



Enabling
& Transboundary Cooperation
& Integrated Water Resources Management
in the extended **DRIN RIVER BASIN**



Pilot Project “Preparation of Wastewater Management Decision Support Tool”

In the framework of:

GEF Project “Enabling Transboundary Cooperation and Integrated Water Resources Management in the Extended Drin River Basin”



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Introduction

The Drin Memorandum of Understanding

Coordinated action at the Drin Basin level has been absent until the development of the Shared Vision for the sustainable management of the Drin Basin and the signing of a related Memorandum of Understanding (Tirana, 25 November 2011) by the Ministers of the water and environment management competent ministries of the Drin Riparians i.e. Albania, The Former Yugoslav Republic of Macedonia, Greece, Kosovo and Montenegro. This was the outcome of the Drin Dialogue coordinated by the Global Water Partnership Mediterranean (GWP-Med) and UNECE.

The main objective of the Drin MoU is the attainment of the Shared Vision: *“Promote joint action for the coordinated 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 sustainable development across the Drin Basin”*.

The Drin Coordinated Action

A process called the “Drin CORDA”, Drin Coordinated Action for the implementation of the Drin MoU, was put in place after the signing of the latter.

Following the provisions of the MoU an institutional structure was established in 2012. It includes:

- The **Meeting of the Parties**.
- The **Drin Core Group (DCG)**. This body is given the mandate to coordinate actions for the implementation of the MoU.
- Three **Expert Working Groups (EWG)** to assist the DCG in its work:
 - Water Framework Directive implementation EWG.
 - Monitoring and Information exchange EWG.
 - Biodiversity and Ecosystem EWG.

The **DCG Secretariat** provides technical and administrative support to the DCG; Global Water Partnership – Mediterranean (GWP-Med) serves by appointment of the Parties through the MoU as the Secretariat.

An Action Plan was prepared to operationalize the Drin CORDA. This has been subject to updates and amendments in accordance with the decisions of the Meeting of the Parties to the Drin MoU and the DCG. The DCG and its Secretariat guides the implementation of the action plan while its implementation is currently being supported by the Global Environment Facility¹ (GEF); see below.

The GEF Drin Project

The Global Environment Facility (GEF) supported Project “Enabling transboundary cooperation and integrated water resources management in the extended Drin River Basin” (GEF Drin Project) is aligned in content, aims and objectives with the Action Plan and the activities under the Drin CORDA.

The objective of the project is to *promote joint management of the shared water resources of the transboundary Drin River Basin, including coordination mechanisms among the various sub-basin joint commissions and committees*. Albania, The Former Yugoslav Republic of Macedonia, Kosovo and Montenegro are the Project beneficiaries.

The GEF Drin project is structured around five components:

- a. Component 1: Consolidating a common knowledge base
- b. Component 2: Building the foundation for multi-country cooperation

¹ www.thegef.org



- c. Component 3: Institutional strengthening for Integrated River Basin Management (IRBM)
- d. Component 4: Demonstration of technologies and practices for IWRM and ecosystem management
- e. Component 5: Stakeholder Involvement, Gender Mainstreaming and Communication Strategies

The Project is implemented by UNDP and executed by the Global Water Partnership (GWP) through GWP-Mediterranean (GWP-Med) in cooperation with UNECE; GWP-Med is responsible for the realization of the Project. The Drin Core Group is the Steering Committee (SC) of the Project.

Demonstration Activities under the GEF Drin Project

Within the context of the project, Pilot Demonstrations under Component 4 are intended to provide multiple benefits to allow countries to (i) accrue direct experience on approaches, technologies, practices and organizational settings novel to the region and test their cost effectiveness and feasibility in the regional context, (ii) test cooperative arrangements, (iii) feed into the SAP formulation process.

The Pilot Project *“Wastewater Management Decision Support Tool”* is one of the six Demonstration activities of the GEF Drin Project. The objectives of this Pilot are to:

- Develop a Drin Wastewater Management Decision Support Tool to be used by competent authorities in the Drin Basin, for the identification of the most environmentally appropriate and cost-efficient solutions to address wastewater related problems in ecologically important areas.
- To test the Drin Wastewater Management Decision Support Tool for the case of Shkodra city and identify the most environmentally appropriate and cost-efficient solutions in terms of wastewater treatment methodology and infrastructure to address wastewater related problems.

The Pilot Project “Wastewater Management Decision Support Tool”

The Wastewater Management Decision Support Tool (WEMDST) tool is a decision support tool that helps with planning of new wastewater treatment plants and solutions on catchment or city level. It can help planners identify which agglomerations should be equipped with wastewater treatment technologies first to maximize the effect on river bodies.

The WEMDST model follows the DPSIR framework (Drivers, Pressures, State, Impact, Response model of intervention), which is a causal framework for describing the interactions between society and the environment. The drivers (inhabitants, agriculture, industries) are generating pressures (wastewater, fertilizers, pesticides) that are released into environment and therefore creating a state (polluted rivers), which eventually leads to the impacts to the environment. Application of measures can mitigate drivers, pressures, state, or the impacts.

The goal of the WEMDST tool is to assess measures that would reduce pressures (construction of Wastewater Treatment Plants (WWTPs)) and therefore improve the state of the rivers.

WEMDST identifies pressures and suggests actions for the target improvement of current status in the field of Urban Wastewater Treatment (UWWT) with scalable solutions (using parametric curves). The tool demonstrates impact on recipients in case of wastewater treatment (WWT; secondary or tertiary). It assesses cost estimation for different WWT scenarios and provides visualization of agglomerations. It considers the quantity, quality and temporal variations of urban wastewater and overall runoff.

The evaluation and selection of wastewater treatment methodology and infrastructure is based on alternative scenarios for two parameters:

- present and projected future loads of pollutants in influent wastewater (as defined under Urban Wastewater Treatment Directive)
- rate of wastewater producers connected to the sewer system over those still using septic tanks, presently and in the future. The trends of the water quality of the discharged effluent of the treatment plant/system will be harmonized with the provisions of the Water Framework Directive.

An overview of the Wastewater Decision Support Tool for the Drin River Basin is shown in the figure below. The model offers information on the current state of river quality in Drin catchment area and the possibility of predicting river quality and indicative infrastructure costs (both investment and operating) for various pre-set or custom scenarios (e.g. secondary treatment applied for all agglomerations above 2000 PE).

INPUTS – predefined for the DRINI river basin (current state model)

- Connected river network of watercourses on Drini river basin
- Pressures – identified agglomerations (above 2.000 inhabitants) and modelled loads from agglomerations according to the number of inhabitants
- Connecting agglomerations to river network
- Modelling data for the river network – hydraulics (characteristic cross-sections, dams, temperature regime and oxygen intake)
- Existing Waste water treatment plants on the river basin, their capacity and efficiency
- Hydrological data – discharges – average discharges for summer month (June)
- Available water quality data of watercourses for the calibration and validation purpose

Preparation of Wastewater Management Decision Support Tool

In the framework of Memorandum of Understanding for the Management of the Extended Transboundary Drin Basin GEF Project "Enabling Transboundary Cooperation and Integrated Water Resources Management in the Extended River Basin"

WEMDST
Wastewater Treatment Decision Support Tool for Drin River Basin
Schematic representation of inputs, models and modelling results, November 2019



<http://wemdst.apps.vokas.si/map>

All inputs integrated and modelled by QUAL2K water quality model

River quality at current state

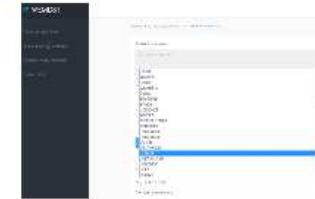


SCENARIO ANALYSIS – user modified inputs

Selection of the agglomeration(s) for which the future scenario is modelling

Edit planned infrastructure (WWTP, sewerage)

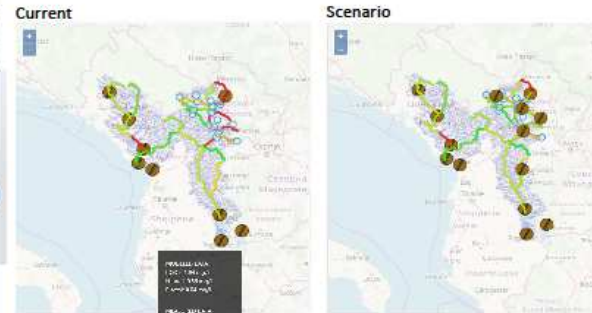
Selection of the planned infrastructure for the selected agglomeration(s)



Treatment type, treatment capacity, treatment efficiency, sludge treatment, necessary sewerage length, future pressures

Definition of scenario OK – re-run of QUAL 2K model with new pressures

RESULT OF SCENARIO MODELLING:



	Current	Scenario
Treated agglomerations, (with sewerage connected)	11	18
Untreated agglomerations	57	50
WWTP	10 WWTP	15 WWTP
SPWAGE	177 km SPWAGE	228 km SPWAGE
CAPIT-X	0 €	9.145.500 €
OPEX	456.300 € (est.)	744.200 €

save/ export of scenario – detailed data on the developed scenario



The Tool is primarily designed for the following groups of users:

- Planners and stakeholders on the national level;
- Planners and stakeholders on the regional level;
- Municipalities for their strategic planning purposes; and as an integral part of management and budgeting;
- Public utility operators in the Drin catchment to strengthen their capacities.

WEMDST aims to empower key decision-makers (users):

- To be in a stronger position to make the right technical and investment choices;
- To build awareness/capacity to ensure sustainable and affordable wastewater related services;
- To promote the increase in resource recovery from wastewater;

This has a lasting impact on people, economic activities and environment to prevent poor wastewater management decisions.

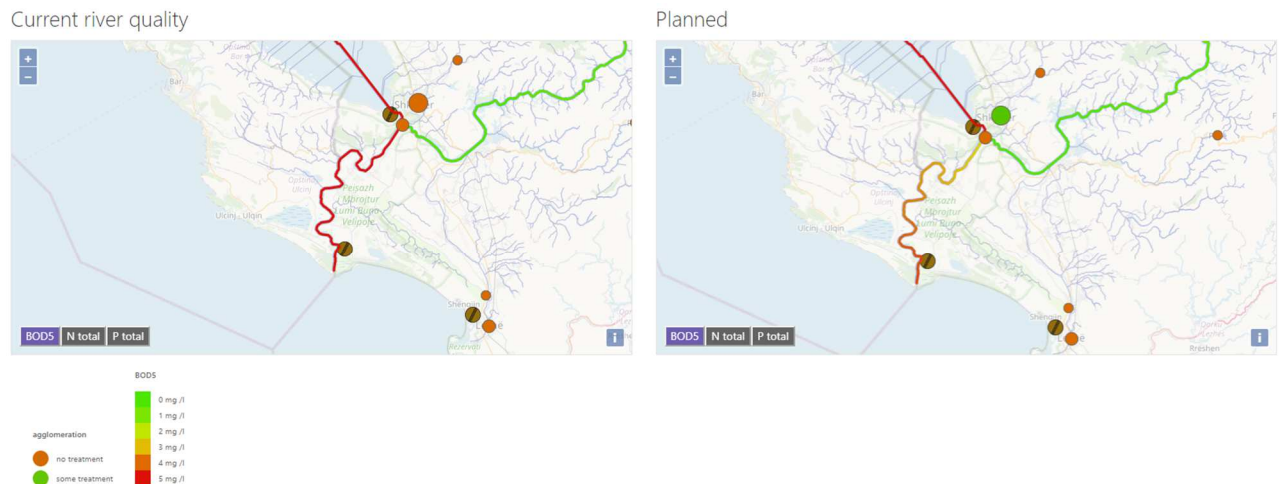
Systematic data and model analyzing support (and aim at) interoperability with existing models used by the competent institutions in the Drin Riparians and third-party tools. Stakeholder feedback will be included after the process of training and further guidelines or support for the interoperability of systems integration.

Wastewater Management Decision Support Tool in Shkodra area

The WEMDST tool, in this case, is a decision support tool that helps with the planning of new wastewater treatment plants and stormwater solutions on Shkodra city level. It can help city planners to identify how and where the city of Shkodra should be equipped with wastewater treatment technologies, also aiming to maximize the positive effect for the Drin River.

It offers information on the current state of river quality in the Drin river as well as the ability to predict river quality and indicative infrastructure costs (both investment and operating) for various preset or custom scenarios. The tool itself was both calibrated and validated against measured Drin river quality data, and it proved to very accurate and consistent with the measurements.

Shkodra city is a pilot case to test the scenarios for the Drin river basin. A case of tool performance (WWTP Shkodër) is seen below. A positive effect on lake water quality is demonstrated with the application of WWTP with secondary treatment level:



Scenarios for Shkodra city developed in the project:

Shkodra city is a pilot case to test the scenarios for the Drin river basin. Two types of scenarios for Shkodra city were developed within this project. Scenarios A are intended for stormwater management in the city of Shkodra. Scenarios B are intended for future WWTP implementation in the Shkodra city.

Scenarios for storm water management in the city of Shkodra

Stormwater in urban catchment of Shkodra city was examined in terms of flow quantity, under the effects of urbanization, and retention measures. The model considered the following factors: climate, catchment characteristics, land use, and management strategies. Climate affects storm characteristics such as frequency, duration, and intensity (design storm). Storm runoff is driven by the design storm and modified by land surface characteristics (terrain, soil type, cover, and imperviousness). These are affected by land use and catchment management strategies. The output from the model is a flow rate and retention areas flooded in the case of a specific return period event.

Main objectives of the stormwater management scenarios consist of:



1. Assessment of storm events and flow quantities;
2. Definition of possible retention areas;
3. Definition of retention measures to reduce frequency of flooding.

Scenarios for future Wastewater Treatment Plant (WWTP) implementation in the city of Shkodra

The Shkodra city is a pilot case used for the testing of the Drin Wastewater Decision Support Tool. Scenario modeling was used to identify the most environmentally appropriate and cost-efficient wastewater treatment system in Shkodra. Following scenarios were used to adjust the modeling tool appropriately:

- **Scenario (b.1) Shkodra city served by the classical WWTP (activated sludge technology) for tertiary treatment with and without sludge reuse in agriculture**
- **Scenario (b.2) Shkodra city served by the WWTP (SBR technology) for tertiary treatment**

Main objectives of the future wastewater treatment plant scenarios consist of:

1. Assessment of emission control costs for wastewater treatment plant related to waste treatment technology
2. Assessment of emission control costs for sludge reuse and their comparison with conventional disposal technology
3. Fine-tuning of the WEMDST