

The Floristic Relay Game: Background

Succession:

When we study ecosystems, we can separate them into the living parts, and the non-living parts, like rocks, water, air. The living part can be separated into the plant and animal community. Animals in the ecosystem depend on the plant community. Plant communities change over time. These changes are called succession, or plant community dynamics. This is one of the key concepts in ecology. Most people are unaware that plant communities, on which animals depend, are always changing.

Events such as wildfires, floods, drought, disease, and plant death, can trigger changes in the plant community. Ecologists call these events disturbances or “stresses”. Disturbances change the environment, for example after a fire there are few plants left to shade the ground and the soil gets hot. The change in the environment leads to changes in the composition of the plant community. Composition refers to the number of species and how many plants of each species occurring in an area.

How do changes in the environment lead to changes in the species composition of the community? As any gardener knows, different plant species respond differently to their environment. Some plants grow better in the bright sunlight, some grow well in the shade, some can survive wildfires and others cannot. These differences in plant characteristics form the basis for changes in the composition of the plant community as a whole.

Some disturbances are small, only affecting the plants in a small area. For example, if we are looking at the whole forest and a tree dies, we may not notice. But if we focus on one place in the forest, then we can see the tree die. The environment in that spot is changed. There is now more light hitting the ground, the tree is not there to provide shade. A plant that grows well in the shade is replaced by another that needs a lot of light. Then, as the plant that needs light grows, it shades the ground, now a plant that needs shade can grow. Over a long period of time, maybe centuries, we will see the whole forest slowly replaced by new trees.

Some disturbances are very dramatic and affect larger areas than others, like when a volcano erupts, wiping out an entire forest. After a large disturbance, the environment on the mountainside is changed. The ground is covered with solid rock from the lava flows. Seeds have to travel to the area to colonize it. Usually the colonizing plants are not the same kind as the plants that covered the mountain before the disturbance. The colonizers use their roots to break up the rock, when they die they leave behind nutrients and start turning the rock to soil. These colonizing plants create a new environment that other plants can use. Other plants start taking over until eventually there is a forest that looks a lot like the forest that was there before the volcano.

The game

This concept of succession, or plant community dynamics is difficult to teach because it occurs over long periods of time, and cannot be observed easily. I created a game where succession can occur within a class period. With this game students can observe the changes in an imaginary plant community. The rules of the game are based on current scientific theories of how plants respond to disturbances, such as wildfires, and how plants respond to each other.

In the game the students play the roles of six different imaginary plant species. To “win” is to have the most plants of your species dominating the community. As students play the game, they learn that the six plants respond differently to the disturbances. They also learn that plants interact with each other. They learn that some are better competitors, and some plants help other

plants, these are called facilitators. They may notice that plants that do well during disturbances, usually lose during competition. These are the early successional plants because they dominate the community soon after a disturbance occurs. Early plants are also known as colonizers, ruderals, or weeds. They are generally annual plants, they produce many small seeds, and the seeds can usually travel far carried by either wind or water. Late successional compete well but don't respond well to disturbances. These plants dominate only after there has been some time without disturbances. Late plants are usually perennials, they produce few, large seeds which are usually carried by animals.

Once students start learning how the game works, they will almost inadvertently learn about plants in their environment and how they interact. Encourage them to research local ecosystems and plant communities, they can learn which disturbances are important in these ecosystems. The personnel at your local National Park or Forest, State Park or other conservation agency should be knowledgeable in this area. Students could even create their own game using the regional plants.