

Forests and Forestry: in a changing climate

Ontario has already experienced changes in climate. As forest species are closely linked to climate and the forestry sector relies on the growth of forest species, a changing climate could significantly impact both the forests and the forestry sector¹. Forest managers will benefit from understanding how forests and trees are vulnerable to climate change in order to develop adaptation measures to build resilience and reduce the risks associated with these vulnerabilities.



Impacts on Tree Species

- In general, the impacts of climate change on tree species include changes in regeneration success, forest health (e.g. reduced vigour, maladaptation, and increased mortality), productivity (i.e. positive in some places and negative in other places), amount of growing stock (i.e. as a result of increased frequency, intensity, duration, and location of disturbances) and species ranges, species composition, age class distribution, and forest structure at any given location, over time².

Wildfire and Drought

- Climate change may increase the frequency and intensity of disturbances, such as fire. By 2080, the overall area burned by forest fire in Ontario could potentially increase by 50% and 300%, with most of the increase occurring in the remote northwestern portions of the province². In some years, longer periods of drought and warmer temperatures may create a situation where fires become unmanageable³.

Spruce Budworm

- Climate models suggest that warmer winter and spring temperatures may result in an extension of the northern limit of spruce bud worm defoliation, a decrease in the frequency of defoliation in the existing defoliation belt and a persistence of the southern limit of defoliation³. The extension northward, without a corresponding loss in the south or center of the belt could result in an increase in total area defoliated of between 22% and 25%⁴.

Species Migration

- Warming temperatures could permit expansion of the northern range limit of many forest species; however, actual species migration may not keep pace with the rate at which the climate changes⁵.



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Adaptation

Adaptation, through modifying forest management policies and practices has the potential to minimize negative impacts and maximize benefits associated with climate change⁶. Actions that could facilitate adaptation⁶ include:

- mainstreaming climate change into forest management using a systems approach⁶
- facilitating assisted migration of tree species and seed sources where data support these activities⁶
- enhancing species adaptation by developing, sharing, and adopting climate sensitive best management practices⁶
- reducing the risk of losses to catastrophic disturbance (e.g. fire and pest outbreaks) through harvesting and “climate conscious” management⁶
- enhancing monitoring to ensure the early detection of the impacts of climate change and the effectiveness of adaptation measures⁶
- incorporating vulnerability analysis, risk analysis, and adaptive management into forest management practices; and continually identifying key knowledge gaps, institutional arrangements, and policies that pose significant barriers to adaptation, and taking actions to rapidly address them⁶
- forest harvest operations could be directed towards the most susceptible stands to reduce the risk of large insect outbreaks⁶

Footnotes

1. Lemprière et al., 2008, Brown 2009, Williamson et al., 2009
2. Johnston, 2009.
3. Williamson et al., 2009
4. Candau and Fleming, 2011
5. Williamson et al., 2009
6. Johnston, 2009

Full References

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Ontario Centre for Climate Impacts and Adaptation Resources (OCCIAR)

OCCIAR specializes in communication of climate impacts and supports adaptation planning to a wide range of stakeholders throughout the province of Ontario.

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