DIVERSE
Adapting Forests to Global Change

THEME 2

Identification of Tree Species Favoring Local Resilience

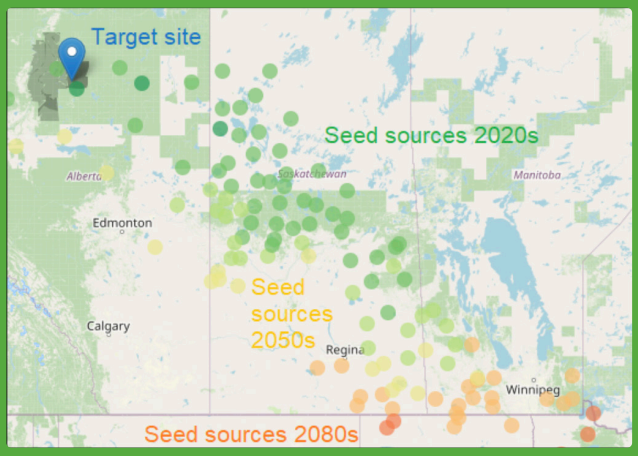
DIVERSE is a Pan-Canadian research initiative dedicated to advancing forest management through innovative approaches that emphasize functional diversity and ecological connectivity. The research encompasses six interconnected themes that aim to enhance forest resilience and sustainable forest stewardship in the face of global changes.

Theme 2 Goals & Objectives

Theme 2 seeks to:

1) Identify adapted tree species to determine groups of tree species and populations within species most suited to thrive under both current and future climate and disturbance conditions across Canada;

2) Build functional tree species groups for each biogeoclimatic region of Canada by integrating newly identified adapted species with those already present in the landscape.



Example of projected seed-sourcing regions for target site in Alberta under future climate scenarios

- 2020s climate
- 2025s climate
- 2080s climate

Access projection tool here.

Value Statement

Theme 2 lays the foundation for the Functional Complex Network (FCN) approach (Messier et al. 2019) by identifying tree species and functional groups best suited to future climatic conditions. These findings are critical for promoting resilience and functional diversity in Canada's forests.

Scientific Background

The FCN approach shifts the focus of forest management from short-term productivity to long-term resilience by emphasizing functional diversity and connectivity. Given the complexity of global stressors and their impacts, FCN should not be built solely using species that are already present in a forested landscape, but rather integrate new species, or new provenances, to optimize a landscape's functional diversity, ensuring resilience to climate change and disturbances. Identifying species and provenances that should thrive under both current and future conditions is essential. These species will form functional groups that maximize resilience, helping forest managers choose appropriate species for specific local conditions.

Methodology

1. **Climate Analogue Approach:** Spatial lists of tree species suited to current and future climate projections for Canada will be developed using a climate analogue approach with multi-model climate projections and tree species location data;
2. **Seed Source and Climate Projection Tools:** A North American online tool to identify optimal seed lots by tree species and provenances. See the illustration above.

Timeline

Inter-Theme Links

Theme 2 supports other DIVERSE Themes by:

- **Theme 3:** Providing species and provenances for developing Functional Complex Networks;
- **Theme 4:** Informing landscape-scale modeling;
- **Theme 5:** Assessing the socio-economic implications of species translocation;
- **Theme 6:** Identifying silvicultural scenarios best suited to promote selected species and provenances.

Project Personnel

Theme 2 is led by a researcher from Université Laval with support from the University of Alberta, NCASI, and Université du Québec en Outaouais.

Highly-Qualified Personnel (HQP): 2 PhD, 2 MSc, and 1 Post-Doctoral Fellow.

Projected Deliverables

- **Species Lists:** Spatially explicit lists of tree species suited to Canada's current and future climate projections;
- **Functional Groups:** Regionalized Functional groups incorporating climate-resilient species;
- **Online Tool:** A user-friendly platform designed to assist with seed source selection while offering insights into current and future climatic niches for various tree species.