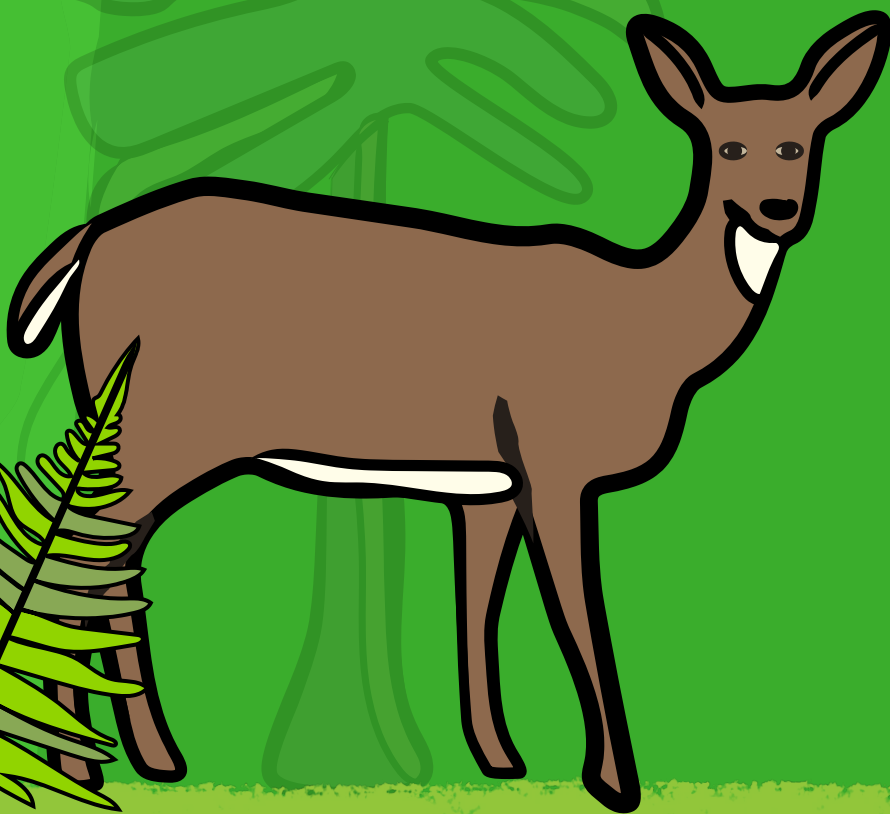


Let's GO to the Forest!

Field Trip Ideas and Activities to Explore in Forests
in BC Parks and other Special Places in B.C.

GRADES 7-9 MODULE



BC Parks



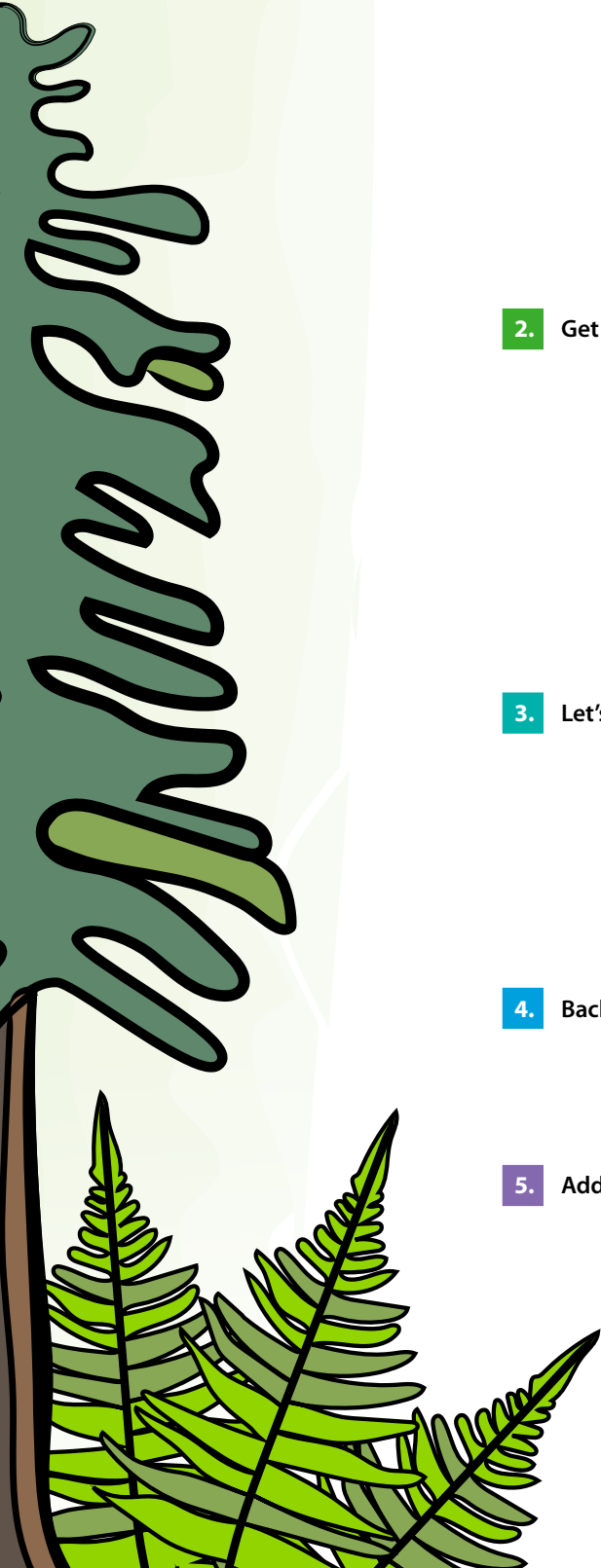
HCTF Education



HABITAT CONSERVATION
TRUST FOUNDATION

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Meet the Forest

The world's forests are incredibly diverse. Forests cover 1/3 of the earth's surface and contain an estimated 3 trillion trees. Forests exist in dry, wet, very cold, and extremely hot climates. These different forests all have special characteristics that allow them to thrive in their particular climate. Broadly speaking, there are three major forest zones that are separated according to their distance from the equator. They include the tropical, temperate, and boreal or taiga forests, and the specific types of forests within each of these larger regions.

Forests in British Columbia

British Columbia is characterized by its abundant forests, rugged Pacific coastline, mountainous terrain, plateaus, and numerous lakes and rivers. Forests cover close to two-thirds of the province – an area of almost 60 million hectares. Our large and diverse province varies physically and biologically more than any other region in Canada. Across all these areas forests are the dominant vegetation. There are 40 different species of native trees in B.C. each adapted to varying climates and landforms. For example, Western redcedar grows on the coast and in the wetter parts of the interior, Engelmann spruce and subalpine fir are found in higher elevations where winters are cold and there are heavy snowfalls, Garry oaks only grow in the drier forests along the southeastern coast of Vancouver Island and Gulf Islands, and the towering ponderosa pines prefer the open savannah and dry heat of the southern interior.

A walk in any of B.C.'s forests, from alpine krummholz and coastal temperate rainforest to boreal spruce and the open pine forest of the southern interior, is a feast for the eyes. Whether it is the musky scent of skunk cabbage, the sweet smell of calypso orchids, the dry crackle and snap of fallen leaves or the feathery feel of a hemlock bough, every forest has its own smells, sounds and textures.

Why are Forests Important?

Our forests contribute to the Earth's biodiversity and include species, genetic and ecosystem diversity. They provide critical habitat for a myriad of animal and plant species, fungi and microorganisms. A significant portion of the species in B.C. depend on forests. This includes 82% of freshwater fish, 72% of the amphibians, 60% of the mammals, 50% of breeding birds and 31% of the reptiles. Forests are the lungs of our planet. They play a crucial role in stabilising global climate by converting carbon dioxide into oxygen. As we pump more and more carbon dioxide into the atmosphere the forest's ability to regulate the global climate is increasingly diminished. As the dominant living part of a forest, trees play a vital role in providing wildlife habitat, nutrient cycling, soil conservation, the exchange of gases, and the water cycle.

Trees provide us with fruits, nuts, seeds and sap, as well as a cornucopia near the forest floor, from edible mushrooms, berries and beetles to larger animals like deer, turkeys, rabbits and fish. Forests provide a wealth of natural medicines. For example, taxol, a potent anti-cancer drug is found in Pacific yew. Taxol is now being synthetically made. Indigenous people use the trees and forest for food, clothing, transport, cooking, storage, and medicine.

By growing a canopy to absorb sunlight, trees also create vital oases of shade on the ground. Urban trees help buildings stay cool, reducing the need for electric fans or air conditioners, while large forests can tackle daunting tasks like curbing a city's "heat island" effect or regulating regional temperatures.

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"This is the temperate rainforest, not just big trees, but little trees growing on big trees growing on fallen trees lying atop rotted trees, linked in an unbroken chain of life thousands of years long."

- Randy Stoltmann,
Written by the Wind

Forest Definition

- *By definition, a forest is a dense growth of trees, together with other plants, covering a large area of land. It is also an ecosystem, consisting of a community of plants and animals interacting with one another and with the physical environment.*



A forest's root network stabilizes huge amounts of soil, bracing the entire ecosystem's foundation against erosion by wind or water. Not only does deforestation disrupt all that, but the soil erosion can trigger new, life-threatening problems such as landslides and dust storms.

Forests are like giant sponges, catching runoff rather than letting it roll across the surface, but they can't absorb all of it. Water that gets past their roots trickles down into aquifers, replenishing groundwater supplies that are important for drinking, sanitation and irrigation around the world.

People have long used this renewable resource to make everything from paper and furniture to homes and clothing, but we also have witnessed overuse and deforestation. With the growth of tree farming and sustainable forestry it's becoming easier to find responsibly sourced tree products. B.C. is a world leader in sustainable forest management with leading-edge environmental practices. 94% of the land and forest is Provincial Crown whereby the Province determines when, where and how forest resources can be used.

Besides having important recreational values, forests offer a place for exploration, reflection and relaxation. 'Forest bathing', or shinrin-yoku, is a very popular practice that originated in Japan. It is not exercise, or hiking, or jogging. It is simply being in nature, connecting with it through the senses of sight, hearing, taste, smell and touch.

Things to Learn About in Forests

Curriculum Connections

Grade 7 Science:

- *Diversity, survival needs, FP knowledge of changes in biodiversity, impacts of humans, Evolution by natural selection provides an explanation for the diversity and survival of living things. Earth and its climate have changed over geological time.*

Grade 8 Science:

- *Life processes are performed at the cellular level; photosynthesis; nutrient recycling; micro-organisms are key to nutrient recycling in ecosystems as they act as decomposers*

Grade 9 Science:

- *The biosphere, geosphere, hydrosphere, and atmosphere are interconnected, as matter cycles and energy flows through them; energy flow; biotic and abiotic components in ecosystem; FP knowledge of interconnectedness and sustainability*

Why Visit Forests?

Forests in our province are relatively easy to access and provide an excellent outdoor classroom experience. There are many things to learn about in the forest. Explore the relationships between living and non-living components of a forest ecosystem and how these are affected by the local environment. Observe seasonal changes and how the forest changes over time. Investigate how micro-organisms play a key role in nutrient recycling and soils help to regulate the ecosystem processes. Forests offer a multitude of learning opportunities and it is easy to find a place nearby to visit.

Layers in the Forest

Forests are divided into three different layers: the canopy, understory and the forest floor. The canopy is made up of the leaves and branches of the trees that dominate the forest. Some examples of canopy species include: bald eagle, osprey, flycatchers, kinglets and warblers. Plant species may include: western hemlock, douglas fir, western redcedar, lodgepole pine and larch.

The understory contains small trees or bushes and is also called the shrub layer. Some understory species include: pacific treefrog, great horned owl, chickadees and bushtits. Plant species may include: salal, red-osier dogwood, snowberry, douglas and vine maples.

The forest floor is made up of soil, dead plants and animals, and small plants such as grasses and wildflowers. It can be broken down into three levels: litter, humus and mineral soil. The litter layer is on top. It includes undecomposed organic material such as twigs, logs, leaves and bodies of animals. The next layer, humus is the zone where litter has decomposed to the point where it is unrecognizable. Many plants and animals benefit from the nutrients provided in this layer. Some forest floor species include: dusky shrew, banana slug, western red-backed salamander, ruffed grouse, deer, and humans. Plant species may include: sword fern, bracken fern, queen's cup, twinflower, tiger lily, kinnikinnick, huckleberry, and many mosses and lichens. Soil consists of topsoil (small inorganic particles) and subsoil (large

inorganic pieces - the water storage layer) and bedrock (solid continuous mass of rock). Some soil species include: nematodes, springtails and earthworms.

Wildlife Trees and Fallen Logs

You may not think that dead or dying trees could provide anything valuable to the life of a forest. In fact, wildlife trees play a vital part in the complex webs of life that make up the forest ecosystem.

Any standing dead or living tree that provides habitat for wildlife is called a wildlife tree. Over 90 different species in B.C. use wildlife trees for food, shelter, nest-building, dens and raising young. The most valuable wildlife trees that provide the best habitat are found within surrounding forest cover with access to water and food sources. Some species' survival would be seriously threatened if wildlife trees disappeared, such as the spotted owl or keen's long-eared bat.

Trees fall on the forest floor in various stages of decomposition, from wind-downed trees to snags to stubs of old snags toppled because they are so badly decayed that they can no longer support themselves. Each is unique when it begins its new "life" as a fallen tree. Some of the decay organisms living in standing trees in an old-growth forest may continue their activity after a tree falls. Others, especially those that were in the tops of the standing trees, soon die out after the tree falls and are replaced by ground inhabitants. A generalized scenario of the stages of decomposition in a fallen tree may include the following:

- Animals that eat the fallen tree, which opens it to the outside and initiates.
- Nutrient cycling: wood-boring beetles, carpenter ants, termites, and wood-tunneling mites.
- Microorganisms that live on the fallen tree: bacteria, yeasts, and ambrosia fungi.
- Animals that eat live microorganisms that grow on the fallen tree: collembolans, mites, and ambrosia beetles.
- Live plants, such as western hemlock or huckleberry, that form a specific symbiotic (mycorrhizal) association with other live plants (particular fungi), both of which are partially or completely rooted in the fallen tree.
- Animals that depend on the fungal portion of the mycorrhizal association for their food supply: mites, beetles, and voles.
- Animals that eat live animals: mites, spiders, pseudoscorpions, centipedes, and salamanders.
- Animals that eat detritus (dead plant and animal material and animal feces): earthworms, mites, millipedes, isopods, and earwigs.

Matter Cycles and Energy Flows

All ecosystem components are connected by the flow of energy and cycling of nutrients. Matter cycles from biotic (living) communities to the abiotic (nonliving) environment and back again. There are a variety of cycles that materials flow in. Some of them are: the carbon cycle, nitrogen cycle, phosphorus cycle, sulfur cycle, and water cycle. These are important to organisms because they involve materials used to make the chemical components of cells. Energy flow fuels the cycles.



The cycling of nutrients begins when they are released and are picked up by plants. Plants incorporate nutrients available in soil and water and store them in their tissues. Trees in forest ecosystems are well adapted to cycling nutrients and storing them in their trunks and branches. The nutrients are transferred from one organism to another through food webs. Nutrients are either deposited in long-term storage (such as mineral deposits) or are ultimately released by bacterial and fungal decomposition so the nutrients are again made available to plants.

Quick Facts: Did You Know These Things About Forests?

- Every year on March 21, the world celebrates the International Day of Forests. <http://www.fao.org/international-day-of-forests/en/>
- The largest forest type in the world is the taiga.
- B.C. records its largest trees in a tree registry <http://bigtrees.forestry.ubc.ca> - check this website out for B.C.'s big trees in your neighbourhood or learn how to nominate one!
- B.C.'s forests have more species of plants and animals than any other province or state in North America.
- The Great Bear rainforest is a temperate rainforest on the Pacific coast of British Columbia, comprising 6.4 million hectares. It is part of the larger Pacific temperate rainforest ecoregion, which is the largest coastal temperate rainforest in the world, home to the extremely rare Kermode "spirit" bear. A subspecies of black bears, their white coat is caused by a recessive gene, but it makes them expert fishers as they are harder to see.
- There is a tree named Pando that is technically an entire forest. It is a clonal colony of 4700 aspens in Utah that all share the same root system.
- Wildlife trees provide habitat for over 90 different plants and animals in B.C.
- The mountain pine beetle is a native insect of the forest ecosystem. In the late 1990s, after several relatively warm winters due to climate change, a massive outbreak resulted in the loss of millions of hectares of pine forest in British Columbia over the next 15 years. The beetles are killed by very cold winter weather, which historically has kept their numbers in check. They attack mature trees by boring through the bark and mining the phloem (living tissue in vascular plants that carries organic nutrients).
- Wildfires present a challenge for forest management because they have the potential to be both harmful and beneficial. They can threaten communities and destroy vast amounts of timber resources. However, wildfires are a natural part of the forest ecosystem and important for maintaining the health and diversity of the forest. Forest agencies work to harness the force of natural fire to take advantage of its ecological benefits while at the same time limiting its potential damage and costs to humans.
- Mushrooms have a symbiotic relationship with trees. The food-gathering part of the fungus is a wide-spreading mat of tiny hairs called mycelium. These tiny hairs connect with tree roots beneath the top layer of soil. This partnership known as mycorrhizae (fungus root) provides the fungus with sugars produced by the tree's leaves, and the tree receives nutrients, including water from the fungus.
- It is important to protect forests as their plants and soils are a major storage of the



earth's carbon. Globally, 19 percent of the carbon in the earth's biosphere is stored in plants, and 81 percent in the soil.

- A pedologist is a type of soil scientist.
- There can be more organisms in a teaspoonful of soil than there are people on the entire Earth - that is more than 7 billion. Wow!

Planning and Preparation

You've decided to go on a field trip to visit a forest. Fantastic! But now what?

When to Go?

Forests are open all year long and offer many different opportunities for learning depending on the season. Any time of year is a good time to visit a local, municipal or provincial forest. There are as many possibilities for forest exploration with your students as there are forests.

Lead a discussion on what determines leaf colour in September or October. With changes in the length of daylight and changes in temperature, the leaves stop their food-making process. The chlorophyll breaks down, the green colour disappears, and the yellow to orange colours become visible and give the leaves their unique beauty. Return to the same spot in the spring to discover that most of those leaves have 'disappeared'. Decomposition and the rotting of leaves through the carbon cycle and other cycles are preparing the soil and providing the building blocks for a flush of new greenery next May.

There is a beauty and a stillness to the forest in the winter months. And there is lots of activity both seen and unseen. Look for the tracks of snowshoe hares, deer, lynx and squirrels. Look for other signs of animals that stay awake through the winter and are therefore always on the hunt for food, active above or below the snow. For example, watch for squirrel middens, a pile of leftovers squirrels leave after eating. One favorite food of the Douglas squirrel is the Douglas fir cone. Sitting on their favorite branch or stump they pull the outside bits of the cone off, letting them fall to the ground below, and eat the seeds inside.

Life is bursting from every corner of the forest in the spring. Territorial songs and whistles from birds fill the air, wind rustles through fresh new green leaves and creatures are busy capitalizing on the abundance of food, longer daylight hours, and finding mates. Watch for signs of wildlife. Study local forest birds in the classroom and then take your students into the forest for some birdwatching. Lead a discussion on why we aren't all up to our armpits in leaves in the spring, what happened to those leaves from the autumn?

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Start here by following this step-by-step checklist of outdoor field trip planning:

- <https://hctfeducation.ca/file/field-trip-checklist.pdf>

Learn how to incorporate place-based learning into your teaching and some easy solutions to overcome some challenges associated with outdoor learning.

- <https://hctfeducation.ca/file/c2c-place-based-activities.pdf>
-

Multiple trips? Try this:

- Create a class seasonal wheel that can be added to after each trip to the forest.
- See <https://earthzine.org/phenology-wheels-earth-observation-where-you-live/> for tips on using seasonal wheels and wheel templates, courtesy of Anne Forbes, Partners in Place, partnersinplace.com/wheels-of-time-and-place



Where to Go?

Where or what is a good forest to go on a field trip to? Check around to see where other teachers may have taken their classes. Is there a small grove on your school grounds? A regional park nearby? A provincial park or woodlot? One consideration for urban parks is often the species that are planted there are not native to B.C. so it may present challenges when trying to identify species.

Try to visit the site prior to bringing your students so you can check out the lay of the land. Review your activities beforehand so that you know you have everything set for success.

Some considerations for a suitable location for your field trip:

- Visit the site ahead of time, especially if you are not familiar with the location.
- Is there space for the bus to turn around? Is there good parking for parent volunteer drivers?
- Are there any hazards at the site? Can they be mitigated?
- Are there toilet facilities/outhouse on site?
- Are there any trails to allow for exploration of forest or other adjoining habitat?
- Are there any covered areas to gather in inclement weather, during snack and lunch time, and to leave belongings while exploring? If not, plan accordingly, such as by bringing a tarp to cover belongings or to sit upon.

Finding a Forest to Explore in British Columbia

BC Parks in Forests

Most BC Parks have forested elements. Find BC Parks near your school at <http://www.env.gov.bc.ca/bcparks/explore/parks> and filter by activity or facility. Here are a few regional examples of provincial parks in each of the 5 BC Parks Regions:

- **Vancouver Island** – for example, Goldstream, Rath Trevor, Englishman River Falls, Strathcona.
- **Vancouver, Coast, and Mountains** – for example, Garibaldi, Golden Ears, Sasquatch, Mt. Seymour, Manning Park.
- **Kootenay Rockies** – for example, Kikomun, Fernie, Kokanee Creek, Kalamalka.
- **Thompson Okanagan** – for example, Lac La Hache, Ten Mile Lake, Pinnacles.
- **Northern B.C.** – for example, Purden Lake, Beaumont, Tyhee Lake.

Here are some online tools to identify a forest site that may be near your school:

- Forest Service sites in B.C.
<https://www2.gov.bc.ca/gov/content/sports-culture/recreation/camping-hiking/sites-trails>
- Contact local (municipal or regional) parks offices to see if their parks have forests suitable for a class field trip.
- Contact the Association of B.C. Forest Professionals <https://abcfp.ca/web>

Preparing for Your Trip

Checklist

Make your field trip plan early. Gather all permissions and required forms, get your class prepared and order or make your supplies.

Field Trip Materials

Having “exploration tools” for your field trip to the forest can help focus the students and enhance their learning. Basic materials, such as clipboards and sit-upons, can make outdoor learning more comfortable. Many tools are inexpensive and easy to make--making them together as a class can be a fun way to start learning about the field trip topic and activities.

Some Common Forest Equipment:

- **Binoculars** - Bring or borrow if available. Turned around the opposite way, the viewing affords spectacular close-ups
- **Collection containers** - Clear plastic containers from the recycling bin work well to temporarily collect and observe small organisms.
- **Digging tools** - Hand shovels or spoons for digging in the soil. Make a Pooter to collect insects. (see <https://hctfeducation.ca/file/pooter.pdf>)
- **Field guides** - There are lots of great field guides available to use (see the “Books and Other Resources” section for suggestions) or make your own field guides. Laminated identification sheets are ideal in the field or use ziploc bags to keep them dry. Laminate copies of the Forest Identification Cards (see Copy Pages).
- **Garbage bag** - Pick up trash that you find even if it isn't yours. Also handy for collecting and removing invasive plant parts/seeds that you may find on your clothing and shoes.
- **Journal** - Bring a journal to record observations.
- **Densiometer**- To measure forest cover. See Copy Page: How to Make a Densiometer.
- **Magnifiers** - For close-up investigation of lichens, mosses, and insects.
- **Measuring Tape** - For measuring out transects or tree circumferences.
- **Thermometers** - To measure temperature of soil or leaf litter.

Other ideas for making your own field studies equipment:

- *Outdoor Classroom Essentials: materials to make or bring outdoors with your students.* <https://hctfeducation.ca/file/outdoor-classroom-essentials.pdf>
- *Get Outdoors Basics Bag, available for purchase from* <https://resourceroom.hctfeducation.ca/products/get-outdoors-2>



Things to Know Before You Go: Setting the Stage for Curiosity and Wonder

Field trips in nature can be some of the most memorable and meaningful learning experiences for your students, opening a door of wonder and curiosity about the world. Help spark your students' interest by considering some inquiry questions before your trip. Foster a sense of social responsibility early to build appreciation for nature, encourage proper outdoor etiquette and minimize your impact in sensitive outdoor places.

Forest Inquiry

Introduce students to the animals, plants, and habitats that you might see on your field trip to the forest. Look at photographs, read books and watch videos about forests and the species that live there. Learn about local First Peoples and their connection to the forest, past and present. Make a list of questions that students hope to learn from the field trip experience. Ask questions that encourage investigation, for example how do you think those ants built that huge ant nest? What would happen if it started to pour with rain on the ant nest? Why do trees have different bark? How long do you think it will take for this tree to grow? Could we jump as long as that tree is tall?

Tell students to put on their scientist hats, and do what scientists do – wonder, question, explore, reflect, make possible conclusions. Remember as a teacher, you don't need to know everything. Make a list of questions that your students are asking for research back in the classroom.

Sample Inquiry Questions

- What are the biotic and abiotic components in the forest ecosystem?
- Why is biodiversity important in a forest ecosystem?
- How do some of the roles and relationships in forest ecosystems contribute to biodiversity?
- How do different parts of the forest work together?
- How did First Peoples use the forest in the past, and now?
- How do forests help our planet and us?
- How do forests benefit my community?
- How are fires today different than the fires of the past?
- How do you determine if a forest is healthy?
- How is climate change affecting our forests?

Social Responsibility

Start building an environmental ethic as early as possible in the school year to reinforce on outings in and around the schoolyard and on field trips. Have students collectively come up with rules on how to treat living things in the schoolyard and on the field trip (such as stay on the trail, leave flowers for all to enjoy, treat all animals with gentle care and respect). Discuss with students the importance of minimizing their impact when they are outdoors.

See the sample pre-field trip activities to build social responsibility on the right, and the Copy Pages for Tip Sheets on Conservation Ethics and Safety.

Pre-Field Trip Learning

Forests are ecosystems. An ecosystem is an area that contains organisms such as plants, animals, and bacteria interacting with one another and their nonliving environment. Ecosystems can be of any size (for example, forest, meadow, log, puddle). Ecosystem structure consists of different types of organisms (including producers, consumers, decomposers) interacting with one another and their environment. Humans are part of ecosystems.

Ecosystems have energy flowing through them all the time. Where does that energy come from? The energy in a forest ecosystem (and all other ecosystems) comes from the sun. There are three main types of organisms that energy flows through – producers, consumers, and decomposers. Ecosystem functions include the fixation of energy through the process of photosynthesis, the flow of energy through food chains and food webs, and the cycling of matter.

The different organisms and nutrients that live in a forest (such as plants, animals, light, and soil) can be distinguished as abiotic (non-living) and biotic (living) organisms. There are four essential abiotic requirements for life to exist. Your students will remember this acronym: SAWS - Sun, Air, Water, Soil.

Sample pre-field trip activities to build social responsibility:

- **Ethi-Thinking/ Des Activités Nuisibles (Project WILD/Atout FAUNE)**
Students consider activities that are harmful to wildlife and the environment and why; recommend alternatives activities.
- **Playing Lightly on the Earth/ Nos Jeux Sont-ils Inoffensifs? (Project WILD; Atout FAUNE)**
Evaluate the schoolyard for signs of games that have harmed the environment. What could have caused the damage and how could it be prevented? Create schoolyard games that don't harm the environment.



Layers in the Forest

Dichotomous Keys

- **Understanding Keys.** To aid in identification, organisms are classified into different categories based on similarities and differences. To help students understand how keys are a useful system for classifying organisms, introduce dichotomous keys. A dichotomous key is an identification tool which presents a series of two (hence dichotomous) choices (usually opposite traits). It can be compared to a series of forks in the road that allows the user to make a choice. Lead a discussion on the uses and structure of dichotomous keys. Possible questions may include: Is it possible to create more than one dichotomous key for classifying the same group of objects? If two people use the same dichotomous key to identify the same object, is it possible for them to have different final results? Why is classification important?
- **Construct a Dichotomous Key** to identify shoes. Brainstorm as a class the characteristics and types of shoes, such as colour, ways that they can be done up (such as laces, buckles, or velcro), open toe or closed, high or low tops, and so on. Based on the categories and characteristics of shoes, have the students create a dichotomous key. Have students take off one of their shoes and collect them in a spot in the classroom where everyone can see them. Test the key. Choose shoes at random and have students key them. If all the students' shoes fit do not fit into one of the categories check that the key is listing opposite traits.
- **Using Keys.** Give small groups of students a variety of buttons, office supplies or hardware. Have your students create a dichotomous key for classifying the objects that they have been given. Remind your class that in order for their key to be complete, each object must fit into a group onto its own. When the groups have completed their keys, choose an object with which to test the key.
- **Classifying Leaves** (such as simple/compound, oblong, lanceolate, serrated, toothed). Provide each group with a variety of leaves and a dichotomous key for classifying leaves. Instruct your students to work through the key to identify the leaves that they have been given. Once each group has classified each leaf, ask them to share their findings with the rest of the class. Were the students able to classify each leaf? You may choose to work through some of the more difficult classifications as a whole group.



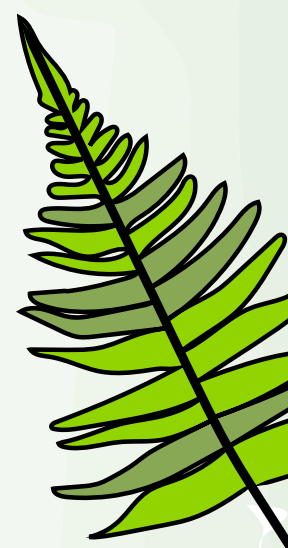
- **Identifying Native Tree Species.** Trees can be identified using key features, such as bark, needles or leaves, and cones or fruit. The tree's location within the biogeoclimatic zones in B.C. also aids with identification. The following excellent tree identification guide can be purchased as a class set and taken on the field trip with you: <https://resourceroom.hctfeducation.ca/products/tree-book-learning-to-recognize-trees-of-british-columbia>
- **Looking at the Layers.** Use Forest ID Cards or photos from magazines and calendars to identify forest organisms (including animals, plants, and fungi). Consider which species live in the forest and what layer they live in.
- **Make a Berlese Funnel.** If in a place where you are permitted to take a soil sample; or could be done even with schoolyard soil samples; compare forest soil and schoolyard. (see Copy Pages)
- **Make a Densiometer.** A densiometer is used to measure the amount of light that is available for plants growing on the forest floor. Students can make their own densimeters and practice using them in the schoolyard prior to going on the field trip to the forest. See Copy Pages for instructions on how to make and use a densiometer.

Wildlife Trees and Fallen Logs

- **Wildlife Trees.** Brainstorm animals that rely on trees for homes, food, resting, hunting perches, and nest sites. Introduce wildlife trees, explaining that these trees are unique and why they are different from other trees. Have students decide which animals from the list use these unique types of trees, why the animal may use it, and which parts of the tree each would use. Have students look for wildlife trees on the schoolyard. Debrief by choosing a wildlife tree and going over the parts of the tree that are being used or could be used by different animals. Back in the classroom have students make examples of signs that would identify wildlife trees to the public. (Adapted from Wildlife Trees in British Columbia, Inspector Arboreal: Wildlife Tree Detective)
- **Create a Wildlife Tree Mural.** Use different types of materials such as cloth, twigs, or old leaves to make a large colourful mural, add drawings, photos, or sketches of each of the wildlife tree users. (Adapted from Wildlife Trees in British Columbia, Wildlife Tree Inn)

Matter Cycles and Energy Flows

- **Web of Life.** This activity is an introduction to the interconnections in the forest ecosystem. It could be done in a large indoor or outdoor space at school before the field trip or is an engaging activity to do on the field trip itself.
 - With a ball of yarn or string in your hand ask students who could be living in this forest ecosystem. You can have the students choose cards from the Forest ID Cards (see Copy Pages), or each student can say one plant, animal or non-living thing in the forest. Students can wear the card on their chest (with string or a pin). As an alternative, you could have students make their own cards, each with a different species that lives in a forest ecosystem. Make sure the class has representation from Producers, Consumers – both plant eaters (herbivores) and animal eaters (carnivores) – and Decomposers.
 - Have students read their cards and share their “new identity” briefly with the class. You as the teacher, begins as the SUN. Say “I am the sun and I am passing the ball of string to the Douglas fir because I give the tree the energy





to grow". Hold onto the string and pass the ball to the Douglas fir. The fir in turn chooses an animal or plant that is connected to it in some way, for example a mushroom that it provides sugar to, a woodpecker that eats the insects on its bark, a great horned owl that nests in its branches. The tree holds onto the string, passing the ball to the plant or animal. Keep the string tight, but not too tight. The web continues to build until all the students have a hold of the string. There can be several connections made by plants and animals to each other. This shows the complexity of relationships.

- As the SUN you as the teacher can create a scenario where the sun's light was blocked from reaching the plants. Tug gently on your part of the string and tell the students when they feel a tug, they should gently tug also. Soon the whole web will be shaking. Try wiping out the mushroom and see what the effect is. Introduce an invasive species that is common in your area or try mountain pine beetle or starlings. Replace one of the student's identities with the invasive species. Ask that student to let go of the string. Ask the other students to pull gently on the string. What happens? Watch as the web falls apart. Discuss other scenarios: wildfire raged through the forest, drought for 4 months, storms toppled all the big trees, construction of a condominium adjacent to the forest.
- **Flow of Energy.** Divide the class in thirds. Assign one third to be producers, one third to be consumers, and one third to be decomposers. Give each producer 2 tokens representing "energy". Explain to the class that they are going to learn how energy flows between producers, consumers, and decomposers.
 - Ask the producers to stand in two rows facing each other with space between the rows. The producers should hold their food energy in their hands in front of them.
 - Next ask the consumers to come into the playing area between the rows of producers. Each should collect only one energy circle from the producers. Producers must always have one energy circle left.
 - The next step is to ask the decomposers to join the consumers in the playing area and collect one energy circle from the consumers. Explain that the decomposers have used the energy in the energy circle. Producers need to add more.
 - Ask the decomposers to return the circles to the producers. Review how the producers (plants) will make food energy. (They use sunlight, water, and carbon dioxide from the air to make food energy with their leaves.).
 - Tell students that in the next round you will remove one or two producers. Ask them what they think will happen. A consumer or decomposer who cannot collect an energy circle must leave the playing area.
- **Abiotic or Biotic?** Provide the students with a list of some abiotic and biotic factors in a forest ecosystem (See Copy Pages). Have the students discuss the items on the list and sort them as abiotic or biotic. Take students outside to the schoolyard or walk around the street to see if students can find examples of biotic and abiotic things.

Abiotic:

- *A term applied to non-living physical or chemical factors in the environment; for example: air, water, and soil.*

Biotic:

- *A term applied to living components in the environment such as humans, plants, birds, microorganisms, and insects.*

You Made it to the Forest!

No doubt the students are excited to get out and explore. Before you begin you should review with students the safety guidelines and conservation ethics (see Copy Pages). Remind them that they are guests in a special place and they have a responsibility to treat this place with care and respect.

Safety and Conservation Ethics in the Forest

- **Review safety guidelines and conservation ethics** (see Copy Pages). Remind students that they are guests in a special place. They have a responsibility to treat this place with care and respect. Reinforce the importance of staying on the trails. The quieter they are the more likely they are to see or hear wildlife.
- **Check for any hazards** at the site, such as deep holes, sharp objects, or poisonous or irritating plants.
- **Know the road system.** If possible, do an advance dry run.
- **Look for low-hanging branches and obstacles.** School buses are not well designed for off-highway travel so look for steep grades, tight turns, and narrow stretches of road. They also are not allowed to go any place where they have to back-up. Watch for low hanging branches when on trails. Have students carefully hold a branch until the next student has passed by safely.
- **Stay on developed trails** or dry, solid rock areas with good footing.
- **Watch where you probe with your hands!** Keep your hands away from any place you cannot see.
- **Reduce your impact as much as possible.** When exploring fallen logs try to disturb your log and the area as little as possible. Replace your log in its original position.
- **If you are temporarily collecting creatures** found in logs or leaf litter make sure to return them to the place they were found as quickly as possible.

Field Trip Activities

Begin with an Energy Burner!

Especially after a long drive it can be helpful to start a field trip off with an active “energy burner” game before settling down for some focused exploration. Find an open area where the students can safely run around without disturbing wildlife or treading on plants.

Any version of tag can be transformed into a game of predator and prey, where several people who are “it” are the predators and the others are its prey. Have the students choose their predator and prey based on their in-class learning. When the prey are tagged, they join the predators. After a given amount of time any predator that hasn’t tagged anyone becomes prey.

Tips and Tricks:

- *Remembering to use a ‘classroom voice’ does not always work in the outdoors because students are excited to be in a new environment. Model the volume of voice and energy you expect from your students. Practice ‘stealth mode’ explaining to the students that the quieter they are, the more chance there is to see wildlife.*
- *It is unlikely that your students will see wildlife because of such a large group however let students know that ‘wildlife is everywhere’ and that animals are shy, and though you may not see any you can look for tracks and scat and other signs of animals’ presence.*
- *Promote observing and describing, rather than naming. There is a place for naming and identifying the life that is found; however, initially observation is key.*

Decomposition Tag (Get Outdoors!)

Students learn about the cycle of life, death and decomposition. One or two students are 'Death', one or two are 'Decomposers' and everyone else is a living thing. Death must chase and tag the living things; when a living thing "dies" they must freeze with their arms outstretched until the Decomposer runs underneath their arms, returning them to the cycle as another living thing.

No Room at the Animal Inn (Wildlife Trees of British Columbia)

If you know the game "Oh Deer" from Project WILD, this is the Wildlife Tree version.

- Ask your students to count off in fours. The 2, 3 & 4's all line up shoulder to shoulder. The 1's line up shoulder to shoulder about 18m distance from the 2, 3 and 4's.
- Choose an animal that is dependent on a wildlife tree for habitat. Discuss with the students what an animal needs to survive. For example a spotted owl needs secondary cavities for nesting, shelter, and roosting. They also require food and water.
- Tell everyone that the 1's are the owls that live in the forest. This activity emphasizes food, shelter and water. Space is also a requirement however assume that there is adequate space.
- When the owl (or another wildlife tree-user) is looking for a wildlife tree it must hold its arms straight out sideways (or above head). When it is looking for water it must put its hands over its mouth. When it's looking for food, the owl must clamp its hands over its stomach.
- The spotted owls will choose what they are looking for at the start of each round. They cannot change what they are looking for once the round has begun. The 2, 3 & 4's are all food, water and wildlife trees. At the start of each round each student gets to choose which component they will be for that round. These students depict what they're going to in the same way as the Spotted Owls do.
- Have the students turn their backs to each other on the line. Begin each round by asking students to make their sign. Give them a few moments and on the count of 3, each student turns around doing their sign. When the owls see what they're looking for they run to it, holding the sign they are looking for until they reach it. When they've found their habitat component they take it back to the owl line. These habitat components will become the owls for the next round. The owls that didn't find what they were looking for remain at the habitat side and will become a habitat component. Have yourself or a student record the number of owls that survived each 'year'.
- Play the game for at least 10 rounds, keeping a quick pace. At the end of the activity discuss the owl population, what happened and why.

Sensory Awareness

After burning off some energy, the students will be ready to focus their attention and start to explore the forest. Some suggested activities are outlined below that instill a sense of calm and heightened awareness of the natural surroundings.

Sensory Wake Up Circle (Get Outdoors!)

Start experiencing the outdoor field trip location by warming up each of the senses. Everyone in the class forms a circle in silence and the teacher guides them to slowly focus on one sense at a time- "waking up" each sense. Wake up the sense of touch by rubbing



your hands together vigorously. Feel all the energy that you create by rubbing your hands together. Put your energized hands over your eyes to wake them up. Then take them off, look up high and down low. Do you notice anything that you didn't see before? Rub your hands together again as fast as you can. Wake up your sense of smell by putting your hands over your nose. Remove your hands and take a big sniff. What do you smell? How would you describe the smells in the air? Is it different than at the school? Continue to do the same for all the senses: taste the air (or raindrops), close your eyes and count how many sounds you can hear and in which directions they are coming from. Use "deer ears" to channel sounds from in front and then from behind you.

Instant Camera

With students in pairs, explain that one student is the photographer and the other is the 'camera'. Demonstrate how to safely guide your 'camera' through the forest, such as standing beside the 'camera' and holding their arm to guide them along while giving directions; 'walk to the right, now bend down, or tilt your head slightly upward to the right etc...'. The photographer guides their 'camera' to beautiful and captivating natural areas along the trail. When the photographer sees something they like, they point the 'camera' at it to frame what they want to shoot. The signal of tapping twice on the 'camera's' shoulder tells the 'camera' to open their eyes and take the picture. A third tap on the 'camera's' shoulder tells the 'camera' to close their eyes again. Have the 'camera' keep their eyes closed between pictures to give the images the impact of surprise. Encourage the 'camera' and the photographer to walk in silence to enhance the 'camera's' experience. Suggest unusual angles and perspectives such as close-ups of lichen, looking up at the sky or tree trunk, or a panorama of the surroundings. After taking 4 - 6 pictures, the 'camera' and the photographer trade roles. Debrief by discussing the pictures that people remembered, asking 'what picture stood out for you the most, and why?' How did closing your eyes between pictures help 'develop' them? Have everyone 'develop' their favourite photograph back in the classroom or in their science/nature journals. As with Phone Apps encourage them to write captions or add graphics or information to their memories.

Inquire and Investigate

As the students explore the forest habitat using their senses and tools, have them think of and record all the questions that arise. Tell them to resist temptation to answer the questions but simply to wonder and wonder some more. Discuss as a group the questions that arose and how they may go about further investigation during the field trip or back in classroom.

Exploring Place with Inquiry

This activity can be used to ignite students in inquiry-based learning in the forest. Students are engaged outdoors in small groups using a selection of different tools to enhance their exploration. The physical tools (such as measuring tapes, magnifying glasses, thermometers, trowels or other simple tools of choice) offer a means for interaction between student and nature, supporting student curiosity and playful exploration of the natural world around them. Students are tasked to come up with some questions from their explorations. The activity can stop there, or be extended to have these questions then become the basis for further inquiry-based learning, be it student-led or teacher guided. See <https://hctfeducation.ca/file/exploring-place-with-inquiry.pdf> for a full description of the activity.

Layers of the Forest

Just being in a big forest can be intimidating to some students. Take a step back and look at the bigger picture by leading inquiry about the different layers of a forest and who could



live in each layer. Observe the forest as an apartment building. Ask who would like to live in the penthouse apartment, and which animals may live there and why they would choose that home. Move to the basement, then the middle floor asking the same questions. Students can spend some time sketching each layer in a forest and drawing one or two animals and plants they think would live in each layer. Alternatively students in groups of 3 or 4 act out the animal that lives in their chosen layer, while the rest of the class tries to guess. Make friends with your local forest. Shake hands with a douglas fir or cedar tree.

Reflective questions:

- What are some differences and similarities between the layers of the forest?
- What would you have to observe in order to tell the differences between the layers?
- What are the challenges for a canopy animal to survive on the forest floor? What about a forest floor animal surviving in the canopy?
- Which layer would you like to live in and why?

Life in a Log

Exploring rotting logs provides an amazing opportunity to learn about the diversity of life in these microhabitats and communities along with a better understanding of decomposition. Using magnifiers, students in groups carefully examine a fallen tree. Divide the students into teams of 3 or 4. Distribute the materials (clear containers with lids, paper and pencils, clipboards or sheets of cardboard with paper clips, hand lenses and bug boxes, (optional field guides on insects, spiders or nonflowering plants). Have each team examine the rotting log. If there aren't enough logs, have the teams double up on the same log. Keep track of each different kinds of animals or plants they see and where they were found.

When the teams have finished examining their logs, have them examine areas around the log. Encourage them to look in the leaf litter, under rocks (being sure to replace them), around bases of trees and so on. Have them record similarities and differences between these areas and the log. If some students have phones or cameras, they could take photographs of their log and the surrounding area.

Forest Quadrat Inventory (adapted from *Are Vacant Lots Vacant*, Project Learning Tree)

Divide the class up into teams of ~ 4 students. Each team will set up a 3x3 meter survey area in the forest using stakes, flagging tape and string. Choose appropriate survey sites- not sensitive sites or places with rare species as students will be walking off trail and assessing all areas within their survey site. Each student in a team will be responsible for collecting data in their survey area to evaluate the layers of the forest - forest canopy, shrub layer/understory, forest floor/litter. See Copy Page for a forest quadrat inventory data sheet.

Measure Canopy Cover

A densiometer is used to measure canopy cover and so indirectly is a measurement of the amount of sunlight that reaches the forest floor. This is an important measurement because it affects light available for the growth of understory plants. Scientists classify forest canopies as open (10-39% of the sky is obstructed by tree canopies), moderately closed (40-69% of the sky is obstructed by tree canopies) or closed (70-100% of the sky is obstructed by tree canopies). Students can make their own densiometer to use on the field trip investigation. See Copy Pages – How To Make A Densiometer.



Measure Tree Height

Have the class brainstorm ideas about the value of measuring tree heights, such as for logging select trees, for identifying trees for conservation, to thin out a forest, to determine information about the canopy, to identify a tree's potential as habitat for various animals. Measure the height of trees using a clinometer.

A clinometer measures the height of a tree at certain distances from the base of the tree. Looking through the small window gives you an instant reading of the estimated height. See Copy Pages - How to Make a Clinometer.

Easy Wrap-Up Activities in the Forest

Take 5, Feel Alive

Have your students find a quiet spot on the trail near a tree and take 5 minutes to reflect on how trees help the environment. Think, pair, share.

Parts of a Tree

Have students act out the parts of the tree. From Sharing Nature with Children (Cornell), a great activity demonstrating the parts of a tree. In this active role play, students learn the parts of a tree and their function. Students are assigned a part of the tree, including heartwood, sapwood, tap and lateral roots, cambium/phloem, and bark. Students move into position and act out their tree part using sounds and movements, coordinated with the other parts of the tree.

Tips and Tricks:

- *Resist the urge as teacher to be the 'sage on the stage' and rather be the 'guide on the side.' Ask, don't answer. Follow student leads. Awaken curiosity by being curious yourself. Role model inquiry, wonder, investigation.*
- *Have a backup plan if you have extra time before the bus arrives. For example, stand in a circle and everyone can reflect on one thing that loved about the field trip in the forest, and then on the count of 3, everyone shouts out their favourite memory. Play a quick game of animal charades where 3-4 students per group act out an animal that lives in the forest.*
- *Likewise if you are running out of time, decide which component of the activity you are doing that you will have to cut short. You can perhaps finish up on the school grounds the next day, or in the classroom if there is a written component.*



Post Trip Learning Extensions and Connections

Evaluate

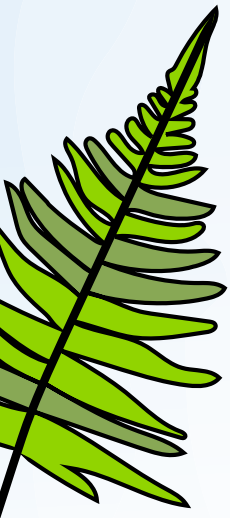
- Back in the classroom have the students share what they learned from their field trip to the forest and what was different than they expected.
- Have students make an identification key to classify local trees according to other traits, such as silhouettes, seeds, or a combination of traits.

Communicate

- Be inspired by the forest! Have students create a visual representation to show how they personally value a forest. This could be an advertisement, album cover, brochure, collage, comic strip, recipe, stamp or storyboard.
- Do further research to find the answers to some of the questions the students wondered about while on the field trip.
- Continue adding insights, sketches, words to a science or discovery journal throughout the year.
- Write a story about your outdoor experience.
- Consider a local issue that is in the news and have the students think about it from many perspectives. Have students reflect on their own perspective and consider where it comes from before making a final decision about it.

Apply and Innovate

- Become a forest steward. This means your actions are respectful of the forest ecosystem. Some inquiry questions you may consider: what do forests give us? And what do we give them? How are we connected to the forest? How can we demonstrate care toward the forest? Who is responsible for the forest?
- Get involved with a citizen science project like Plantwatch.
<https://www.naturewatch.ca/plantwatch/>
- Take on an Action Project. Download the Leap into Action guide for ideas and guidance. <https://hctfeducation.ca/file/leap-into-action.pdf>
- Connect with a local community group that focuses on stewardship or citizen science.
- Invite a forester, biologist, arborist or other expert to your classroom.
- Organize a tree-planting event at your school.
- Start a native tree and plant garden in your school.



Additional Post Trip Learning Activities and Ideas:

Fallen Logs

Back in the classroom have students use their sketches, notes and photos to identify the creatures they were unable to identify in the field. Teams can make presentations of what they found. Discuss the following questions as a class:

- What similarities and differences were there between each of the logs? What might explain the differences?
- Which animals and plants were found both on the log and in nearby areas, such as in the leaf litter? What do those areas and the log have in common?
- How do the animals you found in the log interact with it?
- Why is important that logs like the one you studied decompose?
- How does the forest ecosystem benefit from a fallen log?

Forest Quadrat Inventory

Back in the classroom, all of the data could be compiled from all the forest plots into a master datasheet. How does the master list compare to that of the individual plots? Is there much variation between plots? Why or why not?



Additional Forest Activities and Resources

There are so many learning opportunities in the forest! If you are looking for more ideas, here are some other favourite activities and resources to support you before you go, during your trip, and when you return.

Additional Classroom and Schoolyard Activities

Here are some additional activities that could be done in the classroom or schoolyard to introduce some concepts before the field trip or to reinforce learning afterwards.

Forest Journals

Get students to create their own forest journal by using recycled cardboard, paper, and fasteners like yarn or binder rings. Simply hole-punch the cardboard for the covers, the recycled paper for the pages, and fasten.

Invite a Guest

Invite an ecologist, local park or nature center educator, or forest professional to come and speak to your students about your local forest ecosystem. Or better yet, meet this specialist at your local forest. In this way, your students will experience a career they may want to explore further!

Skype a Scientist

For example, ecologist, plant scientist, climate scientist, animal scientist; sign up here: <https://skypeascientist.com>

Ecosystem Experiment

Take the class into the schoolyard or another urban forest. Split students into teams, and give each team two pre-cut one-gallon milk jugs, a pre-punched tuna-sized can, some soil, and forest leaf litter. Have them:

1. Fill both jugs with soil to just below the spout.
2. Put forest floor leaf litter on top of the soil in only one jug.
3. Write a hypothesis about what will happen when water is sprinkled into each jug.
4. Sprinkle 1-2 cups of water from the pre-punched can into each jug. Pour water from each jug into a clear container. Compare what they observed with their hypothesis. For discussion purposes only, which water would you rather drink?

Conclusions:

- The jug with the forest litter holds more water (like a sponge). Also, the water that comes out of the spout is cleaner (as if going through a filter). In the jug with no leaf litter, the soil eroded quickly, and runoff and dirty water poured out of the spout.
- Just as a sponge sucks up water, trees and forests do the same for our communities— absorbing polluted air and water, preventing water runoff and erosion, and acting as a filter by returning fresh air and water to the environment.

Soil Ecosystems

Here are a couple activities to explore the world of soil:

- **What's Living in My Soil?** Make a Berlese funnel (see Copy Pages) to capture soil creatures and determine the health of the soil. Have students create their own traps in groups of two or three. With the class, determine a location to place the traps and/or from which to get soil for the Berlese funnels. After a period of time check the traps to see which if any creatures have been captured. Using the strongest microscope you can find, examine the tiniest elements (creatures) and try to estimate numbers if possible.
- **Digging Deeper.** Everything we come into contact with on a daily basis can be traced back to soil! Yet we often think of soil as dirt, something that is inconvenient, needs to be swept up, dusted, and washed off of our lives. But no matter how hard we try, we cannot separate ourselves from soil, and the role it plays for all of us. It filters our water, grows our plants and trees, and provides something to build houses and roads on. This lesson explores the physical and chemical properties of life <https://hctfeducation.ca/file/digging-deeper.pdf>

Rainforest Debate

This activity encourages students to consider issues raised by human activity, particularly logging, in an ancient temperate rainforest. Students assume the roles of a variety of people who would be affected in different ways by plans to log an area of forest. By considering many perspectives, they can begin to understand the need for cooperative resolutions to environmental problems.

Additional Field Trip Activities

Energy Burners

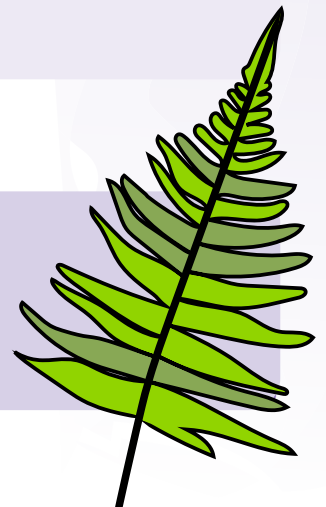
Quick Frozen Critters/Proies et Prédateurs (Project WILD/Atout FAUNE)

An active game of freeze tag between predators and prey. Choose pairs of predators and prey from animals that students have learned about that live in the forest, such as bears and squirrels, bats and moths, or wolves and . Have the students move like their predator/prey animals. Prey are safe from predators if they are in designated temporary shelter areas or are "frozen" (representing that they are camouflaged). But prey can't stay frozen or sheltered indefinitely - to survive, the prey need to gather a certain number of food tokens, which are scattered throughout the play area and predators need to tag at least two prey in order to survive. After several minutes see who has survived. Play again, allowing students who were predators to become prey and vice versa.

Sensory Awareness

Take 3 with a Tree

Each student finds a tree and takes 3 minutes to explore it on their own. Re-group and share 3 things you liked or noticed about your tree.



Sit Spot

Set boundaries for your students to keep them within the range of your sight or voice, while allowing them enough space to spread out. A sit spot is a solitary and silent activity. Have each student find a spot in the forest to sit, 5 meters apart from anyone else. This activity can be 10 - 20 minutes in length. You may choose to have students write reflections during or after engaging in sit spots. Prompt students to write about the sit spot using sensory language. An example of such a prompt might be, "While sitting in nature I saw/felt/smelled/heard...."or, "I noticed"...?" or, "observing nature made me wonder..."? After your sit spot activity and reflective writing are complete be sure to give students the opportunity to share their observations and reflections. Ideally each student would share a short thought in a circle while still outside.

Forest Freeze

Encourage your students to explore their urban forest from different perspectives by playing a game of "Forest Freeze". Have students walk around the schoolyard/urban forest and write or draw what they experience in their Forest Journals. Remind them to use their senses of sight, touch, hearing, and smell. Then, call "Freeze". Students should stop, look, and closely observe the small area immediately around them, including looking up into trees etc. Record what they discover. Call "Unfreeze," and they will return to a larger area exploration until you call "Freeze" again. 3. Return to the classroom and have students discuss their urban forest and share their journals with each other (activity from USDA Forest Service)

Meet a Tree

Students gather in an area where there is a variety of different types and sizes of trees. Students are paired up, where one student is blindfolded and the other student safely and carefully guides their partner to a tree. Using touch, smell, and hearing, the blindfolded student explores the tree. After a few minutes the blindfolded student is led back by their partner to the main gathering area. The student who was blindfolded removes the blindfold and tries to find their tree using sight, and then using other senses. Once they meet their tree, the partners switch roles (blindfolded partner becomes the guide). Reflect on how it felt to find your tree.

Duplication Game

As your students are exploring, gather together several items from the forest floor that are easily found, for example a fir cone, a piece of moss, a dead leaf, an interesting-looking stick, a stone. Arrange these natural items in a pattern on a handkerchief and cover them with another handkerchief. Gather students in a circle around the hidden items. Reveal the items for a short interval (approximately one minute), and then cover them up again. The students are tasked with finding the items from their surroundings and replicating the pattern in which they were laid out beneath the handkerchief. Reinforce that students should not pick any living material and should only use items found on the forest floor. (Adapted from Sharing Nature with Children by Joseph Cornell)

Inquire and Investigate

Scavenger Hunts 101

When making up a scavenger hunt, keeping the students' interest should be high priority. Have them search for common outdoor objects that won't be difficult or frustrating to find. Of course, safety and supervision are of utmost importance. Split up the parent volunteers, and assign each one to a small group of students. Their job will be to provide guidance, give a hint or two, and to keep watch over them. Have a time limit, boundaries and a signal for everyone to return to the designated circle area. Debrief on some of the interesting 'finds.' Reinforce: Leave everything as you found it. Here are forest scavenger hunts:

Experiential Scavenger Hunt

- **Listen to:** leaves under your feet, sound of an insect, a bird singing, water running, noises in the forest
- **Feel:** tree bark, wet mud, rotten wood, wind blowing on face, texture of 3 different rocks, prickly plant
- **Smell:** pine tree, flower, sap, soil
- **Watch:** clouds in the sky, spider web, ant moving something, wind blowing the leaves, a leaf falling, sunlight coming through the trees, for something unusual, for something funny, trail markers, animal homes or shelters

Wildlife Tree Scavenger Hunt

Find evidence of wildlife trees, signs of animals and plants that use wildlife trees and other features. See Copy Pages for Wildlife Tree Scavenger Hunt.

Wood Bug Wonders

Did you know that wood bugs have gills and that their ancestors came from the ocean? Check out this inquiry project on these common and fascinating soil invertebrates! <https://hctfeducation.ca/file/wood-bug-inquiry.pdf>



Books and Other Resources

Field Guides and Background Information

- **Plants of the Pacific Northwest Coast** by Jim Pojar and Andy McKinnon. Alberta: B.C. Ministry of Forests and Lone Pine Publishing, 1994. This classic illustrated field guide features 794 species of plants commonly found along the Pacific coast from Oregon to Alaska, including trees, shrubs, wildflowers, aquatic plants, grasses, ferns, mosses and lichens. Areas covered are the coastal region from shoreline to alpine, including the western Cascades -- from tide pools to rain forests and meadows.
- **Plants of the Southern Interior British Columbia** by Roberta Parish, Ray Coupe and Dennis Lloyd. Alberta: Lone Pine Publishing, 1996. Over 675 species of trees, shrubs, wildflowers, grasses, ferns, mosses and lichens commonly found in the region from the crest of the Rockies to the Coast Mountains, including the interior of Washington and Idaho. Detailed species descriptions are combined with concise drawings and excellent colour photographs.
- **Plants of Northern British Columbia** by Andy McKinnon. Alberta: Lone Pine Publishing, 2018. More than 500 species of trees, shrubs, wildflowers, grasses, ferns, mosses and lichens are illustrated and described. Revised and substantially updated, this comprehensive and accessible guide to a region rich in plant life includes new photographs and native uses of plants.
- **Trees and Shrubs of B.C.** by T. Chris Brayshaw. Victoria: Royal BC Museum Handbook, 2007. Trees and Shrubs of British Columbia is the definitive guide to all native and naturalized woody plants in the province. T. Christopher Brayshaw describes almost 300 species of trees and shrubs, as well as many subspecies and varieties. His beautifully detailed illustrations of leaves, flowers, fruits and woody parts are arranged to show the distinguishing traits in similar species. Diagnostic keys, comparative diagrams and a selection of colour photographs help make identification easy.
- **British Columbia, A Natural History of its Origin, Ecology, and Diversity with a New Look at Climate Change** by Richard Cannings and Sydney Cannings. Vancouver: Greystone Books, 2015. This revised and expanded edition explores British Columbia's ecology and also features an increased focus on climate change. With expanded sections on the province's geological history, updated information on the mountain pine beetle and the future of B.C.'s biodiversity, and fresh information on many other topics, this edition includes new illustrations, photos, sidebars, and new and revised maps. Both an authoritative reference and an easy to read guide, this revised edition is a must for anyone who wants detailed and up to date information about British Columbia's dazzling natural world.
- **Green Giants: Rainforests of the Pacific Northwest** by Tom Parkin. Toronto: Groundwood, 1992. Introduces the temperate rain forests of the Pacific coast, describes the plants and animals of the rain forest zone, and discusses logging dangers and conservation efforts.
- **Saving Our Ancient Forests** by Seth Zuckerman. Washington: Living Planet Press, 1991. A concise action guide to saving one of North America's most majestic natural treasures, those irreplaceable 1000-year-old trees. This volume discusses their great ecological value to our nation and our planet. It catalogs what we stand to lose. Giving tips on recycling wood products, visiting ancient forests, using consumer power to preserve forests, and joining the political fight for preservation are only a few of the benefits for the reader to learn from this forest-preservation book. Line drawings.



- **Temperate Deciduous Forest** by April Pulley Sayre. New York: Twenty-First Century Books, 1994. This book looks at temperate forest biomes and the plants and animals in them. It talks about communities, people and forests, and the abiotic factors that influence them.

Fiction Books

- **Spirit in the Rainforest** by Eric Wilson. Orca Book Publishers, 2001. The rainforest of British Columbia holds many secrets, but none stranger than those of Nearby Island. After hair-raising events during a Pacific storm, Tom and Liz Austen seek answers among the island's looming trees.
- **One Day in the Woods** by Jean Craighead George. New York: Harper Collins Publishers, 1988. In this illustrated book, a girl climbs a tree and observes the things around her. It examines forest layers, habitat, birds, animals, insects, and forest characteristics.

Organizations and Websites

- **Association of B.C. Professional Foresters.**
https://abcfp.ca/web/ABC FP/Students/Educational_Resources/ABC FP/Students/Educational_Resources.aspx?hkey=53d9d62d-dba f-4cbd-a1ee-02de7bb18168#Plans
- **B.C. Government: Current Snapshot of B.C. Forests.**
<https://www.for.gov.bc.ca/hfd/pubs/docs/mr/Mr112.pdf>
- **B.C.'s Ministry of Forests.**
<https://www2.gov.bc.ca/gov/content/governments/organizational-structure/ministries-organizations/ministries/forests-lands-natural-resource-operations-and-rural-development>
- **Canadian Institute of Forestry.** This teaching kit is a complete set of tools designed to help teachers engage students in the topic of forests.
<https://www.cif-ifc.org/get-engaged/forest-education/teaching-kits/>
- **Council of Forest Industries.** <https://www.cofi.org/>
- **FSNatureLive.** The USDA Forest Service, Prince William Network and partners bring nature learning to you through a series of webcasts, webinars, and online education resources. No matter where you are in the world, visit LIVE programs for exciting, on-site learning about bats, butterflies, climate change, wetlands, and more.
<https://fsnaturelive.org>
- **iTree** (www.itreetools.org). Additional information and activities found in the Natural Inquirer's Urban Forest Edition <https://www.naturalinquirer.org/Urban-Forest-Edition-i-9.html>
- **Natural Resources Canada.** Mountain Pine Beetle.
<https://www.nrcan.gc.ca/forests/fire-insects-disturbances/top-insects/13397>
- **Project Learning Tree.** <https://plt.org> and <https://pltcanada.org>
- **Royal BC Museum.**
https://royalbcmuseum.bc.ca/exhibits/journeys/english/overview_forest.php
- **Sierra Club B.C.'s EcoMap.** Explore British Columbia's nine ecoprovinces and learn about the plants and animals that are found there. <https://sierraclub.bc.ca/ecomap/>
- **USDA Forest Service. Teacher's Guide to Discovering the Forest (gr. 3-8)**
https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5201734.pdf

