Potential Energy & Food Consequences of India's Suspension of Indus Waters Treaty

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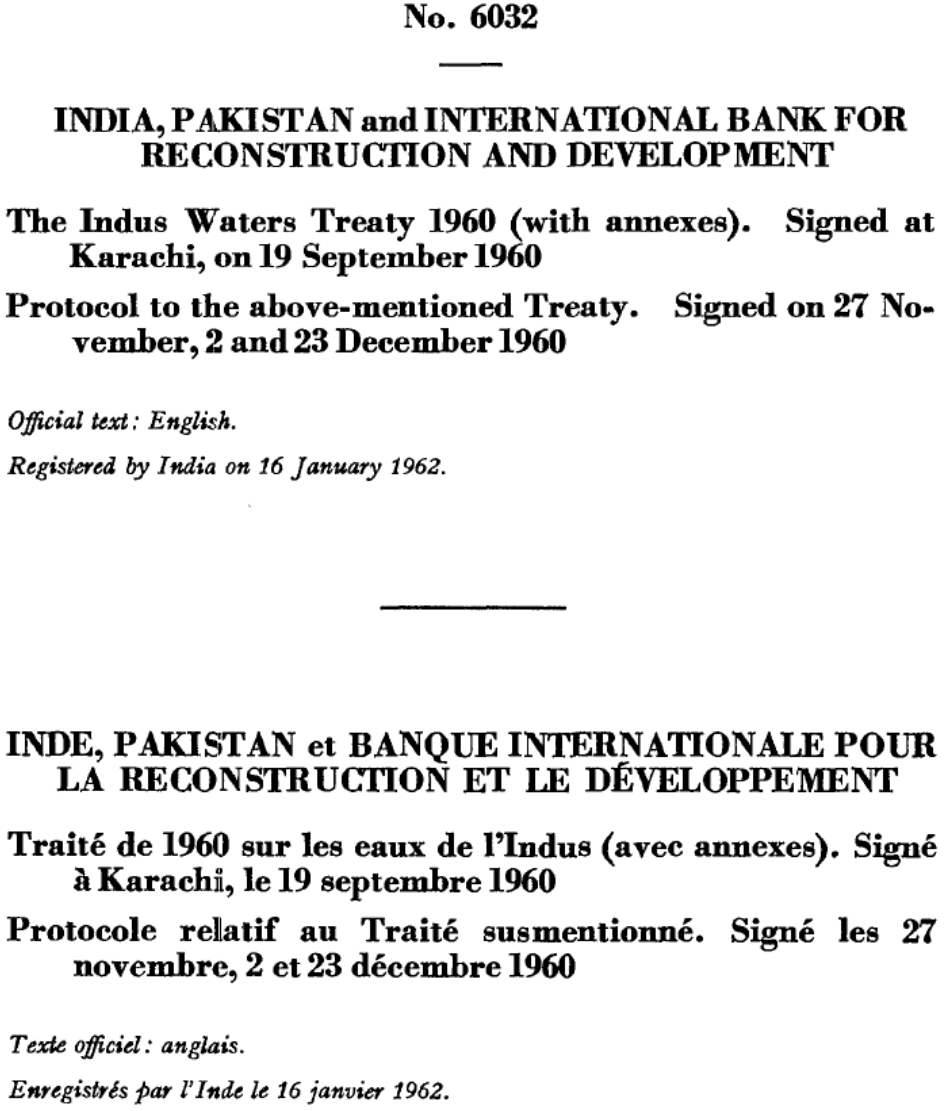
Notes

- I understand that emotions are running high. A terrorist attack has been followed by military retaliation. People in both India and Pakistan have perished. More violence may well follow.
- In this deck, I am not taking any side. I am simply explaining some of the collateral consequences that could plausibly result from lower Indus Basin water flows to Pakistan over time.
- These consequences are of great interest as a matter of economic, human, and national security in Pakistan, India, and also the United States itself.
- The analysis uses the lens of the Energy-Food-Water Nexus, the three-legged stool that human civilization stands on.
- This is very much a beta analysis that will evolve and be updated as I learn more.

IWT Suspension is Historically Unprecedented

- Indus Waters Treaty signed in 1960
- Water sharing agreement that governs use of water from six rivers in the Indus Basin
- Has survived many previous stressors:
  - 1965 Indo-Pakistani War—IWT remained in force
  - 1971 Indo-Pakistani War—IWT remained in force
  - 1999 Kargil War—IWT remained in force
  - 2019 Crisis—IWT remained in force
  - Multiple prior attacks in Kashmir—IWT remained in force
  - ***2025 Kashmir Massacre—IWT suspended***



No. 6032

INDIA, PAKISTAN and INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

The Indus Waters Treaty 1960 (with annexes). Signed at Karachi, on 19 September 1960

Protocol to the above-mentioned Treaty. Signed on 27 November, 2 and 23 December 1960

Official text: English.

Registered by India on 16 January 1962.

INDE, PAKISTAN et BANQUE INTERNATIONALE POUR LA RECONSTRUCTION ET LE DÉVELOPPEMENT

Traité de 1960 sur les eaux de l'Indus (avec annexes). Signé à Karachi, le 19 septembre 1960

Protocole relatif au Traité susmentionné. Signé les 27 novembre, 2 et 23 décembre 1960

Texte officiel: anglais.

Enregistrés par l'Inde le 16 janvier 1962.

Source: https://timesofindia.indiatimes.com/india/india-has-suspended-the-indus-waters-treaty-what-does-it-mean/articleshow/120621117.cms

Reportedly Fast-Tracked Projects That Could Alter Indus Basin Flows

Project	Capacity (MW)	River	Type	Est. Commissioning Date
Bursar	800	Chenab	Conventional storage	2027
Dulhasti-II	260	Chenab	Run-of-river	2026
Kirthai-II	930	Chenab	Run-of-river	N/A
Kiru	624	Chenab	Run-of-river	2026
Kwar	540	Chenab	Run-of-river	2026
Pakal Dul	1000	Chenab	Conventional storage	2026
Ratle	850	Chenab	Run-of-river	2026
Sawalkote	1856	Chenab	Run-of-river	N/A

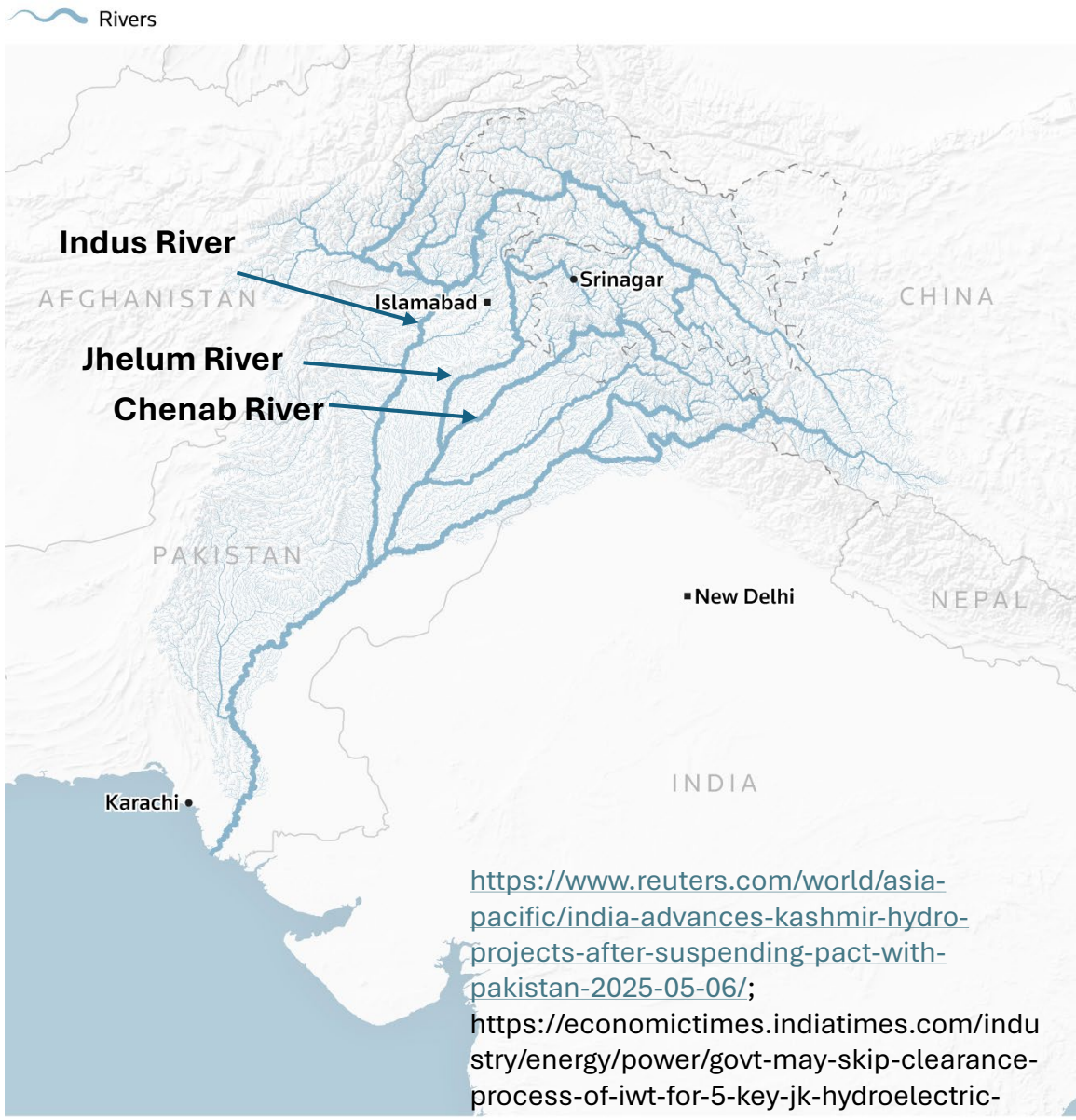
Source: Global Energy Monitor, Author's Analysis

Why Do New Dam Projects Matter?

- The IWT favors Pakistan's right to relatively unimpeded flows of water from the three western rivers in the Indus Basin: Chenab, Jhelum, and the main Indus itself.
- The IWT traditionally only allowed run of river hydro power plants with small storage capacities.
- But two of the fast-tracked projects actually involve storage of water and are large dams (800-to-1,000 MW power generation capacity).
- There could potentially be more storage and diversion projects to come.
- Consider recent leadership statesments from India: "*Earlier, even the water belonging to India was flowing out, now India's water will flow for India's benefit, will stay here for India's benefit and will be utilized for India only*."--Prime Minister Narendra Modi, 6 May 2025
- Source: https://timesofindia.indiatimes.com/articleshow/120947577.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

Rivers of the Indus Waters Treaty

The Indus Waters Treaty, signed in 1960 between India and Pakistan, is an agreement for the distribution and use of water from the Indus system of rivers and its tributaries.

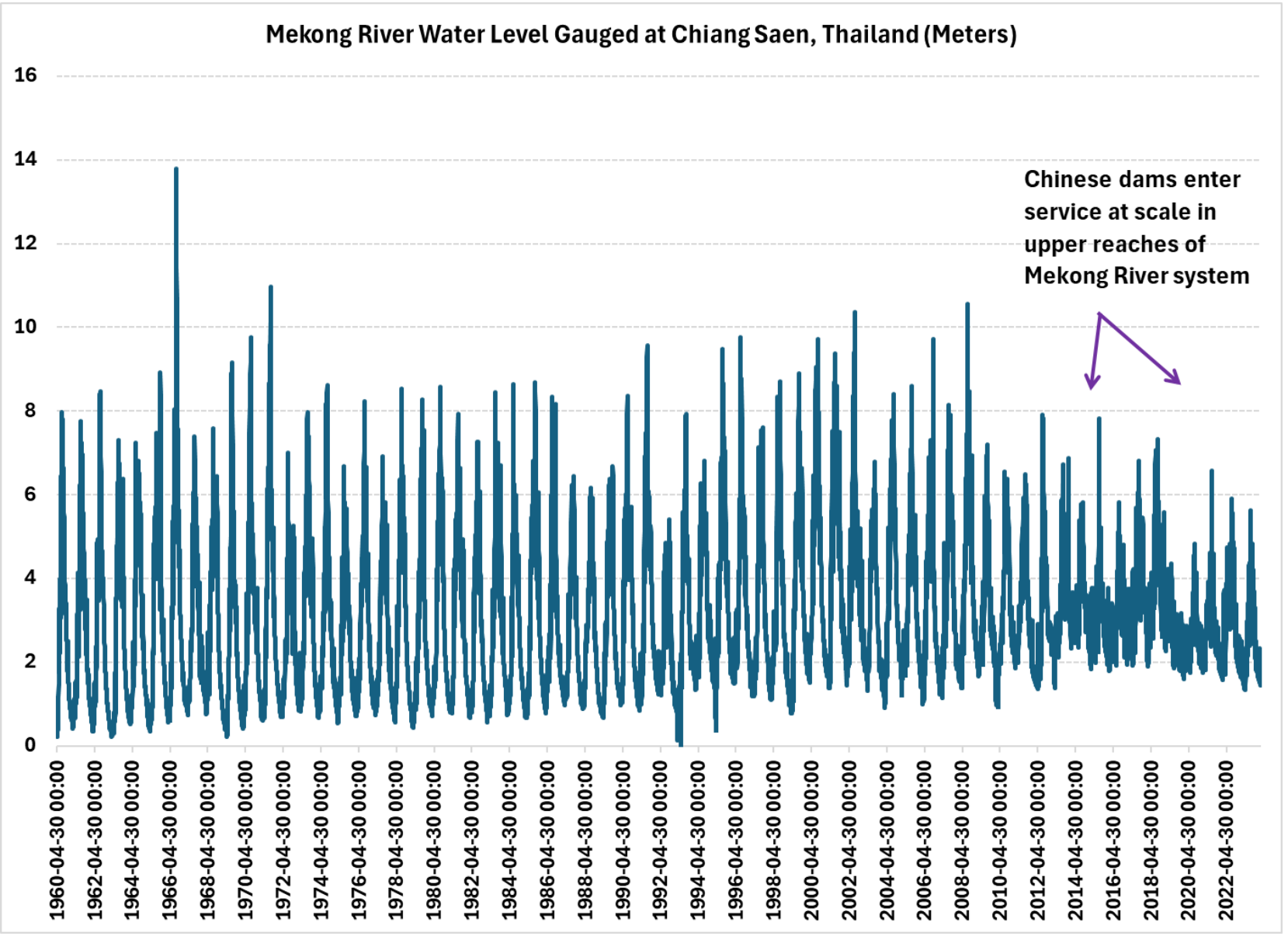


Sources: HydroSHEDS; Natural Earth

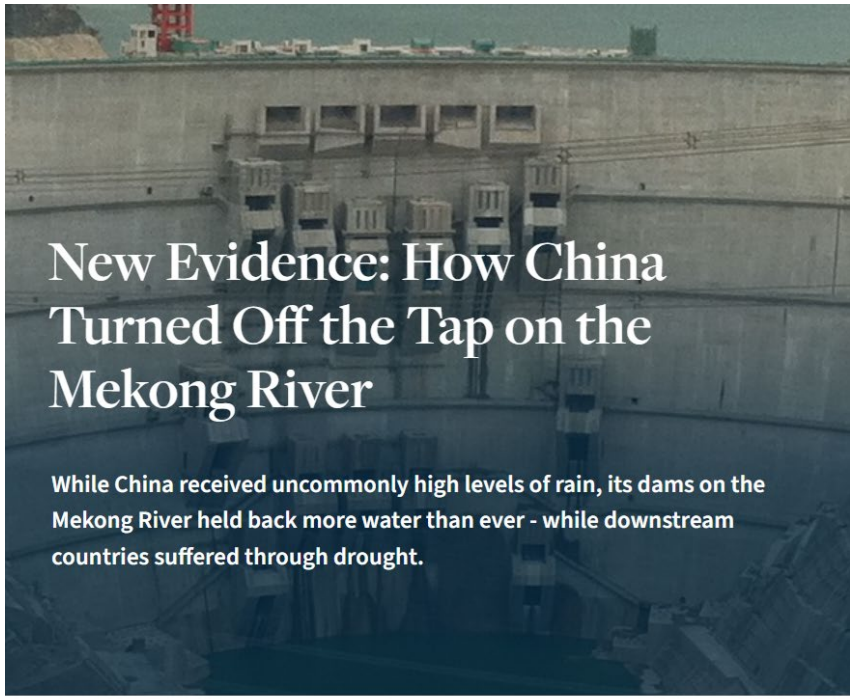
Sudev Kiyada • April 24, 2025 | REUTERS

https://www.reuters.com/world/asia-pacific/india-advances-kashmir-hydro-projects-after-suspending-pact-with-pakistan-2025-05-06/;
https://economictimes.indiatimes.com/industry/energy/power/govt-may-skip-clearance-process-of-iwt-for-5-key-jk-hydroelectric-projects/articleshow/120674378.cms

Plausible Downstream Effects of Dams in a Monsoon-Dependent Location



Source: Mekong River Commission



By Brian Eyler Lead Author • Regan Kwan Data Visualization • Courtney Weatherby Co-author

April 13, 2020

For three decades, China has been building dams on the upper Basin of the Mekong River, worrying countries downstream that China could one day turn off the tap. New data shows that for six months in 2019, while China normal to above average precipitation in most of its part of the Mekong, its dams held back more water than ever — even as downstream countries suffered through an unprecedented wet season

https://www.stimson.org/2020/new-evidence-how-china-turned-off-the-mekong-tap/

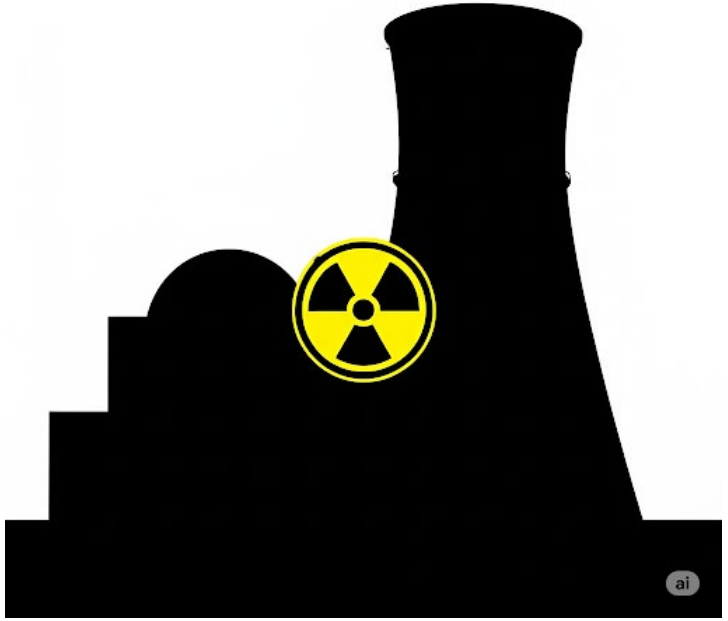
Indus Flow Reduction Risk is Not Theoretical

Jammu & Kashmir: Salal Dam extreme low outbound water flow into lower Chenab River bound for Pakistan, 6 May 2025

Source: https://www.indiatoday.in/world/story/india-shuts-gates-bagligar-salal-dam-chenab-dry-pakistan-war-indus-system-kharif-water-scarcity-punjab-2720175-2025-05-06

Potential Energy Impacts

Nameplate capacity of power plants whose water supply definitely or likely comes from the Indus River system.



Chashma: 1,330 MW

Jamshoro: 660 MW
Sahiwal: 1,320 MW

Guddu: 1,762 MW
Trimmu: 1,263 MW
HBS: 1,230 MW
Kapco: 1,006 MW
Muzzaffargarh: 830 MW

These plants account for roughly 1/3 of Pakistan's dispatchable generation capacity so disruptions could pose big problems.

Sources: EIA, Global Energy Monitor

Power Plant Options If Surface Water Supplies Reduced

Action Timeline

Weeks

Months

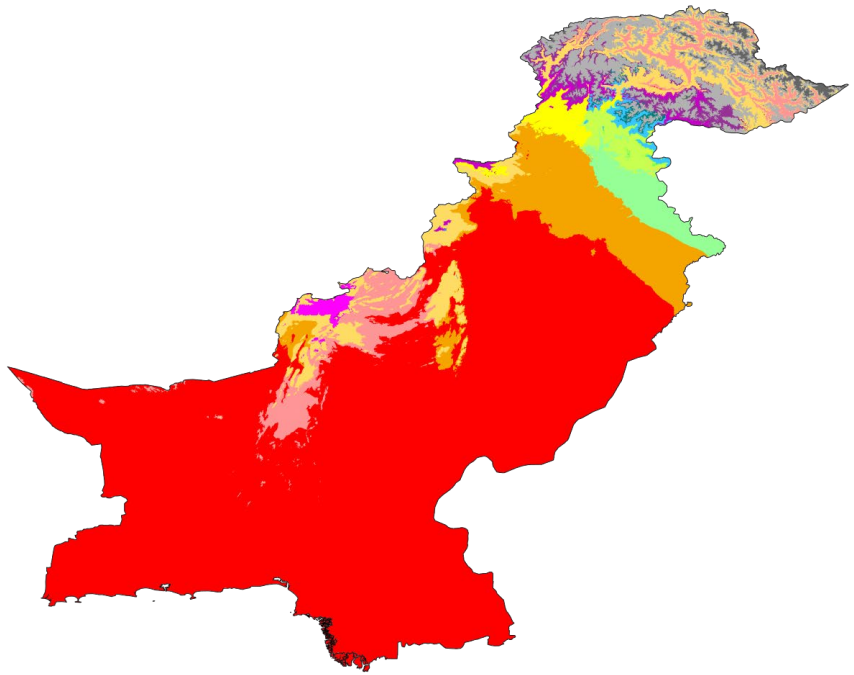
Years

- **De-rate power production**
  - Bad for a country that is already chronically short of power
- **Shut down (worst case)**
  - Really bad for a country chronically short of power
- **Increase use of diesel-powered generators**
  - Problems arise with pollution and the high cost of fuel in a poor country short on foreign exchange
  - We have already seen these types of problems afflict LNG imports
- **Use more groundwater for plant cooling**
  - Once-through plants would require major retrofits
  - Aquifer drawdowns
  - Arsenic and pollution problems
- **Build more air-cooled power plants**
  - Expensive
  - Who would build other than China? Would likely entrench coal.

Potential Food Impacts

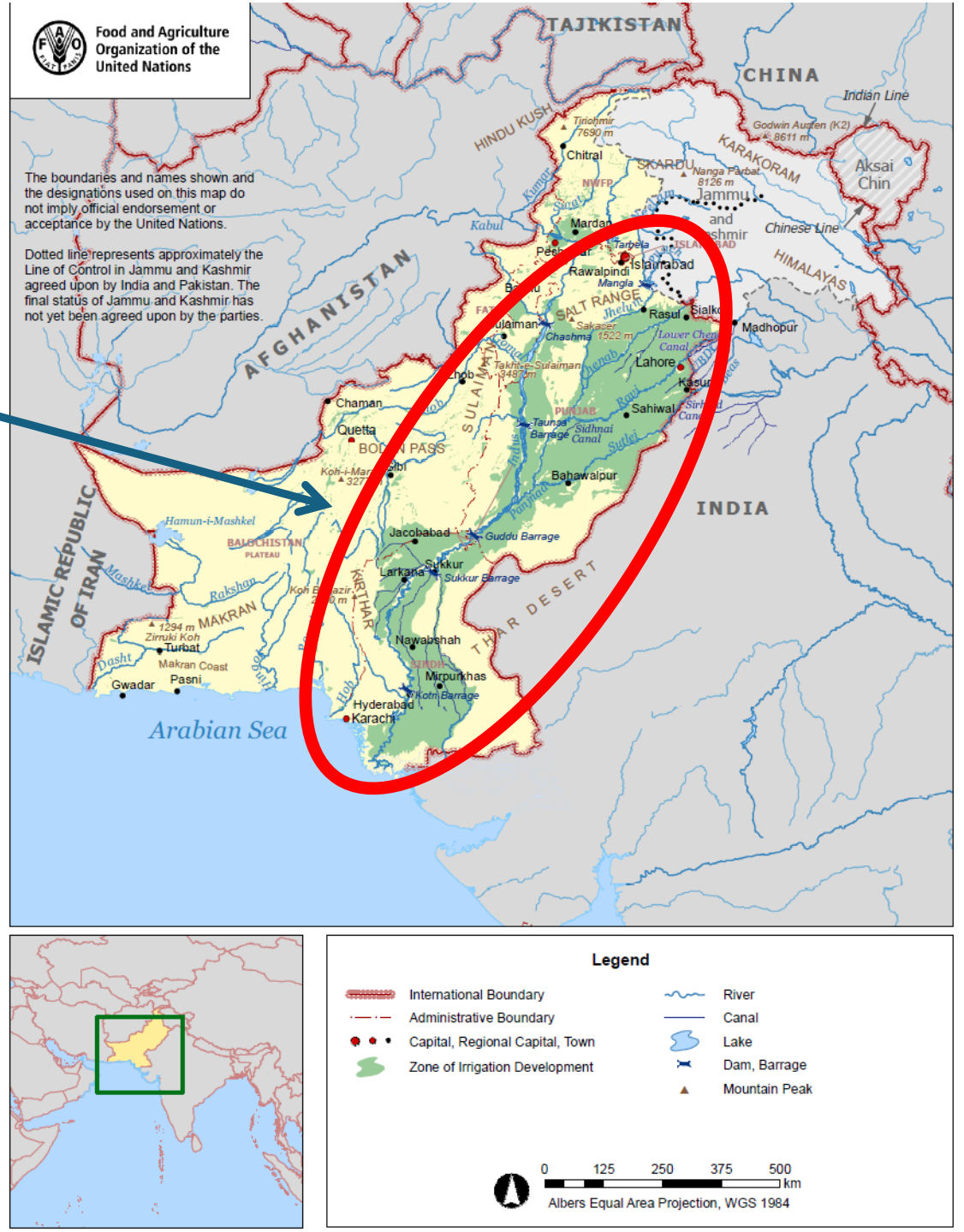
- **Pakistan is very dry and irrigation-dependent.**
- **Its farmers are especially reliant on the Indus Valley, which is the country's breadbasket**

Köppen–Geiger climate classification map for Pakistan (1980–2016)



- Arid, desert, hot (BWh)
- Arid, desert, cold (BWk)
- Arid, steppe, hot (BSh)
- Arid, steppe, cold (BSk)
- Temperate, dry summer, hot summer (Csa)
- Temperate, dry summer, warm summer (Csb)
- Temperate, dry winter, hot summer (Cwa)
- Temperate, dry winter, warm summer (Cwb)
- Temperate, no dry season, hot summer (Cfa)
- Temperate, no dry season, warm summer (Cfb)
- Cold, dry summer, hot summer (Dsa)
- Cold, dry summer, warm summer (Dsb)
- Cold, dry summer, cold summer (Dsc)
- Cold, dry winter, warm summer (Dwb)
- Cold, dry winter, cold summer (Dwc)
- Cold, no dry season, hot summer (Dfa)
- Cold, no dry season, warm summer (Dfb)
- Cold, no dry season, cold summer (Dfc)
- Polar, tundra (ET)
- Polar, frost (EF)

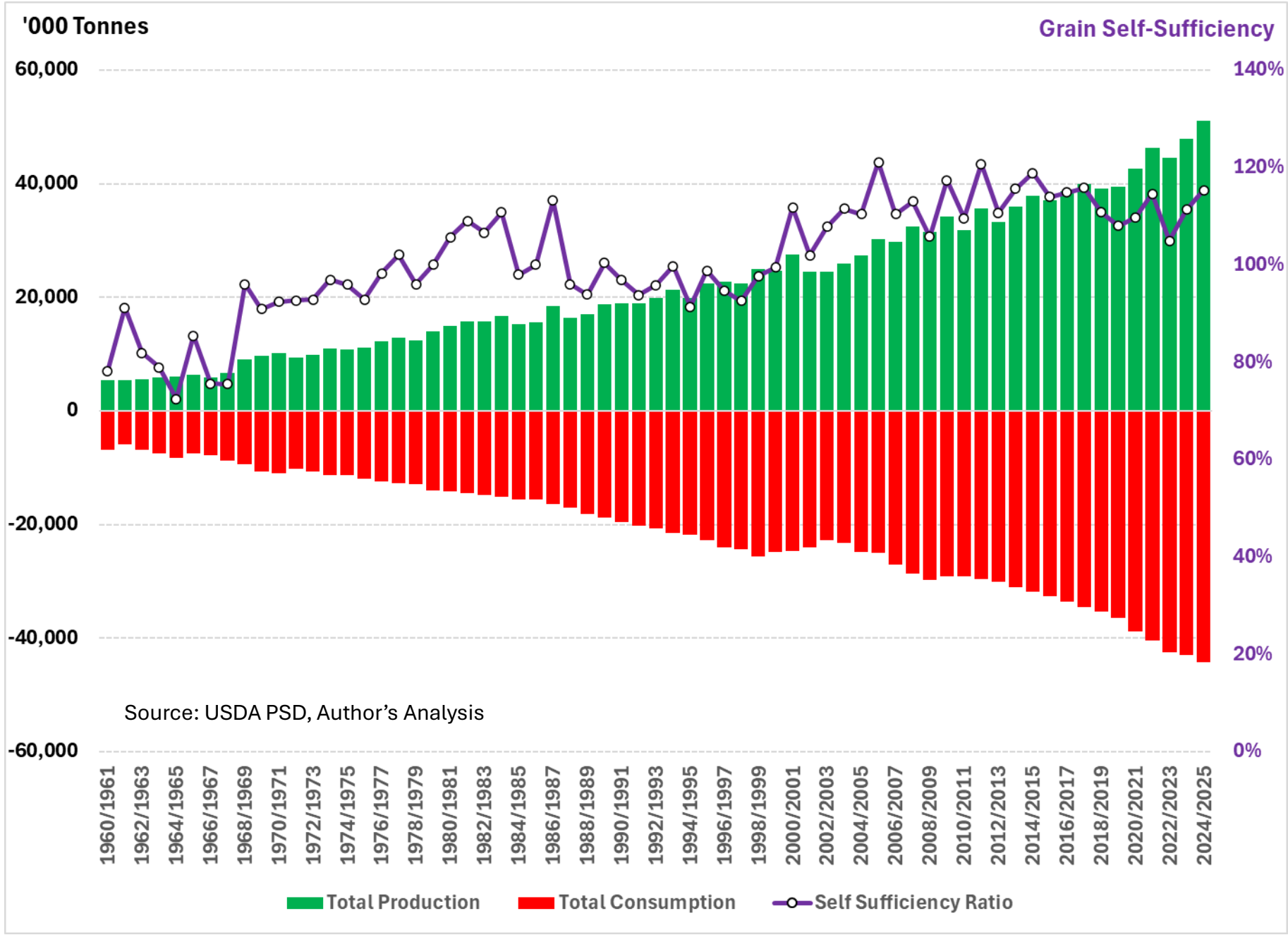
Source: Beck et al.: Present and future Köppen-Geiger climate classification maps at 1-km resolution, Scientific Data 5:180214, doi:10.1038/sdata.2018.214 (2018)



Potential Food Impacts: 2

- Pakistan has for many years sought grain self-sufficiency and even net exporter status.
- Structural curtailment of Indus River flows could change that.
- Under more dire scenarios, Pakistan could be forced to import more staple grains from global markets.
- This could strain government finances and because international food prices may be higher, could also render key foods less economically accessible to poorer Pakistanis.
- Farmers might also suffer unemployment.
- Neither of these two things bodes well for social and political stability.

Pakistan Supply & Demand of Corn, Rice, and Wheat



Source: USDA PSD, Author's Analysis

Key Sensitivities

- Rough rule is that growing a tonne of grain requires 1,600 M^3 of water.*
- This can help quantify the impact of any future water withholdings or diversions to consumptive use that would not have been permitted under the IWT.

*Source: https://waterfootprint.org/resources/Report47-WaterFootprintCrops-Vol1.pdf

Thank You!

- I welcome your feedback
- This research will continue evolving along with events
- I can be found on LinkedIn and also reached at gbc3@rice.edu

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Note: Critics are likely to offer feedback. As they do, estimates and assessments may be revised and refined.

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