

## Ecology Explorers 15! Series

### *Urban Ecology – A shrub is a shrub is a shrub – right?*

Written by: Ecology Explorers Team

Adapted from data collected by ecoplexity.org members

#### **Background Information for Instructor:**

Ecoplexity is a site dedicated to providing various ecology focused resources to science teachers. This includes protocols, data, graphs, modeling platforms, and other educational materials. For example, the data used in this lesson was provided to Ecology Explorers by the Ecoplexity group (<http://ecoplexity.org/home>). This data provides exploration of functional groups which are ubiquitous components of all habitat types, at all scales and useful categorical tools to study ecology.

Functional groups are created for every type of organism including bacteria, plants, and mammals. This lesson uses plant functional groups to explore and brainstorm potential causes leading to functional group patterns in response to different forest ages.

Forest age, in this case old- versus young-growth, is an important consideration in terms of the type of ecological interactions predicted because age is can be (though not always) associated with changes in numbers and types of organisms. For example, old-growth forests may have greater or fewer numbers of plants than a young-growth forest, contributing to an increased organic layer build-up in the soil. This could lead to increased complexity of the detritivore community feeding on the organic matter. In turn this could lead to increased nutrient availability to both plant and soil community members leading to increased plant productivity and resources to herbivores and omnivores (Fig 1).

Another example of plausible differences in system dynamics correlated with forest age is: Increases in soil nutrients resulting from the above processes and reduced erosion, resulting from increases in plant cover, could alter the types and amounts of nutrients moving through stream systems present in old growth forest; add to this increased canopy cover and reduced evaporation of water from stream systems and one can begin to imagine the multifaceted consequences of forest age on water moving into and through the forest and how it might change in response to forest age.

Young growth forests are dominant throughout the world now due to human needs for the basic resource of wood (this is a deliberately simplified example of human impacts on forests). Many urban environments are surrounded by young forests continually harvested for resources such as wood.

This proximity between large forest tracks adjacent to urban areas as well as forest remnants within urban areas leads to feedbacks between the two habitat types. It is these feedbacks that long-term ecologists are researching as part of Long-term Ecological Research Networks (<http://www.lternet.edu/>).

Plant functional groups are based on what is called the plant's *habit*, meaning how it grows. So plants are classified in this lesson as:

1. Ferns
2. Herbs (not having woody tissues, may be perennial or annual, typically low to ground)
3. Vine (typically elongate in structure, may produce wood-like tissues that support the plant or may rely on other plants or walls for support, doesn't produce true wood)
4. Shrub (may produce wood, doesn't reach canopy height, has more spreading (horizontal rather than vertical) growth pattern)

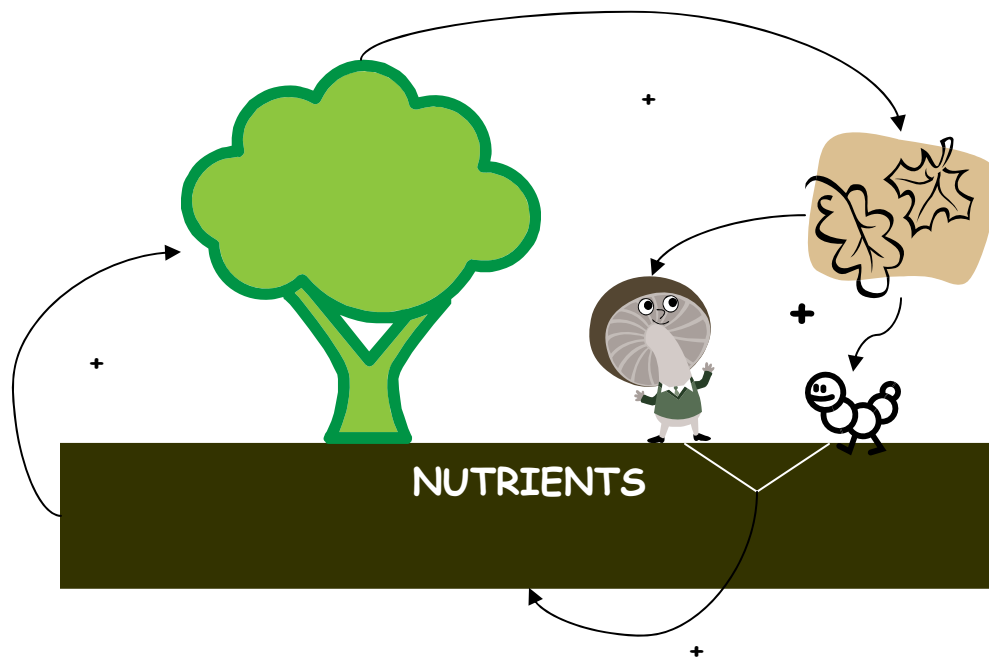
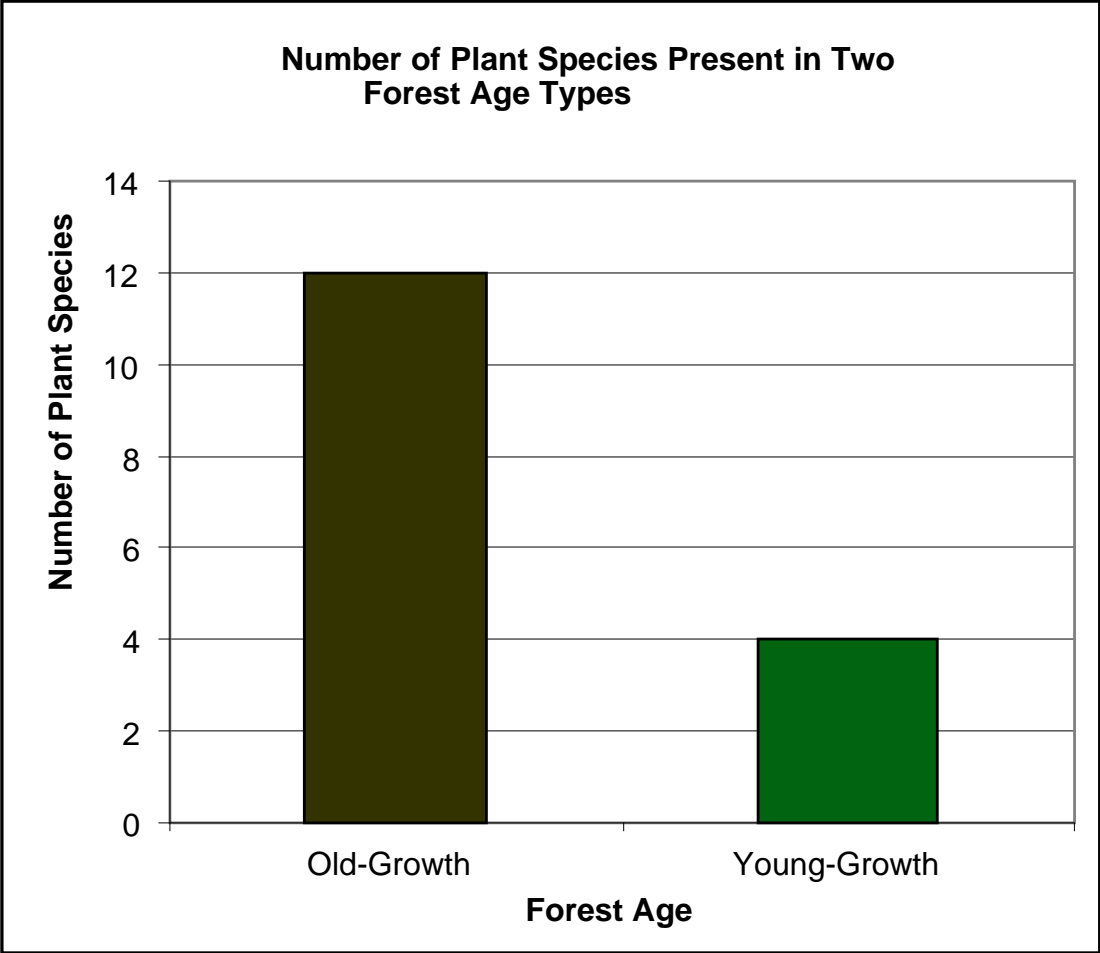
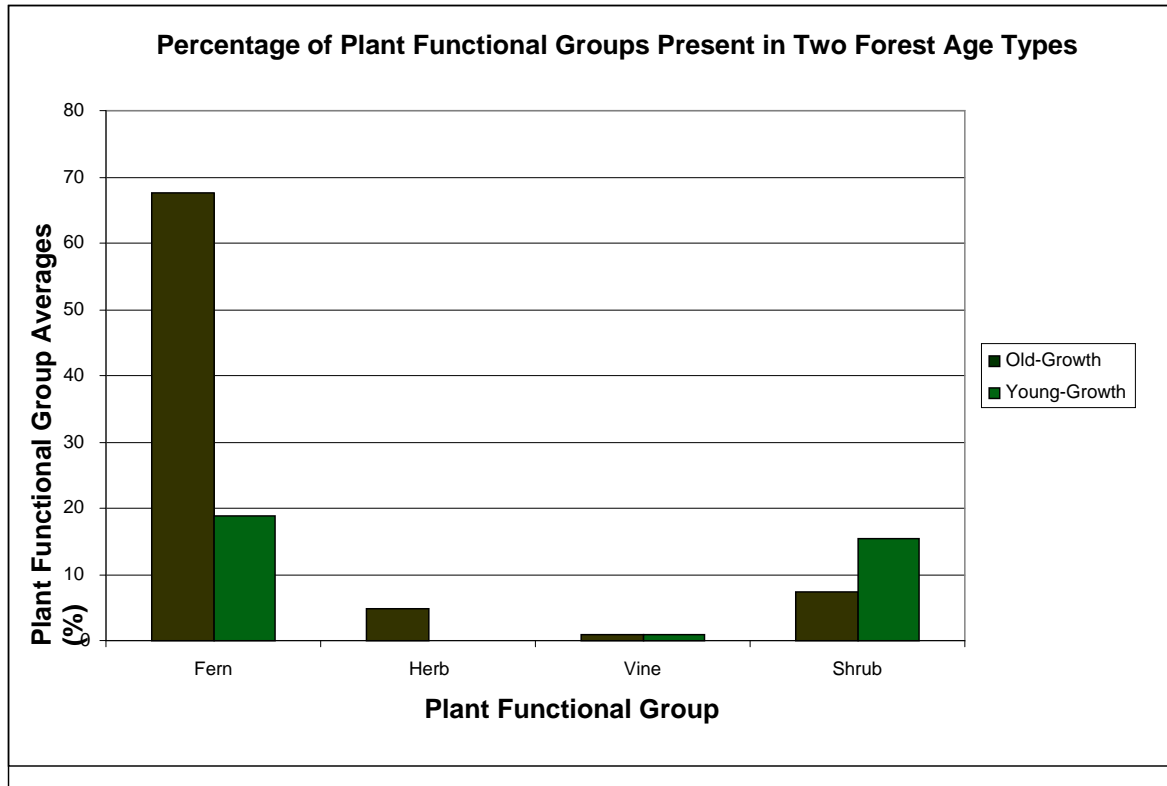


Figure 1. Positive feedback between plants, detritivores, and soil nutrients.

Lesson's Graphs:





**Question examples:**

1. Which forest type has the most plant species?
2. What is the most common type of plant in Old-Growth Forests?
3. What is the most common type of plant in Young-Growth Forests?
4. If old-growth forests have more plant species present how might this affect other members of the forest community?

5. Create a feedback diagram like Figure 1 to represent what you wrote in question 4?

6. All of the plant functional groups presented in graph 2 are part of the understory plant community. This means none of them are trees so they don't reach canopy height. Do you think you'd find the same trends in the plant canopy (tree and epiphyte) community found in the understory in these two forest types? \_\_\_\_\_ Really, why? \_\_\_\_\_

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