Highlands to Oceans (H2O): Anticipatory Governance of Hydroclimatic Regime Shifts in the Transboundary River Basins

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Achieving SDG 6 by 2030 will require the current rates of progress to quadruple.

According to the report, 5 billion people, or nearly half of the global population, are already living in countries under water stress. The report estimates that by 2050, the latter is expected to be more than five billion. The water stress percentages in the report show the freshwater withdrawal as a proportion of available freshwater resources.

In 2018, 2.3 billion people were living in countries under water stress and 3.6 billion people faced inadequate access to water at least one month per year. By 2050, the latter is expected to be more than five billion.

Source: WMO (2021)
WMO (2021) Recommendations to improve the implementation and effectiveness of climate services for water worldwide

1. Invest in Integrated Resources Water Management as a solution to better manage water stress
2. Invest in end-to-end drought and flood early warning systems
3. Fill the capacity gap in collecting data for basic hydrological variables which underpin climate services and early warning systems;
4. Improve the interaction among national level stakeholders to co-develop and operationalize climate services with information users to better support adaptation in the water sector.

• Great recommendations but WMO 2021 report assumes that riparian countries in transboundary river basins are willing to cooperate and coordinate their efforts.

• These recommendations ignore the imminent reality of “water wars” within and across riparian countries due to climate change.
Transboundary Indus and Mekong river basin boundaries spanning highlands of Tibetan Plateau across 9 riparian countries' lowlands and oceans. Locations of major dams are shown.
Transboundary Amazon and Jordan river basin boundaries spanning highlands to oceans across riparian countries. Locations of major dams are shown.
Q1: How do shifts in global climate change and ENSO regimes affect the dynamics of regime shifts in highlands (e.g. glaciers), highlands to lowlands (e.g. hydroclimatic regimes) and the provision of aquatic ecosystem services (ES) (e.g. hydropower, irrigation, fishing, drinking, recreation and cultural)?
Q2: How do transboundary governance regimes (cooperative or conflictive) and national/subnational water policies (anticipatory or reactive) affect the provision of aquatic ecosystem services to farmers, energy producers and households and prevent mass migrations under alternate climate change and ENSO regimes?

Q3: Can integrative modeling of multi-scalar cascading regime shifts in transboundary river basins spanning Highlands to Oceans (H2O), provide foresight about designing sustainable solutions to watershed management problems, such as benefit-transfer mechanisms from lowlands to highlands and international treaties?
Diverse Tools and Methods of Anticipatory Governance: Engaging with the Future, Acting in the Present

...vision assessments. However, here such methods are either the subject of, or used for, critical interrogation (Bellamy et al., 2012; Fonseca & Pereira, 2014; Mittelstadt et al., 2015; Selin, 2007, 2008). An example of such critical application is analysis of future narratives and images, which is used to question the limiting assumptions about what futures are possible, to open up dialogue for exploring novel and alternative pathways, and to interrogate the political implications of future visions and pathways for the present (Selin, 2008). Anticipation tools serve here as a heuristic device to identify diverse futures (Sarkki et al., 2017; Talberg et al., 2018) and to democratize anticipatory knowledge production.

Here, anticipation mechanisms are primarily investigated as future framings with important political implications in the present (Biermann & Gupta, 2011; Vervoort & Gupta, 2018), rather than as a proxy for merely knowing futures. In this view, participatory and inclusive anticipation practices are vehicles to interrogate and open up dominant framings of the future.

In this section, we discussed methods and tools that are used in and across four approaches to anticipation and anticipatory governance. Figure 2 maps these methods and tools onto our continuum of four approaches to anticipatory governance. The boxes detailing the four approaches are not repeated here again, to improve the readability of the figure. As Figure 2 illustrates many of these methods overlap and can be used across these continua and approaches. The crucial distinction lies thus not so much in type of method used in the four approaches—these can be similar—but in the ends they serve. These ends can vary significantly, as can the associated perceptions of the future and actions in the present (for a recent extensive review of anticipatory tools and methods in envisioning climate engineered futures, see Low & Schäfer, 2019).

Our analysis supplements hence the insight of Anderson (2007, p. 158), who argues that different methods and tools of anticipation "produce different epistemic objects through which future possibilities and potentialities are disclosed, objectified, communicated, and rendered mobile, through the very way in which they are employed." As our analysis suggests, even if the anticipatory methods are similar, the ways they are employed can vary because of the diverse conceptions of the future they take as a starting point, the actions to be taken in the present that they prioritize, and the end they seek to achieve.

Calibration, Validation, & Scenario Testing of H2O Integrated Models Requires Science Cooperation and Data Sharing Among All Riparian Partners of a River Basin!

Figure 7: Computational Structure of a novel Highlands to Oceans (H2O) Integrated Regime Shift Assessment Model (H2O-IRSAM)
Securing clean water in transboundary river basins through science and environmental diplomacy

1. Set up a network of networks ”Transboundary Water In-Cooperation Network” (TWIN) www.transboundarywater.org

2. Identifying the gaps in transboundary watershed monitoring and water security early warning early action systems (e.g. flood, drought, famine, water quality early warnings)?

3. Promoting scientist to scientist (track-2) and community to community (track-3) cooperation within and across transboundary river basins

4. Integrating indigenous knowledge and wisdom with scientific knowledge to secure clean water
Thank you!

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