

# Using Economics to Understand the Implications of Wildfires: An Alberta Case Study

Principal Investigator – Dr. Diane P. Dupont, Brock University, 2014-2016

## Challenge

Forested regions in northern and western Alberta provide approximately 88% of surface water supplies to Alberta's population. It is critical that the risks associated with changes in water quality and the connections to upland forests are understood. One of the key risks arises from wildfires as these disturbances release a variety of contaminants into surface waters. These contaminants travel downstream to water utilities and may result in a range of possible outcomes from less severe (small change in operating costs) to more severe (shut-down of water utility and importation of water supplies). Recent increases in the magnitude of wildfires, along with increased provincial water demand, have resulted in a need to evaluate wildfire risk to downstream municipal drinking water supply and treatment systems. The project models the magnitude and likelihood of wildfire occurrences in source water regions in Alberta and combines fire/water transport and water utility cost models in order to undertake a cost-benefit analysis of existing and future management strategies for drinking water security.

## Project

Wildfires have been shown to worsen water quality, causing water utilities to adjust their operations in response. In extreme cases, water utilities may need to shut down on a temporary basis, thereby incurring costs to local communities affected. It is necessary to identify the potential costs associated with wildfire events and compare these to potential benefits associated with upstream land management and resource development. This research will develop an over-arching model to link ecological effects with economic outcomes, as well as to estimate water utility costs that are sensitive to changes in water quality. While such models have been described in general terms in the literature, this research team has developed and calibrated a model specific to the current Alberta situation. The results from this project will provide municipal water utilities in Alberta and AESRD with a complete analysis of wildfire risks to drinking water treatment in Alberta.

## Outputs

This research has been disseminated through several presentations:

- Dupont, D. (2014). Connecting Land/Watershed and Water Supply Management. Canadian Water Network Forum: Leading Water Research, Niagara-on-the-lake, January 20, 2014.
- Bladon, K. (2013). Minimizing wildfire risk to municipal water works by active source water protection. 2013 Water Quality Technology Conference, Long Beach, CA., Nov 3-7, 2013.

This research project has held several key end-user oriented meetings and workshops:

- Wildfire Researcher and Partner workshops. (2014)

Major Research Papers from HQPs:

- Arcuri, Stephen, 2013. "Canadian Wildland Fire Suppression Costs: An Economic Perspective - Cost Function Analysis" (MBE Research Paper)
- Bird, Jourdan, 2013. "Lost Creek wildfire effects on water quality and non-market valuation of corresponding implications for residents" (MBE Research Paper)

## **Outcomes**

Outcomes to date include:

- Through a number of workshops with partners, a joint understanding of the issues have been solidified and this has led to a more nuanced approach to the cost-benefit analysis that will ultimately be undertaken.
- Relationships with end users have been strengthened through several meetings with both the fire management group at Alberta Environment and Sustainable Resource Development and the drinking water manager to refine our understanding of the scenarios that will be evaluated in the cost-benefit analysis.
- Relationships with project partners have been strengthened through meetings and have resulted in refined understanding of water forecasting needs.

## **Research Team and Partners:**

### **Research Team:**

Dr. Diane P. Dupont, Brock University

### **Partners:**

Alberta Environment and Sustainable Resource Development (AESRD)

### **Highly Qualified Personnel (HQP):**

James Price, Post Doctoral Fellow, Brock University

Jourdan Bird, Masters, Brock University

Stephen Arcuri, Masters, Brock University