

VISUALISE THIS 5: ECOLOGICAL SUCCESSION

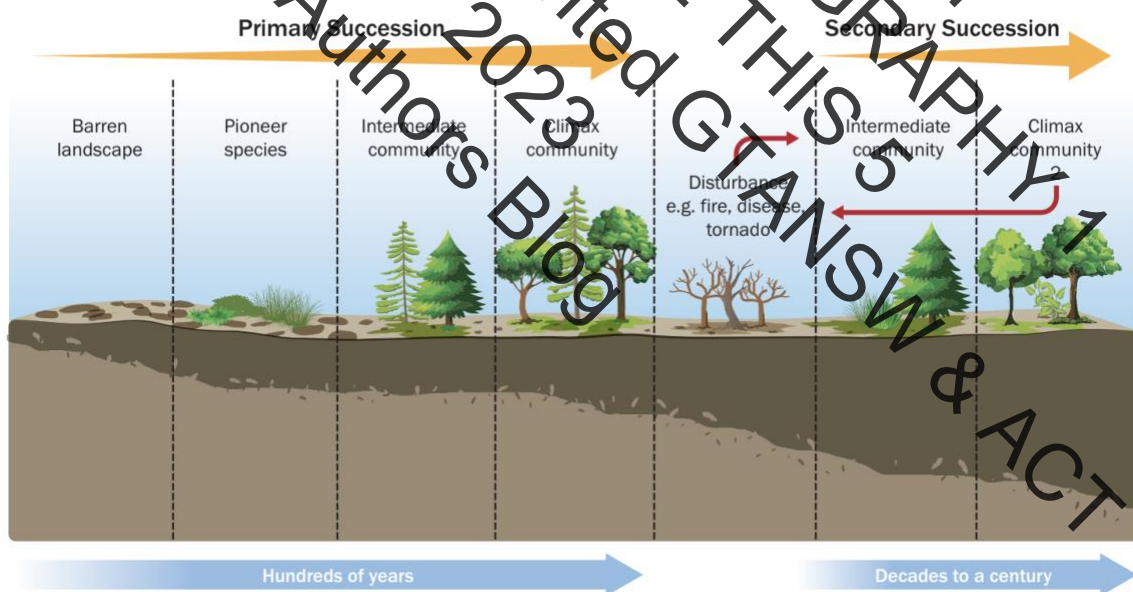
An ecological succession is the natural change in land cover at a place over time through the development of a sequence of increasingly complex plant communities. The end of the process is a *climax community* which is a stable mature plant community that will not change much and may last in that state for hundreds of years and support complex food webs.

Succession occurs in nature because living things change the environment at a place and create the abiotic (non-living) conditions needed for different species to thrive. Ecological succession is unique to the environmental conditions at a place and is usually investigated at a local scale. Communities of fauna are attracted at each stage of a succession and become part of the process of change.

The two main types of succession are primary and secondary.

<Insert Source 5.1>

Source 5.1 Types of ecological succession.



Primary succession begins in an area that has no life or soil - it is a barren area such as

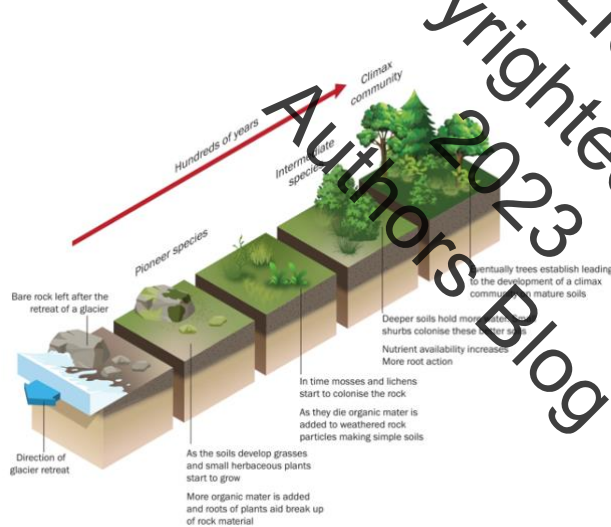
- bare rock left behind by a retreating glacier or after a volcanic eruption.
- new land created by deposition such as sand dunes, floodplains and deltas.

The first organisms in a succession are the ‘pioneer species’ that can survive in a nutrient-poor and barren environment. The pioneers include fungi, mosses and lichens that grow from spores carried by the wind. Lichen can grow on most surfaces, do not need soil and release acids that break down rocks. In addition to assisting in the weathering of rock to form soil, when pioneer species die and decompose, they improve soil fertility. Developing soil can sustain plants like grasses and herbs, which further change the soil to create conditions for larger plants. Often seeds blown in by wind will establish in the new soil.

Over time, as the amount of shade and soil increases, taller plants and trees will become established, outcompeting smaller shade intolerant plants. The final stage of succession is a ‘climax community’, a stable stage of mature plants that could last for hundreds of years. Each new community in a succession is called a ‘sere’.

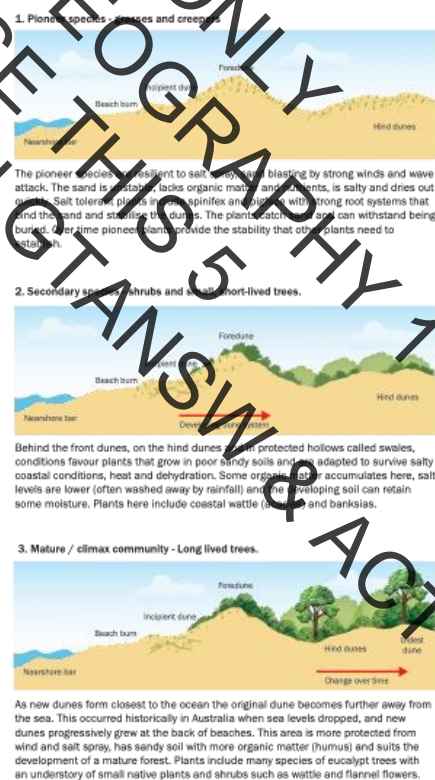
<Insert Source 5.2>

Source 5.2 Primary succession after glacial retreat.



<Insert Source 5.3>

Source 5.3 Primary succession on coastal dunes



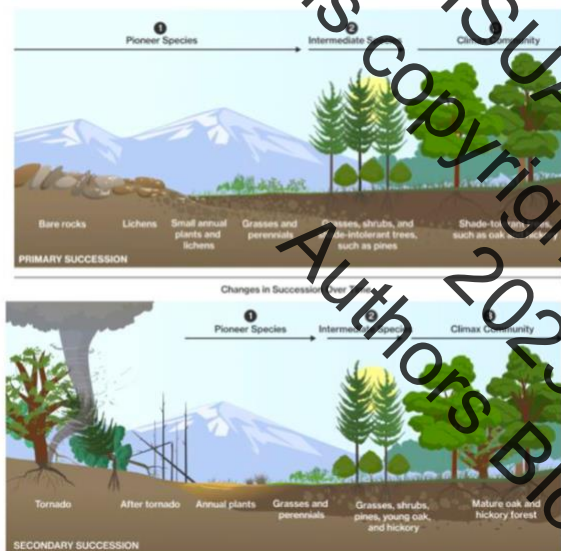
Secondary succession occurs where there has been a disturbance. The repopulation of plant communities after a dramatic disturbance such as a natural wildfire, cyclone, disease, insect invasion or human activity like logging illustrates nature's resilience. Vegetation gradually

returns to a damaged ecosystem forming populations and communities over time, in a similar way to a primary succession.

Unlike a primary succession, soil formation is not needed because the soil remains and microbes and other organisms in the soil make nutrients immediately available to plants. This enables vegetation communities to recover more quickly. After a forest fire for example, although the plants are destroyed and wildlife has gone, the soil retains enough fertility to support life. Ash from a fire enriches soil that may still contain seeds and plant roots that are able to sprout or regrow. The succession begins with grasses followed by shrubs and small trees.

<Insert Source 5.4>

Source 5.4 Secondary succession following a tornado.



Recovery after bushfire.

Australian Eucalypt forests burnt by bushfires can recover quickly through secondary succession, unless the fires are so intense that all life above and below the ground are destroyed by the extreme heat. The intensity and duration of fire will determine whether a primary or secondary succession will take place. The recurrence of fires in one location may mean a new climax community may never develop or take centuries without further disturbance.

Understanding ecological succession through illustrations.

Diagrams illustrating an ecological succession show change over time not a change in the location of the natural system. These illustrations are usually shown as a transect moving away from the source of the change and illustrate the stages of change over time. For example, where ice has retreated in Source 5.2 the climax community has been through all of the stages of succession that occur as the ice melted. The continued melting of the ice means it is possible to see the many stages in a succession walking through the landscape. The same applies to the dune succession shown in Source 5.3.

<Insert Source 5.5>



ACTIVITIES

Core knowledge

1. Define ecological succession in your own words.
2. Briefly explain how ecological succession changes Earth's land cover.
3. Illustrate the similarities and difference between primary and secondary succession in a Venn diagram.

Application

4. Refer to source 5.1. Explain the difference in time frames for primary and secondary successions.
5. Refer to Source 5.2. Explain how the retreat of a glacier can lead to a primary succession.

6. Refer to Source 5.3. Explain how different plants change the environment during the development of a climax community on sand dunes.

7. Refer to Source 5.4.

a. Describe the natural event that changed this forest and led to the development of a secondary succession.

b. Explain why plant communities were able to return quickly following the natural event.

c. What other natural disturbances could have a similar effect on this forest.

8. You are visiting a mature forest to complete fieldwork.

a. Explain the stages of a primary succession the forest has been through.

b. Identify three ways this climax community could change before undergoing a secondary succession.

c. Describe three fieldwork techniques you would use to investigate characteristics of the forest you are in.

9. Refer to Source 5.5. Investigate the features of Australian native plants that assist in ecological succession after an intense forest fire.

Extension

10. Refer to Source 5.3. Explain why the climax community is a long distance from the sea.

11. Investigate ecological succession at Glacier Bay, Alaska following glaciation. Represent your findings as an annotated illustration or in a Story Map.

Linked chapters.

Powerful Geography 1 Earth's Natural Systems

Chapter 2 The Cryosphere / Ecological succession in the Patagonia

Chapter 3 Forest systems / Ecological succession in a forest system