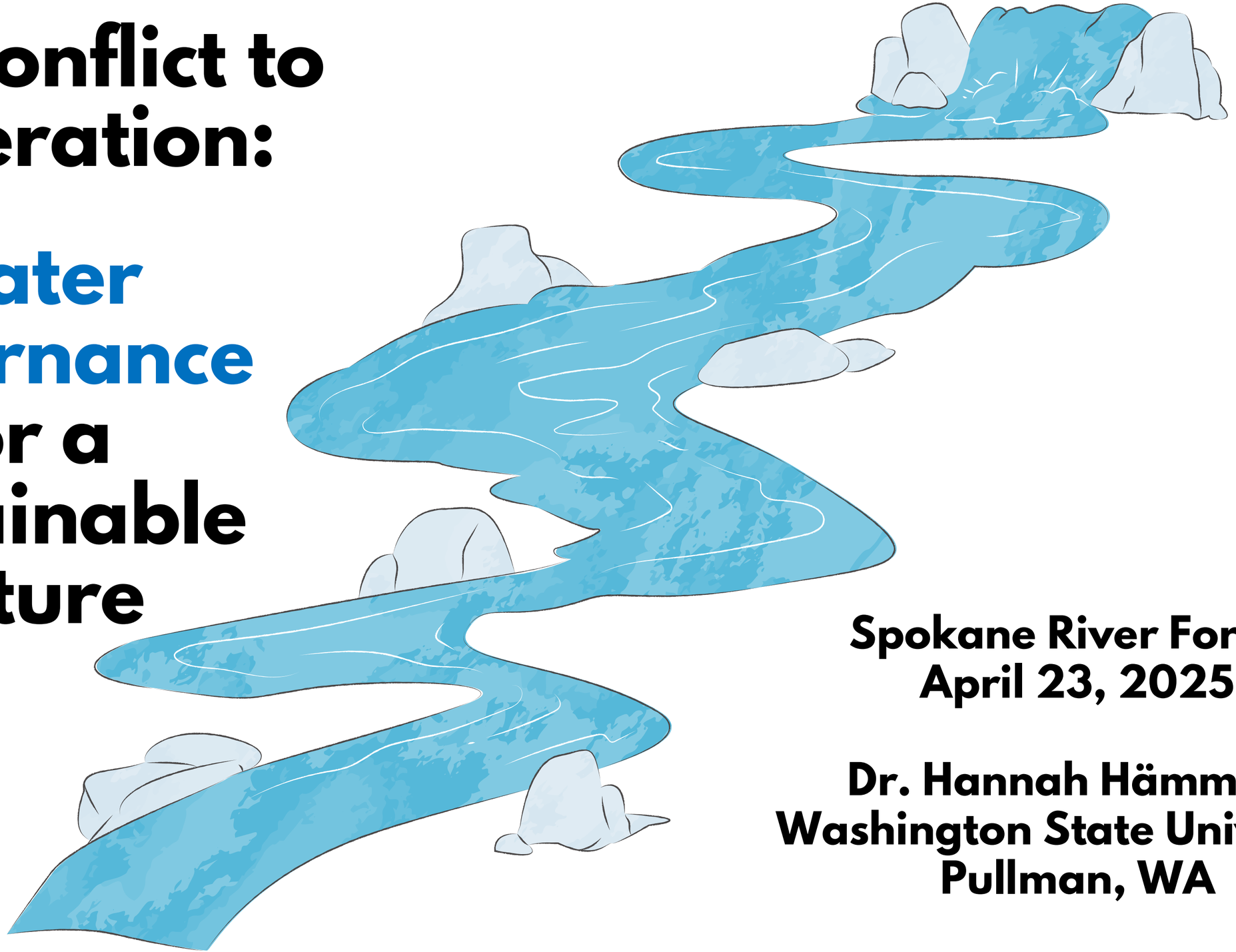
From Conflict to Cooperation:

Water Governance for a Sustainable Future

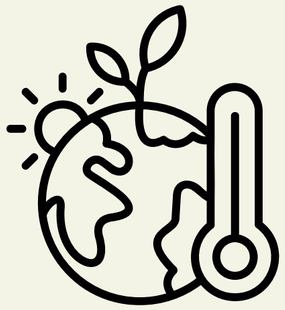


Spokane River Forum
April 23, 2025

Dr. Hannah Hämmerli
Washington State University
Pullman, WA

THIS MORNING'S PLAN

INTRODUCTION



SET THE SCENE: ROLE OF SOCIAL SCIENCES

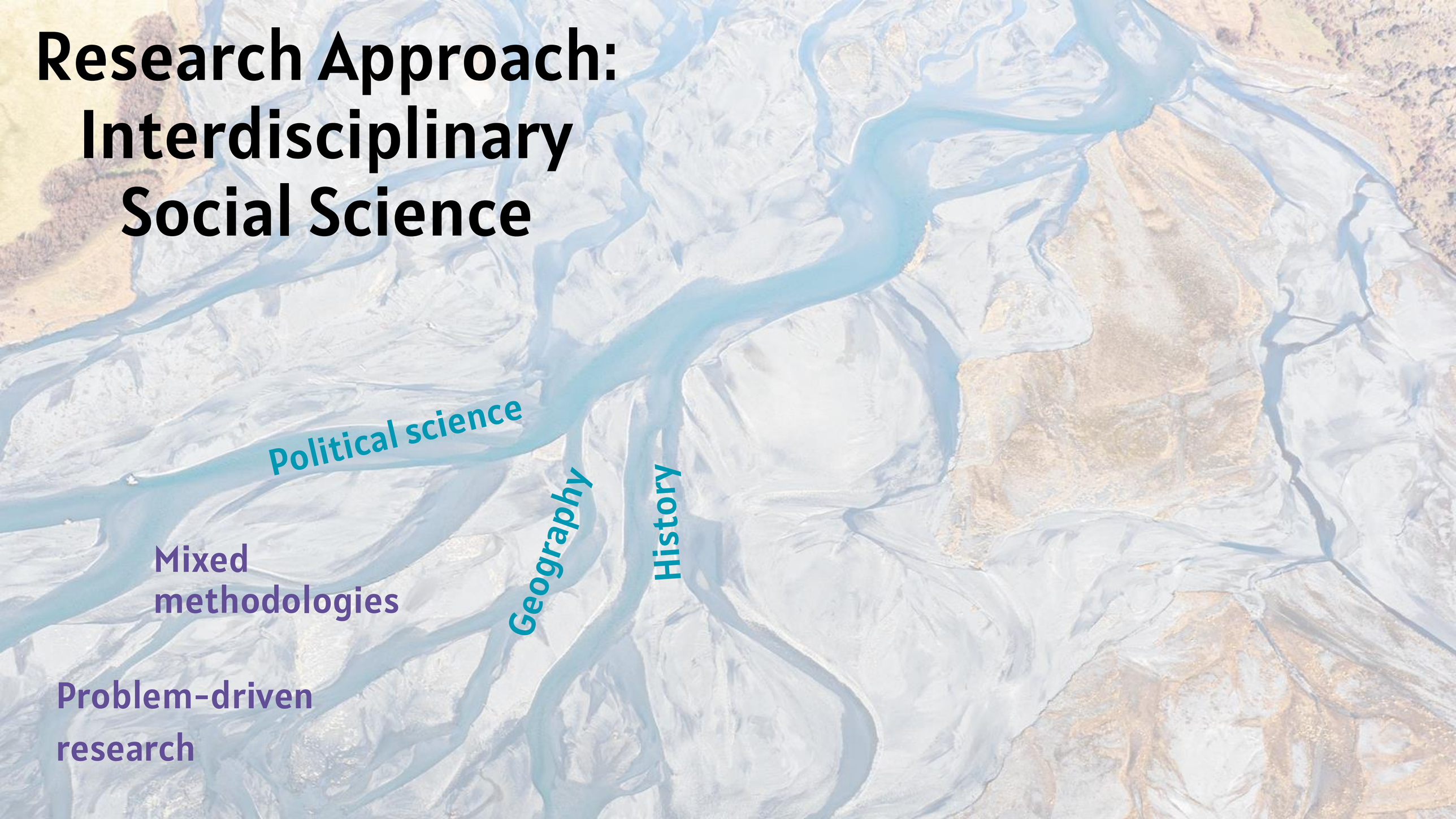
3 IDEAS: FOOD FOR THOUGHT – WATER GOVERNANCE & COLLABORATION

Research Approach: Interdisciplinary Social Science

Mixed methodologies

Problem-driven research

Research Approach: Interdisciplinary Social Science



Research Approach: Interdisciplinary Social Science

Robust theories & solutions useful for real-world application

Political science

Geography

History

Mixed methodologies

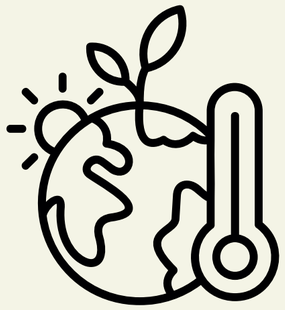
Problem-driven research


UN
2023 WATER
CONFERENCE
NEW YORK
22–24
MARCH
2023


UN
2023 WATER
CONFERENCE
NEW YORK
22–24
MARCH
2023

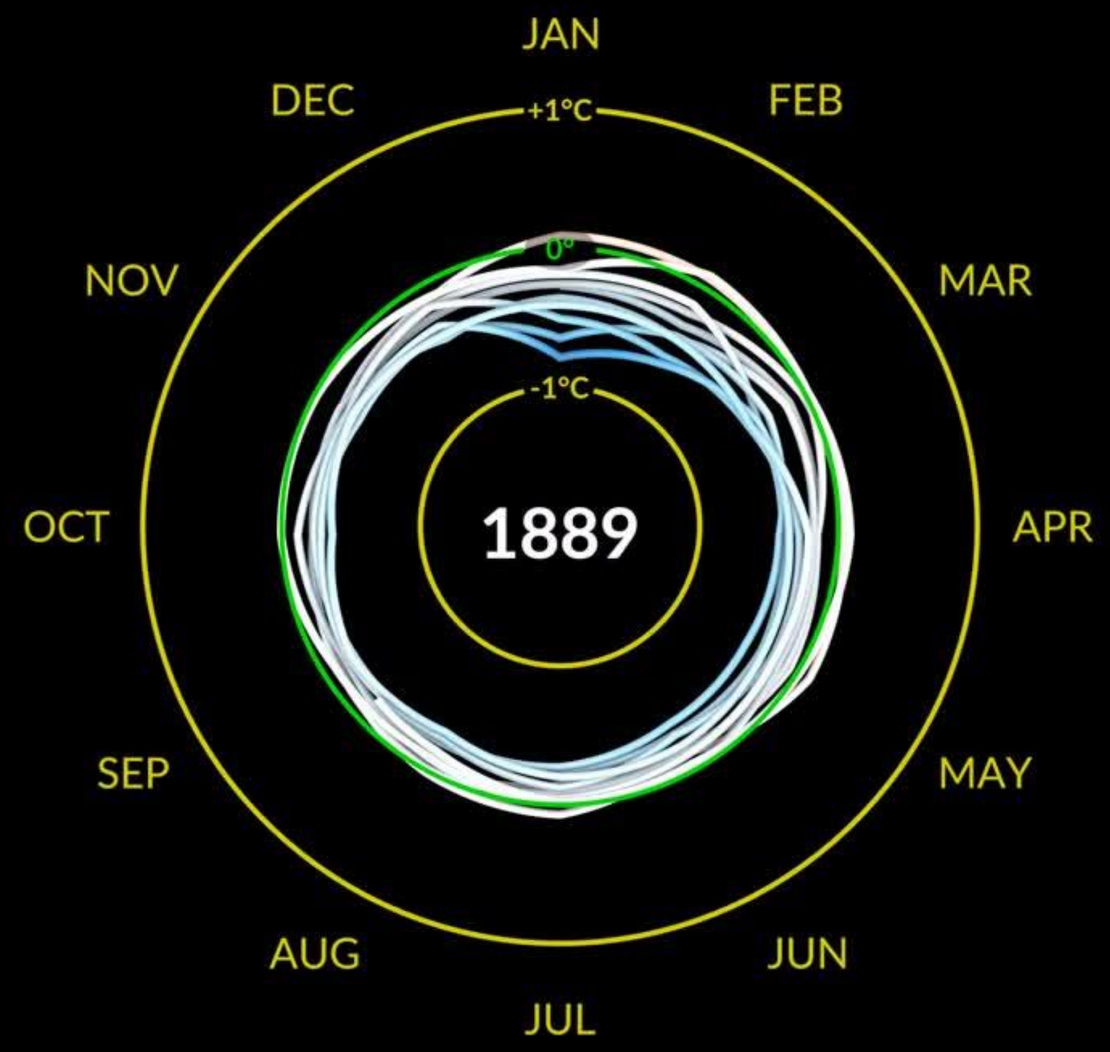
THIS MORNING'S PLAN

INTRODUCTION



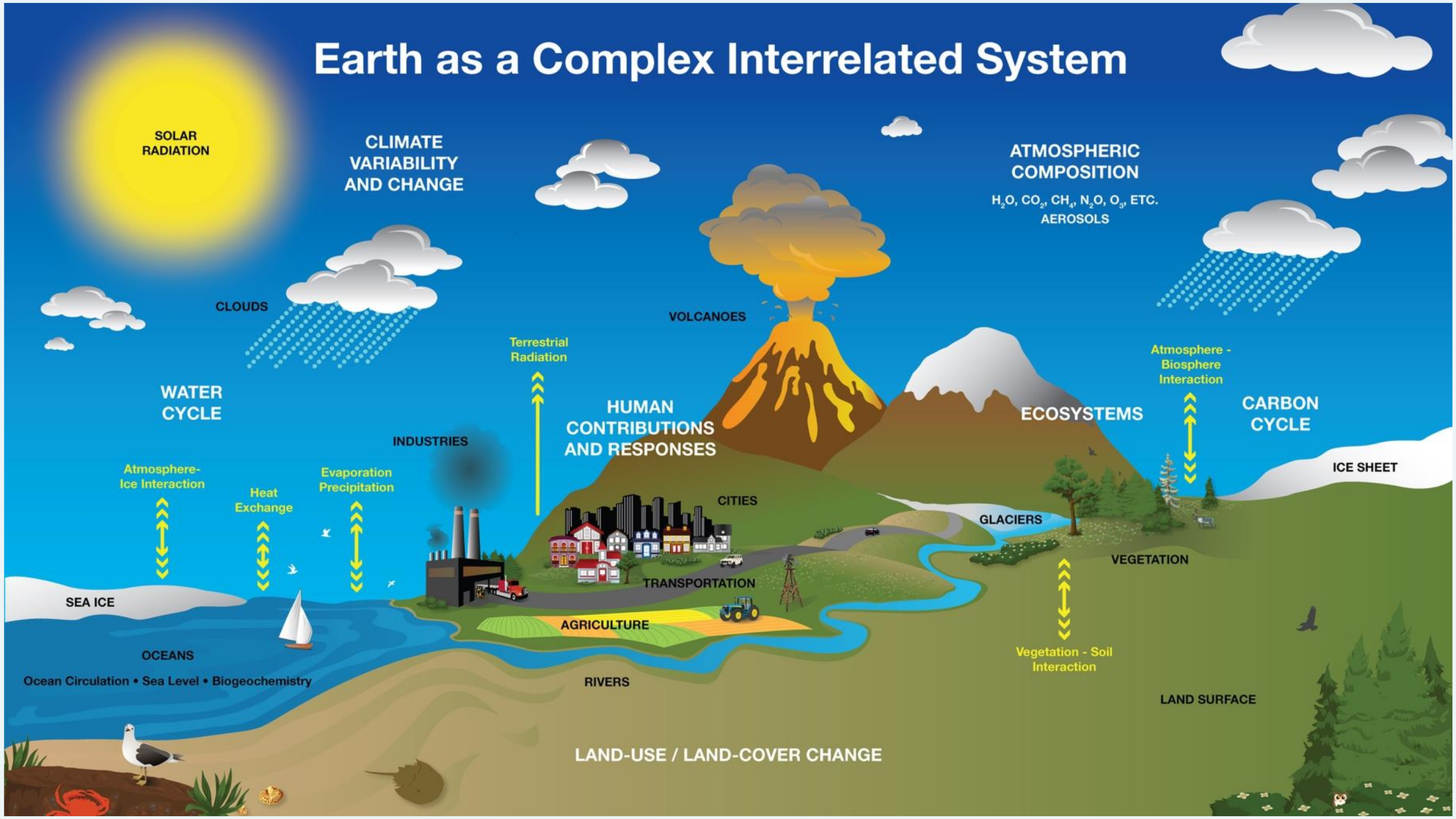
SET THE SCENE: ROLE OF SOCIAL SCIENCES

GLOBAL AVERAGE TEMPERATURE



NASA's Scientific Visualization Studio

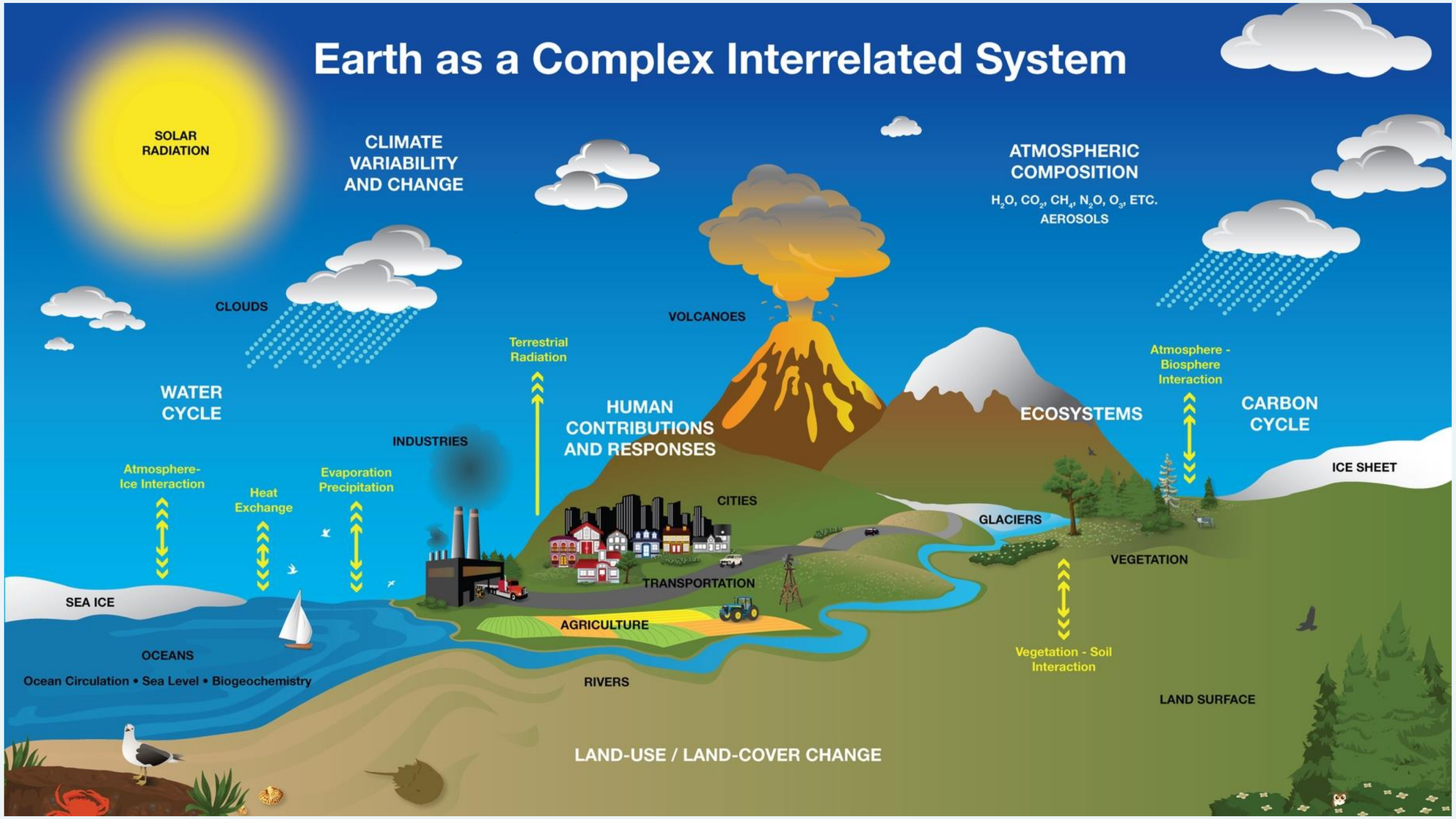
SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF CLIMATE CHANGE



Climate science requires STEM

- understanding the physical Climate System
- understanding its components

SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF CLIMATE CHANGE

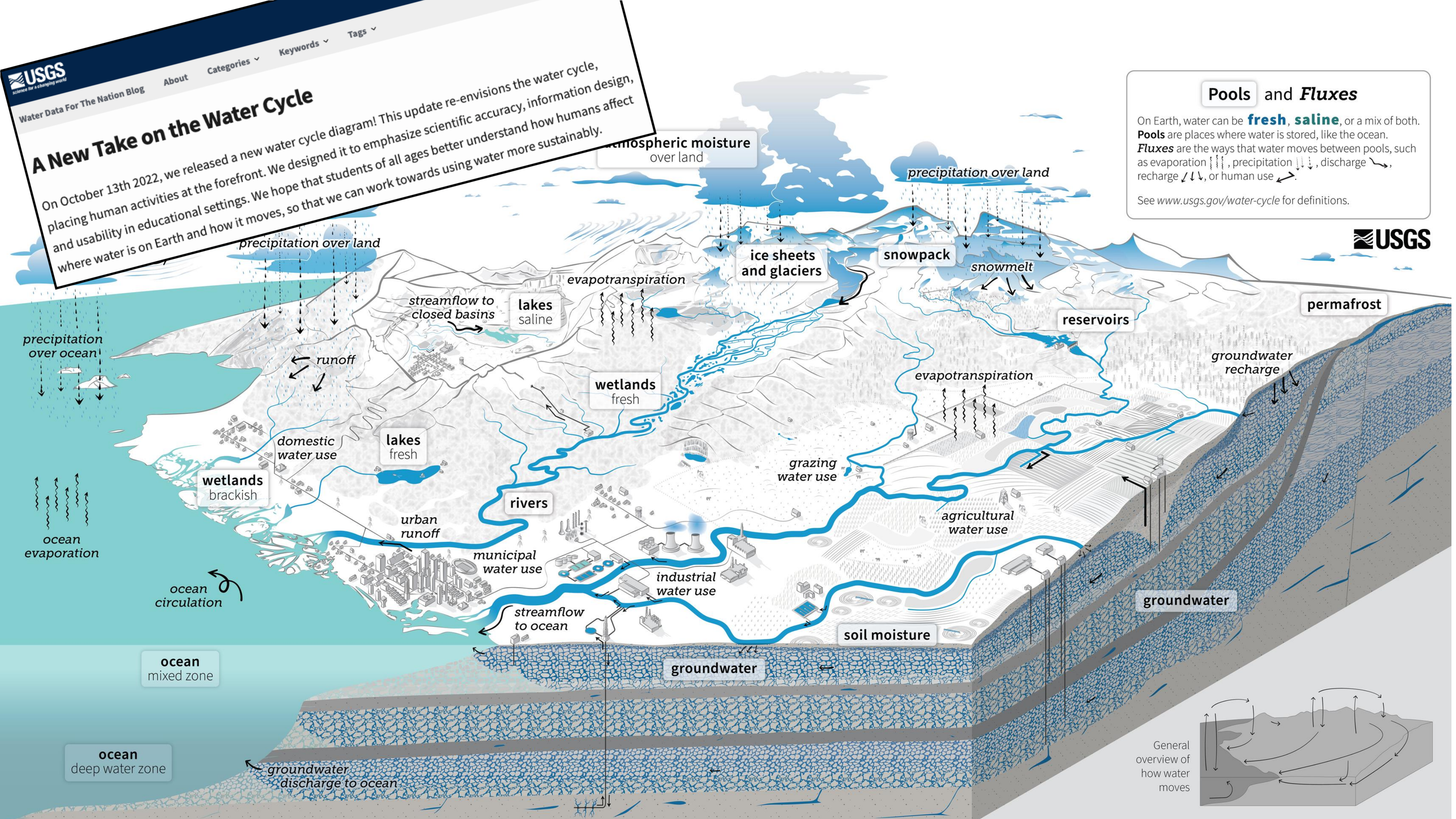


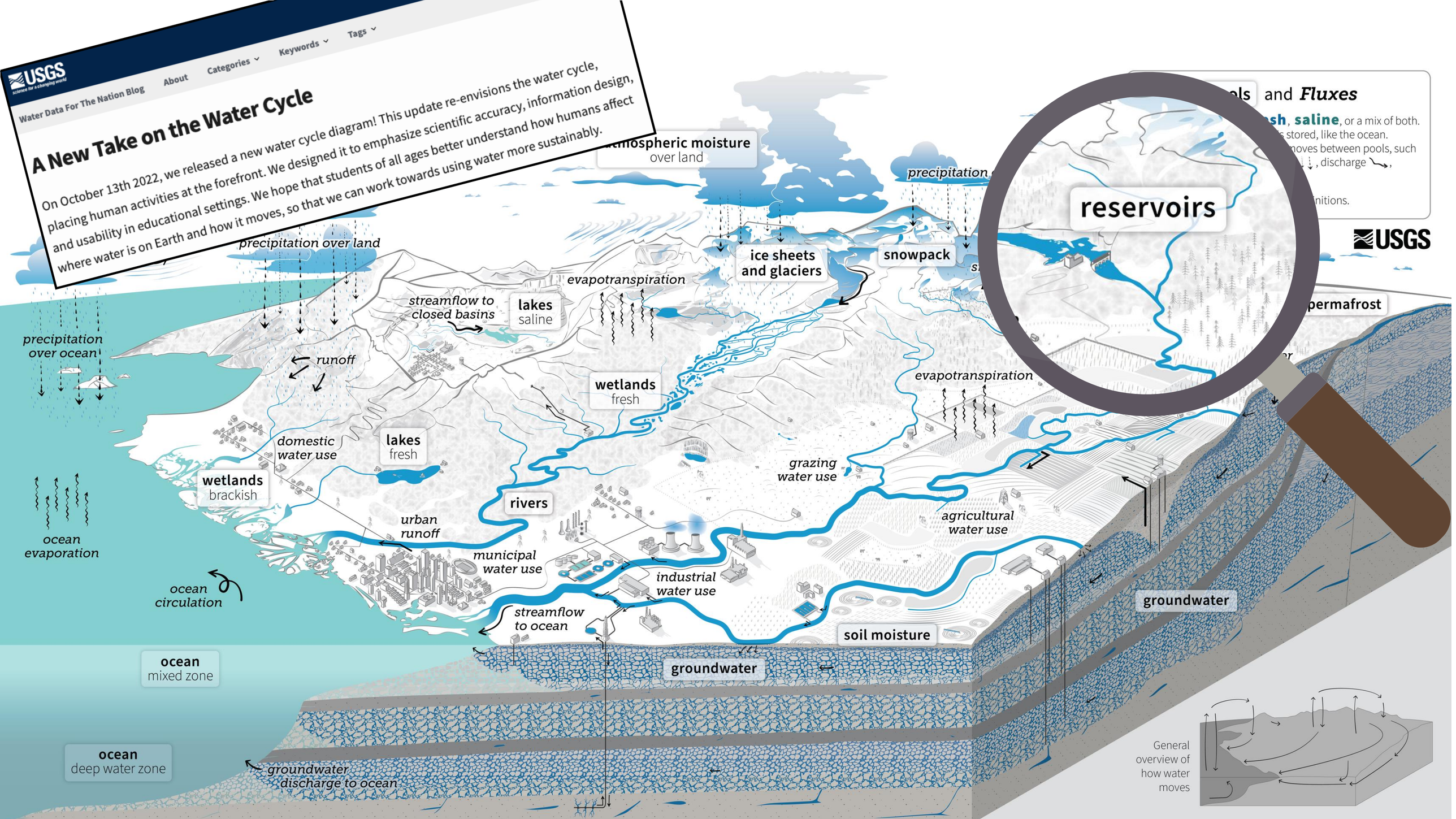
Climate science requires STEM

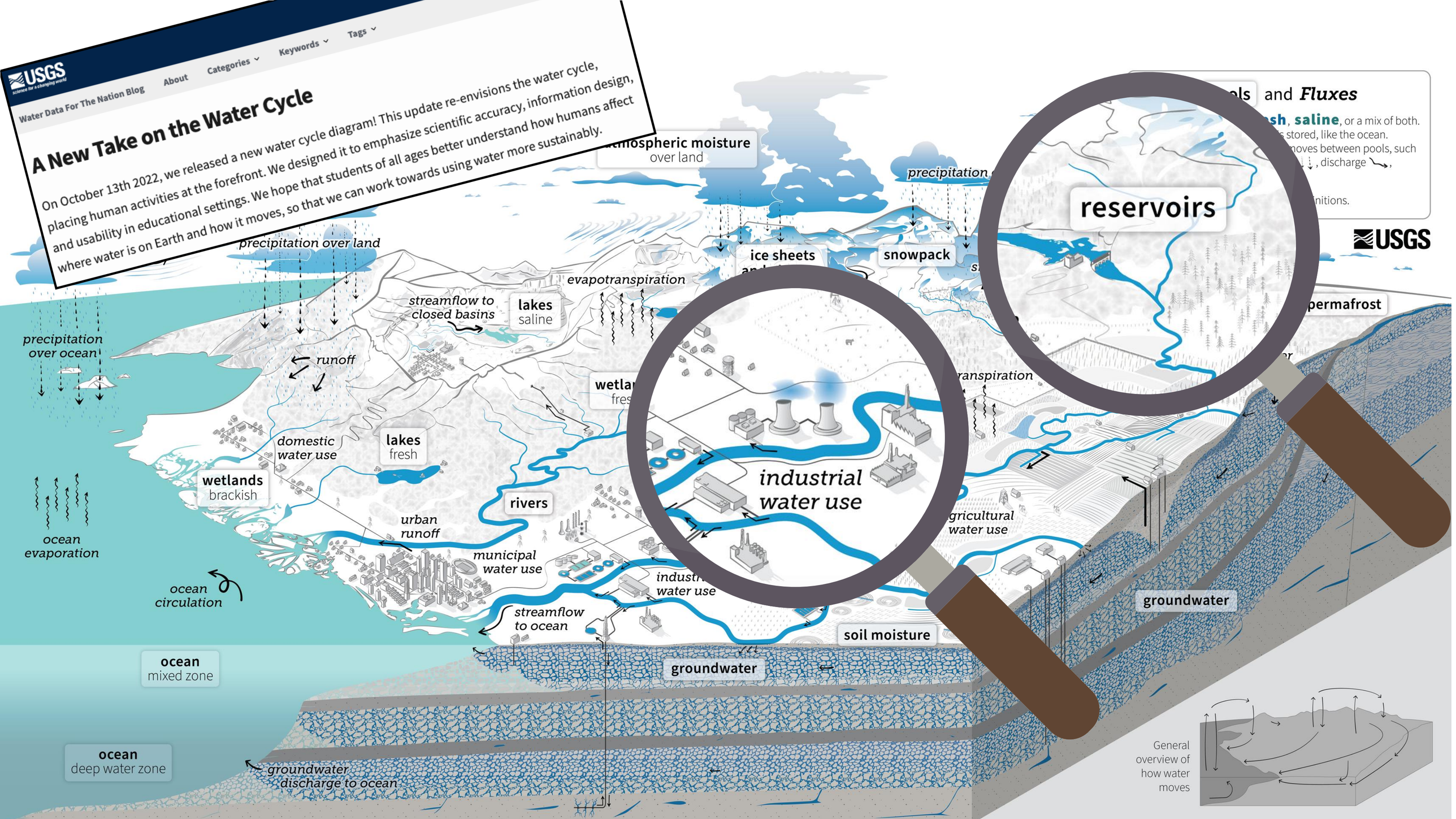
- understanding the physical Climate System
- understanding its components

Solving Climate Change problems requires STEMS

- **social science**: “society”, governance, institutions, etc. are an integral component of the climate system

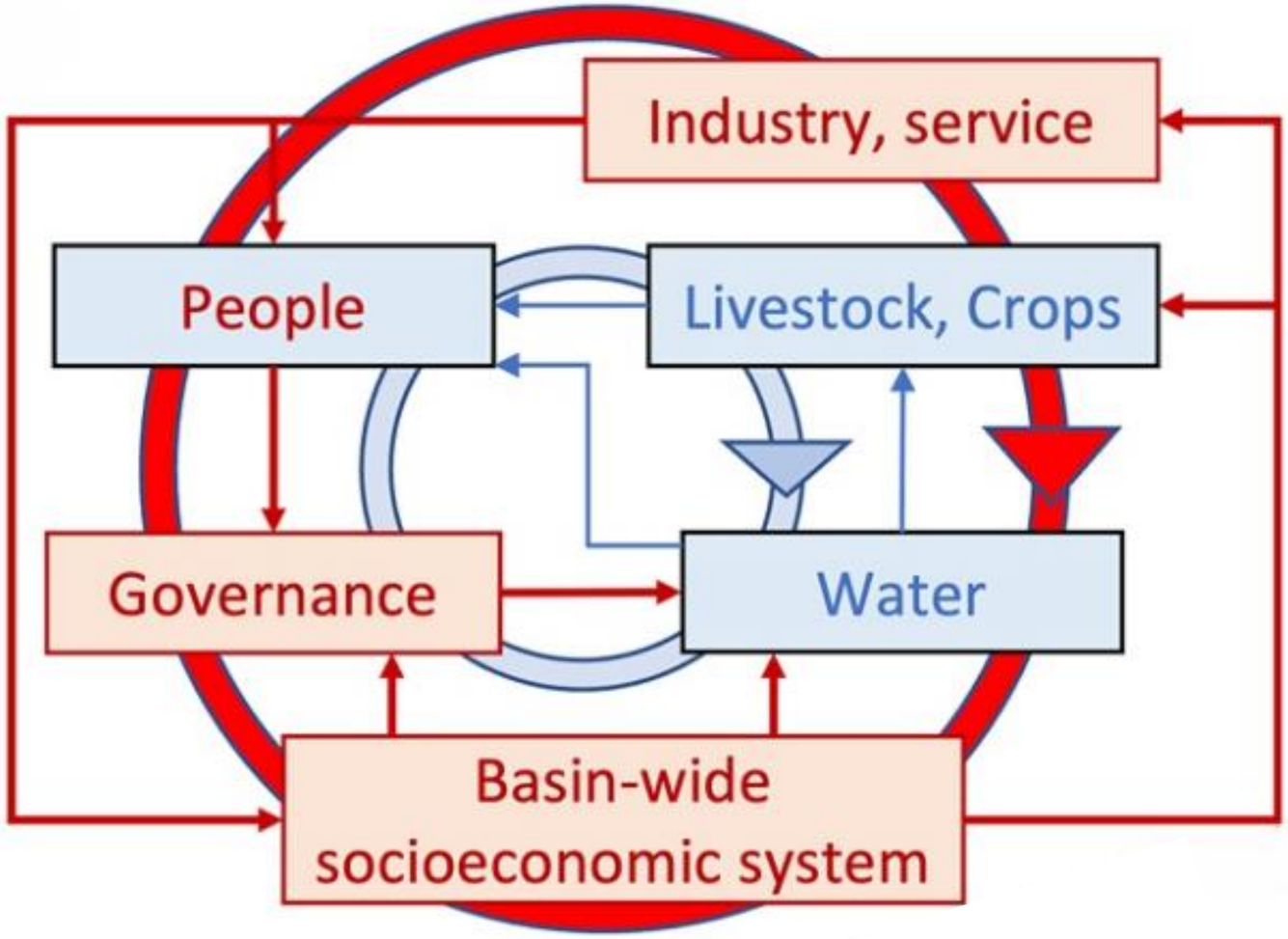

USGS
science for a changing world
Water Data For The Nation Blog
About
Categories
Keywords
Tags
A New Take on the Water Cycle
On October 13th 2022, we released a new water cycle diagram! This update re-envisions the water cycle, placing human activities at the forefront. We designed it to emphasize scientific accuracy, information design, and usability in educational settings. We hope that students of all ages better understand how humans affect where water is on Earth and how it moves, so that we can work towards using water more sustainably.
Pools and Fluxes
On Earth, water can be fresh, saline, or a mix of both.
Pools are places where water is stored, like the ocean.
Fluxes are the ways that water moves between pools, such as evaporation, precipitation, discharge, recharge, or human use.
See www.usgs.gov/water-cycle for definitions.
USGS
atmospheric moisture over land
precipitation over land
ice sheets and glaciers
snowpack
snowmelt
permafrost
reservoirs
evapotranspiration
streamflow to closed basins
lakes saline
precipitation over ocean
runoff
wetlands fresh
groundwater recharge
evapotranspiration
domestic water use
lakes fresh
wetlands brackish
grazing water use
rivers
urban runoff
agricultural water use
ocean evaporation
municipal water use
industrial water use
ocean circulation
streamflow to ocean
groundwater
soil moisture
ocean mixed zone
groundwater
ocean deep water zone
groundwater discharge to ocean
General overview of how water moves


USGS
science for a changing world
Water Data For The Nation Blog
About
Categories
Keywords
Tags
A New Take on the Water Cycle
On October 13th 2022, we released a new water cycle diagram! This update re-envisions the water cycle, placing human activities at the forefront. We designed it to emphasize scientific accuracy, information design, and usability in educational settings. We hope that students of all ages better understand how humans affect where water is on Earth and how it moves, so that we can work towards using water more sustainably.
and Fluxes
saline, or a mix of both.
stored, like the ocean.
moves between pools, such
, discharge
nitions.
USGS
reservoirs
atmospheric moisture over land
precipitation
precipitation over land
ice sheets and glaciers
snowpack
evapotranspiration
streamflow to closed basins
lakes saline
permafrost
precipitation over ocean
runoff
wetlands fresh
evapotranspiration
domestic water use
lakes fresh
wetlands brackish
grazing water use
rivers
urban runoff
agricultural water use
ocean evaporation
municipal water use
industrial water use
ocean circulation
streamflow to ocean
groundwater
soil moisture
ocean mixed zone
groundwater
ocean deep water zone
groundwater discharge to ocean
General overview of how water moves


USGS
science for a changing world
Water Data For The Nation Blog
About
Categories
Keywords
Tags
A New Take on the Water Cycle
On October 13th 2022, we released a new water cycle diagram! This update re-envisions the water cycle, placing human activities at the forefront. We designed it to emphasize scientific accuracy, information design, and usability in educational settings. We hope that students of all ages better understand how humans affect where water is on Earth and how it moves, so that we can work towards using water more sustainably.
and Fluxes
saline, or a mix of both.
stored, like the ocean.
moves between pools, such
, discharge
nitions.
USGS
atmospheric moisture
over land
precipitation
ice sheets
snowpack
permafrost
precipitation over land
evapotranspiration
streamflow to
closed basins
lakes
saline
precipitation
over ocean
runoff
wetla
fres
transpiration
domestic
water use
lakes
fresh
wetlands
brackish
rivers
urban
runoff
municipal
water use
industrial
water use
agricultural
water use
ocean
evaporation
ocean
circulation
streamflow
to ocean
soil moisture
groundwater
ocean
mixed zone
ocean
deep water zone
groundwater
discharge to ocean
reservoirs
industrial
water use
General
overview of
how water
moves

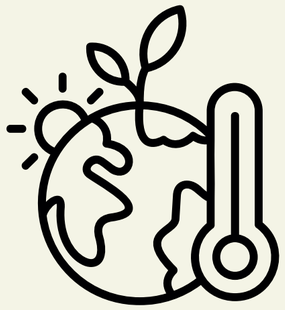
Hydrosocial Water Cycle

Song et al. (2023)



THIS MORNING'S PLAN

INTRODUCTION



SET THE SCENE: ROLE OF SOCIAL SCIENCES

3 IDEAS: FOOD FOR THOUGHT – WATER GOVERNANCE & COLLABORATION

Three ideas

(1) Water challenges are governance challenges

(2) Water as a blue thread

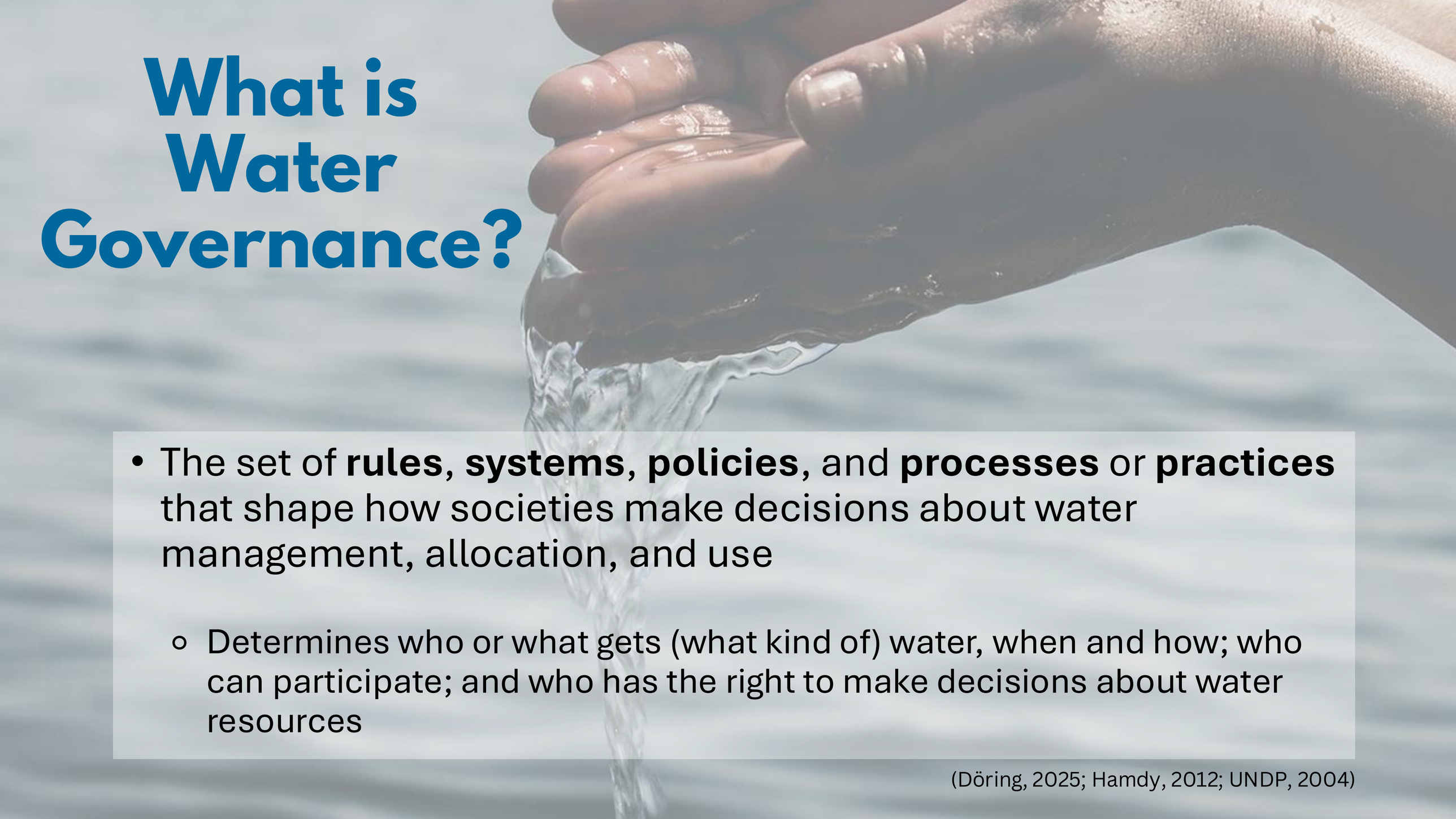
(3) Blue peace

Water challenges are governance challenges

"**Water governance** has emerged as one of the **most critical areas** in the context of sustainable water resources development and services, **necessary to respond to global water shortages** – a crisis which is not about having too little water to satisfy our needs, but rather **a crisis of managing water and making it accessible to all.**"

-UNDP, 2015

What is Water Governance?



- The set of **rules**, **systems**, **policies**, and **processes** or **practices** that shape how societies make decisions about water management, allocation, and use
    - Determines who or what gets (what kind of) water, when and how; who can participate; and who has the right to make decisions about water resources

(Döring, 2025; Hamdy, 2012; UNDP, 2004)

What Water Governance is Not

A FEW DISTINCTIONS

- Difference between government and governance! - governance doesn't just rely on authorities, includes bottom up approaches, can be polycentric

- water management is the activities to analyse and monitor resources along with measures to keep the resources within a desirable condition
    - water governance: a function that helps regulate water resources and provides guidance towards a desirable state and away from an undesirable state

      (Pahl-Wostl, 2009)

What are the challenges?

Water problems are not just technical or hydrological

- They are social, political, and institutional
  - Some examples:
    - fragmented institutions with unclear / overlapping jurisdictions
    - Rigid institutions that cannot adapt well under uncertainties like climate change

What are the challenges?

Water problems are not just technical or hydrological

- They are social, political, and institutional
  - Some examples:
    - fragmented institutions with unclear / overlapping jurisdictions
    - Rigid institutions that cannot adapt well under uncertainties like climate change

see Pauli, 2020 in WIREs Water for more

- governance failures
- cost-cutting
- environmental injustice
- politics
- historical factors

Received: 27 January 2024 | Revised: 1 April 2024 | Accepted: 25 April 2024

DOI: 10.1002/wat2.1735

PERSPECTIVE

WIREs WATER WILEY

Reimagining hydropower in the United States

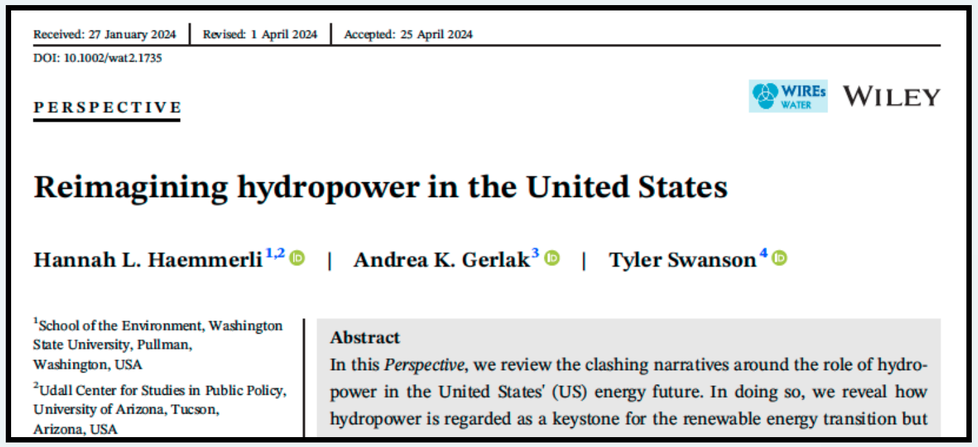
Hannah L. Haemmerli[1,2] | Andrea K. Gerlak[3] | Tyler Swanson[4]

[1]School of the Environment, Washington State University, Pullman, Washington, USA

[2]Udall Center for Studies in Public Policy, University of Arizona, Tucson, Arizona, USA

Abstract

In this *Perspective*, we review the clashing narratives around the role of hydropower in the United States' (US) energy future. In doing so, we reveal how hydropower is regarded as a keystone for the renewable energy transition but



Received: 27 January 2024 | Revised: 1 April 2024 | Accepted: 25 April 2024
DOI: 10.1002/wat2.1735

PERSPECTIVE

WIREs WATER WILEY

Reimagining hydropower in the United States

Hannah L. Haemmerli[1,2] | Andrea K. Gerlak[3] | Tyler Swanson[4]

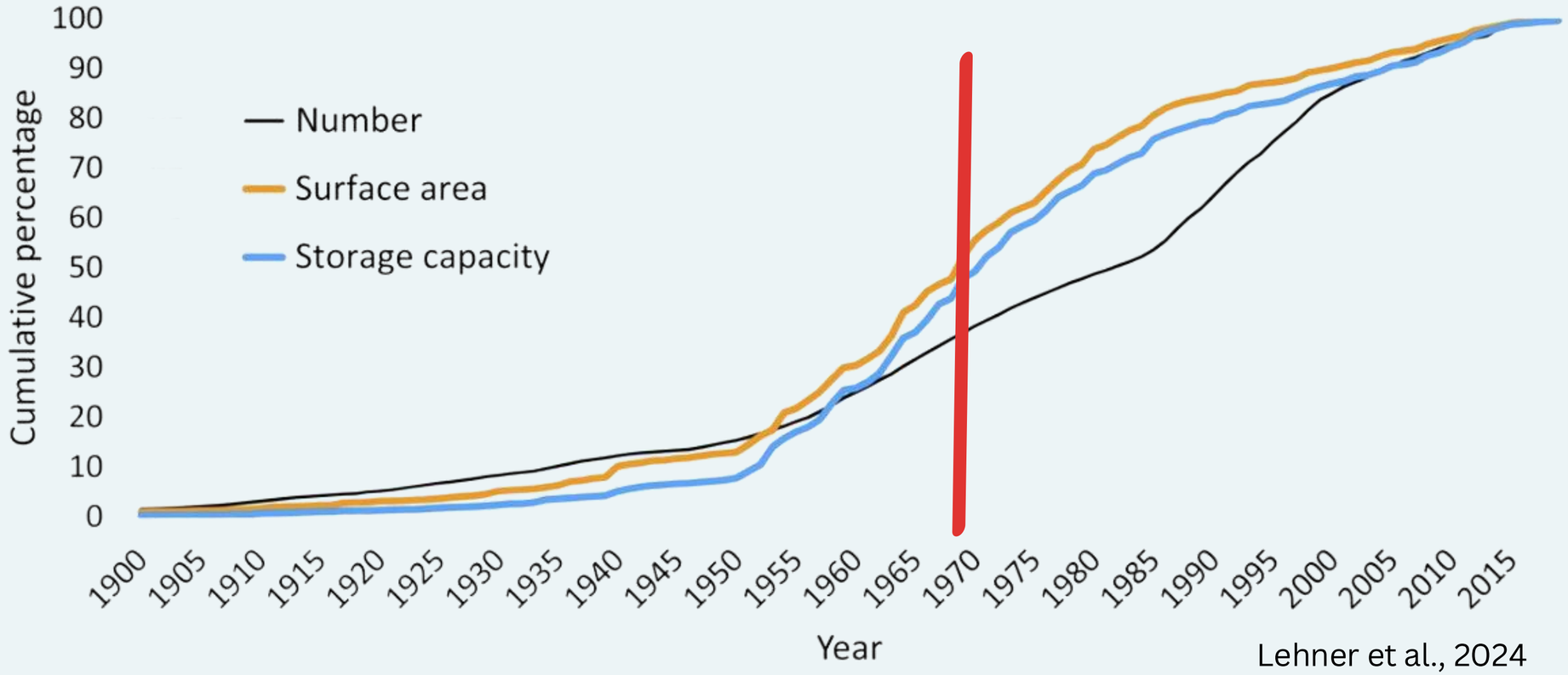
[1]School of the Environment, Washington State University, Pullman, Washington, USA
[2]Udall Center for Studies in Public Policy, University of Arizona, Tucson, Arizona, USA

Abstract
In this *Perspective*, we review the clashing narratives around the role of hydropower in the United States' (US) energy future. In doing so, we reveal how hydropower is regarded as a keystone for the renewable energy transition but

the world's largest renewable source of electricity (~50%)

"61% of the Earth's seasonal surface water storage variability occurs in human-managed reservoirs"
Cooley et al., 2021

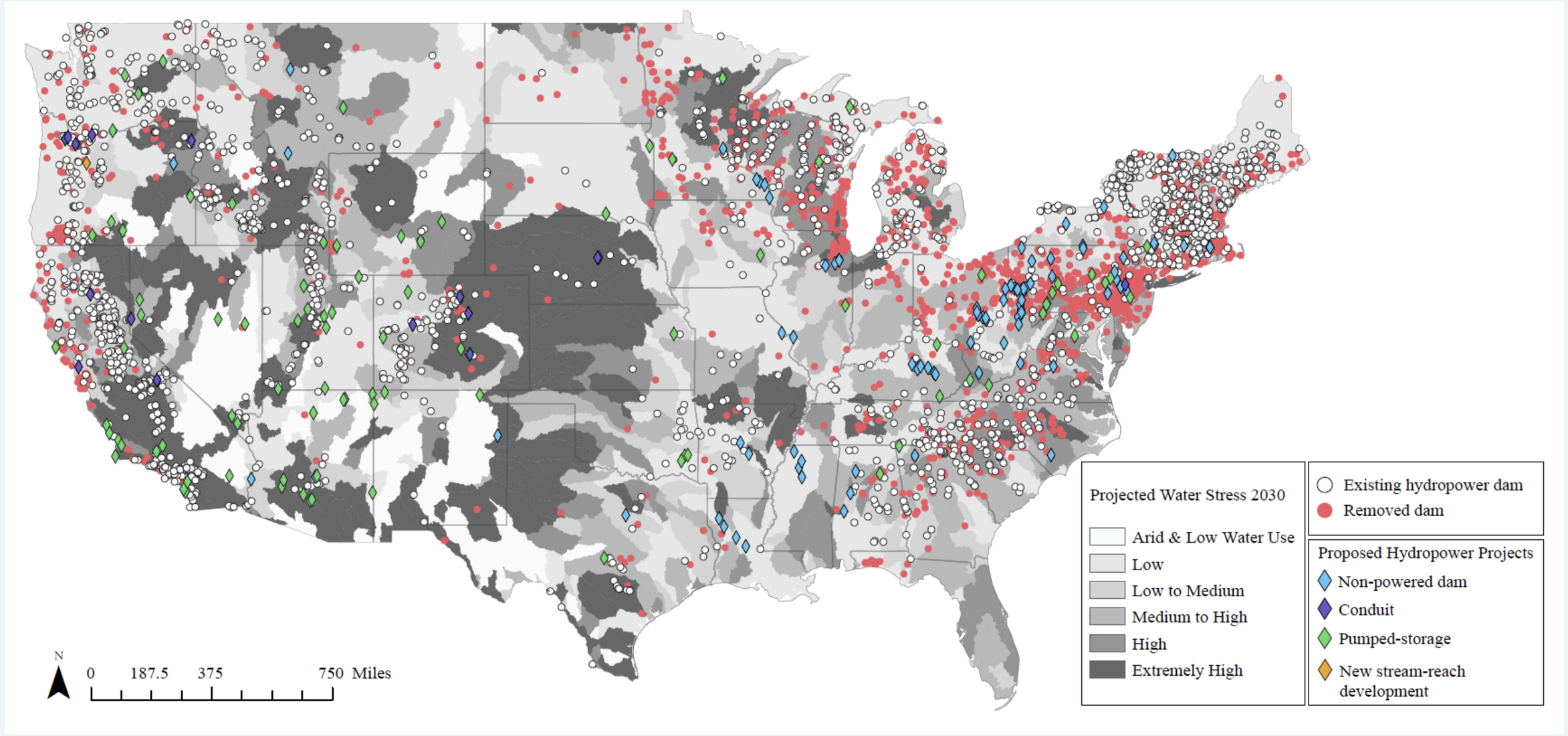
Technology enmeshed in environmental degradation, social conflict, and economic hardship



Lehner et al., 2024

Hydropower has been central to U.S. industrialization since the 19th century. Peak construction of large dams occurred in the mid-20th century, followed by a **decline due to rising awareness of environmental impacts**.

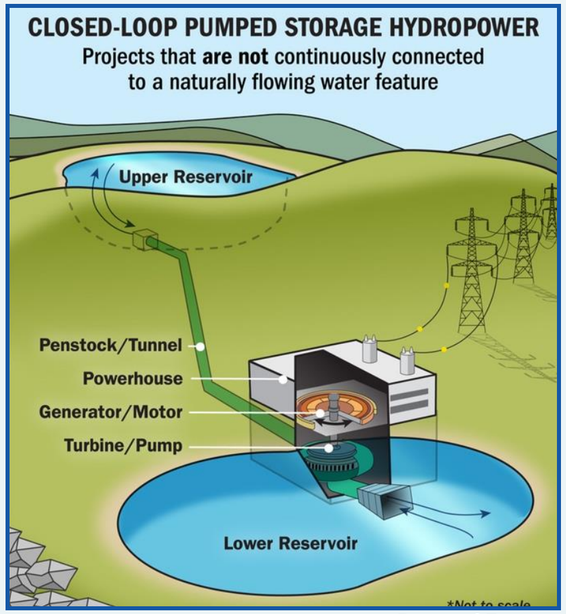
Renewed interest in the US



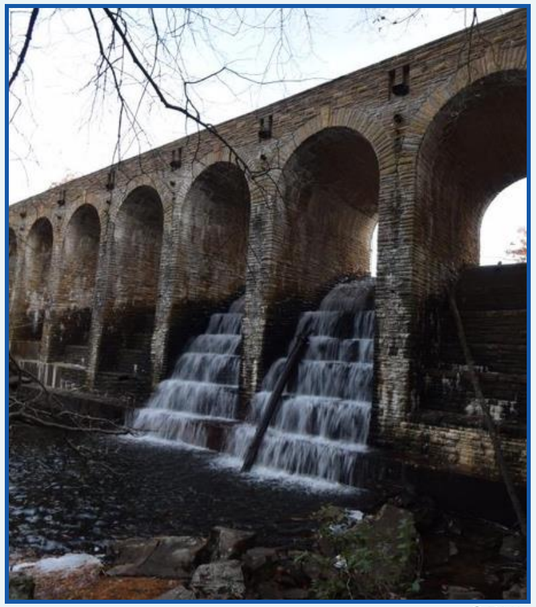
Haemmerli et al., 2024

Limits to Technologic Solutions

Technologies



Dept. of Energy

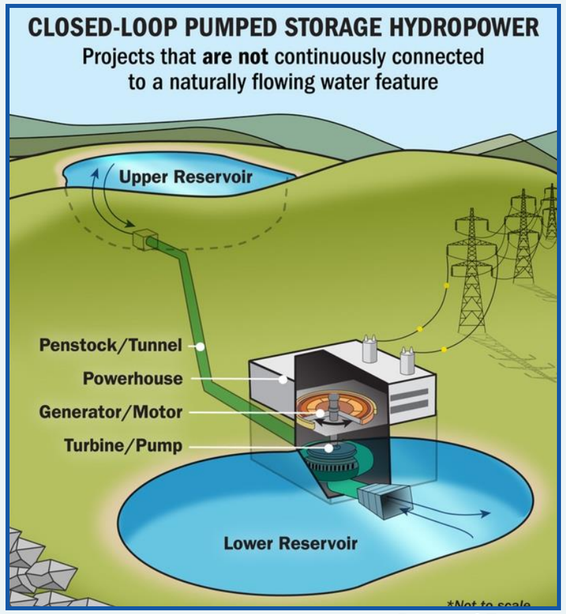


ORNL

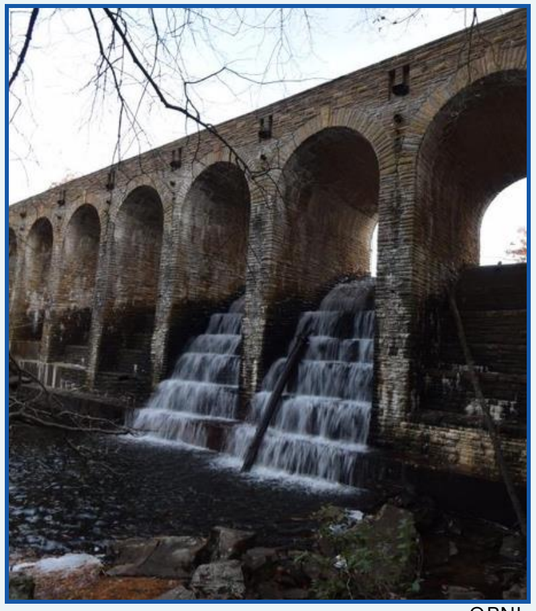
Turbulent

Limits to Technologic Solutions

Technologies



Dept. of Energy


ORNL


Turbulent

Familiar Conflicts

FEATURED

Tribes oppose Goldendale pumped storage project on Indigenous gathering grounds

By Flora Gibson Columbia Gorge News Sep 18, 2024

Oklahoma reps to hold study on controversial proposed pumped storage project

October 24, 2024 Sean Wolfe 3 MIN READ SHARE TO:

Example:

- **Pumped Storage Projects -** New projects like the Goldendale Energy Storage Project in WA face opposition for cultural and ecological impacts on Tribal lands and local ecosystems.

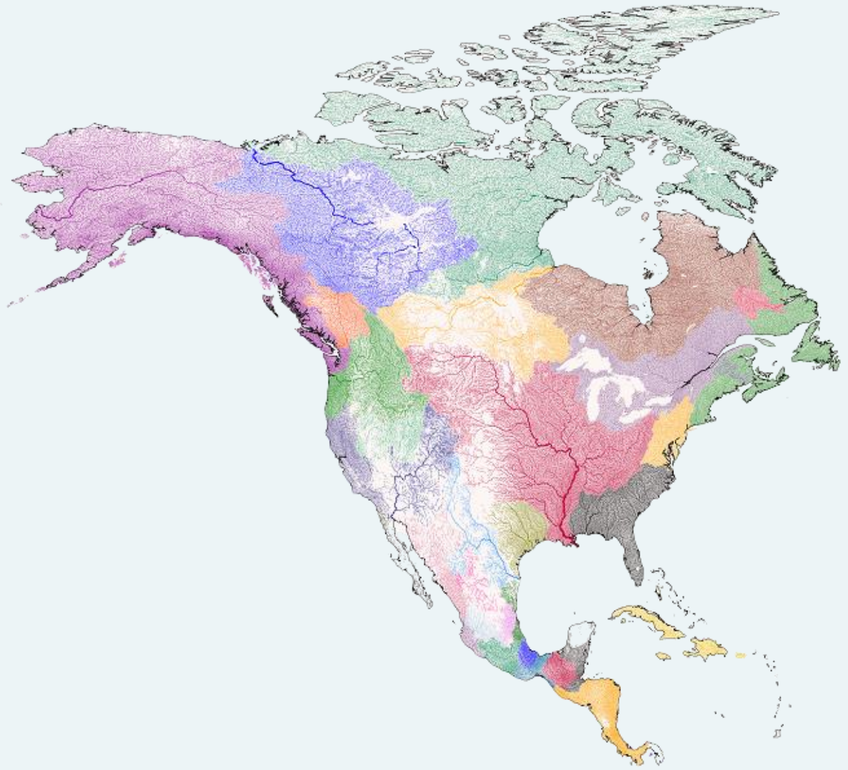
GOVERNANCE AND COLLABORATIVE SOLUTIONS

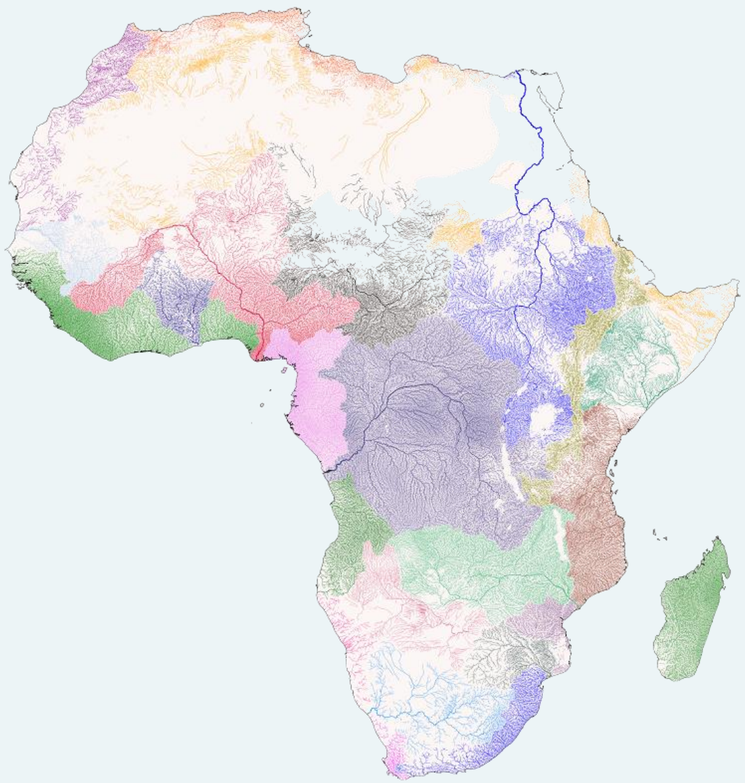
- **Innovative Governance:** Collaborative governance can bridge diverse interests, increase transparency, and include marginalized voices in hydropower decision-making.
  - Example: The Penobscot River restoration in Maine successfully balanced hydropower with ecological restoration and Tribal involvement by taking a basin-scale approach.

- **System-Scale Planning:** Future projects can benefit from holistic planning across entire river basins, considering both energy needs and ecological impacts.

- **Equity and Justice:** In the renewable energy transition, it is crucial to recognize that energy (or water) cannot be considered in isolation from the complex systems within which it operates.

Why is water governance challenging?

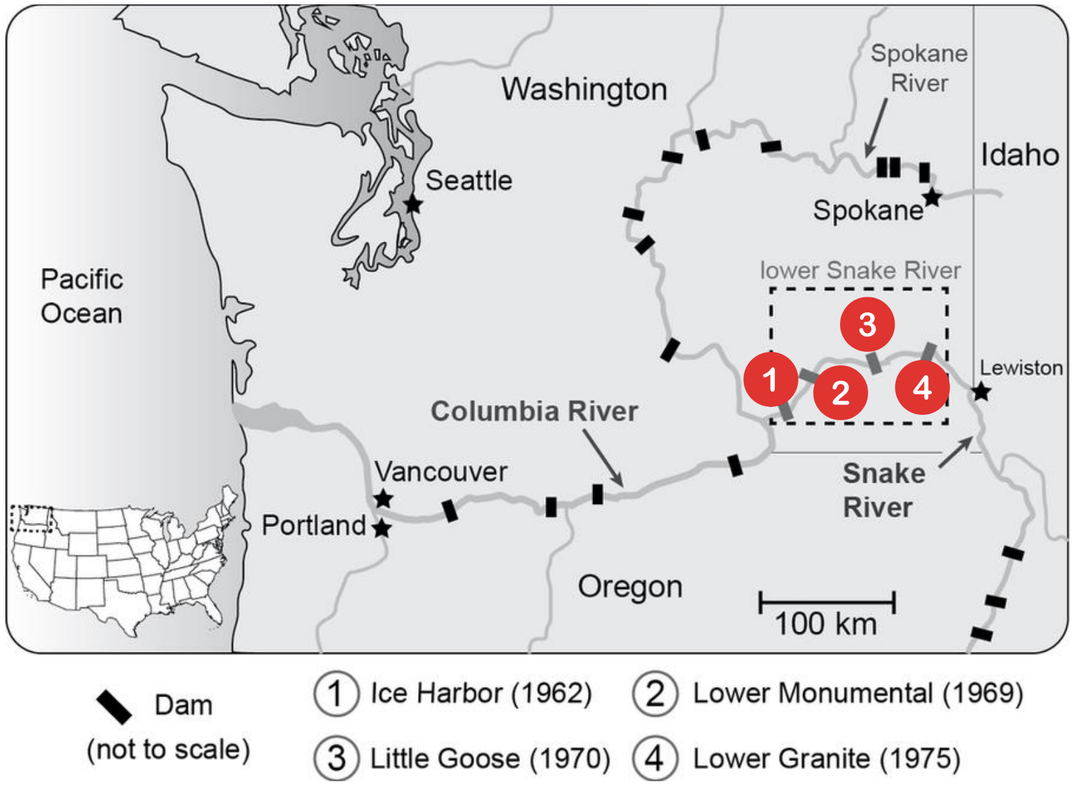




maps by Adam Symington

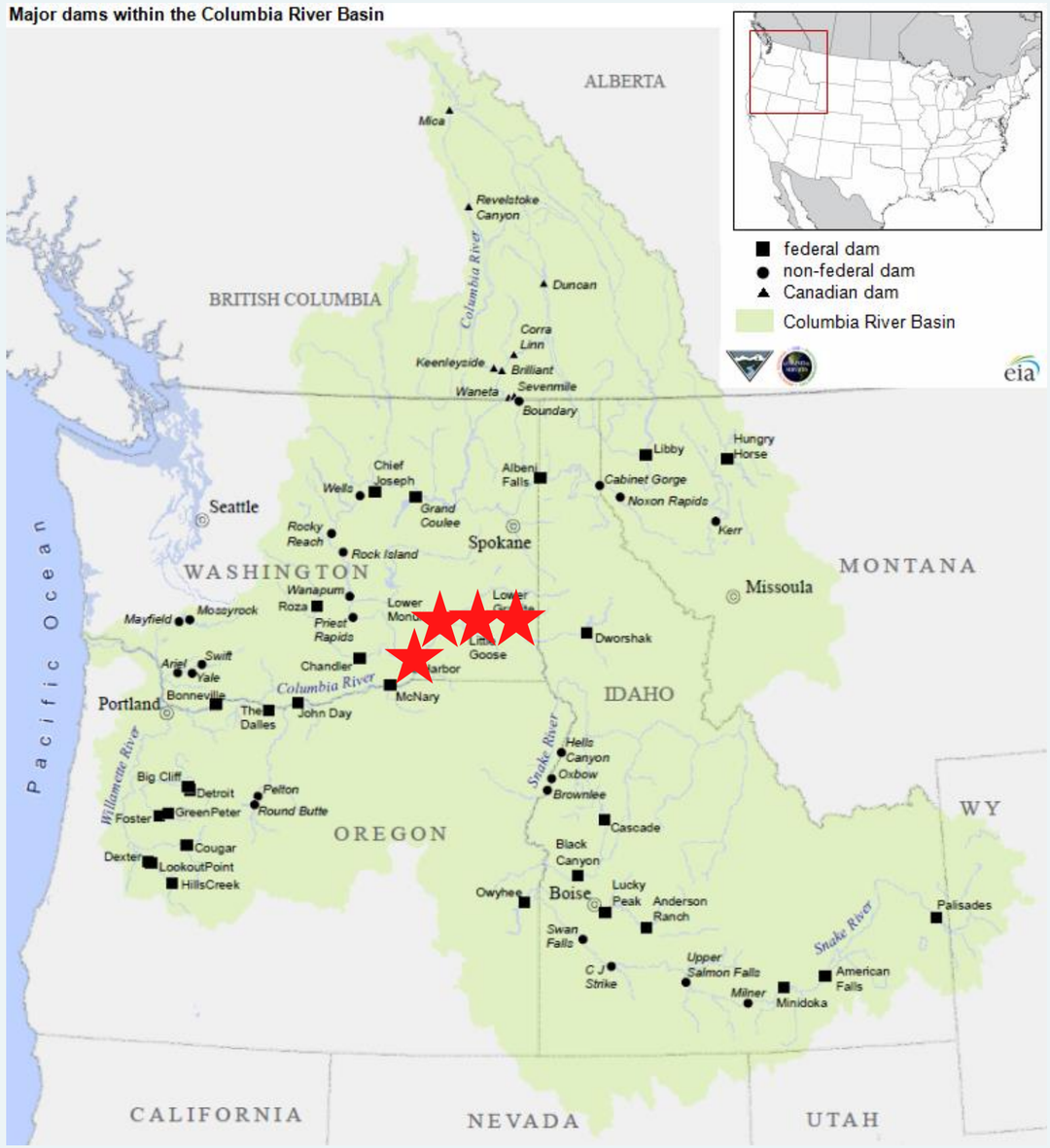
- Shared water across boundaries
- Issues of scale
- Limits to technologic solutions
- Competing values and uses
- Funding
- Multisectorality
- Power asymmetries and exclusion
- ……..

The Evolution of the Modern Dam Conflict on the Snake River, USA



Hannah L. Hilbert-Wolf & Andrea K. Gerlak (2022): The evolution of the modern dam conflict on the Snake River, USA, *Water International*, DOI: 10.1080/02508060.2022.2090147

A Brief History of the Conflict



Since NOAA Fisheries began issuing BiOps in 1992 for the CRB salmon, every BiOp issued has been challenged in court.

Case studies

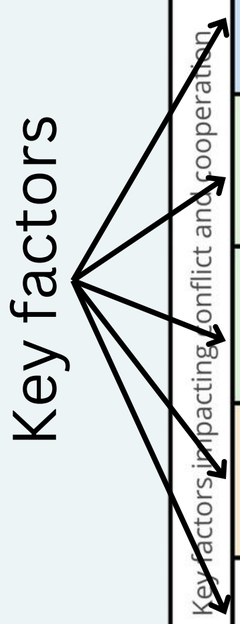
Key factors

Key factors impacting conflict and cooperation

Case studies	CHAFFIN & GOSNELL (2017)	GABROWSKI ET AL. (2017)	MAGILLIGAN ET AL. (2017)	FOX ET AL. (2016)	GOSNELL & KELLY (2010)
	Endangered species	Environmental dimensions	Institutional structure & dynamics	Competing interpretations of science & environment (environmental knowledges)	Innovative approach to negotiation: scaled forum for integrating multiple basin needs [venue]
	Presence of Native American tribes with fishing and water rights	Social dimensions (knowledge systems, cultural values and identities)	Framing of dam removal in economic, political, and cultural terms	Role of multiple actors	Growth of bottom-up, place-based approach to collaborative governance
	Venues (FERC relicensing process)	Technological dimensions	Historical & geographical contingencies	Micropolitics (insiders v outsiders)	NGOs holding governments accountable
	Economics	Financial dimensions	Place-based politics	Complex cultural dynamics: history, identity, aesthetics (landscape identities)	Unified, local leadership
	Local politics	Political dimensions			Robust legal framework
Key	science	stakeholder interactions	economics	political and cultural dynamics	

Case studies

Key factors



Case studies	CHAFFIN & GOSNELL (2017)	GABROWSKI ET AL. (2017)	MAGILLIGAN ET AL. (2017)	FOX ET AL. (2016)	GOSNELL & KELLY (2010)
Key factors impacting conflict and cooperation	Endangered species	Environmental dimensions	Institutional structure & dynamics	Competing interpretations of science & environment (environmental knowledges)	Innovative approach to negotiation: scaled forum for integrating multiple basin needs [venue]
	Presence of Native American tribes with fishing and water rights	Social dimensions (knowledge systems, cultural values and identities)	Framing of dam removal in economic, political, and cultural terms	Role of multiple actors	Growth of bottom-up, place-based approach to collaborative governance
	Venues (FERC relicensing process)	Technological dimensions	Historical & geographical contingencies	Micropolitics (insiders v outsiders)	NGOs holding governments accountable
	Economics	Financial dimensions	Place-based politics	Complex cultural dynamics: history, identity, aesthetics (landscape identities)	Unified, local leadership
	Local politics	Political dimensions			Robust legal framework
Key	science	stakeholder interactions	economics	political and cultural dynamics	

- **politicization of science & expertise**
- **nature of stakeholder interactions**

Environmental decisions are deeply embedded in socio-political and economic landscapes

- Politicization of science and economics

Environmental decisions are deeply embedded in socio-political and economic landscapes

1

Politicization of science and economics

2

Persistant legal battles; expanded, but ineffective, stakeholder engagement

Environmental decisions are deeply embedded in socio-political and economic landscapes

1

Politicization of science and economics

2

Persistant legal battles; expanded, but ineffective, stakeholder engagement

3

Reframing “knowledge” to include other values

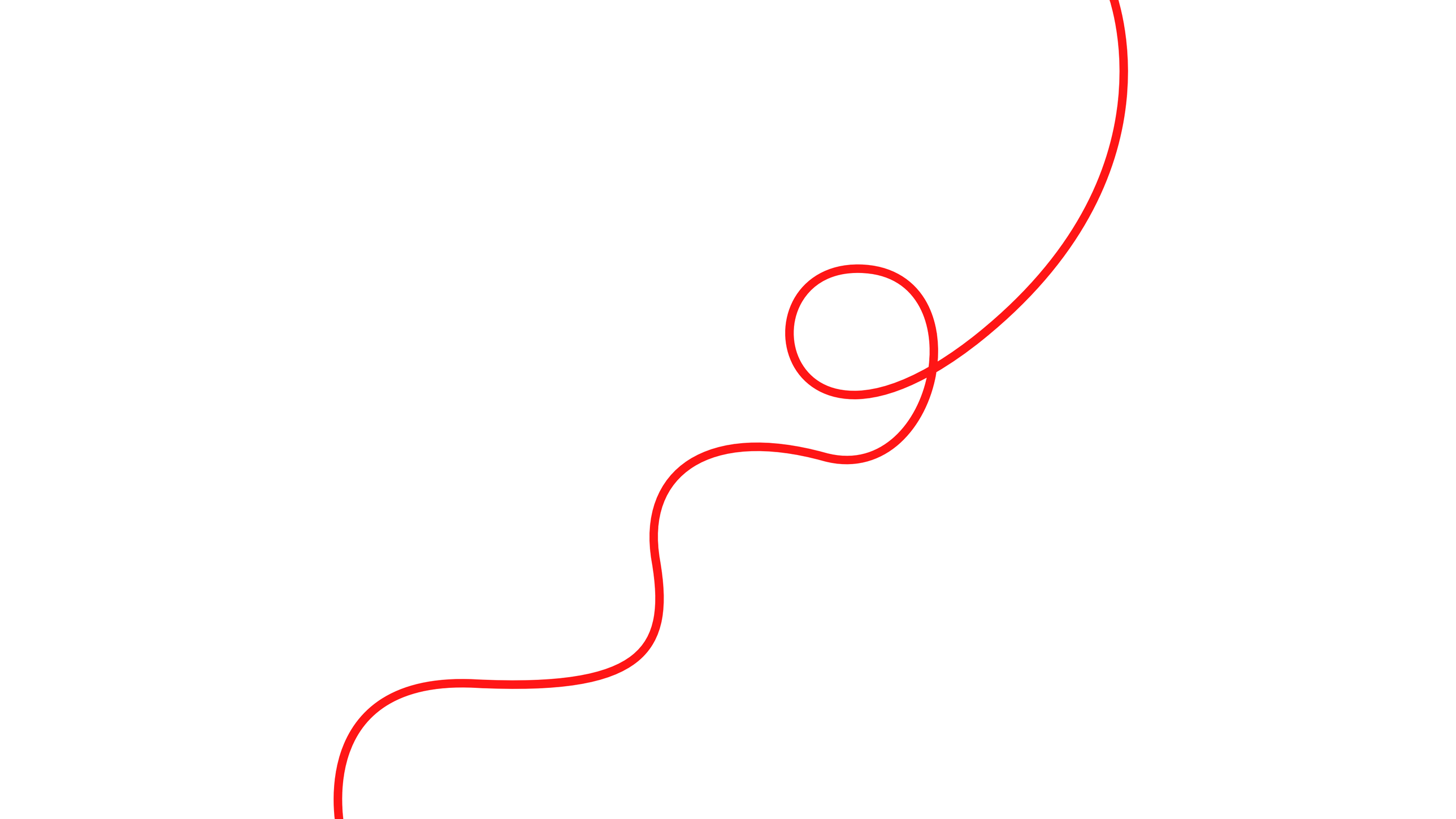
What have we learned from studying dam removal conflicts?

- Conflicts are not about the physical structure, hydrology, or ecology (in fact, more physical science ≠ resolution, as science can be politicized)

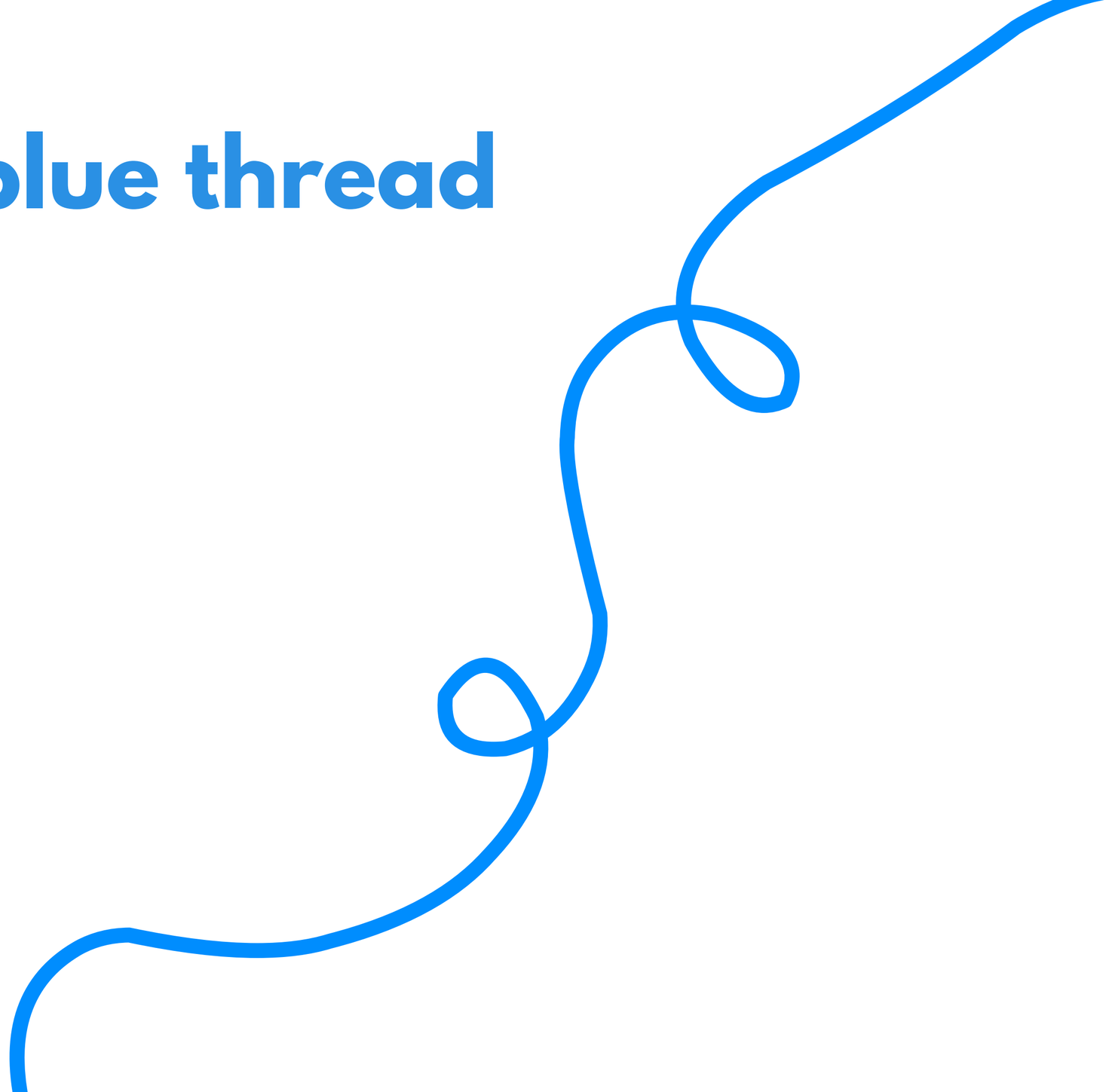
- Conflict is often rooted in social values, historical situations, politics, power dynamics, and competing visions for place and identity, justice

- Trust and inclusive governance (equity, co-production of knowledge, long-term relationship building) often lead to conflict resolution

see Chaffin et al., 2014; Fox et al., 2016; Hilbert-Wolf & Gerlak, 2022; Magilligan et al., 2016



Water as blue thread




3
GOOD HEALTH
AND WELL-BEING


3
GOOD HEALTH
AND WELL-BEING


7
AFFORDABLE AND
CLEAN ENERGY


3
GOOD HEALTH
AND WELL-BEING
7
AFFORDABLE AND
CLEAN ENERGY
16
PEACE, JUSTICE
AND STRONG
INSTITUTIONS

Water as a source of peace

Blue Peace refers to water cooperation across borders, sectors and generations to foster peace, stability and sustainable development.

https://www.thebluepeaceinitiative.org/about-blue-peace-who-we-are.html

Water as a source of peace

Blue Peace refers to water cooperation across borders, sectors and generations to foster peace, stability and sustainable development.

https://www.thebluepeaceinitiative.org/about-blue-peace-who-we-are.html

Cooperation over water is much more common than conflict over water

Pioneering work of Aaron Wolf (OSU) demonstrated that there are many more instances of states cooperating over shared water resources rather than fighting over them.

Adversarial states can cooperate over water

image: historyhaven.com

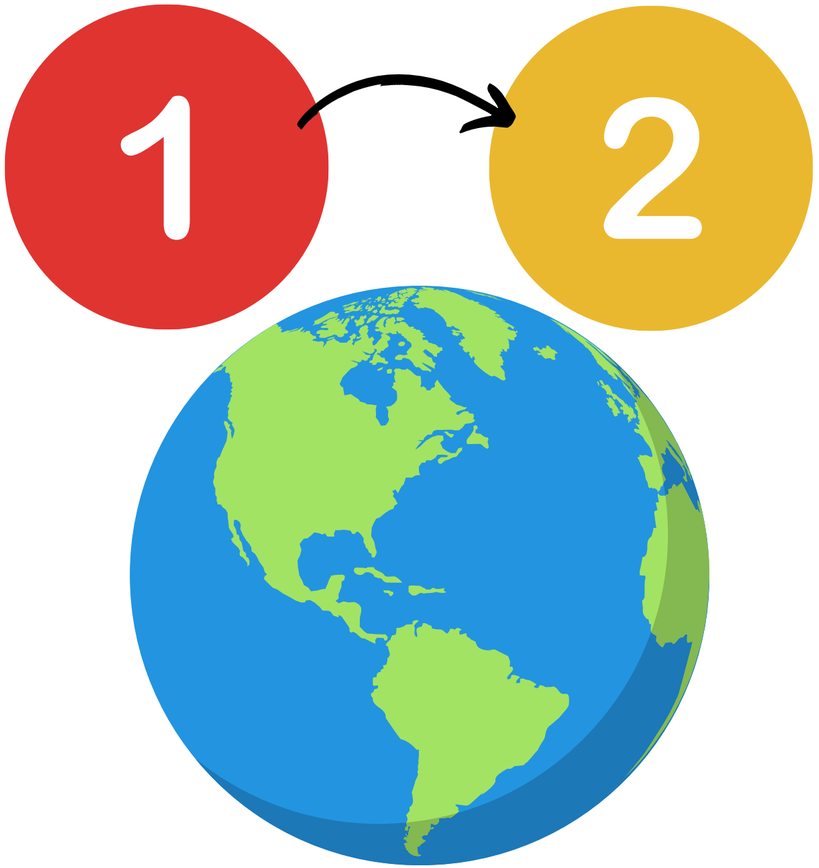
see: Wolf, 2007

1.the world we have

modified from Glantz (2018) WMO Bulletin

1.the world we have

2.the world we want



modified from Glantz (2018) WMO Bulletin

1.the world we have

2.the world we want

3.we cannot have the world we want, without the water we need

modified from Glantz (2018) WMO Bulletin

1.the world we have

2.the world we want

3.we cannot have the world we want, without the water we need

4.we cannot have the water we want, without the climate we need

modified from Glantz (2018) WMO Bulletin

1. the world we have
2. the world we want
3. we cannot have the world we want, without the water we need
4. we cannot have the water we want, without the climate we need
5. we cannot have the water or climate we want without the **policies** or **institutions** (or, **GOVERNANCE**) we need

modified from Glantz (2018) WMO Bulletin

1.the world we have
2.the world we want
3.we cannot have the world we want, without the water we need
4.we cannot have the water we want, without the climate we need
5.we cannot have the water or climate we want without the policies or institutions (or, GOVERNANCE) we need
6.without these, we are back to the world we had...

modified from Glantz (2018) WMO Bulletin

Why is this important to consider now?

- World Economic Forum's (WEF) Global Risks Report: global water crisis has been one of the top five global risks for over a decade

Why is this important to consider now?

- World Economic Forum's (WEF) Global Risks Report: global water crisis has been one of the top five global risks for over a decade

- Often see more conflict when and where there is rapid change occurring.
  - E.g., climate change – effects of which are primarily felt through the water cycle

Why is this important to consider now?

- World Economic Forum's (WEF) Global Risks Report: global water crisis has been one of the top five global risks for over a decade

- Often see more conflict when and where there is rapid change occurring.
  - E.g., climate change – effects of which are primarily felt through the water cycle

- Environmental stress can intensify intergroup tensions, especially where institutions are weak

Summary of learnings and what we can do

- Technocratic solutions alone fall short when dealing with complex water problems

Summary of learnings and what we can do

- Technocratic solutions alone fall short when dealing with complex water problems

- As water consumption and demand are increasing in the light of climate change and population growth, further insights from social science work are vital

Summary of learnings and what we can do

- Technocratic solutions alone fall short when dealing with complex water problems

- As water consumption and demand are increasing in the light of climate change and population growth, further insights from social science work are vital

- Consider the governance “side” of your challenge: conflict often arises not from scarcity but from governance failures

Summary of learnings and what we can do

- Technocratic solutions alone fall short when dealing with complex water problems

- As water consumption and demand are increasing in the light of climate change and population growth, further insights from social science work are vital

- Consider the governance “side” of your challenge: conflict often arises not from scarcity but from governance failures

- Increase institutional capacity - better able to absorb shocks

Summary of learnings and what we can do

- Technocratic solutions alone fall short when dealing with complex water problems

- As water consumption and demand are increasing in the light of climate change and population growth, further insights from social science work are vital

- Consider the governance “side” of your challenge: conflict often arises not from scarcity but from governance failures

- Increase institutional capacity - better able to absorb shocks

- Recognize that water interactions are inherently political

Summary of learnings and what we can do

- Technocratic solutions alone fall short when dealing with complex water problems

- As water consumption and demand are increasing in the light of climate change and population growth, further insights from social science work are vital

- Consider the governance “side” of your challenge: conflict often arises not from scarcity but from governance failures

- Increase institutional capacity - better able to absorb shocks

- Recognize that water interactions are inherently political
- Elevate water from low to high politics

Summary of learnings and what we can do

- Technocratic solutions alone fall short when dealing with complex water problems

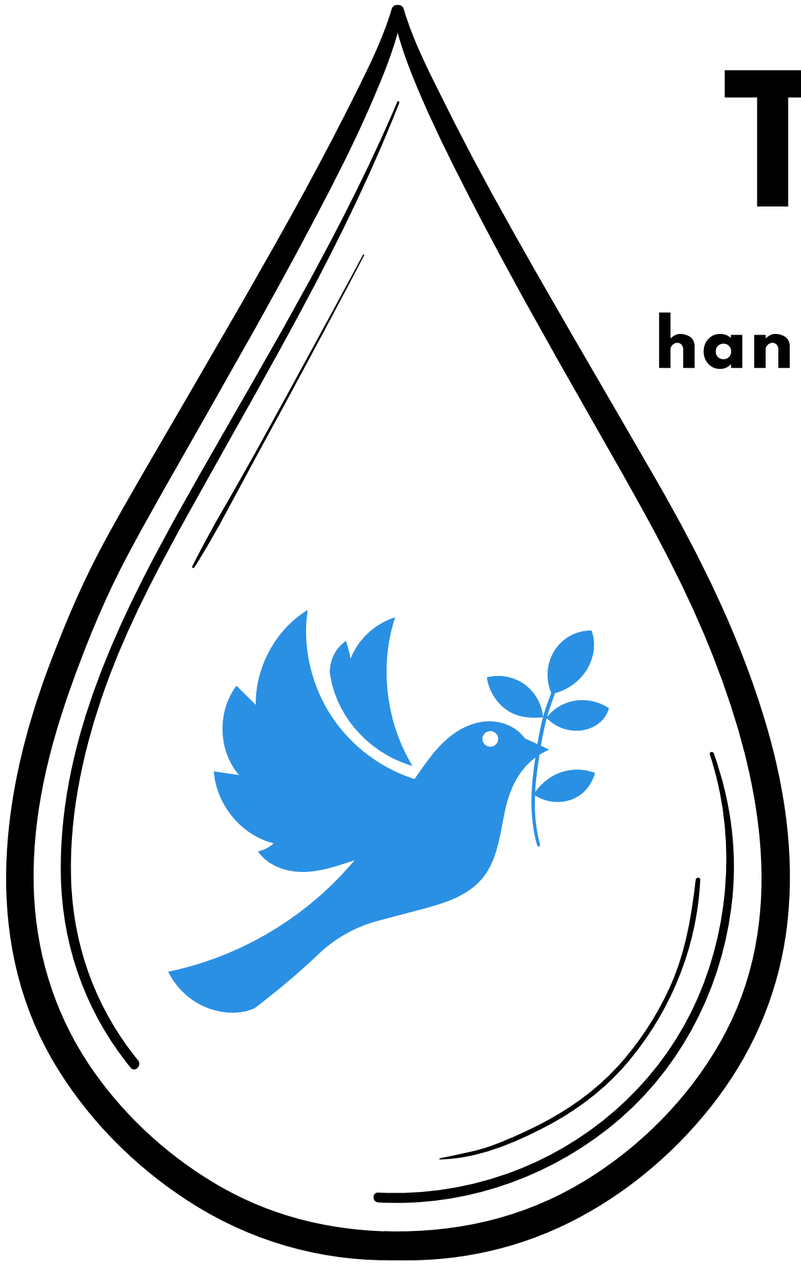
- As water consumption and demand are increasing in the light of climate change and population growth, further insights from social science work are vital

- Consider the governance “side” of your challenge: conflict often arises not from scarcity but from governance failures

- Increase institutional capacity - better able to absorb shocks

- Recognize that water interactions are inherently political
- Elevate water from low to high politics

- **Continue to work towards collaboration, as water is a vehicle for peace!**



Thank you!

hannah.haemmerli@wsu.edu

FRIENDSHIP DAMS:

Exploring friendship in hydropolitics via the case of the Asi/Orontes River

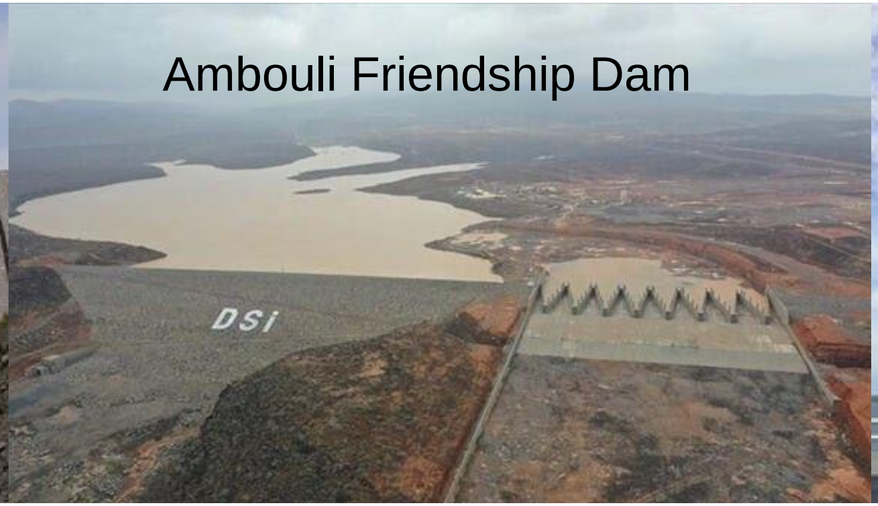
Hannah Hämmerli, Washington State University (formerly Uni. Geneva)
Christian Bréthaut, University of Geneva, Geneva Water Hub
Fatine Ezbakhe (formerly University of Geneva)

What is a Friendship Dam?

	Friendship Dam	Countries involved	River	Infrastructure	Governance
1	Afghan-India Friendship Dam	Afghanistan (funded by India)	Harirud/Tejen	Earth and rock-fill (hydropower, irrigation, drinking)	Government consultancy firm
2	Ambouli Friendship Dam	Djibouti (funded by Turkey)	Ambouli	Earth-fill (flood control, irrigation)	No joint body or agreement
3	Amistad Dam	Mexico, USA	Rio Grande	Earth-fill (flood protection, hydropower)	Joint international management body
4	Amistad Cuban-Bulgarian Dam	Cuba (funded by Bulgaria)	Saramaguacan	Earth-fill (drinking water)	No information
5	Doosti Dam	Iran, Turkmenistan	Harirud/Tejen	Earth-fill (hydropower, irrigation, drinking)	Joint international management body
6	Dostyk hydrosystem	China, Kazakhstan	Khorgos/ Horgos	(Irrigation, flood control, hydropower)	Joint international management body
7	Friendship Dam	Turkey, Bulgaria	Tunca/Tundzh a	Earth-fill (flood control, hydropower, irrigation)	Bulgaria did not agree to dam
8	Syria-Turkey Friendship Dam	Syria, Turkey	Asi/Orontes	Earth-fill (irrigation, flood control, hydropower)	Technical working group (binational)
		China (Hebei		Earth-fill (water supply,	

Observed characteristics

Afghan-India Friendship Dam



Ambouli Friendship Dam

~~Diablo~~ Amistad Dam

- Riparian & non-riparian
- Foreign aid & cost-sharing
- ”Friendship” as a re-labelling

Two important variables emerged from the analysis:

1. Security
2. Dynamics of international cooperation

Two important variables emerged from the analysis:

1. Security

a. Historically, security concerns have triggered shifts in high-level relations

a. And high-level political relations can be directly correlated to transboundary water relations

a. Syria and Turkey historically have linked water to security (1987 water & security protocols)

Two important variables emerged from the analysis:

2. Dynamics of international cooperation

a. Multiplicity of factors influenced cooperation process - water embedded within them

a. Multiple scales at play

a. Willingness to cooperate depends on country’s foreign policy strategy, political positioning, events, etc.

Conclusions

- Define FD – important to look at different cases and understand diversity

- Two key factors we identified **(security and dynamics of intl. cooperation)**
  - future work on other cases (comparative analysis)

- Theoretical contribution –
  - cross-fertilization (IR, hydropolitics, diplomacy)
  - beyond water box
  - value of historical perspective to understand current hydropolitical situations