Terms of Reference:

Hydrological Modelling to support Water-Energy integrated analysis of Hydropower and Floods in the Drin River Basin

In the framework of the Project "Promoting the Sustainable Management of Natural Resources in Southeastern Europe, through the use of Nexus approach" (SEE Nexus Project) supported by the Austrian Development Agency and implemented by the Global Water Partnership - Mediterranean

1. Background

The purpose of the SEE Nexus Project is to introduce the Water-Energy-Food-Ecosystems Nexus approach and catalyse action for its adoption and implementation in South East Europe's (SEE) Economies (Albania, Bosnia and Herzegovina, North Macedonia, Kosovo[1]*, Montenegro and Serbia), at the national and transboundary basin levels. Doing so, the Project will also enable the identification of nexus related issues to be addressed in the geographical areas that its activities focus on (transboundary basin of Drin, transboundary basin of Drina, and Albania), and create the conditions for financing actions to address four of these issues.

Action at the Drin Basin (shared by Albania, North Macedonia, Montenegro and Kosovo*) was uncoordinated until the development of the Shared Vision for the Sustainable Management of the Drin Basin and the signing of a related Memorandum of Understanding (MoU, Tirana, 25 November 2011) by Ministers from the water and environment Ministries of the Drin Riparians. This was the outcome of the Drin Dialogue coordinated by the Drin Riparians, with the support of the Global Water Partnership - Mediterranean (GWP-Med) and the United Nations Economic Commission for Europe (UNECE). The main objective of the Drin MoU is achieving the Shared Vision: "*Promote joint action for the coordi-nated integrated management of the shared water resources in the Drin Basin, as a means to safeguard and restore, to the extent possible, the ecosystems and the services they provide, and to promote sus-tainable development across the Drin Basin*". The Drin Coordinated Action for the implementation of the Drin MoU (Drin CORDA) was put in place after the MoU was signed.

The Drin River Basin, is the focus of a Nexus assessment process which has been initiated through a collaboration with the GEF-funded project "*Enabling Transboundary Cooperation and Integrated Water Resources Management in the extended Drin River Basin*", implemented by UNDP and managed by Global Water Partnership - Mediterranean (GWP-Med) in cooperation with UNECE. The

[1] This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence.

Transboundary Diagnostic Analysis (TDA) of the basin, developed as part of this project, included a "Thematic Report" on the water-food-energy-ecosystems Nexus that was prepared in 2018-2019, including the identification and qualitative assessment of key inter-sectoral Nexus-related issues in the basin.

The Phase II of the Drin Nexus Assessment will be carried out in the framework of the SEE Nexus project funded by the Austrian Development Agency (ADA) and implemented by GWP-Med in partnership with the UNECE.

One of the key topics identified in the Nexus Thematic Report as requiring further analysis, is how to reach integrated optimisation of power generation and flood risk management in the Drin river basin, which entails cooperation and coordination among the hydropower plants (HPPs) operators across the basin and across borders. To serve this, the Nexus Assessment will investigate in a quantitative manner the costs and benefits of coordinated operation of HPPs under different scenarios. This analysis needs to be backed by an integrated water-energy model that links the hydrological features of the basin with the national power grids that extend beyond the basin borders, in each riparian country.

A team of energy modellers has been contracted under the Project who will build an ad hoc multi-country energy model representing the Electricity Systems of the Drin riparians. In order to effectively build an integrated model of the Drin water-energy linkages, this team needs to be supported by an hydrological expert with in depth knowledge of the Drin Basin Flood Forecasting System[2] .

The Project Team in coordination with the energy modellers, has identified the following key scenarios that will be explored in the context of the Assessment:

1. Current situation (BAU)

This scenario represents the current situation in the Drin with the HPPs operation not considering the flood forecasting system.

2. New dam (Skavica) (ND)

A new HPP on the Drin is planned in Skavica, Albania. This will produce more energy and provide flood protection. What will be its impact on energy (power generation) and water (flood control, availability downstream)?

3. Climate Change (CC)

Climate change is expected to affect the region through changing temperatures, precipitations and water availability. What will be the impact on HPP production (and in turn, on security of electricity supply)?

4. Flood protection (FP)

Can HPP operation be optimized towards improved flood management at basin level? What would be the implications on HP production?

5. HP Cascade Optimization (HCO)

Can HP operations be optimized towards optimal energy production at basin level? What would be the implications on HP production and on flood risk?

[2] Developed with the support of German Development Cooperation (GIZ) and donated to the Hydro-meteorological institutes of the 4 Riparians in the framework of the GIZ project "Adaptation to Climate Change through Transboundary Flood Risk Management in the Western Balkans". It is based on the Panta Rhei hydrological model.

The scenarios were presented and discussed during the Drin Experts Working Groups Meeting, the Drin Stakeholders Conference and the Drin Core Group Meeting, held in Tirana, Albania between 28-31 January 2020.

2. Objective of the Assignment and description of Tasks

To serve the aim of the analysis outlined in the previous section, the objective of the present Assignment is ensuring the effective linking of the hydrological model with the multi-country power system model, carrying out related analysis, and providing related outputs and insights.

The specific tasks required from the expert are as follows:

Task I. Detail the scope and structure of the integrated energy-hydrology model, and define related data needs (in close coordination with the energy modellers)

(a) Define in detail, in coordination with the energy modellers, the key assumptions and questions under each of the above mentioned scenarios that will be modelled, including an elaboration and definition of "improved flood management" and "optimal energy production" under the FP and HCO scenarios respectively. A 2-day working meeting with the energy modellers will be required at the onset of the assignment.

(b) On the basis of the above, list in detail the required data (hydrological, technical or otherwise) that need to be obtained or validated in order to carry out the integrated modelling exercise (including, notably regarding the Skavica dam).

Task II. Link the hydrological model to the energy model and perform related analysis

(a) Ensure, for each of the scenarios, the effective linking of the Panta Rhei hydrological model for the Drin Basin with the multi-country power system model developed by the energy modellers, in close coordination with them;

(b) Carry out, for each of the scenarios, the analysis (including flood mapping using appropriate hydrological software) corresponding to the key assumptions and questions laid out as part of Task I, in cooperation with the energy modellers as required;

(c) Conduct further modelling if requested and to the extent possible within the scope of this ToR, to address potential comments from partners and local stakeholders.

Task III. Contribute to the preparation of the report on "Hydropower and Floods" Chapter of the Drin Nexus Assessment Report

(a) Provide results from the hydrological model to the energy modellers in any form requested, including a report (around 10 pages), which will be used by the energy modellers to prepare a draft of the "Hydropower and Floods" Chapter of the Drin Nexus Assessment Report, highlighting clearly:

- Description of the models and how they link (technically) to the multi-country energy system
- Insights and outputs relevant to flood risk/hazard mapping for the basin under each scenario
- Insights and outputs relevant to changes in flood buffers in the reservoirs and changes in power generation under each scenario
- Data used, main assumptions, and list of any remaining data gaps
- Suggestions for changes in the rules of operation of HPPs in the basin or any other technical aspects of cooperation among HPP operators, that could contribute towards improved and effective related coordination among HPPs operators.

(b) Address potential comments from partners and stakeholders (including e.g. UNECE, GWP-Med, Drin Core Group, utilities, experts) as appropriate and share an improved version of the report to the energy modellers.

Task IV. Participation in consultation meetings and policy-dialogues

(a) Present as requested by GWP-Med results and outputs of the modelling exercises during the meetings of the Drin Core Group (provisionally May and October 2020), the Drin Experts Working Groups meeting and Drin Stakeholders Conference (provisionally October 2020) or other related events (any travel-related costs will be covered by GWP-Med);

(b) Discuss data, model, and results with energy utilities, facilitate transboundary dialogues on modelling results, give demonstration of modelling tool as required.

3. Contract price, deliverables and payments

The maximum lump sum fee for this assignment is 14.000 € Gross Total (including all foreign taxes and the 20% Greek tax when non-double taxation is applicable).

All payments shall be made upon reception and acceptance/verification of the deliverables, as laid out in the schedule below. Claims for payment will be made through an Invoice accompanied by proof of delivery.

The expert may be asked to travel to participate in working and/or consultation meetings related to the assignment activities. Travel-related costs to participate in these meetings will be covered separately by GWP-Med.

Task	Deliverables	Deadline	Payment
1. Detail the scope and structure of the integrated energy-hydrology model, , and define related data needs (in close coordination with the energy modellers)	Scoping report, including detailed list of data needs	20 March 2020	20%
2. Link the hydrological model to the energy model and perform related analysis	Analysis report	15 June 2020	35%
3. Contribute to the preparation of the report on “Hydropower and Floods” Chapter of the Drin Nexus Assessment Report	Report	1 October 2020	30%
4. Participation in consultation meetings and policy-dialogues	Presentations	30 November 2020	15%

4. Duration of the Contract

The consultancy will commence work upon signature of the contract and continue until 30 November 2020.

5. Location and Language of the Assignment

The location of the assignment will be the location that the Consultant lives.

The language for all documents and reports as well as for all communication is English. Bad quality of language used in the report may provide grounds for the final payment to not be made.

6. Qualification and Experience

The successful Expert must have the following qualifications and experience:

Academic Qualifications

- University and Post-graduate degree (Masters or equivalent), on Hydrogeology and/or related Engineering degree.

Work Experience

Required

- Professional experience relevant to hydrological research, modelling and assessments;
- Hydrological experience relevant to the Drin river basin, including experience with the Panta Rhei model
- Experience with the HEC-RAS or othe related flood mapping software.

Desired

- Very good understanding of technical and policy issues related to the interface of hydropower and flood management;
- Working experience with national, regional or international institutions and stakeholders in the Drin river basin.

Language skills required

English is the working language for this assignment, therefore excellent oral and written communication skills in English are required.

Excellent knowledge of Albanian and/ or Macedonian language is required.

Requirements (ON/OFF)

- A University and Post-graduate degree (Masters or equivalent), on Hydrogeology and/or related Engineering degree.
- Excellent Knowledge of English Language
- Excellent Knowledge of either Albanian and/ or Macedonian language

7. Evaluation Criteria

Criteria - min. 100 points, max 150 points per Criterion:

- Number of years of professional experience relevant to hydrological research, modelling and assessments.
  Minimum of 12 years of experience are required.
- Number of hydrological-related assignments or activities on the Drin river basin.
  Minimum of 1 assignment is required.
- Number of assignments or activities relevant to flood forecasting, monitoring or mapping.
  Minimum of 1 assignment is required.

- Number of assignments or activities relevant to hydropower plants
- Number of assignments or activities involving national, regional or international institutions and stakeholders in the Drin river basin

Failure to provide the minimum requirements in any of the above is considered ground for disqualification.

8. Award Criterion - Evaluation of offers

The Award criterion is the most economically advantageous tender on the basis of best price / quality ratio.

Offers shall be evaluated as follows:

Name of Firm / Participant:			
(1) Criterion	(2) weighting (w)	(3) points of criterion 100p Base +10p for extra criteria over base up to 50 additional points	(4) Score = (2) x (3)
Number of years of professional experience relevant to hydrological research, modelling and assessments	20%		
Number of hydrological-related assignments or activities on the Drin river basin	40%		
Number of assignments or activities relevant to flood forecasting, monitoring or mapping	25%		
Number of assignments or activities relevant to hydropower plants	10%		
Number of assignments or activities involving national, regional or international institutions and stakeholders in the Drin river basin	5%		
UTO	100%		

In case of equality of overall scores, the retained offer is the one whose corresponding technical Offer received the highest rating.

Evaluation of Technical Offers

Each evaluation criterion is evaluated autonomously, according to the respective technical offer submitted. The relative scoring of each evaluation criteria is the outcome of its scoring multiplied by its weighting. The overall score of the technical offer is the sum of the relative scoring of all the evaluation criteria.

The overall score of the technical offer is calculated on the basis of the following formula:

UTO = w1 x c1 + w2 x c2 +……

where w1 + w2 + …. = 100

For the overall score which will determine the ranking of offers, technical evaluation will be weighted with 70%.

Evaluation of the Financial Offer

Each financial offer is evaluated on the basis of the following formula:

UFO = 100 x max amount / financial offer

For the overall score which will determine the ranking of offers, financial evaluation will be weighted with 30%.

Offers which have been rejected as inadmissible or as not meeting the minimum requirements shall not be evaluated.

Identification of the most economically advantageous offer on the basis of best price / quality ratio

The final listing of the most economically advantageous offers will be made on the basis of the following formula:

U = UTO x 70% + UFO x 30%

Where U is the total scoring if each offer

The most economically advantageous offer is the one with the greater value of U.