

DUTCHESS COUNTY

soil & water
CONSERVATION DISTRICT
Since 1945

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Conservation for Kids!

The ABC's of Forest Ecology!

Forest ecology is the study of the forest environment and how that environment works as a system with all the various interactions! It studies how various environmental factors, such as climate, topography, soil, plants and animals work together as a system. Humans also have an impact on the forest environment.

Knowledge of forest ecology helps us predict outcomes and manage our impact, so that ecosystems can remain healthy and continue functioning into the future.

Forest Ecology ABC's!

Forest ecology aims to specifically study how

Abiotic (Non-living)

Biotic (Living)

Cultural (human Impacts)

factors interact within the forest ecosystem.



<https://www.dec.ny.gov/lands/90720.html>

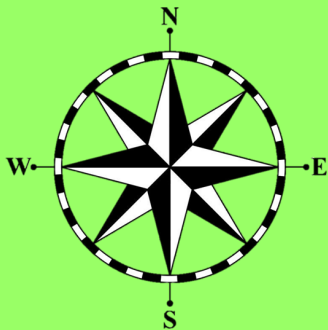
Abiotic

refers to non-living components, such as climate, soils and topography, as well as many other things that are non-living in the environment. They are the system that supports the forest and determines the species of trees and plants that grow in each site!

CLIMATE— is not the same as weather. Weather refers to an area's present conditions, such as for that day or week. Climate is the average of weather over long periods of time. It includes temperature, humidity, atmospheric pressure, wind, precipitation, and numerous other meteorological elements. Climate affects the growth and productivity of forests through changes in temperature, rainfall, weather, and other factors. These factors influence complex forest ecosystems in many ways.



SOIL—itself is nonliving. It is the medium that supports life in a forest. Trees depend on soil and need enough soil to grow roots and anchor themselves so that they can stand upright. Soil is made of a mix of organic materials (decayed plants and animals) and broken bits of rocks and minerals. Trees get nutrients and water from soil, but they must also have air spaces to hold oxygen so roots can grow. Soil productivity is measured by looking at tree height. Trees have the potential to grow taller on better soils.



TOPOGRAPHY—Two parts of topography are slope steepness and aspect (compass direction), which together influence the tree species, productivity and growth at forest sites!

Slope is how steep the ground is. Some topography is flat, some rolling and some steep. How steep a slope is can impact site productivity. As steepness increases, so does erosion and run-off.

Aspect is the compass direction a slope faces. The direction that a slope faces influences the amount of sunlight, heat and wind a site receives. These influence the species of trees able to grow on a site and how well they grow.

In the northern hemisphere where we live this is how direction affects growth:

South facing slopes receive the most intense sunlight which creates the hottest and driest growing conditions. These sites tend to be less productive and are generally composed of trees that are adapted to drier growing conditions.

North facing slopes receive the least direct sunlight and are typically cooler, moister sites. This creates a superior growing environment, where trees are able to obtain their best height growth. North facing slopes can be some of the most productive growing sites!

East facing slope receives sun during the morning, when air temperatures are typically lower. East facing slopes lose less water to evaporation because of this and are less likely to experience moisture stress, unlike west and south facing slopes.

West facing slopes get their sun later in the day, when daytime temperatures are at their maximum. The added heat causes the water to evaporate from these sites, making west facing slopes hot and dry. On these sites, water stress decreases productivity and causes reduced tree growth.

Biotic

refers to the living components of forest life and how they interact! The most obvious features of any forest ecosystem are its trees. Other biotic factors include shrubs, flowering plants, ferns, mosses, lichens, fungi, mammals, birds, reptiles, insects, worms and microbes. Biotic factors can be broken down into three categories: **producers**, **consumers** and **decomposers**.

PRODUCERS— are plants! Producers are photosynthesizing organisms that make their own food. Photosynthesis is how they make energy!

Plants absorb sunlight, water, minerals and carbon dioxide. These energy sources are then used to create food for the plant.

Oxygen is also produced by the plant in this cycle, which is then let off into the air!

*Trees, shrubs, flowering plants, ferns and mosses are all **producers** in the forest!*



CONSUMERS—Are organisms that cannot make their own food. They need to consume (eat) plants and/or animals to get energy.

There are three types of consumers; herbivores, carnivores, omnivores. **Herbivores** only eat plants, **carnivores** eat other animals, and **omnivores** eat both plants and animals.

All of the animals, insects, amphibians in the forest are consumers.

White-tailed deer are herbivores, which means that they only eat plants like leaves, twigs, nuts and berries.

Great horned owls are carnivores, which only eat other animals. They eat rodents, squirrels, skunks, and various birds such as ducks.

Black bears are omnivores which means that they will eat just about anything such as berries, bugs, acorns, and fish!

DECOMPOSERS—Decomposers are organisms that primarily feed on dead, decaying plants and animals. They break them down and release their nutrient and mineral components back into the soil so that plants can use them to make more food. Decomposers in the forest come in many different shapes and sizes. The most common decomposers are bacteria, worms, slugs, snails, and fungi like mushrooms!



Cultural Elements

refers to all the interactions humans bring to a forest ecosystem. These include activities such as clearing land for agriculture and development, harvesting timber, and recreation!

LAND CLEARING— Humans have interacted with forests by clearing them for agriculture and development. Making more room for farms and building can benefit humans, but it also hurts forest ecosystems.



TIMBER HARVEST— Timber harvests (the cutting and removing of trees) can be beneficial to the forest ecosystem and humans. Removing and thinning trees can help with the growth, composition, health, and quality of forests and woodlands.

Wildlife habitats, access to timber & water resources, and land restoration efforts can all be helped through the harvesting of timber. Harvesting can also help to create continued sustainable recreation opportunities.

Some products that come from timber include lumber, paper and wood!

RECREATION—Humans interact with the forest through recreation which can bring them benefits. Forests provide an environment where it is possible to escape from the stresses of modern life, to connect with nature, get exercise and learn!

Some popular recreation activities that take place in a forest are camping, fishing, hiking, biking, horseback riding, hunting and viewing the wildlife & scenery!

Recreation contributes greatly to the physical, mental, and spiritual health of individuals, bonds family and friends.



Go Outside! Check out a local forest!

The next time you are in a forest take a minute to stop and look around. See if you can point out some abiotic, biotic and cultural aspects around you! See how many you can find and describe!