2019 Promoting Biodiversity and Climate Change Adaptation on Agricultural Lands

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Nova Scotia Habitat Conservation Fund
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Department of Lands and Forestry

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For questions on this report, please contact Coastal Action at info@coastalaction.org.

Coastal Action is a non-profit organization based in Lunenburg, NS with a mandate to address environmental concerns throughout the South Shore region of Nova Scotia and beyond. Our mission is to restore and protect the environment through research, education, and action. Coastal Action works mainly within four key research areas: Climate Change & Education, Species at Risk & Biodiversity, Water Quality & Watersheds, and Coastal & Marine.

Project Goal: Education and Enhancement

The "*Promoting Biodiversity and Climate Change Adaptation on Agricultural Lands*" project will install and showcase innovative climate change adaptation and mitigation Beneficial Management Practices (BMPs) that increase farm resilience, biodiversity, and wildlife habitat, as well as sequester atmospheric carbon in plants and soil. Coastal Action will partner with agricultural businesses in southern Nova Scotia to develop demonstration sites that implement and showcase resilience building, carbon sequestering BMPs (such as perennial cropping systems and agroforestry), and habitat provisioning. The sites are intended to function as carbon sinks and as educational tools that will be utilized in demonstration site tours for members of the agricultural community, the public, conservation practitioners, and youth groups. The project will distribute additional educational materials, and host presentations focused on building farm resilience, sequestering carbon, and increasing wildlife habitat through these innovative agricultural practices.

Project Objectives

Support two small agricultural businesses throughout 2019 in southwest Nova Scotia with planning, design, implementation, and management of Beneficial Management Practices for agricultural lands that increase farm resilience, wildlife habitat, and biodiversity conservation.

Increase education for members of the agricultural community on species, particularly those at risk, that are found on farmlands and may benefit from certain plants, or practices that cooperate with wildlife needs (i.e., using specific plants to benefit pollinator species; avoiding pesticides; haying at certain times to avoid disturbing bobolink nests; providing short eared owl habitat on farm perimeters, etc.).

Deliver two presentations in spring 2019 accompanied by outreach materials that showcase BMPs for agricultural lands that increase both farm resilience, wildlife habitat, and biodiversity conservation while educating farm owners on what species at risk may be currently found on their land, what they can do to help conserve the species, and attract species with particular plants and practices. Ensure presentations have strong attendance (25-50 participants) by members of the agricultural community, the public, conservation practitioners, and youth groups.

Host three demonstration site tours in fall 2019 that showcase BMPs for agricultural lands that increase both farm resilience, wildlife habitat, and biodiversity conservation while educating farm owners on what species at risk may be currently found on their land, what they can do to help conserve the species, and attract species with particular plants and practices. Ensure tours have strong attendance by members of the agricultural community, the public, conservation practitioners, and youth groups.

Transform approximately 9-11 acres (36,500 m^2) of degraded, underutilized pastureland into productive, biodiverse agricultural land featuring practices that cooperate with wildlife needs, perennial cropping systems and agroforestry, at agricultural demonstration sites in southwest Nova Scotia.

Increase habitat, biodiversity, and carbon sequestration at each agricultural demonstration site in southwest Nova Scotia by planting a combined total minimum of 300 trees or woody perennials for this project.

Strengthen adaptive capacity to climate change impacts at each agricultural demonstration site in southwest Nova Scotia through improved agricultural soil fertility (which increases the land's capacity to withstand flooding and droughts).

Outline of Work Completed

- Developed and distributed outreach materials to the agricultural community through established channels.
- Supported two small agricultural businesses with planning, design, implementation, and management of Beneficial Management Practices for agricultural lands that increase farm resilience, wildlife habitat, and biodiversity conservation.
- Designed, planned, and installed two demonstration sites that showcase BMPs for agricultural lands that increase farm resilience, wildlife habitat, and promote biodiversity conservation.
- Hosted demonstration site tours in fall 2019 to showcase BMPs for agricultural lands that increase both farm resilience, wildlife habitat, and biodiversity conservation.
- Delivered presentations that showcase BMPs for agricultural lands that increase both farm resilience, wildlife habitat, and biodiversity conservation.

Results

- Distributed approximately 100 information cards to attendees of two educational presentations and three demonstration site tours.
- Distributed outreach materials through four established agricultural organization networks.
- Supported two small agricultural businesses in creating a demonstration site.
- Hosted three demonstration site tours with 26 participants in attendance total.
- Hosted two presentations with 25 participants in attendance total.
- Transformed approximately 36,500 m^2 of degraded and/or underutilized pastureland into productive, biodiverse agricultural land featuring practices like perennial cropping systems and silvopasture that cooperate with wildlife needs.
- Each demonstration site features increased habitat, biodiversity, and carbon sequestration capacity by planting a combined total of 1,042 woody perennials and trees selected to suit site conditions and habitat needs.
- Each demonstration site exhibits a strengthened capacity to adapt to climate change impacts through improved agricultural soil fertility (which increases the land's capacity to withstand flooding and droughts).

Assessment of Achievements and Lessons Learned

Key Achievements:

- Planting an additional 742 trees and woody shrubs beyond our initial goal of 300 (1,042 total plants) to increase plant diversity, pollinator habitat, sequester carbon, and strengthen resilience and adaptive capacity to climate related hazards and natural disasters.
- Supporting two local, small-scale agricultural businesses
    - To develop adaptive capacity in the face of climate change.
    - To install perennial and silvopasture systems to transform 36,500 m^2 of degraded, underutilized pastureland.

Key Lessons Learned:

- It is important to align the grant timeline and activities with the farmers work and growing season schedule in order to:
    - allow the farmer enough time to prepare land for the installation (e.g., lay silage tarp in the fall to prepare the ground for spring planting)
    - reach a greater percentage of the farming community when hosting demonstration site tours
- It is valuable to facilitate knowledge sharing and collaboration between participating farms on the project (e.g., combining tree orders for discounts, sharing resources/tools, discussing challenges and successes).

Recommendations for Follow-up Steps to the Project

- Continue communicating with our agricultural partners to acquire knowledge about the long-term challenges, needs, function, and yield (crop production) of these systems.
- Continue soil testing for net increase in organic carbon as this is a long-term metric.
- Explore the option of converting retired Christmas tree lots into agroforestry systems or restored forests.
- Explore the options for utilizing these systems in larger-scale agriculture.

This project could not have been completely successfully without the support of the Nova Scotia Habitat Conservation Fund.

Thank you on behalf of Coastal Action.

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CARBON SEQUESTRATION ON AGRICULTURAL LANDS

A CLIMATE CHANGE ADAPTATION AND MITIGATION STRATEGY

Why Sequester Carbon on Agricultural Land?

Agriculture makes its largest contribution to climate change with practices that erode and degrade soils, such as plowing, tilling, and clearing of land. These practices diminish the productivity of agricultural lands and release soil organic carbon into the atmosphere. With the agricultural sector contributing to approximately 18% of all human emissions and holding large swaths of degraded land, this industry holds the potential to make significant contributions to climate change mitigation through the application of farming practices that sequester carbon.

Selected Carbon Sequestration Techniques

Annual Cropping Systems

Techniques that allow you to continue growing desired annual crops while increasing carbon sequestration e.g. conservation agriculture, strip intercropping, alley cropping, living hedgerows/ fences/windbreaks, and perennial crop rotation.

Perennial Cropping Systems

Techniques that incorporate more perennials to either replace or integrate with the growing of staple crops e.g. woody agriculture, short-rotation coppice, perennial grains, and herbaceous biomass crops.

Livestock Systems

Techniques for grazing and managing livestock while increasing sequestration e.g. managed grazing and improved pasture management, silvopasture, fodder banks, and restoration agriculture.

Agriculture makes its largest contribution to climate change with practices such as plowing, tilling, and clearing of land.

Additional Benefits

Increasing soil organic carbon on your land also:

- Improves soil fertility (which buffers pH, helps prevent disease in crops, and increases the soil's capacity to hold water).
- Produces higher crop yields.
- Increases drought and flood tolerance.

Tips for Integrating Woody Perennials

Start small! Build your system over time to match your management style and site conditions.

Be prepared to prioritize irrigation while your perennials are establishing themselves (1-2 years).

Seed a cover crop while your perennials establish themselves to help suppress weeds, improve soil fertility, reduce erosion, and increase the soil's capacity to hold moisture.

Select a diversity of perennial species that are cold-tolerant and will thrive in a shorter growing season. Planting a diversity of species enhances biodiversity and reduces the risk of detrimental yield loss associated with storm events, drought, and flooding.

Plant on contour or use keyline design to slow the movement of water across your landscape, increase water absorption, and passively water perennials.

Group species by height and variety to ease harvesting and match species light preferences to site conditions to help ensure they thrive.

Convert sloped/degraded land that is not accessible or suitable for annual production to perennial production.

Additional Resources

Association for Temperate Agroforestry
www.aftaweb.org/about/what-is-agroforestry/alley-croping.html

Evaluating Site Potential for Silvopasture
https://cpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/d/5957/files/2015/03/SP-Site-Evaluation-Form-2gxsk8f.pdf

USDA Alley Cropping Resources
www.fs.usda.gov/nac/practices/alley-cropping.php

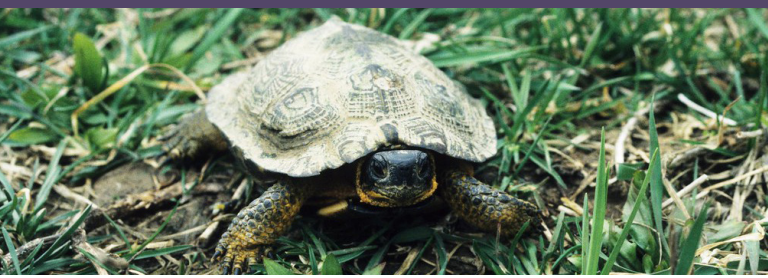
Northeast Climate Hub Silvopasture Resources
www.climatehubs.usda.gov/hubs/northeast/project/agroforestry-angus-glen

USDA Perennial Windbreak Resources
www.fs.usda.gov/nac/practices/windbreaks.php

COASTAL ACTION
RBC
Clean Annapolis River Project
Enhancing the ecological health of the Annapolis River watershed through science, leadership, and community engagement
Nova Scotia Habitat Conservation Fund
Contributions from Hunters and Trappers

SUPPORTING BIODIVERSITY ON AGRICULTURAL LANDS

PRACTICES THAT PROMOTE BIODIVERSITY ON THE FARM



Importance of Biodiversity

Southwest Nova Scotia is a known biodiversity hotspot, and is also home to 75% of Nova Scotia's species at risk. We are lucky to live and work in a part of the world that is home to so many unique and rare species. However, many of these species are in decline, or at risk of disappearing, from this province forever. Agricultural producers have a unique opportunity to help support biodiversity, as they often care for their land deeply and interact with it daily.

Here we hope to provide some ideas and resources that can help you identify what you're already doing, as well as what else you can do to conserve biodiversity. You will also learn about the ways in which biodiversity can benefit your farm and livelihood.

Benefits of Biodiversity

Promoting biodiversity on your farm has many perks. Not only for wildlife, but for farmers and landowners as well!

- Attracting pollinator species such as bees and other insects can improve crop production and yields.
- Creating space for predators such as birds of prey, bats, and some larger mammals can reduce the presence of rodents and mosquitoes on your farm.
- Planting cover crops has been shown to outcompete weeds, reduce disease and insect damage, prevent soil erosion, as well as limit nutrient runoff. This can lead to an increase in crop health and production in future seasons!
- Forested buffer zones make your farm more resilient to the effects of climate change and storm events by providing stream bank and ground stabilization along with wind protection for crops.
- Wetland habitat can help to filter pollutants and sediment from water and reduce the risk of flooding during storm events.

Application Methods and Tips

Leave Dead or Fallen Trees: Standing dead trees provide habitat for flying squirrels, woodpeckers, and other bird species, while fallen trees provide homes for snakes and small mammals, and return beneficial nutrients to the soil.

Create Critter Homes: Adding a bird, bat or pollinator house to your property can attract other species to live on your land.

Leave Wetlands Undeveloped: Wetlands are often biodiversity hotspots, and can contain rare or threatened species.

Create Buffer Zones: Leaving (or planting) forested buffer zones or hedgerows around water sources (lakes, rivers, wetlands) and in between crops, or sections of your farm, helps improve habitat connectivity for many species.

Limit Livestock Access to Streams: Livestock can increase streambank erosion and damage valuable fish habitat and spawning areas.

Change Mowing Habits: By raising your mowing blades (to a height of 150 mm), delaying your hay cutting (until after July 15th), or avoiding cutting altogether, you can help protect endangered wood turtles and other turtle species that live in Southwest Nova Scotia.

Record Species at Risk: If you are lucky enough to spot a species at risk on your land, note the location, date and time, and snap a picture if possible! Send sightings to the Department of Lands and Forestry (see Additional Resources).

Additional Resources

Creature Home Design Plans
https://nature.mdc.mo.gov/discover-nature/activities/woodworking

Biodiversity Landowners' Guide
http://www.farmbiodiversity.ca/

Pollinator Garden Tips & Tricks
https://eastcoastliving.ca/2017/03/calling-all-pollinators/

NS Species at Risk List
https://novascotia.ca/natr/wildlife/biodiversity/species-list.asp

Reports of Rare Species or Habitats
https://novascotia.ca/natr/wildlife/habitats/hab-data/habitat-report-form.asp

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FARMER SPOTLIGHT

SWEET FERN FARM. PLEASANTVILLE, NS

Mhari Lamarque and Chris Pyke run Sweet Fern Farm in Pleasantville, Nova Scotia. On their small mixed farm they grow vegetables, herbs, and flowers, as well as raise pastured chicken and eggs. Sweet Fern Farm serves the Lunenburg and Chester farmers' markets and sells flowers to businesses in Halifax.

For the 2019 Carbon Sequestration on Agricultural Lands Project, Sweet Fern Farm installed rows of perennials (cold-hardy fruit and nut trees) along the contours of a slope with selected successional intercropping of raspberries. Their system makes use of sloped land that is too steep to use for growing annual crops or grazing livestock .

As their trees mature, they hope to have them act as windbreaks for annual crop beds, provide forage for native pollinators and honey bees, as well as produce fruit for value-added products (jams, jellys, preserved peaches).

FARMER SPOTLIGHT

WAYWARD FARM. WEST NORTHFIELD, NS

Casey Vaasjo and Steven Wieler run Wayward Farm located in West Northfield, Nova Scotia where they serve the West Dublin farmers' market and sell their products off the farm. They produce 100% grass-fed heritage beef, pastured eggs, and pastured poultry.

For the Carbon Sequestration on Agricultural Lands Project, Wayward Farm installed a silvopasture farming system which integrates perennial tree crops (cold-hardy fruit and nut trees), with grazing animals (cows, laying hens, and meat birds).

As their tree crops mature, they hope to grow into fruit and nut production and manage their systems to create reciprocal relationships to reduce maintenance and foster co-benefits.