DESIGN AND BUILD OF GROUNDWATER
DESALINATION PLANTS IN
RAPPELSPAN AND STRUIZENDAM,
BOTSWANA

TERMS OF REFERENCE

December 2019
1. Background

1.1 The Orange Senqu River Commission (ORASECOM)

The Orange-Senqu River originates in the Lesotho Highlands, from where it flows westwards to its mouth at Alexander Bay/Oranjemund on the Atlantic West Coast. The river basin is the third largest in Southern Africa, after the Zambezi and the Congo, covering a total area of 1,000,000 km² of which almost 600,000 km² is inside the Republic of South Africa. Four countries – Botswana, Lesotho, Namibia and South Africa - share the Basin, and the river forms the border between South Africa and Namibia at its lower reaches.

Lesotho, the upstream country falls entirely within the basin and contributes over 40% of the stream flow from only 3.4% of the total basin area but is one of the smallest users of water from the basin. South Africa is by far the biggest user of water from the Orange-Senqu River Basin, and this use drives the economic heartland of South Africa. The Botswana part of the Basin is entirely covered by the Kalahari Desert with very little surface runoff, but groundwater contributes to the water demands in this portion of the basin.

The water requirements in the lower reaches of the river are driven primarily by irrigation demands from both Namibia and South Africa, and the need to maintain environmental flows to the estuary. As the most downstream portion of a heavily used basin, water resources quality in this stretch is a concern. Similarly, the middle and lower reaches of the river are subject to periodic and often devastating floods. The Orange River estuary is ranked as one of the most important wetland systems in Southern Africa but has experienced environmental degradation. This wetland system was re-designated as a Ramsar Site, but because of its threatened status it was placed on Montreux Record in 1995.

The effective management of the Orange-Senqu River Basin is, therefore, particularly complex, but is also vital to the economy of the region. As a result, the riparian States prioritised this basin for the establishment of a Shared Watercourse Institution under the revised Southern African Development Community (SADC) Revised Protocol on Shared Watercourses. ORASECOM was one of the first of the Shared Watercourses Institutions to be established in SADC.

ORASECOM is an advisory body, issuing recommendations to its Member States (The Parties) aimed at optimizing the development and management of the water resources of the Orange-Senqu River Basin for the benefit of all the people in the Parties.
1.2 The ORASECOM Agreement

The Agreement establishes Council as a technical advisor to the Parties on matters relating to the development, utilization, and conservation of the water resources in the River System. The Parties may also assign other functions pertaining to the development and utilisation of water resources to the Commission. Article 5 of the Agreement empowers Council to take all measures to make recommendations on *inter alia*; water availability in the basin, equitable and reasonable sharing of water, studies on the development of the River System, the extent to which stakeholders should be involved in management of the system, the prevention of pollution and the control of aquatic weeds, and plans for emergency situations.

All recommendations provided by Council to Parties must be contained in a report, signed by the leader of each Delegation. These reports must also include estimates of the cost of implementing the recommendation and may suggest how these costs may be apportioned between the Parties. Recommendations to Parties must therefore not only indicate what must be done, but also how it must be done.

1.3 The ORASECOM UNDP-GEF Project to support the Strategic Action Programme Implementation

ORASECOM, with support from UNDP, managed to secure further financial support from GEF to implement selected priority activities of SAP. The UNDP-GEF project titled, Support to the Orange-Senqu River Strategic Action Programme Implementation, will be implemented by UNDP and executed by ORASECOM in the next 5 years to support ORASECOM and its member states to implement SAP. The project has been built on the Transboundary Diagnostic Analysis (TDA) which has carried out the necessary causal chain analyses in order to identify the transboundary threats to the sustainable development and management of the water resources of the Orange-Senqu Basin. Having identified and understood the threats and their causes, it was possible to identify the barriers which are preventing the removal of these threats, so that sustainable development/management of the basins water and related resources can proceed.

The overall objective of the SAP Implementation project is the strengthening of joint management capacity for implementation of the basin-wide IWRM Plan and demonstrating environmental and socioeconomic benefits of ecosystem-based approach to water resources management through the implementation of SAP priority actions in the Orange-Senqu River basin.

It is under this project, that the design and building of the groundwater desalination plants in Botswana is being undertaken. The demonstration of groundwater desalination is meant to augment the existing water resources as well reduce water stress in the Orange – Senqu River Basin.
2. Objective

The objective of this assignment is to procure the services of a team of consultants to design, build and hand-over two low-cost desalination plants in the villages of Rappelspan and Struizendam in Kgalagadi South District in Botswana. The plants are envisaged to be low-cost and use green technology to harness and utilize saline groundwater for agricultural and potable purposes.

2.1 Project Sites

The borehole in Rappelspan (number BH10922) was drilled in 2013 by the Department of Water Affairs primarily for water supply. The borehole can yield up to 5000 litres per hour. The Total Dissolved Solids (TDS) of 10000mg/l are above the maximum allowable of 7000mg/l. The borehole therefore needs rehabilitation, test pumping, water quality testing and analysis, equipping, installation of a desalination plant, reticulation of the water to an agreed site (less than 2 kilometres from the borehole), reservoirs and animal watering troughs.

The traditional hand dug well in Struizendam is 30-meters-deep and used by the community for agricultural purposes. The water is saline but drinkable by livestock. The well needs to be reconstructed, equipping, installation of a desalination plant, reticulation of the water to an agreed site (less than one kilometres from the borehole), reservoir and animal watering troughs.

3. Scope

This Consultancy will include (but may not be limited to) the following tasks:

i. Drafting of an Inception Report, which will contain a clearly defined programme of work and methodology to be used to undertake the assignment. The Inception Report should outline the project components, the associated costs and a monitoring and evaluation plan for the project.

ii. The Consultant should explore and make recommendations for appropriate desalination technologies to be used at each of the two demonstration sites taking into consideration the characteristics of each site.

iii. Design and build the agreed upon groundwater desalination plant at each of the sites. The desalination plants should be designed based on low-cost and green technologies which will make it easier and cheaper for the Government of Botswana and other stakeholders to replicate.

iv. Hand over the completed and operating desalination plants to the Government of Botswana and the Communities of the two villages. This will be
compensated by training of selected Community members on the operations and maintenance of the plants.

v. Develop and hand over an Operations and Maintenance manual to the Government of Botswana and the relevant community members.

vi. The Consultant is expected to work with stakeholders to identify opportunities of developing community enterprise(s) from the uses of brine (from the rejected water) and the available desalinated water. The Consultant should support the communities in the implementation of the enterprise(s) based on the use of brine and any other sustainable business opportunity that may arise.

4. Deliverables

It is envisaged that this Consultancy will produce the following deliverables:

i. An Inception Report that contain a clearly defined programme of work and methodology to be used for the assignment, which will have been confirmed with the Secretariat and the Government of Botswana;

ii. Report on the various costed desalination technologies that can be used in the area.

iii. A design of the Groundwater Desalination plant based on the approved concept from (ii) above;

iv. A built and operating Desalination plants;

v. Training report on the operating and maintenance of the plants. This should be accompanied by the Operations and Maintenance Manual and;

vi. Community enterprises identified and implemented.

5. Time Schedule

The Consultancy is expected to start on 01 March 2020 and be completed by no later than 30th October 2020.

6. Submission of the tender

The Team Leader should submit separate Technical and Financial Proposals clearly detailing total number of days to complete work and daily rates inclusive of all anticipated costs in South African Rands (ZAR) during the period of assignment. The term "all-inclusive" implies that all costs (professional fees, communications, consumables, etc.) that could be incurred by the consultant in completing the assignment are already factored into the daily fee submitted in the proposal. Travel costs and daily allowance cost should be identified separately in line with allocated consulting days.

Electronic Technical and Financial proposals should be submitted with a subject line clearly titled: "Design and building of groundwater desalination plants"
in Rappelspan and Struizendam in Botswana” through email to Mr Michael Ramaano (mike.ramaano@orasecom.org) with a copy to communication.orasecom@gmail.com and info@orasecom.org no later than 1600hrs on Wednesday 22 January 2020.

7. Requirements
The Consultancy Team must have at least the following:

i. At least one member with postgraduate qualification in project management, hydrogeology or relevant engineering and at least 10 years working experience;

ii. The Consultant must demonstrate experience with groundwater resources management, desalination and green technology;

iii. Experience in executing similar projects especially in arid environments;

iv. Familiarity with the Orange-Senqu River Basin.

8. Institutional Arrangements
The Consulting Team is expected to commence work as soon as possible after concluding all necessary contractual arrangements with UNDP GEF ORASECOM SAP Implementation Project.

The successful Consultant will work under direct supervision of the Environment/Water Quality Expert. The Project shall be responsible for arranging meeting venues as well as transport, meals and accommodation (if required) for participants (including the consultant(s) during national workshop consultations). Unforeseen costs incurred may be reimbursed based on acceptable justification and documentation. However, the Consultant(s) shall be responsible for supplying own office facilities, equipment, transport, meals and accommodation during fieldwork.

ORASECOM and its partners will not be responsible to arrange visa requirements for Consultant(s); however, can facilitate where necessary by giving supporting letters and will oversee arranging translation services during workshops only.