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Peterborough Old-Growth Forest Project

A Citizen-science Approach to Identify and Describe Old-Growth Forests in Peterborough County, Ontario

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Introduction

This report describes the *Peterborough Old-growth Forest Project* that was recently funded by the Ontario Trillium Foundation. We are circulating it to publicize this new project and to begin recruitment of citizen scientists. We believe in the power of citizen science as the foundation of a successful local forest conservation program. This project will develop a new approach to identifying old-growth forests in Peterborough County that can be adapted and applied to other regions of Ontario. Results will be made widely available and practically applied to the conservation and restoration of old-growth forests.

The Issue

Figure 1. Intact Forest Landscapes in Ontario (larger than 500 km^2; from: http://www.intactforests.org/world.webmap.html)

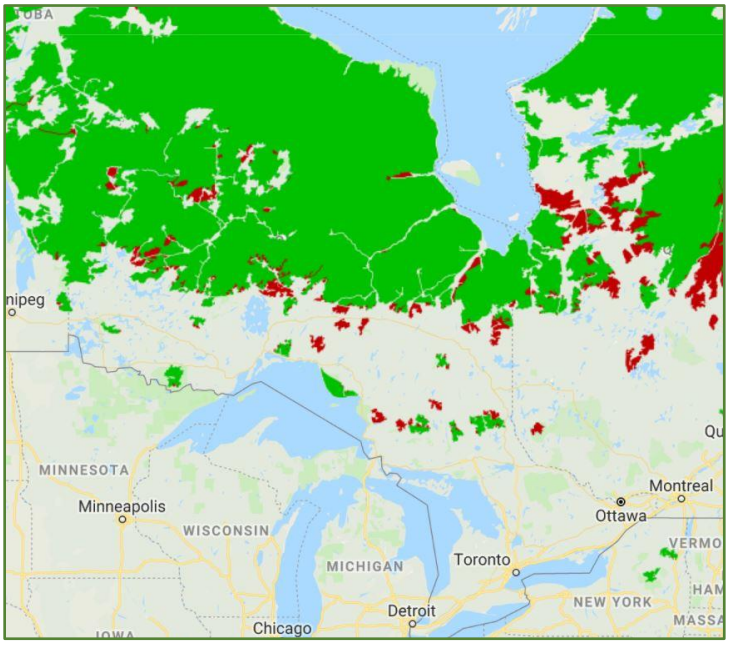
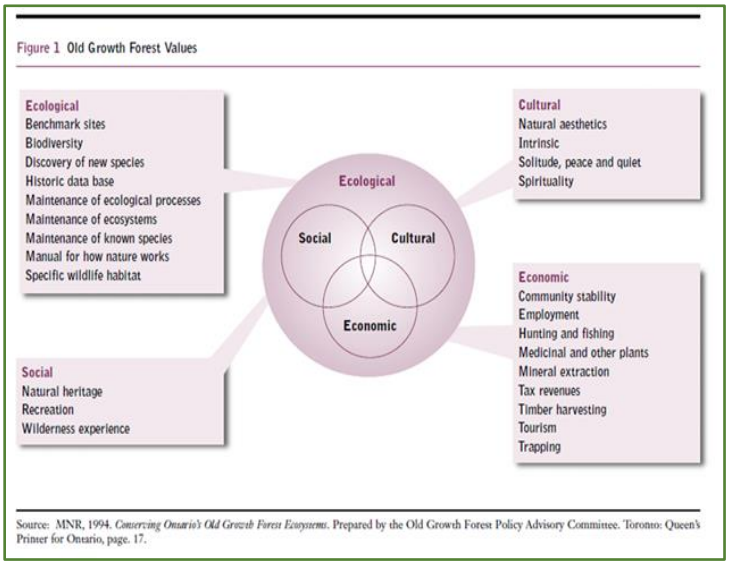


Figure 2. Old-Growth Forest Values (from: Old Growth Policy for Ontario's Crown Forests 2003; *note: we reject mineral extraction and timber harvesting as economic values of old-growth forests*)



Globally, 1.5 million square kilometers of forests were lost to human activity between 2000 and 2012. Similarly, forests in Ontario, including old growth, have continued to decline due primarily to logging, suburban development, agriculture, spread of destructive invasive species and declining public engagement (Fig. 1).

The ecological and cultural importance of old-growth forests in Ontario is specified in both the *Planning Act* and the *Crown Forest Sustainability Act*. In addition, the *Old Growth Policy for Ontario's Crown Forests* describes old-growth forests as the "ultimate expression of the natural forest" that should be managed for a balance of ecological, social, cultural, and economic benefits (Fig. 2).

Many old-growth forests may qualify as endangered ecosystems (Quinby 1993), and they play an important role in biodiversity conservation. For example, Mosseler et al. (2003) found that old-growth forests play a valuable role as reservoirs of both genetic diversity and reproductive fitness.

Old-growth forests also help mitigate climate change by acting as a carbon sink, accumulating and storing large quantities of carbon over many centuries (Luyssaert et al. 2008). Disturbances to old-growth forests release significant amounts of carbon, especially carbon stored in soils, logs and snags (Luyssaert et al. 2008, Pukkala 2018).

Studies have also shown that increased time spent in forests leads to improved human health including decreases in stress, blood pressure, pulse rate and mortality; and that as forest patch size increases, Lyme disease abundance decreases.

After 30 years of working on forest conservation issues (Henry and Quinby 2019), we have found that there is no systematic, organized effort to locate and map Ontario's old-growth forests at risk (rare, threatened, or endangered). According to Ontario Nature, 80% of forest patches in southern Ontario are so small that they can

no longer provide the habitat required by many native species resulting in colonization by destructive invasive pests (Fig. 3).

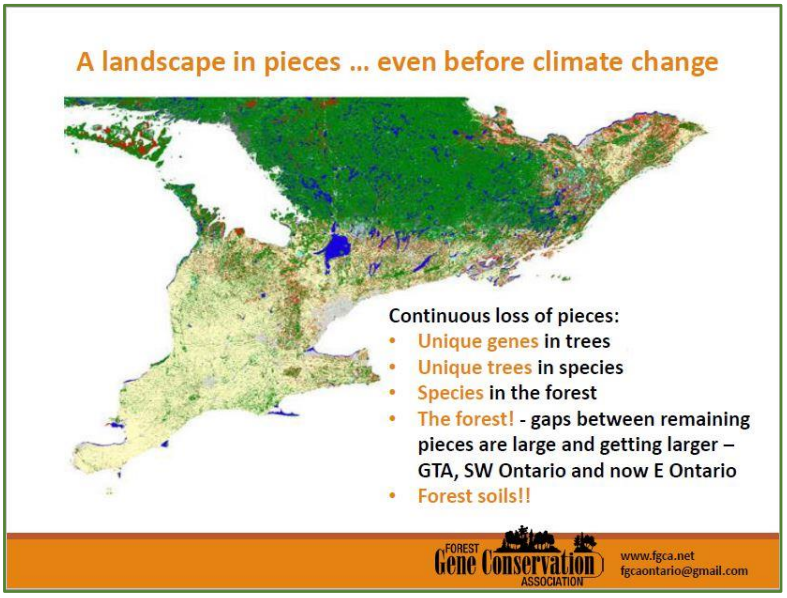
Purpose and Objectives

The purpose of this project is to develop an approach to conserving old-growth forests at risk in Ontario that eventually can be adapted and applied to southern and central Ontario, and to demonstrate this approach in Peterborough County. To do this, we will develop training materials and field protocols for use by volunteer stewards who will identify and map old-growth forest, old trees, invasive species, and insect and disease-resistant trees. Results will be used to facilitate forest conservation through the protection of old-growth forest values (biodiversity and ecological integrity, environmental education, scientific study, recreation, spirituality, and tourism) and restoring forests using native and disease-resistant trees as seed stock.

Project objectives include the following:

- Form partnerships
- Develop simple methods for identifying and recording old-growth forest characteristics
- Produce booklets and handouts
- Recruit and train citizen scientists
- Provide expert guidance
- Map and assess old-growth forests in Peterborough County
- Advance the conservation and restoration of these old-growth forests
- Develop a culture of forest stewardship
- Apply lessons learned to expand the project to southern and central Ontario

Figure 3. Forest Loss in Southern Ontario (green shows forest cover, yellow and brown show loss of forest cover)



The questions we aim to answer with this project are listed below.

- Where are the old-growth forests at risk located, and what are their features?
- Where are insect/disease resistant trees located?
- What is the most effective way to recruit and retain high quality stewards?
- What level of relevant experience, if any, is required?
- What training materials and methods are most effective?
- Do steward attitudes change because of participation?
- Which partner organizations can help collect data, apply it to conservation objectives, and sustain elements of the program beyond the funding term?
- What are some applications and outcomes of collecting the data

Our Approach

We will contact numerous community groups to establish partnerships and to recruit citizen scientists. These groups will include universities, colleges, high schools, Forest Schools, First Nations groups, Girl Guides of Canada, Scouts Canada, Peterborough 4-H, naturalist groups, community service clubs, senior's organizations, outdoor adventure clubs, cottage associations, children's camps, landowner groups, and others. We will also use social media to generate interest in the project.

Training to identify and describe old-growth forests will be provided for citizen scientists (Fig. 4) including the following.

- Four season tree identification
- Recognition of old-growth forest characteristics (old trees, large trees, logs and snags, pit and mound topography, supercanopy trees, structural diversity, low human disturbance, shade-tolerant tree species)
- Reading the forested landscape (soils, fencerows, wolf trees, stumps, stilt-trees / nurse stumps and logs, fire)
- Participation in citizen science, use of smart phone apps
- Use of GPS equipment, compass, range finder and clinometer
- Field sampling of forest soils, vegetation, and wildlife
- Identification of shrubs, understory plants, and wildlife signs.
- Identification of rare and old-growth dependent species such as the endangered pale-bellied frost lichen (*Physconia subpallida*), which has been found in Peterborough County Forests
- Tree seed forecasting and collection
- Invasive species early detection and mapping (e.g., hemlock woolly adelgid, Asian long-horned beetle, dog-strangling vine, giant hogweed, etc.)
- Identifying and mapping disease-resistant trees; especially American beech, elm and ash species
- Certificates of accomplishment for various subject areas will be provided to participants.

Figure 4. **Volunteer Citizen Scientists** (we have recruited over 400 volunteers from 20 countries on more than 50 Earthwatch Institute Expeditions; age ranged from 17 - 70 yrs.)

AFER's Mission and Guiding Principles

AFER is a non-profit scientific organization with a mission to carry out research and education that lead to the identification, description and protection of ancient (pristine) forested landscapes, including old-growth forests. The earth-stewardship principles that guide our work include the following.

- Many forest ecosystem types are now endangered. We consider these ecosystems and other ancient forests to be non-renewable resources, which is not consistent with the practice of mining or logging them.
- We consider biodiversity conservation needs at local, provincial, federal and international scales.
- We support the Government of Canada's official commitment to increase protected areas to 17% of the Canadian land base (Government of Canada 2018).

- We support the *New York Declaration on Forests* to end natural forest loss by 2030 (Climate Focus 2015).
- We support the *Tree-SMART Trade* policy initiatives proposed by the Cary Institute of Ecosystem Studies (2017) to eliminate the importation of invasive insects and pathogens and to prevent tree species declines.

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