

UNITED REPUBLIC OF TANZANIA



MINISTRY OF WATER

TERMS OF REFERENCE

FOR

**PREPARATION OF AN INTEGRATED WATER RESOURCES MANAGEMENT AND
DEVELOPMENT (IWRMD) PLAN FOR THE PANGANI BASIN, UPDATING OF THE
SIX COMPLETED BASIN PLANS AND LAYING THE FOUNDATION FOR
PREPARATION OF THE NATIONAL IWRMD PLAN**

1.0 BACKGROUND

The Government of the United Republic of Tanzania, through the Ministry of Water (MoW) and with support from the World Bank under the Sustainable Rural Water Supply and Sanitation Program (SRWSSP Phase II: 2025–2030), is strengthening water resources management through the preparation and updating of Basin Integrated Water Resources Management and Development (IWRMD) Plans.

The SRWSSP Phase II builds on previous phases of the Rural Water Supply and Sanitation Program (RWSSP) and represents a key milestone toward achieving universal access to safe water and sanitation services, in line with Tanzania Development Vision 2050 and Sustainable Development Goal 6 (SDG 6). The Program is implemented through a hybrid Program-for-Results (PforR) and Investment Project Financing (IPF) approach, aimed at improving sustainable access to water supply, sanitation, and hygiene services while strengthening institutional capacity, sector performance, and climate resilience.

Within the IPF component, technical assistance and capacity building are provided across six key areas, including water resources management, water supply and sanitation services, program implementation support, verification of results, and the evaluation of the twenty-year Water Sector Development Programme (WSDP), which is expected to conclude in June 2026.

Under the Water Resources Management component, the Government intends to:

- (i) Prepare the Integrated Water Resources Management and Development (IWRMD) Plan for Pangani Basin;
- (ii) Update the six existing basin IWRMD Plans;
- (iii) Strengthen basin-level planning, coordination, and governance;
- (iv) Lay the foundation for the development of a future National IWRMD Plan.

Among Tanzania's nine water basins, Pangani Basin remains the only basin without a completed IWRMD Plan. Previous efforts undertaken between 2012 and 2014 were not finalised due to contractual and implementation challenges. This assignment, therefore, seeks to complete and operationalise the planning process, incorporating updated hydrological data, socio-economic dynamics, institutional arrangements, environmental considerations, and emerging climate change risks.

The assignment will also support the updating of six completed basin plans, namely: Rufiji Basin, Lake Rukwa Basin, Lake Tanganyika Basin, Lake Nyasa Basin, Internal Drainage Basin, and Ruvuma and Southern Coast Basin.

The scope of work shall align with key national and sectoral frameworks, including:

- (i) The National Development Vision 2050;
- (ii) The National Water Policy 2002 version 2025;
- (iii) The Water Resources Management Act No. 11 of 2009 and its subsequent amendments;
- (iv) National Water Sector Development priorities;
- (v) The National Water Grid initiative; and
- (vi) National climate resilience strategies and ecosystem protection objectives.

To ensure consistency, comparability, and interoperability across all Basin Water Boards, this assignment will use unified planning methods, standard analytical approaches, suitable modeling frameworks, and shared reporting structures. The assignment will set up a foundation for creating a future National Integrated Water Resources Management and Development (National IWRMD) Plan. This plan will bring together basin-level planning into a clear national framework for sustainable water resource management.

1.1 Rationale of the Assignment

Water resources in Tanzania face growing stress from rapid population growth, urbanization, agricultural expansion, industrial development, environmental damage, and the increasing effects of climate variability and change. These factors have led to more competition among water users, less water availability in some areas, poorer water quality, and damage to important ecosystems, increased groundwater extraction, and new conflicts related to water. At the same time, the Government is pursuing national initiatives such as the National Water Grid Initiative, agricultural transformation, industrial growth, hydropower development, expanding urban water supply, and programs for climate resilience. These initiatives need water resource-planning frameworks that can integrate science and balance different water needs while ensuring that resources are managed sustainably.

Integrated Water Resources Management and Development (IWRMD) Plans serve as the main framework for guiding water allocation, building infrastructure, managing groundwater, protecting the environment, adapting to climate change, and long-term development of watersheds. They help with informed decision-making and coordinated management of water resources across various sectors. While six Basin Water Boards have approved IWRMD Plans, most were created several years ago using data, assumptions, and development scenarios that no longer reflect the current conditions related to water and groundwater availability, national policies, or rising climate risks. Therefore, these plans need a thorough review and updates to stay relevant and effective.

The lack of an approved IWRMD Plan for the Pangani Basin highlights a significant gap in planning. As one of Tanzania's key basins, Pangani supports hydropower generation, irrigated agriculture, drinking and industrial water supply, tourism, biodiversity protection, and shared water resources with Kenya. A comprehensive planning framework for the basin is crucial to ensure sustainable and coordinated management of these resources.

This assignment will prepare the Pangani Basin IWRMD Plan and provide technical support in reviewing and updating existing IWRMD Plans for six Basin Water Boards by using consistent planning methods, standardized analytical techniques, compatible modeling frameworks, and clear reporting structures. The assignment aims to enhance the integration of groundwater management, climate resilience, water quality, ecosystem protection, stakeholder participation, and data-driven decision-making into the basin planning process, while also laying a strong technical groundwork for the future creation of the National Integrated Water Resources Management and Development (National IWRMD) Plan.

1.2 Description of Pangani Basin

The Pangani Basin is one of Tanzania's nine river basins, covering about 58,400 km²; of which approximately 93% is in Tanzania and the rest is in Kenya. In Tanzania, the basin spans the Regions of Kilimanjaro, Arusha, Manyara, and Tanga and includes nine major

catchments: Pangani Main River, Kikuletwa, Ruvu, Mkomazi, Lwengera, Uмба, Zigi, Mkulumuzi, and Msarigazi (**Figure 1**). The basin has a variety of water resources, including rivers, lakes, wetlands, reservoirs, springs, and productive groundwater aquifers. These resources support domestic water supply, irrigation, livestock, industry, hydropower generation, tourism, fisheries, and environmental protection. Important water bodies include the Pangani River system, Nyumba ya Mungu Reservoir, and Lakes Jipe and Chala. The basin also features significant ecosystems, such as Mount Kilimanjaro and several protected conservation areas that are crucial for maintaining river flows and groundwater recharge.

The Pangani Basin is one of Tanzania's key economic areas. It plays a big role in national food production, energy generation, industrial growth, and tourism. The basin contains major hydropower projects that contribute greatly to the national electricity grid while also supporting large-scale irrigated agriculture, urban and rural water supply, livestock production, and rapidly developing economic activities. Additionally, the basin has transboundary water resources shared with Kenya. This includes rivers and aquifer systems that need cooperative planning, information sharing, monitoring, and coordinated management to ensure fair and sustainable use based on international water management principles.

Despite its importance, the basin faces growing challenges from population growth, urbanization, increased irrigation, industrial expansion, catchment degradation, declining water quality, climate changes, and rising demand for surface water and groundwater. These challenges have intensified competition among water users, reduced dry-season river flows in some catchments, increased groundwater extraction, and led to localized water-use conflicts and ecosystem damage.

The basin needs an integrated planning framework based on updated hydrological, hydrogeological, environmental, socio-economic, and institutional information. Creating a detailed Integrated Water Resources Management and Development Plan will offer a strategic framework for sustainable water allocation, groundwater management, ecosystem protection, climate resilience, investment prioritization, and coordinated development of water resources throughout the basin.

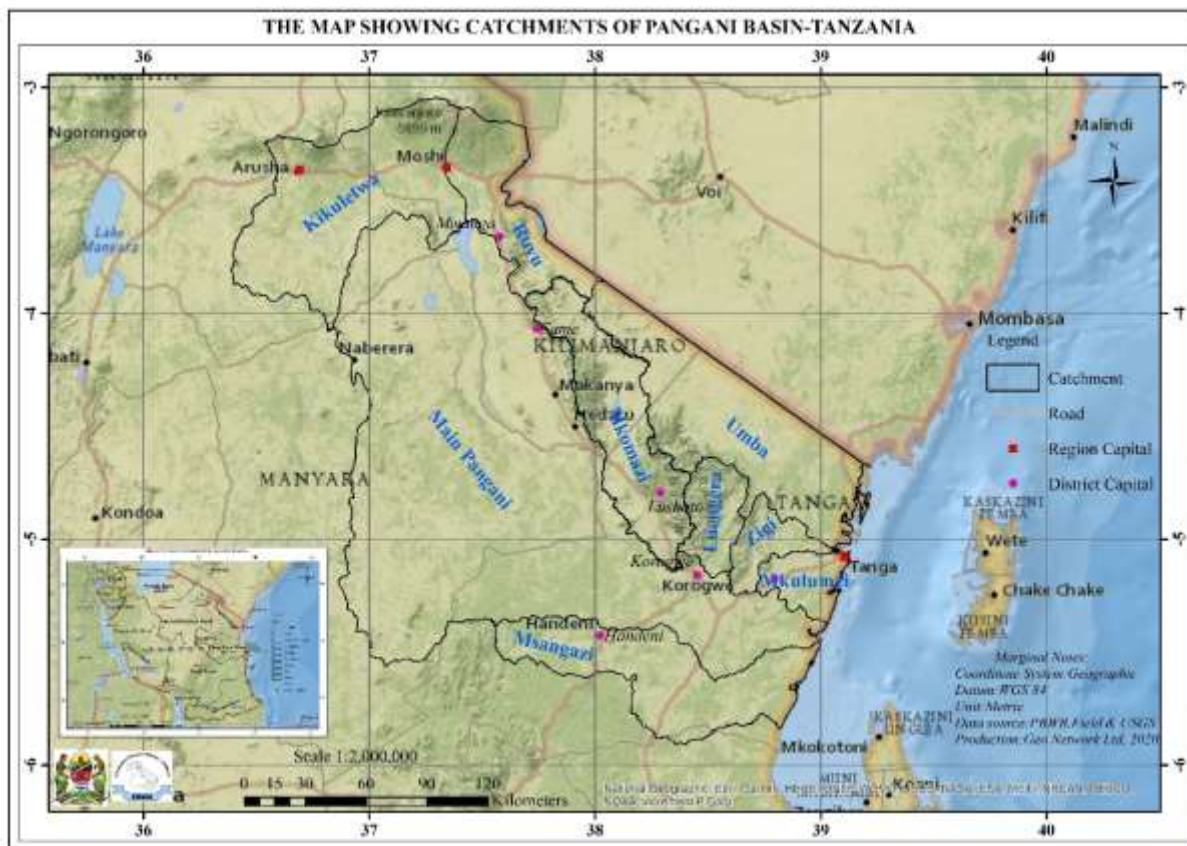


Figure 1: Pangani Basin: The location of the Pangani Basin within Tanzania (54,600 km²) and the associated Nine River Catchments is shown in the Figure 1, above. **Source:** Geo Network Limited, 2020

1.3 Planning Context and Guiding Framework

The preparation of the Pangani Basin Integrated Water Resources Management and Development (IWRMD) Plan and the updating of six Basin IWRMD Plans will happen within the framework of Tanzania's national development agenda, relevant legal and policy instruments, international commitments, and recognized best practices in Integrated Water Resources Management (IWRM).

The Consultant will ensure that all assessments, analyses, planning methods, and recommendations align with the following:

- (i) The Water Resources Management Act, No. 11 of 2009 and its Regulations;
- (ii) The National Water Policy 2002 version 2025;
- (iii) Tanzania Development Vision 2050;
- (iv) The Sustainable Rural Water Supply and Sanitation Programme (SRWSSP Phase II, 2025-2030);
- (v) The National Water Grid Initiative;
- (vi) National strategies and policies related to climate change adaptation, environmental management, biodiversity conservation, disaster risk reduction, agriculture, energy, irrigation, and land use planning;
- (vii) The Sustainable Development Goals (SDGs), especially SDG 6 on Clean Water and Sanitation; and

- (viii) Relevant regional and international frameworks on transboundary water resources management and climate resilience.

The Consultant will also adopt internationally accepted IWRM principles and planning methods. This will ensure that the Pangani Basin Plan and the updated Basin IWRMD Plans are technically sound, climate-resilient, based on evidence, driven by stakeholders, and well-coordinated to aid in the future preparation of the National Integrated Water Resources Management and Development (National IWRMD) Plan.

2.0 Objectives of the Assignment

2.1 Overall Objective

The overall objective is to prepare an Integrated Water Resources Management and Development (IWRMD) the Plan for Pangani Basin, and provide technical support in reviewing and updating existing IWRMD Plans for six Basin Water Boards (Lake Rukwa Basin; Lake Nyasa Basin; Ruvuma and Southern Coast Basin; Lake Tanganyika Basin, Rufiji Basin and Internal Drainage Basin) and lay the foundation for preparation of National IWRMD Plan. This should be in accordance with the Water Resources Management Act, relevant Water Sector Frameworks and National Development Priorities.

2.2 Specific Objectives

The specific objectives are divided into two groups; covering the (1) assignment for the Pangani Basin; (2) the six Water Basins as follows and (3) laying foundation for the preparation of National IWRMD Plan:

2.2.1 Pangani Basin

The Consultant shall:

- (i) Review and update hydrological, hydrogeological, environmental, socio-economic, institutional, and water related information required for integrated basin planning;
- (ii) Assess current and future water availability, water quality, groundwater resources, sectoral water demands and climate change impacts to support sustainable water resources management;
- (iii) Develop integrated water allocation and development scenarios that balance environmental sustainability, socio-economic development, climate resilience and water security; and
- (iv) Prepare a comprehensive Integrated basin-wide IWRMD Plan for Pangani Basin including implementation strategy, investment priorities, monitoring framework and action plan.

2.2.2 Six Water Basins

The Consultant shall:

- (i) Review and update six existing basin IWRMD Plans to reflect current hydrological conditions, emerging development priorities, climate risks, policy changes and advances in water resources development and management;
- (ii) Identify priority investments and implementation strategies;
- (iii) Strengthen institutional capacity, stakeholder participation of Basin Water Boards in IWRMD planning and implementation;

- (iv) Strengthen knowledge transfer to support effective implementation, monitoring, periodic review and updating of Basin IWRD Plans; and
- (v) Promote harmonized basin planning approaches, standardized analytical methodologies, and compatible modelling frameworks to improve consistency and comparability across Basin Water Boards and support the preparation of a future National Integrated Water Resources Management and Development (National IWRMD) Plan.

2.2.3 The National IWRMD Plan

The Consultant shall use data and information gathered from the reviewed and updated six existing basin IWRMD Plans and IWRMD Plans for Pangani, Wami-Ruvu and Lake Victoria to lay the foundation for preparation of the National IWRMD Plans as a national coordination and investment framework by:

- i. Consolidation and Analysis of the Nine Basin IWRMD Plans
- ii. Review of Relevant Policies, Plans, Programmes and Strategies
- iii. Development of National IWRMD Thematic Areas and Strategic Framework.
- iv. Preparation of the National IWRMD Planning Framework and Roadmap.

3.0 Scope of Work

3.1 General Requirements

3.1.1 Pangani Basin

The Consultant shall prepare the catchment based Pangani Basin IWRMD Plan covering the following nine (9) catchments: Pangani Main River; Kikuletwa; Ruvu; Mkomazi; Lwengera; Uмба; Zigi; Mkulumuzi; Msangazi. The Consultant shall review and build upon previous studies and reports prepared under earlier initiatives, including outputs developed by MS SMEC and other relevant studies. The assignment shall adopt Integrated Water Resources Management (IWRM) principles emphasizing sustainability; equitable water allocation; climate resilience; ecosystem protection; stakeholder participation; efficient water use.

In developing the Pangani Basin IWRMD plan, the following five (5) thematic components will be considered:

- (i) Component 1: Inventory and review of water availability, use and demand
- (ii) Component 2: Review of the Institutional, Policy and legal framework,
- (iii) Component 3: Review Sector/Thematic Water Plans,
- (iv) Component 4: Integrated Water Resources Management and Development Plan,
- (v) Component 5: IWRMD Plan Implementation Strategy and Action Plan.

However, MS SMEC accomplished Components 1 to 3 through the work. In this regard, the current assignment requires the Consultant to apply professional judgment in reviewing, updating, and refining the existing work, ensuring that all available data, analyses, and findings are aligned with current hydrological conditions, development trends, and policy priorities.

To ensure consistency and comparability in basin-level planning processes in Tanzania, the Consultant will review the modelling platforms, hydro-economic models, decision

support systems (DSS), and analytical tools used in the development of existing basin IWRMD Plans. The Consultant shall use the same or a compatible modelling framework, ensuring consistency in: model structure and configuration; assumptions and parameterization; input datasets and data processing methods; calibration and validation procedures; scenario development and evaluation methods. The goal is to make sure that outputs from the Pangani Basin IWRMD Plan and the updated basin plans are directly comparable. These outputs should be able to integrate into the National IWRMD Plan and broader water resources planning frameworks. Any suggested changes to previously used modelling frameworks must be clearly explained in the Review Report, including the effects on data needs, model outputs, and comparability across basins.

3.1.2 Six Water Basins

Due to changing socio-economic conditions, climate variability, emerging water demands, technological advancements, and evolving national development priorities including the National Integrated Water Resources Management and Development Plan and the National Water Grid (NWG), initiative 6 of the previously prepared basin IWRMDPs require updating to ensure that they remain relevant and responsive to current and future water resources management challenges. The Consultant will provide technical support to the BWBs to review and update six completed Basin IWRMD Plans for the Lake Rukwa Basin; Lake Nyasa Basin; Ruvuma and Southern Coast Basin; Lake Tanganyika Basin, Rufiji Basin and Internal Drainage Basin to reflect current hydrological conditions, water demand projections to 2050, policy frameworks, and emerging development priorities.

The assignment shall include but not limited to:

- (i) Review of existing plans and supporting studies;
- (ii) Updating basin situation analyses;
- (iii) Updating water resources assessments and water balances;
- (iv) Reviewing water allocation frameworks;
- (v) Identifying priority investments and interventions;
- (vi) Assess water related conflicts;
- (vii) Updating implementation frameworks;
- (viii) Conducting stakeholder consultations;
- (ix) Capacity building for Basin Water Board staff and key stakeholders; and
- (x) Develop guidelines and tools to support periodic review and updating of basin plans.

The updated basin plans shall align with National Water Policy; National Water Grid initiative; Climate resilience objectives; National development priorities.

3.1.3 The National IWRMD Plan

The scope of the consultancy shall encompass the establishment of a comprehensive foundation for the preparation of the National Integrated Water Resources Management and Development Plan (IWRMDP). The assignment will involve the consolidation and synthesis of information, priorities, programmes, investment needs and strategic interventions contained in the nine Basin IWRMD Plans to generate a coherent national

perspective on water resources management and development. The consultancy will further undertake a review and documentation of relevant national, sectoral, regional and international policies, plans, programmes, strategies and legal frameworks to ensure alignment of the future National IWRMDP with broader development objectives and water sector priorities. Building on these analyses, the consultant shall identify and develop the key thematic areas, strategic issues, vision, objectives and guiding principles that will form the basis of the National IWRMDP. Finally, the consultancy shall develop a National IWRMD Planning Framework and Roadmap, outlining the proposed structure of the Plan, planning methodology, stakeholder engagement process, implementation considerations, financing approaches and subsequent steps required for the preparation, validation and adoption of the National IWRMDP. The assignment is therefore, intended to establish the technical, strategic and institutional foundation necessary for the subsequent preparation of a comprehensive National Integrated Water Resources Management and Development Plan (IWRMDP).

The assignment will be undertaken through a participatory and coordinated process involving sector ministries, Basin Water Boards, Local Government Authorities, development partners, academia, civil society organisations and other key stakeholders. Particular emphasis will be placed on the consolidation and analysis of existing information, climate-responsive planning, cross-sectoral coordination and alignment with national development priorities. Through policy and institutional reviews, stakeholder consultations and strategic analysis, the consultancy will identify key thematic areas, strategic priorities and planning considerations that will inform the preparation of the National IWRMDP. The process will result in a clear planning framework and roadmap to guide the subsequent development, validation and adoption of the National IWRMDP. The assignment shall involve but not limited to:

- i. **Consolidating and synthesising information from the nine Basin Integrated Water Resources Management and Development Plans (IWRMDPs)**, including the water resources assessment, basin priorities, strategic interventions, programmes, projects, investment requirements, emerging challenges and opportunities, with a view to establishing a coherent national perspective for integrated water resources management and development.
- ii. **Reviewing and documenting relevant national, sectoral, regional and international policies, legislation, strategies, plans, programmes and institutional frameworks** to determine their relevance and implications for the preparation of the National IWRMDP and to identify areas of convergence, gaps and policy alignment requirements.
- iii. **Identifying, harmonising and prioritising national thematic areas and strategic issues** arising from the nine Basin IWRMDPs and other relevant development frameworks, including cross-cutting issues such as climate change, environmental sustainability, water security, disaster risk management, gender and social inclusion.
- iv. **Preparing a National IWRMDP Planning Framework and Roadmap**, including the proposed vision, objectives, strategic pillars, Plan structure, planning methodology, stakeholder engagement arrangements, institutional coordination mechanisms and a roadmap for the subsequent preparation, validation and adoption of the National IWRMDP.

3.2 Thematic Components for Pangani Basin assignment

3.2.1 Component 1: Inventory and review of water availability, use and demand

The aim of this component is to review and update data and information previously collected and analysed by MS SMEC. This will include gathering additional data regarding surface and groundwater resources availability in terms of quantity and quality as well as estimating water use and demands for various sectors.

(i) Surface Water Assessment

The Consultant shall review and update information related to surface water resources in the basin. Tasks shall include:

- a) Collection and review of hydrological data;
- b) Rainfall and evaporation analysis;
- c) Catchment characterization;
- d) Streamflow assessment;
- e) Hydrological modelling; and
- f) Assessment of current and future surface water availability.

The Consultant shall also:

- a) Evaluate existing hydrological monitoring data;
- b) Identify data gaps;
- c) Assess seasonal and spatial variability of water resources; and
- d) Review water balances within major sub-catchments.

(ii) Groundwater Assessment

The Consultant shall review and update groundwater resources information for the basin. The tasks shall include:

- a) Groundwater inventory review;
- b) Aquifer identification and characterization;
- c) Groundwater quality assessment;
- d) Groundwater recharge analysis;
- e) Groundwater modelling; and
- f) Estimation of safe yields and development potential.

The Consultant shall assess groundwater availability for domestic supply, irrigation, hydropower, livestock, and other productive uses.

(iii) Water Quality and River Health Assessment

The Consultant shall:

- a) Assess water quality conditions in rivers, reservoirs, lakes, and groundwater systems;
- b) Identify major pollution sources and pollution hotspots;
- c) Assess impacts of land use and environmental degradation on water quality;
- d) Assess river health and aquatic ecosystems; and
- e) Recommend water quality protection and pollution control measures.

The assessment shall consider domestic pollution; agricultural runoff; industrial effluent; sedimentation; invasive aquatic weeds and mining-related impacts.

(iv) Water Demand Assessment

The Consultant shall:

- a) Assess current use and water demands;
- b) Assess projected water use and demand;
- c) Evaluate water use efficiency;
- d) Identify water conservation opportunities;
- e) Assess sectoral water requirements for 2030, 2040, and 2050.
- f) Assess Pangani basin annual renewable water resources

Sectoral water demand assessment shall cover areas such as domestic water supply; irrigation; livestock; hydropower; industry and mining; tourism; ecosystem requirements.

(v) Assessment of Water Related Conflicts

The Consultant shall:

- a) Review existing water-related conflicts, policies, permits, and conflict resolution mechanisms.
- b) Identify and map water-related conflict hotspots across the basin.
- c) Assess the causes, trends, and severity of water-related conflicts among different water users.
- d) Evaluate the impacts of water scarcity, climate change, and increasing water demand on conflict occurrence.
- e) Assess institutional capacity and the effectiveness of existing conflict management mechanisms.
- f) Conduct stakeholder consultations to validate findings and identify emerging conflict issues.
- g) Assess future water-related conflict risks under projected development and climate scenarios.
- h) Develop a water conflict risk maps and recommend strategies for conflict prevention and resolution.

The assessment of water-related conflicts will provide Basin Water Boards with the information required to support integrated water resources planning, equitable water allocation, and the development of effective and sustainable conflict prevention and management strategies.

(vi) Water Resources Classification, Establishment of Reserve, and Water Quality Objectives

- a) Water Resources Classification - the Consultant shall classify water resources within the basin according to their ecological, social, and economic importance. This classification will provide a framework for prioritizing management interventions and ensuring sustainable use. Tasks shall include:
 - Categorization of rivers, lakes, reservoirs, and aquifers based on ecological integrity, strategic importance, and vulnerability.

- Identification of high-value water bodies critical for biodiversity, cultural heritage, and economic activities.
 - Development of classification criteria aligned with national water policies and international best practices.
- b) Establishment of Reserve - the Consultant shall determine and establish water reserves to safeguard ecological and basic human needs. This process will ensure that minimum flows and groundwater levels are maintained to support ecosystems and communities. Tasks shall include:
- Quantification of ecological reserve requirements to sustain aquatic ecosystems and river health.
 - Determination of basic human needs reserve to guarantee access to safe water for domestic use.
 - Integration of reserve requirements into basin-level water allocation models.
 - Assessment of trade-offs between reserve establishment and sectoral water demands.
- c) Water Quality Objectives - the Consultant shall establish water quality objectives to guide pollution control, resource protection, and sustainable development. Tasks shall include:
- Definition of water quality standards for different uses (domestic, irrigation, livestock, industry, hydropower, and ecosystem protection).
 - Identification of priority pollutants and setting threshold limits for key parameters (e.g., nutrients, heavy metals, pathogens, salinity).
 - Development of basin-specific water quality objectives consistent with national standards and international guidelines.
 - Integration of water quality objectives into monitoring programs and basin management plans.
- d) Effects on Data Needs, Model Outputs, and Comparability Across Basins
- Data Needs: Establishing reserves and water quality objectives will require enhanced hydrological, ecological, and water quality datasets, including long-term monitoring of flows, groundwater levels, and pollutant concentrations.
 - Model Outputs: Hydrological and groundwater models must incorporate reserve requirements and water quality thresholds, influencing water allocation scenarios and demand projections.
 - Comparability Across Basins: Standardized classification criteria and water quality objectives will improve comparability across basins, enabling benchmarking, policy harmonization, and equitable resource management.

(vii) Transboundary Water Resources

This sub-component will be carried out in conjunction with water resources assessment and demand analysis. The aim is to promote relevant mechanisms for coordination in management of shared water resources with riparian countries such as Lake Jipe, Lake Challa, Uмба river and transboundary aquifer systems that are shared with Kenya.

(viii) Inter-basin and Intra-basin Transfers

The assignment will include need assessment, and propose recommendations for, inter-basin and intra-basin water transfers in the Pangani Basin to offset any expected water

deficits. The recommendations should be based on cost effective and technically feasible assessment of the inherent status of water resources in the basin. Consideration must be made for mitigating potential environmental issues that may arise.

(ix) Climate Change Assessment

The Consultant shall:

- Assess impacts of climate variability and climate change on water resources;
- Evaluate implications on water supply and demand;
- Review impacts on groundwater recharge and environmental flows; and
- Incorporate climate resilience into planning scenarios and investment options.

Climate change considerations shall be integrated into all planning scenarios and recommendations.

3.2.2 Component 2: Review of the Institutional Frameworks

(i) Institutional Assessment

The Consultant shall assess the institutional arrangements for water resources management at national, basin, catchment, district, and community levels.

The assessment shall include, but not be limited to:

- a) review institutional arrangements for water resources management;
- b) Assessment of coordination mechanisms among water-related sectors and institutions.
- c) Assessment of institutional effectiveness in implementing Integrated Water Resources Management (IWRM).
- d) Identification of institutional overlaps, gaps, and coordination challenges.
- e) Recommendations for strengthening institutional coordination and governance.

(ii) Human Capacity Assessment

The Consultant shall assess human capacity required for effective implementation of Basin IWRMD Plans. The assessment shall include:

- a) Human resource capacity.
- b) Technical and operational capacity.
- c) Water resources monitoring and information management capacity.
- d) Modelling and analytical capacity.
- e) Digital systems and data management capacity.
- f) Institutional training needs.

(iii) Financial Assessment

The Consultant shall assess the financial sustainability of water resources management institutions. The assessment shall include:

- a) Existing financing mechanisms.
- b) Revenue sources and expenditure patterns.
- c) Cost recovery mechanisms.
- d) Financing gaps.
- e) Sustainable financing options for Basin Water Boards.

- f) Opportunities for public-private partnerships and development financing.

3.2.3 Component 3: Review Sectoral/Thematic Water Plans

Based on the outcome of the review of water use, water demand and water resources availability assessments a water allocation and management plan is to be prepared for each sector based on the current and future water demands in 2025, and projections to 2035 and 2050 (i.e. short term- SDGs, medium term-Vision 2050 and long term). Forecasts are done using standard models and procedures as well as Government policies.

Consideration should be on reasonable water saving measures to be introduced by each sector for water demand analysis while conducting scenario analysis based on different development parameters and sector development objectives (in terms of number of population, hectare, environmental and water quality objectives etc.).

The Consultant shall review and update sectoral water plans covering domestic water supply; irrigation; livestock; hydropower; industry and mining; environment and ecosystem protection; tourism and fisheries. The Consultant shall:

- a) Review sectoral development trends;
- b) Assess future sectoral water requirements;
- c) Identify opportunities for improving water use efficiency; and
- d) Evaluate trade-offs among competing water uses.

3.2.4 Component 4: Integrated Water Resources Management and Development Plan

(i) Basin scenario development and water allocation framework

The Consultant shall:

- a) Develop basin development scenarios;
- b) Undertake socio-economic and water allocation analysis;
- c) Evaluate trade-offs among competing water uses;
- d) Identify strategic water resources investments;
- e) Develop decision-support and analytical tools; and
- f) Prepare the Pangani basin IWRMD Plan and catchment sub-plans.

The IWRMD Plan shall include:

- a) Basin vision and objectives;
- b) Water allocation framework;
- c) Environmental flow considerations;
- d) Strategic investment priorities;
- e) Climate resilience measures;
- f) Institutional strengthening measures; and
- g) Monitoring and evaluation framework.

The Consultant shall also identify opportunities for:

- a) Water storage infrastructure;
- b) Irrigation modernization;
- c) Groundwater development;
- d) Catchment restoration;

- e) Improved hydrological monitoring; and
- f) Demand management and water conservation.

(ii) Planning Time frame and Assumptions

The period for implementing the Pangani IWRMD Plan is 2025-2050. In this regard, the Consultant will establish all assessments and planning approaches based on this period while in consultation with different sectors and stakeholders. The Planning process will outline short, medium and long-term actions in the basin for water resources management and development.

(iii) Planning Phases

The planning process for development of the Pangani IWRMD plan will involve three phases namely:

- a) Inception Phase
- b) Assessment and development phase
- c) Planning process phase

(iv) The IWRMD Planning Process Phase

In accordance with the principle of demand-driven development, IWRMD Planning process will be implemented in response to both perceived and expressed demand within the hydrological units of the basin. The identification and definition of the basin management units will be based on the understanding of physical, socioeconomic and administrative characteristics of different catchment areas that will be obtained during the assessment and development phase while taking into account the interests of relevant stakeholders. Stakeholder sub-committees representing each of the basin management units will be constituted to guide the planning and management of water resources within these areas. The key elements of the planning process will therefore be oriented towards these management units; taking into account of inter-connections and relationships between these units.

(v) Root-cause Analysis

In order to identify and address the real causes of water resources challenges, the Consultant is expected to undertake a root-cause analysis workshop to identify the effects from the root causes. The root cause analysis will involve a consultative process between targeted stakeholders and Pangani Basin Water Board. Once the root causes are identified, criteria for identifying strategies and activities will be developed. A portfolio of projects that will be required to address the root causes will be prioritised based the 3 E's of IWRMD i.e. efficiency, environmental sustainability and socio-equity.

(vi) Stakeholder Consultations

The consultant will carefully design and facilitate a series of structured consultative meetings with stakeholders of the Basin. The Team will support the client in detailed identification for the Basin Planning Process. This will include stakeholders at various levels in the Basin wide and thematic such as water related sectors, government institutions, academia, private sector, NGOs, farmers, communities, general public. Each of these stakeholder groups will be engaged through an effective stakeholder consultation strategy.

3.2.5 Component 5: IWRMD Plan Implementation Strategy and Action Plan

The Consultant shall prepare:

- a) Implementation strategy;
- b) Phased action plan;
- c) Financing and investment framework;
- d) Communication strategy;
- e) Monitoring and evaluation framework;
- f) Institutional implementation arrangements; and
- g) Pre-feasibility of the selected options/projects where applicable.

The implementation strategy shall identify priority interventions; conduct prefeasibility of new or undersigned options, implementation responsibilities; financing mechanisms; timelines for implementation; Monitoring indicators.

4.0 Capacity Building and Transfer of Knowledge

The Consultant shall build capacity of all six (6) Basin Water Boards and the Pangani Basin staff through on-job training; technical workshops; modelling and planning demonstrations; preparation of technical manuals and guidance materials. The Capacity building shall focus on IWRMD planning; scenario analysis; water allocation; climate resilience; monitoring and evaluation; and periodic plan review and updating of IWRMD plans.

5.0 Deliverables and Payment Schedules

The Consultant shall undertake two distinct assignments as described above, each with its own deliverables and corresponding payment schedule. The Consultant shall submit all deliverables in accordance with the requirements, timelines, and quality standards specified in this Terms of Reference.

Payments shall be made upon the satisfactory completion, review, and acceptance of the deliverables for each assignment by the Client, as follows:

- (i) **Preparation of the Pangani Basin Integrated Water Resources Management and Development (IWRMD) Plan – 40%** of the total Contract Price.
- (ii) **Review of Six Existing Basin Integrated Water Resources Management and Development (IWRMD) Plans – 50%** of the total Contract Price.
- (iii) **Laying the foundation for the National Integrated Water Resources Management and Development (IWRMD) Plan – 10%** of the total Contract Price.

The detailed deliverables and payment schedules for each assignment are presented in the following sections.

5.1 Deliverables and Payment Schedule for the Pangani Basin IWRMD Plan

The Consultant shall prepare the Pangani Basin Integrated Water Resources Management and Development (IWRMD) Plan in accordance with the approved methodology and scope of work. The assignment shall include all activities necessary to produce a comprehensive, technically sound, and stakeholders validated IWRMD Plan. The expected deliverables and corresponding payment milestones are presented in **Table 1** below.

Table 1. Consultant deliverables for the Pangani Basin Assignment

S/No	Title of Reports	Schedule of Delivery	Payment Schedule (of 40% Contract Price)
1	Review Report including: (i) Updated Water resources Assessment (surface water, groundwater, including availability, water quality, river health, Terrestrial Ecology, and water demands (ii) Updated institutional frameworks reports including Human and institutional capacity development, Financing and socio-economics for water resources. Stakeholder Participation, Sector Coordination, Advocacy and Awareness, Transboundary water resources, inter-basin water transfers. (iii) Updated Sectoral/Thematic water Plans	End of third month	10%
2	Monthly Progress Reports	14 th Day of every next month	
3	Draft Reports:	End of 6 th Month	30%
	• Component 4 Report: (i) Draft Basin wide IWRMD Plan including the Executive Summary (ii) Draft IWRMD Plan for all Pangani Basin Catchments (iii) Stakeholder Consultation Reports • Draft Component 5 Reports: Implementation Strategy and Action Plan including IWRMD Review and Implementation Manual/Guidelines • Draft Guidelines for Preparation, Reviewing, Updating, Monitoring, Implementing, Financing and Approving IWRMDPS		
	• Training and Capacity Building Plan		
	• Draft Basin Investment Plan		
4	Draft Final Reports (as per s/n 3)	End of 11 th Month	20%
5	Final Reports:	End of 12 th Month	20%
	• Review reports • Final Component 4 Reports: Basin Integrated Water Resources Management and Development Plan for Pangani Basin and each of the 5 Catchments		

S/No	Title of Reports	Schedule of Delivery	Payment Schedule (of 40% Contract Price)
	- Final Component 5 Reports: Implementation Strategy and Action Plan - Final Investment Plan - Communication Strategy		
6	Pangani Basin Water Atlas GIS based maps, figures, tables and other illustrations Other key project outputs and reports; (i) Hydrological models and data sets (ii) Decision Support Systems (DSS) with a Dashboard (iii) MIKE BASIN model (and Customised ODSS). (iv) Maps - Geological and Hydrogeological maps - Surface water resources maps (location of hydrological monitoring stations, unit flows, catchment yield, water quality, location of current and planned investments for all sectors, location of existing and potential dam sites of different sizes and capacities, locations of existing and planned groundwater and water quality monitoring stations, locations of water abstractions points and return flows, locations of future stabilization ponds)	End of 15 th Month	10%
7	The Consultant shall submit all reports, deliverables, and outputs for each Basin in ten (10) high-quality printed copies and in electronic format. The electronic submission shall comprise all final reports in both editable and PDF formats, together with all underlying datasets, databases, GIS data, models, source files, analytical tools, and any other materials generated or utilized during the assignment. All electronic files shall be provided on external storage media or through another delivery mechanism acceptable to the Client to facilitate future use, updating, and archiving.	End of 18 th Month	10%

5.2 Deliverables and Payment Schedule for the Review of Six Basin IWRMD Plans

The Consultant shall undertake a comprehensive review and updating of the six existing Basin Integrated Water Resources Management and Development (IWRMD) Plans in accordance with the scope of work outlined in these Terms of Reference. The review shall

ensure that the plans are aligned with current national policies, legal and institutional frameworks, emerging water resources management challenges, and international best practices. The expected deliverables and corresponding payment milestones are presented in **Table 2** below.

Table 2. Consultant deliverables for the Six Basins Assignment

S/No	Title of Reports	Schedule of Delivery	Payment Schedule (of 50% Contract Price)
1	Review Report including: (i) Updated Water resources Assessment (surface water, groundwater, including availability, water quality, river health, Terrestrial Ecology, and water demands (ii) Updated institutional frameworks reports including Human and institutional capacity development, Financing and socio-economics for water resources. Stakeholder Participation, Sector Coordination, Advocacy and Awareness, Transboundary water resources, inter-basin water transfers. (iii) Updated Sectoral/Thematic water Plans	End of 4 th month	10%
	Training and Capacity Building Plan		
2	Monthly Progress Reports	14 th Day of every next month	
3	Draft Updated Basin IWRMD Plans for the six basins with (i) Review Report (ii) Updated Basin Situation Analysis Report (iii) Updated Water Resources Assessment and Water Balance Report (iv) Draft Updated Basin IWRMD Plans (v) Stakeholder Consultation Reports	End of 9 th Month	40%

S/No	Title of Reports	Schedule of Delivery	Payment Schedule (of 50% Contract Price)
	Draft Guidelines for Preparation, Reviewing, Updating, Monitoring, Implementing, Financing and Approving IWRMDPS		
4	Draft Final Reports	End of 13 th month	10%
	Final Reports:	End of 15 th Month	30%
	Review reports		
	- Final Updated Basin IWRMD Plans for the six basins with - Review Report - Updated Basin Situation Analysis Report - Updated Water Resources Assessment and Water Balance Report - Draft Updated Basin IWRMD Plans - Stakeholder Consultation Reports		
	Capacity Building and Training Materials	End of 16 th Month	
	Final Guidelines for Preparation, Reviewing, Updating, Monitoring, Implementing, Financing and Approving IWRMDPS	End of 16 th Month	
5	The Consultant shall submit all reports, deliverables, and outputs for each Basin in ten (10) high-quality printed copies and in electronic format. The electronic submission shall comprise all final reports in both editable and PDF formats, together with all underlying datasets, databases, GIS data, models, source files, analytical tools, and any other materials generated or utilized during the assignment. All electronic files shall be provided on external storage media or through another delivery mechanism acceptable to the Client to facilitate future use, updating, and archiving.	End of 18 th Month	10%

5.3 Deliverables and Payment Schedule for the National IWRMD Plan

The expected deliverables and corresponding payment milestones are presented in **Table 3** below.

Table 3. Consultant deliverables for the National IWRMD Plan Assignment

S/No	Title of Reports	Schedule of Delivery	Payment Schedule (of 10% Contract Price)
1	Draft reports • Report on Consolidation and Synthesis of the Nine Basin IWRMDPs • Policy, Legal, Institutional and Strategic Review Report • National IWRMDP Thematic Areas and Strategic Framework Report • National IWRMDP Planning Framework and Roadmap Report	End of 14 th Month	30%
	Draft Final Reports	End of 16 th Month	40%
	Final reports	End of 18 th Month	30%

All reports shall be submitted in both hard and editable electronic formats. Final Report shall, in addition to Components 4 and 5 reports contain a compilation of all the five components reports. The Team shall also present the following outputs:

- (i) A brief report that will be used by Ministry of Water for disseminating the main features of the plan to the Government, Parliament and other stakeholders,
- (ii) Power Point presentation slides for dissemination to different categories of stakeholders
- (iii) Media products including popular version and podcasts
- (iv) All data sets collated and used in analyses

6.0 Duration of the Assignment

This assignment will take a total duration of 18 months, starting from the date of inception workshop. Table 1 highlights the estimated staff-months

7.0 Estimated staff-months and qualification of key personnel

Table 4 shows the staff months required in undertaking this assignment. The Consultant Team will work very closely with counterpart staff from PBWB, six BWBs and Directorate of Water Resources in to order to enhance their competency as part of a wider strategy to build inherent capacities in the country.

Table 4: Technical expertise for undertaking the assignment

S/NO	Team Member	Proposed No. of Staff	Input (Person Month)
1.	Water Resources Planner (Team Leader)	1	9
2.	IWRM Expert (Assistant Team Leader)	1	9
3.	Water Resources Modeller	1	6
4.	Hydrologist	1	6
5.	Hydro-geologist	1	6
6.	Environmental /Water quality Specialist	1	3
7.	Water Resources Engineer	1	5
8.	Water Resources Economist	1	4
9.	Irrigation Engineer	1	3
10.	Hydropower specialist	1	2
11.	Quality control and assurance	1	5
12.	Sociologist	1	3
13.	GIS/Remote sensing Expert	1	3
Total			

8.0 Consultant Qualifications and Team Composition

Staff to be engaged in this special assignment shall have qualifications and experience as described in the following section. The Consultant shall demonstrate experience in preparation of similar basin plans and integrated water resources studies.

(i) Water Resources Planner (Team Leader)

Should possess a minimum MSc degree or equivalent in water resources or related field with proven experience in integrated water resources planning. She/he shall have a minimum of fifteen (15) years overall experience and five (5) years relevant experience in preparing integrated water resources management and development plans, plan implementation strategies and action plans. As Team Leader he/she should demonstrate leadership skills and experience in managing a dynamic and multi-disciplinary team of experts.

(ii) IWRM Expert (Assistant Team Leader)

Should possess a minimum MSc degree or equivalent in water resources or related field with proven experience in integrated water resources planning. She/he shall have a minimum of ten (10) years overall experience and five (5) years relevant experience in preparing integrated water resources management and development plans, plan implementation strategies and action plans. As an Assistant Team Leader he/she should demonstrate leadership skills and experience in managing a dynamic and multi-disciplinary team of experts.

(iii) Quality Control and Assurance

Should possess a minimum MSc degree or equivalent in Water Resources Management with a good publication record in peer review journals. She/he should have broad knowledge on IWRM processes at global, regional and country level. She/he shall have a minimum of ten (10) years of overall experience in IWRM and five (5) years in coordinating dynamic groups

(iv) Hydrologist/Modeller

Should possess a minimum MSc degree or equivalent in hydrology/water resources engineering. She/he shall have a minimum of ten (10) years of overall experience in the

field of competence and five (5) years relevant experience in modelling hydrologic systems.

(v) Hydro-geologist

Should possess a minimum MSc degree or equivalent in hydro-geology. She/he shall have a minimum of ten (10) years of overall experience in the field of competence and five (5) years relevant experience in groundwater assessment and mapping.

(vi) Environmental /Water quality Specialist

Should possess a minimum MSc degree or equivalent in Environmental Science/Engineering. She/he shall have a minimum of ten (10) years of overall experience and five (5) years relevant experience in Environmental Assessments, Environmental Impact Assessment, Strategic Environmental Assessments, and well versed with the Tanzania's Environmental Management Act 2004 and its regulations and implementation.

(vii) Water Resources Management Expert/Engineer

Should possess a minimum MSc degree or equivalent in Water Resources Engineering or Hydrology. She/he shall have a minimum of ten (10) years of overall experience and five (5) years relevant experience in Water Resources Management and Development.

(viii) Water Resources Economist

Should possess a minimum MSc degree or equivalent in water resources economics. She/he shall have a minimum of ten (10) years of overall experience and five (5) years relevant experience in economic assessment of water resources in different sectors and in financing patterns.

(ix) Irrigation Engineer

Should possess a minimum MSc degree or equivalent in water engineering. She/he shall have a minimum of ten (10) years of overall experience and five (5) years relevant experience in planning and development of irrigation systems infrastructure, Agricultural Sector Development Programme, Agricultural Sector Development Strategy, and National Irrigation Master Plan.

(x) Hydropower Specialist

Should possess a minimum MSc degree or equivalent in Hydropower water engineering. She/he shall have a minimum of ten (10) years of overall experience and five (5) years relevant experience in planning and development of hydropower systems, National Power Master Plan and its implementation.

(xi) Sociologist

Should possess a minimum MSc degree or equivalent in Sociology or related field. She/he shall have a minimum of ten (10) years of overall experience and five (5) years relevant experience in social and livelihood assessments.

(xii) GIS/Remote Sensing Expert

Should possess a minimum MSc degree or equivalent in GIS/Remote Sensing or related field. She/he shall have a minimum of ten (10) years of overall experience and (5) years relevant experience in GIS/Remote Sensing

9.0 Reference Team

The Director of Water Resources shall form a Reference Team of Experts to provide overall technical support in guiding the assignment. The team members will be professionals with relevant experience.

10.0 Data, Services and Facilities to be provided by the Client

The Ministry of Water and Basin Water Boards shall provide available reports, datasets, maps, and relevant information necessary for undertaking the assignment.

The Consultant shall however be responsible for collection of any additional information required to complete the assignment.

11.0 Confidentiality and Ownership of Outputs

All reports, datasets, models, maps, and other outputs prepared under this assignment shall become the property of the Ministry of Water.

The Consultant shall not disclose or reproduce project information without prior written approval from the Client.