5.4: Ecological Succession

1) Series of one or more predictable changes that occur in a **community** over time.

2) Over the course of succession, the number and type of **species** changes.
Succession (Teachers Pet) Video

- [https://www.youtube.com/watch?v=OuMUPYA3ao4](https://www.youtube.com/watch?v=OuMUPYA3ao4)
- Two forms: **primary** and **secondary**
- Key terms: **pioneer species**
  **climax community**
Primary Succession

- Begins in areas with no remnants of an older community.
- First species to live in an area of primary succession are called **pioneer species**.
Primary Succession

- series of changes that occur in an area where no soil or organisms exist

1. **Volcanic Eruption**
  Shortly after a volcanic eruption, there is no soil, only ash and rock.

2. **Pioneer Species**
The first species to grow are pioneer species such as mosses and lichens.

3. **Soil Creation**
  As pioneer species grow and die, soil forms. Some plants grow in this new soil.

4. **Fertile Soil and Maturing Plants**
  As more plants die, they decompose and make the soil more fertile. New plants grow and existing plants mature in the fertile soil.
Primary Succession

1. **Pioneer species**, such as lichens, are the first to colonize.

2. The environment changes as
   - **soil** forms
   - new species **immigrate**
   - new **habitats** are established
Secondary Succession

1. Occurs when a **disturbance** dramatically alters a **community**

2. **Soil remains in place**

3. Common **disturbances**: wildfire, logging, and farming

4. Occurs significantly faster than **primary succession**
Secondary Succession

- series of changes that occur in an area where the **ecosystem** has been disturbed,
- soil and organisms still exist.
### Comparing and Contrasting

<table>
<thead>
<tr>
<th>Factors in Succession</th>
<th>Primary Succession</th>
<th>Secondary Succession</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible cause</td>
<td>Volcanic eruption</td>
<td>Fire</td>
</tr>
<tr>
<td>Type of area</td>
<td>No soil or organisms exist.</td>
<td>Soil and organisms exist.</td>
</tr>
<tr>
<td>Existing ecosystem?</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Climax Community

• “final” **community** of living things that will populate an area

• **stable climax community** will change when a natural or “human-caused” **disturbance** occurs
Video: Amoeba Sisters/Ecological Succession: Nature's Great Grit

- [https://www.youtube.com/watch?v=uqEUzgVAF6g&list=PLwL0Myd7Dk1F0iQPGrjehze3eDpco1eVz&index=45](https://www.youtube.com/watch?v=uqEUzgVAF6g&list=PLwL0Myd7Dk1F0iQPGrjehze3eDpco1eVz&index=45)
Ecological succession is a slow process.
The change from an open field of goldenrods to a mature oak-hickory forest can take over 100 years!
Ecological Disturbances

- undisturbed community is in **equilibrium**: generally stable and balanced
- most populations at or around **carrying capacity**
- disturbances to an ecosystem can throw a **community** into disequilibrium
Forest Fires

Many communities of living things depend on periodic fires for survival.
✓ replenish **nutrients** to soils by rapidly decomposing debris

✓ control **parasites** (such as wood-boring beetles) by destroying them directly or reducing the numbers of their host(s)

✓ Fires are **abiotic density-independent limiting factors**
Pine Forests

- Many have seeds or cones that require fire for **germination** \( \rightarrow \) sprout from seeds
to remove competing plants in order to make space for **shade-intolerant** plants.
- pitch, loblolly, long-leaf, short-leaf, ponderosa, and lodgepole pine **species** require fires to **regenerate**.
Trees that depend on wildfires have a thick bark that is fire resistant.
Many species of oaks regenerate quickly after forest fires.

Many wildflowers, such as fireweed, depend on fires as well.
Invasive Species

• Nonnative organisms that spread widely in a community
• A lack of **limiting factors** such as predators, parasites, or competitors enables their population to grow unchecked.

**Did You Know?** Although the European honeybee is invasive to North America, it is beneficial because it pollinates our agricultural crops.
Invasive Species

• Not all invasive species are harmful.

Did You Know? Although the European honeybee is invasive to North America, it is beneficial because it pollinates our agricultural crops.