**Changes in ecosystem review sheet**

***SC.912.L.17.4 Describe changes in ecosystems resulting from seasonal variations, climate change, and succession.***

**Community dynamics**

Community dynamics are the changes in community structure and composition over time. Sometimes these changes are induced by environmental disturbances such as volcanoes, earthquakes, storms, fires, and climate change. Communities with a stable structure are said to be at equilibrium. Following a disturbance, the community may or may not return to the equilibrium state.

Succession describes the sequential appearance and disappearance of species in a community over time. In primary succession, newly-exposed or newly-formed land is colonized by living things. In secondary succession, part of an ecosystem is disturbed, but remnants of the previous community remain.

Primary succession and pioneer species

**Primary** **succession** occurs when new land is formed or rock is exposed; for example, following the eruption of volcanoes, such as those on the Big Island of Hawaii. As lava flows into the ocean, new land is continually being formed. On the Big Island, approximately 32 acres of land are added each year. First, weathering and other natural forces break down the substrate enough for the establishment of certain hearty plants and lichens with few soil requirements, known as pioneer species. These species help to further break down the mineral-rich lava into soil where other, less-hardy species will grow, eventually replacing the pioneer species. In addition, as these early species grow and die, they add to an ever-growing layer of decomposing organic material, contributing to soil formation. Over time, the area will reach an equilibrium state with a set of organisms quite different from the pioneer species.

**Secondary** **succession**

A classic example of secondary succession occurs in oak and hickory forests cleared by wildfire. Wildfires will burn most vegetation and kill those animals unable to flee the area. Their nutrients, however, are returned to the ground in the form of ash. Thus, even when areas are devoid of life due to severe fires, they will soon be ready for new life to take hold.

Secondary succession in the forest

Secondary succession is shown in an oak and hickory forest after a forest fire. Those organisms that could not escape are killed, but their bodies decompose, adding nutrients to the soil. These nutrients provide the basis for new plants to grow.

Before a wildfire, vegetation is often dominated by tall trees with access to the major plant energy resource: sunlight. Their height gives them access to sunlight while also shading the ground and other low-lying species. After the fire, however, these trees are no longer dominant. Thus, the first plants to grow back are usually annual plants followed, within a few years, by quickly-growing and spreading grasses along with other pioneer species. Due to changes in the environment brought on by the growth of the grasses and other species, over many years, shrubs will emerge along with small pine, oak, and hickory trees. These organisms are called intermediate species. Eventually, over 150 years, the forest will reach its equilibrium point where species composition is no longer changing and resembles the community before the fire. This equilibrium state is referred to as the climax community, which will remain stable until the next disturbance.

**Draw a series of picture to explain 1-2:**

1. Primary Succession:
2. Secondary Succession:
3. Give 2 examples of a Pioneer Species and explain what it is.
4. Draw a graph to explain Climax Community:
5. Explain the difference between primary and secondary succession.
6. Changes in an ecosystem over a long period of time are shown in the diagram below.



These changes will most likely lead to a:

* + - * 1. stable ecosystem that can last for many years
        2. loss of heterotrophs that cannot be recovered
        3. long-term rise in environmental temperatures
        4. forest consisting of only producers and decomposers

1. A biologists compares how different ecosystems undergo succession. She divides the series of events that happen during primary and secondary succession into three different stages. Which feature might be used to distinguish secondary succession from primary succession?
   * + - 1. the lack of pioneer species in the second stage
         2. the presence of pioneer species in the final stage
         3. the presence of trees and large plants in the final stage
         4. the presence of soil and organic matter in the first stage.
2. After a volcano erupts and destroys an ecosystem, a few organisms are able to begin growing from the decaying organic matter left behind. What do we call those organisms that are able to grow in little or no soil that first appear?
   1. adaptors
   2. pioneer species
   3. non-vascular plants
   4. decomposers