

Forest Ecology Background

When most people hear the word “watershed” they probably think of water. But a watershed is mostly land. The land and the water are connected. Run-off draining over the land will pick up any pollution and loose sediment and carry it downstream, and we all live downstream of somewhere.

Forests act as a buffer zone. They can filter out some pollutants and tree roots stabilize soil to prevent erosion. In the case of a storm event, trees will absorb lots of water, whereas a paved or developed area would shed most of that water and contribute to flooding.

A healthy watershed in the Pacific Northwest would have a forest supporting a rich community of life. As each plant, fungus, and creature has a different role to play in supporting the ecosystem, a healthy forest has a high degree of biodiversity. Biodiversity means many different kinds of living things.

The word ecology comes from the Greek word *oikos* “house, dwelling place, habitation” and *logia* “study of.” So ecology is literally the study of our home.

Each-One Teach-One Stations

Below are suggestions of topics for each-one teach-one stations. Some of the info below is recorded on the each-one teach-one cards in the lesson tub, and some of it is additional background details.

Cultural Tree/Cedar Tree

Native Peoples of the Pacific NW depended on Western Red Cedar to meet many of their needs from shelter to clothing, tools, transportation etc. Cedar was used for cradles, coffins, and even baby diapers! It is still an important resource to Native People today and it is known as the tree of life.

Traditionally young girls learn how to collect cedar bark in the spring from their mothers and grandmothers. They find a tree about ½ meter in diameter, say a prayer for it and make a cut in the bark. Using a wedge to pry up the bark they then pull it upward and outward until a big strip comes free, leaving behind a scar. People are careful not to take too much bark from one tree so that the tree does not die.

Identification – The bark is gray to reddish brown and “stringy” in appearance. The branches tend to droop and then turn upwards making a J shape. Leaves are scale like, glossy green to yellowish green, and look like a flattened braid. Cones are small and numerous. It grows mostly in moist to wet soils, usually in shaded forests, at low to medium elevations.

Snag/Pileated woodpecker

Snags are dead standing trees. Many critters use snags for food or homes. For example a pileated woodpecker may create a hole looking for insects, then other animals such as owls or squirrels may use the hole for shelters or nests. If the snag is large enough in diameter, a bear cub may sleep on the top. There are more snags in older forests.

Pileated woodpeckers are the largest woodpecker in this area. They need deep forests with many snags, so their population has decreased as old growth forests have shrunk. Their holes are easily distinguished by the large size and square shape. They have barb-tipped tongues for snatching insects, and their tongue is much longer than their head. It wraps around the inside of their skull.

Mosses

Mosses are small plants that grow on the forest floor, on trees, or on rocks, generally in wet places. They are *non-vascular* plants. (Refer to Build-A-Tree activity if you did this with students. Mosses do not have xylem and phloem.) Instead of a vascular system they absorb water directly through the leaf surface. They absorb water when it is present and dry out when it is not. They are most active in the winter and spring when water is abundant and light reaches the forest floor.

Mosses are *spore-bearing*. As a more ancient type of plant mosses do not grow flowers or bear fruit but instead reproduce with spores. The biggest difference between a spore and a seed is that seeds have more stored food resources.

Mosses growing in thick mats often hold a lot of water on the ground providing a cool habitat for insects and a safe place for seeds to sprout and plants to grow. Some types of moss have been used by people as bedding, baby diapers, medicinally, and in gardens.

Sword Fern

Identification - Sword Ferns have dark, leathery, evergreen leaves. Leaflets have jagged edges and are shaped like swords.

Ecology - They grow in dense clumps, in moist forests, and are common in the understory. On the underside of leaves are round orange brown dots. These are called *sori* and they hold the *spores*. Ferns reproduce from spores instead from seeds. New leaves emerge from the center of the plant and unfurl in springtime. The new shoots are called fiddleheads.

Evergreen – Leaves stay on plant/tree for more than 1 year and allow the plant to photosynthesize all year round. Leaves remaining through the winter are important for food and habitat.

Deciduous – leaves fall off in autumn allowing plant to reserve resources in cold months. Abundant leaves on the ground provide habitat and decompose to enrich the soil.

Sword ferns are evergreen ferns. Bracken Fern is an example of a deciduous fern.

Lichens

Lichens are two organisms, fungus and algae, working and living together. The algae provides the food through photosynthesis and the fungus provides a structure or protection for the algae, as well as water and minerals. Most of the mass of the lichen is made up of the fungus, with only a small percent being made up of the algae.

There are more than a thousand kinds of lichen in the Pacific NW. They come in many different forms including crust, scale, leaf, club, shrub, and hair.

Functions/relationships – Some lichens “fix” nitrogen, or change nitrogen in the atmosphere into a form plants can use to grow. Some lichens are an important winter food source for deer and elk. Birds and mice use lichen in their nests.

Lichens are an indicator of air quality because they need very clean air to grow. Very few lichens can grow in cities.

Root Wads

Most trees in the Pacific NW have shallow roots because there is so much moisture near the surface. They don't need to grow deep in search of water. This causes trees to be easily blown over in big winds, which opens up the canopy to let in light. Falling trees and rising root wads also churn up soil and bring nutrients to the surface. Root wads also provide habitat for other plants, insects, and sometimes even larger critters shelter beneath them.

Nurse Log (or stump)/Decomposers

Decomposers are very important for nutrient cycling. They break down dead organic matter and put those nutrients back into the ecosystem. Decomposers include fungus, insects, worms, slugs, and other creepy crawlies.

Nurse Logs – If a tree dies, is its life really over? In a forest, decomposing logs and stumps provide lots of nutrient for new plants to grow. Sometimes trees or plants will grow directly out of a nurse log/stump. Nurse log/stumps also hold lots of water, and provide food and habitat for decomposers and other critters. In the Pacific NW plants that commonly grow on nurse logs/stumps include hemlock and huckleberry.

Fungus

Fungi are important decomposers. The mushroom is the “fruiting body” of the fungi. The mushrooms carry the spores for reproduction. The “body” of the fungi may be many times larger than the mushroom and is made of tiny hair like structures called *hyphae*. Hyphae are usually too small to see. One cubic eight-inch of soil can contain more than 300 linear feet of hyphae.

Some types of fungus grow on the roots of trees and help the trees absorb water, minerals, and nitrogen.

Mice and other critter sometimes nibble on mushrooms. People sometimes eat mushrooms too! But some mushrooms are DEADLY poisonous, and positive identification can be difficult.

Hemlock

Identification – Hemlock needles are of unequal lengths and spaced irregularly, (the bad haircut tree). The top branch or *leader* droops. The bark is scaly and the cones are small and numerous.

Ecology – Grows well in shade. Seedlings thrive in the understory and when the canopy opens up and lets light in, they grow rapidly towards the light. It is the most shade tolerant tree on the Pacific coast. It is commonly found growing on nurse logs or stumps.

Uses – Native people had many uses for hemlock. They made dyes from the bark and many implements from the wood, (spoons, combs, dip-net poles, spear shafts.) The bark also contains tannins which are used in tanning hides. The branches were considered excellent bedding. They were also used for collecting herring spawn (eggs) by lowering the branches into the water of estuaries. The pitch or sap was made into poultices to help with colds or prevent sunburn.

Trillium

Identification – Trillium has leaves in whorls of three. It has white flowers, (turning pink with age) with three petals. Tri means three.

Ecology – Trillium are very slow growing. The seeds need two “winter chillings” before they sprout. Trillium depend on ants for *seed dispersal*. Trillium seeds have gummy oil on them. The ants take the seeds back to their nests and eat the oil and thus spread the seeds to different locations in the forest. Because both parties benefit, this is a *symbiotic* relationship.

Berry Wonderland

There are 50-60 types of edible berries in our region (most of them grow in old-growth forests.) Fruits are a staple of many animals’ diets including insects, birds, bears, and people. These animals can act as seed spreaders. Other critters pollinate the flowers, making the fruit possible.

Red Huckleberry – The new branches of red huckleberry are bright green. The branches are very strongly angled. The leaves are oval. It has bright red berries that are round and sour. It grows on forest edges, in openings, and in soils rich in decaying material, often on nurse logs or stumps.

Huckleberry berries were used as fish bait in steams. They were also made into a beverage and drunk to stimulate appetite, or used as a mouthwash. Berries were eaten fresh and dried for winter use.

Trailing Blackberry – grows trailing along the ground. Its leaves have toothed edges and have three leaflets. It is armed with curved prickles. It is common on disturbed sites, or in dry open forests. The blackberries are delicious. It is the only blackberry native to the Pacific Northwest. The berries were eaten fresh and dried for winter use. A tea was also made from the leaves.

Salal – is an evergreen shrub with leathery shiny egg-shaped leaves. It is one of the most common forest understory shrubs in the Pacific Northwest. It has blue to purple berries that are juicy and an important source of food for native peoples. The berries are eaten fresh and dried into cakes. The berries were also used to sweeten other foods. In recent times, salal berries have been used to make jam or preserves.

Multi-Layered Canopy

Ground cover

Shrub layer

Understory

Canopy

Multi-layered canopies are more typical of old growth forests and they provide a variety of habitat. A variety of habitat promotes more bio-diversity.

Sources:

Mathews, Daniel. *Cascade Olympic Natural History*. Portland Oregon. Raven Editions, 1999. Print.

Pojar, Jim., and Andy MacKinnon, eds. *Plants of the Pacific Northwest Coast*. Vancouver BC: Lone Pine Publishing, 2004. Print