



## **NEXUS ASSESSMENT OF THE DRIN RIVER BASIN**

### **Final report of the Workshop**

#### ***Introduction to the Climate-Land-Energy-Water (CLEWs) modelling framework and its use in the Nexus Assessment of the Drin River Basin***

In the framework of the project

***“Promoting the Sustainable Management of Natural Resources in South-eastern Europe, through the use of the Nexus approach”***

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the operational unit of Austrian Development Cooperation,*

implemented by the Global Water Partnership-Mediterranean (GWP-Med)  
in partnership with the United Nations Economic Commission for Europe (UNECE)



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## 1. Scope of the workshop

The workshop aimed to make the participants familiar with the Climate, Land, Energy and Water systems (CLEWs) nexus methodology, used to quantitatively assess the energy-water interlinkages within the Nexus assessment of the Drin River Basin. By providing an overview of general concepts, tools used and hands-on experience on model building, the workshop opened the box of the modelling analysis to the audience and laid the ground for local uptake of the model infrastructure.

## 2. Description of activities

The workshop was held entirely online due to Covid-19 restrictions and was structured in two parts:

### The first part (Day 1)

The activities of the first day were aimed at a broad audience. The participants received an introduction to existing Nexus assessment methodologies and to CLEWs in a plenary presentation. They were then invited to discuss with the trainers current and potential water-energy nexus challenges in the Drin River Basin and assess the quality of the modelling work carried out with CLEWs within the Nexus Assessment of the Drin River Basin.

### **Agenda of Day 1: 6<sup>th</sup> July (Overview of methodologies and models)**

- 9:30 Welcome and introduction (Mr. Tassos Krommydas, Senior Programme Officer, GWP-Med, Mr. Francesco Gardumi, KTH Royal Institute of Technology)
- 9:45 Introduction to Nexus assessment methodologies and CLEWs (Dr. Francesco Gardumi, KTH Royal Institute of Technology)
- 10:30 Break
- 10:45 Discussion on current and potential Climate-Water-Energy nexus issues in the Drin River Basin (All, guided by Dr. Francesco Gardumi, KTH Royal Institute of Technology)
- 11:15 Presentation of the Water-Energy model of the Drin River Basin and riparian countries – underlying modelling framework (OSeMOSYS), key characteristics and assumptions (Mr. Youssef Almulla, KTH Royal Institute of Technology)
- 12:00 *Breakout group session*: discussion (guided by trainers from KTH) on scenarios, selected results and methodological aspects in the Water-Energy model of the Drin River Basin (All)
- 12:45 Wrap-up and end of session

The discussion was facilitated through Mentimeter (online survey tool) and revolved around the questions:

- What are the current or potential Climate-Energy-Water-(Land) nexus challenges in the Drin River Basin?
- How do you think the CLEWs framework could be useful to you?

Finally, the session concluded with a group exercise where the participants would analyse actual results of the Drin River Basin Nexus assessment visualised online and would question the assumptions behind such results.

### The second part (Day 2)

The second day aimed at an audience with basic modelling experience. Firstly, the participants were guided in the creation of a simple model with the CLEWs framework (focusing only on the electricity sector, for simplicity). With a follow-along exercise, they were introduced to ground concepts of CLEWs modelling and their link to the nexus challenges in the Drin River Basin. The exercise was carried out online, through individual workbooks that the participants could open on their laptops with a shared link. Secondly, the participants were guided in the expansion of the model and creation of scenarios with similar characteristics to those created in the Drin Nexus assessment. Finally, they navigated through all the resources and material used in the creation of the model (see below), so that they may learn where to find it and how to use it.

#### **Agenda of Day 2: 7<sup>th</sup> July (Technical and modelling session)**

- 9:30 Welcome and introduction (Mr. Tassos Krommydas, Senior Programme Officer, GWP-Med, Mr. Francesco Gardumi, KTH Royal Institute of Technology)
- 9:45 *Follow-along exercise*: Creation of a simple electricity system model with the Open-Source energy Modelling System (Guided by Dr. Francesco Gardumi, KTH Royal Institute of Technology)
- 10:45 Break
- 11:00 *Follow-along exercise*: Modifying and re-running an existing model using Jupyter Notebook (Guided by Dr. Francesco Gardumi, KTH Royal Institute of Technology)
- 11:45 GitHub and model transfer: Detail on the Water-Energy model of the Drin River Basin and riparian countries – how it looks, how it works, how to use it and run it using Jupyter Notebook (Mr. Youssef Almulla, KTH Royal Institute of Technology)
- 12:15 Wrap-up and end of session (Mr. Youssef Almulla, KTH Royal Institute of Technology)

All the activities were designed so as to not require any software installation on the participants' computers. They were all carried out online, based on open source infrastructure.

### 3. Feedback and conclusions from the sessions

The limited number of participants was deemed a potential driver for high interaction with the three tutors throughout the workshop.

During Day 1, the sessions moderated via Mentimeter established a good ground of discussion for what are agreed to be the main nexus challenges in the basin: the establishment of cooperation in the energy sector between all stakeholders in the region, in balancing the waters for electricity production and flood protection; and the accounting of water use for multi-purposes (including irrigation). The participants also

gained understanding on how the CLEWs methodology could help investigate the challenges, as demonstrated by the answers in Figure 1.

## How do you think the CLEWs framework could be useful to you?

Mentimeter

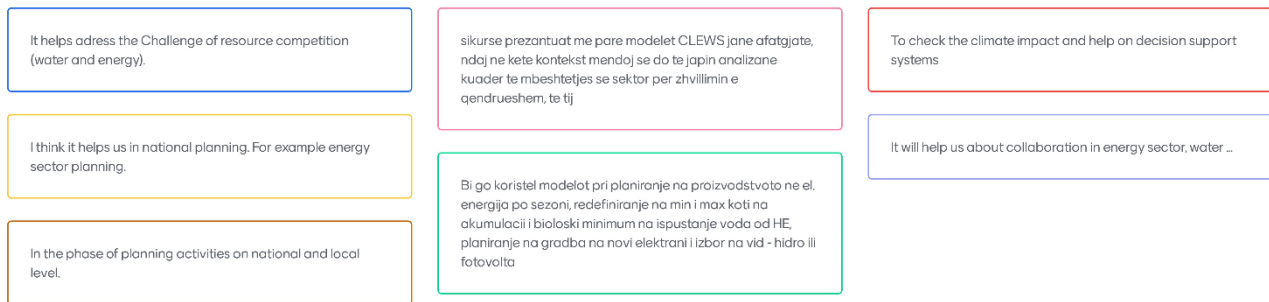


Figure 1. Screenshot of results of one Mentimeter survey in day 1.

However, the free interaction between participants and trainers was limited throughout the workshop and especially lower during the last session of Day 1, where the participants were able only to limited extent to extract insights from the online visualisation of the Nexus assessment's results. The reason for this likely lies in the limited time the participants had to analyse such results. One comment was on the data used on the hydrological model. The operators in of the North Macedonian Hydropower plants offered to share more detailed data (50 years) for the river discharges in the North Macedonian part of the Drin basin. This issue was followed up after the workshop with the participant through GWP.

During Day 2 the participants carried out the hands-on exercises without issues and were able to gain significantly more insights on the functioning of the tools behind the Nexus assessment. The tutors stressed the availability and accessibility of all the material (both related to the training and to the Nexus assessment model) and placed care in guiding the participants through all the resources, inviting follow up and further use.

The second day was concluded by mentimeter surveys to get participants' feedback on the workshop activities and the relevance of the methodology and tools to their work. The participants were keen in giving feedback to the final report of the Drin modelling exercise. They also find the training useful and relevant for their work. More details on the survey results is shown in the following figures.

## How would you evaluate the level of difficulty of this training?

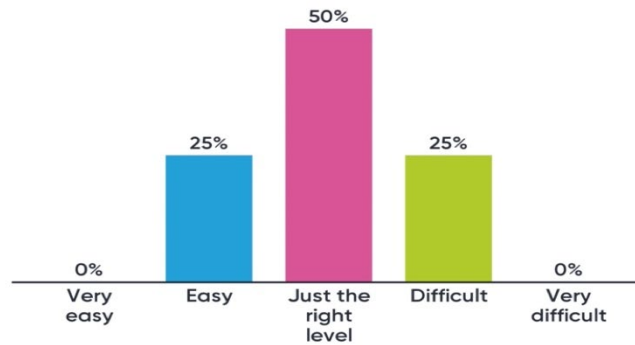


Figure 2. Screenshot of results of one Mentimeter survey in day 2 – question 1

## How useful is the training for you?

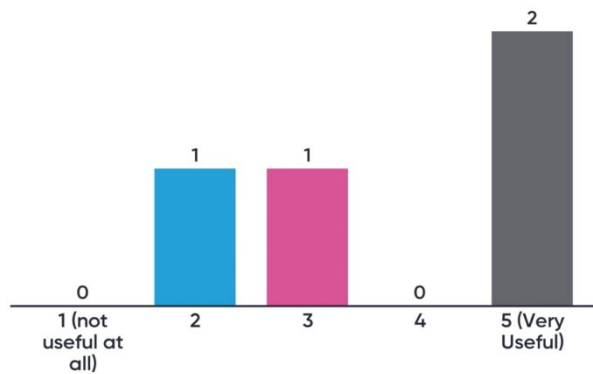


Figure 3. Screenshot of results of one Mentimeter survey in day 2 – question 2

## Do you think the tool (OSeMOSYS) is useful/ can be used in your institution?

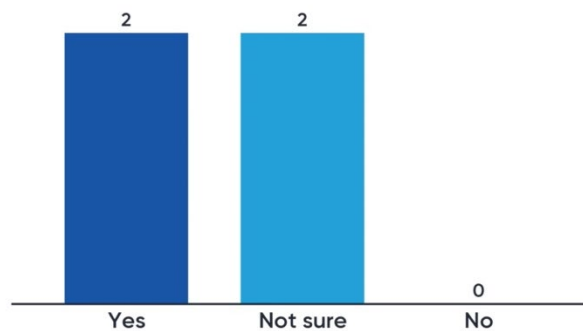


Figure 4. Screenshot of results of one Mentimeter survey in day 2 – question 3

## Any suggestions for improvement ?



Maybe more excercises....

Интерфејс за внес на податоците

Links to available materials about the workshop before the workshop

I need detailed analysis regarding the increase in cascade operating levelsents, I am waiting for the final version of the Drin River modeling.

Figure 5. Screenshot of results of one Mentimeter survey in day 2 – question 4

## ANNEX

### A1. List of participants

The table lists the registered participants and (marked in yellow), those who attended the workshop.

Name	Institution	Date
Albi Islami	Transmission System Operator (OST)	06.07.2021
Eblerta Ajeti	Transmission System Operator (OST)	06.07.2021
Euglert Beshello	Transmission System Operator (OST)	06.07.2021
Aleksandra Dorri	Transmission System Operator (OST)	06.07.2021
Fatjon Zekaj	Transmission System Operator (OST)	6-7.07.2021
Djana Bejko	Transmission System Operator (OST)	6-7.07.2021
Elgi Haxhiraj	Transmission System Operator (OST)	6-7.07.2021
Elio Voshtina	Transmission System Operator (OST)	6-7.07.2021
Elton Radheshi	Albanian Energy Regulatory Authority (ERE)	6-7.07.2021
Arbesa Kamberi	Albanian Power Corporation (KESH)	06.07.2021
Enerida Markokaj	Albanian Power Corporation (KESH)	06.07.2021
Orland Muca	Albanian Power Corporation (KESH)	6-7.07.2021
Artur Mustafaraj	Albanian Power Corporation (KESH)	6-7.07.2021
Eriona Gega	Ministry of Infrastructure and Energy	6-7.07.2021
Jonida Rika	Ministry of Infrastructure and Energy	6-7.07.2021
Toni Markoski	JSC Power Plants of North Macedonia	6-7.07.2021
Slavko Milevski	JSC Power Plants of North Macedonia	6-7.07.2021
Marjan Glavinceski	JSC Power Plants of North Macedonia	6-7.07.2021
Fationa Sinojmeri	GIZ Albania	06.07.2021
Alban Doko	GIZ Albania	6-7.07.2021

### A2. Links and material shared with participants

The material shared with the participants is available here:  
<https://kth.box.com/s/m3nhjzi4c6ystp52d828bh7b7qx9hcng>.

It includes:

- Workshop concept note and agenda (.docx);
- Presentation for the first session of Day 1 (Welcome & Introduction; Introduction to Nexus assessment methodologies and CLEWs);



- Presentation for the second session of Day 1 (Presentation of the Water-Energy model of the Drin River Basin and riparian countries – underlying modelling framework (OSeMOSYS), key characteristics and assumptions)
- HTML file for the last session of Day 1 (Discussion - guided by trainers from KTH - on scenarios, selected results and methodological aspects in the Water-Energy model of the Drin River Basin)
- Presentation for the third session of Day 2 (GitHub and model transfer: Detail on the Water-Energy model of the Drin River Basin and riparian countries – how it looks, how it works, how to use it and run it using Jupyter Notebook)

KTH drafted also news items presenting the activities and their outcomes, [published at GWP website](#).

Besides the presentations, several links to supplementary materials and tools were shared during the workshops:

- Online exercise to get started with the modelling tools (Session I of Day 2):  
[https://mybinder.org/v2/gh/KTH-dESA/UNECE-Capacity-Building/main?filepath=cb\\_simple\\_example.ipynb](https://mybinder.org/v2/gh/KTH-dESA/UNECE-Capacity-Building/main?filepath=cb_simple_example.ipynb)
- Online exercise on scenario analysis with the modelling tool (Session II of Day 2):  
[https://mybinder.org/v2/gh/KTH-dESA/UNECE-Capacity-Building/main?filepath=cb\\_simple\\_example.ipynb](https://mybinder.org/v2/gh/KTH-dESA/UNECE-Capacity-Building/main?filepath=cb_simple_example.ipynb)
- User guide for the modelling tool: <https://osemosys.readthedocs.io/en/latest/>
- Q&A forum for the modelling tool: <https://groups.google.com/g/osemosys>
- Model used for the Drin Nexus assessment: <https://github.com/KTH-dESA/UNECE-Capacity-Building>
- Open access and free self-learning course on the CLEWs methodology, with tutorials (ca. 30 hours study): <https://www.open.edu/openlearncreate/course/view.php?id=7244>