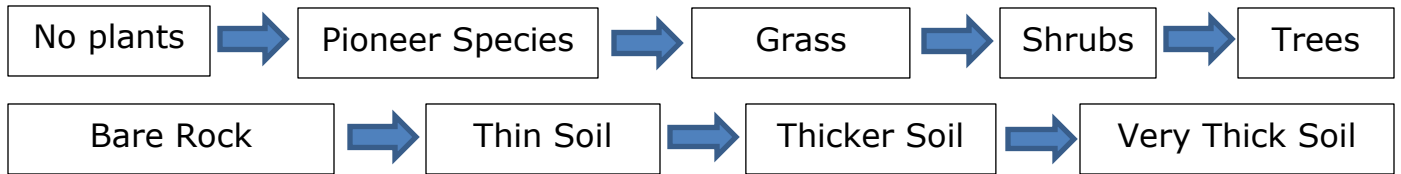


STAAR Science Tutorial 44 **TEK 7.10C: Succession**

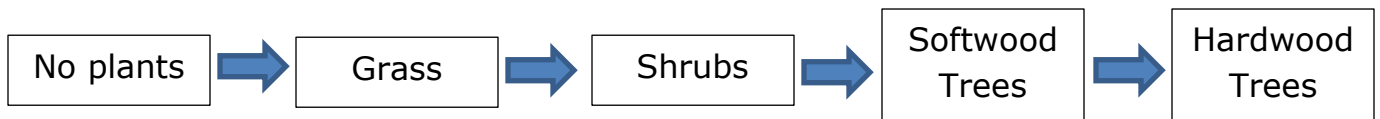
TEK 7.10C: Observe, record, and describe the role of ecological succession such as in a microhabitat of a garden with weeds.

- In an ecosystem, a **habitat** is the place in which an organism lives and finds all of the resources necessary for its survival. Examples of habitats include a salt-water marsh, an open meadow, or an oak forest.
- Many different species can live in a habitat, though each species will probably spend most of its time in specific small areas of the habitat, called **microhabitats**. Examples of microhabitats include a rotting log laying the forest, the leaves and flowers of certain plants in the meadow, the top branches of the oak trees in the forest, or in the litter on the forest floor. Microhabitats provide specialized requirements for a limited number of species.
- A **community** is all of the living organisms that live in an area. Each **population** of species within the community interacts with one another in interconnected **food webs** and symbiotic relationships—the **biotic** factors of the ecosystem.
- See *Tutorial 53: Competition* for a complete discussion of habitats, biotic and abiotic factors, populations and communities. See *Tutorial 52: Food Webs and Symbiosis* for a complete discussion of food webs and symbiotic relationships.
- In a healthy ecosystem, the population of each species of the community is in **equilibrium** (in balance) with one another. The limited resources of the ecosystem, the established niche of each species, and the predator-prey relationships of the ecosystem tend to keep each population within a narrow range. This stable community is called a **climax community**, because once achieved, it tends to continue with little change.
- This normal equilibrium ends when a **disturbance** or catastrophic event occurs within the ecosystem. Examples of disturbances include wildfires, hurricanes, floods, extreme droughts, volcanic eruptions, human habitat destruction and glacial action.
- After such a disturbance, natural processes slowly work to restore the ecosystem to equilibrium. This process, called **succession**, is the series of predictable changes to the community that occur over time until a new climax community is established.
- There are two kinds of succession: primary succession and secondary succession. They differ with the severity of the disturbance, and in particular, whether soil exists in the ecosystem after the disturbance.
- **Primary succession** begins with exposed solid rock, with no layer of soil in which plants can start growing. The disturbances that begin primary succession include volcanic eruptions with lava flows, receding glaciers leaving bare rock, and newly uncovered land caused by tectonic uplift or dropping sea levels. **Pioneer species**,

such as lichens and moss which can live on bare rock, slowly break down the rock into smaller and smaller pieces, eventually creating a thin layer of soil over the rock. As more soil is created, the size of plants that can be supported increases, from moss and grass to small shrubs and finally trees. Each new community of plant life helps to build up the soil in depth and fertility, making life for the next plant community possible. Each new successive plant community brings its own animal community. The primary succession process is very slow, because the creation of soil can take thousands of years, and is subject to erosion forces until a protective covering of plants holds the soil in place. The following flow map describes the steps in primary succession, in terms of plant cover and soil thickness:



- Secondary succession** begins with an existing layer of soil in place. The disturbances that begin secondary succession include wild fires, human habitat destruction such as the clear-cutting of a forest, extended droughts or floods. Because an existing layer of soil is already in place, secondary succession is a much faster process. The first plants may sprout from seeds in the soil that survived the disturbance, or may be dropped by birds or the wind. Within a few years, grass and wild flowers cover the ground and stabilize the soil. Shrub and tree seeds take root within a decade. If the climax community is a grassland or meadow, succession may only take a few years or a decade. If the climax community was a hardwood forest, it may take 100 - 200 years for the series of different plant communities to restore the ecosystem to equilibrium. The flow map for plant communities in secondary succession follows:



Note that no significant change to soil depth occurs in secondary succession, unless erosion immediately after the disturbance removed some of the soil.

- An example of a microhabitat is a vegetable garden in a residential yard that has been abandoned. Over a short time, weed and grass seeds fall onto the bare soil and begin to sprout. Within a few months, grass and weeds have completely overtaken the once empty garden plot, returning the area to its pre-garden state.

Practice Questions

- A _____ is the place in which an organism lives and finds all of the resources necessary for its survival. Examples include _____

2. A _____ is a specific small area within a habitat with the specialized requirements for a limited number of species. Examples include _____.
3. A _____ is all of the living organisms that live in an area. It is made of _____ of different species.
4. A _____ is a stable community that tends to not change over time, because it is in _____ or balance.
5. The process of _____ is the series of predictable changes to the community that occur over time until a new climax community is established.
6. The process of primary succession begins with _____. Disturbances that can start the primary succession process include _____.
7. The process of secondary succession begins with _____. Disturbances that can start the secondary succession process include _____.
8. Primary succession is very _____, because it takes a long time for soil to be formed. Secondary succession is relatively _____, because the soil already exists.