



## **A Monte Carlo simulation approach for flood risk assessment**

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Floods are the most frequent natural disaster and the most damaging in Canada. The issue of assessing and managing the risk related to this disaster has become increasingly crucial for both local and national authorities. Brigham, a municipality located in southern Quebec Province, is one of the heavily affected regions by this disaster because of frequent overflows of the Yamaska River reaching two to three times per year. Since Irene Hurricane which hit the region in 2011 causing considerable socio-economic damage, the implementation of mitigation measures has become a major priority for this municipality. To do this, a preliminary study to evaluate the risk to which this region is exposed is essential. Conventionally, approaches only based on the characterization of the hazard (e.g. floodplains extensive, flood depth) are generally adopted to study the risk of flooding. In order to improve the knowledge of this risk, a Monte Carlo simulation approach combining information on the hazard with vulnerability-related aspects of buildings has been developed. This approach integrates three main components namely hydrological modeling through flow-probability functions, hydraulic modeling using flow-submersion height functions and the study of buildings damage based on damage functions adapted to the Quebec habitat. The application of this approach allows estimating the annual average cost of damage caused by floods on buildings. The obtained results will be useful for local authorities to support their decisions on risk management and prevention against this disaster.