

Costing Climate Change: a case study of employing climate, land-use and water quality data to assess the economic impacts of climate change on local public health.

Principal Investigator – Dr. Steven Renzetti, Brock University, 2012-2015

Challenge

One of the potential linkages between climate change and public health stems from the way climate change may increase the likelihood of human exposure to water-borne pathogens. Climate change may have this effect due to 1) increased survival of fecal pathogens on land mediated by temperature and precipitation, 2) transport of pathogens over land and loading to water sources, and 3) increased risks from failure of water treatment and disinfections arising from flooding, and storm-water and sewage/septic overflows.

Project

The linkage between climate change and the presence of water-borne pathogens and health risks may have significant economic, policy and governance implications for local communities. However, many communities in Canada do not have the capacity to study, assess and act upon these sources of risks to public health. The purpose of this research is to build on an existing set of field studies being undertaken by Mazumder in order to do three things:

1. Investigate statistically the linkages between observed extreme weather events, observations of water quality and incidences of water-borne diseases.
2. Assess the potential costs of climate change - to - water quality - to - public health linkage.
3. Employ the findings of (1) and (2) to inform policy discussions regarding best adaptation strategies.

Outputs

In order to disseminate information to end-users, researchers have held several workshops, as well as presented to various audiences:

- S. Renzetti (2013) “Water Economics Policy and Governance Network: thinking hard about the ‘soft’ side of water” invited presentation to the Res’eau WaterNet annual conference, Vancouver, October 2.
- S. Renzetti (2013) “Water Economics Research in Canada” invited presentation given to joint Environment Canada- Chinese Research Academy of Environmental Sciences Workshop On Valuation Of Biodiversity, Niagara Falls, September 7
- S. Renzetti (2012) “From Green to Blue: The New Economy” invited presentation to the annual meeting of the Canadian Association of Zoos and Aquariums, Toronto, September 27
- A. Mazumder (2013) - Community workshop with the Cowichan Valley Regional Authority and all the stakeholders for Shawnigan Lake Water System (March 2013)

- A. Mazumder (2013) - Community workshop with the Comox Valley Regional Authority and all the stakeholders for Comox Lake Water System (August 2013).
- A. Mazumder (2013) - Community workshop with the Salt Spring Island Water District and all the stakeholders for St Mary's Lake Water System (Scheduled for Oct 18, 2013)
- D. Dupont, S. Renzetti and J. Price "Economics and Biology: Working Together to Make Better Policy" poster produced for Brock Research Celebration, February 25th, 2014. This event highlights the public research being carried out at Brock.

This research has resulted in scholarly journal publications and end-user reports:

- Report to Government. Renzetti, S. and Price, J. (March 2014) "Water Resources and Economic Values in the Shawnigan Lake Watershed." Prepared for CVRD.
- Report to Government. Estimates of residents' valuation of water quality changes that will form the basis for a report to CVRD.
- Survey Instrument. Choice expert survey administered to residents of Cowichan Valley. It is using a novel approach (the frequency severity and duration framework) that was jointly designed with partners in order to elicit residents' valuation of changes in water quality.

Outcomes

Outcomes include:

- Database compiled and analyzed on water quality, water level, water consumption, watershed planning, treatment plans, and distribution system for Sooke Lake (CRD water supply to Greater Victoria). This database covers from 1989 to 2013, and represents one of the most comprehensive data sets from a water supply system.
- Strengthened relationships with partners CVRD and Environment Canada.
- Anticipated changes in practice with the development of the water quality ladders (WQL) software. Environment Canada will have a significantly enhanced capacity to assess economic dimensions of proposals that may impact water quality in Canada.
- Cost Savings due to the development of the WQL software. Environment Canada will be able to carry out portions of the required Regulatory Impact Analysis more quickly and efficiently.
- Anticipated changes in practice with the development of the first estimates of the value of local natural capital in its region. CVRD staff will now be in a position to move forward on planned ecological governance approaches in the region.

Research Team and Partners:

Research Team:

Dr. Steven Renzetti, Department of Economics, Brock University
 Dr. Asit Mazumder, University of Victoria

Partners:

Capital Region Water District
Cowichan Valley Region District
Comox Valley Region District
City of Nanaimo

Highly Qualified Personnel (HQP):

James Price, Post Doctoral, Brock University
Lisa Rogers, Masters
John Zhu, Post Doctoral, University of Victoria