RESEARCH PROGRAM ON Water, Land and Ecosystems

Led by IWMI International Water Management Institute

Increasing Synergies and reducing Tradeoffs along the Water—Energy—Food Nexus (WE4FOOD)

A focus area within the CGIAR Research Program on Water, Land and Ecosystems

Photo: Joe Ronzio

THE CHALLENGE

Increasing natural resource scarcity and degradation links food security of the poor and most vulnerable rural men and women inextricably to developments in the water and energy sectors.

Water is essential for virtually all energy development; and the energy sector is becoming more water intensive with changing energy mixes. On the other hand, energy is essential to use water (lifting, pumping, desalination); and food production is both increasingly water- and energy-intensive.

All this plays out at the basin level, where agricultural water uses compete with other water and energy-intensive sectors. The trans-boundary nature of many large river basins further complicates the water-energy linkages. Because of the nexus, agricultural, water, energy and climate policies influence each other and jointly determine outcomes for the poor and the environment.

Tensions over water, energy and food uses are already severe in rapidly growing Asia and are growing in Africa south of the Sahara and Latin America.

OBJECTIVES

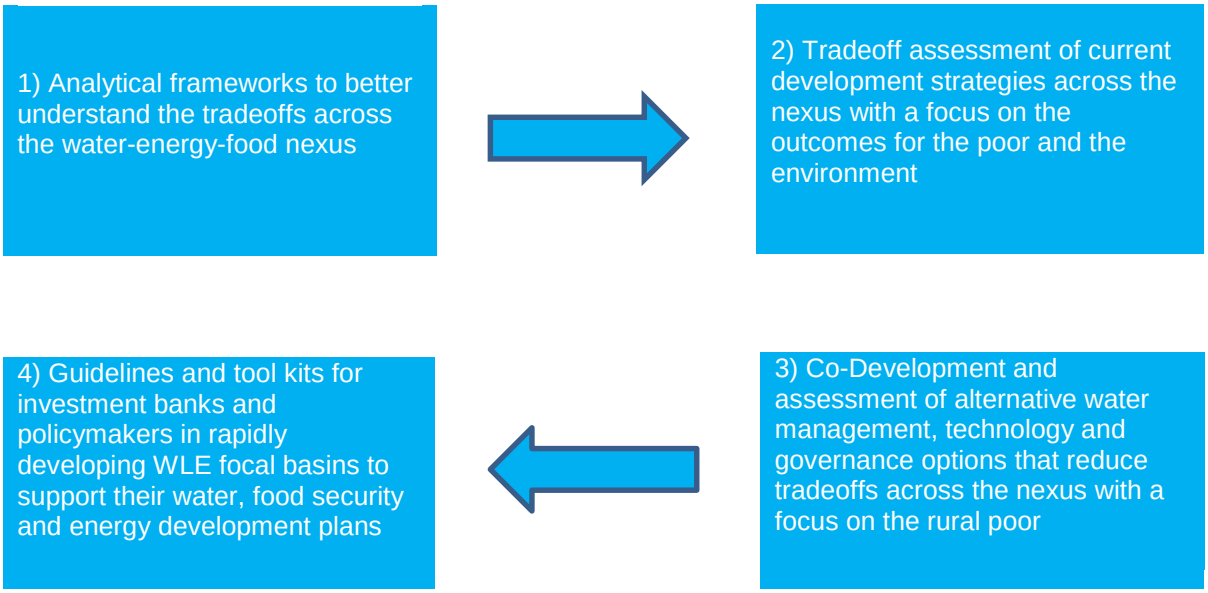
- To identify and quantify the linkages, tensions and tradeoffs across the water-energy-food sectors using water as an entry point.
- To examine alternative water management, technology and governance options to reduce tradeoffs and adverse consequences across the nexus with a focus on the rural poor.
- To help governments develop water, energy and food security strategies that minimize tradeoffs across the sectors.

DID YOU KNOW

- Over the next 4 decades, global food and water demands will grow by over 40%. Energy demands will increase by 35% over 25 years.
- Global freshwater withdrawals for energy production were estimated at 583 km^3 in 2010.tion at 66 km^3.
- In the Central Asian Aral Sea Basin upstream hydropower in Kyrgyzstan competes directly with irrigation in Uzbekistan.
- Across South Asia, supply and demand across the water and energy sectors are not well aligned with sub-optimal outcomes for everyone.
- In the Mekong, hydropower will reduce protein security and income opportunities of the poor.

CGIAR Challenge Program on WATER & FOOD · CIAT · ICARDA · ICRISAT · World Agroforestry Centre · Bioversity International · International Potato Center · IFPRI International Food Policy Research Institute · ILRI International Livestock Research Institute · IITA Research to Nourish Africa · WorldFish · FAO

The principal hypothesis of the WLE Water-Energy-Food Nexus activities is that by holistically assessing water-energy-food security strategies under the WLE ecosystem approach with partners, tradeoffs across these sectors can be reduced and solutions can be identified that reduce adverse outcomes for poor men and women. The research process in key nexus hotspot areas is described in the following diagram.



WLE will review the literature on the linkages between water, energy, food and the environment in various geographical and political settings and at different scales in WLE river basins as well as past and current policy environments affecting the water-energy-food nexus with a focus on agriculture.

WLE will co-develop modeling tools in key nexus hotspot areas, including the Indus and Ganges; Central Asia and the Mekong at the basin, but also at the global scale to better understand water-energy-food interactions and assess associated environmental impacts. These tools can help, for example, to identify in what cases water interventions will not be feasible because of energy constraints and when energy interventions are not feasible because of water constraints, as well as implications for food security.

Stakeholder dialogues will then support the development of alternative water-energy-food management options and scenarios and identify promising technologies, policies, institutions and investment alternatives. For example, a scenario might identify pathways to reduce energy consumption at the basin scale through changing irrigation through adapting water saving technologies, shifting to conjunctive use of canal and ground water or conservation agriculture in lift irrigation zones.
The modeling tools will use these alternative options and scenarios to assess the potential of “water and energy smart” agricultural intensification options for both rainfed and irrigated lands. These results will feed into guidelines and tool kits to support governments develop water, energy and food security strategies that minimize tradeoffs across the sectors.

CURRENT & POTENTIAL PARTNERS

Governments of India and Pakistan, Central Asia and the Mekong Region, IEA (International Energy Agency), IFDC (International Fertilizer Development Center), Global Water System Project

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