Deliverable 4.6

Report on Network-wide training event 3: Modelling water quality under global change

Grant Agreement nº: 956623

Project full title: Inventive forecasting tools for adapting water quality management to a new climate

Project acronym: inventWater

Type of deliverable: report

Planned date of deliverable: 31 January 2023

Actual submission date: 29 November 2022

Target Audience: Public

Authors: Rafael Marcé (ICRA), Daniel Mercado-Bettín (ICRA)

This project has received funding from the European Union`s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 956623

Content

This project has received funding from the European Union`s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 956623

Introduction

This training school developed the necessary scientific and technical skills required to forecast water quality at time scales from days to centuries while accounting for changes in climate and socio-economic activities. We focused on different water systems such as lakes, reservoirs, and rivers. Scientific programming (bash, R, cdo and python) were used in Linux and other operating systems to conduct simulations with multiple climate change scenarios. To achieve this and following the Grant Agreement a list of activities and goals were developed:

- CLM5.0 (8h - 0.5 ECTS). The Community Land Model (CLM) is a global-scale land surface model and key model in ISIMIP. The ESRs will learned to run this model in a high-performance computing environment and analysed its output.
- SWAT+ (8h - 0.5 ECTS). During two half-day sessions the ESRs were trained in using the Soil and Water Assessment Tool (SWAT+), which is a widely used catchment-scale hydrological model.
- FLake (4h - 0.5 ECTS). The ESRs run the Freshwater Lake model (FLake), a one-dimensional lake model used to parametrize lakes in numerous numerical weather prediction systems and climate models.
- MARINA (4h - 0.5 ECTS). This water quality model, developed by Wageningen University, was run to quantify annual river export of nitrogen and phosphorus in dissolved inorganic and organic forms.
- WATERGAP2-WorldQual (4h - 0.5 ECTS). ESRs performed simulations with this global hydrological model which explicitly represents water quality.
- Model integration for nexus analysis, model uncertainty, model ensembles (4h - 0.5 ECTS). After 5 half-day sessions on applying individual models, the training school concluded with a session on integrating ensemble information from various models and assessing their uncertainties, as well as considering impact indicators for model outputs.

This project has received funding from the European Union`s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 956623

Location of the meeting

The meeting was hold in Brussels (Belgium) at the Vrije Universiteit Brussel following the grant agreement. The meeting was organised by Ann van Griensven and Wim Thiery as beneficiaries of the project, with the support of the coordination team. See some pictures from the meeting in the different sessions. More details in the blog post (https://inventwater.eu/brussels-training-week-modelling-water-quality-under-global-change/).

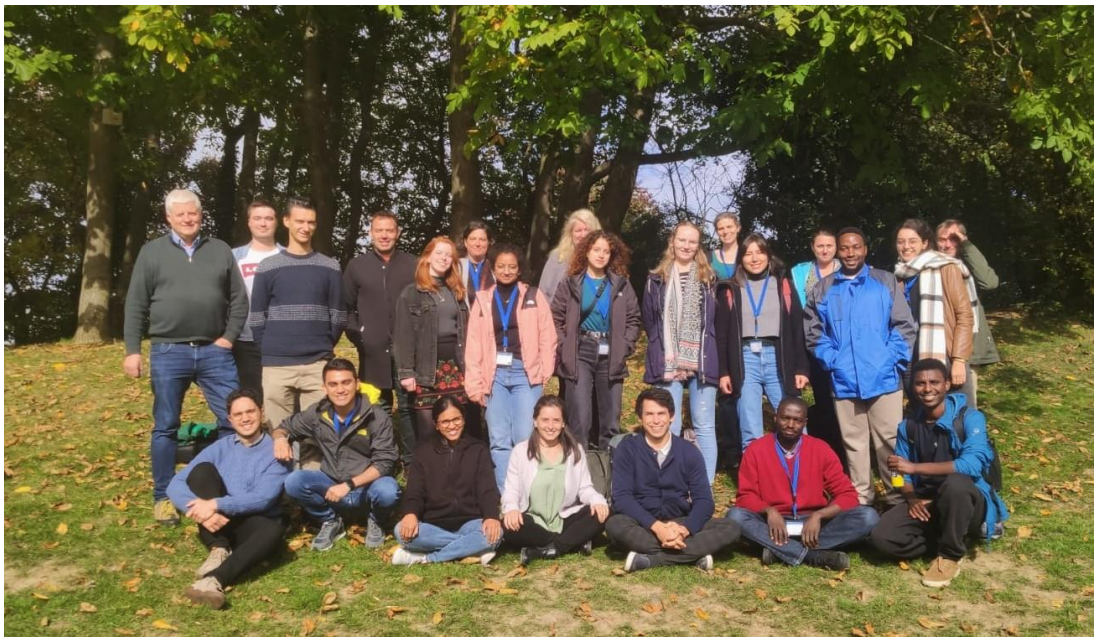

Figure 1. Picture of the whole group at VUB

This project has received funding from the European Union`s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 956623

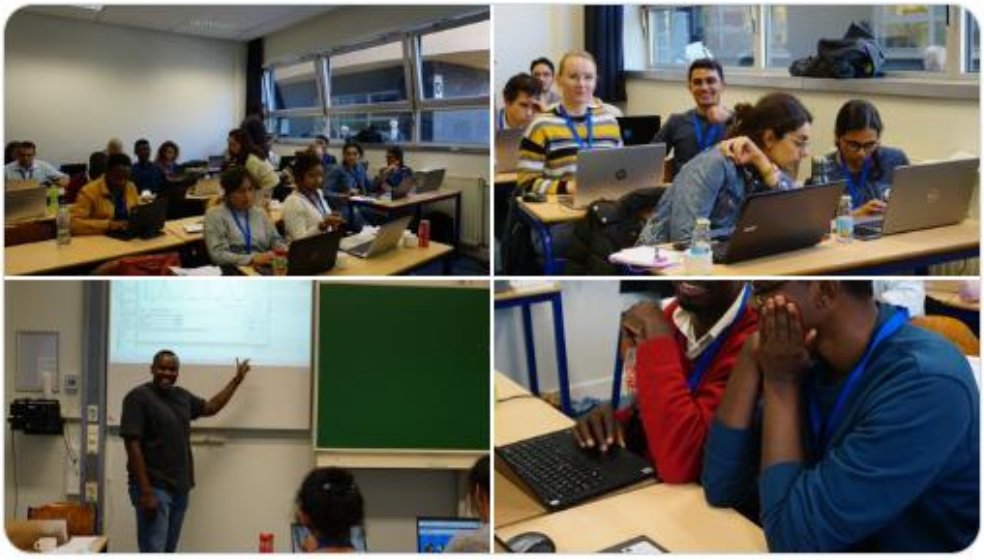

Figure 2. Running Earth Sistem and Hydrologic models

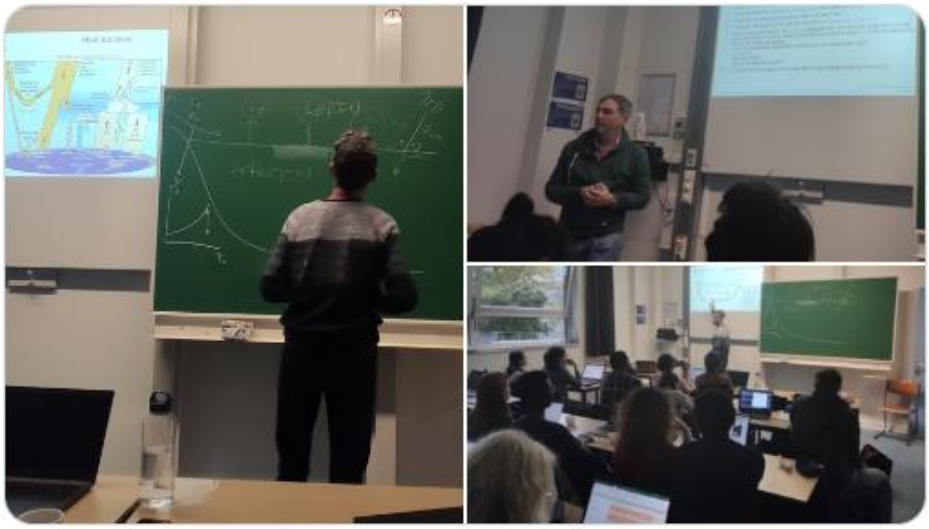

Figure 3. Learning about lake physics and modeling

This project has received funding from the European Union`s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 956623

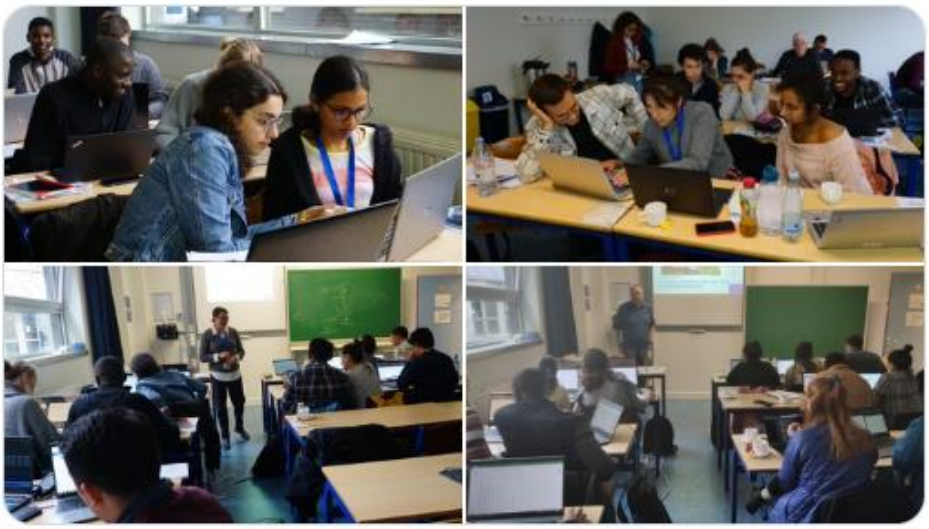

Figure 4. Modeling nutrients in aquatic ecosystems

This project has received funding from the European Union`s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 956623

List of attendees

Name	Institution	Role
Anandita Agarwal	AU (Denmark)	ESR
Ammanuel Bekele	RUB (Germany)	
Maud Siebers	US (UK)	
Sabin Taranu	VUB (Belgium)	
Ilaria Micella	WU (The Netherlands)	
Keerthana Suresh	IIASA (Austria)	
Ricardo Marroquin	DkIT (Ireland)	
Angela Pedregal	ICRA (Spain)	
Lipa Nkwalalw	UFZ (Germany)	
Faluku Nakulopa	UFZ (Germany	
Mahtab Yaghouti	US (UK)	
Adrian Rinaldo	UCC (Ireland)	
Daniela Henry	ICRA (Spain)	
Annika Schlemm	VUB (Belgium)	
Floran Clopin	WU (The Netherlands)	
Ann van Griensven	VUB (Belgium)	Supervisor
Carolien Kroeze	WU (The Netherlands)	
Katrin Bieger	AU (Denmark)	
Eleanor Jennings attended online	DkIT (Ireland)	
Phil McGinnity	UCC (Ireland)	
Karsten Rinke	UFZ (Germany	
Hans Duerr	RUB (Germany)	
Rafael Marcé	ICRA (Spain)	
Lisette Senerpont Domis	NIOO (The Netherlands)	
Maryna Strokal	WU (The Netherlands)	
Ting Tang	IIASA (Austria)	
Tom Shatwell	UFZ (Germany	
Wim Thiery	VUB (Belgium)	
Valerie McCarthy	DkIT (Ireland)	
Albert Nkwasa	VUB (Belgium)	Expert on SWAT+
Daniel Mercado-Bettín	ICRA (Spain)	Project Manager

Agenda of the Third Training Event

This project has received funding from the European Union`s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 956623

Following the initial plan, a five-day meeting was planned and successfully implemented. The first day was assumed as a traveling day to respect the family time of the network and because the training will continue after the 5-day-meeting, fulfilling the GA. In the following table are the activities and sessions per day.

	Monday	Tuesday	Wednesday	Thursday	Friday
	10/10/2022	11/10/2022	12/10/2022	13/10/2022	14/10/2022
8.30 - 9.00	Travel day	Welcome and logistics	Introduction to day	Introduction to day	Introduction to day
9.00 - 10.00		Introduction to Community Land Model (VUB)	Introduction to Community Land Model (VUB)	Introduction to FLake (UFZ, MI)	Introduction to WorldQual (RUB)
10.00 - 11.00					
11.00 - 11.30		Coffee and tea	Coffee and tea	Coffee and tea	Coffee and tea
11.30-12.30		Introduction to Community Land Model (VUB)	Introduction to Community Land Model (VUB)	Introduction to FLake (UFZ, MI)	Introduction to WorldQual (RUB)
12.00 - 13.00					
13.00 - 14.00		Lunch	Lunch	Lunch	Lunch
14.00 - 15.00		Introduction to SWAT+ (VUB)	Introduction to SWAT+ (VUB)	Introduction to MARINA model (WU)	Model integration for nexus analysis (WU, IIASA, VUB)
15.00 - 16.00					
16.00 - 17.00					Wrap up
End c. 17.30		Wrap up	Supervisory board	Wrap up	
Evening	Dinner together	Social event	Social event	Dinner together	

This project has received funding from the European Union`s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 956623