



Agroforestry: Enhancing Resiliency in Canadian Agricultural Landscapes Under Changing Climatic Conditions

Impacts of Climate Change on Canadian Agriculture

There are approximately 65 million hectares of productive agricultural land in Canada (Figure 1). The production system is based primarily on large-scale, industrial monoculture. The food, feed and other agricultural products are destined for local and international markets. Climate change and associated extreme weather variability is a challenge that is bringing a new urgency to concerns about long-term sustainability.

Most regions are projected to warm during the next 60 years. For a high-latitude country like Canada, the warming is expected to be more pronounced than the global average. The result will likely be a longer frost-free season with increased evapotranspiration. This warming may increase productivity, allow expansion of agriculture into new areas, and provide opportunities for growing new and potentially higher profit crops. Negative impacts are also expected, including increased intensity and frequency of droughts, heat waves and flooding. Furthermore, crop pest and disease outbreaks are expected to be more severe than current, along with the potential threat of new pests and diseases. Northern and remote communities will see great changes in their environments – some of these changes may ease food security concerns while others could exacerbate already decreasing food stocks and challenges in delivering supplies to isolated areas.

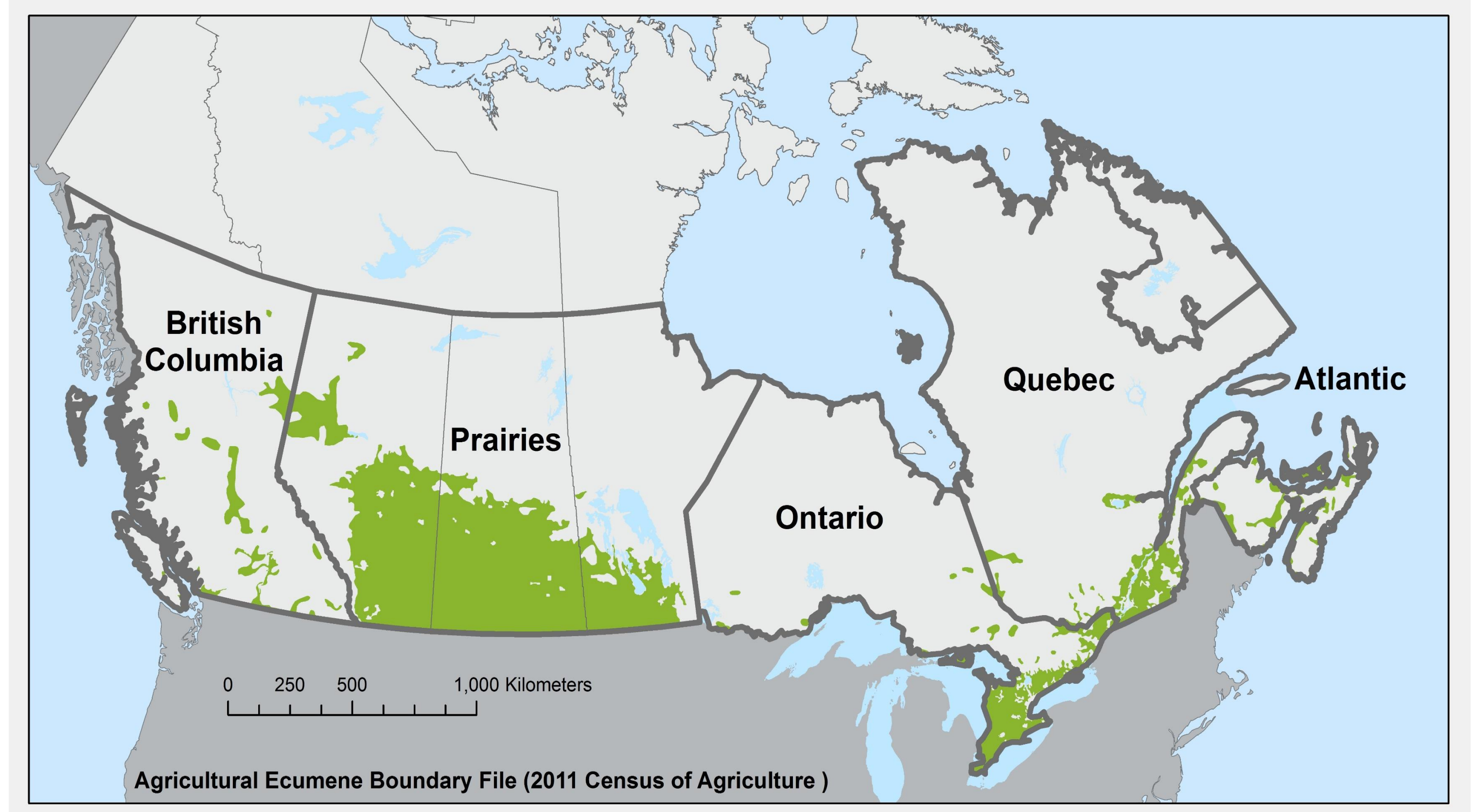


Figure 1. Canadian agricultural extent (in green): most agricultural land is concentrated in the south (Statistics Canada 2012).

Agroforestry Across Canada

Agroforestry provides ecosystem goods and services that support integrated management of farmland and rural spaces. These goods and services include pollination from wild pollinators; suppression of crop pests and diseases; nutrient cycling; carbon sequestration; water purification, cycling and retention; and soil conservation and regulation of soil organic matter.

Farmers and ranchers need land management alternatives that minimize risks from shifting climate and markets while also maximizing ecological services. Increased use of temperate agroforestry practices using diverse species could play an important role in agro-ecosystems to increase the resiliency of Canadian agricultural lands and enhance food security.

Because the climate, soils, and agricultural systems vary considerably across Canada's broad agricultural landscape, agroforestry solutions need to be region specific. Furthermore, each province has unique preferences for agroforestry systems that are adapted to local conditions (Figure 2).



Figure 2. Agroforestry practices across Canada. Left to right: Silvopasture in British Columbia; Farmyard and field shelterbelts in Saskatchewan; Tree-based intercropping research site in Ontario; and Willow riparian buffer on Prince Edward Island.

Reducing Threats and Enhancing Resiliency

Agroforestry can play a critical adaptation role in agricultural areas, lessening the impact of more extreme and variable weather events, increased pest outbreaks, and other climate-related stressors. If agroforestry is expanded, it can also have a significant effect in mitigating greenhouse gas emissions from Canadian agricultural activity. Furthermore, with the possible expansion of Canadian agriculture into new areas under changing weather and climate conditions, agroforestry can be an important tool in enhancing food security, particularly in northern and First Nation communities.

However, currently used tree species (or species that could be potentially used) for agroforestry in Canada are vulnerable to climate-induced fluctuations in insect pests and disease. This is why Agriculture and Agri-Food Canada's Balsam Poplar (AgCanBaP) program is so important. The AgCanBaP program is focussed on developing adaptable native balsam poplar materials (*Populus balsamifera* L.) for use in agroforestry plantings. This program is an example of what is required now to ensure the success of agroforestry as a climate change tool moving forward.

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