



Terms of Reference for IUCN Consultancy

Title: Terms of reference for the procurement of consultancy services for the development of an operational model for water allocation in the revue river sub-basin

Objective of the Consultancy

This consultancy has the following objective(s):

1. To map, quantify and characterise water availability, current uses and future demands in the Revue basin;
2. To develop a user-friendly water allocation tool for the Revue River basin;
3. To contribute to the creation of conditions that ensure the sustainable use of water resources in the Buzi basin, particularly in the Revue River sub-basin.

The specific objectives of the consultancy are as follows:

- i. To assess water availability for different current and future uses in the Revue sub-basin;
- ii. Define the prioritisation of raw water allocation in the Revue sub-basin;
- iii. Propose mechanisms for the efficient control of current and future water resource uses in the Revue sub-basin;
- iv. Propose improvements on the planning process of quantitative water resources for the Revue sub-basin;
- v. Develop procedures for monitoring water demand from registered and licensed users;
- vi. Set measures to control water use by various users in the Revue sub-basin;
- vii. Define usage rules that ensure a balance between water consumption and ecological flow; and
- viii. Establish the rules to be observed in water allocation in accordance with the water resources regime.

Background

Project Reference: P04620

Donor reference: AVMZ-00020

About IUCN

IUCN is a membership union composed exclusively of government agencies and civil society organisations. It provides public, private and non-governmental organisations with the knowledge and tools that enable human progress, economic development and nature conservation to work jointly.

Established in 1948, IUCN is now the world's largest and most diverse environmental network, drawing on the knowledge, resources and reach of over 1,400 member organisations and some 15,000 experts. It is a leading provider of data, assessments and analysis on conservation. Its broad membership base enables the IUCN to act as an incubator and trusted repository of best practices, tools and international standards.

IUCN provides a neutral space in which various stakeholders, including governments, NGOs, scientists, businesses, local communities, indigenous peoples organisations and others, can

work together to develop and implement solutions to environmental challenges and achieve sustainable development.

Working with a wide range of partners and supporters, IUCN implements a broad and diverse portfolio of conservation projects around the world. Combining the latest science with the traditional knowledge of local communities, these projects aim to reverse habitat loss, restore ecosystems and improve people's well-being.

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About the Project

The Mainstreaming and Integrated Water Resources Management approach for More Resilient Basins in Mozambique [MozWaterR] is a geared project towards achieving water security and safety by supporting Mozambique in developing its capacity to implement effective integrated water resources management (IWRM) in key basins in the northern and central water administration regions and improve capacity at a national level. This project is a collaborative effort where joint action on the ground will produce critical lessons from tried best practices that inform policy which strengthen business approaches, institutions, and rules around the sustainable use of land and water. MozWaterR is being implemented collaboratively with the Northern Regional Water Administration (ARA-Norte), Central Regional Water Administration (ARA-Centro) and the National Directorate for Water Resources Management (DNGRH) as primary Implementing Partners (IPs) to combat several challenges in the national water sector.

Description of the Assignment

The objective of this assignment is to develop an operational water allocation model for the Revue River sub-basin.

To undertake this assignment, the Consultant will collect and analyse data from ARA-Centro, IP, carry out field data collection, visit water users, and conduct stakeholder consultations to obtain all necessary information. The Consultant shall also review sectoral water use plans, estimate future water use, and assess current and future water availability in the sub-basin to support the development of the model.

The Consultant's Obligations are as follows:

- a) to ensure that the consultancy is carried out in strict compliance with the terms of reference, applicable standards and specifications, and all other contractual conditions;
- b) to alert and advise ARA-Centro, IP (Consultancy Manager) regarding compliance with the consultancy's physical and financial schedules.
- c) to provide the necessary support to ARA-Centro, IP with a view to ensuring the technical sustainability of the model's implementation, data security and the security of its execution, and compliance with other relevant requirements.
- d) Design a flexible, user-friendly and easy-to-use model.

General tasks

1. Conduct an analysis of the current state of water resources management in the Revue River sub-basin;
2. Identify the main water sources and current water uses;
3. Carry out campaigns to inspect, register and update water demands throughout the Revue sub-basin;
4. Generate runoff series to be used in modelling to determine operating rules;
5. Analyse existing water resource management institutions and mechanisms;
6. Identify the main issues and challenges related to water resources management in the region;
7. Identify water requirements for different uses (agriculture, industry, hydroelectricity, public supply, etc.);
8. Determine environmental water requirements;
9. Analyse water demand projections for the next 10–20 years; and
10. Identify the areas with the highest water demand and those with potential for water resource development.

Specific Tasks

1. Develop an Operational Water Allocation Model that takes into account water requirements for different uses;
2. Establish technical rules and criteria for water allocation among different uses;
3. Develop a system for monitoring and evaluating water allocation;
4. Identify infrastructure and investment needs for water resource management;
5. Develop water demand and supply scenarios for the next 10–20 years;
6. Analyse the potential impacts of climate change and other external variables on water resource management;
7. Identify adaptation and mitigation strategies for the different scenarios;
8. Develop an implementation plan for the Operational Water Allocation Model;
9. Identify responsibilities and deadlines for implementation;
10. Establish a system for monitoring and evaluating implementation;
11. Develop a capacity-building and training programme for stakeholders and staff of the institution responsible for water resources management;
12. Transfer knowledge and skills for the effective management of the Operational Water Allocation Model; and
13. Undertake other activities necessary to address each of the specific objectives of this project

Three stakeholder seminars shall be organised: the first to present model options and support selection, the second to present preliminary results, and the third to present the final product and conclude the consultancy.

ARA-Centro, IP will provide the Consultant with a comprehensive set of technical documents (designs, data in various formats) and other materials available within the scope of this contract. It is the Consultant's responsibility to assess the information provided, and to request and collect any further information necessary for the full fulfilment of the project's objectives.

Expected Results

With the implementation of the Operational Water Allocation Model in the Revue River sub-basin, the following results, amongst others, are expected:

1. Initial and Diagnostic Report with options for model selection;
2. Hydrological Assessment Report;

3. Report on Demand and Growth Scenarios;
4. Allocation Model Report; and
5. Model and accompanying Operating Manual.

Proposals for Components of the Operational Water Allocation Model

Model Interface

The interface of the Revue sub-basin water allocation model should be visually appealing, predominantly blue to symbolise ARA-Centro, IP and water, with a clearly visible map of the Revue sub-basin, which may be depicted within the Buzi basin, where the georeferenced locations of water users' facilities within the sub-basin are shown on the map using clearly defined symbols and their respective names, in accordance with the functionalities of geographic information systems (GIS). In this case, the system must be georeferenced.

The map should have features that can be manipulated in accordance with the aforementioned programmes and others, allowing for visualisation at the level of sub-basins, water bodies, abstraction sources, and administrative divisions such as villages, hamlets, towns and cities, with an indication of the number of users and the number of beneficiaries where applicable. These names must be represented graphically and descriptively (name and graphic) on the map, and may be represented either by name and graphic, or by graphic alone, according to the user's preference.

The interface should also include a legend for the points, symbols and other designations appearing on the map, to provide clear guidance on what they represent.

Data on Water Demand

At a minimum, the model must contain the following features or information regarding water demands:

- **User data:** full name of the individual or collective user; name of the representative's identification document (ID card, DIRE, passport or other); identification document number;
- **Type of Resource:** It must contain three types of resources to be abstracted, namely Surface Water from a River, Surface Water from a Lake or Reservoir, and Groundwater;
- **Location of the Abstraction:** this section must include the georeferenced location data of the abstraction source, for representation using a symbol based on the type of activity. The abstraction location data should be presented in a flexible format, in separate windows that allow for modification and quick viewing, and which enable the selection of some or all location items. Accordingly, the following designation is proposed for the location information: Province, District, Administrative Centre, Town, Neighbourhood, Avenue/Street;
- **Water Uses:** this component should be flexible to update and automatically convert the Volume Captured into m³/month, m³/year, Mm³/month and Mm³/year, etc.

Model Features

The model should allow for a statistical analysis of demand data, namely:

- Processing annual, monthly, quarterly and half-yearly average water demand for the entire sub-basin for a single user or group of users, water availability in the sub-basin over the same analysis period, and the respective ecological flow, taking into account the time period analysed;
- Graphical representation of water demand data for the sub-basin as a

whole, for a group of users, and for an individual user in relation to availability and the ecological flow for a given period;

- Graphically represent the percentages or absolute and relative values of the key indicators to be proposed by the consultant, which will enable decision-making regarding water allocation, always cross-referencing these with water availability in the sub-basin and the ecological flow.
- Simulate the impacts of water demand scenarios for a user or group of users over short, medium and long-term periods in situations of water surplus (floods) and water scarcity (droughts);
- Simulate and project water allocations for future projects in the basin and water availability, as well as the ecological flow; and
- Allow the import and export of data and information in various formats (vector, raster).

Applications of the Model

Scenario Development

Based on physiographic characteristics, hydrology, the occurrence of groundwater in the sub-basin, and other assumptions, the model should develop short-, medium- and long-term scenarios regarding the implications of water demand in the event of occurrences such as droughts and floods. The scenarios should provide effective results and corresponding indicators to enable water resource managers to make decisions regarding water allocation processes. The quantitative results of the water availability indicators in the scenarios to be presented should balance demand with ecological flow and availability.

Types of Demand and Activities

The model must be capable of distinguishing between different types of water resources, namely surface water and groundwater. Furthermore, it must also distinguish between the types of water and demands, including water supply, hydroelectricity, mining, agriculture, aquaculture, other industrial activities and tourism. In this regard, in order to ensure that the classification of water users within the model and other key elements are accurate, the supplier should consult all applicable legislation on this matter, with particular reference to the Water Act, the Licensing and Concessions Regulations, the Regulations on the Exploration and Exploitation of Groundwater, and the Regulations establishing the new surface water charges, and may propose a more appropriate classification for this purpose.

Projects in the Pipeline

The Revue sub-basin is characterised by the existence of several projects in the pipeline that will require water for their implementation. In this context, the tool must be capable of producing simulations for the short, medium and long term.

In principle, ARA-Centro, IP will provide a list of known future projects, including their location, purpose, and monthly and annual water demands, to be integrated into the model. In addition to the current projects in the pipeline, the model should be designed to accommodate future projects as they arise over time.

Updating Information

The model must be flexible, allowing for the updating of demand data, ordinarily every three months and whenever necessary. The process of updating water demand data will need to take the following factors into account:

- Users' water demands change due to variations in production;
- Raw water users sometimes cease their activities and request the cancellation of water uses and allocations; and
- The emergence of new requests for water use.

At the start and during the preparation of the consultancy, the consultant should plan to carry out campaigns for the inspection, registration and updating of water demands throughout the Revue sub-basin.

Model Users

The allocation model should incorporate access authorisation profiles for specific activities within the model, namely:

- Registration – entry and analysis of information on water demands to support water allocation recommendations;
- Groundwater Resources – entry and analysis of information on groundwater;
- Surface Water Resources – entry and analysis of hydrological information in the sub-basin;
- Head of the Water Resources Department – viewing of information for analysis and to support the water allocation opinions received;
- Director General and Division Director – viewing of information (indicators) for decision-making.

Thus, the registration unit will be responsible for the entry, processing and analysis of information regarding requested water demands, availability in relation to the ecological flow, possible usage scenarios and their respective impacts, and proposals for authorisation to issue licences for water use and exploitation. The main indicators proposed by the consultant will be analysed to determine whether to issue a favourable or unfavourable opinion regarding the requested water demand. For each authorisation, the flow rate to be pumped to the boreholes will be proposed in the case of groundwater.

In the areas of land registration and groundwater resources, they will regularly carry out simulations for water allocation. In the event of changes to water demand within the sub-basin, they must report to the Head of Department, and where necessary to the Director-General or Division Director, regarding the water situation and availability, to facilitate strategic decision-making on water resource management.

The consultant shall also propose the best water allocation model, based on their experience and the specific characteristics of the sub-basin.

Knowledge Transfer

In this context, the consultant shall ensure the training of seven (7) technicians from ARA-Centro, IP throughout the data collection process, model design and calibration at interim stages, as a means of knowledge transfer.

The knowledge transfer referred to here has nothing to do with training; therefore, training must be provided in addition to the involvement of ARA-Centro, IP technicians in the development of the models.

Data Analysis and Processing

A thorough analysis of the information collected and organised in the database will be carried out and provided to the consultant for subsequent work on model development. Whenever it is deemed necessary to collect information in the field, the technical team from ARA-Centro, IP will be immediately available to support the process.

Model Licences and Warranties

The model must be covered by a warranty of at least one (1) year following calibration and delivery to ARA-Centro, IP. During this period, should any issues arise relating to functionality, the consultant must provide the necessary technical support at no additional cost to the contracting entity.

The licence must be valid for installation on at least 5 user workstations and renewable every 3 years, during which time the model will be maintained to keep pace with likely

technological developments through updates and to ensure compatibility with other requirements.

Selection of the Model

The consultant must develop the model on a platform that does not require licence maintenance costs.

Ownership Rights

All products generated as a result of the services provided by the contractor are the property of ARA-Centro, IP, and any disclosure or commercialisation by the contractor is prohibited.

Required Materials and Equipment

During the presentation phase of the Selected Model Prototype, based on the survey conducted, the consultant must submit a proposal listing the equipment and materials required to use the model, taking into account the anticipated capacity and users. This equipment refers to computers and their peripherals, operating systems and capabilities, as well as suitable equipment for the ongoing collection of data and information (e.g. cameras, GPS, etc.) which will feed into the model during its implementation.

Duration of the Assignment

From 1st June 2026 to 30th June 2027

Deliverables and Activities

The consultant will provide the following deliverables and carry out the following activities:

Deliverable/Activity	Description	Deadline
1. Deliverable 1	Initial and Diagnostic Report with options for model selection	1 st July – 31 st August 2026
2. Deliverable 2	Hydrological Assessment Report;	1 st September – 31 st October 2026
3. Deliverable 3	Report on Demand and Growth Scenarios	1 st November 2026-31 January 2027
4. Deliverable 4	Allocation Model Report	1 st February- 31 March 2027
5. Deliverable 5	Model and accompanying Operating Manual	1 st April -30 th June 2027

Payment Schedule

The Timetable below summarises the chronological order of deliverables and indicates milestones at which IUCN will pay the Consultant.

Deliverable	Milestone payment
Deliverable1: Initial and Diagnostic Report with options for model selection	10%
Deliverable 2: Hydrological Assessment Report;	10%
Deliverable3: Report on Demand and Growth Scenarios;	20%
Deliverable4: Allocation Model Report	30%
Deliverable5: Model and accompanying Operating Manual	30%

Skills and Experience

- Demonstrated previous experience in developing at least three water allocation models of similar complexity;
- Hold a valid licence to carry out consultancy work;
- Proven experience in organisation/team management, with a minimum of 5 years' experience in similar consultancy work;

- Working language: Portuguese;
- Experience and familiarity with the water resources management framework in Mozambique will be an advantage.

Drawing on their knowledge and experience, the Consultant will develop a water allocation model for the Revue River sub-basin. This model will encompass water availability, water demand, future projects, ecological flow, and annual series of water levels and flows, all of which will influence its development. The Consultant is free to use any technique deemed most appropriate for this sub-basin and capable of producing acceptable results.

The Consultant may present various options for water allocation models, with their respective advantages and disadvantages, proposing a preferred model to ARA-Centro, IP for selection. Key personnel must possess relevant professional qualifications and experience as outlined above.

Position	Qualifications
Team Leader: Master's degree in Civil Engineering, Water Resources Engineering, Hydrology or Hydraulics.	– Minimum of 15 years; – At least 10 years' experience in water resources management and the development of water allocation models; – Knowledge of water resource policies and regulations; – Development of cadastral databases and GIS; – Modelling of spatial and non-spatial geographic information; and – Leadership and team management skills.
IT/Model Development/Database and Programming Specialist, Systems and Network Analysis.	– At least 10 years' experience in IT with knowledge of programming and the development of integrated models and databases; – At least 5 years' experience in hydrological data analysis and hydrological modelling; – Knowledge of hydrological models (e.g. SWAT, HEC-HMS, etc.); – Skills in data analysis and programming (e.g. Python, R, etc.).

Supervision and coordination

The consultant will report to and work under the supervision of ARA-Centro, IP.