DIVERSE
Adapting Forests to Global Change

THEME 6

Implementation of Alternative Silvicultural Treatments and Multi-Species Plantations

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 6 Goals & Objectives

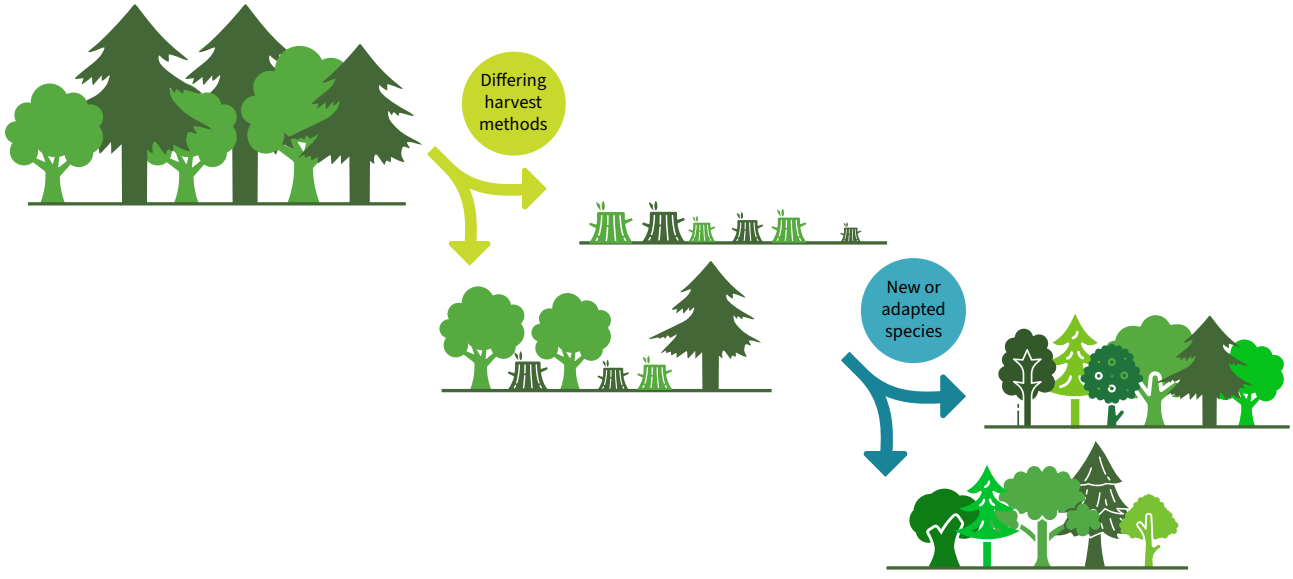
Theme 6 aims to explore alternative silviculture and multi-species tree plantations while leveraging research conducted in Themes 1 to 5. Research undertaken within Theme 6 will also evaluate existing alternative silvicultural treatments and plantations across Canada.

The overall goal is to establish a subset of test sites representing different ecological regions and maintain a range of tree species. Each test site will function as its own standalone research project, and geared to offer opportunities for demonstrations for public engagement and education.

Each test site will focus on opportunities for forest adaptation by influencing forest stand regeneration through:

1) Differing harvest level (i.e. clearcut vs partial harvest);

2) Planting different combinations of current and future adapted species.



Value Statement

Although we now have powerful computer models to help us predict how forests can evolve overtime, field data acquired through observation is still essential. Thus, establishing long-term field experiments utilizing current and novel silvicultural methods allows for opportunities to test forest management amidst global changes. The demonstration sites established through the DIVERSE project will provide lasting benefits, offering long-term opportunities for evaluating how Canada's forests may evolve into the future, and opportunities for research, education, and communication of the study.

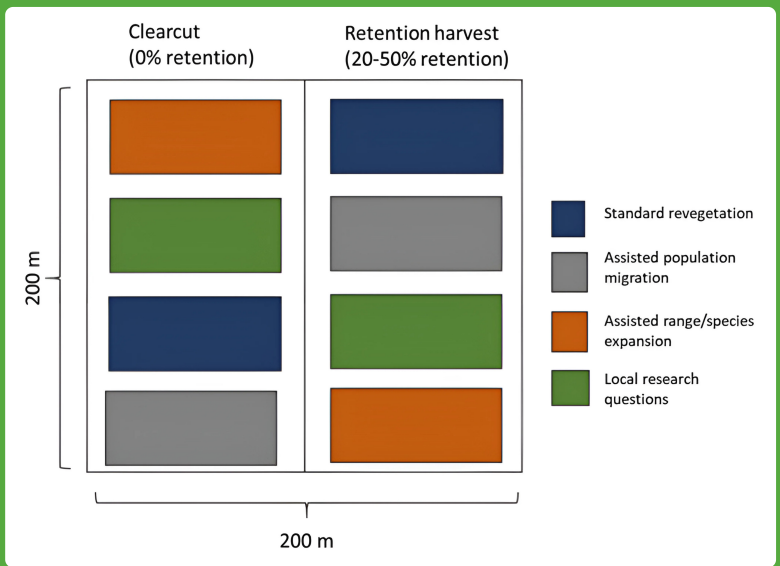
Scientific Background

Global changes threaten the adaptability, resilience, and sustainability of Canada's forests. However, while forest management objectives and goals continue to evolve, there is growing concern around the ability to implement strategies that can reduce the long-term vulnerability of Canada's forests in the face of rapidly changing climate and environmental stressors. Therefore, Theme 6 aims to test existing and innovative new approaches to improve forest resilience through field trials. Field testing of forestry practices is critical as it allows us to evaluate management options under realworld conditions and with direct comparisons to current practices, thereby allowing for more relevant policy guidelines.

Methodology

Each test site will evaluate two main experimental treatments: (1) Overstory Harvest (a clearcut (0-5% retention) and partial cut (20-50%) treatment) and (2) Revegetation treatments, which will include four variations:

1. **Local Revegetation (i.e., control treatment):** business-as-usual reforestation strategy using local tree species/genotypes;
2. **Assisted Population Migration:** utilize current tree species but planting provenances that are better suited to future climate;
3. **Assisted Range Expansion:** Introducing tree species not currently present;
4. **Local Research:** aimed at addressing a project partner research question (e.g., vegetation control, site preparation).



Experimental design layout of treatment groups within a single replicate block.

Each installation will have 3-4 complete replicate blocks, each with a pre-harvest assessment of timber attributes (e.g. species composition, tree heights, basal area, volumes, etc.). Note: Specific tree species treatments to be tested will be determined through partner and research consultations that will leverage research findings from DIVERSE Themes 1-2.

Timeline

2024 2025 — Project partner consultation phase – site identification, tree species selection, identification of local research questions, pre-harvest data collection, establishing site steering committees.

2025 2027 — Planting stock initiated, harvest treatments occur.

2026 2028 — Reforestation treatments implemented.

Inter-Theme Links

- **Theme 1:** Identify current tree species (and mixtures) resilience and adaptability that will influence species selection for planting treatments;
- **Theme 2:** Identify suitable tree species for future conditions that will influence species selection for planting treatments;
- **Theme 5:** Socio-economics associated with alternative silviculture treatments that will influence treatments in silviculture trials.

Project Personnel

Theme 6 is led by researchers from the University of Alberta, with support from the University of Québec at Outaouais, NCASI, Université Laval, and the Ontario Forest Research Institute.

Highly Qualified Personnel (HQPs): 4 MSc, 1 PhD, and 2 Post-Doctoral Fellows.

Projected Deliverables

Establishment of 10 to 12 field sites to conduct silvicultural tests and develop demonstration sites across Canada in different forest types. The trials developed through Theme 6 will showcase a range of silvicultural approaches to adapt forests to global change while enhancing their functional diversity through natural regeneration and planting different tree species. In addition, there will be 4-6 peer-reviewed scientific publications and practical recommendations for silviculturists.