

Four Questions About Water

ISSUES THAT WILL SHAPE THE 22ND CENTURY
(and beyond)



Four Challenges in Water Resources

1. Is Water a Human Right?
2. How will Water Get to Growing Urban Areas?
3. Can we Stop Destroying Surface Water Systems?
4. **Who Controls Water?**

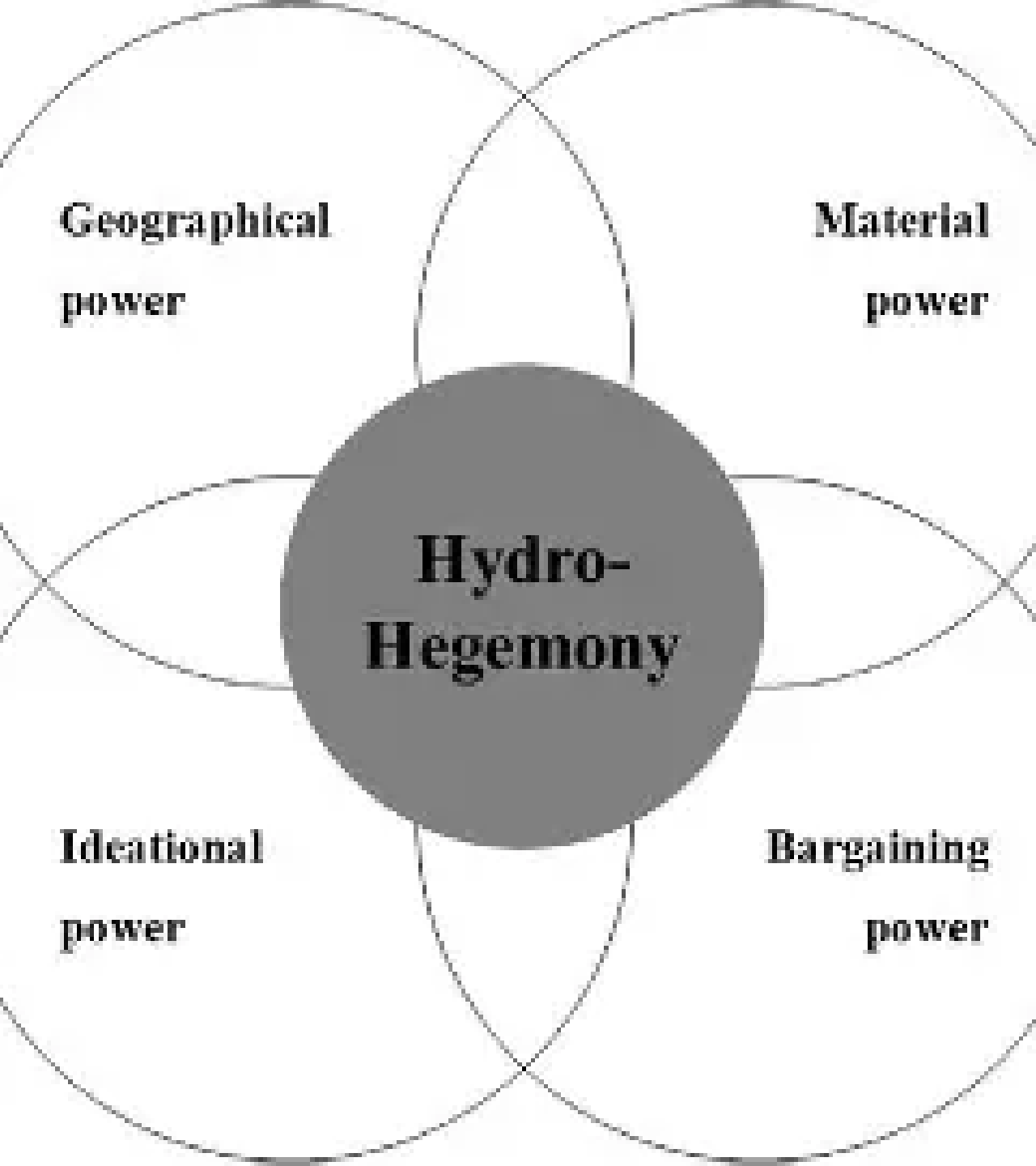
**CONTROL THE WATER AND YOU
CONTROL EVERYTHING."**

Definitions

Geopolitics: Analysis of the geographic influences on power relationships in international relations.

Weaponization: The process of transforming traditionally non-military entities or institutions into tools for gaining political, strategic, and/or military advantage.





Definitions

Hydro-diplomacy: The use of water resources in international relations.

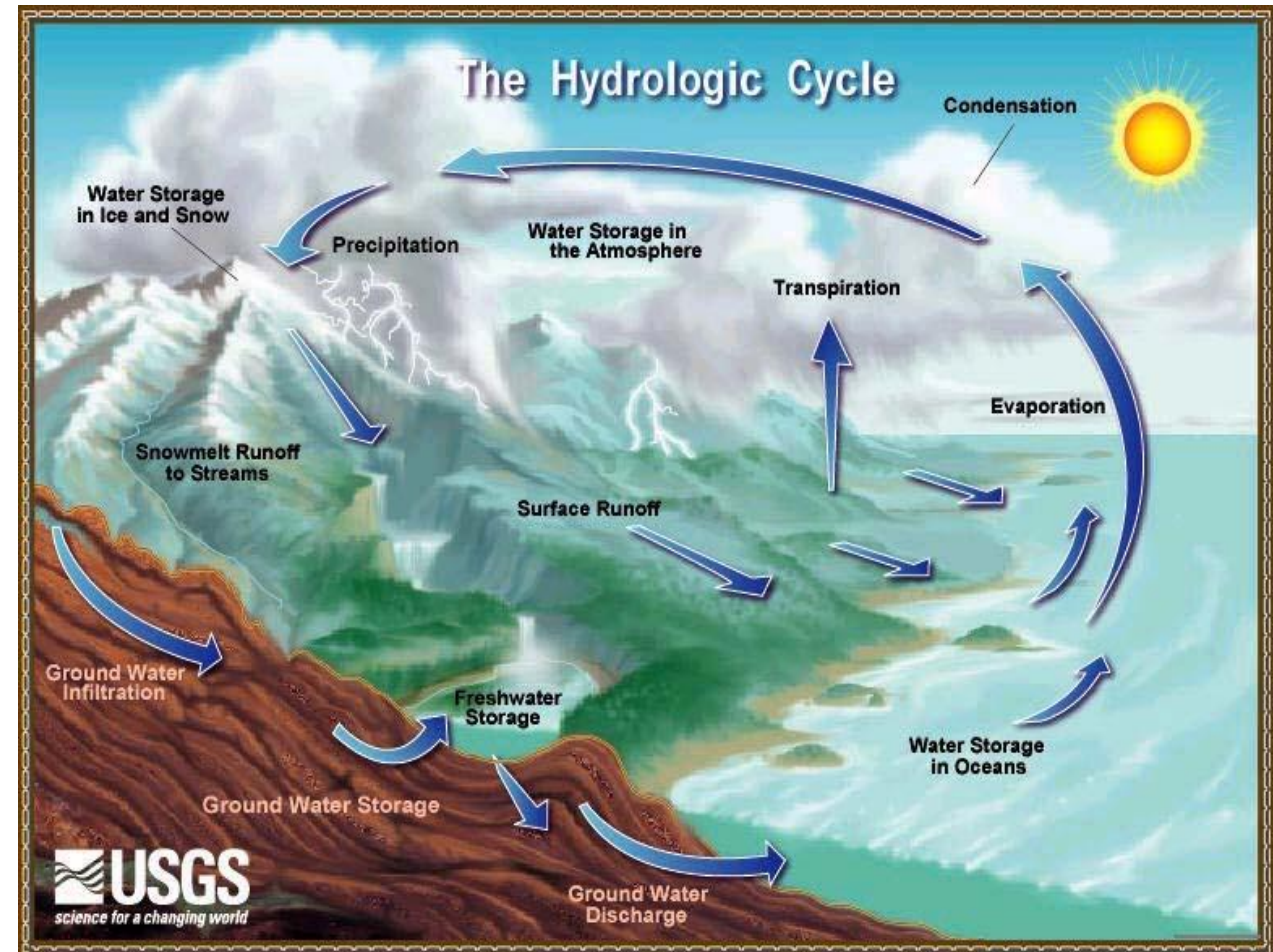
Hydro-hegemony: the power imbalance inherent within transboundary water systems where one entity exerts dominance over other beneficiaries of that system.

Water as a Source of Conflict

Water is a limited resource, although not in the same manner as oil or uranium (that is, where consumption permanently removes the resource from future consideration). Rather, consumption of water returns the resource to a larger cycle.

As such there is no “shortage” of water other than:

- A shortage of water in areas where consumption is needed (a distribution issue); or
- A shortage of clean, usable water (an engineering problem).

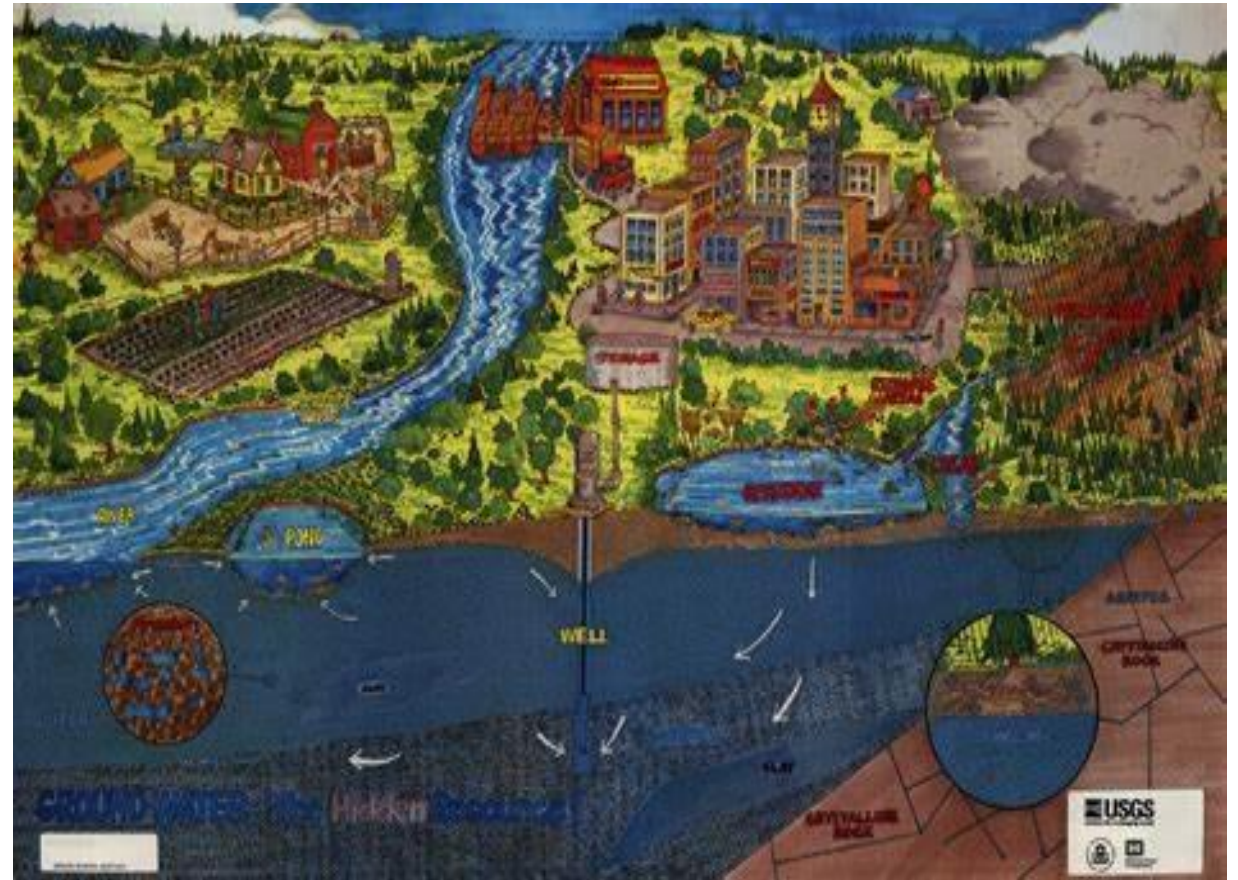


Water as a Source of Conflict

Critical future water issues will revolve around:

- Equitable distribution of potable water with particular concern for rapidly expanding urban areas
- Efficiencies in consumption of water for agricultural and industrial purposes without sacrificing water quality concerns for growing populations
- Impacts to water availability as a result of climate change

Inherent in each of these concerns is the potential for conflict as political entities attempt to impose sometimes overlapping control of this limited resource.



Water as a Source of Conflict

Conflicts over water resources and the weaponization of those resources is not a modern phenomenon. Methods of control have changed and tactics have evolved, but the struggle for water has been a constant throughout time.

That is, **water security** has, throughout recorded history (and most likely even before then), been a source of societal concern and, by extension, geopolitical conflict.

It will continue to be so in the future, with the potential for conflicts to grow as population expansions put increased pressure on finite (clean) water resources.



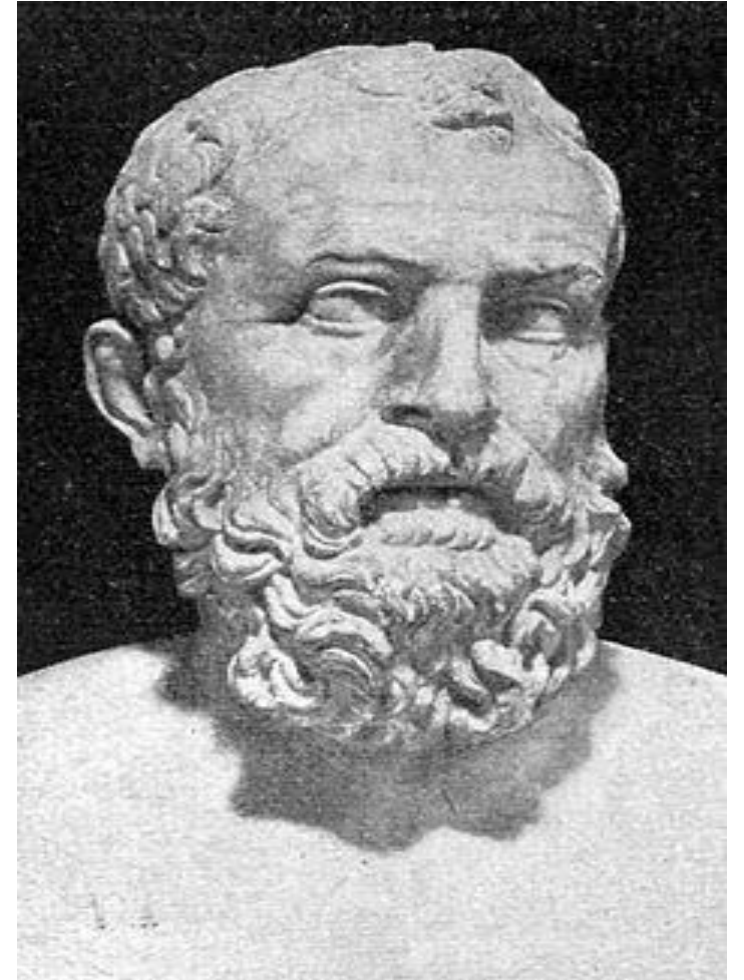
Water as a Source of Conflict

The need to resolve disputes over water is as old as civilization. The prominence of water disputes are evident in the famous "*Law Code of Hammurabi*" (ca. 1750 BCE), with four laws (of 282) pertaining to the negligence of irrigation systems and to water theft. These laws managed water distribution in Mesopotamia by controlling extractions and oversaw a fair distribution of irrigation water to avoid conflicts.



Water as a Source of Conflict

A similar dynamic existed in ancient Greece; the rights of farmers superseding the rights of other potential users. From the early 6th century Athens, the reforms of the magistrate Solon clarified that farmers had the right to secure a neighbor's water if efforts to secure other sources of water on their own property were unsuccessful.



Water as a Source of Conflict

Solon was also connected to an early example of weaponizing water. Athens besieged the City-state of Cirrha around 595 BCE and their water supply was cut off, according to Polyaeus, a writer of the 2nd century AD.

Thucydides also mentions that the Spartans resorted to poisoning the water supply of certain Athenian cities during the Peloponnesian War (circa 430 BCE).



Water as a Source of Conflict

There is ample evidence that the Roman army used water, both as an offensive and defensive weapon. Tactics detailed in Roman war textbooks (see *Strategemata*, a first century CE guide) include methods of diverting urban water supplies, polluting urban water supplies, and targeting water infrastructure.

Julius Caesar implemented these practices a century earlier in Southern France against the Gauls, writing: "*At last, the water streams were cut off, and diverted from their course, therefore the flow of the water suddenly stopped*".



Water as a Source of Conflict

It took over 500 years for the “favor” to be “returned”.

In 537AD, Goths severed the Roman Aqueduct system as a prelude to their years-long successful siege of the City of Rome. Rome would be sacked over the course of the next decades, devastating a technologically advanced water distribution system.



Water as a Source of Conflict

The practice of despoiling wells was common from the Crusades through World Wars I and II.

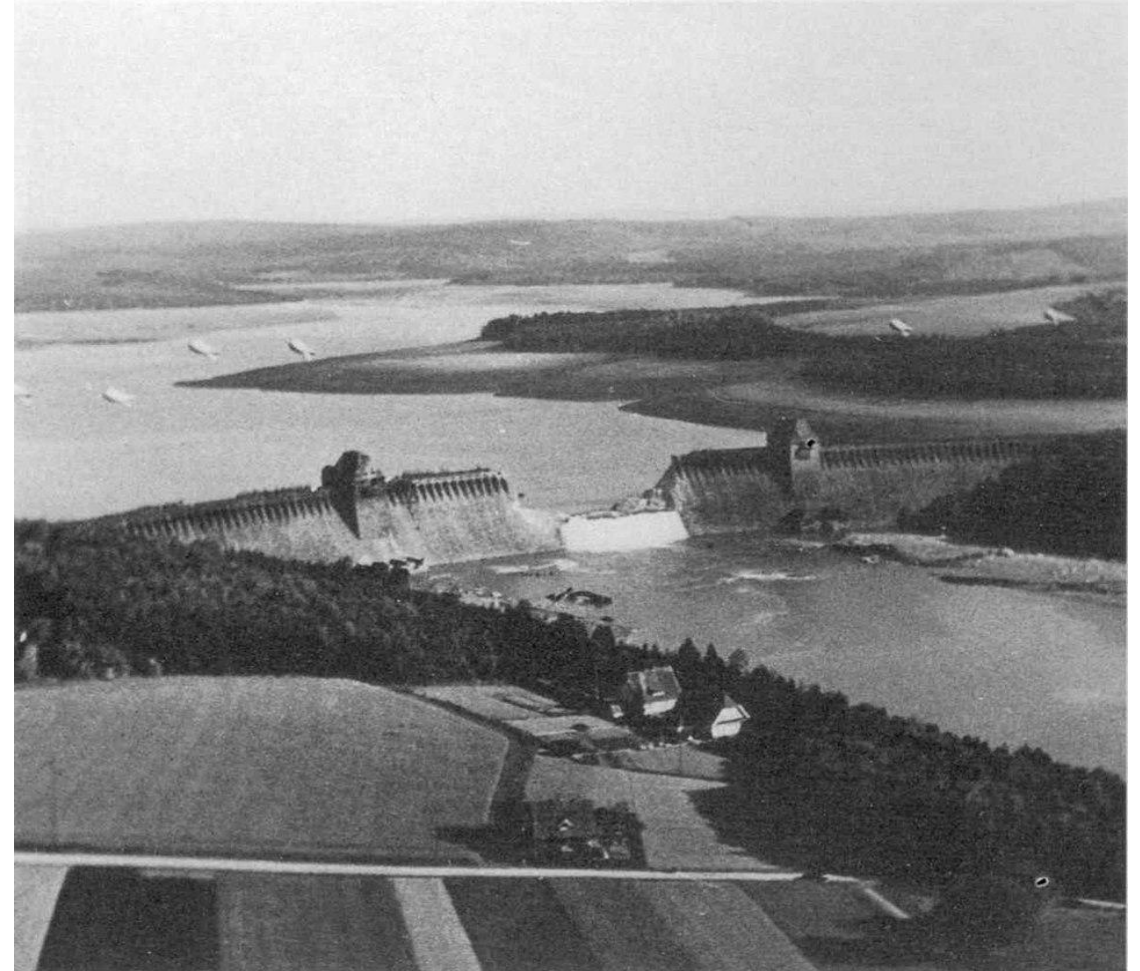
A later practice that exemplified the weaponization of water was the intentional damaging of water infrastructure. "Operation Chastise" was the name of the Allied bombing campaign in WW2 that targeted (successfully) two German dams along the Ruhr River. The result was the deaths of an estimated 1600 non-combatants.

These practices have been considered a war crime since the 1949 Geneva Convention, which stated:

"In no event shall actions against these objects be taken which may be expected to leave the civilian population with such inadequate food or water as to cause its starvation or force its movement."

The term "objects" is expanded as:

"objects indispensable to the survival of the civilian population, such as foodstuffs, agricultural areas for the production of foodstuffs, crops, livestock, drinking water installations and supplies and irrigation works..."



Water as a Source of Conflict

And yet intentional attacks on water supply systems continue:

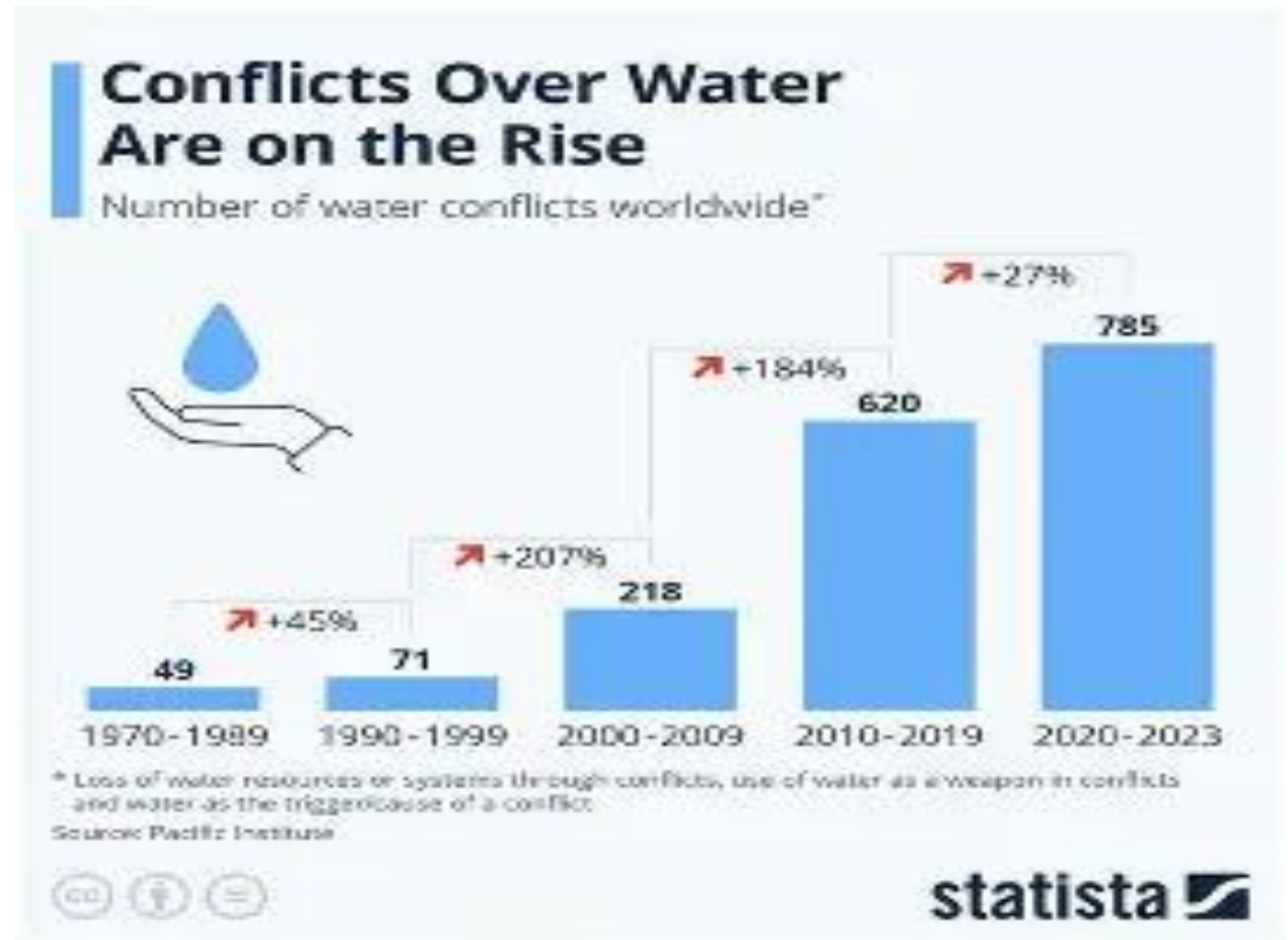
- Syria (2014 – 2017)
 - 30 deliberate water cuts in 2016 alone-- in Aleppo, Damascus, Hama, Raqqa and Dara. Pumps were destroyed and water sources contaminated in clear violation of human rights.
- Iraq (2014)
 - ISIS poisoning wells in the Singar Mountains
- Ukraine (2022/2023)
 - Russian assaults on dams and water supplies
- Iran (2026)
 - US missiles and Iranian drones damaging desalination plants



Water as a Source of Conflict

The Pacific Institute tracks water conflicts and, according to their data, the frequency of these conflicts is on the rise. In 2000, the Institute documented 22 incidents of political or military conflict over water. In 2023, that number had risen to 347.

“The fundamental value of water to life makes it an attractive target during conflict,” says Peter Gleick, a scientist and water expert at the California-based Pacific Institute, which charts water-related violence.

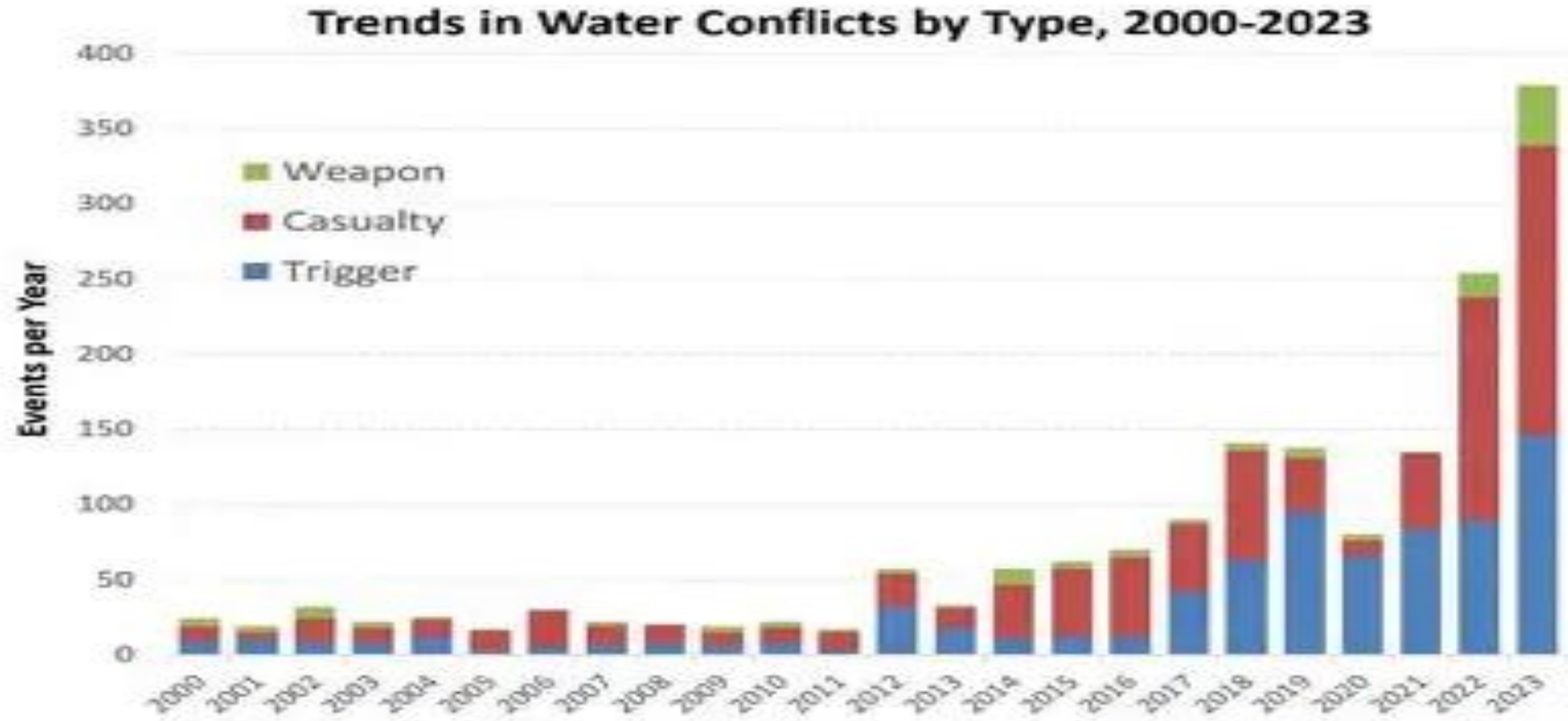


Map of Historic Water Conflicts (Pacific Institute, 2023)



2. Lagash-Umma border dispute (2500 BC)
3. Hammurabi's laws on water (1790 BC)
4. Tigris River dammed (1720-1684 BC)
5. Kishon River flooded in defeat of Sennacherib (700 BC)
6. Moses parts the Red Sea (1200 BC)
7. Assyrian king destroys Armenian irrigation network (720-700 BC)
8. Sennacherib razes Babylon (700-600 BC)
9. Hederiah stops springs in advance of Assyrian invasion (701 BC)
10. Assyrian king cuts off water of enemy (681-680 BC)
11. Assyrian king dries up enemy's wells (689-620 BC)
12. Khor River diverted by Babylonians (512 BC)
13. Nebuchadnezzar uses Euphrates River as defense (500-562 BC)
14. Assyrians poison wells of enemies (9th Century BC)
15. Athens poisons enemies' water (500-500 BC)
16. Cyrus diverts the Diyala River (559-528 BC)
17. Cyrus diverts the Euphrates (529 BC)
18. Spartans poison cisterns of Pyaeus (430 BC)
19. Alexander tears down Persian dams (335-323 BC)

Frequency of Historic Water Conflicts (Pacific Institute, 2016)



Water as a Source of Conflict

An obvious geopolitical concern is the overlap of political boundaries and fresh water sources. According to the Meelis Munt (UN Undersecretary for the Environment): “**We have 286 transboundary rivers in the world, shared by 153 countries.**” There are currently 46 parties to the Water Convention, so a large number of these countries have not yet joined the Convention.” While most of these rivers are shared by two countries, several important rivers (e.g., Nile and Mekong) are shared by multiple nations (see map of the Danube River watershed).



Water as a Source of Conflict

“Shared” rivers represent only a portion of this growing international concern. There are also 22 major “international” lakes of major size, 1000s of smaller lakes* extending across political borders, and an estimated 426 aquifers shared by two or more nations.

But more critically, more than half the world’s population depends on the water from these shared sources.

* “Major” lake is a loosely defined term. While the 4 shared Great Lakes qualify, Lake Champlain does not.



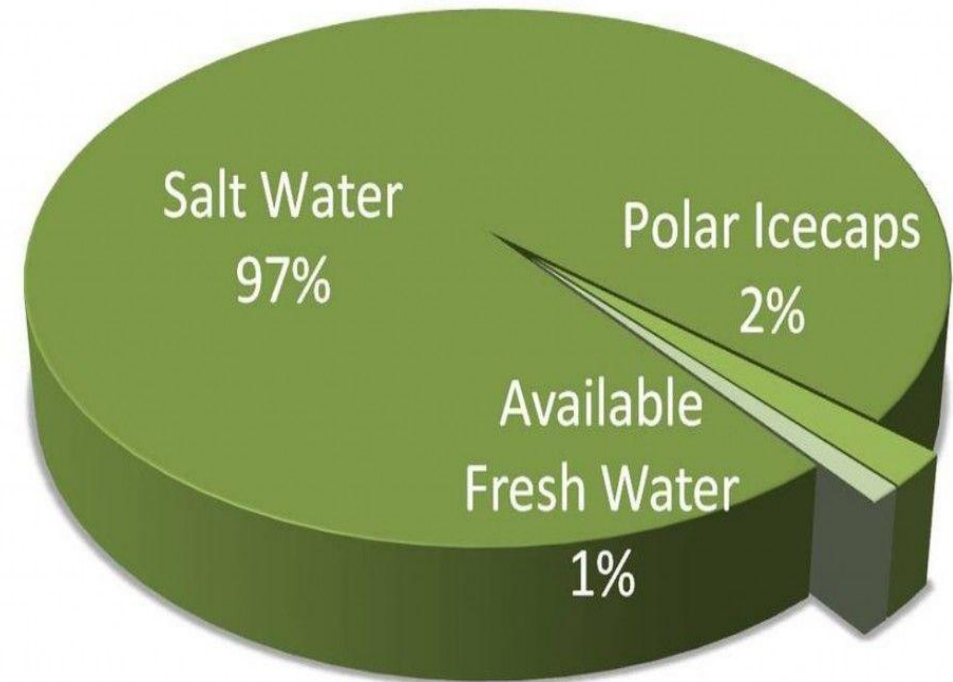
Water as a Source of Conflict

As discussed earlier, water is a limited resource (i.e., there is a finite volume of water on the planet). Of that finite volume, most water is either practically undrinkable (i.e., salt water) or practically inaccessible (e.g., polar ice caps).

Further, most societies on the planet place a positive economic value on water.

So future water conflicts will likely occur in areas where demand for this limited resource is increasing while the supply of this limited resource is either declining or static against the backdrop of price pressures.

Water on Earth



Water as a Source of Conflict

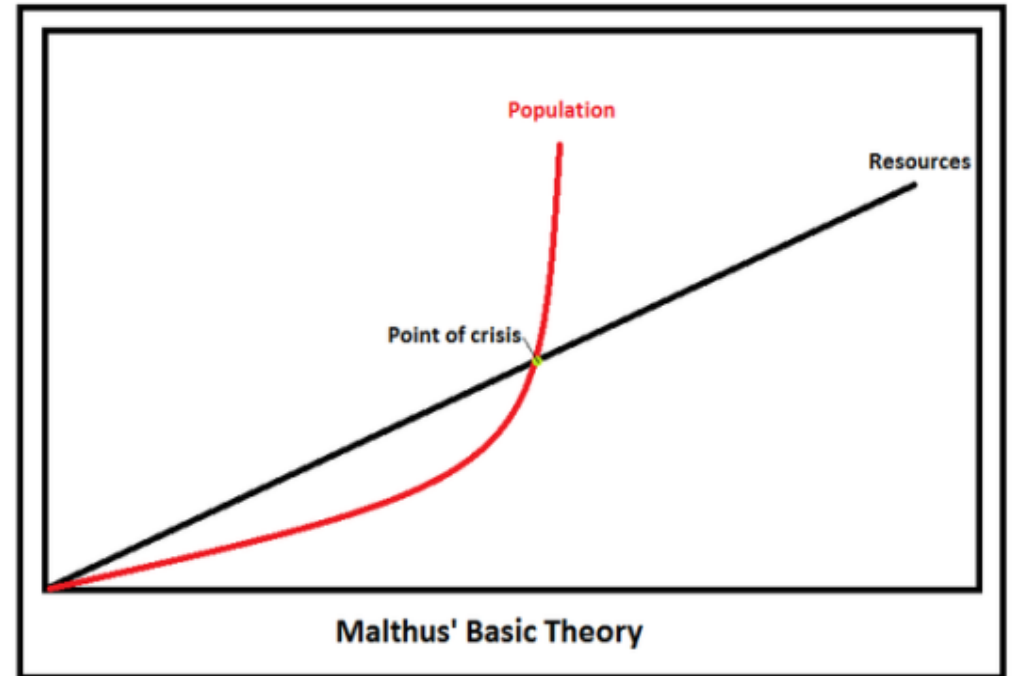
Thomas Malthus (1797) and Paul Ehrlich (1964) focused attention on the relationship between resource supplies and resource consumption in the arena of positive valuation.

Malthus put forth that exponential increases in population will outstrip more modest increases in resource supply (Malthus focused on food), with the predicted result being famines and wars over a limited resource (food).

Ehrlich tweaked this theory, adding that increases in demand for a particular resource (again, food) is a function of both population and affluence Ehrlich predicted that mass starvation was inevitable.

Neither prediction was realized, in part as a result of technological advancements and innovations.

Will water be the next resource that humans fight over?



Water as a Source of Conflict

In 2012, the US Department of State commissioned an assessment of current and predicted water security issues, with a focus on “how will water problems...impact US security interests over the next 30 years”.

The Report concluded: “Between now and 2040, fresh water availability will not keep up with demand absent more effective management of water resources.”

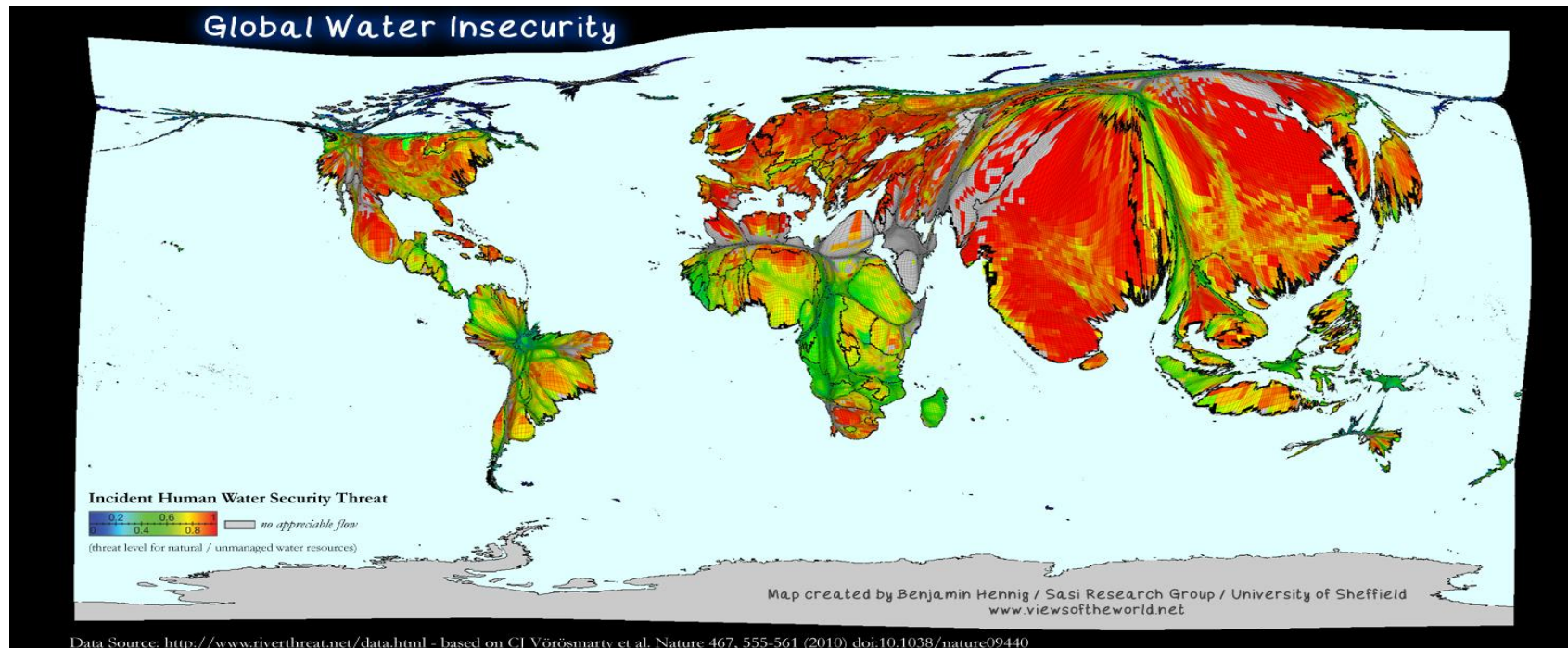
Source: Global Water Security (Intelligence Community Assessment), by the Office of the Director of National Intelligence, February 2012 (page iii)



Water as a Source of Conflict

The Report further concludes:

“The lack of adequate water will be a **destabilizing factor** in some countries because they do not have the financial resources or technical ability to solve their internal water problems. In addition, some states are further stressed by a heavy dependency on river water controlled by upstream nations with unresolved water-sharing issues.” This last point is underscored by the reality that upwards of **40% of the world’s population relies on river systems that are shared by at least 2 nations.**



Water as a Source of Conflict

The European Union conducted a similar evaluation in 2018 and concluded the following:

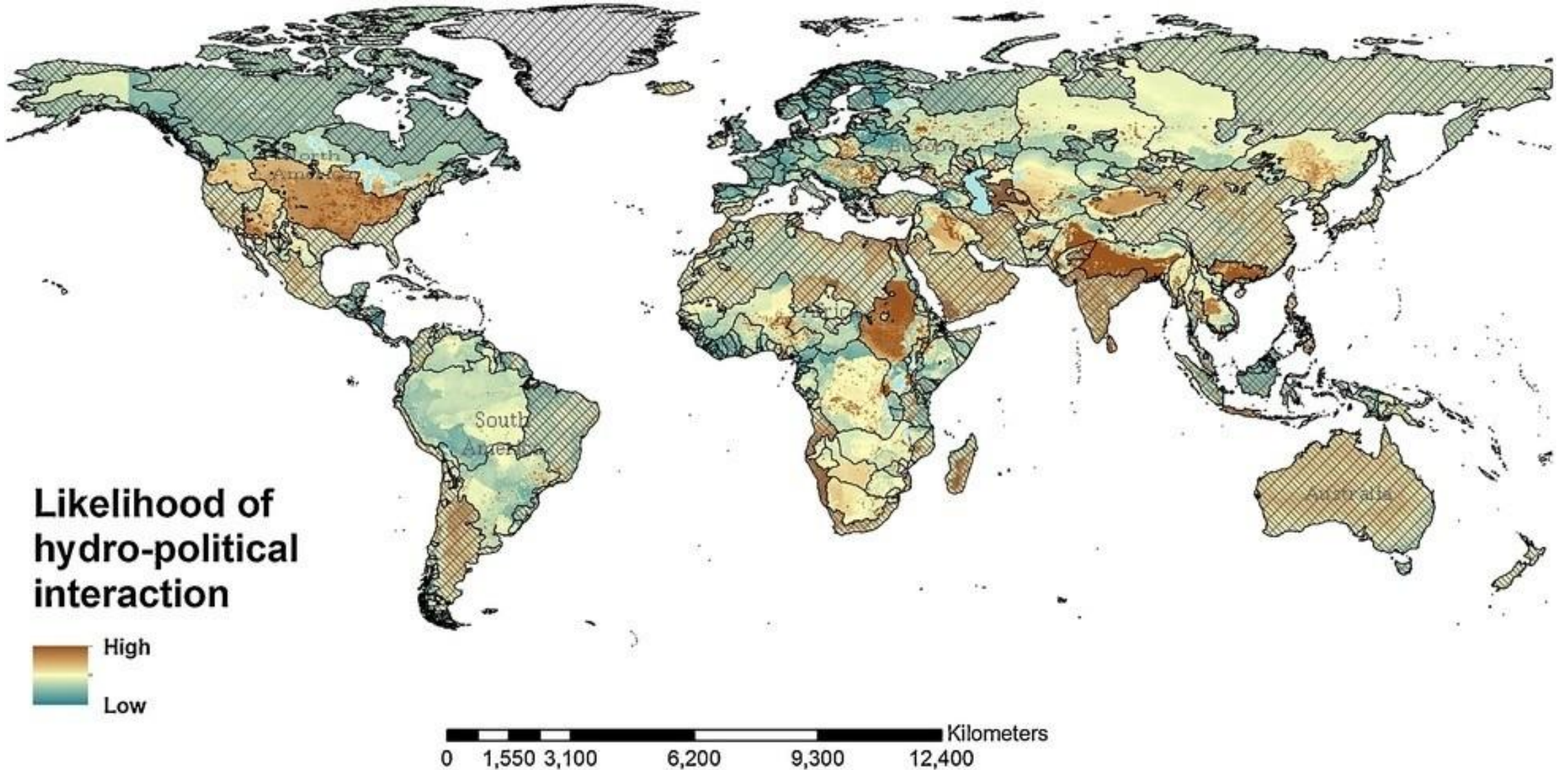
“Scarcity of water, high population density, power imbalances and climatic stressors are the main factors which **push countries towards either political cooperation or tensions** in transboundary river basins.”

The EU went on to identify areas across the globe where water will be central to political conflict.

Source: “Global Hotspots for Potential Water Disputes” (10/16/2018)

Possible Future “Hotspots” for Water Conflicts

Source: World Economic Forum (10/2018)

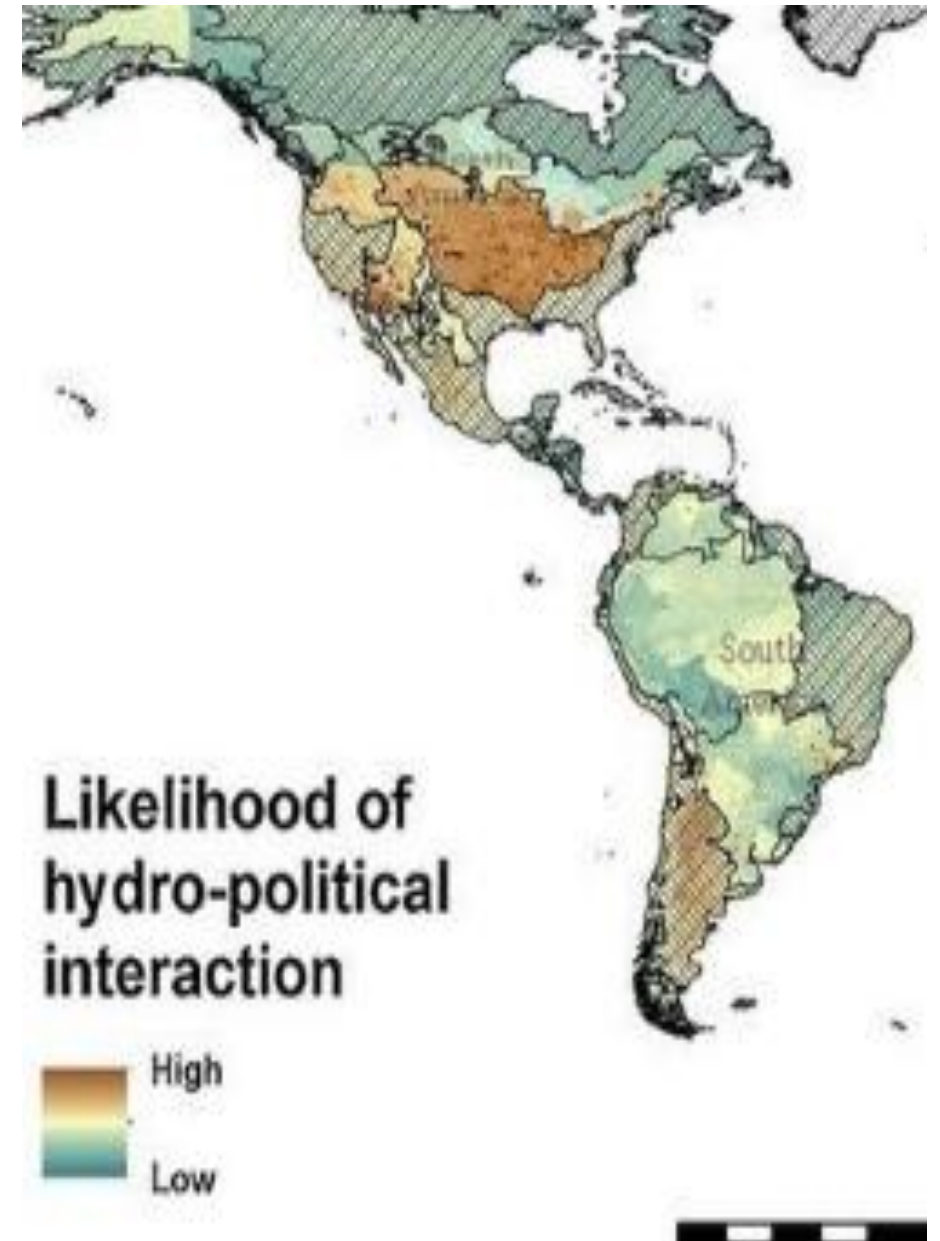


Water as a Source of Conflict

It is instructive to note the “High” potential for conflict shown in the central US. This designation represents (for the most part) the potential conflicts emanating from the loss/depletion of the Ogallala aquifer.

In places, up to 80% of known water reserves have been extracted and a recent (2006) study estimates “widespread” system depletion by 2100 “at current extraction rates”, resulting in potentially catastrophic reductions in crop production.

The conflict represented in the figure to the right is conflict between the eight states overspreading the aquifer.



Water as a Source of Conflict

Both reports have similar conclusions:

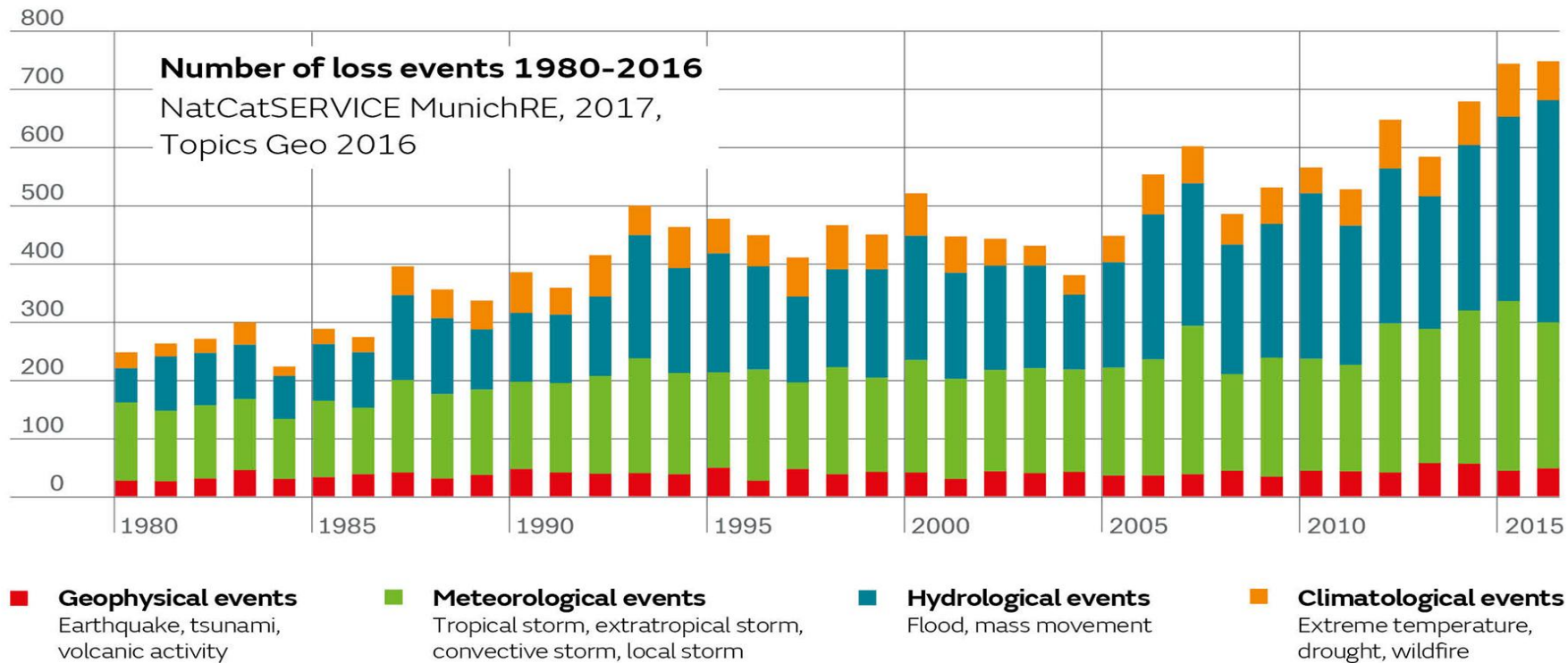
- Water as a limited resource is a source of conflict currently in limited areas of the world and those conflicts are expected to increase in frequency and in intensity in the future as populations increase;
- Political entities will strive to control, to the maximum extent possible, those sources of water that their populations depend on, even when those sources are depended upon by others; and
- Water conflicts represent sources of both conflict and opportunity.

That is, solutions can bring political entities closer through shared need.

Water as a Source of Conflict

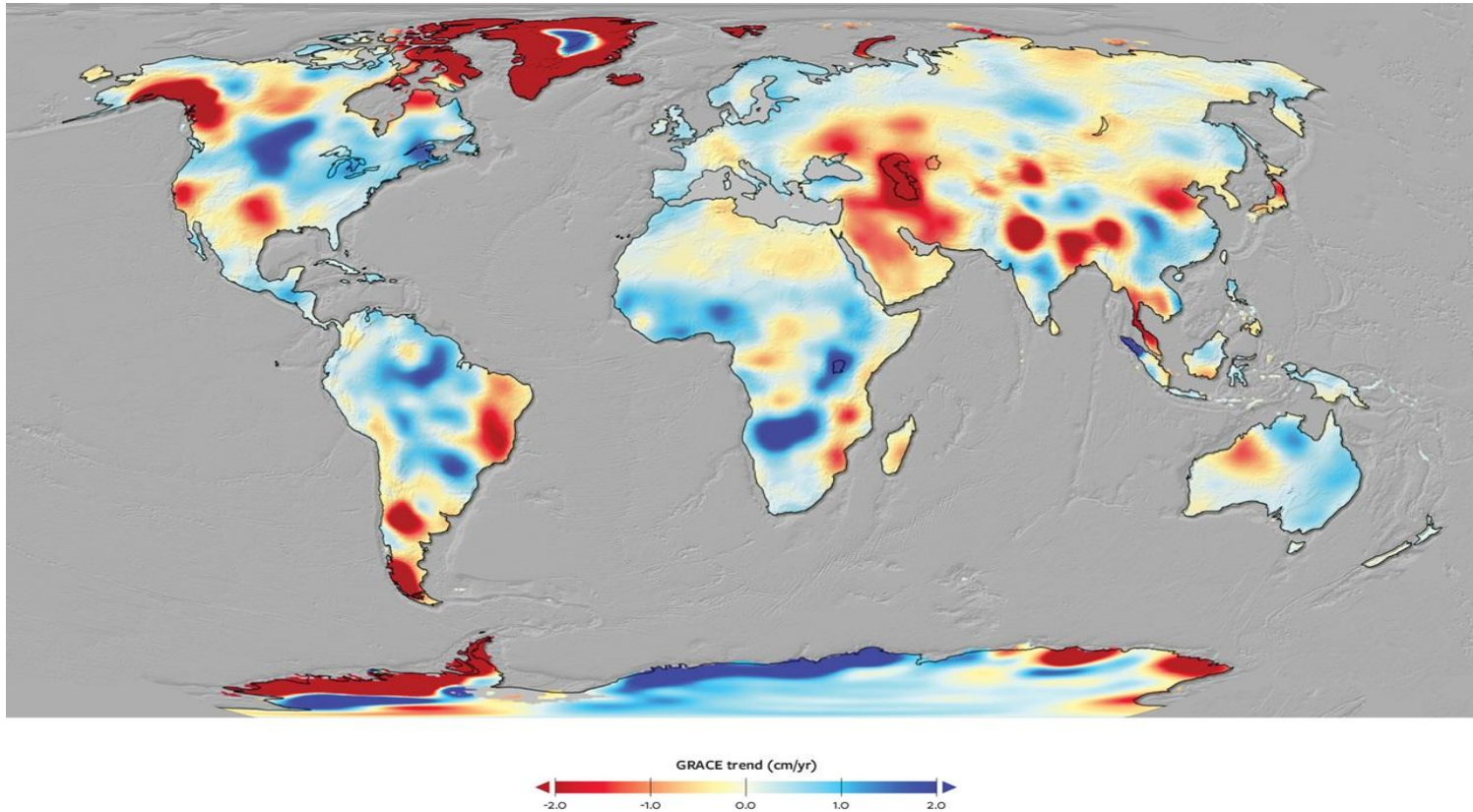
In the backdrop of this conversation is the added stress emanating from Climate Change. Data suggest that the spatial distribution of water is changing, an impact of Climate Change. That change in distribution may be a catalyst for conflict.

Are extremes becoming more frequent?



Water as a Source of Conflict

The Pew Trust analyzed data of moisture levels in the Earth's atmosphere over a 20 year period. The data indicated that the world's high-latitude regions, including the northern half of the United States, as well as the global tropics, the low latitudes, are getting wetter. Simultaneously, the mid-latitudes—the arid to semiarid belt sandwiched in between—are getting drier. This pattern of wet getting wetter, dry getting drier, has long been predicted by the IPCC.





Water as a Source of Conflict

All of which underscores the pervasive concern that water will be fought over, if not militarily at least politically, in the near future. This anticipated “weaponization” of water is likely to utilize one or more of the following strategies:

- Reduction in the quality/potability of water
- Control of water flow, either through constriction of access or delivery of excess volumes (i.e., flooding)
- Domination/manipulation of water pricing, impacting both direct consumption and agricultural water use

Water as a Source of Conflict

Two examples of the weaponization of water are instructive in both highlighting the complicated nature of the issue as well as the opportunities for solutions:

- Israel/Jordan/Syria/West Bank
- China and the Tibetan Water Tower



Israel/Jordan/Syria/West Bank

Water as a source of conflict has been particularly acute and particularly long-lasting in the Middle East. The watershed of the Jordan River stretches across Israel, Lebanon, Syria and Jordan and this watershed represents the majority of fresh water surface sources in the region*.

* Rivers can be compared in size either as relative to the land drained by that river (the "watershed") or by the flow of the river itself. On both accounts, the Jordan is tiny. The Jordan watershed is slightly larger than the Connecticut River watershed and the flow is 400 times smaller than the Mississippi.



Israel/Jordan/Syria/West Bank

Within this small corner of the world, there are longstanding animosities between the nations sharing extremely limited surface and underground water resources and climate change is exacerbating this dynamic with increasing average temperatures and decreased annual precipitation.

The region is also being stressed as a result of sharp increases in population.

Finally, there is significant disparities in national and individual wealth.



Israel Jordan Syria West Bank

The formation of the State of Israel in 1948 did not directly address the issue of water rights (earlier negotiated agreements also ignored this topic). In 1955, the US brokered an agreement (never approved) for allocating the river's flow to Israel, Jordan and Lebanon in accordance with the following formula:

- 31% to Israel
- 56% to Jordan
- 10.3% to Syria
- 2.3% to Lebanon



Israel/Jordan/Syria/West Bank

Each nation pursued competing and conflicting plans for control of the watershed. Independently, Israel siphoned water from the Sea of Gallilee (1964), Jordan dammed the Jabbok River (1952 and 1971) and Syria began to divert water in the Hulah Valley (1965).

Syria bombed Israeli pumping stations near Tiberias (1964) and Israel destroyed Syrian earthworks in the Hulah Valley (1967). The Israeli diversion projected was completed and the Syrian plans were abandoned.

These conflicts contributed to the subsequent conflict known as the Six Day War in June 1967 between Israel and its Arab neighbors (Egypt, Jordan and Syria).



Israel/Jordan/Syria/West Bank

The forgotten party in this conflict is the Palestinian State on the West Bank of the Jordan River. As a non-State actor, the population of the West Bank territory was beholden to the recognized State that controlled this area.

Prior to 1967, Jordan controlled this area and so water was provided by Jordan. Since 1967, this area has been under the control of Israel.

While the provision of water under Jordanian control could be characterized as inept, most independent observers have characterized Israeli distribution of water as inequitable and intentionally weaponized in favor of Israeli interests (both agricultural and residential).



Israel/Jordan/Syria/West Bank

Israel has demolished as many as 270 Palestinian water supply and/or treatment facilities in the West Bank since 2016 (Israeli position is that these facilities were illegally constructed). These actions have resulted in:

- Increase in water insecurity within Palestinian communities
- Increased Palestinian dependence on Israeli infrastructure
- Payment by Palestinians of water prices charged by Merkrot (Israeli national water company)



Israel/Jordan/Syria/West Bank

According to a September 1, 2025 article in the *Jerusalem Post*:

The United Nations recorded 62 incidents of Israeli settlers vandalizing water wells, pipelines, irrigation networks, and other water-related infrastructure in the West Bank in the first six months of the year.



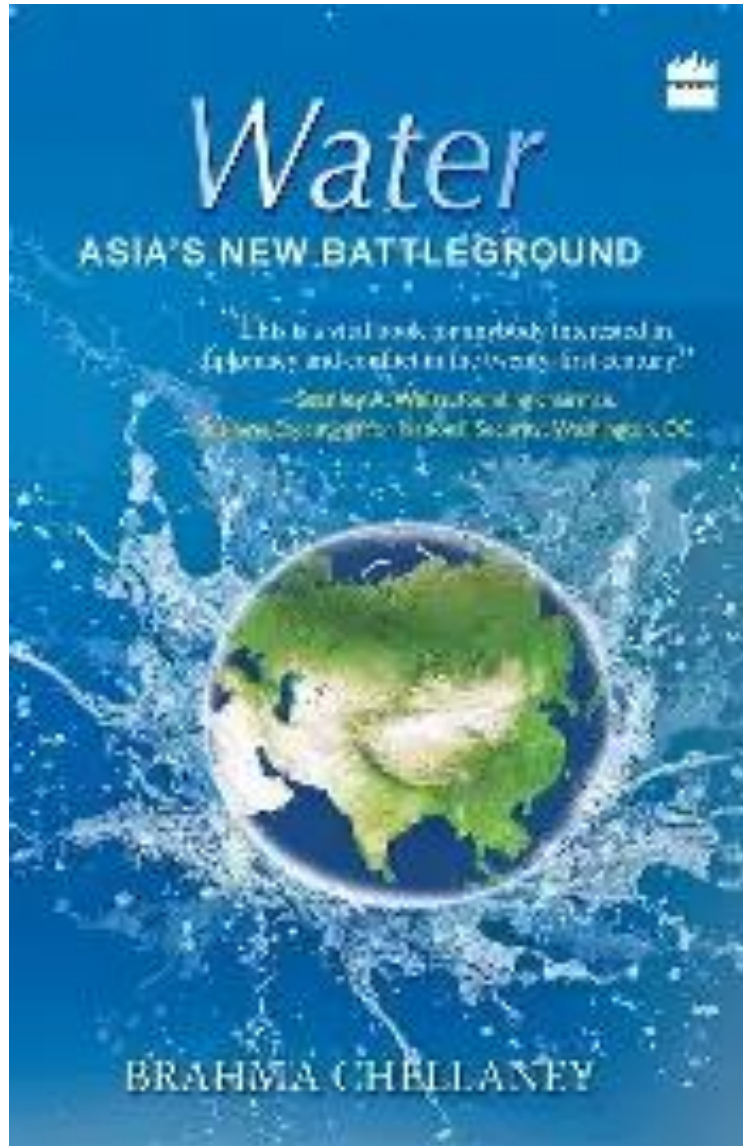
Israel/Jordan/Syria/West Bank

Water allocation is used as a means of controlling land uses.

In the West Bank, for example, the agribusiness Meshek Achiya receives roughly 274 cubic meters of water per day for their winery, date groves and olive orchards, much of which occupies disputed lands (see map).

The average Palestinian subsists on about 20 liters of water per day.





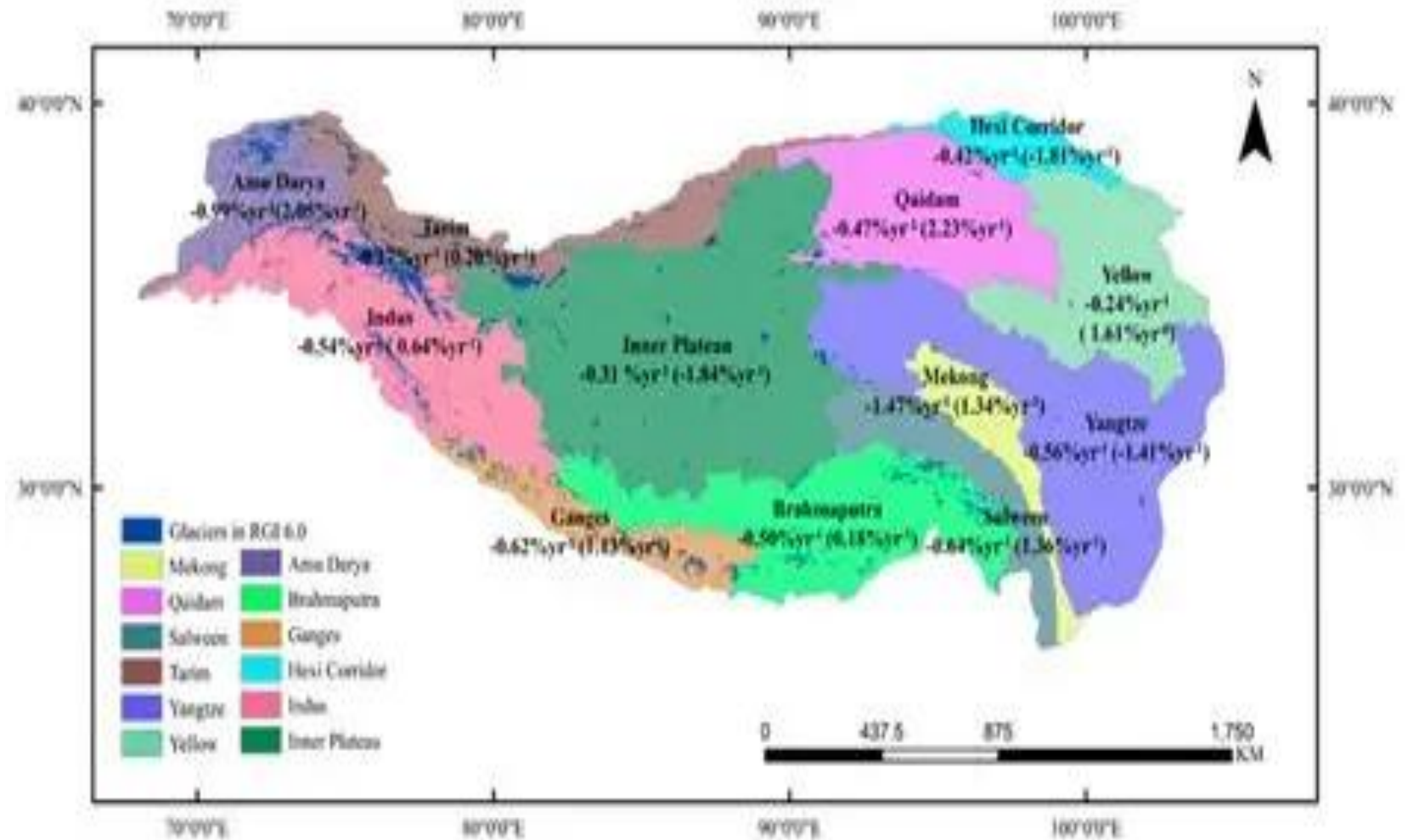
Future Weaponization: Tibetan Plateau

It is estimated that more than 700 billion cubic meters of water flow out of Tibet, Xinjiang, and Inner Mongolia to neighboring countries each year, with about 48 percent of that water flowing into India. More than 50 transboundary rivers feed into Bangladesh, constituting the second largest river basin in the world.

In his 2012 book *Water: Asia's New Battleground*, author Brahma Chellaney called China "Asia's water hegemon".

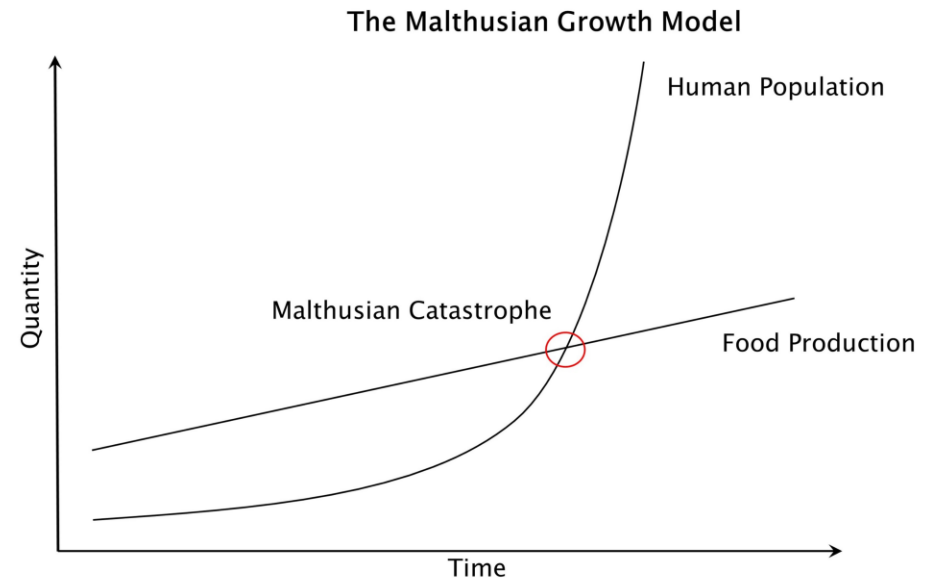
Future Weaponization: Tibetan Plateau

Climate change is impacting the amounts of water on the plateau that remains as ice, resulting in a reduction in flow consistency. Climate change is also impacting the amount and the timing of that rainfall.



Future Weaponization: Tibetan Plateau

This combination of reduced quantity, increased variability in availability, and/or increased demand (both population growth and economic development) is generating a perceived shortage of water resources.



Future Weaponization: Tibetan Plateau

In response to this perceived shortage, the Chinese government is taking actions which have the potential to create regional uncertainty and/or instability.

And China controls approximately 75% of the Tibetan plateau* so their actions reverberate throughout southeast Asia and the Indian subcontinent.

* Because of the physical distribution of glaciers, China controls less than 75% of the water. At the same time, a portion of the Mekong, Irrawaddy, and Salween River watersheds traverse Chinese territory.



Future Weaponization: Tibetan Plateau

The Mekong river is 2750 miles long, flowing from Tibet where it collects melting snow from the Himalayas in China, through Myanmar, Laos, Thailand, Cambodia, and Vietnam. The Mekong has a relatively small drainage basin (about 800,000 square kilometers) but an impressively high average flow (16,000 cubic meters per second). Almost 70 million people live in the Mekong River basin (most in the lower basin), with the vast majority of these people living within 15 kilometers of the shore.



Future Weaponization: Tibetan Plateau

Because of its impressive flow and dramatic elevation change from source to mouth (over 15,000 feet), the Mekong contains significant potential energy.

Its importance to local economies and the wealth extracted from its waters by riparian communities is why this river is called “River of Gold”.



Future Weaponization: Tibetan Plateau

The Mekong Committee was established in 1957 by the UN, shortly after Vietnam, Laos and Cambodia became independent. The US government supported this organization both monetarily and technically. This Committee was a strong advocate for damming the river, recommending up to 17 large-scale construction projects (mostly dams) along the River.

Only one major project was completed by the Committee, the Nam Ngum River (tributary to the Mekong) dam in Laos in 1971.



Future Weaponization: Tibetan Plateau

China has built (as of 2022) 11 dams on the Mekong River. With these dams, China has the capability of withholding as much as 43 million cubic feet of water to down-system countries.

Laos has two operational dams with 7 more planned but all of these structures (and the power they could generate) are subject to flow originating in China.

Cambodia is constructing two dams.

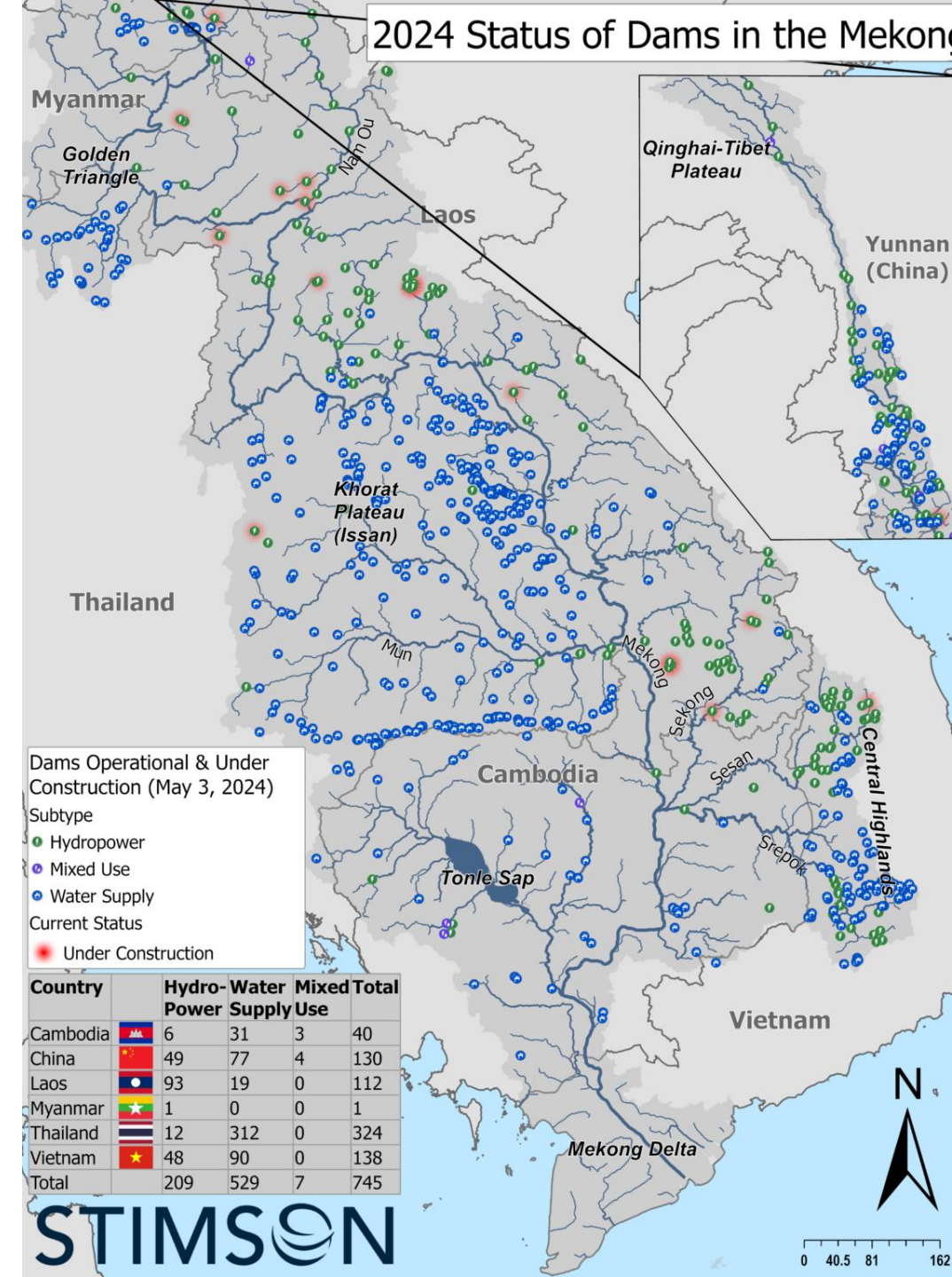
Dams are not impoundments, delaying the movement of water. Dams represent reductions in flow, both through controlled withdrawals and as a result of increased infiltration.



Future Weaponization: Tibetan Plateau

China is now:

- Impounding water that had, in the past, flowed freely to downstream communities;
- Removing water for industrial and agricultural purposes, resulting in downstream flows that threaten fish stocks and therefore community livelihoods.
- Forcing other nations to act in similar manners, hoarding water in their own impoundments, further complicating the regional problem.



Future Weaponization: Tibetan Plateau

In 2015, China established the Lancang-Mekong Cooperation, a body that helps govern the shared use of the Mekong, with membership including Cambodia, Laos, Myanmar, Vietnam, and Thailand. While this organization was formed under the guise of cooperation, it is actually a tool for China to force out U.S. institutions in the region, leaving Southeast Asian states without a choice in partnership and limiting America's actions in the region. Without western institutions in the region, China's regional hegemony becomes more secure, and exerting pressure on its small southern neighbors becomes much more effective. This is because it is harder for western-oriented nations such as the U.S. and Japan to insert themselves into regional affairs without the necessary institutional infrastructure currently being whittled away by China.



Future Weaponization: Tibetan Plateau

According to a 2024 report by the Stockholm Resilience Centre, “the Mekong’s reduced flows are not just a hydrological problem; they are a symptom of a broader global crisis of resource governance and security.”

The World Bank estimates that the economic losses due to reduced river flows could reach \$4.5 billion annually by 2030. But these losses are realized by downstream nations, while China secures financial gain as a result of their control of the river’s flow.

Mekong River delta in Vietnam



Solutions

Establish rights to water bodies including glaciers and aquifers

- Recognize the importance of waterways and water sources
- Assert that such entities are alive, have a right to existence, and a right to protection
- Identify Guardians empowered with the ability to manage use of the water

Prioritize the global protection of critical water supplies

- Identify and accurately map critical watersheds, glaciers, and aquifers (2025 was the first year when all cross-boundary aquifers were mapped).
- Establish and properly fund research organizations empowered with the task of measuring changes within these systems, including changes as a result of changes in climate.

Expand international treaties and agreements

- Promote successful transboundary agreements (e.g., the Indus, brokered in 1960 between India and Pakistan) as models

Solutions

Promote strategies that protect water distribution systems

- Modernize managing entities to effectively neutralize Cyberattacks

Establish “north-south” transfers of funds and technology

- US (mostly, but not exclusively) maintains sophisticated innovations with respect to efficient water use and distribution
- Disseminate predictive model data regarding climate change to forewarn nations of impending changes that might trigger instabilities.

Conclusions

Water, an element so fundamental to life on this planet, is increasingly becoming a tool of manipulation, geopolitical influence, and conflict.

As population grows and demands for water increase, the need for new approaches to anticipate and then diffuse potential conflicts also increases.

Cooperative efforts have, in the past, demonstrated impactful results.

Progress is being made but significant obstacles exist.