

Flood Hazard and Risk Mapping to Assess Ice-Jam Flood Mitigation Measures

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Abstract : In this presentation, we explore options for mitigating ice-jam flooding along the Athabasca River in western Canada. Not only flood hazard, expressed in this case as the probability of flood depths and extents being exceeded, but also flood risk, in which annual expected damages are calculated. Flood risk is calculated, which allows a cost-benefit analysis to be made so that decisions on the best mitigation options are not based solely on flood hazard but also on the costs related to flood damages and the benefits of mitigation. The river ice model is used to simulate extreme ice-jam flood events with which scenarios are run to determine flood exposure and damages in flood-prone areas along the river. We will concentrate on three mitigation options - the placement of a dike, artificial breakage of the ice cover along the river, the installation of an ice-control structure, and the construction of a reservoir. However, any mitigation option is not totally failsafe. For example, dikes can still be overtopped and breached, and ice jams may still occur in areas of the river where ice covers have been artificially broken up. Hence, for all options, it is recommended that zoning of building developments away from greater flood hazard areas be upheld. Flood mitigation can have a negative effect of giving inhabitants a false sense of security that flooding may not happen again, leading to zoning policies being relaxed. (Text adapted from Lindenschmidt [2022] "Ice Destabilization Study - Phase 2", submitted to the Regional Municipality of Wood Buffalo, Alberta, Canada)

Keywords : ice jam, flood hazard, flood risk river ice modelling, flood risk

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