Terms of Reference for Sediments Assessment of the Cubango-Okavango River Basin

1. Background

1.1 The Cubango-Okavango River Basin

The Permanent Okavango River Basin Commission (OKACOM) was established and mandated to advise the party states (Angola, Botswana and Namibia) on sustainable long-term yield, reasonable demand, conservation criteria, development of water resources, prevention of pollution, addressing extreme events (short term problems such as droughts) and other matters pertaining to the management of the Cubango-Okavango River Basin (CORB). The role of OKACOM is to anticipate and reduce the unintended, unacceptable, and often unnecessary impacts that occur as a result of uncoordinated resource development. In recent years, OKACOM conducted Transboundary Diagnostic Analysis (TDA) which identified glaring knowledge gaps regarding sedimentology of the basin.

The TDA, the OKACOM Strategic Action Programme (SAP), and the UNDP-GEF Support to the OKACOM SAP Implementation Project Document identified limited knowledge on dynamics of sediment provenance and transport in the CORB as a major concern. These critical documents further recognise sediment dynamics as complex and critical to the ecological functioning of the CORB and its wetland systems. Furthermore, the impact of different land use activities in the CORB on sedimentation processes are largely not known due to limited understanding of the sedimentation regimes of the entire CORB system to date. The most critical knowledge gaps relate to the upstream causal factors associated with land use activities. These include not only potential disturbance in sediment transport resulting from river damming, but also issues related to land cover transformation in the source areas resulting in potential to increase erosion and sediment loads in the river system. This lack of information, coupled with evident increase in population pressure, tourism, and agricultural activities, has potential to impact the basin management planning.

Meanwhile, there is no long-term sediment transport-monitoring programme in place for the CORB across all of the three riparian states largely due to limited capacity. As part of the implementation of the OKACOM SAP, OKACOM, through support from the UNDP_GEF Project (Support to the CORD SAP Implementation project), is developing a comprehensive basin wide Environmental Monitoring Framework (EMF) which will include sediment monitoring. In anticipation of the implementation of the EMF and the
anticipated sediment monitoring plans, OKACOM through the UNDP-GEF Support to the SAP Implementation Project is commissioning this sedimentation assessment study within the basin that will document baseline conditions which will inform the development of a monitoring programme. The baseline assessment will also include capacity development among relevant technical officers within the member states.

1.2 Purpose and Objective of the Sediment Assessment

The purpose of the assessment is to determine the sediment provenance, transport mechanisms and current fluxes within the basin. The increase or decrease of sediment supply affects the dynamics and physiography of the CORB and thus indirectly acts on the delicate balance of the ecosystems in the rivers and delta. Therefore, understanding the sediment dynamics is particularly important for understanding and managing the resilience of the system and the possible threats to human livelihood, ecosystem functioning and ecosystem service delivery. For these reasons, there is a need to:

- gain better understanding of sedimentary processes specific to the CORB including a complete study of the physiography of the system in the 3 riparian states.
- support modelling of the system evolution through space and time, which is required in complement to the monitoring and will support in a progressive manner projection of future changes.
- study the relative importance of anthropic vs natural processes and thus clarify the potential of management interventions; as well as land-use/land cover change, this includes the localization of possible pollution inputs (threats to local population and livestock).

To achieve its intended purpose the objectives of the sedimentation assessment study will include (but not be limited to) the following:

- Review of Existing:
  - previous sediment studies in the basin including the sedimentology report that was produced as part of the Transboundary Diagnostic Analysis.
  - sediment management plans in the riparian states.
  - sediment monitoring activities in the riparian states.
  - data storage, analysis and sharing protocols.
  - institutional arrangements for national and transboundary water resources management.
  - policies and regulations on sediment management for riparian states.
- Develop a database and collate the existing data into the database.
- Identification of monitoring data gaps, both temporally and spatially.
- Design and implement an initial programme for monitoring sediment fluxes, both bedload and suspended load in collaboration with the Water Resources Technical Committee.
− Design and implement a sediment monitoring capacity development programme which includes training of technicians within the member states on sediment measurements methods and technics, sediment data analysis and interpretation, handling, and maintenance different equipment.
− Revise and update where necessary the current conceptualisation of sedimentation within the basin (identification and mapping of sediment sources) and develop a sediment model for the basin.
− Investigate the impact of sediment on the quality of water, flows and the ecology in within basin.

2. Tasks of the Sedimentation Assessment Study

The following tasks will be performed as part of the sedimentation assessment study:

2.1 Review the current sediment monitoring activities in the basin.

2.1.1 Sediment Management plans for the riparian states.

2.1.2 Suspended sediment monitoring and its impact of water quality, hydrological flows, and aquatic ecology.

2.1.3 Transboundary Monitoring of hydrological flows.

2.2 Existing data and information on sediment provenance and transport in the CORB compiled and analysed as part of the sediment assessment.

2.2.1 Collect, interpret, and analyse existing data and information on sediment provenance and transport within the basin.

2.2.2 Review information related to land use activities and sedimentation processes within the basin.

2.3 Provenance and Production Function of the sediments found in the basin.

2.3.1 Reconstruction of the origin of sediments within the CORB system (sedimentary provenance).

2.3.2 Assess the effect of land use on erosion and sedimentation rates in the basin.

2.3.3 Establish the relative importance of natural sedimentation processes versus anthropogenic processes.

2.3.4 Determine the stratigraphic heterogeneity of the Kalahari unit and, therewith, the geology of the upper part of the basin.

2.3.5 Assess the importance of aeolian sediment inputs.

2.4 Spatial and temporal variation of sediment transport and fate (sediment transfer function) of sediments within the basin.
2.4.1 Determine the sediment transfer function from the headwaters of the basin to the alluvial fan of the Okavango Delta (The slope changes from headwaters (relatively steep) to middle section (flat) to the delta itself (some more slope again) are supposed to be an important driver).

2.4.2 Establish the local sediment transport laws and transit times are not or only very poorly understood.

2.4.3 Study the evolution of the river dynamics in the geological past to understand possible future scenarios.

2.5 *Management of sedimentation within the basin.*

2.5.1 Establish potential impact on the system dynamics relative to increases or decreases of sediment supply caused by e.g. the construction of dams (decrease) or enhanced soil erosion (increase).

2.5.2 Trace Okavango sediments to relate causes to effects and understand the transfer function.

2.6 *Based on existing and new information design a sediment monitoring plan for the basin.*

2.6.1 Design a sediment monitoring plan for the basin including recommendation of appropriate methodology, methods, and equipment.

2.6.2 Identify appropriate sediment monitoring sites within the basin.

2.6.3 Identification of the institutional arrangements for transboundary sediment monitoring.

2.6.4 Identify areas and aspects requiring further study/investigation and optimising the monitoring network.

2.7 *Capacity Development among member states.*

The Consortium must train members of relevant OKACOM Technical Committees on sediment measurements and monitoring which include handling and maintenance of different sediment measuring equipment and sediment data analysis. The Consortium should develop a Capacity Development plan, which will include participation of Member States Technical staff in field work which will be conducted within the basin as part of the project implementation.

3. **Key Deliverables**

The consultant is responsible for production of the following key deliverables in both in English and Portuguese.

- Project *inception report* that succinctly present a detailed methodologies and methods, and an implementable workplan
− Scoping/Situational analysis report detailing existing data and information and identifying data gaps
− Monthly progress reports during the project implementation period
− A draft sedimentation assessment and evaluation report, which include a comprehensive hydrogeological assessment, a sediment model for the basin, proposed monitoring programme with a comprehensive monitoring network, methodologies, method therein and suitable equipment
− A draft final sedimentation assessment and evaluation report, which include a comprehensive hydrogeological assessment, a sediment model for the basin, proposed monitoring programme with a comprehensive monitoring network, methodologies, method therein and suitable equipment
− A final sedimentation assessment and evaluation report, which include a comprehensive hydrogeological assessment, a sediment model for the basin, proposed monitoring programme with a comprehensive monitoring network with clearly defined monitoring sites, methodologies, method therein and suitable equipment, and a database containing all the data collected during the assessment
− Closeout Workshop to be held 4 weeks acceptance of the final report.

4. Eligibility

The Consultant should be a Consortium of Academic and/or Research Institutions within the SADC region, preferably from the OKACOM member states, with proven experience in geology and environmental science (and particularly in sedimentology and wetland ecology) within CORB or similar systems. The Consortium should have reliable analytical facilities and experience with field survey in sub-Saharan Africa, particularly the SADC region. Members of the Consortium must demonstrate a proven track record of partaking in similar transboundary water resources assessment preferably in the SADC region.

5. Composition of the Consortium (Institutions) and Desired expertise and competencies

The Consortium should comprise of experts from at least three (3) Academic and/or Research Institutions based in the OKACOM member states, at least one (1) Academic and/or Research Institution from any country in SADC Region (optional) and at least one (1) Academic and/or Research Institution from abroad (optional). Membership of the Consortium can also be drawn from government institution or departments or parastatals involved in water resources management, particularly sedimentation assessment and management. The lead institution should be a Research Institute or Department/Faculty within a University (Academic and/or Research Institutions) from any of the three (3) OKACOM member states who has been actively involved in transboundary water resources management over the last ten (10) years. Experience
in river basin sediment work within the basin or similar systems is high desirable. The minimum qualifications, skills and experience for key experts, whose Curriculum Vitae are to be evaluated as part of the assessment of proposals, are as defined below.

6.1 Team Leader

Main Function:

- provide leadership and coordinate all Consortium activities, including progress planning, reporting, fieldwork coordination, and capacity development.
- analyse, and interpret effects of past, present, and future flow regimes on biota.
- assess feedbacks between river/wetland vegetation and sediment transport.
- analyse quality of water as influenced by sedimentation processes within the basin.

The leader of the Consortium should:

i. have proven proficiency with water resources management concept and engagement of multi-country transboundary watercourse stakeholder institutions and issues.

ii. be an expert in sediment dynamics, with at least a Master’s degree, but preferably a PhD in earth sciences (hydrogeology or geo-hydrology or sedimentology or geomorphology or geology but preferably a sedimentology), integrated water resources management and wetland hydro-ecology.

iii. have in-depth understanding of the interaction between sediments and vegetation in depositional systems

iv. have experience in evaluating the relationships between dynamic hydrological systems and the biota, preferably in the CORB, or similar system within the SADC region.

v. have at least 10 years’ experience in sedimentology, and experience in at least two of the following fields, preferably in the CORB: sediments characterization, sediment provenance, palaeo-environmental sedimentology, fluvial hydrology, Wetland Ecology, Ecohydrology.

vi. have demonstrated team leadership in similar sediment assessment projects within the CORB or similar systems in the SADC region.

vii. have a proven track record with transboundary projects and engagement in multi-country transboundary watercourse stakeholder institutions and issues.

viii. have proven proficiency in integrated water resources management concept and engagement of transboundary watercourse stakeholder institutions.

ix. Have proven experience in managing multidisciplinary teams with different cultures and backgrounds.

x. be fluent in English. Professional proficiency in Portuguese is desirable.

6.2 Senior Geologist/Fluvial Sedimentologist (Co-Team Leader)

Main Function:
– support and assist the Team with coordination all Consortium activities, including progress planning, reporting, fieldwork coordination, and capacity development.
– examine the palaeo-depositional environment for insights on current and future functioning of the fluvial transport/depositional system.
– design a monitoring protocols, train technicians, and identify the most appropriate, up-to-date techniques for quantifying sediment fluxes.
– contribute to the development of a sediment model for the CORB.

The Fluvial Sedimentologist and Sediment Monitoring Specialists should:

i. have at least a Master’s but preferably a PhD in fluvial sedimentology/geomorphology, geology, hydrology, or related subject.
ii. have at least 5 years’ experience working on fluvial transport processes, and the quantification of sediment fluxes at multiple scales and monitoring and river basin sediment provenance and transport.
iii. have experience in at least following fields, preferably in the CORB or similar environment: sediments characterization, sediment provenance, palaeo-environmental sedimentology, fluvial hydrology and sediment monitoring.
iv. have in-depth, demonstrable knowledge of key issues pertaining to transboundary water resources management.
v. have in-depth knowledge of applications of GIS and remote sensing in water resources studies and exposure to huge datasets is highly desirable.
vi. have experience working in multi-country transboundary river systems.
vii. be familiar with cutting edge technology and instrumentation systems for monitoring sediment fluxes.
viii. have proficiency in sediment modelling.
ix. have experience in training and transferring skills in the use of sediment monitoring equipment, data collection and analysis.
x. be fluent in English. Professional proficiency in Portuguese is desirable.

6.3. **Senior Hydrologist**

Main Function:

– to analyse past, present, and potential future flow regimes to drive projections for future sediment transport.
– assess, describe, and characterise the distribution of hydrological flows within different parts of the basin and their potential impact and influence on sediment transport and deposition.
– determine the sediment transfer function from the headwaters of the basin to the alluvial fan of the Okavango Delta (The slope changes from headwaters (relatively steep) to middle section (flat) to the delta itself (some more slope again) are supposed to be an important driver).

The Senior Hydrologist should have:
i. have at least a Master's Degree, but preferably a PhD in hydrology,
ii. have at least 10 years’ experience in hydrological modelling, and assessment of impacts of climate change and anthropogenic activities on fluvial systems, preferably in the CORB, or in the SADC region.
iii. have a proven track record with transboundary projects and engagement of multi-country transboundary watercourse stakeholder institutions and issues.
iv. be fluent in English. Professional proficiency in Portuguese is desirable.

6.4 **Senior Land Management and Geographic Information Management Specialist**

Main Function:

- to carry out trend analysis on land-use land cover change (LUCC) and assist with developing models for LUCC-Sediment flux relationships.

Should have:

i. at least a Master's Degree but preferably a PhD in Land Management, with strong background in GIS and Remote Sensing or related discipline and proven experience in river basin land use land cover changes and impact of different land use practices on sediment provenance and transport.
ii. in-depth knowledge of key issues pertaining to the land and water resources management in national and transboundary water courses in the SADC region is preferable.
iii. in-depth understanding of regional sediment provenance and transport, applications of GIS and remote sensing in water resources studies and exposure to large datasets.
iv. a minimum of 10 years of relevant experience with GIS software e.g. ArcGIS and Quantum GIS, ERDAS, applications of GIS and remote sensing in water resources studies and exposure to huge datasets.
v. previous experience similar projects at regional projects level within the SADC region is desirable.
vi. be fluent in English. Professional proficiency in Portuguese is desirable.

6.5 **Junior Sedimentologists (three in total, one from each country)**

Main Function:

- understudy the entire project and be involved in all aspects of the project particularly data collection and analysis, development of monitoring programmes as practicable.

The Junior Sedimentologists should:

i. have at least a Bachelors Degree, but preferably a Masters in Earth Sciences preferably in the field of sedimentology, wetland ecology or any other related field.
ii. have at least 3 years' experience in sedimentology, and experience in one of the OKACOM countries.

iii. have a proven track of sedimentology projects in one or more of the OKACOM countries.

iv. be a national of one of the CORB Member States.

6.6 **At most three (3) Associates**

These are senior professionals with vast experience in sedimentology and water resources work in any part of the world but preferably transboundary basins with similar characteristics to CORB. Associates are not considered substantive members of the consulting team but can be can travel to partake in some aspects of the projects with support from the project budget. They can also contribute to quality assurance by reviewing key deliverables/reports before they are submitted to the client.

7. **Schedule and Duration of Assignment**

This is a once-off assignment without any obligation for follow-up work and it is expected to run for 12 months. The Consultant shall include in their submission a proposal for the deployment of the key experts and any non-key experts and support staff deemed necessary to timely delivery of the assignment.

For the Consultant / Team of Experts to achieve the set deliverables, a total period of twelve (12) months are estimated to complete the assignment. Table 1 below presents the anticipated days for consultant to execute the assignment.

<table>
<thead>
<tr>
<th>Schedule of Deliverables</th>
<th>Timing</th>
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<tbody>
<tr>
<td>Project inception report and inception workshop detailing the comprehensive methodology and methods, schedule of work that will deliver the project.</td>
<td>2 weeks after signing the contract</td>
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<tr>
<td>Scoping/Situational analysis report detailing the current status of knowledge of sedimentology in the basin, existing sedimentation management systems including sediment monitoring, status of sedimentation in the basin, existing data and information and data gaps</td>
<td>18 weeks (4 months and 2 weeks) after acceptance of the inception report. Monthly progress reports to be submitted during the four (4) months scoping period.</td>
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<tr>
<td>A draft sediment assessment report • Sedimentation and hydrogeology processes review and evaluation report. • Proposed monitoring network, with proposed data storage and sharing protocols and Institutional arrangements. • A database containing all the data collected during the assessment.</td>
<td>16 weeks (4 months) for draft report writing and two weeks preparation for Technical Reference Group meeting) after acceptance of the scoping report. Monthly progress reports during the two (2) months of the draft report development.</td>
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<tr>
<td>Schedule of Deliverables</td>
<td>Timing</td>
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<tr>
<td>A draft final sedimentation assessment report</td>
<td>4 (1 month) weeks after acceptance of the draft report</td>
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<tr>
<td>• sediment review and evaluation report</td>
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<tr>
<td>• proposed monitoring network, with proposed data storage and sharing protocols and Institutional arrangements</td>
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<td>• a database containing all the data collected during the assessment</td>
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<tr>
<td>Closure workshop: 10 hard copies of the Final report in English and Portuguese, Database, Data and all instruments that were used for data collection</td>
<td>4 (1 month) weeks after acceptance of the Draft Final Report</td>
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<td><strong>Total number of weeks</strong></td>
<td><strong>48 weeks</strong></td>
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8. **Key Documents to accompany the proposal**

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<th>Documents</th>
<th>Clarifications</th>
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<tr>
<td>Academic Qualification</td>
<td>Certified copies of Tertiary Academic Qualifications for all key members of the team must be submitted.</td>
</tr>
<tr>
<td>Legal and Business Documents</td>
<td>All legal company documents including the Certification of Incorporation (optional)</td>
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<tr>
<td>Tax</td>
<td>Bidders must summit a Tax clearance certificate for the year 2019 (optional)</td>
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<tr>
<td>Letter of commitment</td>
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9. **Evaluation of the Proposal**

In addition to OKACOM internal evaluation processes, the Consulting Team will be evaluated based on qualifications and the years of experience, as outlined in the qualifications/requirements section of the Terms of Reference. Furthermore, the Consultant will also be evaluated on the following methodology:

- Technical Criteria weight: 70%
- Financial Criteria weight: 30%

Contract awarding shall be made to the Consulting Team through the focal Team Leader whose offer has been evaluated and determined as responsive/compliant/acceptable; and having received the highest score out of a pre-determined set of weighted technical and financial criteria specific to the Terms of Reference.

If you do not receive any notification 30 days the closing date, it means your application was not successful.

10. **Institutional Arrangements**

The Consulting Team is expected to commence work as soon as possible after signing a contract with OKACOM. The successful Consultant will work under direct supervision of the OKACOM SAP Implementation Project Regional Project Manager
supported by Senior Scientific Officer. OKACOM 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. However, the Consultant(s) shall be responsible for supplying own office facilities, equipment, transport, meals and accommodation during fieldwork. OKACOM and its partners will not be responsible for visa arrangements for Consultant/s; however, OKACOM can facilitate where necessary by giving supporting letters and will oversee arranging translation services during workshops only.

10.1 Contractual Arrangements

OKACOM will enter into a contractual agreement with the Consortium lead institution only, while the lead institution will sub-contract other Consortium member institutions.

11. Payment Schedule

The Consultant shall receive payments for service fees upon certification of the completed tasks satisfactorily, as per the following payment schedule:

- Upon submission and approval, the Inception Report: 10%
- Upon submission and approval of the Scoping Report: 20%
- Upon submission and approval of the Draft Report: 40%
- Upon submission and approval of the Draft Final Report: 20%
- Upon submission of the Final Report: 10%

12. Submission of the Proposal

The Team Leader should submit a technical and financial proposal online in separate folders or folders envelops. All interested consultants should visit the OKACOM website in the ‘Procurement’ section to access the Terms of References and the Online Submission Platform. The Technical and Financial proposal should be submitted online by Friday 14 August 2020 at 12:00 (CAT).

The submissions should include:

i. Lead Person with contact details (telephone, e-mail address, office physical address).

ii. Short cover letter outlining the suitability of the Consortium/Consultant for this assignment.

iii. A full technical proposal demonstrating the understanding of ToRs by assembling a suitable team, clearly articulating the proposed methodology, deliverables, and timelines.

iv. A detailed financial proposal in BWP or USD.
v. CV and Summary of qualifications and experience for the Team Members, clearly indicating the Lead Consultant and supporting consultants with clear articulation of their roles in the consultancy.

vi. Certified copies of academic certificates for all the team members.

vii. Registration documents which include a certificate of incorporation, share certificates (list of Directors) and the latest Tax Clearance certificate (if it’s a company) if applicable.

viii. A letter of commitment from the Institution Senior Management Authorising Team Members to partake in this consultancy.

For any correspondence or clarification contact the OKACOM Senior Scientific Officer Dr. Mpaphi Casper Bonyongo at casper.bonyongo@okacom.org and/or telephone +267 3161593.