Community Water Model CWATM

Development of a community driven global water model

Water Program, IIASA

IIASA

water Futures and Solutions

The Community Water Model (CWATM)

represents one of the new key elements of IIASA's Water program to assess water supply, water demand and environmental needs at global and regional level. The hydrologic model is open source and flexible to link in different aspects of the water energy food nexus. CWATM will be a basis to develop a next-generation global hydro-economic modeling and will be coupled to the existing IIASA models like MESSAGE and GLOBIOM.

Community Water Model

Processes included in the Model Design

The Community Water Model (CWATM) will be designed for the purpose to assess water availability, water demand and environmental needs.
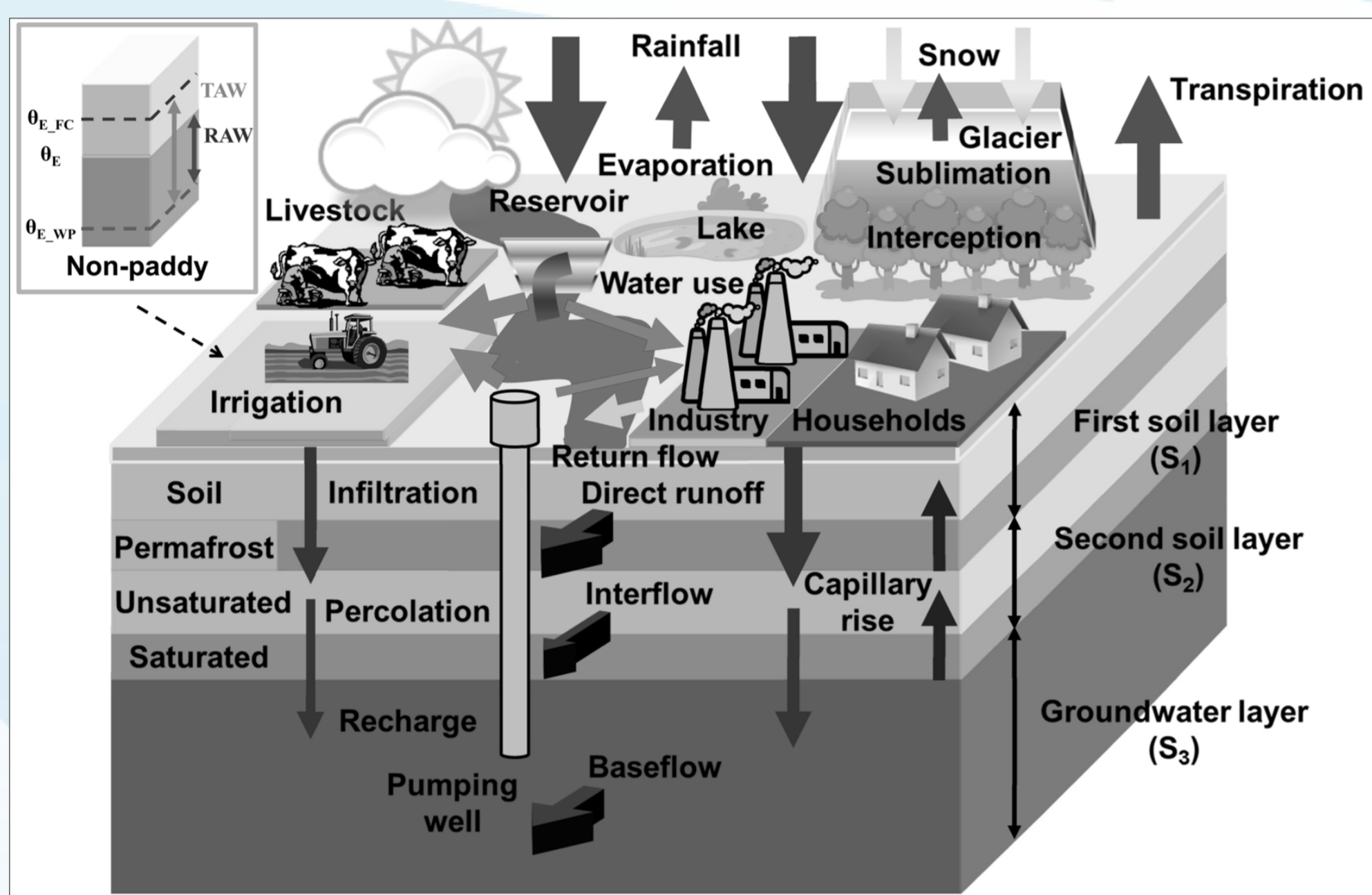

The model includes an accounting of how future water demands will evolve in response to socioeconomic change and how water availability will change in response to climate.

Next-generation Global Hydro-Economic Modeling Framework

The Community Water Model will help to develop a next-generation hydro-economic modeling tool that represents the economic trade-offs among water supply technologies and demands. The tool will track water use from all sectors and will identify the least-cost solutions for meeting future water demands under policy constraints. In addition, the tool will track the energy requirements associated with the water supply system (e.g., desalination and water conveyance) to facilitate the linkage with the energy-economic tool. The tool will also incorporate environmental flow requirements to ensure sufficient water for environmental needs.

The Nexus Framework of IIASA

In the nexus framework – water, energy, food, ecosystem - CWATM will be coupled to the existing IIASA models including the Integrated Assessment Model MESSAGE and the global land and ecosystem model GLOBIOM in order to realize an improved assessments of water-energy-food-ecosystem nexus and associated feedback.

The Community Water Model in the framework of IIASA's nexus models
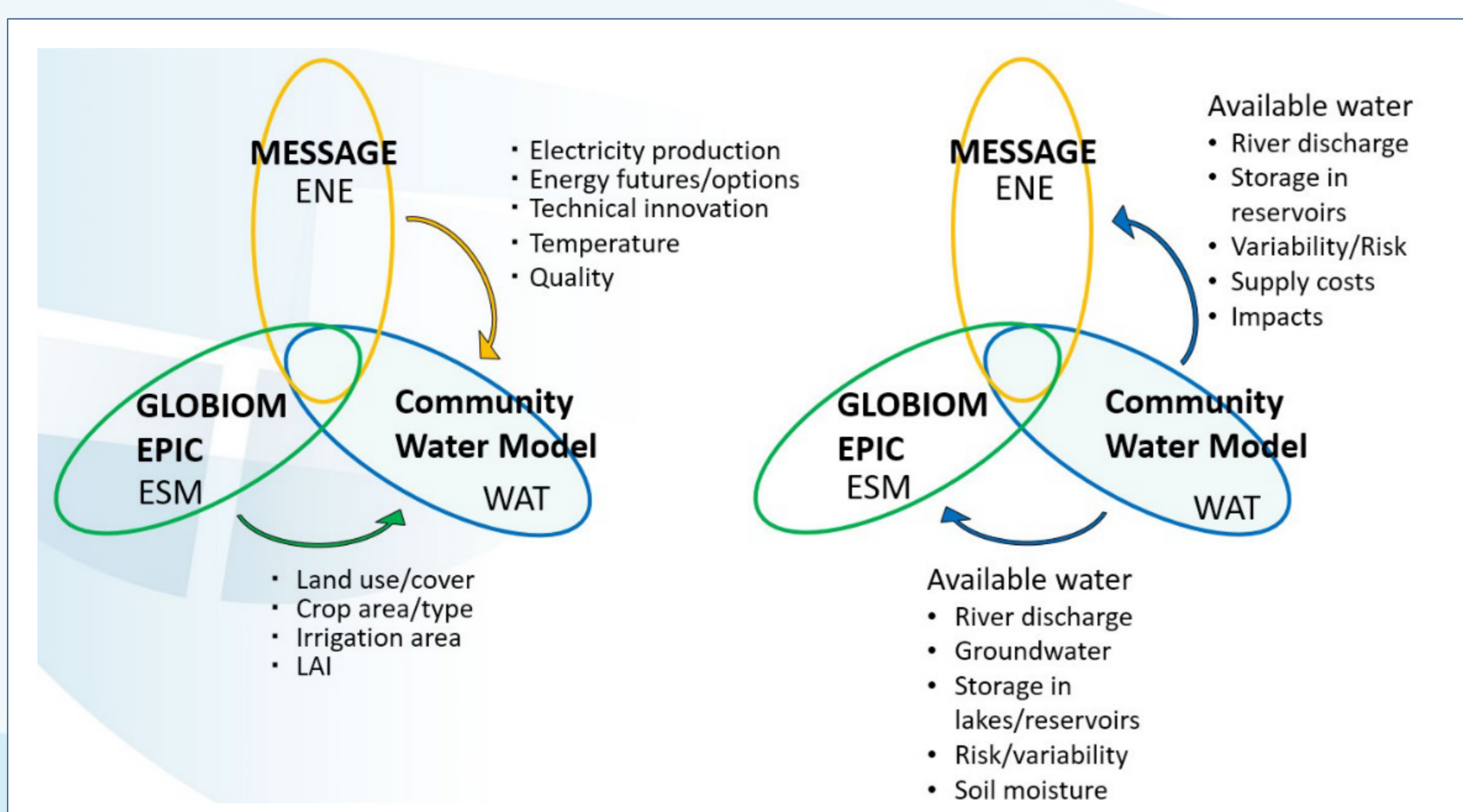
Features of the Model

Community aspect

Feature	Description
Community driven	Open-source but lead by IIASA, source code is available on an open public GitHub repository
Well documented	Documentation, automatic source code documentation available as GitHub documentation online
Easy handling	Use of a setting file with all necessary information for the user, no programing skills required. Input and output directly as NetCDF files
Multi-platform	Windows, Mac, Linux, Unix - to be used on different platforms (PC, clusters, super-computers)
Modular	Processes in subprograms, easy to adapt to the requirements of options/ solutions – Modular structure

Hydrological aspect

| Feature	Description
Flexible	different resolution, different processes for different needs, links to other models, across sectors and across scales
Adjustable	to be tailored to the needs at IIASA i.e. collaboration with other programs/models, including solutions and option as part of the model
Multi-disciplinary	including economics, environmental needs, social science perspectives
Sensitive	Sensitive to option / solution
Fast	Global to regional modeling – a mixture between conceptual and physical modeling – as complex as necessary but not more
Comparable	Part of the ISI-MIP community

Demo of CWATM

CWATM can be run at daily resolution globally from 5' to 0.5° or separately for any basin or any clipping of a global map.
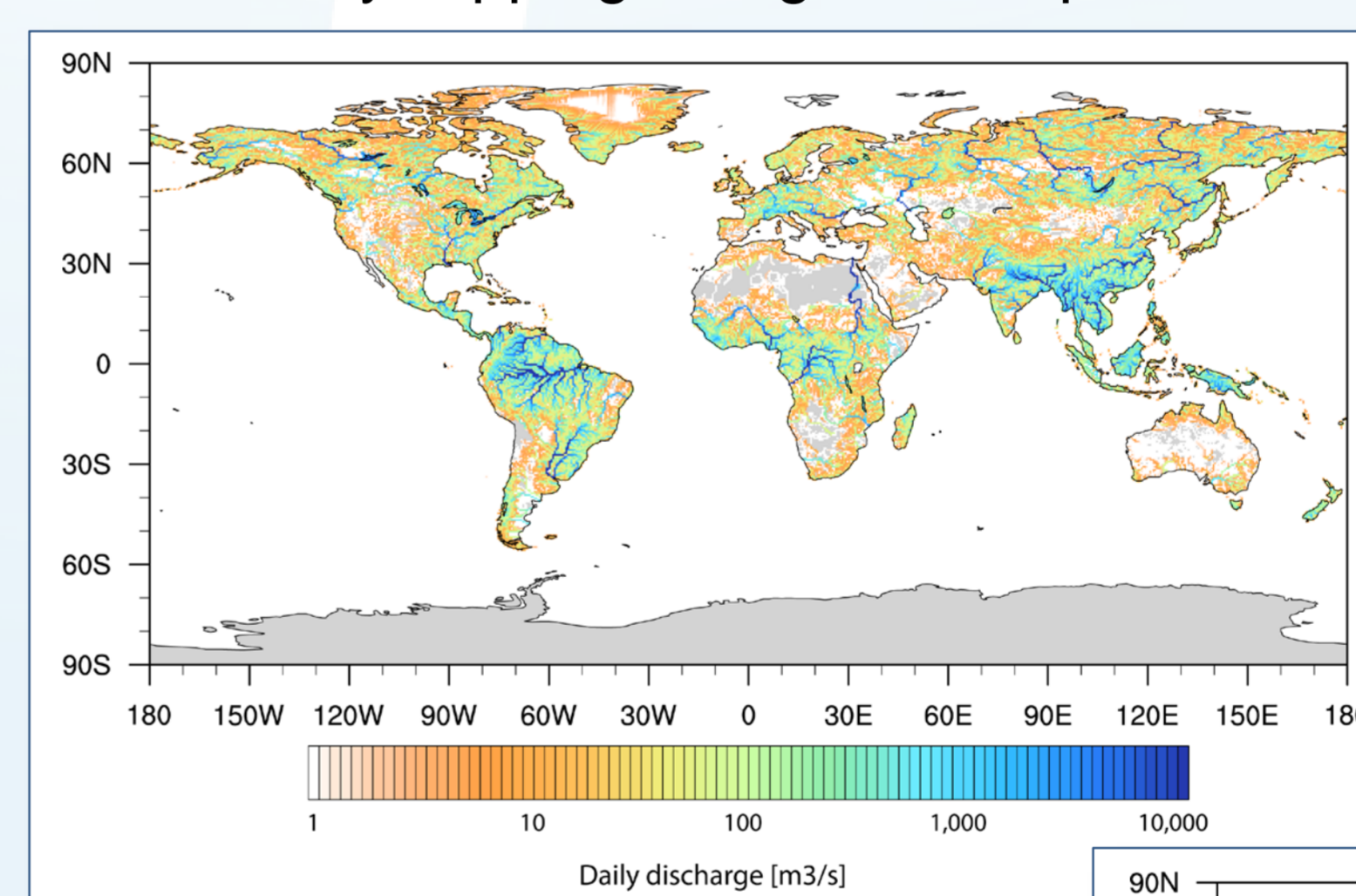
CWATM demo on: Global discharge

CWATM demo on: Global actual evapotranspiration
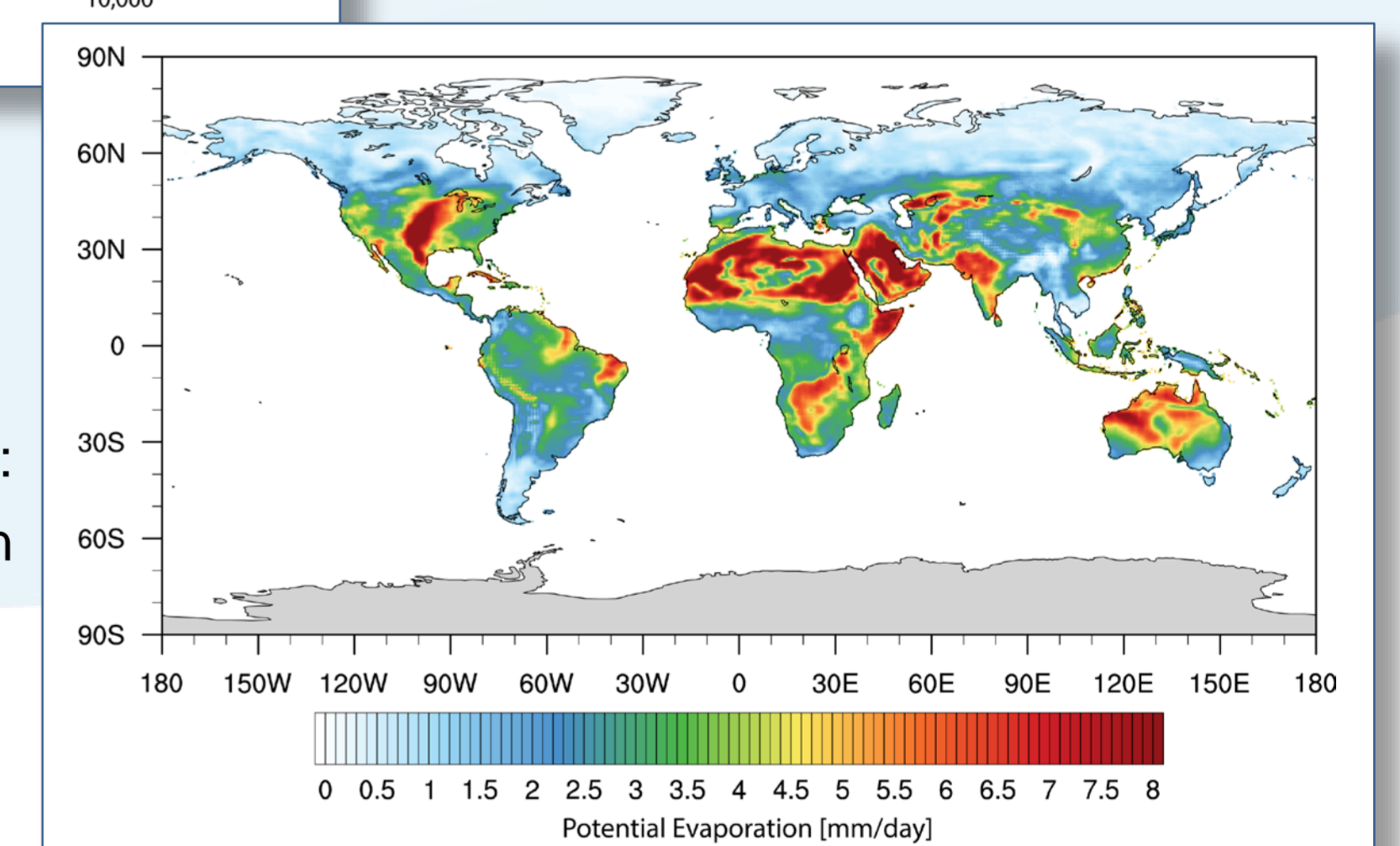
Short to Medium Vision

Our vision for the short to medium term work is to introduce water quality (e.g., salinization in deltas and eutrophication associated with mega cities) into CWATM and to consider qualitative and quantitative measures of transboundary river and groundwater governance into an integrated modelling framework.

Contact CWATM

www.iiasa.ac.at/cwatm

wfas.info@iiasa.ac.at