

Unpacking freshwater's role in nature-based climate mitigation

*Malin Lundberg Ingemarsson, PhD
Program Manager Water for Resilient Landscapes, SIWI*

SIWI – Stockholm International Water Institute

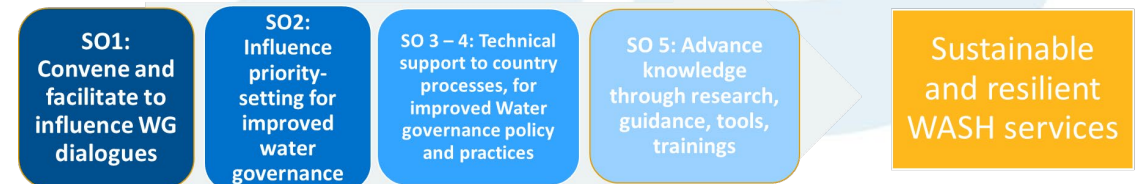
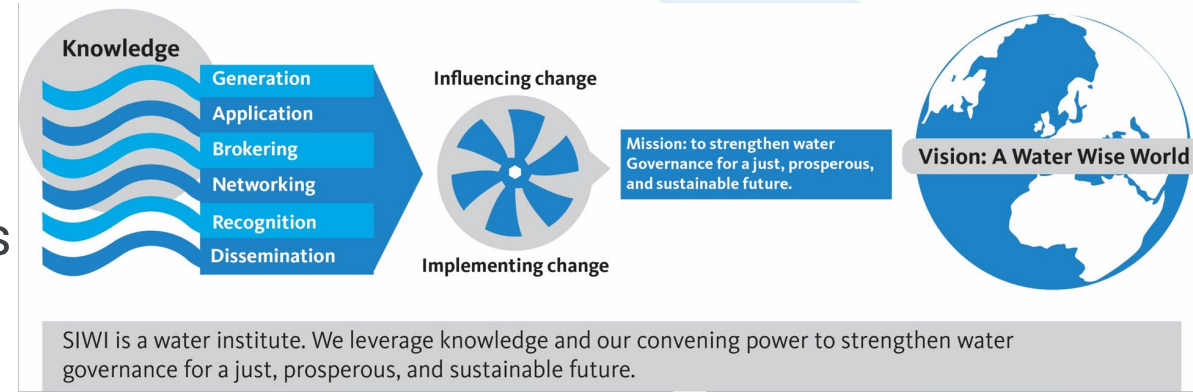
SIWI is a non-profit foundation, founded in 1991

Headquarters in Stockholm, and three regional centers in South Africa, Colombia and Jordan.

SIWI specializes in water governance, in particular the promotion of

- Integrated water resources management
- International cooperation (transboundary management)
- WASH service delivery

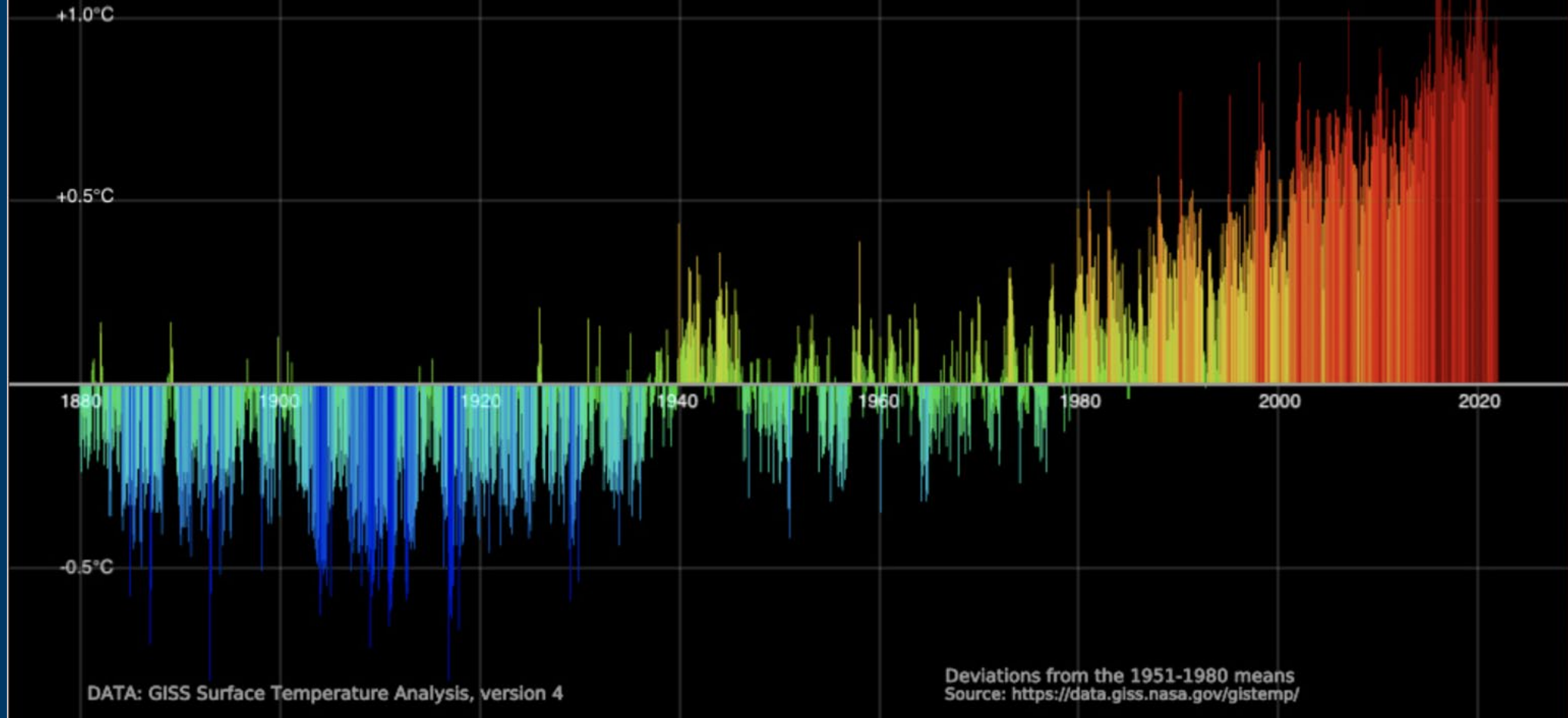
SIWI is also the organizer of the World Water Week in Stockholm



Nature-based and water-wise climate mitigation

GLOBAL TEMPERATURE CHANGE 1880 - 2021

Graphic: @SCOTTDUNCANWX

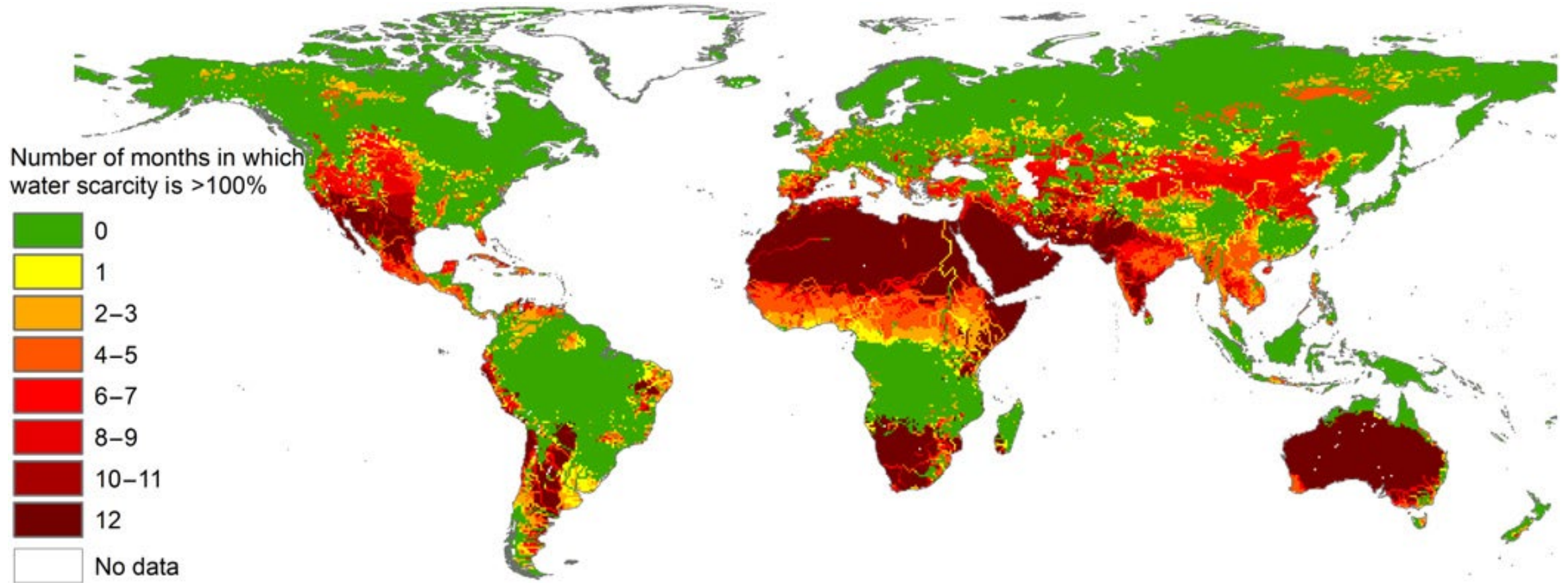


Extreme events in 2022



Water scarcity prevails in many regions

Mekonnen & Hoekstra 2016



➤ **4 bn people are faced with severe water stress**
(during at least one month per year)

Climate action

- **Climate change adaptation** - taking action to prepare for and adjust to both the current effects of climate change and the predicted impacts in the future → **Water is key**
- **Climate change mitigation** – limiting global warming by reducing the flow of heat-trapping greenhouse gases into the atmosphere → **Water is rarely factored in**

Stockholm Resilience Centre
Sustainability Science for Biosphere Stewardship

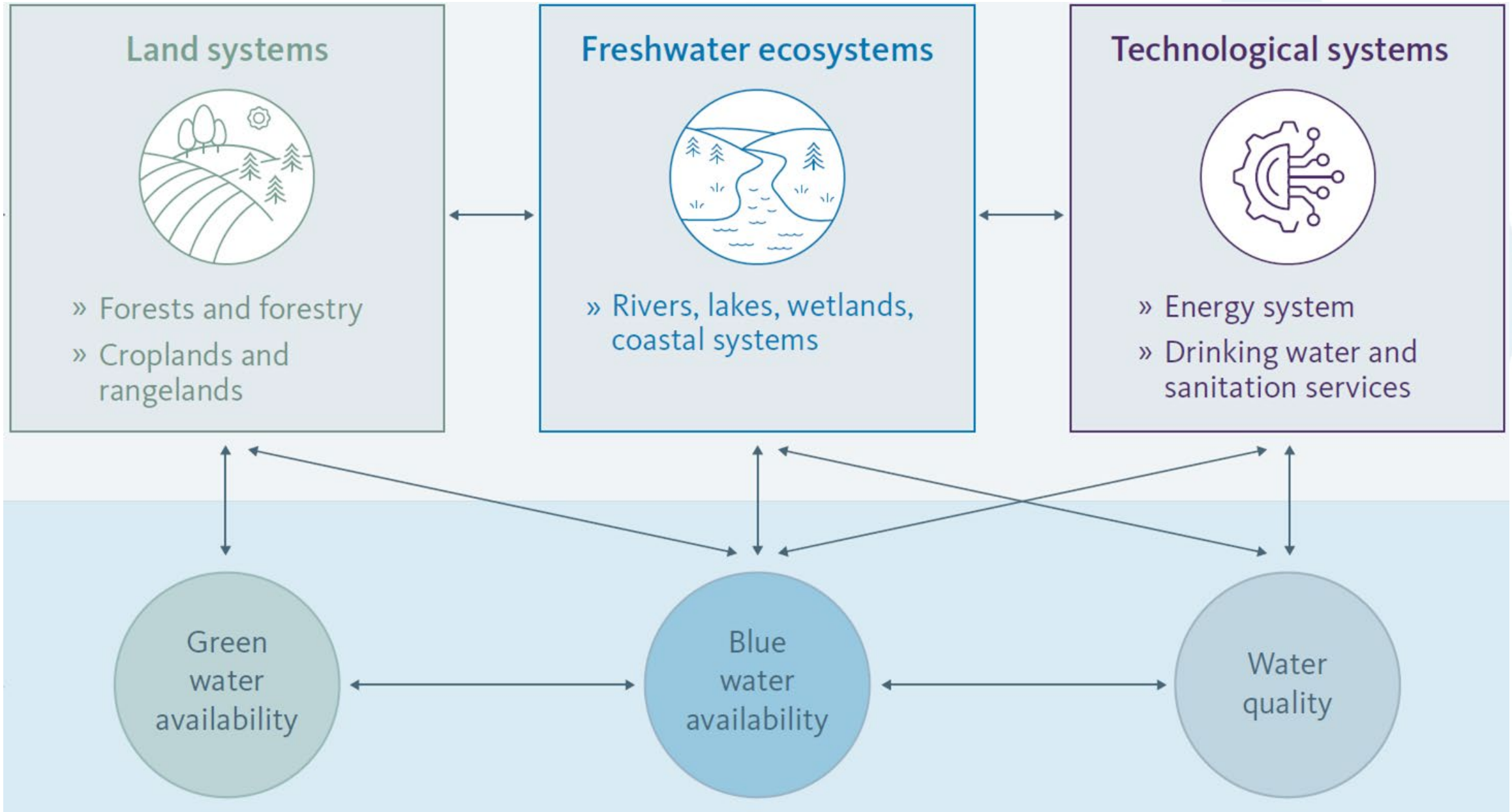


REPORT

THE ESSENTIAL DROP TO REACH NET-ZERO: Unpacking Freshwater's Role in Climate Change Mitigation

Freshwater can make or break our ability to successfully implement many climate change solutions. This report presents why, where, and how freshwater should be integrated into climate change mitigation plans and activities.





Key messages

1. Climate mitigation measures **depend on** freshwater resources.
2. Climate mitigation measures **impact** freshwater.
3. Nature-based solutions can deliver **multiple benefits** for people and the environment.
4. **Joint water and climate governance** need to be coordinated and strengthened



Mitigation potential in freshwater ecosystems

Mitigation potential in freshwater ecosystems



Wetlands

- Peatlands
- Tidal wetlands (e.g. mangroves)
- Inland mineral soil wetlands



Rivers



Lakes and Reservoirs

Mitigation potential in freshwater ecosystems

- Reduced conversion
- Restoration / rewetting



Wetlands

- Peatlands
- Tidal wetlands
- Inland mineral soil wetlands

- Connecting rivers to floodplain
- Limiting channel alterations
- Limiting nutrient and organic matter loading



Rivers

- Reduced pollution and eutrophication
- Sustainable planning and management

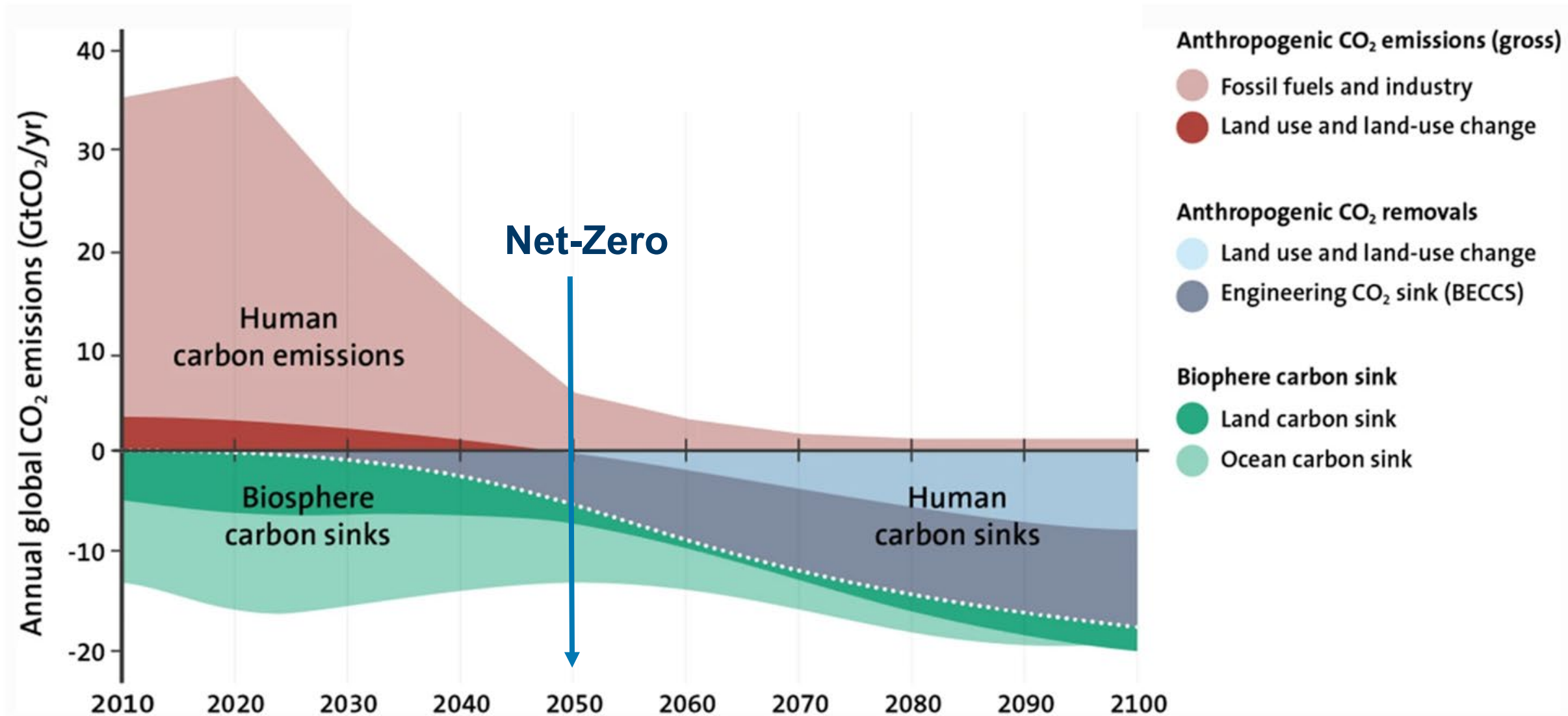


Lakes and Reservoirs

Watershed/basin-scale management approaches

Mitigation potential in land systems

Mitigation potential in land systems



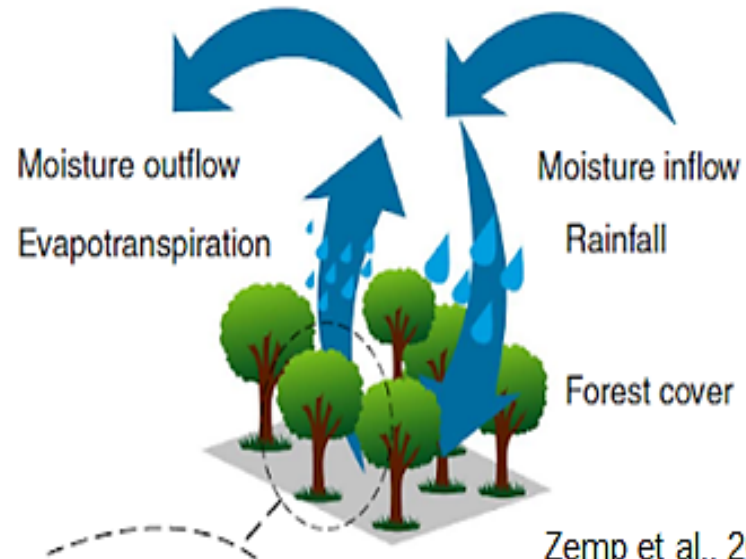
Mitigation potential in land systems

Potential undesirable impacts on freshwater

- Reductions in streamflows and lowering of groundwater table
- Where, how, and what matters -> choice of tree species, density, irrigation technologies, rotation periods, etc.

Positive impacts on carbon stocks can also alleviate water risks

- Rainfall generation and drought mitigation
- Flooding and erosion prevention
- Increase groundwater recharge

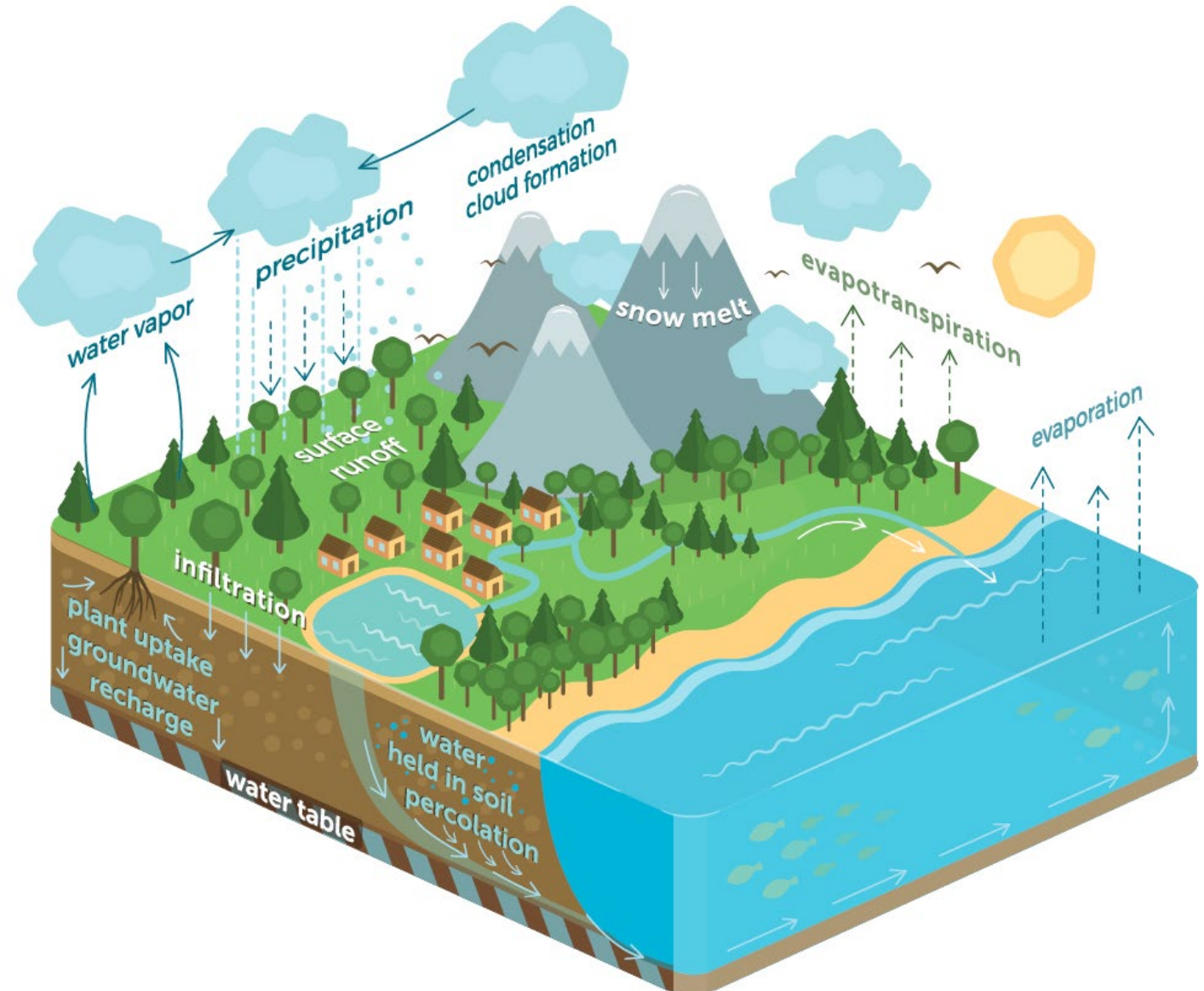


Zemp et al., 2020, *Nat. Comm.*

The Water-smart Forest and Landscape Restoration (W-FLR) Tool

Supporting key water processes in forests:

- Precipitation
- Regulation of surface runoff & flood moderation
- Infiltration and groundwater recharge
- Soil percolation
- Evapotranspiration
- Precipitation formation



Mitigation potential in energy systems

Mitigation potential in energy systems

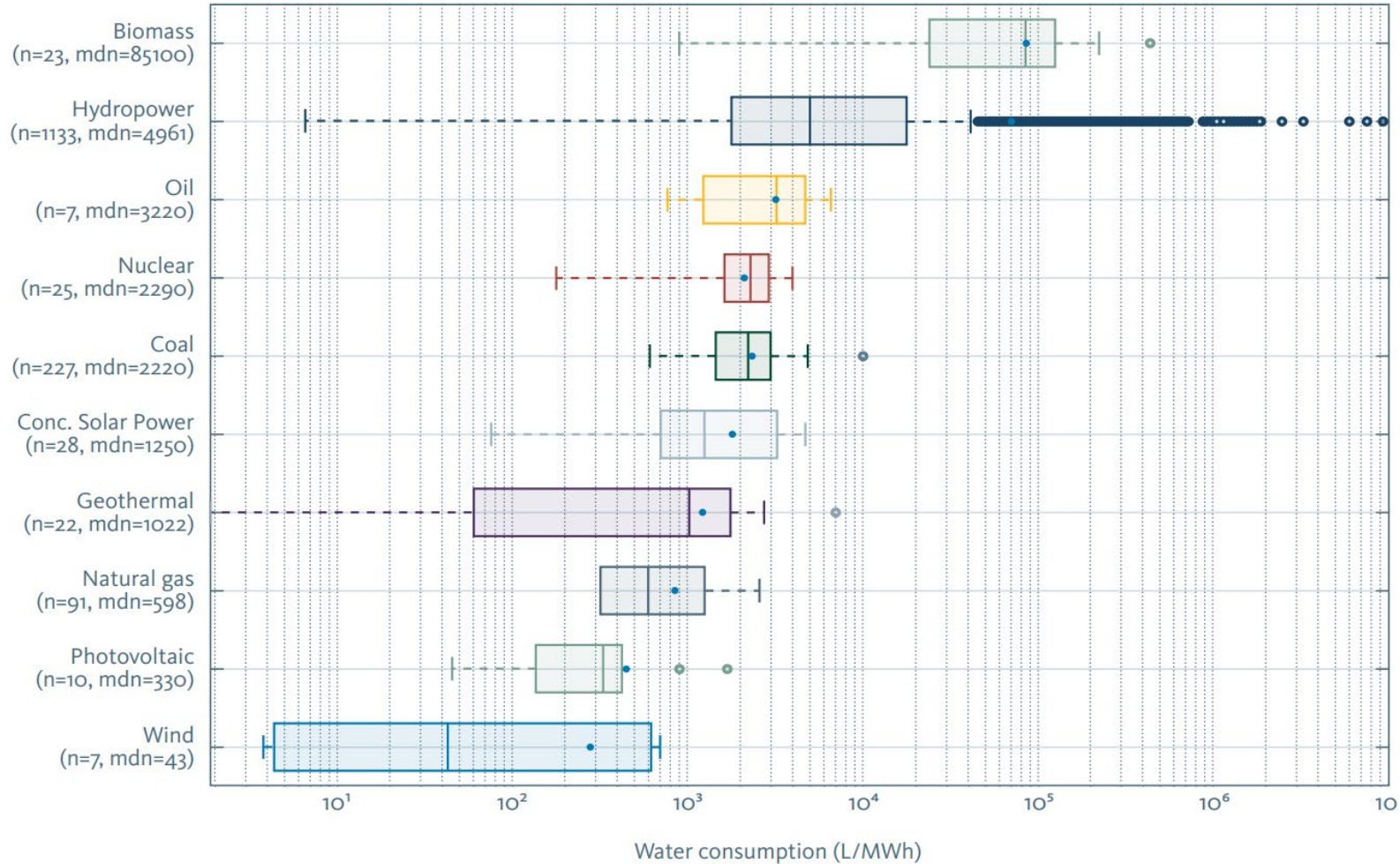
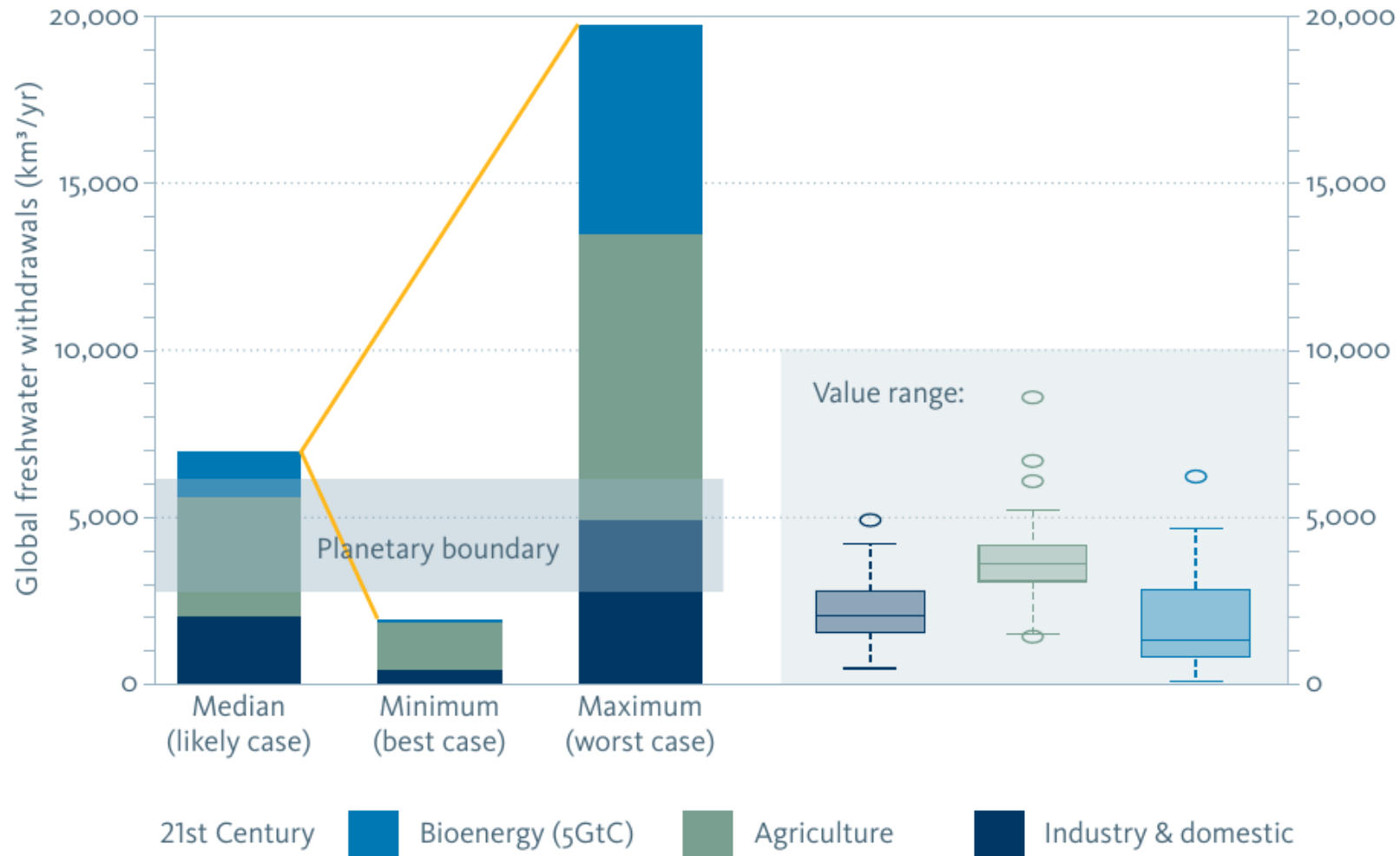


Figure 7.1. Range and median estimate of water use for electricity production by type measured in litres of water per megawatt hour of electricity produced. Source: Jin et al. (2019).

Increased demand for available water resources



Who needs freshwater the most?

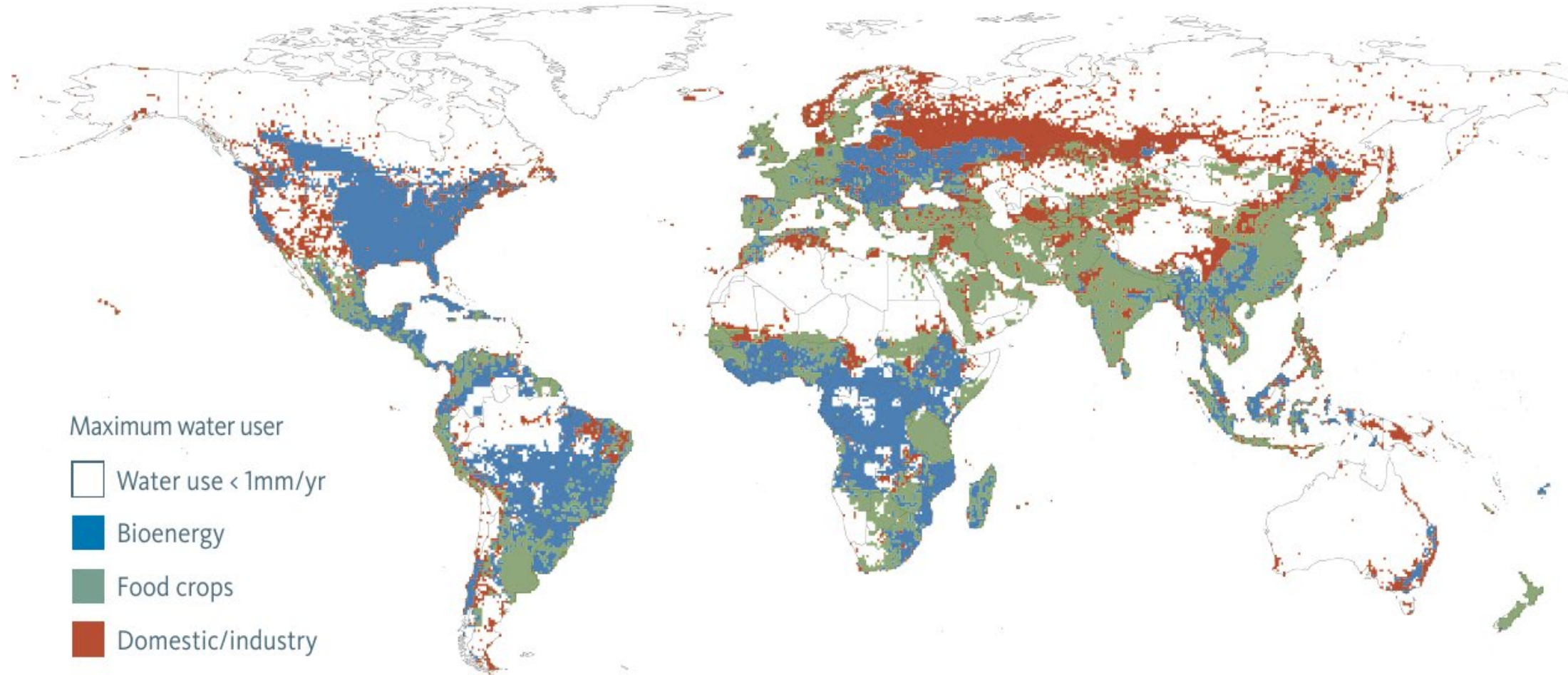


Fig 8.2 - based on Stenzel et al., 2021a, NatComms

Assess water risks in climate action

- **Unmanaged water risks can limit success of mitigation measures.**
Water shortages, floods, or climate-induced changes to the water cycle can impact the effectiveness and viability of actions taken across land, freshwater and energy systems.
- **Uninformed mitigation planning create water risks to the water cycle.**
If not planned carefully, negative impacts on freshwater resources might threaten water security and harm ecosystems.

Taking action for water-wise climate mitigation

- **Support the hydrological cycle** by protecting, restoring and sustainably managing ecosystems, agricultural land and urban green areas
- **Promote a water-wise transition to renewable energy** by mainstreaming water risk assessment for energy planning
- **Account for water-wise co-benefits and synergies** – making investment cases go beyond reducing greenhouse gas emissions (often linked to NbS)
- **Invest in integrated approaches** – adopt watershed/basin-scale climate strategies



Access the report here:



Thank you!

For further questions, please contact:

malin.ingemarsson@siwi.org

