CGIAR
Science for a food-secure future

The NEXUS across water, energy and food

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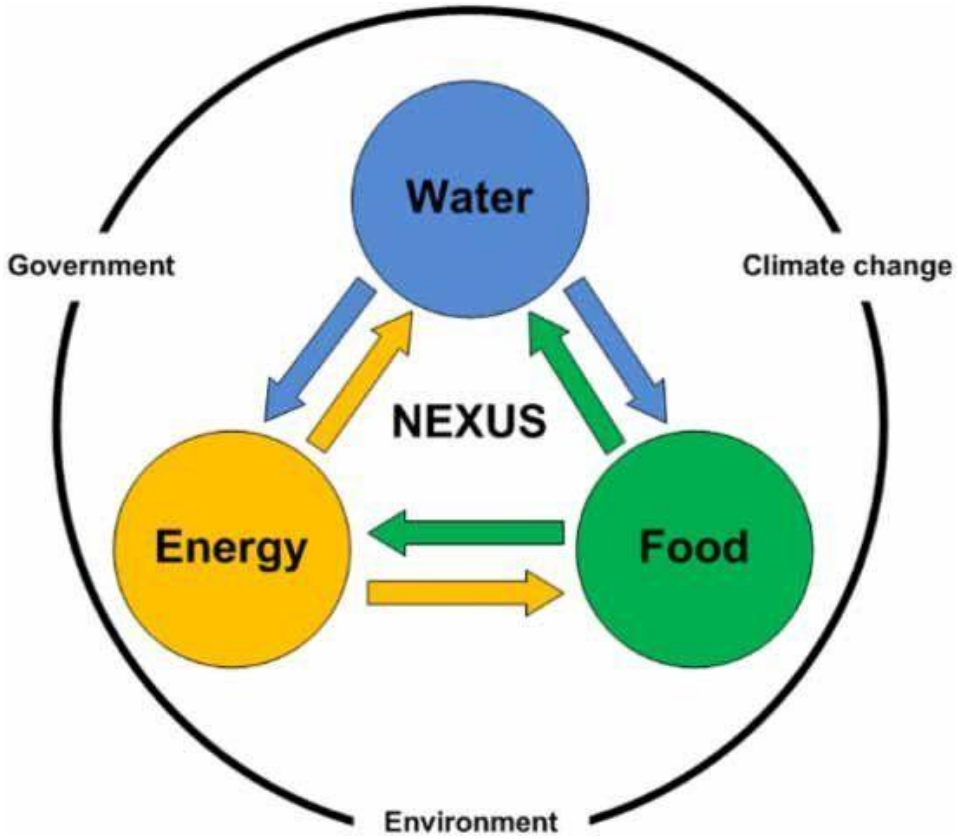
Global Challenges

- Water, land, energy, forests and biodiversity are critical to rural livelihoods and food and nutrition security and are strongly interconnected.
- All these systems are under extreme stress from climate change and other mutually reinforcing human-induced pressures.
- Single-sector approaches are rarely optimal, & thinking about sectors together presents opportunites

- GAINS
  - Increase benefits and sustainability
  - Re-orient trajectories of high water abstraction, deforestation, food insecurity, variable electricity

What is the WEF Nexus?

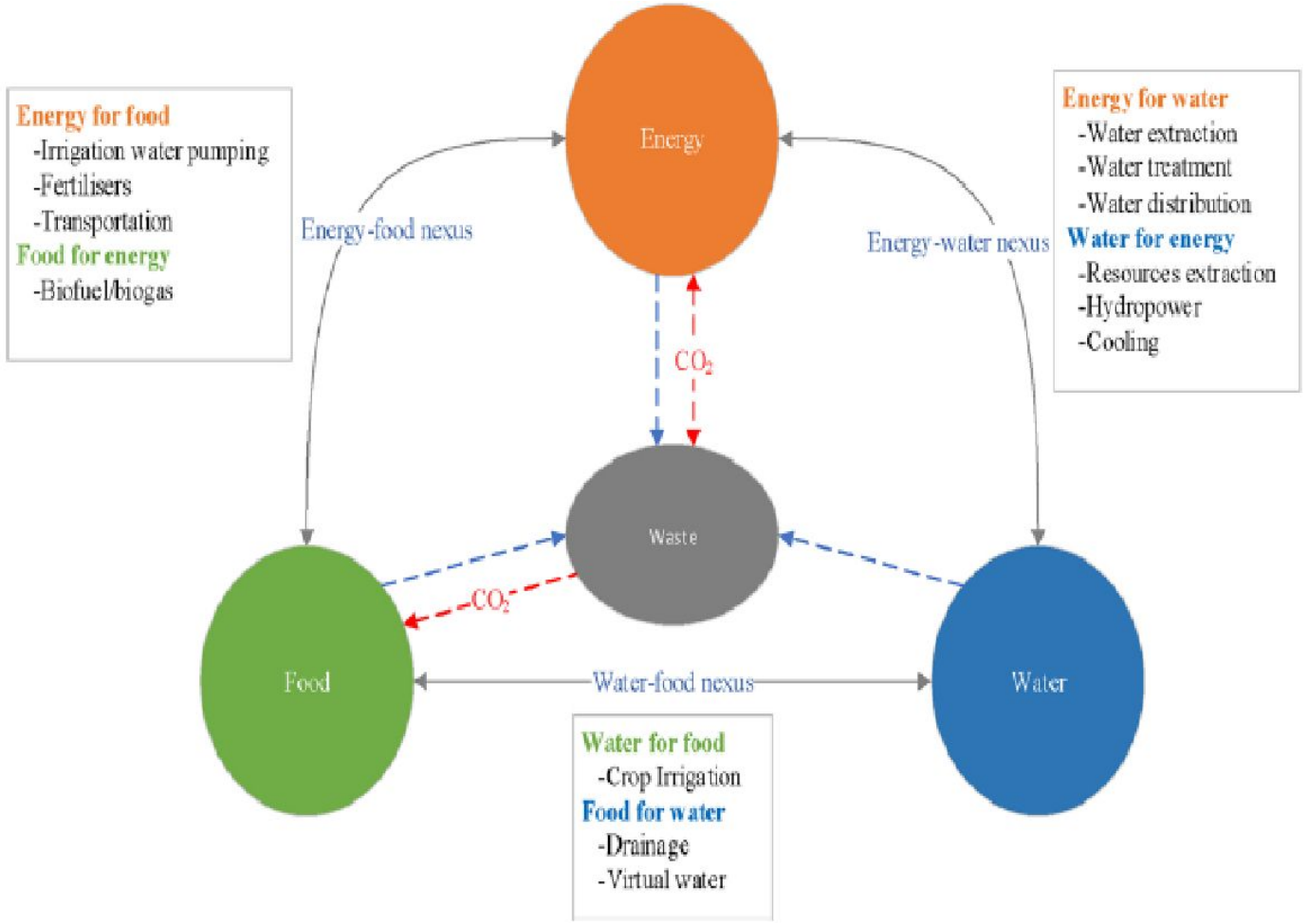
- it presents a conceptual approach to better understand and **systematically analyse the interactions between the natural environment and human activities**, and to work towards a more coordinated management and use of natural resources across sectors and scales (FAO, IUCN, GWP)
- The nexus approach aims to **identify tradeoffs and synergies of water, energy, and food systems**, internalize social and environmental impacts, and guide development of cross-sectoral policies (Albrecht et al., 2018)
- Grew to prominence following the Bonn 2011 Conference WEF Security Nexus – Solutions for a Green Economy
- > 8300 hits on google scholar



(Wicaksono et al. 2017)

What is different about the nexus?

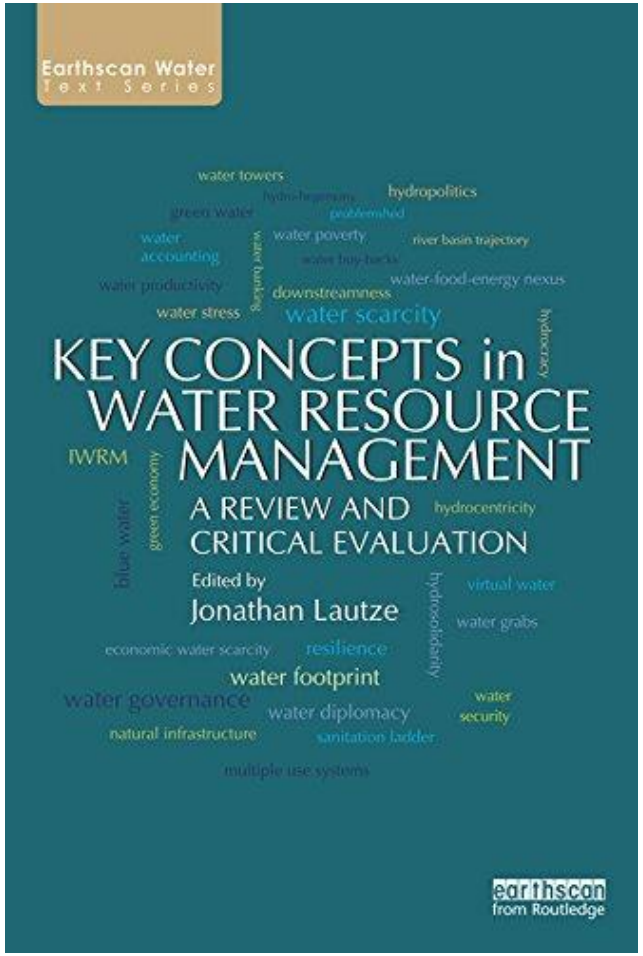
- It is a two (or three) way street
  - Water is less central
- More technical in focus
  - Governance is less central



(Ghiat and al-Ansari, 2021)

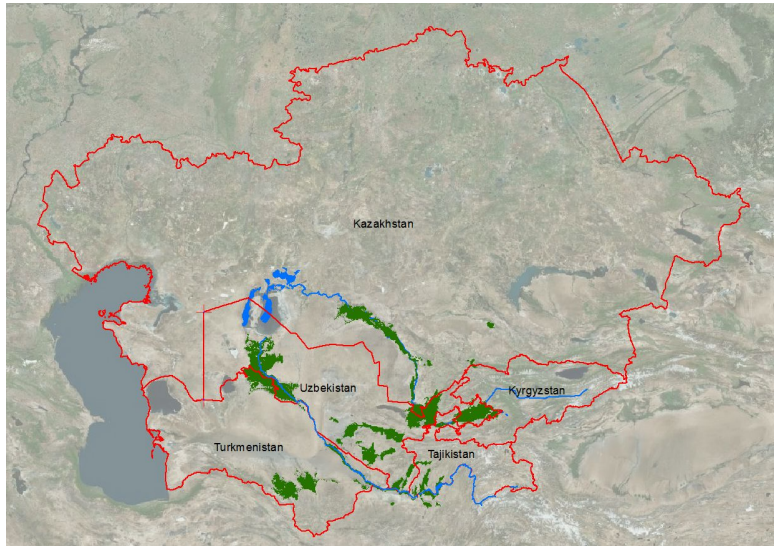
Challenges or Obstacles

- Complexity is not easy to operationalize
  - Existing conditions (e.g. institutions) may deter
  - Transaction of integrating can be daunting
- Complexity is not easy to communicate
- Too driven by the water sector
- New concepts are often subject to discussion and debate (like today? ☺️) in an effort to perfect and/or overcome confusion
  - may redirect focus from doing
  - suggest to find value, do, and learn from what's done (instead of more frameworks)



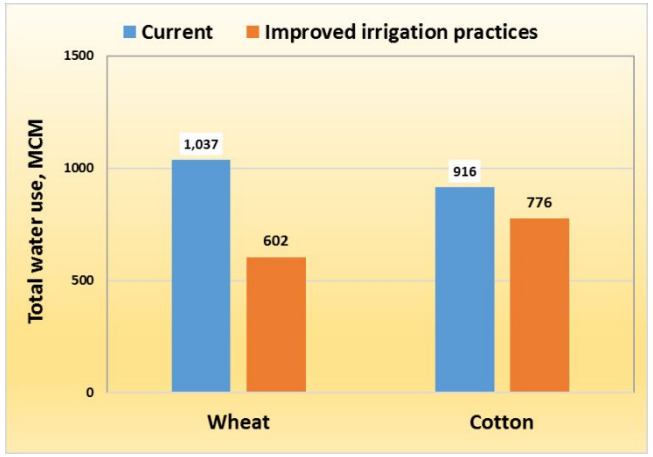
Successes

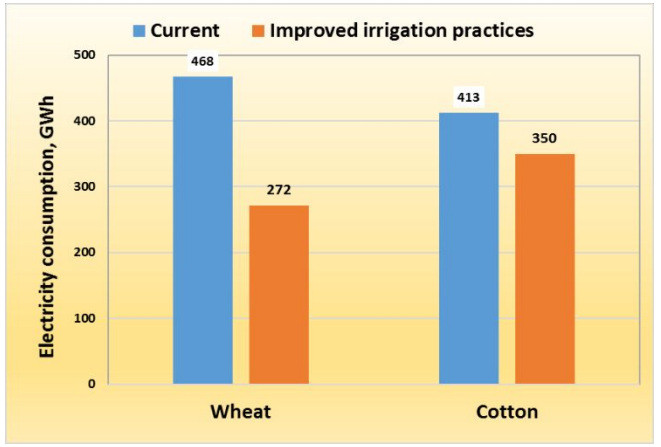
- Project: Mitigating competition for water and energy use in transboundary Amu Darya and Syr Darya rivers by improving WUE (2017-2019)
  - Led by Kakhramon Djumaboev
- 2.2 million hectares land out of 4.3 million hectare under pump irrigation. 70% of pump units outdated and have low efficiency. About 21% of generated energy of Uzbekistan is used for pump operations
- Assessed the potential impact of improvements in the water use efficiency and energy use intensity through development of different scenarios of water and energy savings



Potential efficiency gains, Karshi steppe

Crop	Total pumped area, ha	Irrigation application, mm		Total water use, MCM		Total water saving, MCM	Electricity consumption, GWh		Total energy saving, GWh	GHG emissions, Kton		CO_2 reduction, Kton of GHGs
		Current	Improved irrigation practices	Current	Improved irrigation practices		Current	Improved irrigation practices		Current	Improved irrigation practices	
Wheat	102600	1011	587	1037	602	**435**	468	272	**196**	219	127	**92**
Cotton	119681	765	648	916	776	**140**	413	350	**63**	194	164	**30**
Total	222281	N/A	N/A	1953	1378	**575**	880	621	**259**	413	291	**122**





- 25-30% savings in water, elec, carbon emissions, some increase in yield

Outcomes

Outcomes

- Government of UZ issues decree incentivizing adoption of water-saving technologies (drip, sprinkler, laser leveling)

 Drip irrigation has expanded drastically

 More productive agriculture, less water use, less energy, and more water of better quality available downstream

Successes

- WE4F in MENA (https://we4f.org/filter-innovators)

Sector	Innovation	Innovator Name
Solar Energy	Solar Pumping systems	Agrisolar
	Nano grid	IRSC
	Solar Panels	Green Essence
	solar power water treated technology	Alvatech
	Energy produced from PV Panels	Solar Wind Middle East
	Solar PV energy	Spark Renewables
Organic Pesticides and Organic Compost	Organic Pesticides and Fungicides	Chitosan Egypt
	Organic Compost	Baramouda
	Organic Framing with Technology and Internet of things	Biomass SAL
	Bio-waste disposal - Organic Compost	Compost Baladi
Irrigation Systems	Drip Irrigation System	Robinson Agri
	Daily Irrigation Scheduling	The Platform
	Farm Integrated software for irrigation	SOWIT
	Waste Water Treatment for irrigation	SUWACO
Complete type of Food value chain	Urban Farming Kit	Schaduf
	Software for the whole value chain for breeding poultry	AbuErdan
	Goat Value Chain	GoBaladi
	Engage rural women in the agriculture value chain through planting nurseries	High Atlas Foundation