

Benefits of Trees

LESSON PLAN

ALSO FOR
SCIENCE AND
TECHNOLOGY
LESSON PLAN

GRADE: 8

SUBJECT & STRAND: Geography, Strand A – Global Settlement: Patterns and Sustainability

LESSON(S) TOPIC: Benefits of Trees

DURATION: 120 minutes

CURRICULUM EXPECTATIONS

Overall Expectations

- A1. Application:** Analyze some significant interrelationships between Earth's physical features and processes and human settlement patterns, and some ways in which the physical environment and issues of sustainability may affect settlement in the future. (*FOCUS ON: Interrelationships*)
- A2. Inquiry:** Use the geographic inquiry process to investigate issues related to the interrelationship between human settlement and sustainability from a geographic perspective. (*FOCUS ON: Geographic Perspective; Inter-relationships*)
- A3. Understanding Geographic Context:** Demonstrate an understanding of significant patterns and trends related to human settlement and of ways in which human settlement affects the environment. (*FOCUS ON: Pat-terns and Trends; Spatial Significance*)

Specific Expectations

- A1.3** Describe possible features of a sustainable community in the future, and analyze some challenges associated with creating such a community.
- A2.1** Formulate questions to guide investigations into issues related to the interrelationship between human settlement and sustainability from a geographic perspective.
- A2.2** Gather and organize data and information from a variety of sources and using various technologies to investigate issues related to the interrelationship between human settlement and sustainability from a geographic perspective.
- A2.3** Analyze and construct various print and digital maps as part of their investigations into issues related to the interrelationship between human settlement and sustainability, with a focus on investigating the spatial boundaries of the issue.



A2.4 Interpret and analyze data and information relevant to their investigations, using various tools and spatial technologies.

A2.5 Evaluate evidence and draw conclusions about issues related to the interrelationship between human settlement and sustainability.

A2.6 Communicate the results of their inquiries using appropriate vocabulary.

A3.5 Describe various ways in which human settlement has affected the environment.

A3.6 Describe some practices that individuals and communities have adopted to help make human settlements more sustainable.

Cross Curricular Connection Example

Grade 8 Science, Understanding Earth and Space Systems: Water Systems

- Overall Expectation 2: Investigate factors that affect local water quality.



LEARNING GOALS

- » Understand the interrelationships between trees, the wider natural environment and sustainable communities
- » Identify the ways in which trees contribute to sustainable communities
- » Identify social, environmental and economic benefits of trees

ENVIRONMENTAL EDUCATION CONNECTIONS

KNOWLEDGE

- The resources of the Earth, particularly soil, water, minerals, and air, their characteristics, and their role in supporting living organisms;
- The nature of ecosystems and biomes, their health, and their interdependence within the biosphere;
- The dependence of humans on environmental resources for life and sustenance;
- The characteristics of human societies, including nomadic, hunter-gatherer, agricultural, industrial, and post-industrial, and the impact of each on the natural environment;
- The interconnectedness of political, economic, environmental, and social issues in the present world;
- Cooperative national and international efforts to find solutions to common environmental issues and to implement strategies for a more sustainable future.

SKILLS

- Define such fundamental concepts as environment, community, development, and technology, and apply these definitions in local, national, and global contexts;
- Use a range of resources, communications skills, and technologies in addressing environmental questions;
- Develop problem-solving skills and critical and creative thinking skills, including the ability to reason and apply logic, to recognize and apply abstract patterns, to identify connections and relationships between ideas and issues, and to test ideas against new information and against personal experience and beliefs;
- Work towards a negotiated consensus when there are differences of opinion;
- Detect and assess bias and evaluate different points of view;
- Recognize the need to incorporate an environmental perspective in decision making models.

ATTITUDES

- Appreciate the resilience, fragility, and beauty of nature and develop respect for the place and function of all living things in the overall planetary ecosystem;
- Appreciate that human life depends on the resources of a finite planet;
- Appreciate the challenges faced by the human community in defining and implementing the processes needed for environmental sustainability;
- Develop a sense of balance in decisions that involve conflicting priorities.

LESSON PART 1: MINDS ON/GETTING STARTED

(20-25 MIN)

ACTIVITY 1: GRAFFITI ACTIVITY

(SMALL GROUPS/WHOLE CLASS)

- In small groups, students will discuss the following question: *How do trees contribute to sustainable communities?*
- Have three pieces of chart paper or three white boards around the classroom with the following labels:
❶ Social ❷ Economic ❸ Environmental
- Based on the group conversations, have students organize their thoughts surrounding the initial question into the three different aspects of sustainable communities
- Debrief student answers and have a whole class discussion to highlight key points
- Tell students that our focus for the lesson will be around how trees contribute to sustainable communities in the following ways:
❶ Carbon sequestering ❷ Air quality ❸ Water quality
- Share learning goals to help students monitor learning throughout lesson:
 - » Understand the interrelationships between trees, the wider natural environment and sustainable communities
 - » Identify the ways in which trees contribute to sustainable communities
 - » Identify social, environmental and economic benefits of trees

LESSON PART 2: WORKING ON IT

(50-60 MIN)

ACTIVITY 1: SCHOOLYARD TREE ASSESSMENT

(SMALL GROUPS/WHOLE CLASS)

- Working in small groups of 3-4, students will visit 2-3 different sites within the schoolyard to assess local tree health
- Each group will work to assess the health of 2 trees at each site visited in the schoolyard by collecting data on parameters including:
 - » Tree ID
 - » Tree Height
 - » Canopy cover/density
 - » Conifer vs. Deciduous
 - » Diameter at Breast Height (DBH)
 - » Evidence of animal activity (e.g., nests, tree cavities, grazing, etc.)
 - » Evidence of damage/disease (e.g., fungi, disease, missing/discoloured leaves, etc.)

MATERIALS:

- Personal device
- Survey 123 Mobile App
- *Tree Assessment Data Sheet*
- *Data Submission Guide: EcoSpark Survey 123*
- *How to Use a Spherical Densiometer*
- Clip boards
- Pencils
- Spherical densiometer
- Clinometer
- Measuring tape
- DBH tape
- Optional: EcoSpark's Monitoring the Moraine

- Provide students with the following guides to assist in data collection and reporting:
 - » *Data Submission Guide: EcoSpark Survey 123*
 - » *How to Use a Spherical Densiometer*
 - » Tree ID field guide or mobile application (e.g., EcoSpark's *Monitoring the Moraine* guide for tree identification, TD Tree Bee, etc.)
- Each group will record data in the *Tree Assessment Data Sheet* and input data into the EcoSpark Survey 123 form
- Data submitted via the EcoSpark Survey 123 form will contribute to the creation of an ESRI citizen science map of schoolyard tree health across Southern Ontario
- Have each group use the data recorded in their *Tree Assessment Data Sheet* to make predictions about how healthy the school's wooded areas are
- Use the following questions to guide discussion among groups and conduct a class debrief of the activity:
 - » Where are trees located in the schoolyard? Is there a spatial pattern?
 - » Is there a variation in tree health within the schoolyard?
 - » What are some human activities in the local community that may be affecting the health of the trees in the schoolyard?
 - » How are the trees helping the local community, including wildlife and humans?

ACTIVITY 2: SPATIAL DATA ANALYSIS

SPATIAL DATA ANALYSIS (SMALL GROUPS)

- In the same groups as the previous activity students will pick 2-3 of the parameters from the EcoSpark Survey 123 data they collected to analyze spatially
- Each group will analyze the spatial distribution of their chosen parameters within the schoolyard using the ESRI web map created through the data contributed by the whole class to EcoSpark's Survey 123
- Students should consider the following guiding questions during the spatial data analysis of their chosen parameters:
 - » How are the different parameters distributed spatially?
 - » What factors may be influencing how the different parameters are spread out spatially (e.g., human activity, location infrastructure, animal activity, other plants, etc.)?
 - » Is there a relationship between parameters?

SAMPLE STUDENT-LED INQUIRY

Add a question column to the *Tree Assessment Data Sheet* for students to record their questions during data collection. Use these questions to guide the Activity 1 debrief.

As a class determine whether the questions are descriptive, comparative or correlative.

MATERIALS:

- Chrome-books/personal devices
- *Trees & Sustainability Research Guide*

- Students will use the *Trees & Sustainability Research Guide* to research how their chosen parameters from EcoSpark's Survey 123 may influence the ability of their schoolyard trees to do one of the following:
 - » Sequester carbon
 - » Improve air quality
 - » Improve water quality
- Based on the spatial analysis and research, students must determine where within the schoolyard a tree planting would be most beneficial, with respect to carbon sequestering, air quality or water quality
- Each group will develop a short (5 minute) presentation to articulate their findings and justify the location they chose for the schoolyard tree planting

SAMPLE STUDENT-LED INQUIRY

Instead of providing guiding questions, have students generate a series of question to investigate how their chosen parameters are distributed spatially. (e.g., does tree height change based on the location of the tree in the schoolyard, are there areas where with no tree damage, etc.)

Have students determine whether these questions are descriptive, comparative or correlative.

LESSON PART 3: CONSOLIDATION AND DEBRIEF

(30-35 MIN)

WRAP UP

(SMALL GROUPS/WHOLE CLASS)

- Student presentations
- Following presentations, discuss the following as a whole class:

How can we improve the sustainability of our local community with trees?

 - » In which areas of our schoolyard are trees needed the most? Why?
 - » Where would be an ideal location for a tree planting based on the presentations we have seen?
 - » How would tree planting in the chosen location benefit our local community socially, economically, and/or, environmentally?

MATERIALS:

- Computer & projector

ADDITIONAL CONSIDERATIONS

EXTENSION ACTIVITIES

- Create an ESRI story map to communicate schoolyard tree assessment findings, have students use this to guide their presentation of the best location for a tree planting
- Host an EcoSpark School Watch session to gather additional citizen science data to improve the sustainability of the local school community
- Take action: use the EcoSpark Survey 123 data and ESRI web map to plan and implement a schoolyard tree planting to improve community sustainability

ADAPTING TO DIFFERENT GRADE LEVELS

Senior Level

- Use EcoSpark's *The Air We Breathe* teacher guide or the **Davey Tree Benefits Calculator** to calculate the amount of carbon sequestered by each sampled tree
- Analyze spatial relationships between all parameters contributed to EcoSpark's Survey 123 form
- Calculate air quality and water quality parameters for sampled trees
- Collect additional data biotic and abiotic data (e.g., soil testing, wildlife observations, etc.) to analyze how trees contribute to sustainable ecosystems
- Have students research the conditions required for various species of trees to survive and select which types of tree species would be best to plant in a given area of the schoolyard

Junior Level

- Calculate and analyze the biodiversity of the trees sampled by the whole class
- Discuss the different animals that use trees and how they use them (e.g., food, shelter, etc.)
- Discuss how trees contribute to mitigating climate change
- Create posters of different trees found in schoolyard and label identifying features

REFERENCES

- Davey. (n.d.). *National tree benefit calculator*. www.davey.com/arborist-advice/articles/national-tree-benefit-calculator
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- ESRI Canada. (2019) *Nature in my community*. <https://k12.esri.ca/resourcefinder/#/subject=geog/resourcecetype=lesson/lang=en>
- Ontario Ministry of Education. (2009). *Acting today, shaping tomorrow: A policy framework for environmental education in Ontario schools*. Ontario Ministry of Education. www.edu.gov.on.ca/eng/teachers/enviroed/ShapeTomorrow.pdf
- Ontario Ministry of Education. (2013). *The Ontario curriculum: Social Studies, grades 1 to 6; History and Geography, grades 7 and 8*. www.edu.gov.on.ca/eng/curriculum/elementary
- Ryken, A.E., Otto, P., Pritchard, K., & Owens, K. (2007). *Field investigations: Using outdoor environments to foster student learning of scientific processes*. Pacific Education Institute.

SCHOOL WATCH LESSON PLAN

School Watch introduces students, grades 6 to 12, to the world of citizen science through customized curriculum-linked classroom and on-site activities.

EcoSpark's School Watch program provides the lesson plans and tools - such as butterfly nets, binoculars, and tree measuring tools - to deliver citizen science projects suitable for most school grounds. EcoSpark staff lead facilitated two-hour outdoor sessions with students, on or near the school grounds, to bring curriculum based concepts to life. In addition to providing the necessary equipment we supply data sheets and other project materials such as identification keys.

EcoSpark believes strongly in the benefits of outdoor education but also recognizes that during the Covid-19 crisis not all education will take place in traditional school learning environments. In addition to our in-person programs we have modified remote learning options available with flexible scheduling and delivery variations based on board, school and teacher needs and requirements.

For more information or questions, please contact:
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