Scenario Building: An Accessible Tool for Climate Change Management in Bruce Peninsula National Park

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Overview

Climate change is having many impacts on the environment that have the potential to be damaging to the ecological integrity of Canada's national parks. Neither Parks Canada Agency or any individual park has a climate change oriented management plan, due in large part to restriction of human and financial resources. To help Parks Canada develop a climate change management plan scenario building was selected as an efficient, ecology based, low cost tool and a case study piloting this method was conducted at Bruce Peninsula National Park. Forest health of the park was selected as a key driver, and was found to currently have good ecological integrity. Four scenarios were developed based on the impacts of IPCC primary climate models B1 and A2 and the option for passive and active management.

Background and Rationale

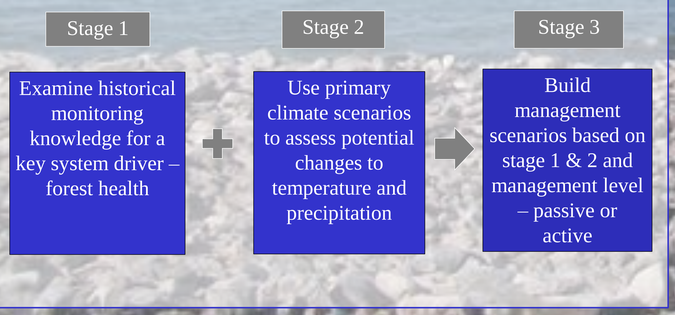
Climate change is causing a wide array of impacts on the environment; changes in temperature and precipitation patterns, altered disturbance regimes, changes in phenology, invasive species, and northward shifting biomes. All of these impacts are threatening the ecological integrity of National Parks in Canada. Parks are mandated to publish and report on their management plans, but Parks Canada as an agency does not have a policy or program in place for climate change management plans. A lack of human and financial resources has been cited as a reason that no action has been taken on developing a climate change management plan. Since that report staffing for conservation has been cut 23% nationwide, and a report by the Environment Commissioner states that Parks Canada is already backlogged in its ability to manage the ecological integrity of its parks.

Objectives

To use Bruce Peninsula National Park to as a case study for creating a tool to assist national parks in creating climate change management plans. This tool will be:

1. Based on a previously existing research program
2. Using basic ecological understanding rather than complicated/expensive models
3. Requires minimal human and financial resources to develop and implement
4. Can be easily transferred and tailored for and among national parks

Conceptual Framework



Forest Health Monitoring

•Forest Health was selected as the key indicator of the health of the Bruce Peninsula National Park, as the park is predominantly covered in forest

•EMAN protocol was used for forest health monitoring – the same protocol could be used by forested parks across Canada

•6 established sites: 3 deciduous and 3 coniferous

•Assessed mortality, abundance, growth, downed woody debris, and regeneration

•Assessment was limited to the one key indicator of forest health, if the financial and human resources were available considering other indicators that also have an established monitoring program would be encouraged

State of the Park Results

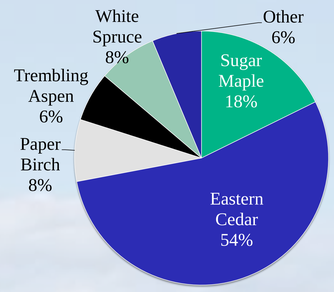


Figure1: Distribution of tree species among all of the sites

Table 1: Results of Annual Growth Rate and Mortality compared to the 2010 State of the Park Report

Site	Annual Growth Rate	Mortality
State of the Park 2010	2.21%	0%
Pendall Point	2.6%	0.53%
Horse Lake Trail	-0.96%	1.28%
Cameron Lake Dunes	2.67%	0%
Emmett Lake	4.00%	0%
Average 2008-2012	2.10%	0.45%

Figure 2: Comparison of total number of trees found per species to the percentage of those trees found dead

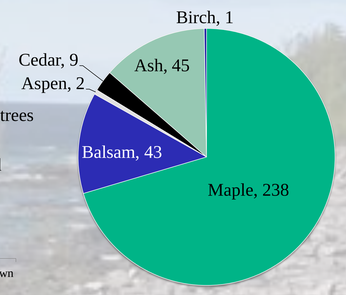


Figure 3: Regeneration result showing the number of seedlings (0-100cm) per species

What is Scenario Building

•Scenario building is a technique for addressing the future that is designed to deal with high levels of uncertainty. It is about creating a suite of possible future outcomes based on a set of drivers that are important to a system. Scenarios provide prospective and alternative projections to how that system may be affected by various drivers Examination of a suite of possible future outcomes can be used as a tool to assess risk as well as influence policy and planning

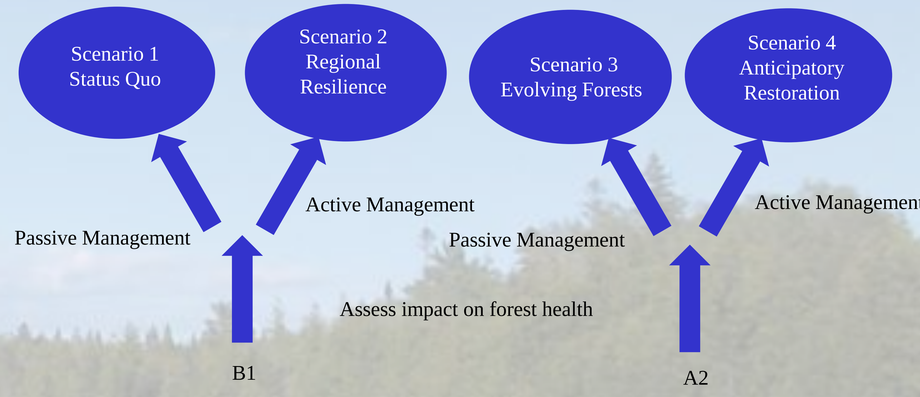
•Scenario Building was a tool originally developed for use in the business community but was adapted for the environment by the Intergovernmental Panel on Climate Change for the Special Report on Emission Scenarios and by the Millennium Ecosystem Assessment

•Scenarios are different from predictions, there are no probabilities assigned to any of the scenarios

•These scenarios are based on how the forest of BPNP will respond to the impacts associated with the primary climate scenarios B1 and A2 of the IPCC .Special Report on Emission Scenarios

• The second branch analyzes the differences in impacts based on management type: Passive management - $0 spent, and Active management - $185000 spent

Scenario Building



Scenario Results

Scenario 1: B1 Passive Management: Status Quo Forest remains very similar with small reduction in health of cedar and balsam fir over time. Most change due to succession forest type dictated by soil depth.

Scenario 2: B1 Active Management – Regional Resilience Forest of generalist trees experiences minimal impact. Opportunity to build ecological integrity by targeting management and removing invasive species

Scenario 3: A2 Passive - Evolving Forests Declines in the health of several boreal conifers but conifer overtake minimal due to poor soil. Increase in shrub plants and invasive species, loss of habitat and EI

Scenario 4: A2 Active – Anticipatory Restoration Use planting to maintain coniferous/deciduous forest structure. More effort needed to maintain hardwood forest, opportunity to reintroduce historic hemlock. Much effort needed to control invasive species and maintain good forest habitat.

Acknowledgments

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