

# SUCCESSION AND SUSTAINABILITY

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- ✘ Plants provide many important ecosystem services, including providing humans with sources of fibre, fuel, pharmaceuticals, and beauty.
- ✘ As primary producers, plants provide food for many organisms either directly or indirectly.
- ✘ From the canopy created by tall trees in a forest to small pools of water that collect in leaves of plants, plants provide habitat for many organisms.
- ✘ Through photosynthesis, plants release oxygen into the atmosphere and take up carbon dioxide, serving as a sink for CO<sub>2</sub>.
- ✘ Plants are also involved in the cycling of nutrients, such as nitrogen and phosphorus, through global systems.
- ✘ Plants detoxify and decompose waste materials, generate and revitalize soil, and purify the air.
- ✘ The presence of plant roots helps reduce soil erosion.
- ✘ Plants, such as those in the wetlands, are natural water filters, removing chemicals and other pollutants from water.
- ✘ Plants also play a role in establishing and developing communities, a process known as ecological succession.

# PLANT (ECOSYSTEM) SERVICES



# PLANTS AS ECOSYSTEM PIONEERS

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- ✘ An event that changes the structure of a biological community – sometimes destroying all actively growing organisms – is called an **ecological disturbance**.
- ✘ Examples of ecological disturbances include forest fires, floods, volcanic eruptions, and retreating glaciers.
- ✘ Following an ecological disturbance, an area may appear barren.
- ✘ Within months, however, new vegetation may sprout, and then animals may repopulate the area. Years later, the same area will likely be thick with life.
- ✘ This process, called **ecological succession**, is the sequence of invasion and replacement of species in an ecosystem over time.
- ✘ Succession is driven by abiotic factors, such as climate, and biotic factors, such as competition for changing available resources.

# PRIMARY SUCCESSION

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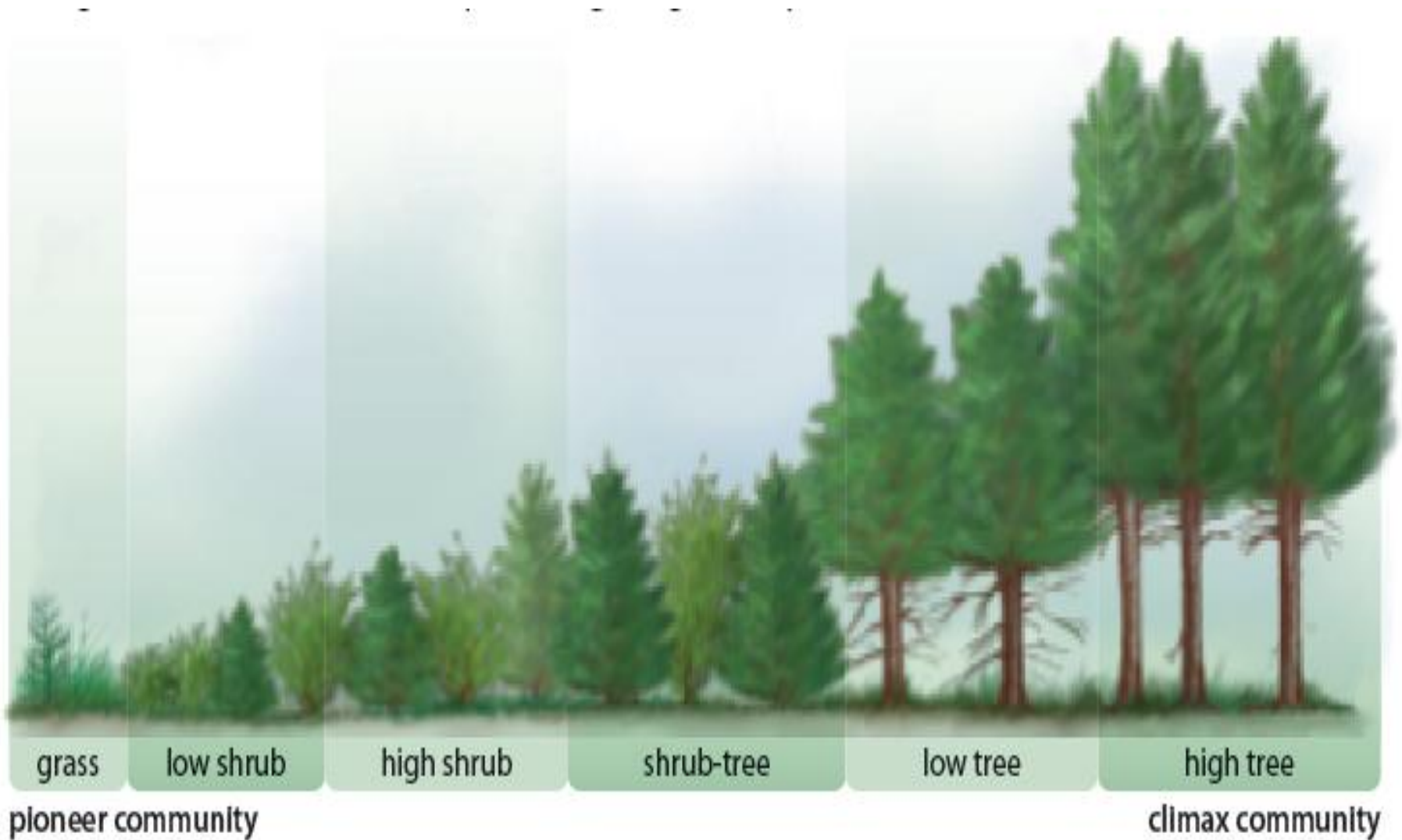
- ✘ **Primary succession** is the establishment of a community in an area after an ecological disturbance has left exposed rock that does not have any topsoil.
- ✘ For example, bare rocks left behind by a retreating glacier and the hardened bed of lava from a volcanic eruption have no topsoil.
- ✘ Plant species play an important role in primary succession.
- ✘ In some cases, plants, such as liverworts, are one of the first species to colonize a barren area.
- ✘ The first organisms that appear in primary succession are called **pioneer species**.
- ✘ Pioneer species, which can include bacteria, algae, lichens, and plants, form a **pioneer community**.

# CLIMAX COMMUNITY

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- ✘ As the plants grow, they compete for light and living space.
- ✘ Some populations are better able to survive the competition and the changing habitat.
- ✘ These populations replace those that are not able to survive.
- ✘ Animals may join the community and, as the species of plants change, so do the species of animals.
- ✘ The latecomers in the process of succession form a **climax community**.
- ✘ This community may remain relatively stable if there are no major environmental changes.

# FROM PIONEER TO CLIMAX COMMUNITY

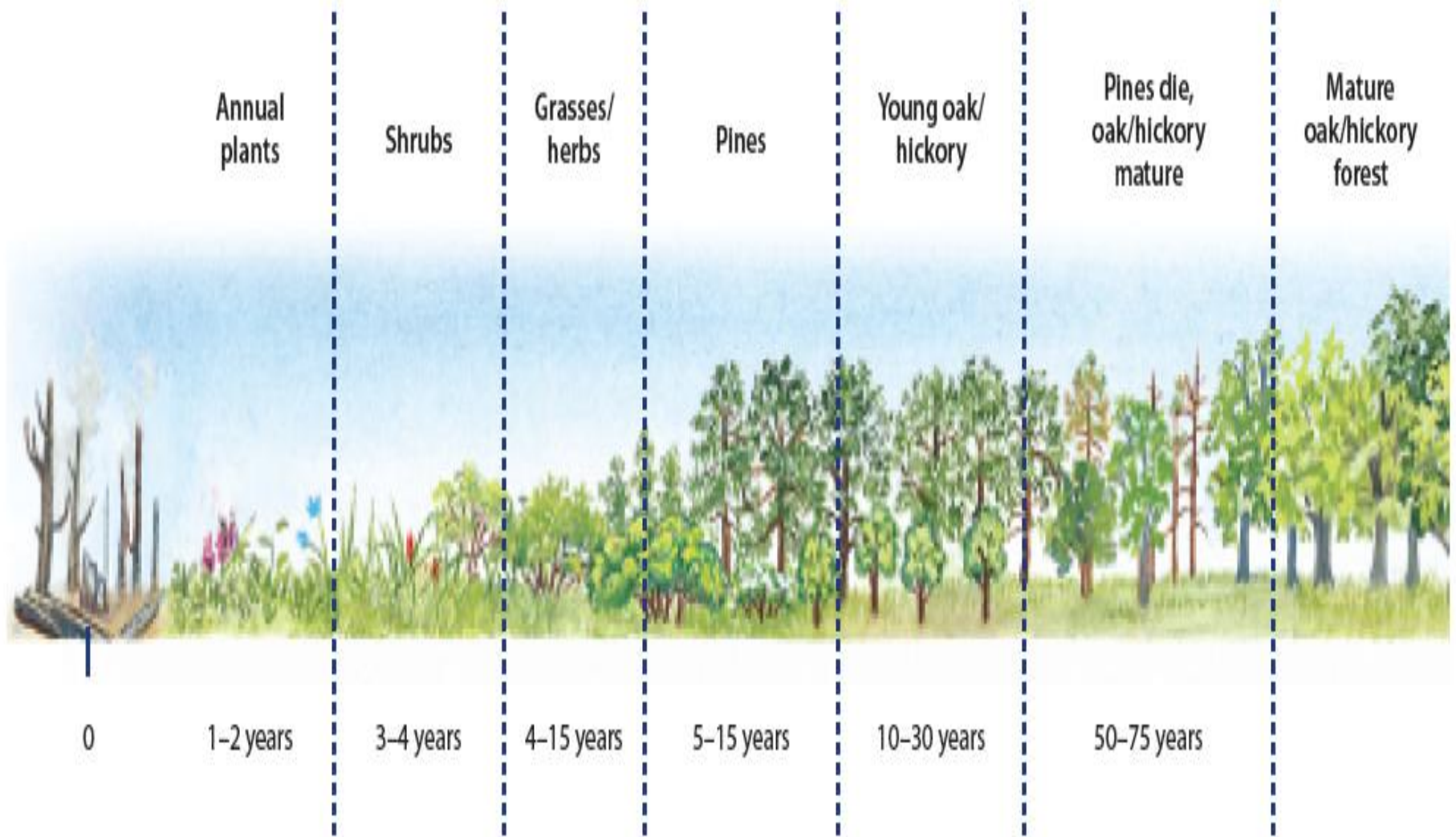


# SECONDARY SUCCESSION

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- ✘ **Secondary succession** is the re-colonization of an area after an ecological disturbance in which soil has remained intact.
- ✘ For example, soil, which contains nutrients and organic matter, usually survives disturbances such as forest fires, floods, and agricultural activity.
- ✘ Often, the seeds and roots of vascular plants remain buried in the soil, as do the spores of ferns and mosses.
- ✘ Like primary succession, secondary succession, includes changes in the composition and number of species over time.
- ✘ The stages of succession may occur over weeks in an area recovering from a flood. In other areas, such as a new forest, succession may continue for 150 years.
- ✘ According to the classical model of succession, once the climax community has developed, it will remain stable unless there is a major ecological disturbance.

# A LOOK AT SECONDARY SUCCESSION





# FREQUENCY OF ECOLOGICAL DISTURBANCE

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- ✘ In the past, scientists believed that ecological disturbances did not occur very often.
- ✘ Ecologists now think that ecological disturbances are the norm rather than the exception in many communities.
- ✘ Even a tree falling in a rainforest creates a small ecological disturbance. This kind of event, and larger disturbances such as the clear-cutting of a forest, open a space in the canopy, allowing light to hit the ground and secondary succession to occur.
- ✘ Thus, ecological disturbances are important for many plants.
- ✘ Ecologists must consider how ecological disturbances affect different species when trying to establish, or preserve, healthy natural communities.
- ✘ Understanding the role of ecological disturbances in structuring communities is currently an important area of study in ecology.