Ending Wars Over Water: To What Extent Can AI Be Used To Predict And Prevent Transboundary Water Conflicts?

Akhila Potluru - London School of Economics and Political Sciences

ABSTRACT

This research aims to determine the extent to which AI can be used to predict and prevent transboundary water conflicts. This will be done via a review of case studies where AI was deployed to predict conflict 'hotspots'. Not only does this advance our understanding of the factors and patterns that lead to water conflicts, but by detecting conflict early, governance bodies can engage in processes to de-escalate water conflicts.

BACKGROUND

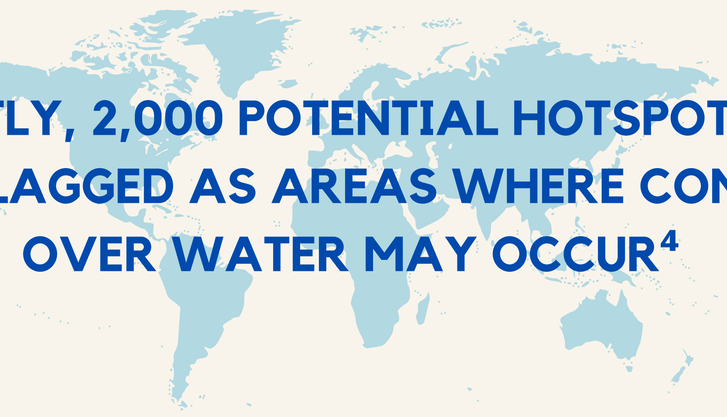
Worldwide, more than 250 lake and river basins are transboundary, meaning they cross the political boundaries of multiple countries.[1] For example, the Indus River is a vital water source for northern India and Pakistan, but originates in the mountains of Tibet which are controlled by China.[2] This creates an intense system of hydrological, economic, and social interdependence between communities reliant on these water sources which can result in transboundary water conflicts.[1] An observable increase in global water conflicts is shown in the table below.[3]

Global Water Conflicts, 1900–2007

Time Period in Which Conflict Began	No. Conflicts	Average No./Year	No. Violent Conflicts and Conflicts in the Context of Violence
1900–1959	22	0.37	At least 19
1960–1989	38	1.27	At least 23
1990–2007	83	4.61	At least 61

CAUSES OF TRANSBOUNDARY WATER CONFLICT

HYDROLOGICAL	HYDRO-POLITICAL
Rainfall, freshwater availability, topography, soil moisture, evapotranspiration etc	Vulnerability in terms of socio-economic and political developments etc



CURRENTLY, 2,000 POTENTIAL HOTSPOTS HAVE BEEN FLAGGED AS AREAS WHERE CONFLICT OVER WATER MAY OCCUR[4]

Previous attempts to predict conflicts by analysing contributing factors have typically failed because data patterns are hard to identify. But, there is potential for AI to identify future 'hotspots' up to a year in advance by identifying patterns in data where humans can't. [4]

USING AI TO PREDICT TRANSBOUNDARY WATER CONFLICTS

Through the classification and clustering of large water datasets (hydrological information collected from satellites along with hydro-political insights from governments/research organisations) using semi-supervised and unsupervised machine learning techniques the Water, Peace and Security partnership (WPS) has developed a prediction tool.[4] The tool has had a significant test run in Mali whilst using historical data from 2018. In this instance, more than 75% of water-related conflicts in Mali's Inner Niger Delta were predicted, including some that were escalating at the time.[5] Ultimately, AI detected patterns in Mali's historical data that human researchers weren't able to.

DISCUSSION OF RESULTS

Policymakers and stakeholders can implement strategies that encourage cooperation before disagreements over water begin to occur. This may look like engaging in a dialogue process that mitigates or resolve issues in the early stages.[5] A common method of de-escalating these types of agreements is water-sharing agreements. More than 3,600 such treaties related to shared water resources have been drawn up since 805 AD.[6] Our understanding of transboundary water conflicts is also significantly improved when hydro informatics is used. Hydroinformatics can give us a more holistic overview and fuller picture of what is happening with water security in areas where due to political/security/environmental concerns it is difficult to have staff physically on the ground. Moreover, the tool can be used alongside other analytical tools to zoom in on a certain region and figure out the factors driving/causes of water insecurity in a specific area. This gives rise to significant policy implications. By detecting conflict early, we can engage in processes to mitigate or resolve them by directing targeted help to where it is needed most. But it is important to remember that as impressive as the WPS's tool is, it still leaves a few gaps in the discourse that links water scarcity and political security with conflict instability.[7] "It isn't simply a case of conflicts increasing every time a water security incident occurs. Several regional and cultural factors also play a part, making prediction difficult." - Susanne Schmeier, a senior lecturer in water law and diplomacy at the IHE Delft Institute for Water Education.[7]

CONCLUSION

Although by no means is it a definitive guide to where water conflict will occur, the conflict prediction tool serves us well as a policy prioritisation tool. By this I mean that we are already faced with a large number of conflict hotspots that are already beginning to damage communities, the tool should be used to help refine policy responses and tackle the regions that are in need of imminent help, as opposed to attempting to de-escalate conflict in regions where conflict may or may not develop. "We can determine the hotspots - the places you have to really tackle immediately - versus other places that may just be simmering or are fine."[8]

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