

Field Trips to Otter Ponds Demonstration Forest

Resources and Ideas for Grade 10

For more information about the forest, visit nswooa.ca/otter-ponds/ Questions? Call Andy Kekacs toll free at 1-855-NS-WOODS or write to andy.nswooa@gmail.com.

Science 10 Curriculum (Unit 4: Sustainability of Ecosystems)

What are the factors affecting the sustainability of an ecosystem?

- Explain biotic and abiotic factors which keep natural populations in equilibrium and relate this equilibrium to the resource limits of an ecosystem
 - **Science 10 Curriculum Guide**, p. 62, 63
 - **Presentation:** Present your analysis of the data gathered by your group about the sustainability of your exploration, either orally or recorded on site. This evidence should be documented. Different aspects of the study (e.g., biotic factors, abiotic factors, human impact, biodiversity) should be included. Be sure to address sustainability. Is it sustainable? How do you know?
 - Sustainability involves the environment, the economy, and society working together. An in-depth study of the sustainability of a local ecosystem (pond, lake, tidal pool, field, forest) could be undertaken to collect data. The selected ecosystem could be used for the topic of a public meeting discussed later in this unit.
 - Decide which ecosystem (stream, forest) to study and what kind of data should be collected
 - Forest: species diversity, site characteristics (draw and map), soil characteristics, air quality
 - Stream: water quality, site characteristics, water temperature and composition, turbidity, species present?
 - What external factors are affecting the site?
 - **Science 10: A Teaching Resource**, p. 146-148
 - <https://sapps.ednet.ns.ca/Cart/description.php?II=400&UID=20141002121852198.90.90.193>
 - **Activity 47: Acadian Forest Research Project**
 - Sustainability of an ecosystem is the focus.
 - Part A: Data and Sample Collection
 - Go to an area of Acadian Forest; make 3x3m sample plot; draw site map; write general description of site (slope, direction, steepness, drainage, etc.); measure soil and air temperature; make aerial map; make side view drawing; observe plants and wildlife, make tallies; collect samples (plants, leaf litter, soil, water, garbage)
 - The Acadian Forest Research Project gives students an opportunity to know more about the Acadian forest environment.

- This project can be used as the framework for most of the Sustainability unit. It requires students to investigate cycling of matter, soil composition, trophic levels, food webs, and many more of the outcomes.
 - Excellent for a grade 10 field trip to OPDF. Students can gather all the data mentioned above at various sites around OPDF.
- **Grade 10: Forest Sustainability (Outdoor Program)**
 - <http://novascotia.ca/natr/Education/NREC/lessons/sustain/>
 - Data collection and interpretation in the forest
 - Tools needed: increment borer, caliper, haga or suunto (for tree height), circular plot string, etc.
 - Data collection sheet sections: forest inventory, soils data, site regeneration, tree data, forest biodiversity.
 - Use data to develop Forest Sustainability Plan
 - Same as above, excellent opportunity for grade 10 students to visit OPDF
 - Great activity for teaching students about management planning and how to use basic forestry measurement tools/equipment
- **Earth Rangers, Monitoring Wetlands**, pp. 5-6
 - http://www.earthrangers.org/wp-content/uploads/2013/06/monitoring_wetlands.pdf
 - **Wetland Field Trip**
 - Survey Procedure
 - Get your bearings
 - What does the wetland look like?
 - How does the wetland fit into the landscape?
 - Measure and observe
 - Temperature, water quality, signs of life, surroundings, signs of pollution and human disturbance
 - Good activity to teach students about wetlands at OPDF
 - Ducks Unlimited's 'How to Deliver a Wetland Field Trip' would be a good additional resource for this
 - Can discuss the kinds of wetlands present at OPDF
 - Can look at ways to monitor wetlands to measure effects of external factors like harvesting
 - Can discuss OPDF's role in the Tangier River watershed
 - Can discuss ways to harvest wood which would avoid/minimize negative impacts to surrounding wetlands
- **University of Wisconsin, LEAF K-12 Forestry Education Program (Field Experience 5: Habitat Assessment)**, pp. 1-7
 - http://www.uwsp.edu/cnr-ap/leaf/SiteAssets/Pages/9-12-Wisconsin-Forestry-Lesson-Guide/5_HabitatAssessment.pdf
 - **Nutshell:** Students work in small groups and use wildlife habitat requirements to assess potential animal habitat based on map interpretation, plant and forest

inventory information, on-site forest composition and structure, and wildlife habitat needs.

- **Big Ideas:**
 - There is biodiversity within a forest. Different forests have different levels of biodiversity.
 - Forests impact air and water quality, prevent soil erosion, and provide habitat for wildlife.
 - **Objectives-** Upon completion of this lesson, students will be able to:
 - Identify specific components of the forest that provide wildlife habitat.
 - Assess the value of an area of the forest as habitat for a wildlife species.
 - **Activity 3: Conducting the Habitat Assessment**
 - Go to the woods, collect data, conduct an assessment
 - Could choose a few key species and assess OPDF sites to see if they meet the habitat requirements of these species (choose different kinds of species—Tree? Large mammal? Invertebrate? Bird? Aquatic species?)
 - Discuss the importance of biodiversity in the Acadian Forest and how to manage it to promote biodiversity
- **Manitoba Model Forest, Sustainable Forest Ecosystems, p. 9**
- <http://www.manitobamodelforest.net/publications/Sustainable%20Forest%20Ecosystems%20-%20A%20Senior%20%20Science%20Unit.pdf>
 - **Activity 4: Investigating the Ecology of a Rotting Log**
 - **Background Information:** An ecosystem can be as small as a tiny pond, or even as small as a log rotting on the forest floor. In this activity you will explore and identify life forms found in this common microecosystem.
 - Have student examine the log for life, moisture content, etc.
 - A log acts as a small, easily observable ecosystem to study
 - Students can collect information on what species are present, how they fit into the food web, what their habitat niche is, the nutrient cycles taking place in the log, what decomposers do, the role of fungi, plants, etc.
 - OPDF is an ideal place to find logs such as this
 - Could combine this activity with others for a full day trip
- **Manitoba Model Forest, Sustainable Forest Ecosystems, p. 139**
- <http://www.manitobamodelforest.net/publications/Sustainable%20Forest%20Ecosystems%20-%20A%20Senior%20%20Science%20Unit.pdf>
 - **Activity 17: Field Project -- Study of the Forest**
 - **Background:** In this field project, the students will select a parcel of forested land and complete a thorough assessment of the following:
 - All components of the ecosystem—soil-water-vegetation analysis
 - Compartments within the forest stand (age classes, vigor, canopy, understory)
 - Wildlife habitat (species present; food web; habitat features)

- The silvics of the species which make up the stand (coniferous, deciduous, shade tolerant/intolerant, etc.)
 - Write a management plan
 - Create a map from aerial photos
 - Students can learn about what information is required to make good management planning decisions and how to collect and analyse that information
 - OPDF organizers can provide class with aerial photos and a section of OPDF's management plan, which can then be explained on the ground
 - This longer-term activity, which can be rooted in the forest at OPDF, is a good opportunity to teach students about uneven-aged forest management and good stewardship
- **Focus on Forests, The Choice is Ours**
 - <http://www.focusonforests.ca/lessons/index.php/intermediate/20>
 - Give students forest management scenarios and ask them to think of solutions
 - Different management for softwood/hardwood/mixedwood stands
 - Young stands that are too dense
 - Old stands that are too dense
 - Mature stands with little or no regeneration
 - Stands bordering wetlands
 - Stands with raptor nests or other endangered species present
 - Stands with lots of blow downs
 - Areas where woods roads/trails would be useful
 - How time of year influences which treatments should/should not be done
 - How soil composition and fertility influences what will grow well on different sites
 - Maybe introduce students to the Forest Ecosystem Classification guides as a tool for management planning
 - Could tailor them to different sites in OPDF and take students to the sites
 - Discuss how woodlot management should depend on forest conditions and woodlot owners' personal goals and values
- **Canadian Forestry Association, Canada's Forests: A Breath of Fresh Air (Vol. 2: Climate Change), pp. 33-35**
 - http://www.canadianforestry.com/kits/english/Vol2_e.pdf/Vol2_e.pdf
 - **Activity Eight: The Carbon Cycle and Canada's Forests**
 - **Summary:** Students will explore the nature of the carbon cycle and its relationship to different processes within the forest. They will come to understand the dynamic nature of forests in storing and releasing carbon. They will look at their local forest, and come to understand its role in natural processes, particularly the carbon cycle.
 - Students will:
 - discuss carbon and the carbon cycle

- gain an understanding of why carbon is a concern in global warming and look at the evidence that proves this natural cycle is out of balance
 - look at the life cycle of the forest and forest succession, and at the different processes in the forest to learn which store and which release carbon
 - discuss the role of Canada's forests in acting as carbon sinks
 - This is not necessarily an on-site activity but one that could be tied in with another activity to make it a full day
 - Students can learn about carbon cycling in forests and the importance of carbon storage and how it relates to climate change
 - An informed speaker (Dale Prest perhaps?) could lead students through the woods and discuss the role of forest in the carbon cycle and how this should affect forest management planning
- Plan changes to, predict the effects of, and analyse the impact of external factors on an ecosystem
 - **Science 10 Curriculum Guide**, pp. 63-64
 - Pose questions that require students to predict the effects of external factors on the sustainability of the ecosystem.
 - It is suggested that an ecosystem, that is significant to your community be selected to form the context of this unit. [...] A simulated public meeting to discuss a proposed project might serve as the vehicle to reach the outcomes. Choose a project that will affect the ecosystem. [...] Challenge students to develop a way of assessing human impact. Identify the external factors. What baseline data must be gathered? How will the impact be determined? Over what time periods should the impact of these effects be monitored? Have students discuss plans of action to lessen this impact.
 - Challenge students to define the critical questions and issues, to conduct research into the present conditions and potential impact, and to collect evidence to support a given interest group. By role-playing a public meeting, students will practice skills of research, presentation, and communication. A field trip to a pristine area, and then to an area that has been impacted, might enable students to assess the impact on the sustainability of an ecosystem.
 - Can take students to a clearcut on the edge of OPDF and then to various sites within OPDF to show the difference between the impacts of different kinds of management (even-aged vs uneven-aged management)
 - Discuss with the students the impacts (negative and positive) different harvesting techniques have on the ecosystem and how to lesson negative impacts
 - OPDF could be the setting for the 'public meeting' activity recommended by the curriculum guide (students can research their roles before coming to OPDF and be prepared to present the views of their stakeholder)
 - Think of a project that could be the topic of a public meeting; does not necessarily have to be linked to OPDF (highway expansion? wetland alteration? Large-scale clearcut?)

Sustainability Issues in an Ecosystem

- Analyse the impact of external factors on the ecosystem
 - **Focus on Forests, A Fine Balance**
 - <http://www.focusonforests.ca/lessons/index.php/intermediate/0>
 - Role playing scenario where students take on the roles of different forest/community interest groups
 - OPDF might be a good setting for the final 'public meeting' simulation
 - Similar to Science 10 Curriculum Guide, pp. 63-64 resource above
- Explain why the ecosystem may respond differently to short-term stress and long-term change
 - **Science 10 Curriculum Guide, p. 62**
 - *Students will be expected to diagnose and report the ecosystem's response to short-term stress and long-term change*
 - This could be a long term project focussed on monitoring the effects of harvesting in OPDF on the surrounding area (separate info available on research opportunities at OPDF)
 - Could monitor species populations, water quality, soil quality, air quality, biodiversity, regeneration, and other indicators of ecosystem health

Extension to the biosphere

- Describe how soil composition and fertility can be altered and how these changes could affect an ecosystem
 - **Manitoba Model Forest, Sustainable Forest Ecosystems, p. 72-74**
 - <http://www.manitobamodelforest.net/publications/Sustainable%20Forest%20Ecosystems%20-%20A%20Senior%20%20Science%20Unit.pdf>
 - **Activity 8: A Study of Soil Horizons**
 - Purpose:
 - To compare the soil profiles of two different sites
 - To compare the level of productivity of topsoil and subsoil
 - Dig a soil pit; examine the layers
 - Students could dig/view soil pits at several sites around OPDF and compare the soil horizons in each
 - Explain what each of the horizons are, how they form, and what information they give us
 - Teach students about the importance of soil health and fertility in forestry and give examples of how soil types influence the kinds of species that can grow on a site
 - Could introduce students to the NS Forest Ecosystem Classification guide for soils and explain how foresters use it for management planning
 - **Focus on Forests, Reforestation**
 - <http://www.focusonforests.ca/lessons/index.php/intermediate/20>

- Take students to the forest; discuss different types of reforestation (natural/artificial); have students choose which would be best for different sites
- Would work best if combined with other topics and activities to create a full-day or half-day trip

English Language Arts 10 Curriculum

pp. 34-35 “Students will be expected to speak and listen to explore, extend, clarify and reflect on their thoughts, ideas, feelings and experiences.”

- Small group discussions, informal debate, oral presentations
 - **Science 10 Curriculum Guide, p. 63**
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pp. 40-41 “Students will be expected to communicate information and ideas effectively and clearly and to respond personally and critically.”

- Small group discussions, debates, oral presentations, seminars, re-enactments
 - **Science 10 Curriculum Guide, p. 64**

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Other Resources for Planning Field Trips to OPDF

Ducks Unlimited Canada, How to Deliver a Wetland Field Trip

- <http://www.ducks.ca/assets/2012/07a/deliverfieldtrip.pdf>

Ducks Unlimited Wetlands Education Program, Wetland Ecosystems 3, pp. 18-19

- <http://www.ducks.ca/assets/2012/06/Grade9-12teacher.pdf>
- **Lesson 6:** Wetland Field Trip
 - At the completion of this lesson, students should be able to:
 - work in field teams in a safe manner
 - draw field maps
 - set out study plots
 - collect animal samples
 - measure water clarity
 - measure and calculate water flow
 - identify and measure plant and animal specimens
 - identify adaptations of animals to their environment
 - identify wetland impacts
 - The lesson plan could be tweaked to include NS curriculum outcomes for grade 10 students