ICPDR IKSD

International Commission for the Protection of the Danube River

Internationale Kommission zum Schutz der Donau

Nutrient emission modelling to support the assessments of the 3rd Danube River Basin District Management Plan

Terms of Reference

April 2020

The winner of the open tender for Nutrient emission modelling for the Danube River Basin to support the assessments of the 3rd Danube River Basin District Management Plan will be supported by DG ENV LIFE and receive funding from the European Union.

1 Subject

The International Commission for the Protection of the Danube River (ICPDR) announces this Tender on performing nutrient emission modelling to support the assessments of the 3rd Danube River Basin District Management Plan (DRBM Plan).

2 Technical specifications

2.1 Background

The ICPDR, being the organization mandated by the Danube countries to coordinate water management and the implementation of the EU Water Framework Directive (WFD) on transboundary level, develops river basin management plans for the Danube River Basin (DRB) every 6 years. Publishing the 3rd DRBM Plan is due 2021, data collection and technical work supporting its development have been started in 2019.

Basin-wide assessment of the nutrient emissions is an important part of the river basin management plans. Spatial pattern of emissions and regional emission hot-spots, the share of various sources and pathways, river loads transported to downstream sub-catchments and to the Black Sea and nutrient retention capacity of rivers and reservoirs are crucial information for understanding the nutrient inputs to and fluxes of the DRB water bodies. To obtain such a complex and highly variable information over a large basin, a comprehensive and coherent assessment tool (water quality model) is needed that is able to examine complex environmental processes in highly a heterogeneous region in a relatively simple and pragmatic way.

The MONERIS[1] water quality model has been successfully adapted and applied for the DRB several times in the last two decades including two previous management plans. MONERIS is a steady state, watershed-scale, lumped parameter empirical model and is able to estimate nutrient emissions of surface water bodies according to long-term average hydrological conditions and to predict the possible impacts of several management objectives on water quality. It has been proven to be as an appropriate tool to assess the nutrient emissions at regional scale and to support the development of river basin management plans for the DRB and the Danube countries. However, the model needs to be regularly updated, fine-tuned and re-run in order to describe and assess the current situation and

[1] Venohr, M., Hirt, U., Hofmann, J., Opitz, D., Gericke, A., Wetzig, A., Natho, S., Neumann, F., Hürdler, J., Matranga, M., Mahnkopf, J., Gadegast, M., Behrendt, H. (2011) Modelling of Nutrient Emissions in River Systems - MONERIS - Methods and Background. International Review of Hydrobiology, 96(5) 435-483.

updated management scenarios in line with the WFD requirements and the needs of the Danube countries.

Based on the success of the previous applications and the comprehensive database The ICPDR decided to further use the MONERIS model for the basin-wide nutrient emission assessments of the 3rd DRBM Plan and asked the ICPDR Secretariat to seek competent institutions which are able to accomplish the modelling task.

Within this activity, the model used for the DRBM Plan - Update 2015 is to be technically upgraded and the model calculations need to be updated. This has to include the incorporation of methodological changes according to the latest model developments, restructuring the model analytical units in line with the current sub-catchment delineation of the ICPDR and a comprehensive and transparent update of the input data set according to the latest information available from the Danube countries and international data sources. The model has to be re-calibrated and validated against measured nutrient loads and the results on emissions need to be assessed (spatial distribution of the emissions, source and pathway apportionment, country contributions). Moreover, the former management scenarios have to be revised and updated in order to have a more realistic set of designed scenarios and to estimate the potential future impacts of measure implementation on the basin-wide nutrient emissions. The management scenarios (e.g. measures in wastewater, industrial and agricultural sectors) have to be redefined according to various time horizons (e.g. baseline, short-term, long-term) and in line with the main economic and environmental drivers of the region (financial development of the countries, climate change impacts, agricultural changes).

The outcomes of the work will provide direct inputs to the development of the 3rd DRBM Plan and will contribute guiding the related water management activities in the DRB until 2027. Model results on current nutrient emissions will serve the pressure assessment whereas scenario analysis will support the elaboration of the Joint Program of Measures.

2.2 Details of the requested services

The Tenderer is requested to provide the following services:

a) Update of all relevant temporal input data of the model for the period of 2015-2018 and all relevant spatial information as well as other specific inputs and parameters by collecting necessary information from either the ICPDR or international data sources or national data sets.
b) Update of the model structure based on the ICPDR reference sub-catchment map.
c) Incorporation of the latest developments of the model MONERIS into the basin-wide model algorithm.
d) Model calibration and validation against measured nutrient river loads.
e) Calculation of annual average nutrient emissions for the DRB for the reference period (2015-2018) and at analytical unit (reference sub-catchment), including pathway and source apportionment.
f) Incorporation (parameterisation) of the agreed future management and climate change scenarios into the model covering several sectors (urban wastewater, industry, agriculture) by adjusting model input data or parameters.

g) Calculation of nutrient emissions for the DRB according to the agreed future scenarios for long-term average hydrological conditions and at analytical unit level.
h) Reporting on the modelling exercise including data collection, model improvement, calibration-validation, assessment of the results, scenario development and analysis.
i) Information exchange and dialogue on the work progress and any modelling-related issues with the ICPDR during the project.
j) Participation in the meetings of the ICPDR Pressures and Measures Expert Group in autumn 2020, spring 2021 and autumn 2021 to discuss the model results with experts of the Danube countries.

2.3 Project duration

The project will start immediately after signing the contract and will finish on 15 of December 2021.

2.4 Deliverables and deadlines

1) Provision of the draft results for the reference period (2015-2018) at analytical unit scale in electronic format (database) by 31 October 2020.
2) Submission of the 1st Progress Report on the modelling in electronic format by 31 October 2020.
3) Provision of the updated draft results for the reference period and the draft results for the future scenarios at analytical unit scale in electronic format (database) by 30 April 2021.
4) Submission of the 2nd Progress Report on the modelling in electronic format by 30 April 2021.
5) Provision of the final input data and all final results at analytical unit scale in electronic format (database) by 31 October 2021.
6) Submission of the Final Report on the modelling in electronic format by 31 October 2021.

2.5 Tender documentation to be filled in by the Tenderer

The Tenderer is requested to provide the following information in the bid:

- **List of References** proving the experiences and competency of the Tenderer in the format attached hereto as **Annex A**;
- **Breakdown of Prices** in the format attached hereto as **Annex B**.

The listed documents will be parts of the Contract between the selected Tenderer and the ICPDR. The tendering procedure, the submission conditions and the evaluation process are described in the **Instructions to Tenderers**.

3 Price and Payment

In full consideration for the complete and satisfactory performance of the modelling tasks under this Tender, the ICPDR shall pay the successful Tenderer a price up to the amount indicated in Annex B.

Payment will be done only for the tasks listed in the Terms of Reference based on the unit prices and working hours per task to be indicated by the Tenderer in Annex B.

The ICPDR shall effect payments to the selected Tenderer according to the Contract, which will be prepared by the ICPDR based on the conditions of the Terms of Reference after the Tender evaluation. Payment shall be issued in two instalments upon Contract signature (30%) and delivery and acceptance of the final results and the Final Report (70%).

4 Special Conditions

The selected Tenderer shall use the MONERIS model for the emission assessments and shall manage the elaboration of the current input database, calculation software and result assessment interface.

The ICPDR shall make available its data and information relevant for the modelling to the selected Tenderer. In particular, the urban wastewater and industrial emission inventories, water quantity and quality data, reference sub-catchment map of the DRB and the previous model input database and outputs shall be provided by the ICPDR. Moreover, the ICPDR shall support specific data collection needed in the Danube countries.

The selected Tenderer shall closely coordinate with the ICPDR Secretariat and the Pressures and Measures Expert Group (PM EG), particularly for the input data collection and the definition of management and climate change scenarios.

During the project, the selected Tenderer has to participate in three meetings of the PM EG and to present the work progress. Moreover, the selected Tenderer shall be ready to present the interim results to and to discuss any modelling details with the representatives of the ICPDR and the PM EG after pre-announcement.

The selected Tenderer has to be available for consultation on and potential fine-tuning of the final results and the Final Report after the final submission deadline until the project termination (from 31 October 2021 to 15 December 2021).

All communication and reporting must be done in English.