Cross-border waters: USGS, UNESCO, and guidelines for transboundary groundwater management

Release Date: JULY 29, 2016

The old adage goes "there are only three things you can count on. Death, taxes, and transboundary water laws." Okay, well that might not necessarily be the saying, but it rings true in water resource management, just as much as the other two are part of life.

While National borderlines can be drawn, shaped, and manipulated, nature is not so easily contained. A single water source can flow into, out of, and through man-made lines, having no regard for titles, populations, or policies. This is where transboundary water laws come in. These laws are set by policy makers to create guidelines for managing water that flows across state, national, and international borders.

Throughout our country, the U.S. Geological Survey plays a key role in monitoring, studying, and conducting fundamental scientific analysis of our water resources. From groundwater to contaminants, stream flow to flood risks, the USGS pays close attention, developing and using innovative science on local, state, and National levels to support National water-resource management. This makes USGS science and scientists great resources in the development and implementation of transboundary water laws.

Within a single country, transboundary water supplies can be monitored and regulated with cooperative effort from local, state, and Federal organizations. This doesn't necessarily mean that peaceful sharing of water is without its difficulties. Historically within the United States, particularly in the west, there have been debates and litigation between states regarding water resources. Monitoring water usage in a single society is difficult, but the ante is upped when international boarders are crossed. In these instances, people of different nations must cooperatively work to use, sustain, and regulate water sources reaching multiple countries. This can be

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troublesome when cultural, social, and economic differences cause friction between border countries.

That is where UNESCO comes in.

When it comes to water, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) International Hydrological Programme works to build intercultural understanding and scientific cooperation among the world's nations, in order to create resource management strategies to deal with transboundary aquifers issues. For America, this means water sources bordering both Canada and Mexico. The U.S. Geological Survey serves as the expert scientific agency representing American interests in UNESCO.

United Nations Educational, Scientific, and Cultural Organization (UNESCO)

Enter Randall Hanson, Research Hydrologist at the U.S. Geological Survey's California Water Science Center. Hanson created his first transboundary hydrologic model, a computer software system that simulates the movement and use of water in a geographic area, for the USGS in 1980. He is one of USGS's leading experts on transboundary aquifer issues and has worked with hydrologists from around the world to provide the firm scientific foundation UNESCO needs to develop guidelines that facilitate international efforts to create both treaties and plans to manage transboundary resources considered.

This scientific base is key to UNESCO's and partnering agencies' success, because in addition to the challenge of diverse cultural, political, and economic differences, there are scientific complexities that make international water management difficult. Changing population, land use, and climate must be taken into account if plans are to be effective. And, hydrologic intricacies such as how groundwater withdrawals may affect surface water supplies, must be studied to create a plan that can be implemented sustainably. "Along borders, it's easy to have rapid growth, which results in over exploitation of resources," Hanson explained. These complexities underscore the importance of the scientific foundation USGS provides in helping UNESCO create effective guidelines. This is exceptionally important in areas like California and the southwestern United States, where prolonged periods of drought stress already dwindling water sources, and tense water litigation within and between states has a long, sometimes sordid, history.

California's struggle with transboundary water laws began in the 1840s with the Gold Rush, when forty-niners were using water with abandon to extract gold from new territory. The California Supreme Court had to step in well before the territory was even granted statehood (in 1850), in order to control the chaos that was Wild West water use. The Court established doctrine that outlined water use guidelines, which protected the surrounding states, the United States, and the users from overexploitation of water resources by businesses brought in by the Gold Rush (Hutchins 2). While this California doctrine was a win for western states, it failed to

recognize Spanish and Mexican interests in the same water sources, which flow through international borders.

Currently, the Colorado River – and other Mexican/U.S. boundary waters – is governed under the International Boundary and Water Commission treaty signed in 1944. This agreement is the culmination of six previous treaties adopted between 1848 to 1933, which defined boundary waters use along the Colorado, Tijuana, and Rio Grande rivers. Since 1944, it has worked to maintain peaceful usage of transboundary waters. The treaty is frequently modified to reflect the changing landscape of water availability. When change arises, there's bound to be conflict; UNESCO's science – including Hanson's transboundary models – can help reduce potential conflicts and encourage communication.

UNESCO-IHP recently published the fourth book (Rivera et al., 2015) in a series of publications seeking to help countries sharing resources deal with political, scientific, and cultural divides throughout the Americas. The newest publication, Regional Strategy for the Management of Transboundary Aquifer Systems in the Americas, addresses not only the US/Mexican transboundary issues, but also aquifer systems shared by the U.S. and Canada, and by Central and South American countries. The book features guidelines for a regional strategy developed by the UNESCO-IHP ISARM-Americas technical committee, which will help neighboring countries assess and manage transboundary aquifer systems. According to Hanson, the goal of the book is "the collective understanding, developing, managing, and protecting of the transboundary aquifers in the Americas," and includes "technical, social, and governance recommendations for the integrated resource management of groundwater."

Hanson's contribution to UNESCO-IHP's new book was a chapter on our scientific understanding of the region's hydrology: "Methodologies to Assess Regional Flow Systems." This chapter includes an in-depth look at water quality data, and explains how to use geo-databases and computer models to better understand selected transboundary aquifers in the Americas. These are examples for potential ways governments can successfully approach developing management plans.

Hanson believes the UNESCO-IHP guidelines can be successfully implemented, for example, in conjunction with International Boundary and Water Commission (IBWC) treaties, but recognizes that there are still cultural, environmental, and governance roadblocks to overcome. The USGS and scientists from Mexico are partnering to provide scientific information needed for productive solutions to current and future transboundary water issues along the Mexican/American border.

Beyond political and cultural barriers, neighboring countries on either side of borders both want the same thing. Hanson said, "We need to steward these resources. Boundary communities are fast-growing, and resources in some areas are currently

overexploited, but collectively we can develop and share resources without conflict and manage them sustainably for future use."

References:

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