

Upstream, Downstream: The Unreliable Aquatic Border between the United States and Canada

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Abstract. The length of the U.S.-Canadian border is approximately 5525 miles, including the Alaska-Canada border. The joint marine environment of the United States and Canada includes the Atlantic Ocean between Nova Scotia and Maine, the Pacific Ocean in the British Columbia and Washington State region and the Great Lakes St. Lawrence Seaway system. The marine environment is viewed as particularly vulnerable and porous to smuggling activity; however, not all potential threats relate to smuggling. The water supply to Walkerton, Ontario became contaminated with the highly dangerous O157:H7 strain of *E. coli* bacteria from farm runoff into an adjacent well that had been known for years to be vulnerable to contamination. Starting May 11, 2000, many people of the community of about 5,000 people began to simultaneously experience symptoms of *E. coli* infection. For days the Walkerton Public Utilities Commission insisted the water supply was safe despite being in possession of laboratory tests that had found evidence of contamination. Seven people died from drinking the *E. coli*-contaminated water, and might have been saved if the Walkerton Public Utilities Commission had admitted to a contaminated water supply sooner. About 2,500 became ill. Walkerton is located on the Saugeen River, which flows into Lake Huron. Hypothetically, any outbreak could have easily passed into Lake Huron and onto U.S. shores, creating a disruption of water supplies in the United States. This ongoing research examines the Walkerton Tragedy a more closely, as well as the potential for disruptions in other locations.

INTRODUCTION

This ongoing research deals with the persistent issue of transboundary water. Borders repeatedly cut across natural boundaries, with political rather than environmental concerns holding the pencil. Humans and the environment

have long had a symbiotic relationship, sharing great pleasure as well as great pain over the passage of time. This relationship is often intensified or diminished depending on where borders are drawn and the resource needs of people within those borders. Out of political and practical necessity most countries, and regions within countries, focus on specific, local issues that apply directly to them. The interaction of geographical area, political process, and physical realities leads to a necessary prioritization of issues and how to best address them.

Most social and political decisions are therefore made with respect to political boundaries and jurisdictions, problematic when environmental systems and environmental problems rarely coincide with them. The politics of water continues to possess relevance to national and international security (Dinar 2002). Studies on transboundary water conflict and cooperation generally consider interstate relations over shared water resources as distinct from intrastate relations (Giordano, Giordano, and Wolf 2002), and vice versa.

THE UNRELIABLE AQUATIC BORDER BETWEEN THE UNITED STATES AND CANADA

Numerous governments are encouraging measures to preserve and protect their water resources. However, until these measures begin to show progress, or in lieu of them, governments still need to draw water from somewhere, and this frequently involves locations not within their boundaries. How do you ensure the safety of this supply when it is difficult to control outside your jurisdiction?

The joint marine environment of the United States and Canada includes the Great Lakes/ St. Lawrence Seaway system plus numerous waterways that traverse the 5525-mile border between the two nations. This environment, and along the Atlantic and Pacific Coasts, is

viewed as particularly vulnerable and porous to smuggling activity due to unique challenges such as ambiguous locations for the actual border (Royal Canadian Mounted Police 2010). However, in this current time period not all potential threats exist that are not connected to smuggling (Meinhardt 2005)

A number of states along the U.S.-Canada border are facing abnormally dry and early drought conditions as well. If they are not already doing so, the prospect exists that these states could look to transboundary water to relieve the situation (Pentland and Hurley 2011). The following are just two examples at different locations along the U.S.-Canadian border.

Walkerton, Ontario is located on the Saugeen River which flows into Lake Huron. The river provides popular pastimes such as bass and salmon fishing in addition to providing the community's water supply. The water supply of Walkerton became contaminated with the highly dangerous O157:H7 strain of *E. coli* bacteria after a heavy rainfall in May 2000 from farm runoff into Walkerton Well #5, a well that had been known for years to be vulnerable to contamination (Parr 2005; Clark *et al.* 2003). Almost immediately 2,300 out of the 4,800 residents in the community located about 175 km northwest of Toronto began to simultaneously experience bloody diarrhea, gastrointestinal infections and other symptoms of *E. coli* infection (Richards 2005).

For days the Walkerton Public Utilities Commission insisted the water supply was "OK" despite being in possession of laboratory tests that had found evidence of contamination (O'Conner 2002). Seven people would die from drinking the *E. coli*-contaminated water; they might have been saved if the Walkerton Public Utilities Commission had admitted to contaminated water sooner, and numerous survivors suffered seriously and continue to experience physical and psychological long-term effects (Salvadori *et al.* 2009; Prudham 2004). Owing to Walkerton's location on a river that empties into the Great Lakes, any outbreak hypothetically could have created a disruption of water supplies in the United States by easily traveling into U.S. water tables via the Great Lakes.

Moving westward and backwards in time, between January 1, 1995 and September 6, 1995 there was an outbreak of acute *Toxoplasma gondii* infections identified among individuals in the Greater Victoria, British Columbia region (Eng *et al.* 1999; Bowie *et al.* 1997). The concern was not just for those immediately infected but the long-term implications for babies who contract it during their mother's pregnancy (Kerns *et al.* 2014). Of the 110 reported cases, 42 infected women and 11 newborns were identified through a pregnancy-related screening program which began on April 24, 1995, and

fifty-seven infections were identified in non-pregnant individuals (Health Canada 1995).

If a woman becomes infected for the first time just before or during pregnancy, she could pass the infection to her baby even if she does not exhibit symptoms. Her baby is most at risk of contracting toxoplasmosis if she becomes infected in the third trimester, and least at risk if she becomes infected during the first trimester (Mayo Clinic 2015). On the other hand, the earlier in the pregnancy the infection occurs, the more serious the outcome for the baby (Centers for Disease Control and Prevention 2015). Many early infections end in stillbirth or miscarriage. Children who survive are likely to be born with serious health problems, including seizures, an enlarged liver and spleen, jaundice, and severe eye infections. Only a small number of babies who have toxoplasmosis show signs of the disease at birth. Often, infected children don't develop signs and symptoms, including hearing loss, mental disability or serious eye infections, until their teens or later (Wallon *et al.* 2004).

Mapped serological evidence of *T. gondii* infection in deer mice and the domestic cat population living in the riparian environments of the Victoria watershed suggested that oocysts were being shed next to both Humpback Reservoir and Sooke Reservoir (Eng *et al.* 1999). *T. gondii* contamination of Victoria's water supply was potentially occurring during this study period, and future waterborne toxoplasmosis outbreaks in this and other communities where domestic and wild cats frequent was deemed possible.

RELEVANCE TO GEORGIA: THE TRI-STATE WATER WARS

The 28-county Atlanta-Sandy Springs-Marietta, GA Metropolitan Statistical Area (MSA) by numerous measurements has done very well. A swelling population, thriving commerce, professional sports teams, universities, and a vibrant art scene would appear to be indicators of an area that has risen from being pigeonholed as a "Southern town" into a leading global city. However, in a scene reminiscent of another staple/stereotype, the Western movie, you need that secure, untainted water supply to maintain and eventually build even further upon that growth.

Areas of north Georgia are already beginning to face water crises according to the National Drought Mitigation Center. The geology of the MSA does not allow for significant underground aquifers (such as the Edwards Aquifer of southcentral Texas) or for a water-supplying snowpack (i.e. the Tuolumne in California's Sierra Nevada range). Consequently, the region relies on surface water sources

such as the Chattahoochee River for its water supply. The problem is that other states also are dependent upon the Chattahoochee and the downstream Apalachicola and Flint rivers for water.

In 1990, Alabama sued the U.S. Army Corps of Engineers for planning to reserve more Lake Lanier water for metro Atlanta's drinking water and industrial use (Lathrop 2008). At that time, Georgia officials were planning to use a reported 500-530 million gallons a day from the lake and the Chattahoochee River to satisfy the demands of hundreds of thousands of new residents through 2010. Yet the more metro Atlanta takes, the less downstream users and others believe they will have for themselves. Alabama wants water guaranteed for its growing towns and industries on its eastern border. Farmers in southwestern Georgia and homeowners on West Point Lake and Lake Eufaula near the Alabama-Georgia state boundary perceive metro Atlanta as a foe (University of Mississippi 2003). Florida's top concern has been the health of the Apalachicola Bay, where a tenuous balance between freshwater and saltwater nurtures world-famous oysters (Lathrop 2008).

Despite years of negotiation and court decisions, a binding agreement between the three states on water allocation has yet to be reached, therefore earning the water allocation activity the nickname of "Tri-State Water Wars" (Southern Environmental Law Center 2015). When and if an agreement is made, one must ponder how having so many hands in the till will affect water quality in a region where the clay-rich soils are easily washed into water basins after heavy rains, leading to elevated E.coli levels and other contaminant spikes. Additionally, with an increase in population and activity, questions persist about what else could possibly end up in any water basin (Luthy 2002).

FINDINGS AND FUTURE RESEARCH BASELINES

In the United States, approximately half of the nation is facing some level of drought (National Drought Mitigation Center 2015; Dimick 2014; Kinney 2014). Aquifers have been at or near record lows for some time, and water tables have been dropping. The state of Texas has long had mandatory restrictions for its long history of drought and recovery, and California recently enacted similar restrictions in the face of its own historic drought. Unusual suspects including north Georgia and communities along the U.S.-Canada border are also facing water concerns of their own (National Drought Mitigation Center 2015).

Borders are an interaction of politics and place. Territoriality, forms of government, treaties, trading blocs, and military implications lead to societal implications involving natural resources. In many instances, the "people on the ground" have minimal-to-no input on where those boundaries are drawn, or control over potential repercussions. Understanding how nations engage in conflict and cooperation over water is related to understanding the relationship between politics and security, and how international water issues and cooperation may also be influenced by domestic water events and vice versa (Dinar 2002; Giordano, Giordano, and Wolf 2002). In the event a waterway is contaminated, either through natural events, accidentally, or via deliberate malfeasance, simply "dumping" that water is not a viable option with drought characteristic prevalent in numerous U.S. locations.

The question then extrapolates into where to obtain needed water when more readily-accessible sources are unavailable. To further explore this, much more work of both a qualitative and quantitative variety needs to be accomplished. Qualitative research should include the study of health records and existing literature to see if any other episodes of waterborne disease have been found and documented in transborder regions. Quantitative research in particular should include sustained sampling of the waterways in transborder regions to determine if overextension of water derivation is ramping up organic and nonorganic pollutant levels in them.

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