Climate change and conflict
Exploring the relationship between water stress and conflicts in India

Background

In September of 2016 **violent riots erupted in the state of Karnataka, India**. In the city of **Bangalore**, this violence led to the imposition of an emergency law and the closure of offices and public transport system. The reason behind these violent events was a ruling by the Supreme Court, that ordered Karnataka to share water from the **Cauvery river** with the state of Tamil Nadu, located downstream the river; all of this in the context of a drought in the region.

The Washington Post presented this situation as a "glimpse into the future", a warning sign about **how the consequences of climate change** (like the increased competition for water resources) **can trigger violence and conflicts**. This argument is based on a study by Hsiang, Burke and Miguel (2013), that looked at 60 studies on climate change and conflict and found **"strong causal evidence"** in favor of a link between climate events and human conflict across the world: for each standard deviation in change in climate from normal temperatures or towards extreme rainfall or drought, the frequency of interpersonal violence rose 4 percent and intergroup conflict rose 14 percent.

Other scholars, like Salehyan (2008), criticize this **"deterministic" view of climate change and its consequences having a direct impact on political violence**, and argue that by doing so, research is ignoring "human agency, ingenuity, the potential for technological innovation, and the vital role of political institutions in managing conflict (or failing to do so)" (Salehyan, 2008, p. 317). Additionally, this approach ignores the role that governments play in managing and distributing resources, and allows decision makers to shift blame for civil wars and violent conflicts.

Hypothesis and Research Objective

The hypothesis implied by the WP's article regarding the conflict in Bangalore is

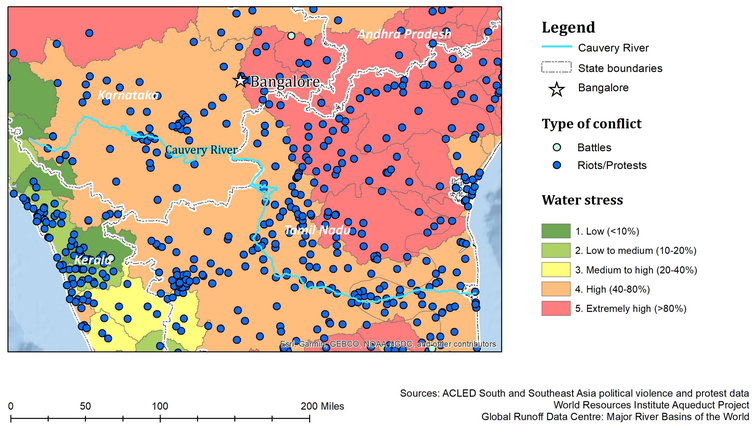
Water stress (+) → Conflict (+)

The counterargument, in the line of Salehyan (2008), would expect to find no clear relationship between the two variables.

The objective of this analysis is to **explore the relationship between water stress and conflict for the case of India,** and provide some insights over the two arguments debated in the background section.

Figure 1

Conflicts and water stress - Bangalore and Cauvery River Basin



Sources: ACLED South and Southeast Asia political violence and protest data
World Resources Institute Aqueduct Project
Global Runoff Data Centre: Major River Basins of the World

Data Sources

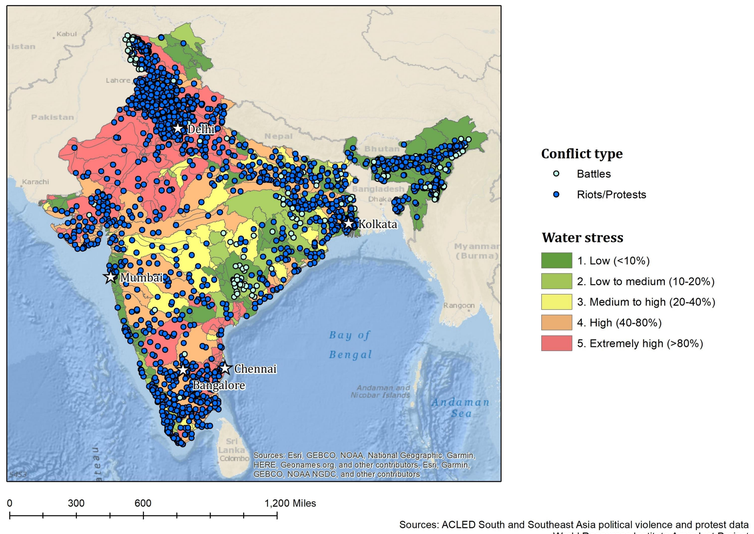
Water stress: WRI Aqueduct Global Dataset
Indicator: Baseline Water Stress. It measures total annual water withdrawals (municipal, industrial, and agricultural) expressed as a percent of the total annual available flow for 2010. Higher values indicate more competition among users.

Conflicts: ACLED Political Violence and Protest Data
Geospatial conflict data between 2010 and 2018 for ten countries in South and Southeast Asia. It classifies conflicts by type; for this analysis two types were included: battles and riots/protests.

River basins: Global Runoff Data Centre – Major River Basins of the World

Figure 2

Water stress and conflicts in India (2016)



Sources: ACLED South and Southeast Asia political violence and protest data
World Resources Institute Aqueduct Project

Methodology

Figure 1 and 2 depict water stress levels and conflict events; the first one for the Cauvery River basin and the second one for the entire country.
Figure 3 presents a **correlation analysis** between the levels of water stress and number of conflicts for each basin in India between 2010 and 2018.
Finally, Figure 4 presents a **hotspot analysis** conducted over a point-to-polygon spatial joint, analyzing the number of conflicts in each basin. The contrast with the adjacent water stress map allows for comparison between hotspots and water stressed areas.

Figure 3

Scatter Plot - Water stress and Conflict in India (2010-2018)

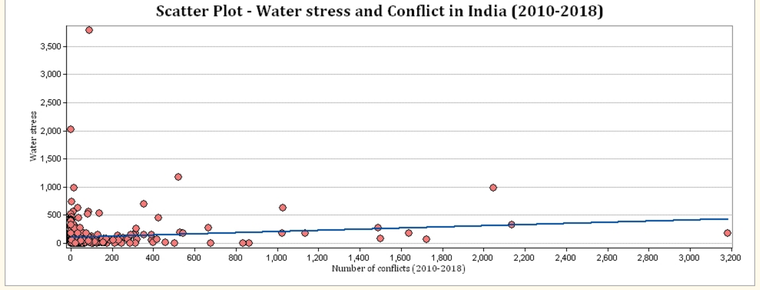
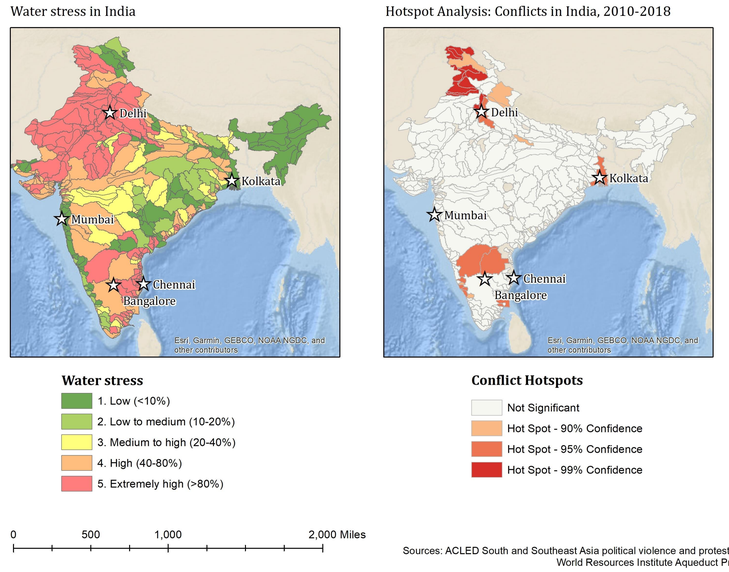


Figure 4

Water stress and conflict hotspots
India, 2010-2018



Sources: ACLED South and Southeast Asia political violence and protest data
World Resources Institute Aqueduct Project

Findings

While the case of Bangalore seems to be evidence of the climate change and conflict link, one case alone is not enough to provide a causal link. As seen in Figure 1, while the area of Bangalore is in fact water stressed and has several conflicts, the western region has low water stress levels and more conflicts. Figure 2 zooms out to the entire country and shows a similar situation: there is no clear relationship at first sight, and there are in fact areas with extremely high water stress in Northwest India that have less conflicts than more water-abundant areas like Mumbai and Kolkata.

Figure 3 shows that there is a positive correlation between number of conflicts and water stress, but the slope is very flat and there are several outliers that contradict the first hypothesis discussed.

Finally, the hotspot analysis seems to provide more evidence in favor of the water stress is linked to conflict hypothesis: most hotspots coincide with water stressed regions of India, with the exception of the area of West Bengal and Kolkata. However, is relevant to note that the hotspot in northern India is actually in the region of Kashmir, affected for decades by a territorial dispute between India, Pakistan and China; and hence the large number of conflicts in the area is likely to be associated with this political issue, and not necessarily with its water stress levels.

Research and policy implications

In line with the climate change and conflict literature to this date, **the relationship between water stress and conflict remains unclear.** Further research should incorporate other social and political variables, like adaptation policies and political regime, as they may be intervening in the way water stress affects population and hence may trigger violence. The relationship between resources and violence is complex and cannot be understood in a deterministic way.

Recognize the ambiguity of this linkage is fundamental when defining policy priorities. The securitization of climate change may lead to focus resources on military preparedness, when they could be more productive if they were used in policies to enhance adaptive capacities in response to climate change impacts.

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