GoNEXUS

FACTSHEET

Global
REGIONS WORLDWIDE

BRIEF OVERVIEW

The GoNexus Global case study aims to promote coordinated and sustainable management of the Water-Energy-Food-Ecosystem **(WEFE) nexus** across **various regions around the world.**

IDENTIFIED WEFE CHALLENGES & PROSPECTED SOLUTIONS

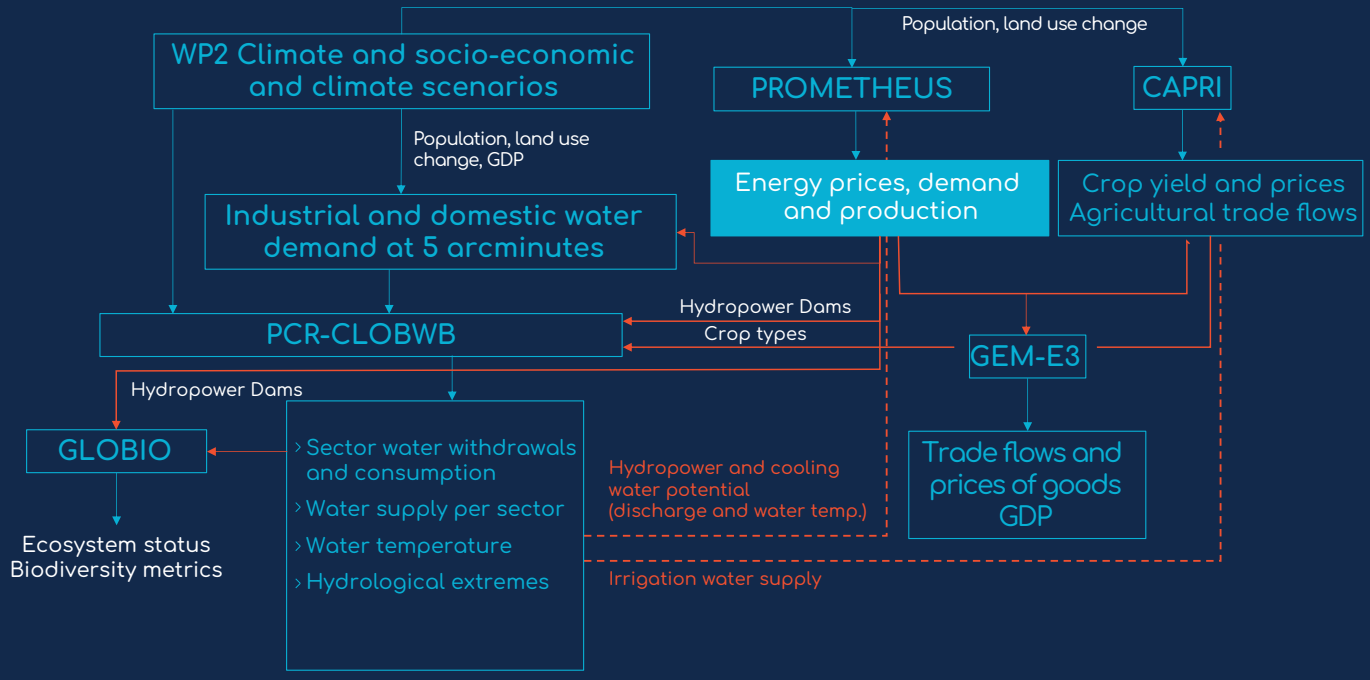
- A main challenge that the world is facing is **an increasing water demand from certain sectors** which impacts the water availability for others. This increases tensions among agriculture, industry, domestic, and energy sectors, and may also **compromise the water availability and quality** needed to sustain healthy ecosystems. Climate change, increasing extremes (droughts) and socio-economic developments (population growth) will exacerbate this challenge even more.
- **A deep understanding of the connections between water, energy, food, and ecosystem (WEFE)**, along with the identification of hotspot regions, is urgently required to enhance the management of future resources and ecosystems.
- GoNEXUS researchers aim to identify key changes in large-scale policy frameworks that can enable **coordinated WEFE nexus management from continental to global levels.** This will involve the use of global models covering hydrology, energy, food, ecosystems, and economic factors, along with input from stakeholders during dedicated nexus Dialogues.
- The evaluation will incorporate relevant policies, including **climate agreements** (e.g., the +1.5°C target), **the European Green Deal,** and additional measures to protect the environment and biodiversity.

MODELLING TOOLS & SCENARIOS

A global modelling toolkit has been developed by GoNexus team using **leading models in water** (PCR-GLOBWB/LISFLOOD), **energy** (PROMETHEUS/PRIMES), **agriculture** (CAPRI), **economy** (GEM-E3), and **ecosystems** (GLOBIO).

After refining these models for more effective nexus analysis, they were interconnected to capture feedback across nexus components. These interconnections are used to analyse **two scenarios: a baseline scenario,** incorporating current emission reduction pledges (aligned with SSP3-RCP7.0) and the European Common Agricultural Policy (CAP) for CAPRI, and **an 'environment-only' policy scenario.**

In the latter scenario, SSP3-RCP7.0 is rerun with the condition that water withdrawals must not exceed environmental flow limits in surface water or lead to groundwater depletion.



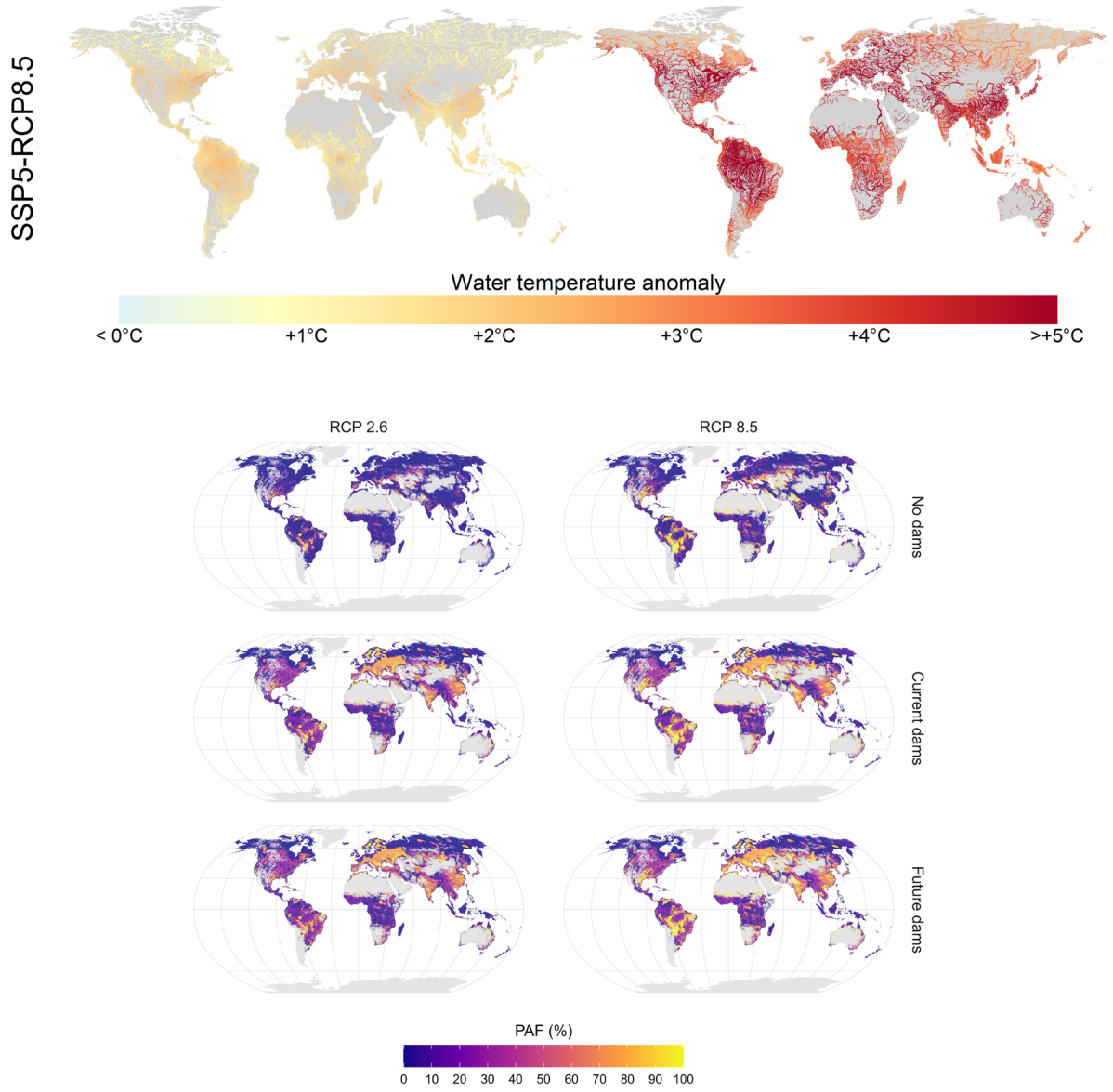
DIALOGUES

The first global Dialogue focused on **how climate and socioeconomic changes** (such as water temperature shifts and dam construction) **impact freshwater fish species**. Participants included representatives from NGOs such as Wetland International and WWF, a natural history museum, and aquatic ecology experts from various universities and research institutes, including voices from the Global South. Insights from this Dialogue helped refine baseline and policy scenario models to **better capture impacts on freshwater fish species.**

A second Dialogue is scheduled for early 2025 to review the results of these global model exercises and nexus impact analyses.

EVIDENCE

The baseline scenario provides **projections for future** water availability, water withdrawals, water temperature, energy usage, agricultural production, and biodiversity impacts. For fish species, which are the primary focus of the Dialogues, we examine changes in water temperature under SSP5-RCP8.5 for the years 2050 and 2100, as well as **the combined effects of dams and rising water temperatures on freshwater fish** by 2050. The results presented below come from an earlier scenario, not yet using the interlinked SSP3-RCP7.0 model; instead, they rely **on socioeconomic boundary conditions.**



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