobe Basin Catchment Management Plan (CMP) in 2006 parallel to the Water Audit study. The CMP elaborates strategies for the integrated land and water resources management of the KYB and proposes an action plan for implementation in the basin. The CMP was similarly extended to cover the Lake Chad Basin in Nigeria in 2011. Some of Water Audit and CMP recommendations are under implementation by the river basin authorities, state governments and the HKJRB Trust Fund. The 2006 and 2011 Water Audit and CMP documents will provide the basis for assessing the Federal and States Governments Plans in the basin.

2.4.3 The World Bank is supporting the FMWR in the implementation of the Transforming Irrigation Management in Nigeria project (TRIMING) which includes studies and design of water resources management works in the upper portion of the KYB area under the operational responsibility of the HJRBDA. The KYB project comprises of two main focus areas dealing with water resources management and dam operations and irrigation development and management. The water resources management work covers improving the instrumentation and upgrading of hydrological stations in the Hadejia-Jama'are sub basin; dam safety and operation; operationalisation of IWRM plan and improving river training in the Hadejia River sub-basin up to the Hadejia-Nguru Wetlands.

2.4.4 The irrigation development and management components is concerned with the feasibility study and detail design for the Kano River Irrigation Project and Hadejia Valley Irrigation Project with institutional development, information system and O&M set-up for the two selected schemes. The World Bank has commissioned a consulting firm to undertake the above studies and design work. The consulting firm has submitted an inception report in March 2014. The AWF proposed study will comprehensively assess the work and results of the World Bank project and fully integrate the findings and recommendations in the Strategic Action Plan for the whole basin.

3. Project Definition and Objectives of the Assignment

3.1 Overall Goals and Framework

3.1.1 The primary goal of the project is to promote sustainable water resources development in the Komadugu-Yobe Basin. This will improve the livelihood of the population of the basin and contribute to the overall growth and development of the country. The strategic development plan prepared through participatory process involving the basin stakeholders will facilitate the optimisation of multipurpose water use in the basin. It will improve the body of knowledge and analysis of water use for various social, economic and environmental purposes.

3.1.2 The analysis of demand and supply of water resources considering the contemporary challenges of climate change impacts will generate, understanding of the social and environmental issues, particularly, the deteriorating ecological situation resulting from current water management practices. The water resources development strategic plan, prepared through the project, will provide the investment road map from the short to long terms period (2015-2040) and the institutional framework for implementing and managing the river basin development programme.

3.1.3 The implementation of the multipurpose water resources development programme will enable the population to attain improved standard of living, as well growth in an inclusive manner, enhance preparedness and adaptation to deal with venerability to climate change impact and climate variability and ensure long term water security for social, economic and environmental purpose. The degraded ecological services and the livelihoods

that are dependent on these will be regenerated by improving the reliability of water supplies for productive uses and restoration of environmental flows while reducing flood risks, and buffering the effects of climate change. The flow restoration resulting from the reoperation for the Tiga and Challawa Gorge dams will restore river basin connectivity, enhance aquatic ecosystems, improve heath from access to water supply, and enhance income of the population in basin.

3.1.4 The proposed assignment for which consultancy services is required will be conducted within the framework of achieving the broad water resources development agenda of the Federal and State Governments and the basin stakeholders leading to the concrete realization of the long term development goals outlined above.

Objectives of the Assignment

3.1.5 The main objective of consultancy services is to assist HJKYB TF to prepare an integrated water resources management plan with investment packages for implementation in the KYB basin over the coming 25 years. The integrated river basin development strategic action plan will provide the optimum water resources allocation and use to meet the long term socio-economic development and environmental needs in the basin. The optimisation of the operation of the existing Tiga and Challawa Gorge dams shall be conceived as part of the overall strategy for increasing the total water service and environmental benefits within basin. Project preparation for priority investment programmes that will be implemented over the short term period of 2015-2020 will be undertaken. Priority investment areas are expected to include the physical changes needed for the optimum operations of the two exiting dams and provision of water services to improve livelihood and environmental conditions of the riverine and wetlands areas.

3.1.6 The specific objectives of consultancy services are (i) formulation the Kpomadugu-Yobe Basin Water Resources Development Strategic Action Plan (SAP); (ii) developing a modified reservoir operation rules for the reoperations Tiga and Challawa Gorge Dams that optimises water resources allocation and use and (iii) Prepare water resources development projects for implementation over the short term period of the Strategic Action Plan.

3.1.7 The SAP shall provide the short, medium and long-term programmes spanning from 2015 to 2040 and shall identify sustainable investments and implementation modalities. It shall be developed based on a participatory strategic social and environmental assessment (SSEA) to facilitate identification of investment options that takes into account social, environmental, economic and institutional values in the basin. Project includes preliminary design, cost estimate and implementation arrangements with the assessment of specific social and environmental impacts of the proposed development.

3.2 Scope of Assignment

3.2.1 The activities under the assignment shall be conducted in three overlapping stages or components. The first stage concerns the preparation of the Water Resources Development Strategic Action Plan. The main activities at this stage shall be data collection, investigation and analysis; water resources assessment; river basin modelling; scenario analysis and plan elaboration; strategic environmental and social assessment and formulation of short, medium and long term development plans. The Strategic Action Plan period is set over a time horizon from 2016 to 2040 with intermediate milestones comprising the short term period from 2016-2020; medium-term period from 2021-2030; and long-term from 2031-2040.

3.2.2 The dams reoperations and optimisation analysis shall be undertaken in the second stage of the assignment. The activities at this stage overlap with first stage in that existing situation assessment, data collection and setting up the river basin modelling and analysis of

development options fully apply to the reoperation exercises. The dams reoperation focus on the Tiga and Challawa Gorge dams but includes the downstream water channels, barrages, wetlands and other significant water bodies ending in Lake Chad. The output from the World Bank Project relating to hydrology; dams study (capacity survey, safety analysis, modification design) flood routing, river training and irrigation management shall be utilised for the analysis and integrated in the final reoperations recommendations. The requirement for field investigation and survey is limited to verification investigation and data collected obtained from the World Bank project. The dam reoperations recommendations shall be an integral part of the river basin SAP.

3.2.3 Project preparation is limited to the short term period and focuses on priority investments needed for improving the water management situations and enhancing the livelihood of the population of the basin. Areas of concern include water supply and sanitation for urban and rural communities; agricultural water use including irrigation and livestock development; flood control and wetlands restoration, fisheries; catchment management for better water quality and increased availability; maintenance of releases to Lake Chad etc. The preparation includes outline design of infrastructure requirement, cost estimate and investment strategy along with the policy and institutional development required for implantation.

3.3 Study Approach

3.3.1 The study shall be conducted by qualified multidisciplinary team of experienced experts consisting of international and national consultants and counterpart staff seconded by the Executing Agency. The assessment commences with initial consultation with the Executing Agency and other key Federal and State stakeholders on the objectives and scope of the project followed by reconnaissance of the basin situation, assessment of existing data and information and detailed elaboration of initial ideas and programme in an inception report. The analysis and elaboration of the Strategic Action Plan, dam reoperation and preparation of priority projects shall be based on the collection and compilation of existing data and information and field verification through survey, investigation and mapping necessary.

3.3.2 The systematic assessment of existing situation, identification of key issues and collection of additional data and information will be followed by the analysis of water resources development needs for the basin. The analysis of the basin needs will be built-up from the sub basins constituting the Hadejia, Jamaare, Komadugu-Gana and Yobe sub basins to basin level as comprehensive development strategy over the coming 25 years.

3.3.3 A GIS structure will be established for compilation of data and information, analysis, mapping and plan elaboration. The GIS system will reside with the Executing Agency on completion of the assignment with capacity created to manage and use the system for implementation, monitoring and follow-up plan elaboration. Hydrological modelling, simulation of the river system for scenario analysis and optimisation of development options constitutes an essential part of the tools applied to undertake the assignment. Demonstration and transfer of a functioning modelling systems and creation of local capacity is necessary.

3.3.4 Stakeholders' consultation during the study process and at intermediate and final output of the assignments is required as an integral part of the study. The stakeholders' structure constitutes the beneficiary community in the basin; local, States and Federal level governments' organisations, CSOs, universities, research institutions and other community of practitioners concerned with the sustainable development of the river basin. Consultation shall be conducted through proper participatory methods including survey, workshops, seminars etc. The intermediate and final outputs of the assignment shall be subjected to review, validation and adoption by stakeholders and the Executing Agency as appropriate.

4. Description of the Assignment

4.1 Assessment of Existing Situation

4.1.1 An assessment of the existing situation shall be undertaken to establish the state of water resources availability and use; the national development framework; the existing Federal and State policies and strategies; sector governance issues; and proposed development plans. The adequacy and availability of data and information on hydrology and meteorology; water quality; hydrogeology; land and water resources use; socio-economic development; natural resources and environmental condition shall be established.

4.1.2 An assessment of the quality and scale of existing maps on water resources; topography; geology and hydrogeology; land cover and land use; soils and land suitability; settlements and infrastructure etc shall be conducted and gaps identified. The requirement and schedule for additional data collection, site investigation, survey, and preparation of thematic maps of varying scales shall be prepared. Comprehensive review and assessment of existing policy and strategy frameworks and gaps as well as sector and thematic developments shall be undertaken and key issues identified.

4.1.3 The water resources assessment shall provide status of surface and ground water resources availability, and inventory of water infrastructure and all water uses for productive and environmental services. Existing provision of water supply for urban and rural population; municipal and industrial use; agriculture (rainfed and irrigation, livestock, fisheries); environmental services (wetlands, lakes and reservoirs) shall be established. Cchallenges faced in water resources development shall be assessed. Water and land availability, soil suitability, food security situation and gaps, current contribution and potential of the sector to support food needs of the population with existing gaps shall be identified.

4.1.4 Assessment of key WRM issues and challenges shall be undertaken. Some of the key concerns include impacts of droughts on livelihoods and communities; capacity for drought and flood resilience; climate change adaptation; sector governance and institutional development; capacity building; water related conflicts and water rights; water valuation; gender and social equity; sector investment levels, sources and gaps; transboundary cooperation etc.

4.1.5 The situation assessment shall provide a comprehensive overview of the existing developments in the basin; status of existing data and information and the need for additional data collection, investigation and survey; the key development challenges and gaps in policy and institutional mechanisms and investment and initial framework on the potential development and strategy direction. Proposals and selection of models and the GIS set-up shall be made**.** An inception report shall be submitted which shall include a situation assessment highlighting the key development issues and options for analysis, the need for additional data collection and mapping and detailed work plan for the following stages. This report shall be a basis for the first review input from Federal and State Governments and key stakeholders.

4.2 Sectoral Studies and Analysis

4.2.1 The sectoral studies and analysis shall focus on the examination of the socio-ecological factors along with policy and intuitional aspects leading to the assessment of development options and scenarios under different sets of assumptions. The thematic and sectoral studies shall include physical characteristics, natural resources, water resources, infrastructure, socio-economic development and environmental aspects. Preparation of

thematic maps needed for the elaboration of the strategic action plan and hydrological simulation for preferred options shall be undertaken.

4.2.2 This aspect shall be closely linked to the Tiga and Challawa Gorge dams reoperation analysis particularly in relation to the situation in the Hadejia sub basin. An interim report that elaborates the nature and outcomes of the analysis undertaken and key issues in the plan preparation shall be submitted. The report shall serve as a basis for the second consultation with the Federal and State governments and key stakeholders. A thorough analysis of water resource development needs and management strategies encompassing the following set of areas shall be undertaken.

4.2.3 **Hydro-meteorology:** Data shall be collected from the National Meteorological Services and other sources, complied and analysed to establish the metrological and hydrological parameters needed for understanding and qualifying the basin's spatial and temporal climatological factors and water resources availability. Analysis of the inflow and outflow from the two dams; rain fall runoff relationships; the spatial and temporal characteristic of the flow regimes along the basin river systems and the occurrences of flood and drought shall be undertaken. The water resources of each sub basins and basin at key location shall be established.

4.2.4 Rainfall, runoff and other climatological parameters required for irrigation assessment; design of water infrastructure and environmental allocation shall be determined. Specific aspect of the hydro-metrological analysis is to assess the risks associated with climate variability and changes on the long term water security of the basin. Time series data base shall be established as part of the GIS and metrological and hydrological maps shall be prepared at the appropriate scale. Review of the hydro-meteorological monitoring networks covering the river basin with proposals for strengthening shall be made. The available data series shall be augmented by other analytic methods such regional analysis, rain-runoff modelling and remote sensing.

4.2.5 **Geology and Hydrogeology:** Geological and hydro-geological studies and analysis shall be undertaken to provide input for maps preparation and parameters for water resources development planning. The analysis shall be based on utilising both existing information and additional examination employing remote sensing and field verification investigation. GIS based data base on geological, geophysical, hydro-geological, seismic and groundwater characteristics shall be established for the preparation of maps and other analytic uses.

4.2.6 Available groundwater data relating to wells, springs, boreholes and streams shall be collected. Preliminary geotechnical investigation of major hydraulic infrastructure sites shall be undertaken. The ground water analysis shall establish the extent, recharge, quality availability and sustainability of groundwater resources throughout the basin. Analysis of the development potential for conjunctive use with surface water, urban and rural water supply and provision for livestock shall be undertaken. An integrated ground water management with surface water resources shall be formulated as part of the Strategic Action Plan.

4.2.7 **Soils, Land Use and Forestry:** Existing data and available maps concerning soils, land use and land cover shall be complied. Gaps in available data shall be completed through verification survey, investigation and use of earth observation data. The data base with mapping attributes shall be established in the GIS structure. The soil studies shall establish the main soil characteristics for classification of suitability for agriculture (rainfed and irrigated) and other economic development and environmental uses. Analysis of land use and land cover shall be made based on acceptable standards to show features settlement, cropland, and vegetation cover (forest, woodland, bush land, riparian vegetation, and grassland), wetland, rivers, water bodies etc.

4.2.8 Land use classification is required to identify actual uses such as rainfed cultivation, irrigated cultivation, agro-forestry, pastoral, sylviculture, and unused areas. The condition of existing forests and use shall be assed, together with proposals for future sustainable forest exploitation, and reversal of past trends of deforestation and degradation in the face of increasing pressures caused by population increase. Soil and land suitability, land use, land cover and vegetation maps shall be prepared for use in the preparation of SAP.

4.2.9 **Wetlands:** The Hadejia-Nguru wetlands, located at the confluence of the Hadejiw and Jama'are Rivers, with other riverine environment have significant ecological and socio-economic importance. The wetland supports wet season cultivation, flood-recession agriculture and dry-season farming using irrigation, fishery and variety of wild life and biodiversity environment. The wetlands are currently threatened by reduced rainfall, use from growing population and upstream flow changes as result of the Tiga and Challaw Gorges dams and irrigation development. Data collection and analyse shall be undertaken to characterize the main ecosystems of the river basin and identify the impacts of the potential investments with particular focus of the wetlands and lake environ.

4.2.10 The major ecosystems around the potential project areas shall be broadly characterized and assessment and mapping of their general condition; current and future commercial and livelihood uses such as agro-forestry; environmental benefits of the riparian flora and wetlands in terms of water quality protection, flood control and river regulation, sediment retention, and wildlife habitat shall be undertaken. The balanced maintenance of the wetlands and enhancement of the ecological services and their socio-economic use is a key objective of the reoperation of the two dams and other upstream water bodies.

4.2.11 **Water Resources Development**: Analysis of the water resources potential both surface and underground shall be undertaken to assess the development potential, status of existing use and opportunities for future sustainable development of the basin. Data collection shall focus on water supply and demand; consumption standards; operational, planned and identified water resources development projects. Emphasis shall be given to multipurpose use in projects formulation.

4.2.12 Project proposal shall consider technical, institutional, social, policy and financial implications and provide preliminary design and estimates of cost and investment requirement. Preliminary site investigation and survey shall be undertaken particularly for priority projects. The requirements for environmental sustainability and downstream riparian users including transboundary outflow shall be established. Basin simulation models for evaluating the impacts of alternative basin development strategies on water resources shall be prepared. The studies and analysis shall focus on the following main areas.

(i) Inventory and analysis of existing and potential storage reservoirs on the main rivers and tributaries shall be carried out using remote sensing and existing topographic maps as well as site visits. Proposals for rehabilitation of existing storage facilities and development of new reservoirs shall be made as part of SAP with priority projects identified.

(ii) Potential areas suitable for irrigation and drainage projects shall be determined from the analysis of hydro-metrological factors, soils suitability, drainage characteristics, location, topography, copping pattern and water availability.

(iii) Engineering studies adequate for preliminary costing particularly for priority projects shall include storage dams and reservoirs; river diversions and off take works; canals and hydraulic structures; typical on farm layouts; drainage types and layouts; miscellaneous infrastructure; land allocation for other uses such as livestock.

(iv) Strategies for drainage (surface and sub surface) shall be prepared for a range of different situations in the basin and then adopted to suit particular schemes, taking account the relevant parameters and drainage factors.

(v) Data collection and analysis of existing energy provisions and the challenges faced in meeting the energy needs for socio-economic development in the basin shall be undertaken. The energy requirement, sources and development needs for implementing the SAP shall be established. The potential for hydropower generation from existing dams and new sites shall be studied in terms of geological and geotechnical considerations; water availability and storage requirement; infrastructure; demand and transmission requirement. Strategies for energy provisions and project proposal for the development of potential hydropower schemes shall be made.

(vi) The potential for local water transport with respect to existing reservoirs, lakes and proposed development shall be assessed including demand, limitations and infrastructure development needs.

(vii) Collection of ground and surface water quality data and analysis with respect to pollution resulting from current future development to meet the quality requirement for domestic, agricultural and other productive and ecological uses shall be undertaken. Strategies and mechanisms for sustainable water quality management shall be provided in the SAP development.

(viii) An inventory and mapping of exiting water infrastructure including dams, hydraulic facilities, irrigation, water supply, flood management and river training shall be made. The rehabilitation or replacement needs shall be assessed and analysed with proposals on changes, outline design and costing.

(ix) Data collection, analysis and mapping on drought and flood events and the associated socio-economic and environmental impacts shall be undertaken.

(x) Analysis of river morphology based on existing data, field inspection and use of historical earth observation data and previous studies shall be undertaken for main river systems in the basin. The analysis includes assessment of channel morphology, topography; vegetation, erosion processes and estimate of sedimentation processes and river training needs.

(xi) Data collection, analysis and mapping of the watersheds shall be made. The analysis includes assessment of the physical characteristics related to sub-basins size, relief, vegetation, soil and land use, land degradation and human settlements, and state of the environment. Particular focus shall be made on watersheds located upstream of existing and potential dam sites and major hydraulic facilities.

(xii) Analysis of the forest landscape, biodiversity potential and development of eco-truism shall be made. Maps classifying the watersheds according to the intensity of the erosion and other characteristics shall be prepared with the data base established in the GIS structure.

(xiii) Data collection and analysis of existing rural and urban water supply and sanitation shall be made for the purpose of assessing the adequacy and quality of existing coverage. The analysis shall focus on source and adequacy of supply; consumption; technology and intuitional arrangements, financing and investment, operations and

maintenance and sustainability. Strategies and programmes for providing water supply and sanitation services over the plan period shall be prepared. A key aspect of water supply and sanitation provisions is the need to provide basic services to meet national and international targets. Projects/programmes for priority investment consideration over the short term plan period shall be elaborate. The sanitation assessment and analysis should consider the potential for recycling and reuse both at the urban and rural setting.

4.2.13 **Agriculture:** Data collection, studies and analysis shall be undertaken to establish characterize and map the main agricultural production practices (rainfed, irrigated, subsistence, commercial etc), farming systems and land use in the basin particularly along the river and flood plains. The study and analyses shall focus on the assessment of existing farming systems and the organisation of the overall agricultural production; farm size and cropping patterns; constraints for intensification; marketing; extension and support services and determine the farming and cropping system which could serve as a basis for future river basin development.

4.2.14 Assessment of the land tenure system in the basin in relation to the current agricultural production system shall be undertaken. The assessment shall establish the legal context around land ownership and constraints for future development of the river basin. The strategy for improved rainfed agricultural production with better water management and input services complementary to irrigated agriculture development shall be elaborated as part of the SAP.

4.2.15 **Livestock:** Livestock constitutes a key part of the agricultural production and sustains livelihoods in the basin particularly around the border of wetlands, riverine and lake areas. Data collection, analysis and mapping of the livestock management systems and the role in the economy of water resources management of the Basin shall be undertaken. The assessment shall provide existing livestock population and migration patterns in relation to the flood plains, the rivers and the wetlands, the water requirement for existing and improved livestock production and establish the constraints for integrating livestock production in future water resources development in the basin. Provisions for water infrastructure programme for improved and sustainable livestock productions shall be made in the SAP with priority projects proposals if deemed necessary.

4.2.16 **Fisheries:** Fishery is an important component of livelihoods for the population living around the wetlands and lakes area. Collection and analysis of data and information shall be undertaken to assess and map existing fishery production and constraints faced in relation to the water management in the basin. The study shall identify and characterize the main fishing systems and livelihood impacts; types of fishes and their migratory and spawning patters, potential for improved fishery production and investment requirements. Project proposals shall be developed for integrating sustainable fishery production as part of the water resources development strategy of the basin.

4.2.17 **Socio-economic Development:** Socio-economic studies shall be undertaken to determine the existing socio-economic condition in the basin and assess the developmental needs related to integrated water resources development in the basin. Collection and analysis of data shall be made from the lowest administrative and community structure to the State and Federal level (where appropriate) disaggregated over the sub basin and basin boundary. Similarly the social and economic development forecasts for the nation and riparian Sates relevant for SAP and priority projects preparation shall follow the sub-basin and basin delineation. Analysis of social and macro-economic development for establishing comparative indicators with State, national and regional indicators shall be made. The socio-economic development studies shall cover the following main aspects.

(i) Settlement studies and mapping to determine existing rural and urban pattern in the basin; impact of basin development and provisions for future growth centres in relation to basin water resources development.

(ii) Population studies and analysis to establish past and existing demographic and socio-economic trends; key livelihoods and growth indicators; projection and demand forecasting for basin planning and project development.

(iii) Assessment, analysis and mapping of status existing transportation and communication networks as applied to the basin development and preparation of strategies and proposal for transport and communication development to support the basin water resources development.

(iv) Assessment of existing industrial development and identification of future growth potential particularly for agro-industry and analysis of water requirement to sustain industrial growth as part of integrated basin water resources development.

(v) Analysis of poverty and livelihood condition in the basin to determine existing situation and future poverty reduction targets. The primary objective of river basin development shall be to overcome poverty and bring about growth and development.

(vi) Assessment and analysis of existing marketing system and infrastructure in the basin and proposals for improvements to cater for the needs of future development in the basin.

(vii) Assessment of investment and finance needs and preparation of strategies for mobilization from public and private sector as well as market and credit opportunities.

4.3 Thematic Mapping

4.3.1 Analysis and mapping of physical and natural characteristics at the river basin shall be undertaken based on use of existing data base and maps with field verification and use of earth observation data to augment and update as necessary. The maps available with the Federal and State Governments, IUCN and the World Bank Project shall provide the basis for preparing the maps required for the project's analytic and reporting works. The maps shall be prepared using the river basins and State boundaries as appropriate. The required scale and type of maps shall be confirmed at the review stage with indicative proposals as follows.

(i) Maps on hydrology, climate, drainage system, river basin system, water security and scarcity shall be prepared at scale ranging from 1:50,000 to 1:250,000. Larger scale maps can be considered for specific requirements.

(ii) Topographic maps for basin shall be consolidating at scale of 1:50,000 with large scale maps at scales of 1:2,500 to 1:20,000 prepared for specific water resources development requirements.

(iii) Geology and hydrogeology maps shall be consolidated at a scale of 1:250,000 to 1:500,000. The ground water maps may be required at a scale of 1:50,000 to 1:100,000 in areas of particular development potential.

(iv) General soils maps at a scale of 1:250,000 should be prepared with 1:50,000 scale maps prepared for areas with particular agricultural development potential. Separate analyses should be carried out to produce land cover and land use maps at scale of

1:100,000 to 1:250,000 scale and land cover, land use and land suitability maps at scale of 1:250,000 to 1:500,000.

(v) Maps for administrative, sub basin and basin boundaries shall be consolidated at a scale of 1:50,000 to 1: 250,000. Infrastructure and urban and rural settlement maps shall be prepared at scale of 1:50,000 to 1: 250,000.

4.3.2 The quality of the available data should be compatible with the mapping scale and remote sensing imageries may be acquired and limited field assessments may be carried out for purposes of complementing existing data. The map data base shall be established within GIS to enable input of additional data and produce maps at the desired scale.

4.4 Policy and Institutional Framework

4.4.1 A comprehensive assessment of existing policies, intuitional arrangements and structures shall be undertaken. The different elements of the State and Federal Governments structure and other institutions responsible for water resources management in the basin shall be reviewed and analysed, and potential deficiencies highlighted together with recommendations for overcoming them. The policy and institutional framework required for the sustainable management of the river basin shall be assessed and elaborated.

4.4.2 The institutional setup should cater for the complex inter-relationships from the community level to the States and Federal Governments level with clear mandates for regulatory aspects, planning, investment, implementation operation, monitoring covering the full range of water resources management from dam reservoir operation to water allocation, use and maintenance of desired flow sustaining the riverine and wetland ecology and release to Lake Chad. The transboundary nature of the basin shall be taken into consideration within the framework of existing arrangements with other riparian countries.

4.4.3 The policy and regulatory frameworks should elaborate the interstate and transboundary water resources management set-up; refinement of the existing policy, legal and regulatory system necessary for SAP implementation. The institutional development should address policy and regulatory changes; organisational set-up, capacity building requirements and provide for a sustainable stakeholders platform in the basin.

4.5 Environmental Assessment

4.5.1 Description and analysis of the socio-ecological conditions and interrelationships in the river basin shall be undertaken. The existing environmental situation and causes and level of environmental impacts in the basin should be assessed. Special focus shall be made on the existing watershed condition; the operation of the two dams; existing water resources development and use; the condition of the water ecosystem particularly the wet lands and Lake Chad environ and overall natural human related environmental degradation. The assessment shall include the overall health situation in the basin and the perceived impact from planned development with measures to be integrated in the development planning and project implementation. An environmental status report of the basin shall be included as part of the SESA.

4.5.2 Strategic Environmental and Social Assessment will be undertaken on basin-wide scale to document the existing situation and assess the potential environmental and social impacts of proposed water resources development interventions in the basin and mitigation measures incorporated as part of the strategic development plan. The SESA will amplify the environmental and social impacts on community livelihoods and mitigation measures adopted, particularly in relation to the enhancement of the ecological services, sustenance of the wetland environment and sustained flow to Lake Chad. Environmental and Social Impact

Assessment (ESIA) of the proposed priority projects prepared for the short term implementation shall be undertaken following standard methodology for ESIA works.

4.5.3 Climate change and variability will have a significant influence on availability of water resources and operations of water infrastructure. There are anticipated risks from frequent droughts and floods and diminished water security in the Basin. The impact from climate change and variability shall be considered in the formulation of the development plan including the mainstreaming of climate monitoring within the hydro-meteorological system and design. The definition of SAP shall be based on the **a**ssessment of the challenges of climate change risks on the sustainability of the basin wide development and integrated adaptive measure as part of the SAP.

4.6 Gender Analysis

4.6.1 The gender studies and analysis shall examine the condition of women and other disadvantaged groups to assess the current conditions and measure taken to ensure their involvement in the water resources development of the basin. Assessment of the productive resources that women and men have access to and control over and use shall be made.

4.6.2 The existing gender based policy and institutional measures and their implications for proposed water resources development programmes shall be investigated. The different constraints faced by both women and men in terms of using available services will be examined. Proposals shall be made on a comprehensive sets of measure required to overcome the gender constraints to ensure full participation in the development of the basin.

4.6.3 Adequate measures shall be taken to ensure effective involvement of women and their representatives in all decision making processes in the SAP and priority projects preparation. The SSEA process shall focus on assessing specific impacts on women and other vulnerable groups and integration into the development process. Gender and social equity considerations shall be mainstreamed into the **SAP** and will constitute an integral part of the river basin development process as well as benefit from its development.

4.7 Simulation and Optimization Modeling

4.7.1 Conceptual and mathematical modelling shall be applied to undertake analysis and simulate the existing social-ecological interactions within the basin and testing of future growth scenarios as a basis for formulating the optimum development option. The modelling analysis shall be conducted in discrete structures covering the upstream conditions for the two dams, the dams and reservoir environ; the sub basins (Hadejia, Jamaare, Komadugu-Gana, and Yobe); existing system; the Hadejia-Neguru wetlands and the Lake Chad environ.

4.7.2 The hydrologic modelling shall be applied to simulate inflow scenarios upstream of the dams, reservoir operations and release partners and downstream of dams extending to the boundary of Lake Chad. Demand on water resources throughout the basin include provisions for hydropower, agriculture (irrigation, livestock, fisheries), urban and rural water supply (including the full range of municipal and industrial development requirements) and maintenance of ecological function (flood plain, wetlands, riverine environment, Lake Chad). Climate change and variability shall be integrated in the modelling analysis.

4.7.3 For the groundwater component of the system, estimates shall be made of aquifer storage capacities; net water availability; recharge areas and rates, and other groundwater modelling parameters. The ecological aspects shall identify environmental indicators, allocations and quantification for use in simulation, and optimisation models. The environmental flow requirement including release to Lake Chad and flow routing parameters and functional relationships between river flows, inundations and groundwater characteristics will be taken into account.

4.7.4 The optimisation modelling analysis shall identify tradeoffs among different developmental objectives in the basin and to determine the most optimum scenario for water resources development and reservoir operations. Cost-benefit analysis using social, economic and technical criteria and production requirement taking into account environmental functions and associated costs will be conducted to determine the most optimum proposition.

4.8 Preparation of Strategic Action Plan

4.8.1 The formulation of the Water Development Strategic Plan encompasses the short to long term development strategies with prioritized projects and programmes for short term implementation. The analysis and plan formulation shall be based on the application of GIS based simulation and optimisation exercise for each sub basin.

4.8.2 The formulation of the Water Resources Development **SAP** for the basin shall be built-up from the development plans for the main sub basins and will incorporate integrated water resources development programmes in the areas of water conservation, water supply and sanitation, hydropower, irrigation, flood management, enhancement of ecological services, livestock, fisheries etc.

4.8.3 The preparation of the Plan shall be based on a systematic assessment of available water resources and existing and potential uses in the basins, and the formulation of development programs and projects which take into account the characteristics of the three main sub basins, including the socio-economic needs and socio-ecological conditions. Economic and financial analysis shall constitute a key aspect of the optimisation exercise. The reoperation of the Tiga and Challawa Gorges dams will be integrated in the analysis and elaboration of the **SAP.** The SAP will provide a prioritized list of development programs and projects for implementation over a period of 25 years. The proposed planning period are set short term (2016-2020), medium term (2021-2030) and long term actions (2031-2040).

4.9 Optimization of Dams Operations

4.9.1 The dams operations study involves the development of new operational rules that will meet the objective of multipurpose water resources development of the Tiga and Challawa Gorges Dams, particularly in the Hadejia sub basin by optimising the existing uses. The analysis will be undertaken by applying mathematical models that will simulate the full range of physical processes in the Tiga and Challawa Gorge Dams system in order to evaluate the feasibility and efficacy of re-optimisation scenarios. The overall objective of the reoperation will be to mitigate adverse effects of the construction of the dams on the livelihoods, river basin health, ecosystems services, floods and aquatic weeds and to sustain or improve the original purposes for irrigation and water supply.

4.9.2 Testing and demonstration of the most preferred operation shall be conducted provided the physical reservoir and dams conditions allows for actual reoperation trial. Computer based simulation shall be applied in the event of the physical condition not allowing the testing. The physical changes required on the two dams to implement the reoperation plan shall be identified. Preliminary designs shall be undertaken to estimate the investment requirement and project proposals shall be prepared for implementation as part of the priority projects. The result of the World Bank on dam safety analysis and downstream release condition shall be fully considered.

4.10 Preparation of Priority Investment Projects

4.10.1 Investment project preparation shall consist of the formulation of projects and programmes for short term implementation from 2016 to 2020. The preparation will include preliminary designs and cost estimates with terms of references for subsequent detailed

design and implementation as well as detailed resources mobilisation strategy to implement the projects. The projects shall consider multipurpose water use, integrated water resources development for water supply (rural and urban); livestock, sanitation and hygiene, and irrigation, hydropower, flood control, improvement in ecological services and environmental management.

4.10.2 Analysis of the technical, economic, financial and environmental aspects shall be undertaken to ascertain economic and financially viability, as well as assess the social and environmental impact and to identify climate change adaptation and mitigation measures.

4.10.3 The institutional arrangement required for implementation shall be proposed in the framework the broad institutional requirement. Estimate of investment requirement and strategies for resources mobilization shall be elaborated. An investment planning report that elaborates the nature of the projects and programmes, the technical solution, economic and financial viability, and environmental and social considerations shall be submitted for review and validation.

4.11 Project Implementation Support

4.11.1 As part of their activities, the consultant shall provide technical assistance to the Project Implementation Team and provide on on-the-job training for the counterpart staff assigned by the Executing Agency. Awareness creation and capacity building for Federal and State level water professional and staff and other stakeholders in the form workshops and professional seminars shall be conducted at key project output stages. The consultant shall participate in the planned knowledge workshops and also support the Executing Agency in the procurement of specialised services and equipment.

4.11.2 The consultant shall assist the Executing Agency in organising a resources mobilization roundtable upon the submission of the investment planning report and participate in the presentation of the plan and discussions. The purpose of the roundtable is to promote the short term project to mobilise investment for implementation and create awareness on the long term development strategy for the basin. The round table is expected to draw commitments from potential donors to commence implementation of priority projects. The consultant shall also assist the EA in the formation of the stakeholder forum and participate in the consultations process.

5. Implementation Arrangement

5.1 Organization and Management

5.1.1 The project implementation structure consists of a Project Management Unit established by the HJKYB-TF. The Project Management Team (PMT) comprises a Project Manager, Administrative, M&E and Communication officers with secretarial and logistical support staff. The PMT will be headed by a Project Manager who shall report to the Administrative Secretary of the HJKYB-TF. The PMT will be responsible for the day-to-day coordination of project implementation..

5.1.2 **The consultancy services is required** to undertake the preparation of the strategic plan, dams' reoperation and priority project preparation and shall be provided by a reputable and qualified international consulting firm recruited on competitive basis.. Counterpart staff will be assigned to work with the consultant to gain knowledge and experiences in all aspect of river basin planning and dam optimisation.

5.1.3 The existing stakeho**lder consultation pla**tform shall be strengthened to meet the specific requirements of the project. A political dialogue platform consisting of States and

Federal government agencies and community engagement will be facilitated as part of the stakeholders' consultative forum.

5.1.4 **Project Steering Committee** consisting of key Federal and State actors, basin organisations, civil society and community representatives shall be constituted with an oversight function to provide strategic guidance and direction as well as validation of key outputs with recommendations to the next level of decision making.

5.1.5 The **Technical Advisory Panel (TAP)** consisting of qualified and experienced professionals will support the PSC with respect to the technical and scientific integrity of the study. The TAP will be established to review and advice on the analytic and technical outputs delivered by the consultancy firm..

5.1.6 The Project Management office will be located in Kano City. The HJKYB-TF will provide a fully furnished project office with adequate space for the PMU and the consultants' team. The HJKYB-TF will be responsible for the provision of logistical and operations of the office including transportation and communication facilities.

5.1.7 Counterpart Staff will be assigned by the Executive Agency to work with the consultants' staff to develop experience, skill and contribute to the planning process. The consultant will make sure the full engagement of the counterpart in the work plan and share experiences through on job exchanges and provision of specialised seminars on the key aspect of river basin planning.

5.2 Implementation and Reporting Schedule

5.2.1 The consultancy services will be implemented over a period of 18 months from contract signature as shown on the tentative implementation schedule below. The consultancy services commences by undertaking collection of exiting data and situation assessment leading to the preparation and submission of the inception report by the end the 3rd month. The SAP preparation and the dam reoperation study will be completed by end of Month 11. Priority project preparation will be completed by month 17 with the final report submitted by month 18.

Item	Activity Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
B	**Preparation of Strategic Action plan**																		
1	Review and assessment of existing situation																		
2	Situation overview and inception																		
3	Data collection, survey and investigation																		
4	Thematic studies and analysis																		
5	Development of basin wide modeling																		
6	Analysis of options and development strategies																		
7	Strategic environmental and social assessment																		
8	Legal and institutional framework																		
9	Preparation of Strategic development plan																		
C	**Re-operation and optimization**																		
1	Analysis of existing operational rules and reservoir condition																		
2	Establishing restoration objectives and flow requirement																		
3	Scenario analysis, simulation and optimization																		
4	Establishing reoperation rules and testing																		
D	**Priority Project preparation**																		
20	Priority projects identification & analysis																		
19	Survey,investigation and design for priority projects																		
21	Environmental and social impact assessment																		
22	Priority projects preparation																		
	Reporting schedule																		
31	Inception report																		
	Thematic Analysis Interim Report																		
32	Basin Strategic Development Plan Report																		
33	Dams Reoperation and Optimization Report																		
34	Priority Projects Preparation report																		
35	Final Project Report																		

5.2.2 The main reporting requirements and schedule of submission are summarised as follows.

(i) **Quarterly Progress Report**: The reports will cover technical, procurement, disbursement and financial progress, administrative issues and constraints affecting the project and suggested solutions.

(ii) **Inception Report:** Inception Report will provide the result of the existing situation assessment and compilation of data and information and a review of the proposed implementation schedule and present detailed work plan, reporting and staff schedule for completing the assignment and issues for guidance.. The report will be submitted 3 months after commencement of input from the consultancy firm for review.

(iii) **Interim Report:** The interim report prepared on completion of the thematic studies and analysis stage will elaborates the nature and outcomes of the analysis undertaken and key issues that will be considered in the basin plan preparation. The report will be submitted 7 months after service commencement for review by EA, the PSC and other stakeholders.

(iv) **Basin Water Resources Strategic Development Plan Report:** The report, prepared by the consultant will be submitted 11 months after commencement of the consultancy services. It will provide the strategic development plan which will elaborate the short, medium and long term development action with investment estimate and implementation mechanisms. The report will be submitted in draft for review by PSC, TAP, stakeholders and AWF and finalised with review input for adoption by the State and Federal Governments.

(v) **Dams Reoperation and Optimisation Report:** This report provides the analysis and consolidated results of the dams reoperation analysis and tests with the proposed operation rules to optimise the use of the dams for multipurpose water development purposes. . The final report is proposed to be submitted 11 months after service commencement for review input by the PSC, TAP and stakeholders.

(vi) **Priority Projects Preparation Report:** This report will elaborate the priority projects considered for implementation from 2016-2020 with the investment mobilisation strategy and implementation plan. The investment strategy will be prepared as standalone report for submission on the resources mobilisation round table. The investment strategy and project preparation reports will be submitted 17 months after service commencement.

(vii) **Final Project Report:** The final study report will provided the consolidate output from the assignment and will be submitted18 month after service commencement.

5.3 Staffing Input, Responsibilities and Qualification

5.3.1 The proposed duration of consultancy services delivery schedule related to key outputs and reports is shown below.

Event	Timing [5]
Contracting of Study Consultants	M
Commencement of Strategic Plan preparation	M+1
Inception report	M+3
Interim report on thematic and sector analysis	M+7
Strategic Action Plan report	M+11
Commencement of dams reoperation study	M+6
Dams reoperation changes report	M+11
Commencement of priority project preparation	M+12
Project preparation report	M+17
Resource mobilization plan roundtable	M+17
Final project report	M+18

5.3.2 The proposed consultancy services shall be provided through a combination of international and national consulting firms. The total input is estimated at 122 Manmonth of which 58% is proposed to be from international consulting firm with the balance from national consultants. The type of proposed experts with the input estimate is provided in the table below.

Proposed Expert	Proposed Input in Manmonth		
	International Consultancy firm	National Consultancy Firm	Total
1. Water Resource Engineer (Team Leader)	14	0	14
2. GIS/ Remote Sensing Expert	6	4	10
3. Hydro-geologist/Geomorphologist	4	0	4
4. Hydrologist/modeller	10	0	10
5. Hydraulic/Dam Engineer	3	3	6
6. Hydropower Engineer	2	0	2
7. Infrastructure Design Engineer	0	6	6
8. Irrigation & Drainage Engineer	0	10	10
9. Water Supply and Sanitation Engineer	0	5	5
10. Agricultural Expert	4	0	4
11. Soil Scientist/Land use Planner	3	3	6
12. Fisheries Expert	2	0	2
13. Livestock Specialist	0	5	5
14. Environmentalist	5	7	12
15. Health Expert	0	2	2
16. Wetland ecologist	2	0	2
17. Institutional Specialist	4	0	4
18. Economist	10	0	10
19. Socio-economist	2	6	8
Total proposed input	71	51	122

5.3.3 Brief description of responsibilities with qualification and experiences required for the assignment is provided for proposed positions as follows.

[5]M : Month of consultancy contract signing

(i) **Team Leader/Water Resources Engineer (TL)**: The Team Leader will be responsible for the overall planning and implementation of the consultancy services including team management and coordination; ensuring the achievement of the study objectives; capacity building particularity counterpart training; facilitating stakeholder consultation; support the investment resources mobilization effort and provide liaison with the relevant State and Federal Government Departments and other stakeholders. As the Water Resources Engineer be responsible for water assessment and allocation study; dams reoperation and modeling analysis, strategic plan formulation and preparation of water resources development projects. The TL will have the overall responsibility for the preparation and finalization of the various reports outlined above. He/she should have as a minimum MSc. Degree in water resources engineering and 20 years of experience partly in Africa, related to river basins planning and modeling and multipurpose water resources project preparation, and track record of leadership in managing multi-disciplinary teams.

(ii) **GIS / Remote Sensing Expert:** Minimum qualifications are Master's degree in remote sensing and application of GIS. His main tasks will be the implementation of the water and other natural resources data base for the basins, the production of a thematic base map compendium, data analyses for the master plan formulation and production of a planning atlas. He/she will be coordinating and training the project staff on the same subject. The specialist will also be responsible for the identification and specification of remote sensing imagery; installation of the image processing system; and the production of thematic maps. Minimum requirement of M.Sc. in geography, GIS, remote sensing or related fields, strong background in remote sensing and computer programming and 10 years of experience in GIS based works.

(iii) **Hydrogeolgist/Geomorphologist:** He/she shall be responsible for assessing the location, quantity, quality and condition of the ground water resources of the basins and preparation of review of the geological and hydro geological map of the basins. In coordination with the water resources and irrigation engineer, he/she will develop proposals for groundwater use both for irrigation, livestock and for potable water supplies. Will be responsible for assessing natural and human induced geomorphological changes in the river stream channels, wetland and lake systems and the impact on infrastructure, livelihood and ecological systems. Provide geomorphological parameters for the river basin modeling and solution and preliminary design for river and wetland training and control of prevalent weed problem. He should have a minimum qualification Master's degree level in hydrogeology/geomorphology or related fields with at least 15 years of experience in field geological survey, investigation, mapping and determination of engineering properties.

(iv) **Hydrologist/Modeler**: He/she will be responsible for compiling and analysis of all available hydro-meteorological data and overall assessment of the surface water resources in the sub basins and the basin as whole including inflow to Lake Chad; analysis of reservoir operations for the two dams and other proposed reservoirs and hydrological simulations of inflow and outflow from existing and proposed reservoirs and wetland system as well as analysis of impact of climate variability and change.Will undertake the modelling tasks including the hydrological modelling and dams reoperations and the simulation and optimisation at sub basin and basin level by applying appropriate computer program package for evaluating the impacts on water resources of alternative dams reoperation rules as well as basin development plans. Minimum qualification of a Master's degree in hydrology/ Water Resources Planning/ Modeling or related field with 15 years relevant experience. He/She will have extensive experience with hydrology of large river basins with surface, ground water, wet land and lake systems; working on large dams projects, multipurpose water projects and strategic water resources assessments.

(v) **Dams/Hydraulic Engineer**: He/she will be responsible for assessing dam types, redesign of changes in existing dams, preparing preliminary designs, setting up cost database for use in the estimation of investment costs of irrigation, water supply, and multipurpose water resource projects. Minimum Master's degree in civil or hydraulic engineering and at least 15 years' experience in large river basin water infrastructure (dams, weirs, power house, river diversions) planning, investigations, and design.

(vi) **Hydropower Engineer:** Will assess feasibility of hydropower generation from existing dams and provide preliminary design and cost estimate for dam modification and hydropower facilities; assess basin wide hydropower potential; existing and potential energy requirement of the basin; prioritise power development over the strategic development plan period; prepare preliminary design and cost estimate for short term priority schemes. Minimum qualification Master's degree in Hydropower with at least 10 years experience in projects involving hydropower dam projects planning in large river basins, feasibility study and design of hydropower.

(vii) **Infrastructure Design Engineer:** He/she will be responsible for assessing types of civil engineering facilities including roads, storage, social (education and health), production and marketing facilities etc; prepare conceptual designs, setting up cost database for use in the estimation of investment costs; and provide preliminary design and cost estimate for selected priority projects. Minimum of Master's degree in civil engineering with experiences in civil engineering design, with at least 10 years' experience in infrastructure planning and design in connection with large basin water resources development planning and implementation.

(viii) **Irrigation Engineer**: The irrigation engineer will be responsible for assessing the basin wide irrigable potential, identification irrigation projects and estimation of water requirement; assessment of water use efficiency and rehabilitation needs of existing irrigation schemes; costing and prioritisation of irrigation development in the basin and preliminary design and cost estimate for priority irrigation projects. Minimum Master's Degree in Irrigation Engineering with at least 15 years of relevant experience in irrigation planning, design and implementation particularity in Africa. .

(ix) **Water supply and sanitation engineer**: He/she will review existing rural and urban water supply and sanitation situation and identify development options for providing access to urban and rural communities in the basin and prepare the rural and urban water supply and sanitation programme for integration in the strategic development plan. Identify and prepare priority projects and programmes for urban and rural water supply for investment. Minimum qualifications are Master's degree in water supply and sanitation with at least 10 years' experience in planning, design and hygiene promotion.

(x) **Agricultural Expert:** Will review the past and present agricultural policies, strategies and legislation; assess existing agricultural production and specific water related (rainfed and irrigated) constraints and potential for improvement; identify basin wide irrigated and rainfed agricultural development potential and formulation of short tot long term staged development proposals. Particular focus on small, medium and large scale irrigated development schemes with requisite agricultural support services and market outlets and give recommendation for improvement. Will assess land use patterns and watershed conditions as input to land use mapping. Minimum qualification is a M.Sc. degree in tropical agriculture, with at least 15 years experience in rainfed and irrigated agriculture (including mechanized agriculture) in Africa with demonstrated experience in agricultural planning and marketing assessment.

(xi) **Soil Specialist/Land Use Planner:** He/she will be responsible for reviewing and checking exiting soil classification and land use maps, determination of land capability and suitability, mapping identification of potential schemes for irrigated and rain fed

agriculture, soil conservation and watershed management needs and preparation of land use plan. Minimum qualification are Master's degree in Soil Science or land use planning with at least 15 years' experience in projects involving the use of soil survey, remote sensing, land use/evaluation techniques. Demonstrated experience in soil mapping and soil suitability assessment on large areas.

(xii) **Fisheries expert:** Assess existing fishery practices and production constraints; Assess the basin wide fishery potential and development options particularly in the wetlands and riverine water bodies; identify the long term wetlands management needs to provide sustainable ecological services; prepare short tot long term fishery development plans and projects for priority implementation in the short term time frame. At least a Master's Degree in any Fishery production or related fields and 10 years of relevant experience. Demonstrated experience in fishery development planning and project preparation in large river basin with wetlands and lake systems impact assessment of infrastructure projects.

(xiii) **Livestock Specialist** He/she will be responsible for assessment of existing livestock production systems and management with constraints as well as improvements needed to modernize the production system and assess the water resources management requirement for production of feeds and livestock consumption; Indentify the livestock development potential of the basin including the ecological and sociological conditions and formulate livestock development plans with projects for short term implementation. Minimum qualifications are M.Sc. in livestock production or related fields with background in tropical livestock production systems, and range management in large river basins with at least 10 years of practical career in Africa.

(xiv) **Environmental Expert**: She/he will lead and undertake the Strategic Environmental and Social Assessment with respect to proposed KYB Water Resources Development Strategic Plan and Environmental and Social Impact Assessment of proposed projects for short term implementation and assess the implication of the climate change impact over the basin and with adaptation and resilience building measures. Special attention will be given to the assessment of watershed condition, downstream impact of existing dams particularly on the wetlands and the reoperation parameters to improve the existing situations to provide sustainable ecological services. Minimum of M.Sc. degree in Environmental Sciences or a related field and have at least 15 to 20 years of relevant experience in analysing positive and negative aspects of large basin water resources development. Substantial experience with Strategic Social and Environmental Assessments related to large basin water resources development projects, wetland, lakes and land management. Experience of economics and water resources management, climate change, and policy and institutional analyses would be desirable.

(xv) **Health Specialist:** Assess basin wide health challenges related large-scale water resources development, identification of all water related and vector-borne diseases and propose the controlling measures. Minimum qualification Master's degree in Public Health with at least 10 years experience in projects involving water resources development project formulation, design, and implementation pertinent to human health.

(xvi) **Wetland Ecologist:** Will be responsible for the assessment, survey and analysis of the riverine and wet land ecology with specials emphasis on establishing the value and balance of ecological services and social and environmental interrelationships in the basin. Determine the restoration needs of the wetlands and identify wetlands management projects for consideration in the SAP. Minimum qualification Master's degree in natural resource sciences/environment/ecology with at least 10 years experience in projects involving survey, study and analysis of wetland ecology and related services.

(xvii) **Institutional Specialist:** Review existing government (Federal, State and transboundary) and non government institutional arrangement and organisational; assess Federal and riparian State institutional policies, strategies, and organisations; identify key constraints related to integrated river basin management and propose the full range of institutional arrangements and organisational setups including interstate and transboundary required to implement the Water Resources Development Strategic Plan. Prepare overall institutional policy and regulatory frameworks and capacity building requirements for the public as well as private sector engagement. Minimum of Master's Degree in Law or other relevant areas with at least 15 years of relevant experience in large transboundary river basin institutional assessment and development, policy analysis, sector regulation, and legal framework analysis in developing countries.

(i) **Sociologist / Gender Specialist:** The Sociologist will be responsible for collection and analysis of information and data on socio-economic and cultural factors that impact on basin wide water resources development, such as land tenure systems, gender roles, poverty, health, population migration, urbanisation, alternative sources of income and decision making on a broad range of production and marketing issues. The specialist will assess the adequacy of the legal, institutional and policy framework both at the national and local level for mainstreaming gender issues and the empowerment of women, formulate inputs that address gender issues to ensure that all aspect of gender requirement are integrated in the Water Resources Development Strategic Plan and priority project formulations. He/she will provide support the stakeholder consultation to ensure an inclusive all encompassing process is put in place. Minimum of Masters Degree in sociology, socio-economics or related discipline with at least 10 years field experience social impact assessment and gender analysis particularity in Africa.

(xviii) **Planning Economist:** The economist will assemble information on the country; analyze the economic, social, and production situation and prepare proposals on various water resources development approaches and options. He/She will provide input to the formulation of the optimisation modelling and undertake scenario analysis and propose the short to long term development strategies and actions plan in coordination with other team members. Undertake general economic and financial evaluation, assessment of the opportunity cost of water, determination of the sensitivity of the results to variations in key variables, and project investment scheduling. He/she will also be involved in preparation of policy framework, projects formulation, prioritization of phasing of development and financial plan. Minimum qualifications are MSc in Economics and 15 to 20 of regional planning, optimisation modelling and large river basin water resources master plan preparation

6. Responsibilities and Modalities of Payment

6.1 Responsibilities of the Executing Agency

6.1.1 The Executing Agency shall establish the project management unit and appoint a Project Manger to co-ordinate and follow-up day to day implementation of the study. The EA will assign counterpart and support staff to the project management unit and provide furnished office with adequate space for the project management and consultant's team located in Kano city.

6.1.2 The EA shall be responsible for all communication with the State and Federal Governments and other concerned stakeholders in all matters relating to the project. The EA shall facilitate collection of existing data and information; access to relevant authorities and institutions; field visits and consultation with stakeholders. The EA shall avail the required

budget to cover its portion of the cost of the study conserving counterpart staff salary and allowance, project office running, workshops and meetings.

6.1.3 The EA is responsible for all costs and support for conducting stakeholders' consultation meeting and review meetings and organisation of the donors' roundtable. However the Consultant will provide technical support for organizing and conducting the workshop and meetings.

6.2 Responsibilities of the Consultant

6.2.1 The consultant shall carry out the study according to the terms of reference and in keeping with internationally accepted standards, using qualified and appropriate staff. The consultant shall be responsible for the collection, compilation and analysis of existing data and information and undertaking of additional field investigation survey. The consultant shall be responsible for the procurement of goods and serviced needed for this purpose and included in the overall consultancy service cost.

6.2.2 At the end of the contract all the equipment and supplies procured for the studies, or for whom reimbursement was claimed and received by the Consultant, shall be handed over to the EA. The consultant shall also hand over all original documents, working files and computer data that have been produced during the studies. All data shall be properly organised and filed with all digital/map/imagery delivered as GIS. The consultant shall hand over a fully functioning data base and GIS.

6.3 Payment Schedule

6.3.1 The consultancy services cost consist of the consultants' fees and cost of goods and services required for the study. The consultant's fee shall be fixed for the duration of the study while other related cost of goods and services shall be claimed as reimbursable. The methods for the payment shall be detailed in the proposed contract.

6.3.2 The modalities of payment shall be in accordance with the terms and conditions of the contract agreement with indicative schedule as follows:

- Signature of contract - 15% of contract amount
- Submission of Inception Report - 10% of contract amount
- Submission Interim report - 15% of contract amount
- Submission SAP and Dam Reoperation Report - 25 % of contract amount
- Submission Priority Project Preparation Report - 20% of contract amount
- Submission Final Project Report - 15% of contract amount