PROJECT IN PROGRESS

A SYSTEM TO FORECAST LOW WATER LEVELS AS A METHOD TO ADAPT TO CLIMATE CHANGE IMPACTS

photo : François Brissette, ÉTS, Université du Québec

Program
WATER RESOURCES

PROJECT STARTING DATE AND LENGTH
October 2010 • 2 years

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CONTEXT

Severe low water levels seem to be more and more frequent in Quebec, and several analyses have suggested that climate change could intensify this situation: over the past ten years, the state of some rivers in Quebec has threatened the water supplies of several cities. In order to monitor this trend, a few organizations have set up systems for medium-term forecasting to make advance decisions in particular in preparation for periods of low water levels.

OBJECTIVES

The goal of this project is the implementation of a prototype for a system to forecast medium-term low water levels for a three-month time horizon. This prototype would lead to the development of applications for forecasting low water levels that could serve as adaptations to climate change impacts. This system is based on ensemble hydrological forecasts – a series of hydrological forecasts – coupled with a stochastic climate generator. The prototype will be tested on watersheds in Quebec.

APPROACH

Three watersheds were selected for this study: the Yamaska, the Lièvre and the Péribonka. These choices are connected respectively to issues of severe low water leading to pollution, of the pursuit of optimal management of reservoirs during periods of low water, and of the evaluation of forecasts in seasons other than summer. Historical data and data provided by simulations are used to validate the hydrological forecast models. Particular attention is paid to the choice of the parameters of the climate generator so that it accurately reproduces past climate changes and takes account of natural variability. The uncertainty of these parameters will also be considered. Depending on the results from the climate generator, the historical data used in the hydrological forecasts will be affected by different coefficients of reliability.

EXPECTED RESULTS

A final report will describe the scientific and theoretical advances resulting from the project. A prototype for the forecasting of low water levels for a three-month time horizon will be produced for three Quebec watersheds and be adaptable to other watersheds. A user's manual will be provided detailing the options, inputs and graphic outputs.

The results will be presented at conferences and disseminated through scientific papers.

IMPACT

Various stakeholders will be concerned with the results of this project, including the ministère du Développement durable, de l'Environnement et des Parcs (MDDEP) responsible for monitoring the state of the environment, as well as municipalities and watershed organizations, the ministère de la Sécurité publique and the Centre d'expertise hydrique du Québec. The applicability of the prototype extends beyond the narrow confines of low water levels and will also be of interest to Hydro-Québec, which is concerned with hydrological forecasting for the three autumn months for watersheds in central and northern Quebec.

LEAD SCIENTIST

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OTHER PARTICIPANTS

- Centre d'expertise hydrique du Québec (CEHQ)
- Environment Canada
- Hydro-Québec
- Université de Sherbrooke

FUNDING

Fonds vert

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