TRU Environmental Science Seminar Series

Thursday, January 28, 4-5:00 pm

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TITLE

Runoff generation and hydrologic resilience to forest disturbance in the eastern slopes of the Rocky Mountains

SPEAKER

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ABSTRACT

The eastern slopes of the Rocky Mountains provide the majority of drinking water supplies for Alberta but are vulnerable to changing climates and forest disturbance from wildfire, logging, and disease. Forest disturbance removes the forest canopy, increasing the amount of precipitation that reaches the forest floor. While numerous studies have shown that this subsequently influences streamflow quantity and quality, the timing of snowmelt, and other hydrological processes, the severity of the impact depends on local soils, geology, climate, and the area disturbed. Some studies in the eastern slopes have reported no change in streamflow quantity following extensive disturbance from wildfire or logging. One of these studies suggested that complex subsurface flow pathways and large storage capacity in fractured bedrock and unconsolidated glacial till may be responsible for this lack of change. However, little research on runoff generation processes or subsurface flow pathways has been conducted in the forested sub-alpine/upper montane region of the eastern slopes. The objective of this research was to develop a conceptualization of runoff generation in the eastern slopes of the Rocky Mountains to understand why this region may be resilient to change. Streamflow and meteorological data (2004-2015) from four nested sub-watersheds in Star Creek (10.5 km2) were used to estimate subsurface storage, baseflow contributions to streamflow, and runoff ratios. Instantaneous discharge measurements were taken every ~700 m to evaluate spatial patterns in gaining/losing reaches (difference in flow among stations) within the larger drainage network (2014-2015). Finally, shallow groundwater wells were used to describe hillslope-stream connectivity and shallow water table response across the watershed.

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