

Geo 873 – 001: Seminar in Human-Environment Geography

12:40 am – 3:30 pm; GEO 120

CHN, telecoupling, transboundary challenges --

Guest Lecture by Dr. Jack Liu, MSU

Reading

Liu, J., Dietz, T., Carpenter, S. R., Alberti, M., Folke, C., Moran, E., ... & Taylor, W. W. (2007). Complexity of coupled human and natural systems. *Science*, 317(5844), 1513-1516.

Liu, J., Dietz, T., Carpenter, S. R., Taylor, W. W., Alberti, M., Deadman, P., ... & Lubchenco, J. (2021). Coupled human and natural systems: The evolution and applications of an integrated framework. *Ambio*, 50(10), 1778-1783.

Term Paper: Due date: 12:00 am, May 4, 2023.

April 19, 2023
GEO873-001, MSU

Term Papers

- Each student will choose a topic for a term paper by discussing potential ideas with the instructors.
- Students will conduct a literature search of major scientific journals (*e.g.*, *Ecology and Society*, *PNAS*, *BioScience*, *Environmental Research Letters*, etc.) to find at least five relevant papers as sources of information and as references for the term paper.
- Papers are to be formatted according to the guidelines for authors, such as “*Ecology and Society*” submissions (<http://www.ecologyandsociety.org/about/submissions.php>) and are limited to 5 pages (single spaced, excluding references, tables, and figures).
- The final papers are due **at 12:00 pm on May 4, 2023** (final exam week!)

Food, Energy & Water Nexus: Transboundary and Cross-Boundary Issues

WASHINGTON — After months of fruitless negotiations between the states that depend on the shrinking Colorado River, the Biden administration on Tuesday proposed to put aside legal precedent and save what's left of the river by evenly cutting water allotments, reducing the water delivered to California, Arizona and Nevada by as much as one-quarter.

The size of those reductions and the prospect of the federal government unilaterally imposing them on states have never occurred in American history.

Overuse and a 23-year-long drought made worse by climate change have threatened to provoke [a water and power catastrophe](#) across the West. The Colorado River supplies drinking water to 40 million Americans as well as two states in Mexico, and irrigates 5.5 million agricultural acres. The electricity generated by dams on the river's two main reservoirs, Lake Mead and Lake Powell, powers millions of homes and businesses.

But the river's flows have recently fallen by one-third compared with historical averages. [Levels in Lake Mead](#) and Lake Powell are so low that water may soon fail to turn the turbines that generate electricity — and could even fall to the point that water is unable to reach the intake valves that control its flow out of the reservoirs. If that happened, the river would essentially stop moving.

<https://www.nytimes.com/2023/04/11/climate/colorado-river-water-cuts-drought.html>

CLIMATE

The New York Times


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Biden Administration Proposes Evenly Cutting Water Allotments From Colorado River

As the river shrinks, the Biden administration is getting ready to impose, for the first time, reductions in water supplies to states.

Give this article

1.5K

An aerial photograph showing a wide, deep canyon of the Colorado River. The river is a dark, narrow strip of water winding through the center of the canyon. The surrounding landscape is arid and rocky, with a road and a small dam structure visible on the left side of the river.

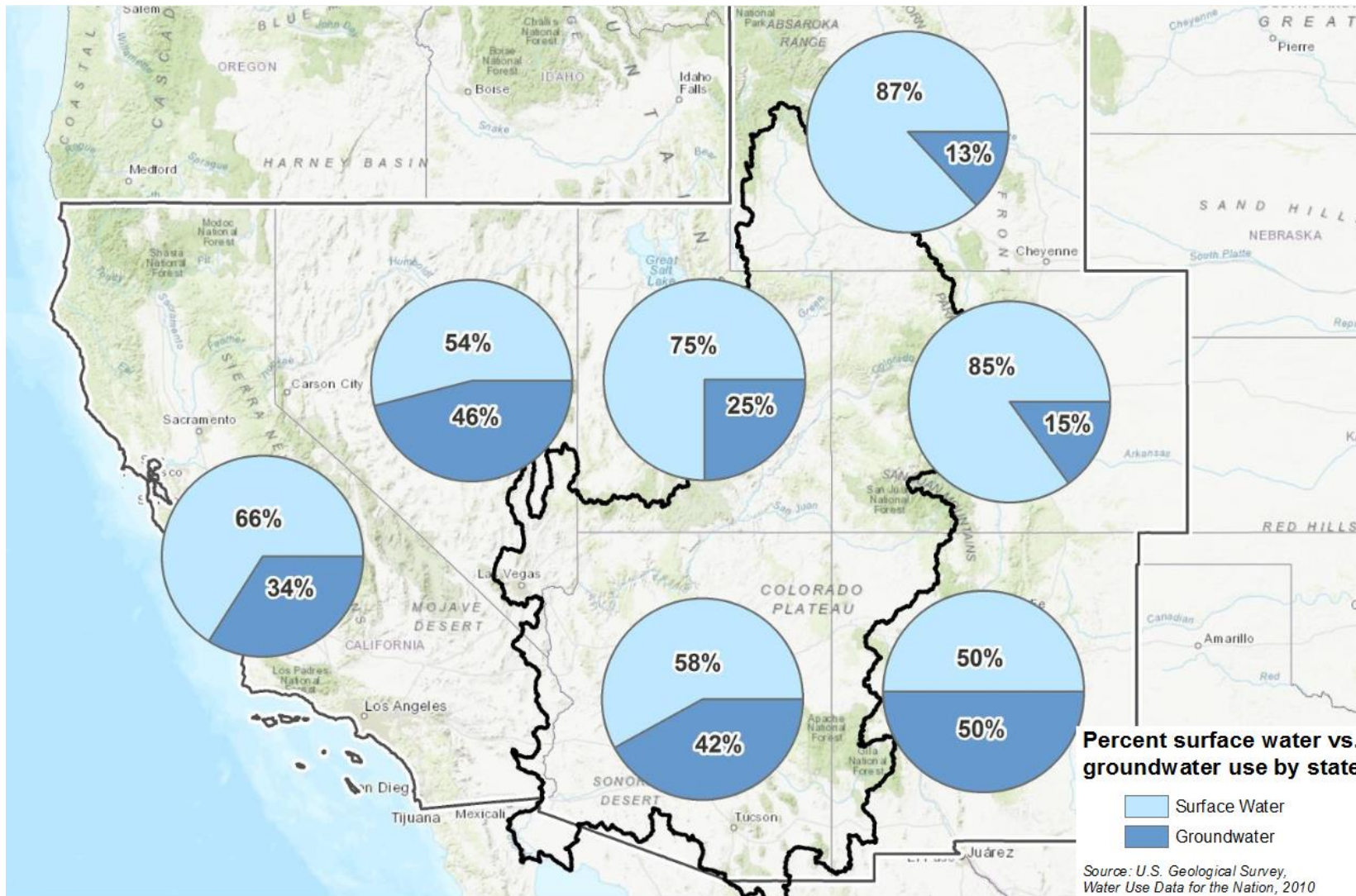
The 1,450-mile-long (2,330 km) river drains an expansive, arid watershed that encompasses parts of **seven U.S. states** and **two Mexican states**. The name Colorado derives from the Spanish language for "colored reddish" due to its heavy silt load. Starting in the central Rocky Mountains of Colorado, it flows generally southwest across the Colorado Plateau and through the Grand Canyon before reaching Lake Mead on the Arizona–Nevada border, where it turns **south toward the international border**. After entering Mexico, the Colorado approaches the mostly dry Colorado River Delta at the tip of the Gulf of California between Baja California and Sonora.

The Colorado River at [Horseshoe Bend, Arizona](#), a few miles below [Glen Canyon Dam](#); https://en.wikipedia.org/wiki/Colorado_River



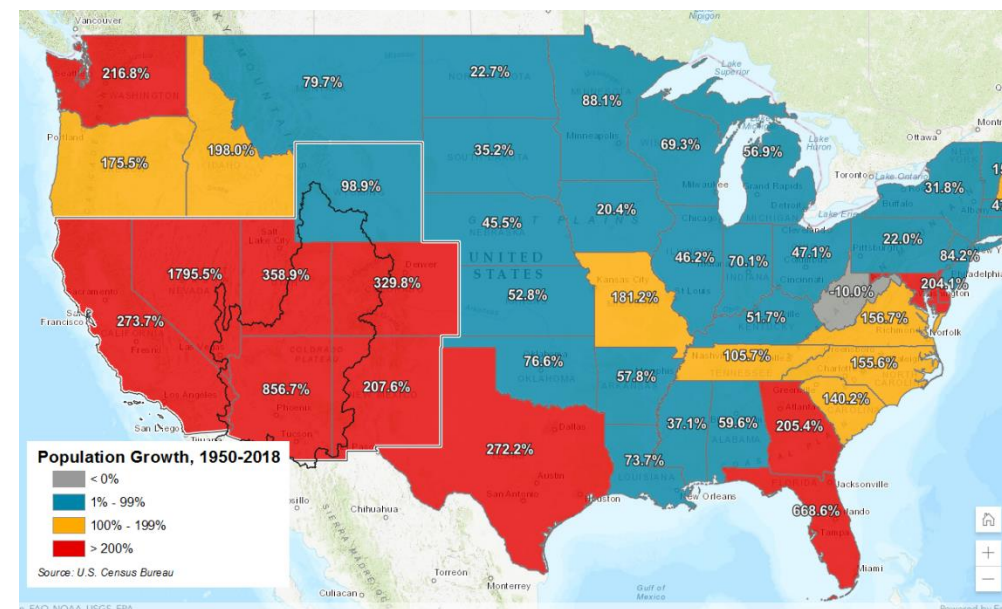
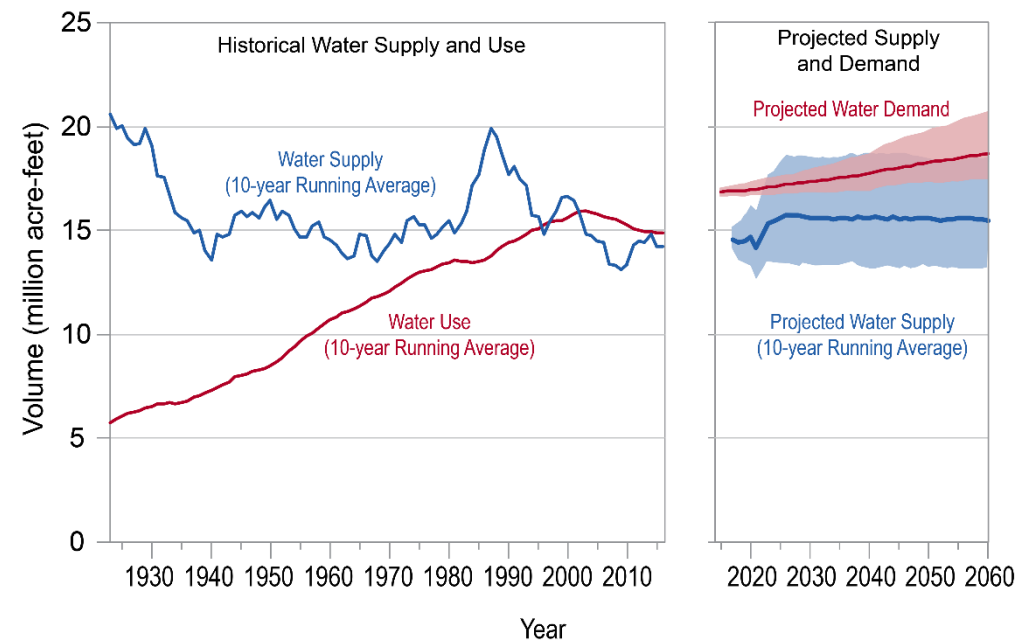
Colorado River Basin story map highlights importance of managing water below the ground

(<https://blogs.edf.org/growingreturns/2019/10/24/colorado-river-basin-story-map-highlights-importance-of-managing-water-below-the-ground/>)



Highlights

- Groundwater accounts for between 13% and 50% of the water portfolio of the Colorado River Basin states
- Groundwater over-pumping led to additional development of surface water infrastructure but now the Colorado River system — the surface water — is over-allocated
- The Colorado River system includes some of the fastest-growing states
- Groundwater-dependent rural towns are grappling with dwindling water supplies



The river's end: Amid Colorado water cuts, Mexico seeks to restore its lost oasis

(<https://www.latimes.com/environment/story/2023-01-31/colorado-river-in-crisis-the-rivers-end>)

LOS ALGODONES, Mexico — When the Colorado River reaches the U.S.-Mexico border, it pushes up against Morelos Dam. Nearly all the remaining water is shunted aside into an immense canal and flows toward the farmlands and cities of Baja California.



Mexico is entitled to receive 1.5 million acre-feet of water per year under a 1944 treaty. But in recent agreements with the U.S., Mexico has also agreed to take part in reductions when there is a shortage.

Video

<https://www.latimes.com/environment/story/2023-01-31/colorado-river-in-crisis-the-rivers-end>

Transboundary water politics in the Euphrates–Tigris (ET)

The Euphrates-Tigris basin is shared between Turkey, Syria and Iraq, with Iran comprising parts of the Tigris basin. Since the 1960s, unilateral irrigation plans altering the rivers' flows, coupled with political tensions between the countries, have strained relations in the basin. Disputes have prevented the three governments from effectively co-managing the basin's rivers. Although cooperation efforts were renewed in the 2000s, these have yet to result in a formal agreement on managing the basin waters.

(<https://climate-diplomacy.org/case-studies/turkey-syria-and-iraq-conflict-over-euphrates-tigris>)

Climatologists predict the drought will be permanent and the Fertile Crescent 'will disappear this century.'

The two rivers water a region long known as the "Fertile Crescent," which sustained ancient Mesopotamian civilizations. They were the first rivers to be used for large-scale irrigation, beginning about 7500 years ago. The first water war was also recorded here, when the king of Umma cut the banks of irrigation canals alongside the Euphrates dug by his neighbor, the king of Girsu.



Water scarcity could lead to the next major conflict between Iran and Iraq

March 18, 2021
Banafsheh Keynoush

- Iran and Iraq are frequently at odds over water issues. Iraq depends on the Tigris and Euphrates rivers for nearly all of its water. But Iran is building dams to redirect some of that water, causing alarm and creating major water shortages for Iraq.
- Tehran prefers not to work with Baghdad on water projects, instead opting for quick fixes for its own water problems. Some [two-thirds](#) of Iran's 10.2 billion cubic meters of water that exits the country actually flows across its borders into Iraq, which could lead to a major water shortage inside Iran by 2036. (<https://www.mei.edu/publications/water-scarcity-could-lead-next-major-conflict-between-iran-and-iraq>)



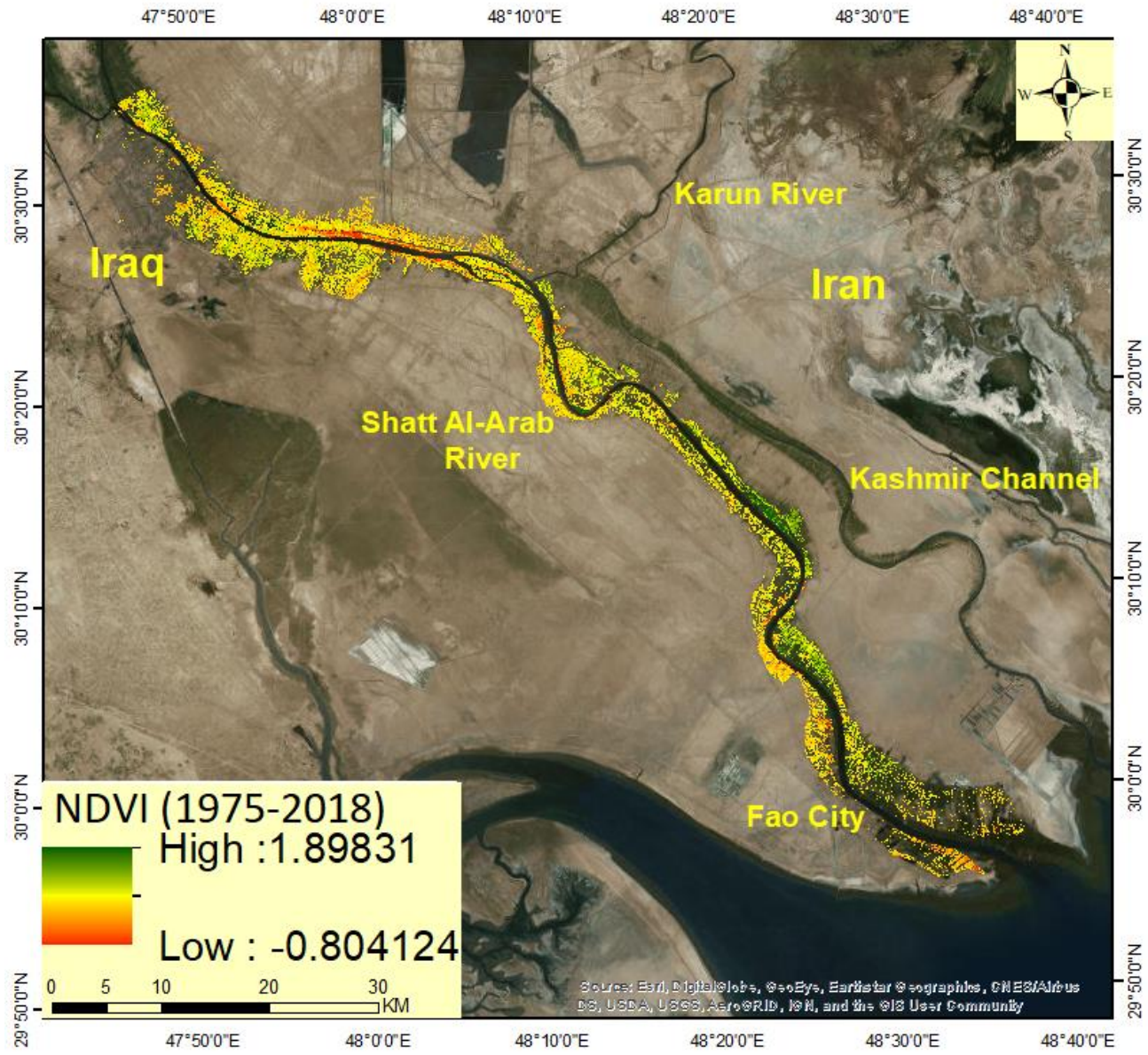
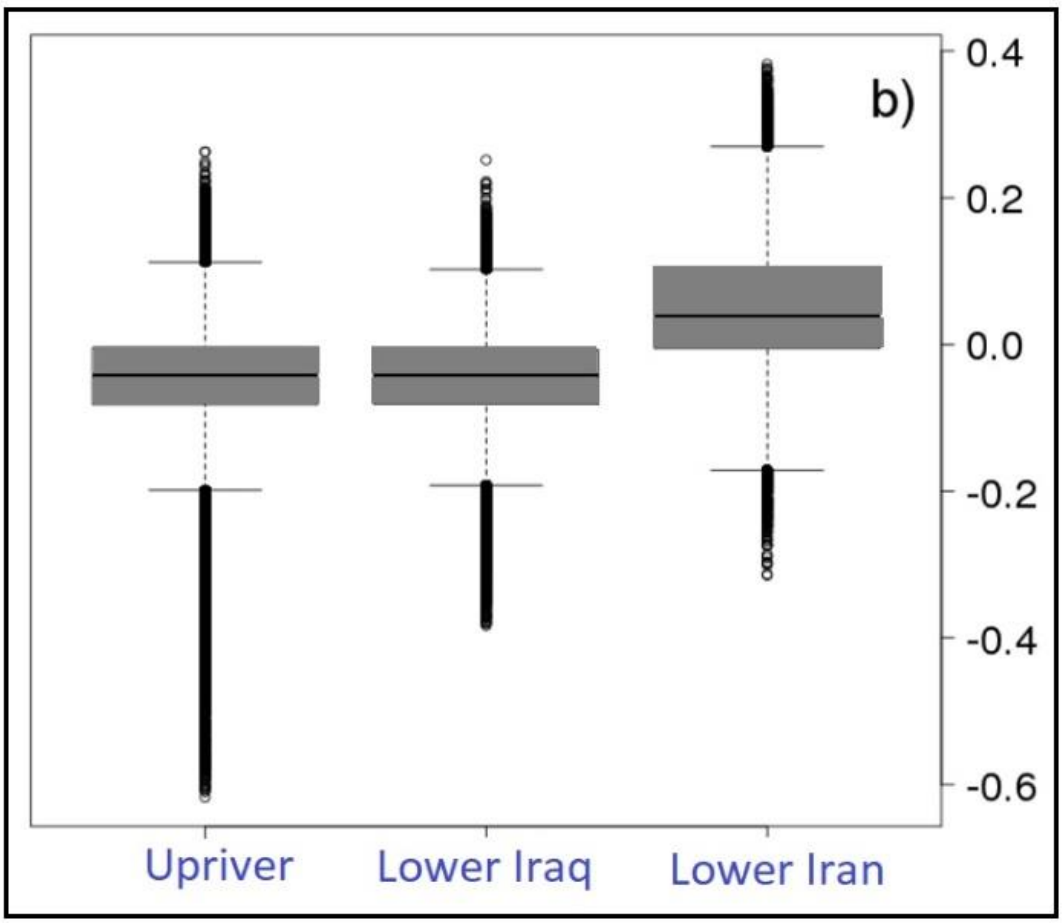


Fig. 10.7 Spatial change in NDVI between 1975 and 2017 in the Shatt Al Arab Region, showing the difference at the junction of the Karun river with the Shatt Al Arab river. NDVI in the southwest of the region has declined more than that in the southeast and north of the region. The southwest region close to the Persian (Arabian) Gulf, which is affected by sea level rise, has less fresh water than that in the northern part of the region. The southeast part has a higher increase in NDVI because the Iranian Government withdraws more water from the Karun River for irrigation.

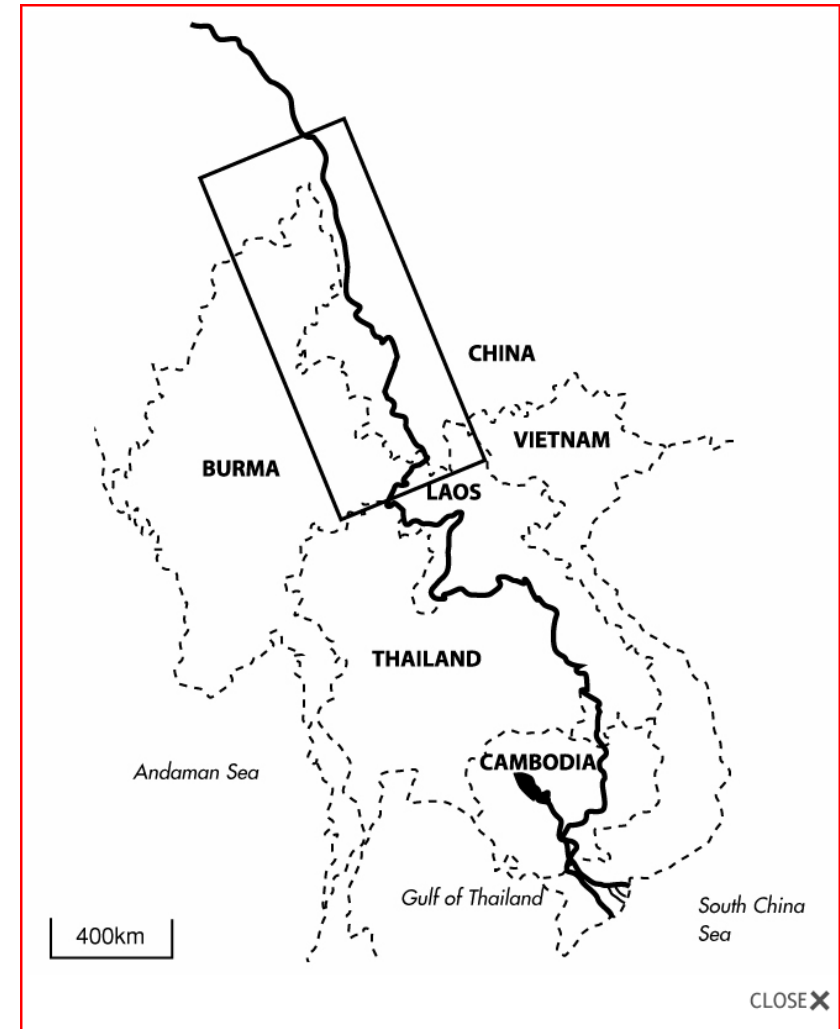


Managing the Mekong: Conflict or Compromise?

(<https://www.newsecuritybeat.org/2010/12/managing-the-mekong-conflict-or-compromise/#:~:text=The%20countries%20of%20the%20Lower,through%20Chinese%20floodgates%20and%20spillways>)

At nearly **5,000 kilometers** long, the Mekong River is one of Asia's most strategically important transboundary waterways. In addition to providing water for populations in the highlands of southern China, the Mekong helps support **some 60 million people** downstream in Southeast Asia, where the river is a key component of agricultural production and economic development.

In recent years, however, the Mekong has emerged as a flashpoint for controversy, pitting **China against a coalition of downstream nations that includes Thailand, Laos, Cambodia, and Vietnam**. The countries of the Lower Mekong argue that **Beijing's construction of multiple dams** on the Upper Mekong is robbing them of critical water resources, by decreasing both the quality and quantity of water that makes it through Chinese floodgates and spillways. China, however, mindful of soaring energy demand at home, has continued its campaign to harness the hydroelectric potential of the Upper Mekong and its tributaries – but at what cost to the environment and Beijing's relationships with Southeast Asia?



- In that context, China’s aggressive hydroelectric development of the Upper Mekong — known in China as the Lán Cang Jiāng— makes perfect sense. The river’s sizeable elevation drops make it a rich source of energy; already, [15 large-scale dams have either been completed or are under construction](#) on the Upper Mekong in Tibet and Yunnan.
- The security implications could hardly be greater for the downstream states. With the dams, China will have literal control over the river system that is the lifeblood of Laos, Cambodia, and Vietnam. The power this gives China is equivalent to an invasion and occupation of a country by the Chinese army.
- To date, China has never threatened to deliberately reduce the flow of the Mekong to its downstream neighbors. Nevertheless, the perception of threat in Southeast Asian capitals remains high.



The Water Wars Myth: India, China and the Brahmaputra

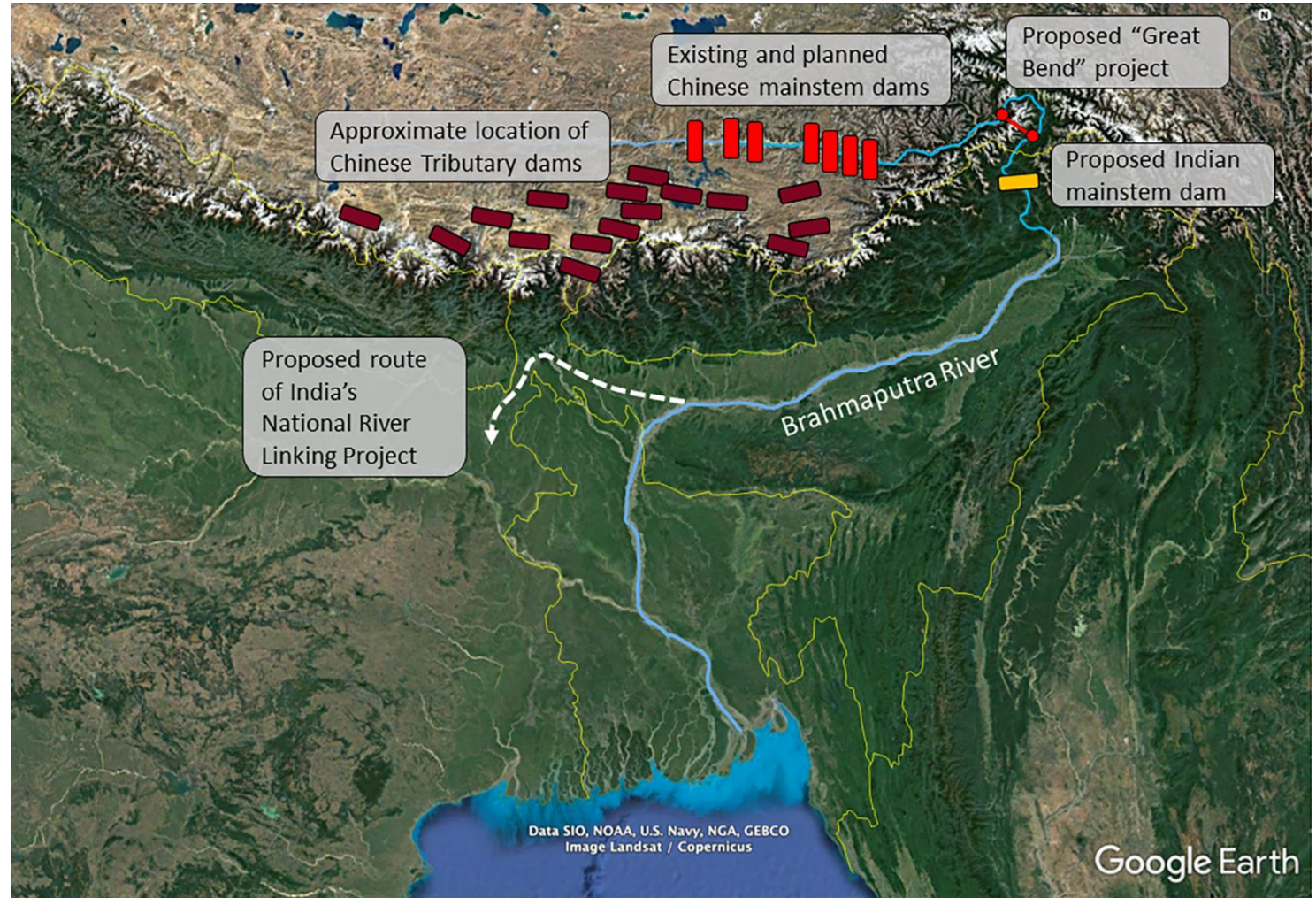
What the hydrology and geopolitics of the Brahmaputra River mean for India-China water relations.

Thursday, December 8, 2022 / by: Mark Giordano; Anya Wahal

A simplified version of the water wars argument is that per capita water availability will drop as populations grow and water supplies remain constant. At the same time, economic growth will multiply demand as effective supplies are reduced with quality declines. Climate change will only worsen the situation. For internationally shared rivers, conflict over the vital resource will occur when some tipping point is reached, particularly if tensions over other issues are high and there is no history of institutionalizing cooperation over water through treaties or other mechanisms.

<https://www.usip.org/publications/2022/12/water-wars-myth-india-china-and-brahmaputra>

China functionally contributes less to the Brahmaputra's flow than is commonly perceived and in part because the river can contribute little to solving India's significant water security challenges.



WEATHER

Sahara dust from Africa arrives in North Carolina this weekend

by: [Associated Press](#), [Wes Hohenstein](#)
Posted: Jun 22, 2020 / 10:02 PM EDT
Updated: Jun 22, 2020 / 11:51 PM EDT

SAN JUAN, Puerto Rico (AP/WNCN) — A vast cloud of Sahara dust is blanketing the Caribbean as it heads to the U.S. with a size and concentration that experts say hasn't been seen in half a century. This cloud will bring impacts to North Carolina this weekend, but they will not be significant.

Air quality across most of the Caribbean fell to record "hazardous" levels and experts who nicknamed the event the "Godzilla dust cloud" warned people to stay indoors and use air filters if they have one. (<https://www.cbs17.com/weather/sahara-dust-blankets-caribbean-air-quality-hazardous/>)

In North Carolina, impacts will include hazy conditions and gray skies along with reduced visibility starting Saturday. Those with sensitive allergies and respiratory issues may notice it more than others, but most people will not be impacted.

<https://www.youtube.com/watch?v=UKzBaTZhfdg>



What the Amazon rainforest tells us about globalization

Nov 8, 2018

Deforestation is a global issue

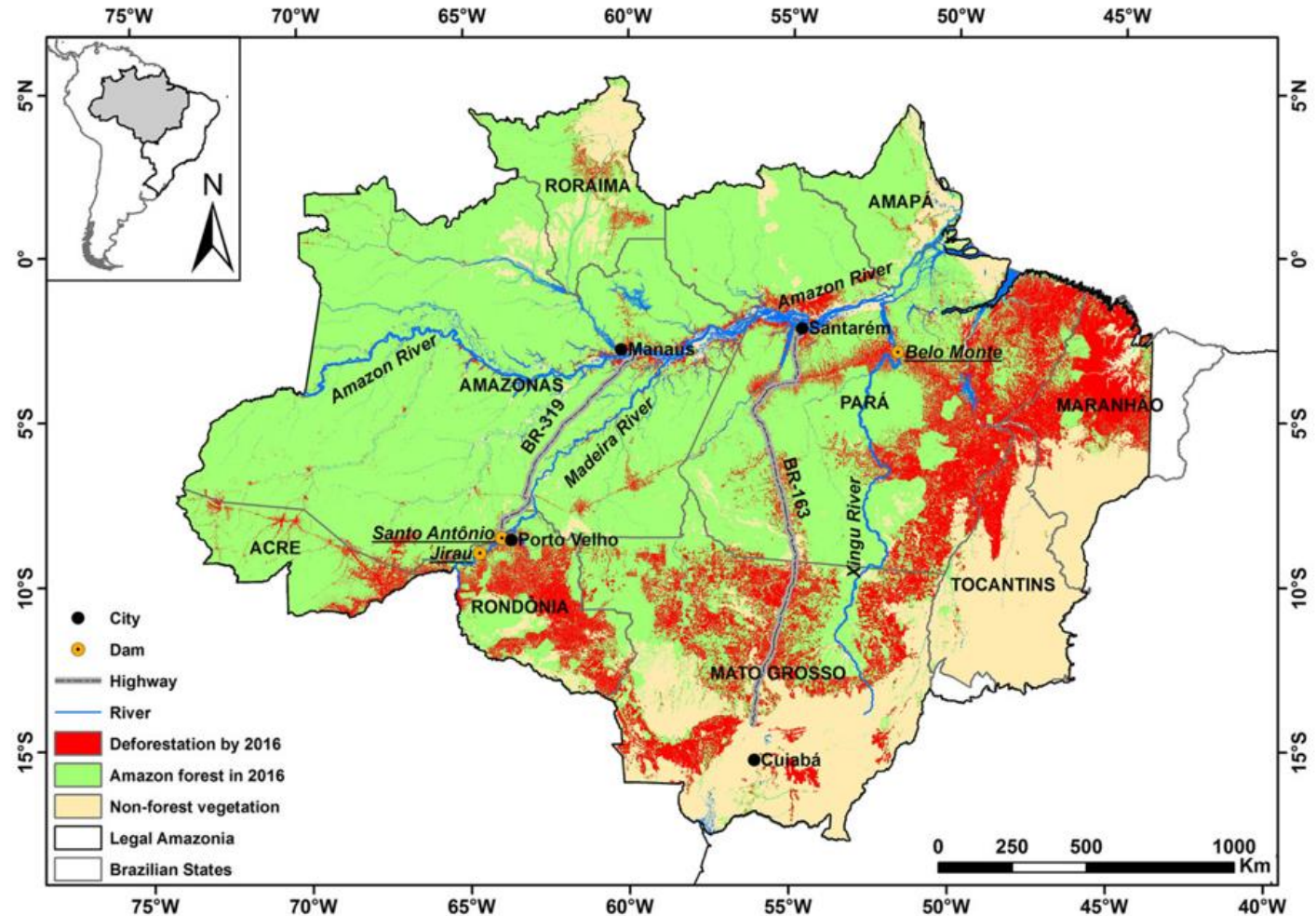
The reason why people cut the forest, however, has largely remained the same: to get more arable land for the farmers that live in its surroundings. This rings especially true for the inhabitants of Brazil, a country that is responsible for about 75% of its deforestation.

First, it seems self-evident why a globalized agricultural market would demand the expansion of arable and pasturable land in Brazil. South America's largest country is a big exporter of many agricultural commodities. [According to the OECD](#), Brazil will account for almost half of world sugar exports by 2026, and 47% of global soybean volumes, with global demand for each growing rapidly from now until then.

Can globalization and the fight against climate change co-exist? Or is the environment doomed to suffer as people fly, goods are shipped, and agriculture and industry tap international markets?

(<https://www.weforum.org/agenda/2018/11/can-globalization-co-exist-with-the-fight-against-climate-change/>)

<https://www.youtube.com/watch?v=SAZAKPUQMw0>



Can investors save the Amazon?

(<https://www.bbc.com/future/article/20210825-can-investors-save-the-amazon>)

Between 2001 and 2015, almost a third of the world's deforestation was due to commodity production – including cattle, soy, palm oil and paper.

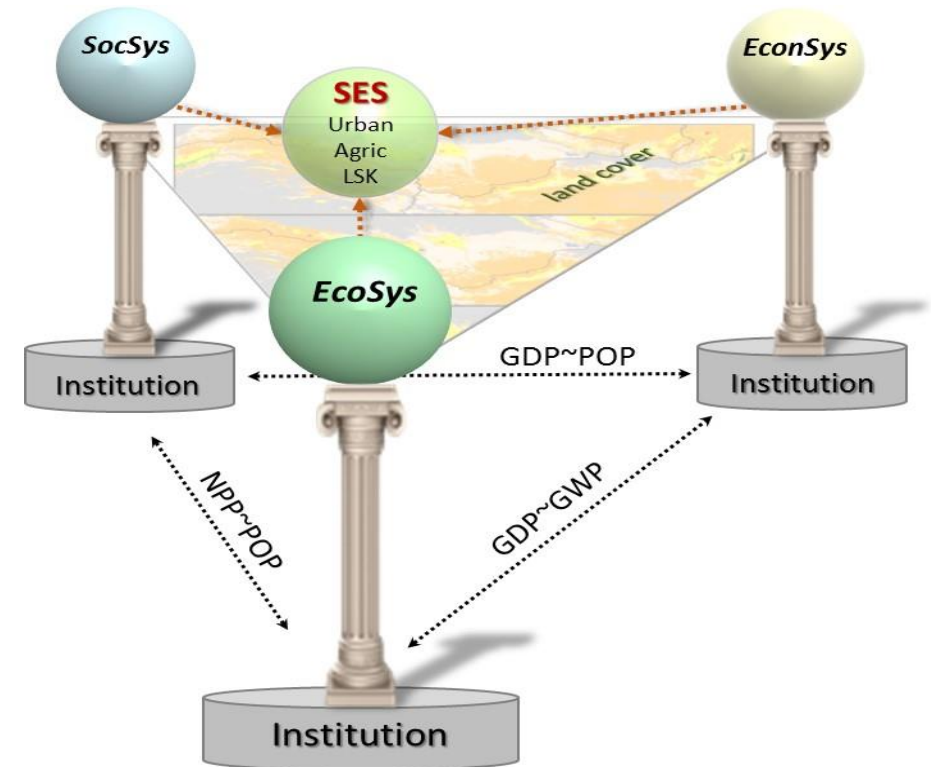
In Brazil, where deforestation has reached a 12-year high, the chief reason is beef. Two-thirds of cleared land in the Amazon and the Cerrado savannah have been converted to cattle pasture,

Between 2008 and 2019, 983 farms JBS bought from directly had caused deforestation of 203 km², and 1,874 indirect suppliers caused a further 508.5 km² deforestation.



In Sum

- Climate change
- Air pollution
- Transboundary water and conflicts
- Infection diseases
- Oil production and international policies
- Economy
- Food, energy and water productions
- Remittance
- Human migration
- Information, technology, and knowledge
- Education
- ?



Next Week: Student Presentations

A few instructions:

- Rule of Thumb: 1 slide per minute (time control)
- More is not better
- A picture is worth a thousand words
- Consistence
- Highlights vs details
- Artworks
- ?

Top Tips for Effective Presentations

<https://www.skillsyouneed.com/present/presentation-tips.html>

1. Show your Passion and Connect with your Audience
2. Focus on your Audience's Needs
3. Keep it Simple: Concentrate on your Core Message
4. Smile and Make Eye Contact with your Audience
5. Start Strongly
6. Remember the 10-20-30 Rule for Slideshows
 - Contain no more than 10 slides;
 - Last no more than 20 minutes; and
 - Use a font size of no less than 30 point.
7. Tell Stories
8. Use your Voice Effectively
9. Use your Body Too
10. Relax, Breathe and Enjoy

Lastly, Course WebPage with a password

“delta”

<http://lees.geo.msu.edu/courses.html>