



Integrating water balance and energy system models for improved benefit sharing in transboundary river basins (TU-NEXUS)

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The TU-NEXUS project seeks to enhance understanding on the way we manage water and energy resources in arid regions. Led by Finnish research teams from University of Oulu and VTT, this project explores the complex interplay between water and energy systems in Tajikistan and Uzbekistan – two countries where sustainable development is closely tied to water availability.

In these regions, water and energy resources are deeply interconnected, yet historically, they have been managed separately. This disjointed approach overlooks the intricate dependencies that exist between these systems. TU-NEXUS aims to bridge the gap by integrating water resource and energy system models. This integration will provide a more comprehensive understanding of the water-energy nexus

and its implications for climate, food, and sustainable development.

The project focuses on the Zarafshan, a critical water source shared by Tajikistan and Uzbekistan. We also look into the large Amu Darya river basins shared by many countries in the region. Here, water management is a contentious issue, with conflicting priorities between upstream and downstream countries. Rapid population growth and climate change exacerbate these challenges, leading to glacier retreat, altered runoff patterns, and strained water supplies for summer irrigation in lowland areas.

TU-NEXUS will develop tools and approaches for analysing scenarios that consider economic, social, and environmental benefits. These scenarios will be informed by future climate predictions, including changes in precipitation, temperature, and glacier melt, as well as socio-economic-ecological factors affecting land, water, and energy systems.

The project is structured into five work packages, encompassing the assessment of current water and energy systems, model integration for catchment-scale studies, sustainable scenario assessments, training, collaboration, and project management. This



collaborative effort involves Finnish researchers and international partners, with a significant contribution from regional partners, PhDs, and postdoctoral students in Tajikistan and Uzbekistan.

Through TU-NEXUS, we aim to offer sustainable solutions to the water-energy management challenges in these arid regions, fostering better resource governance and benefit sharing among the affected countries.



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Project website: <https://www.oulu.fi/en/projects/integrating-water-balance-and-energy-system-models-for-improved-benefit-sharing-transboundary-river>

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