Asia Water Forum 2022
8–11 August 2022 • Online

Focus Area: Water as a sustainable resource

Session Title: Decision support for efficient water utilization

Schedule: [9 August 2022 (Tue) | 11:00 a.m. - 12:30 p.m. (GMT+08)]

Realising the multiple benefits of Water-Energy-Food-Ecosystems Nexus

Experiences from NEXUS Gains initiative

Santosh Nepal, Jonathan Lautze, Mohsin Hafeez, Alok Sikka, Manohara Khadka, Stefan Uhlenbrook

ADB

NEXUS Gains:
Realizing Multiple Benefits
Across Water, Energy, Food
and Ecosystems

Realising the multiple benefits of Water-Energy-Food-Ecosystems Nexus

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Asia Water Forum, 09 August 2022

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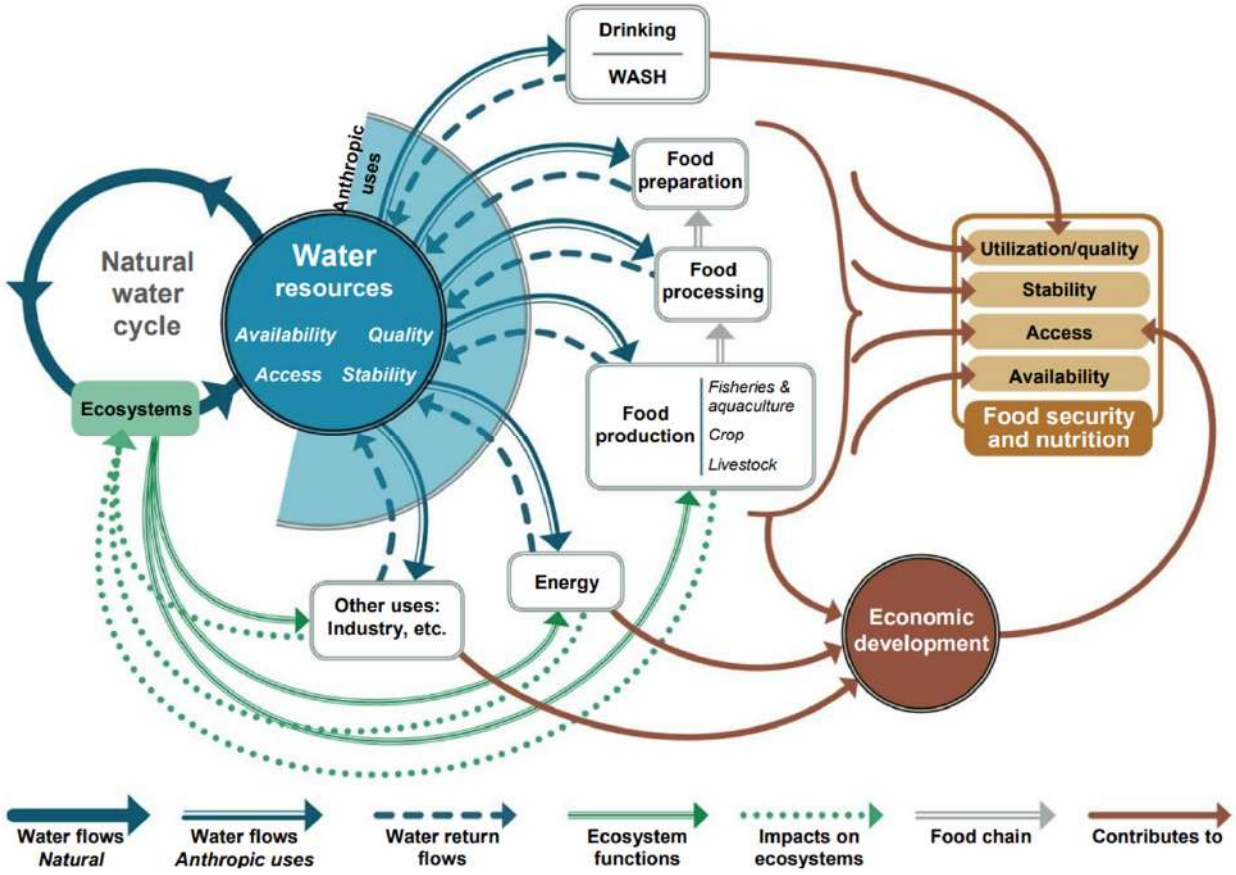
International Water Management Institute

Multiple interfaces between water, energy, food security and nutrition



Water is essential for food and nutrition security

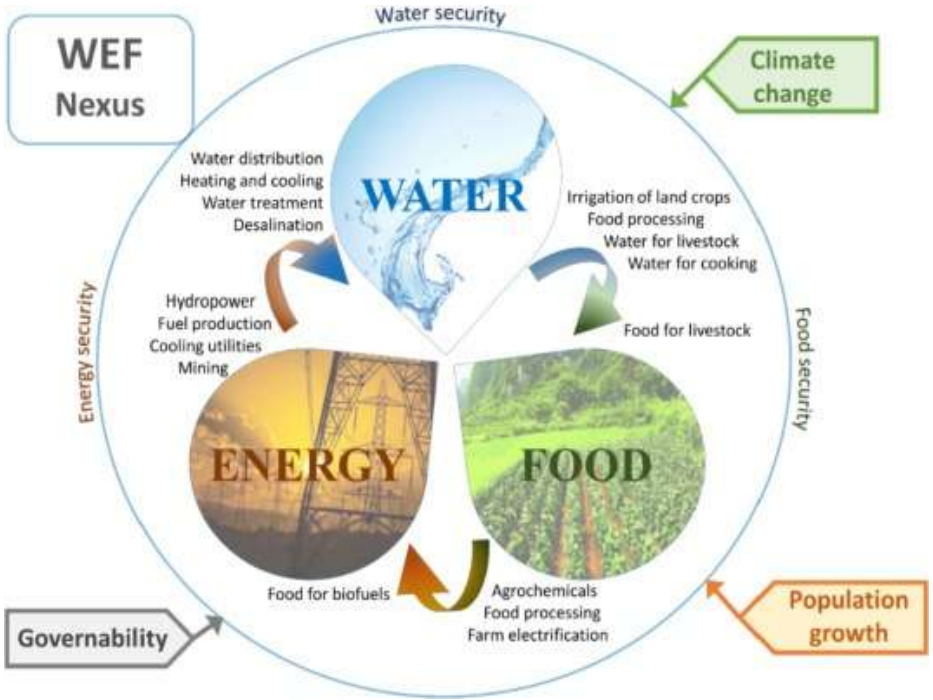
70 percent of freshwater withdrawals for agriculture

Water is a system connector for ecosystem, food, energy and economic activities

Water could be potential for conflict in transboundary river basins

Source: HLPE (2015)

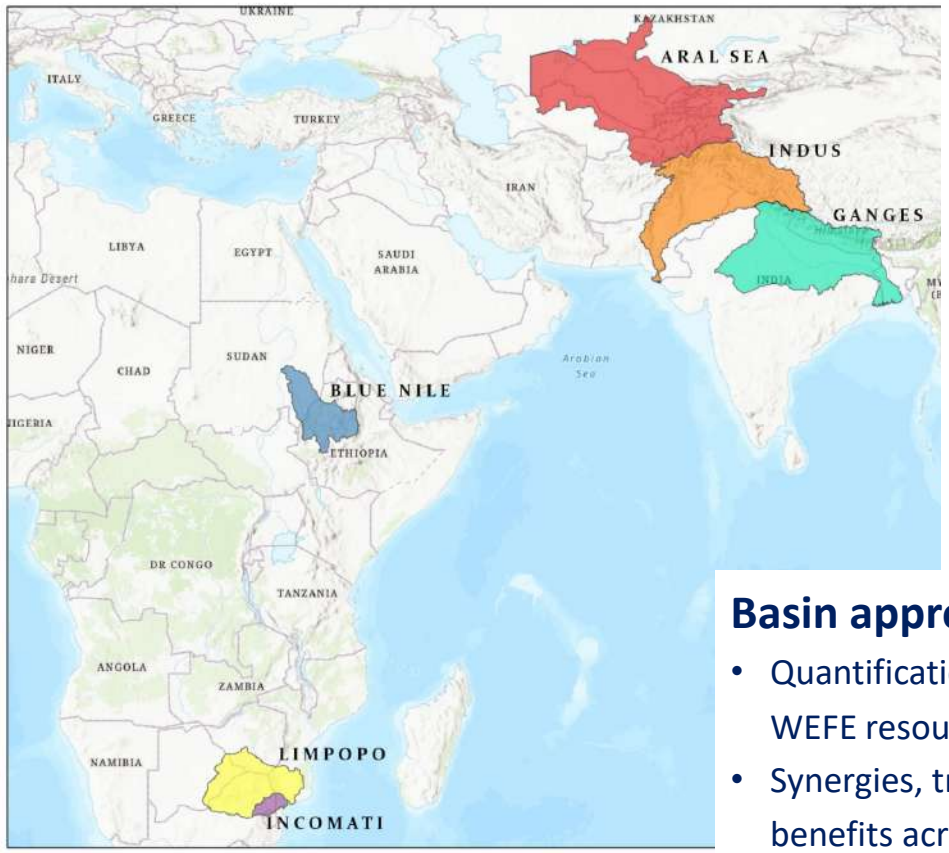
Water Energy Food Ecosystems (WEFE) Nexus Challenges



Source: Mahlknecht et al., 2020; adapted

- **Population growth and economic development** (10 billion by 2050)
- **Supply and demand imbalance**
- **Climate crisis** will cause cross-sectoral impacts
- WEFE nexus is critical to rural livelihoods, food and nutrition security & economies, and systems are **strongly interconnected**
- **National & regional institutions struggle**, particularly in transboundary basins
- Nexus goes beyond the IWRM approach
- Scale dependencies of processes: Farm to landscape/watershed to basin scale

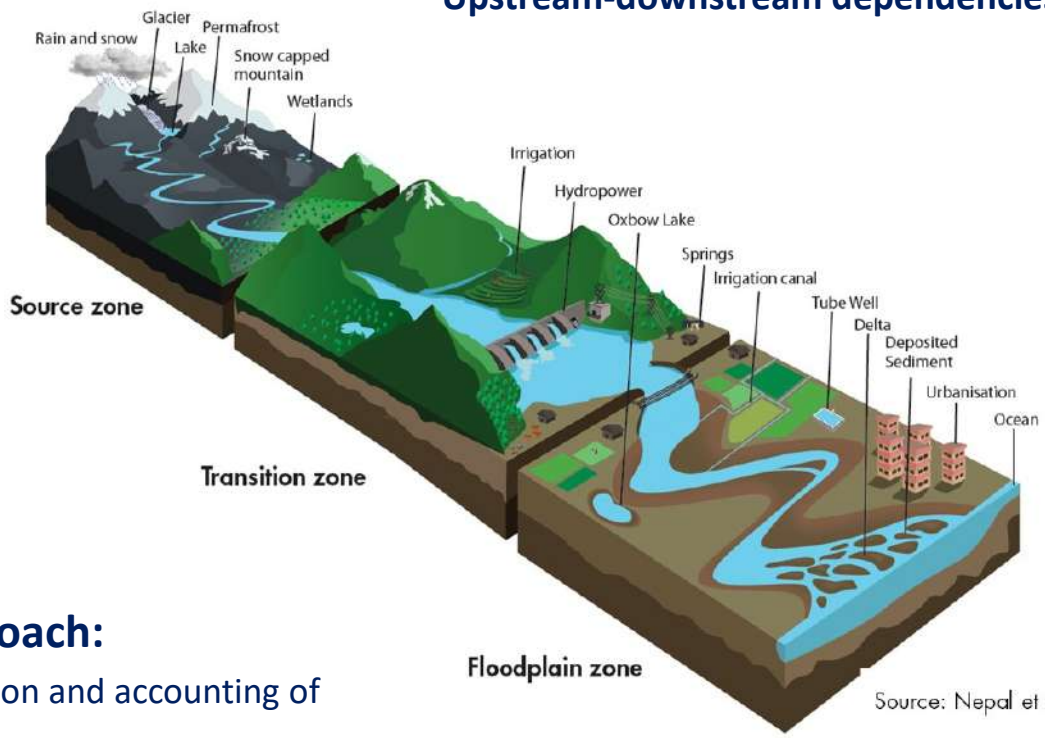
NEXUS Gains Geographies: Taking a basin approach



Basin approach:

- Quantification and accounting of WEFE resources
- Synergies, trade-offs and shared benefits across countries

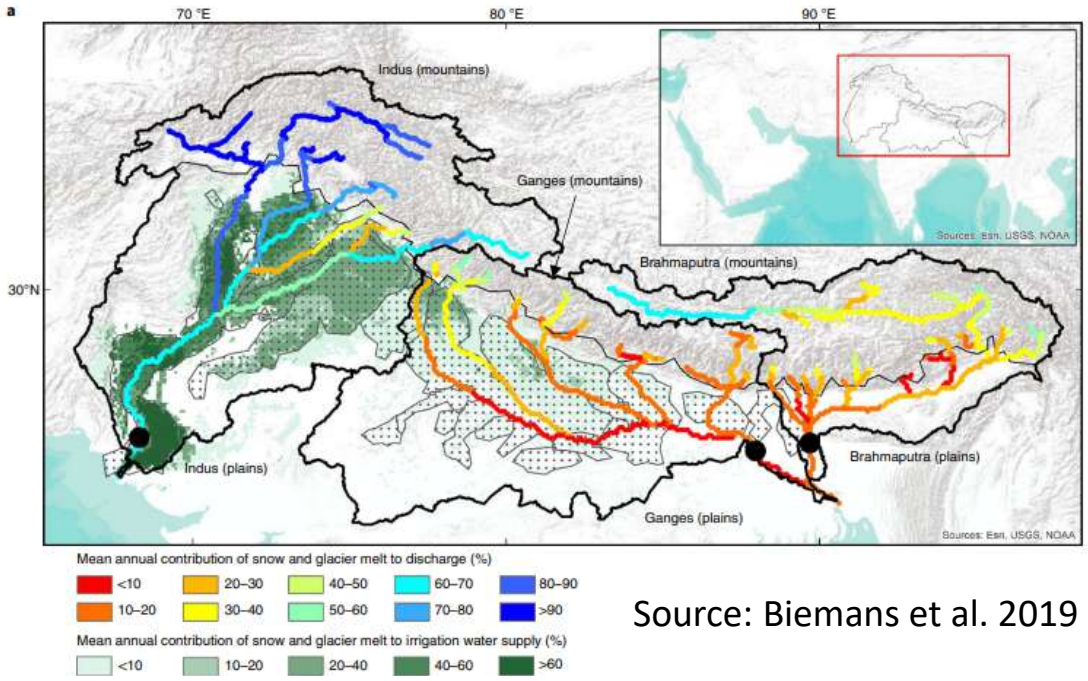
Upstream-downstream dependencies



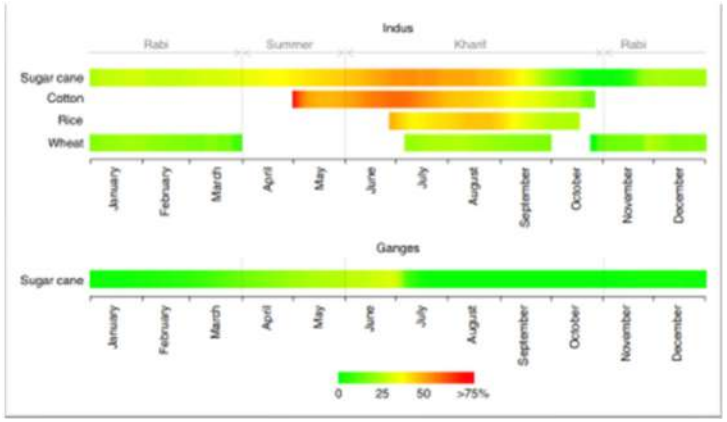
Source: Nepal et al. 2018

Importance of meltwater in South Asia

- Strong melt water dependencies in the Indus basin
- 80-90% meltwater in upstream river network
- 60% irrigation water withdrawal during spring season originates from mountain meltwater
- Strong dependence on melt water in crop development stages

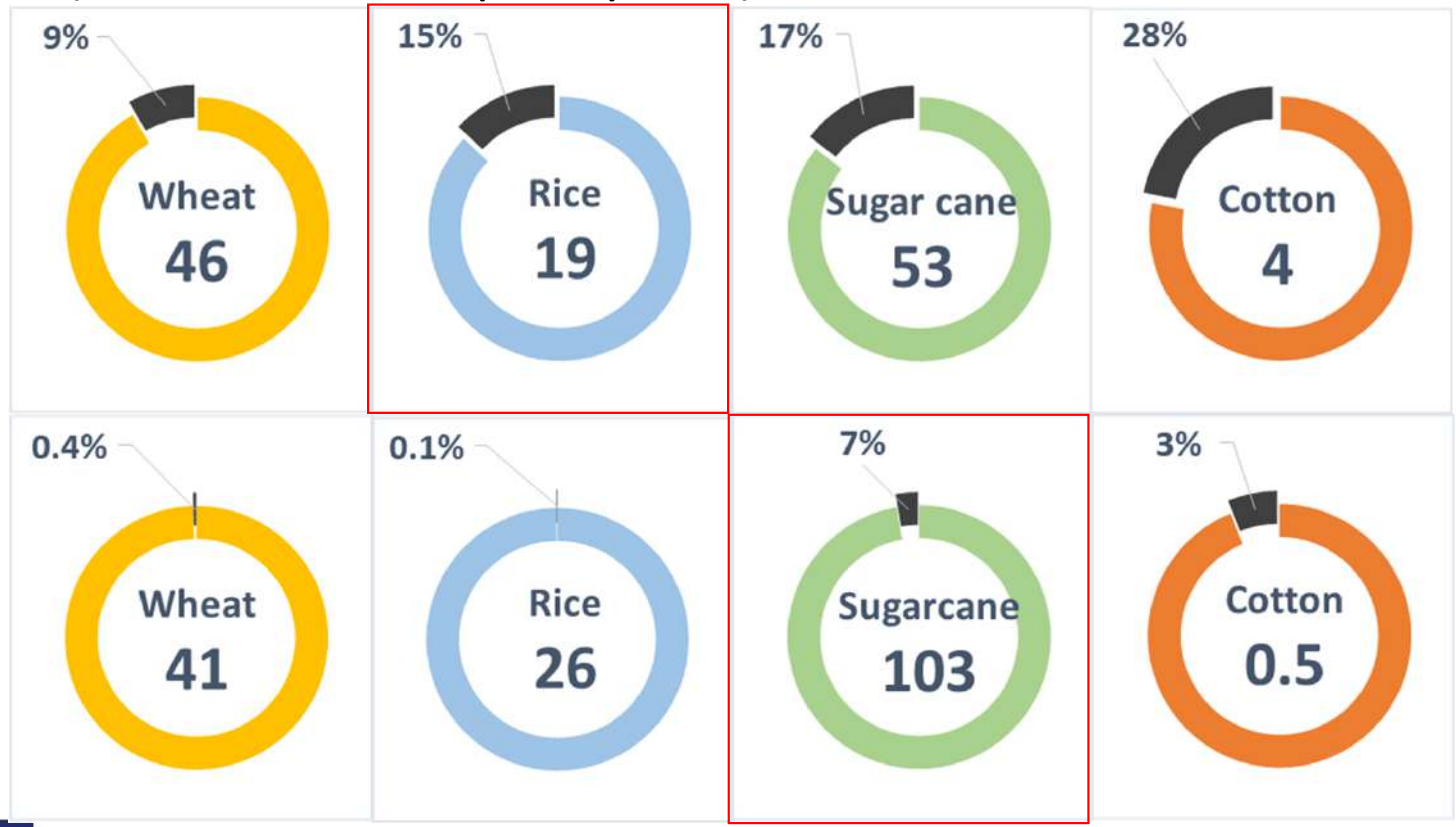


Source: Biemans et al. 2019



Crop calendar and mean annual relative contribution of meltwater

Meltwater contribution (%) in agriculture production (million tons per year)



Indus Basin: 15% of annual 19 million tons of **rice production** can be attributed to glacier and snowmelt

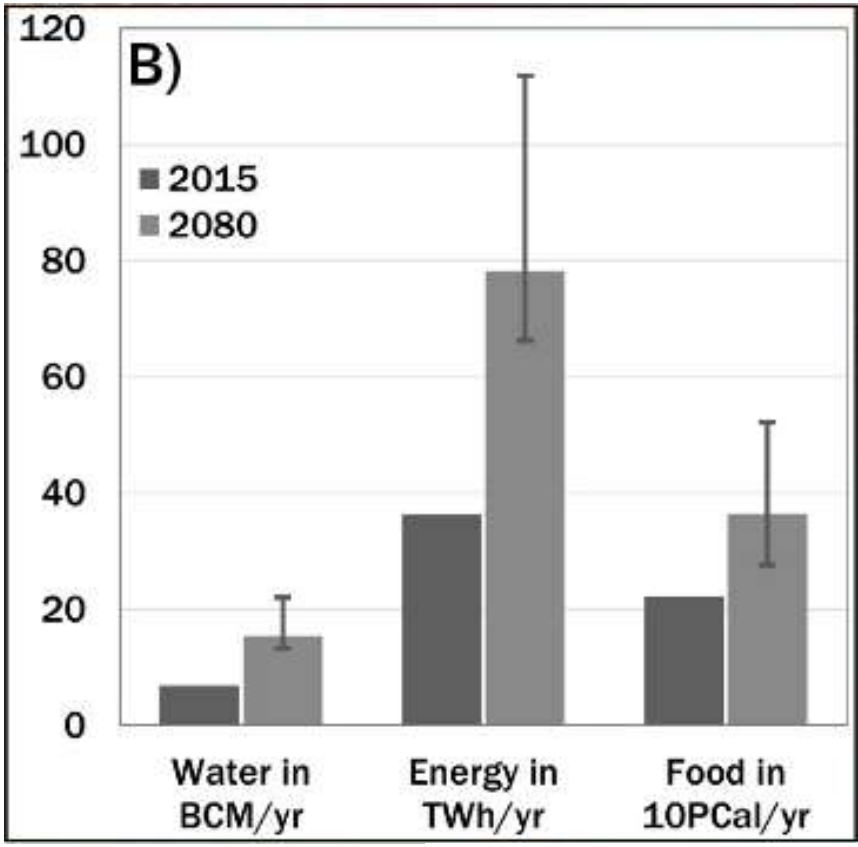
Ganges Basin: 7% of annual 103 million tons of **sugarcane production** can be attributed to glacier and snowmelt

Source: Biemans et al. 2019

Future Indus: More people, more resources

- **Population** 206 million (2016) will increase by 50% by 2050s
- **Basin's GPD** is projected to increase by eight-fold by mid-century & temp increase by 1.9 ^{o}C
- Strong growth in population and economic development and **demand for fresh water** and other WEFE resources
- **Hydro political tension** considering upstream-downstream water uses
- Most vulnerable and **critical water towers** on the global scale

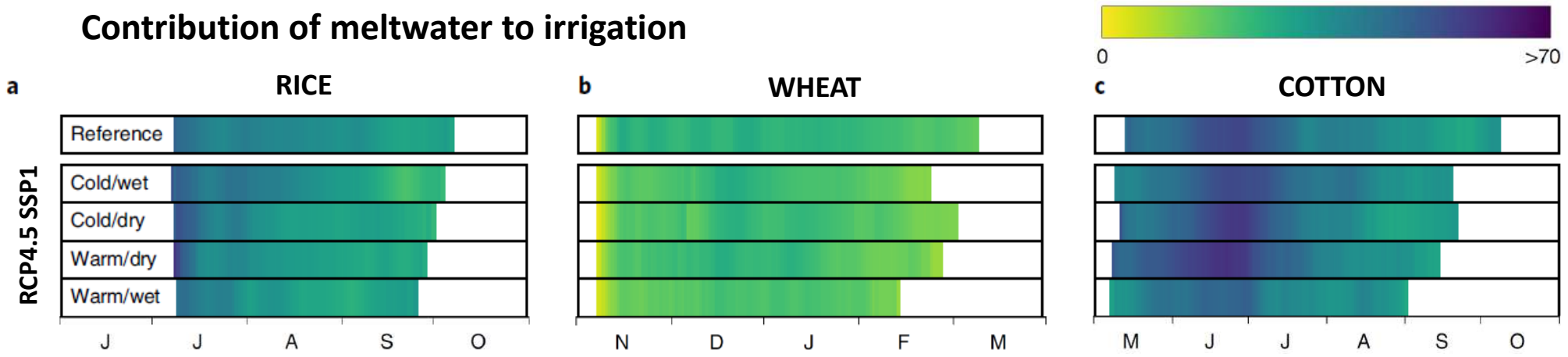
Considerable increase in domestic water uses, energy and food requirements to sustain the increased population and economic growth in the future



Smolenaars et al., 2020.

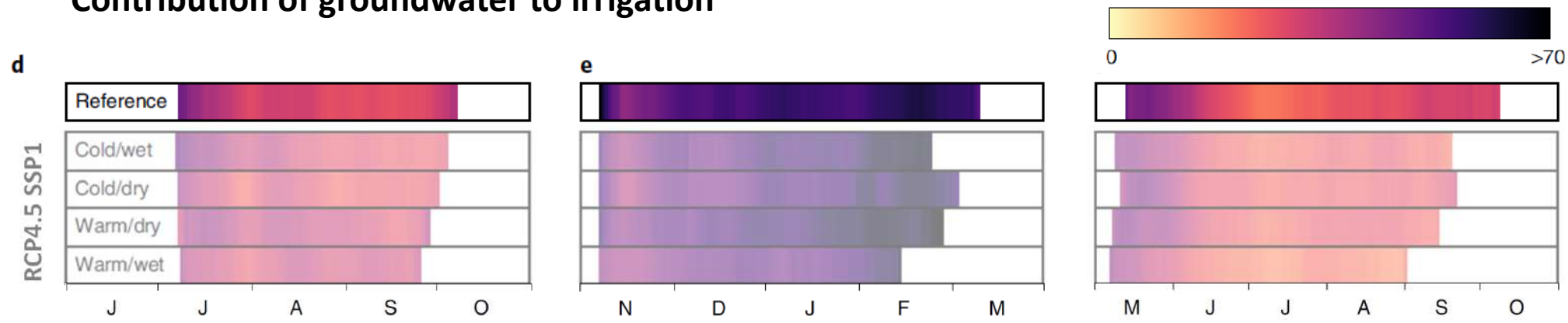
Meltwater and groundwater in Indus: Present vs Future

Contribution of meltwater to irrigation



Lutz et al. 2022, Nature Climate Change

Contribution of groundwater to irrigation



NEXUS Gains: Example of a Core Innovation: *Water Storage Diagnostic*

Rethinking water storage!

- What are the current/future water storage service needs?
- Which types of storage can be best utilized? (*integrated approach, based on systematic mapping and inventory*)
- What are the needs and priorities of the (poor) people? (*social safeguards that minimize potential adverse impacts of storage options)*
- Which solutions support environmental health and biodiversity?
- Provide the evidence base for effective water storage investments that are flexible (allow for uncertainties)

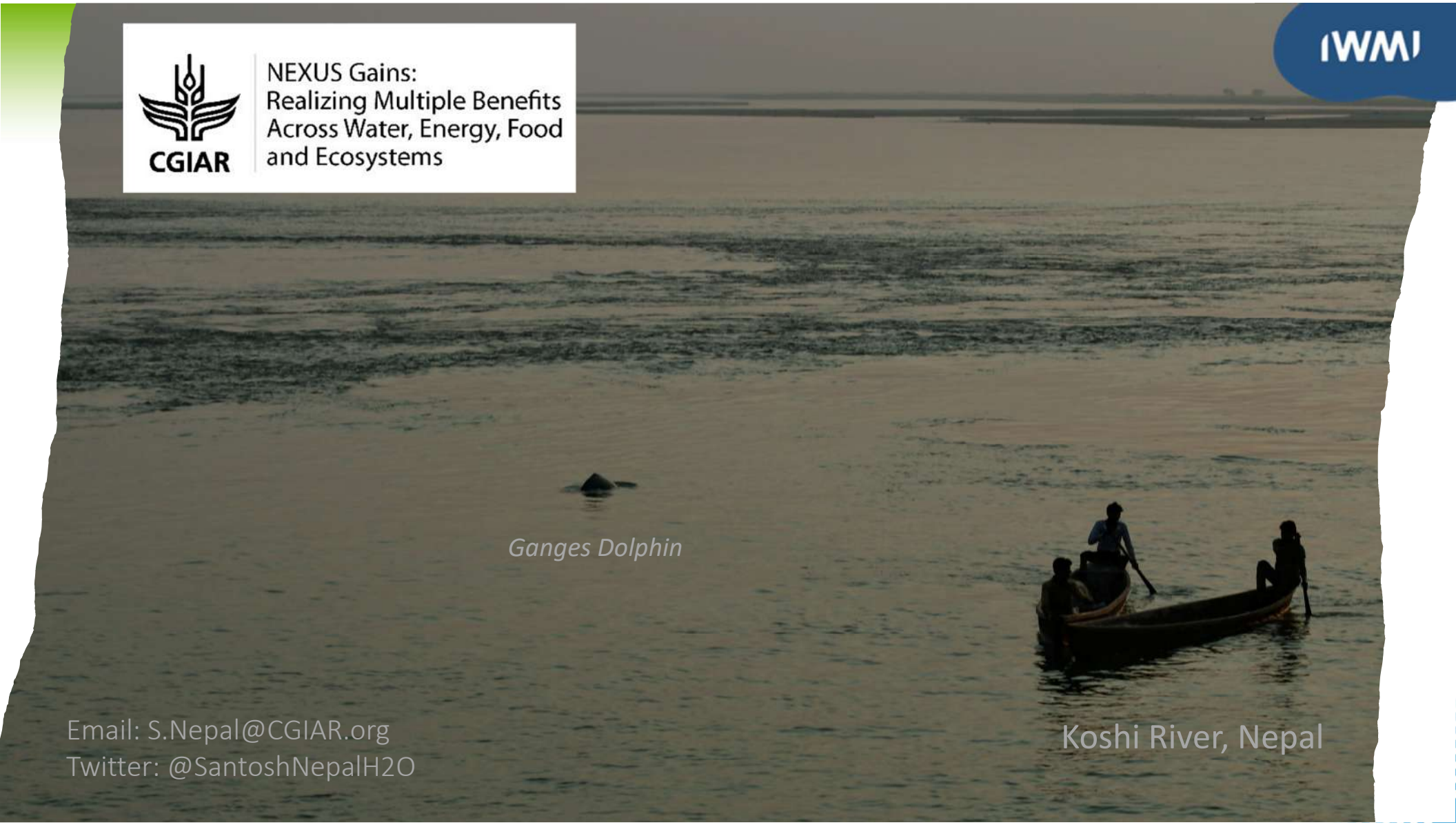





Expected outcomes

- Provide an **in-depth understanding** of climate change impacts on future availability of WEFE resources
- Multi stakeholders will utilize tools and approaches to **improve water productivity** across scales of focal basins
- Investors and policy-makers will use **gender-sensitive business models** to scale clean rural energy access and significantly lower the carbon footprint
- Co-development of guidelines and **governance toolbox** to address growing competition & depletion of resources in basin's hotspots
- Capacity building programs will be implemented for at least **40 emerging women leaders** in government, private sector, and universities to implement WEFE nexus innovations
- Policy-makers, planners and WEFE researchers will use **innovations** to minimize impacts of climate change (e.g. Diagnostic tools, DSS, governance toolbox, cross-sectoral platforms and leadership)

NEXUS Gains: Realizing Multiple Benefits Across Water, Energy, Food and Ecosystems



Ganges Dolphin

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