2BILLION TREES

2 BILLION TREES SCIENCE

Research in Support of Tree Planting

NOTE 5

Impacts of tree planting on hydrology in Canada

LEAD RESEARCHER:
Jason Leach

CFS CENTRE:
Great Lakes Forestry Centre

PROJECT LOCATION:
National

Project Drivers

The 2 Billion Trees (2BT) program aims to reduce greenhouse gas (GHG) emissions through the planting of 2 billion trees over 10 years. Researchers are eager to understand how Canada's watersheds will respond to such extensive tree planting. This research project will determine if the program's carbon sequestration goals will affect water security. It will explore how tree planting impacts hydrology within a Canadian context, informing tree planting for the 2BT program that supports water security and mitigates potential long term negative effects on water availability.

Project Approach

The objectives of this project are to assess how historic reforestation has affected streamflow across Canadian watersheds and to model streamflow response to tree planting associated with the 2BT program. Models will illustrate the potential interactions with future climate change. The project team will select candidate watersheds for study that have experienced reforestation during the previous decades. The team will assess how reforestation impacts streamflow, and in particular, how it impacts periods of low streamflow. Low streamflow periods can be strongly influenced by reforestation and are important for downstream water users, such as agriculture, industry and municipalities. The team will use a new model recently co-developed by the CFS that combines hydrology and forest vegetation algorithms. The model is capable of fully simulating hydrologic response to dynamic forest growth and management, as well as climate variability. In addition, the model allows consideration of the potential trade-offs between carbon storage in trees and downstream water availability. The model will be applied to the watersheds chosen for the study and evaluated on its ability to simulate historic streamflow dynamics in relation to reforestation. Following model evaluation, the team will use the model to assess future tree planting scenarios. The team will also consider various climate change trajectories, exploring potential impacts on streamflow and downstream water availability for both short and long term periods.

Anticipated Outputs and Impacts

This study will generate better knowledge on the hydrologic impacts of tree planting for carbon sequestration in Canada. Based on the results of the research, the program will be able to predict potential unintended consequences of tree planting on water resources and take necessary actions to mitigate risks to water security.

Canada