

## Abbreviated Project Proposal

### **The WELLness Project: Enhancing well water safety and stewardship in rural communities through a novel approach to science-community collaboration.**

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It is critical to effectively engage, share knowledge, raise awareness and thus empower private well owners such that they may better understand well water quality parameters and risks, and thus claim stewardship and minimize potential adverse community health effects associated with untreated well water. The overall aim of the proposed WELLness project is to reduce the incidence of waterborne infectious disease in Ontario (and Canada) through empowering private groundwater users and promoting well stewardship behaviour by facilitating a broader understanding of water security issues relative to the community's specific strengths and weaknesses. As such, the specific objectives of this research are to: (1) assess and provide an accurate, holistic representation of well water contamination and human health risk at the community level in Ontario; (2) develop a prototype web-based interface tool that is accessible to community members; and (3) explore the implications of enhancing the general public's knowledge of water quality.

This project seeks to build upon and leverage data from an ongoing CFID-funded project led by the PI, thus representing significant added value with regard to multiple resources and expertise. The overarching goal of this highly complementary partner project is to capture well water stewardship behaviours (KAP) through a multi-methods approach including qualitative (i.e. survey) and quantitative (i.e. integrated microbial water quality, hydrogeological, and well- specific datasets) techniques to inform future knowledge, attitudes and practices.

Access to a reliable supply of safe drinking water is recognized as a basic human right (United Nations, 2015), and a powerful environmental determinant of health (Gorchev & Ozolins, 2011). This is especially true in the current context where urbanization, landscape modification, and increasing temperatures due to climate change have resulted in a global decrease in water quality, and an increased risk of acquiring waterborne illness (Hunter, 2003). Typically, management of water and wastewater systems has taken a "top down" legislative and/or policy-based approach, predominately valuing scientific knowledge over all else as the basis for formulating policies and programs geared toward individual consumers. This has resulted in unsustainable or unadaptable solutions at the local level. This works seeks to integrate a community-based approach by engaging communities and individual well owners to provide opportunities for capacity building and empowerment tailored to specific needs, wants, and opinions in relation to their own private drinking water systems. This

coupled-systems approach contributes to more secure water systems at the local level.

The outcome of this project will integrate new methods for both knowledge acquisition, as well as how knowledge from different systems (i.e. social and physical) contribute to more effective eco-health modeling and synthesis of translatable public health information. Further, this work will contribute knowledge to underpin policy and programs that influence water governance and infectious disease risk, which will directly impact the 20% of Ontario’s population relying on private wells for their potable water supply (Statistics Canada, 2015). A report by the Auditor General in 2014 documented that, in Ontario specifically, private well water testing has decreased by 40% since 2003 (Auditor General, 2014). Further, in 2013, private well owners submitted approximately 166,000 water samples, representing only about 10% of the total number of domestic wells in the province, to Public Health Ontario, of which 36% tested positive for bacteria including *E. coli* (Auditor General, 2014), illustrating the significant gap between well water stewardship and likelihood of microbial contamination, as individual KAP toward drinking water quality, and trust in drinking water systems, are affected by both perceived and actual adverse water quality.

Water security has been defined as “the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality of water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related diseases, and for preserving ecosystems in a climate of peace and political stability” (UN-Water, 2013). This research will significantly contribute to the various and multi-dimensional aspects of local water security by actively engaging communities in research and translating results that are meaningful and localized. Further, this work, and the tool itself, will serve as an effective template for individual or locally water managed systems not only in the Ontario context but also globally.

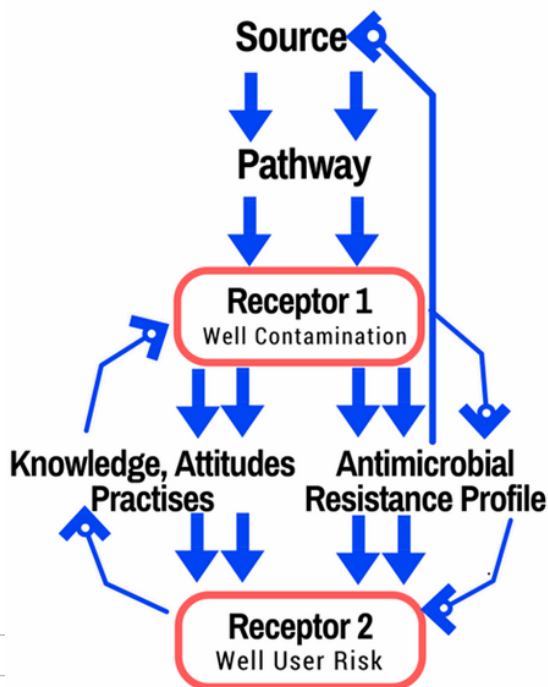


Figure 1: Consumer Susceptibility Model developed for the proposed WELLness project