

INTEGRATING THE IMPACT OF CLIMATE CHANGE IN THE ASSESSMENT OF PROBABLE MAXIMUM FLOODS TO SUPPORT USERS IN THE REVIEWS OF DAM SAFETY



photo : Portage-des-Roches, Centre d'expertise hydrique du Québec

Program
WATER RESOURCES

PROJECT STARTING DATE
AND LENGTH
March 2010 • 2½ years

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CONTEXT

Changes in the rain and snowfall regimes could have significant impacts on the intensity and frequency of extreme floods in Quebec's rivers. Under any climate conditions, including those anticipated as a result of climate change, dam safety reviews must provide an acceptable level of protection. Calculating the values of probable maximum floods (PMFs) is therefore especially important for dams with the highest failure consequences as defined in the Dam Safety Act.

OBJECTIVES

It is important to determine whether the calculation of PMF, which is currently based on historical data, will be modified by potential climate change impacts. This study should make it possible to formulate recommendations for users that will incorporate the concept of climate change in safety reviews of dams with the highest failure consequences.

APPROACH

To calculate PMFs, maximized events (e.g., probable maximized precipitations) are combined with characteristic extreme ones – non maximized – such as 100-year return period events. New data from the Canadian Regional Climate Model (CRCM) will make it possible to study the impact of climate change on PMF calculations. With the help of hydrological models such as HYDROTEL and SSARR, it will be possible to compare the calculations of PMF derived from CRCM data with those based on traditional calculations. The reservoirs of selected dams such as the ones at Kénogami and Choinière lakes will be used to assess current and projected PMF. Results will then be discussed with those in charge of dam safety to determine the best way to integrate them in the dam safety review cycle.

EXPECTED RESULTS

The project will have implications for applied hydrology and will result in the transfer of knowledge to owner-users of dams as well as practicing engineers in the field of dam safety. In this context, results should include:

- The identification of maximized and non-maximized events and a validation of the CRCM model for the pilot basins in a selected reference period (1961-2000);
- The comparison of PMF values issued from modeling with and without consideration of the climate changes expected by 2050;
- The integration of uncertainties associated with climate modeling in PMF assessment;
- The integration of knowledge acquired regarding PMF in dam safety reviews.

LEAD SCIENTIST

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- Hydro-Québec
- Rio-Tinto Alcan (RTA)
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IMPACT

An estimate of the possible impact of climate change on probable maximum precipitation (PMP) and probable maximum snow cover (PMSC) regimes is all the more important because it will make it possible to update the calculation of PMF, an essential index for assessing the safety of existing dams and better planning the construction of new hydraulic structures. Dam owners, administrators of the Dam Safety Act, and consulting firms have frequently expressed a need for this information.

FUNDING

