

Effects of Harvesting and Vegetation Change on Snow Accumulation and Melt in Boreal Forest

MAXIME BEAUDOIN-GALAISE¹ AND SYLVAIN JUTRAS

ABSTRACT

For the Boreal Forest in eastern Canada, previous studies related to the impact of logging on hydrological processes have focused on analyzing short-term changes using empirical relationships and paired-basin approach. In order to contribute to the improvement of knowledge in forest hydrology, the main objective of this research project is to analyze the effects of harvesting and vegetation change on boreal forest water balance and runoff. Given the importance of snow processes on the annual water balance, the first objective of this thesis is to evaluate the effect of logging and regeneration on snow accumulation and melt rate using a modeling approach. The hydrological model chosen for this study is the Cold Region Hydrological Model (CRHM). Based on the long history of logging and hydro-meteorological data from the Bassin Expérimental du Ruisseau des Eaux- Volées (BEREV) at Forêt Montmorency, this study will be one of the first implementation of CRHM in the province of Quebec. With manual snow measurements since 1965, the CRHM model will be parameterized and validated on a multitude of meteorological events. Based on previous studies of the relationship between forest cover and snow processes at Forêt Montmorency and the physically-based algorithms in CRHM, the model is expected to perform well. With good confidence in the model's ability to simulate snow processes, the parameterization of the model will be extended to the building of a complete hydrological model to assess the long-term effect of logging and vegetation changes on streamflow.

¹ Department of Wood and Forest Sciences, Université Laval, Québec City, QC, Canada