ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

CIS
Center for Comparative and International Studies
IED
Institute for Environmental Decisions

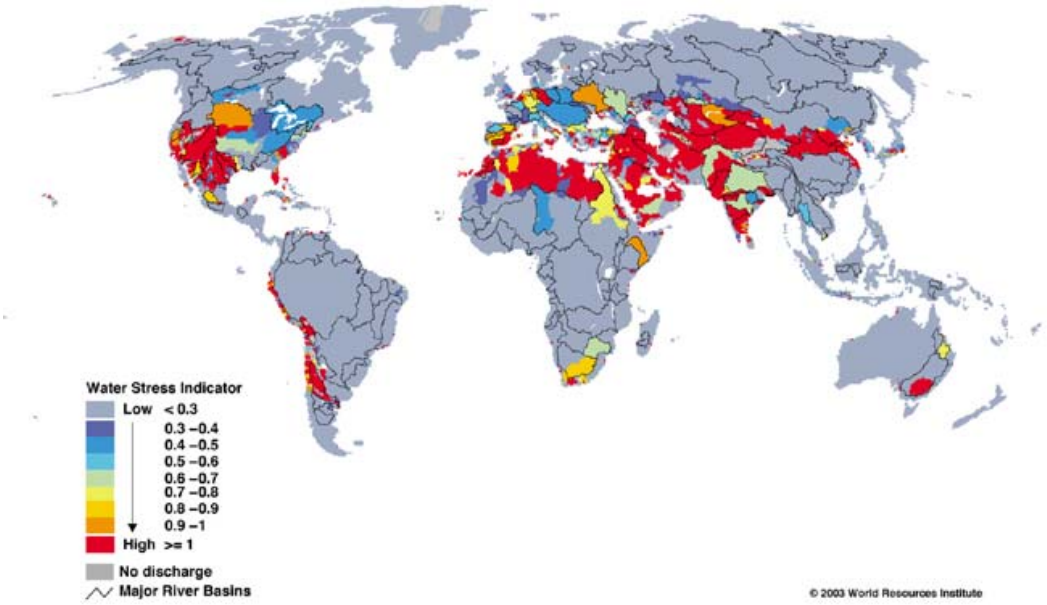
Prof. Dr. Thomas Bernauer

International Water Conflicts

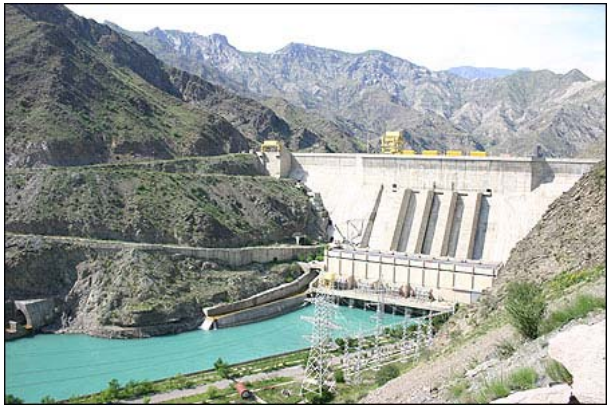
Arguments and Evidence

Zambezi River at the border between Zambia and Zimbabwe in southern Africa

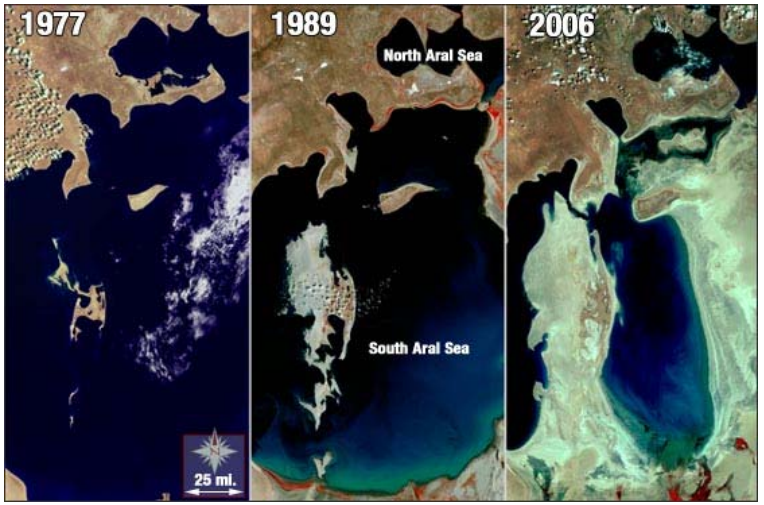
The Usual Assumptions...



Hughes Butts 1997: “History is replete with examples of violent conflict over water, from competition for desert oases and water holes to the battles between the Mesopotamian cities of Lagash and Umma in 4500 B.C., to the fighting between Syria and Israel over Syria's attempts to appropriate the headwaters of the Jordan River in the 1960s.”



Toktogul



Content

- Popular but questionable claims about water conflict and water wars
- Do water-related problems increase the probability of armed conflict, controlling for other influences?
- Evidence from event-data analysis
- What else do we want to know?

Popular Claims

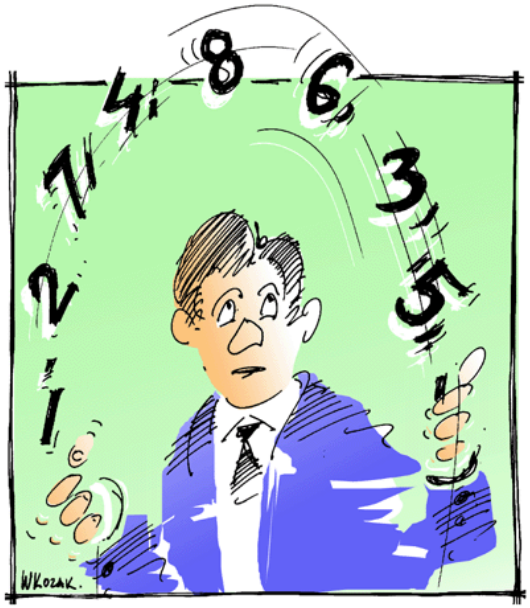
- Most examples of water-induced conflict in the socalled neomalthusian literature are anecdotal
- Studies by Falkenmark, Gleick and others illuminate mechanisms that may lead to conflict and map potential locations. They offer no proof that water-sharing has in fact produced an escalation from conflicts to war. Gleick lists many historical examples of disputes / conflicts over freshwater resources. In most cases, water appears as an element in, but not a major cause of the conflict.

Popular Claims

- Wolf notes that no actual or potential problem with water scarcity motivated a country to go to war. Wolf and Hamner identify only four events in the International Crisis Behavior dataset and three other events where water may have been a partial or sufficient cause of armed conflict. In three of these seven crises, no shot was fired. Two other cases, an attack on the Israeli national water carrier and the subsequent Israeli air attack on a Syrian dam (under construction) happened two years before the 1967 war began. They cannot be defined as the beginning of that war. The remaining two conflicts were not sufficiently violent to qualify as wars.

From Case-Studies Based Evidence to Statistical Studies

- Dominance of qualitative case studies until turn of the century (see Bernauer, Aquatic Sciences, 2002)
- Several large-N studies since the late 1990s



Water-Induced Violent Conflict

Table 1
Hypothesized directional effects for independent variables

Independent variable	Dependent variable		
	Militarized conflict	Peaceful settlement attempt	End river claim
Water scarcity	+	+	−
Water demands Hensel et al. 2006	+	+	−
River institutions	−	+	+
General institutions	−	+	+
Joint democracy	−	+	+
Salience	+	−	−
Capability asymmetry	+	−	−
Recent militarized conflict	+	+	−
Failed settlement attempts	+	+	−

Hensel et al. 2006

Water-Induced Violent Conflict

- Hensel et. al.: water scarcity increases likelihood of militarized conflict and peaceful third party settlement attempts. River-specific institutions reduce militarized conflict and increase effectiveness of peaceful settlement attempts. Joint democracy encourages peaceful management efforts, salience and capability advantages for the challenger discourage them.

Water-Induced Violent Conflict

- Hensel and Brochmann: Greater levels of water scarcity and greater demands on water increase risk of both claim onset and militarization. River treaties have mixed effects on claim onset but significantly reduce militarization. Democracies are better able to avoid river claims, while claim militarization is much more likely over cross-border rivers and over claims that are more salient to the riparian states; navigation claims seem to be particularly prone to lead to militarized conflict.

Water-Induced Violent Conflict

- Gleditsch et al. 2006: Shared rivers increase risk of conflict in a dyad. Effect of scarcity is rather ambiguous. Number of rivers crossing border and percentage of basin upstream are irrelevant. Shared river basins increase risk of conflict more for middle-income countries than for low-income countries.
- Furlong et al. 2006: river-sharing dyad in which at least one member suffers from water scarcity has 41% higher risk of experiencing outbreak of militarized dispute with at least one fatality. Such disputes are low-probability events. Most countries sharing rivers manage without conflict, even when one of them suffers from water scarcity.

Water-Induced Violent Conflict

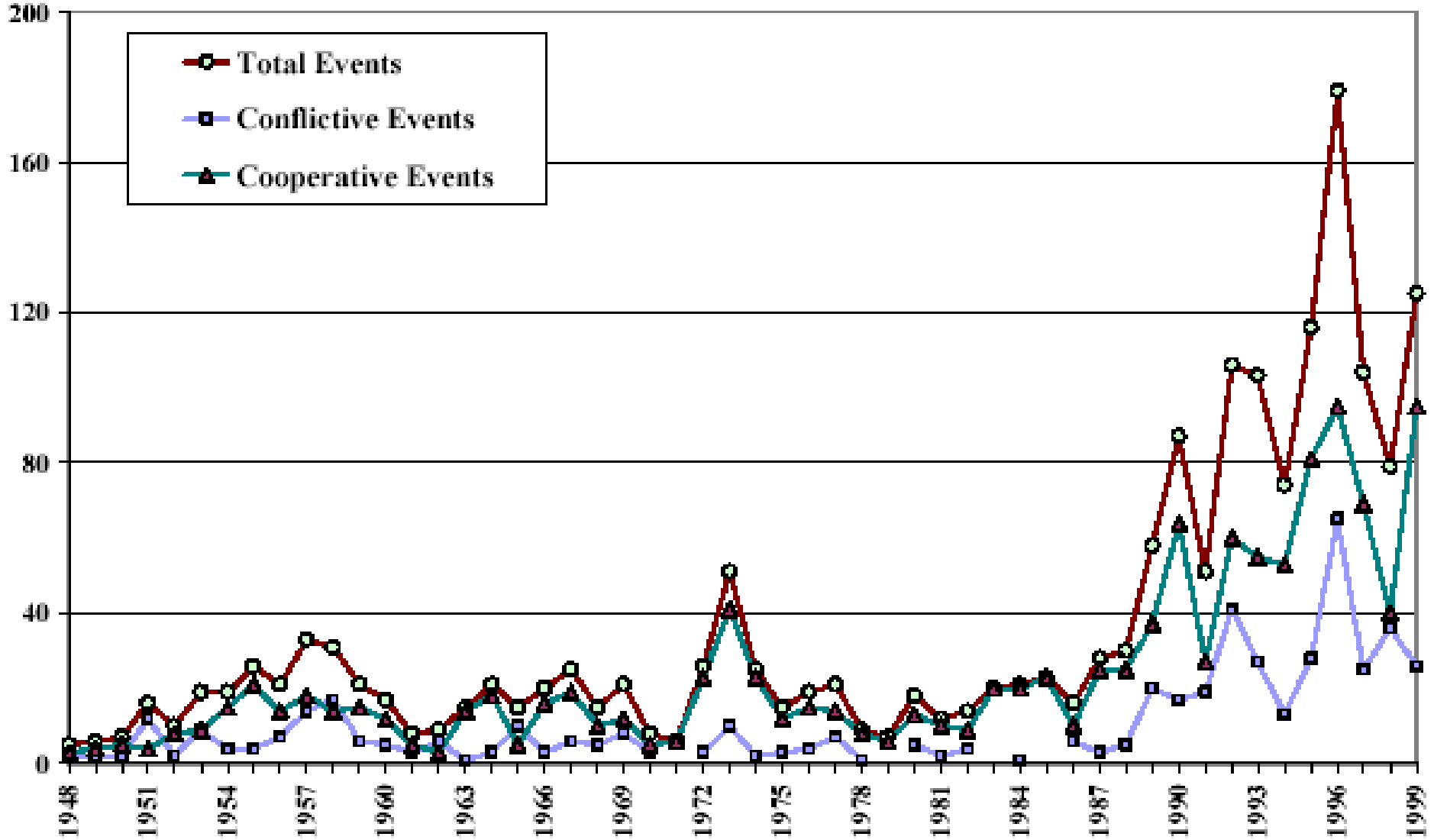
- Toset et al. 2000: Joint river increases probability of militarized disputes and armed conflict over and above mere contiguity, but effect is much smaller than the effect of contiguity itself. Water scarcity is also associated with conflict, and the upstream/ downstream relationship appears to be the form of shared river most frequently associated with conflict. But these results are not very strong.

Event Data Analysis

- What are event data? How does this data differ from data on militarized disputes?
- Wolf et al. TWDD dataset: reported events of either conflict or cooperation between nations over water resources during the last 50 years
- Moving from inductive research on river basins at risk to studies that explain conflict and cooperation



Event Data (Wolf et al.)

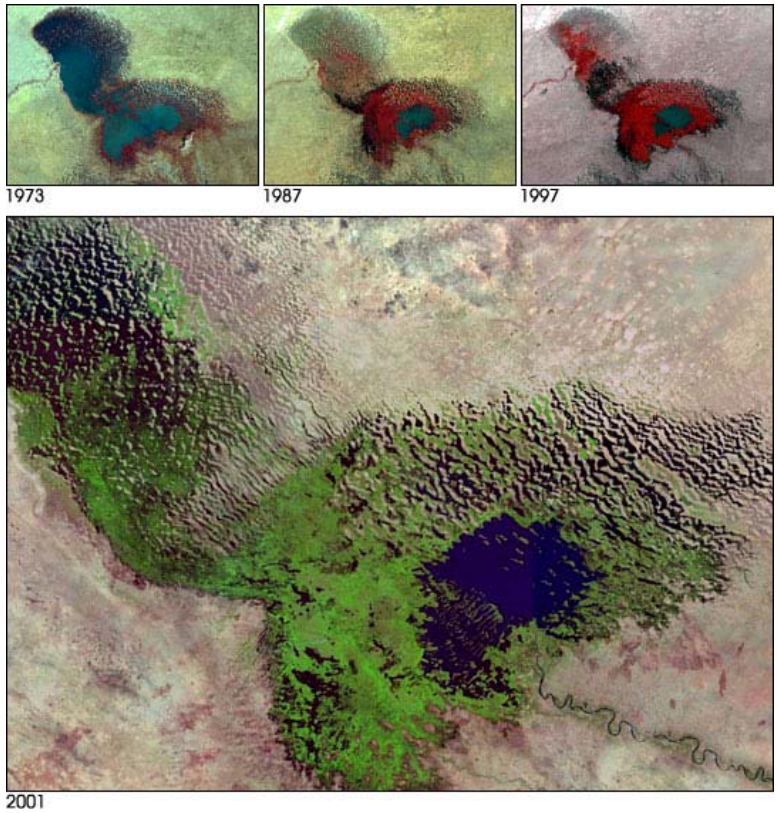


Basins at Risk (Wolf et al. 2003)

- River basins at greatest risk of political stress in the near future (5–10 years)
- Established by ex-post analysis, focusing on which variables produce more conflict (identified by event data): institutional capacity; quality of international relations; rapid institutional or physical system changes (e.g., internationalization of river basins, unilateral development projects)

Basins at Risk (Wolf et al. 2003)

- Ganges–Brahmaputra
- Han
- Incomati
- Kunene
- Kura-Araks
- Lake Chad
- La Plata
- Lempa
- Limpopo
- Mekong
- Ob (Ertis)
- Okavango
- Orange
- Salween
- Senegal
- Tumen
- Zambezi



Lake Chad

Basins at Risk (Wolf et al. 2003)

- no events on the extremes (violent conflict or total cooperation)
- most interactions are cooperative
- most interactions are mild
- water acts as an irritant (water resources can make good relations bad and bad relations worse)
- the major water-related issues are quantity and infrastructure
- countries cooperate over a wide variety of issues
- likelihood and intensity of dispute rises when rate of change wihin a basin exceeds institutional capacity to absorb change

Basins at Risk (Yoffe et al. 2003)

- high population density (>100 people/sq km)
- low per capita GDP (< $765/person – 1998 World Bank lowest income country definition)
- overall unfriendly relations (BAR Scale < -1.0)
- politically active minority groups that might lead to internationalization
- proposed large dams or other water development projects and
- limited or no freshwater treaties (1121)
- The majority of basins at risk are in southern Asia and central and southern Africa

Recent Studies Using Event Data

- Brochmann and Gleditsch: Conflictive as well as cooperative events tend to stimulate treaties and treaties in turn contribute to water cooperation. But treaties do not seem to inhibit future water conflict events. Dyads sharing a river basin cooperate more than other dyads in terms of joint IGO memberships and trade. Results are only partly robust to controlling for scarcity, region, and regime type.
- Ongoing work at ETH Zurich

What Else Do We Want to Know?

- Does statistical analysis focusing on armed conflict really provide the right answers? Can we say that war was water-induced if other determinants of war are controlled?
- Event data measures water-related conflict / cooperation more directly, but scope and quality of data is a problem
- Conflict dynamics at particular scales are poorly understood

Why Are There No Water Wars?

- Conflict is more likely if physical or political setting undergoes a large or rapid change (e.g., dam, irrigation, territorial realignment).
- Conflict is more likely if existing institutions are unable to absorb and effectively manage change.
- Water scarcity and conflict motivate the development of institutional capacity, and the latter mitigates conflict.

Conflict Dynamics at Different Scales

Table 5–2. Conflict Dynamics on Different Spatial Levels

Geographic Scale	Characteristics
International	Disputes can arise between riparian countries on transboundary waters
	Very little violence, but existing tensions between parties are pervasive and difficult to overcome, resulting in degraded political relations, inefficient water management, and ecosystem neglect
	Long, rich record of conflict resolution and development of resilient institutions
National	Disputes can arise between subnational political units, including provinces, ethnic or religious groups, or economic sectors
	Higher potential for violence than at international level
	Rationale for international involvement is more difficult, given national sovereignty concerns
Local (indirect)	Loss of water-based livelihoods (due to loss of irrigation water or freshwater ecosystems) can lead to politically destabilizing migrations to cities or neighboring countries
	Local instability can destabilize regions
	Poverty alleviation is implicitly tied to ameliorating security concerns

(Wolf 2005)

National - International Linkages

- Wolf 1998: “while water wars may be a myth, the connection between water and political stability certainly is not. The lack of a clean freshwater supply clearly does lead to instability which, in turn, can create an environment more conducive to political or even military conflict”

National - International Linkages

- Giordano 2002: “water-related events at the national level are related to both water and nonwater events at the international scale. The nature of these relationships and the extent to which they are present, however, appear to vary considerably by country and region. This result highlights not only the intricacies of hydro-political dynamics and their variation across geographic space, but also the need to consider the often distinct historical and political conditions within a region or basin if water relations are to be well understood”