Topic 2.1

Introduction to Biodiversity

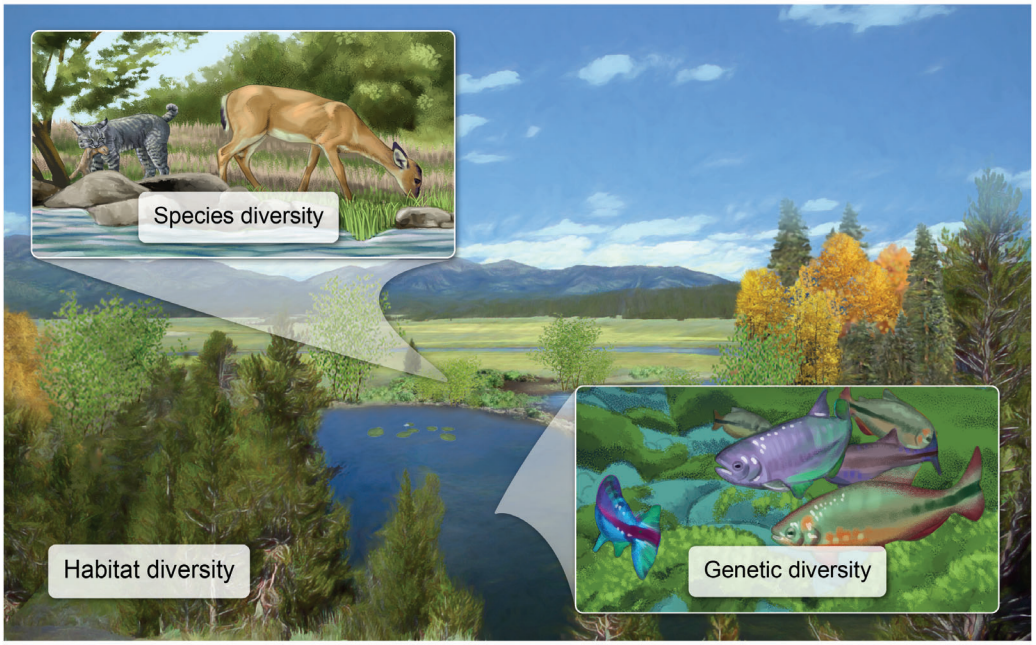
You Will Learn to:

- Identify the types of biodiversity and explain the importance of biodiversity in ecosystems.

By the End of the Topic, You Should Be Able to Answer:

- What are the components of an ecosystem's biodiversity?
- What makes up species diversity?
- How does biodiversity impact the survival of a species?

Biodiversity

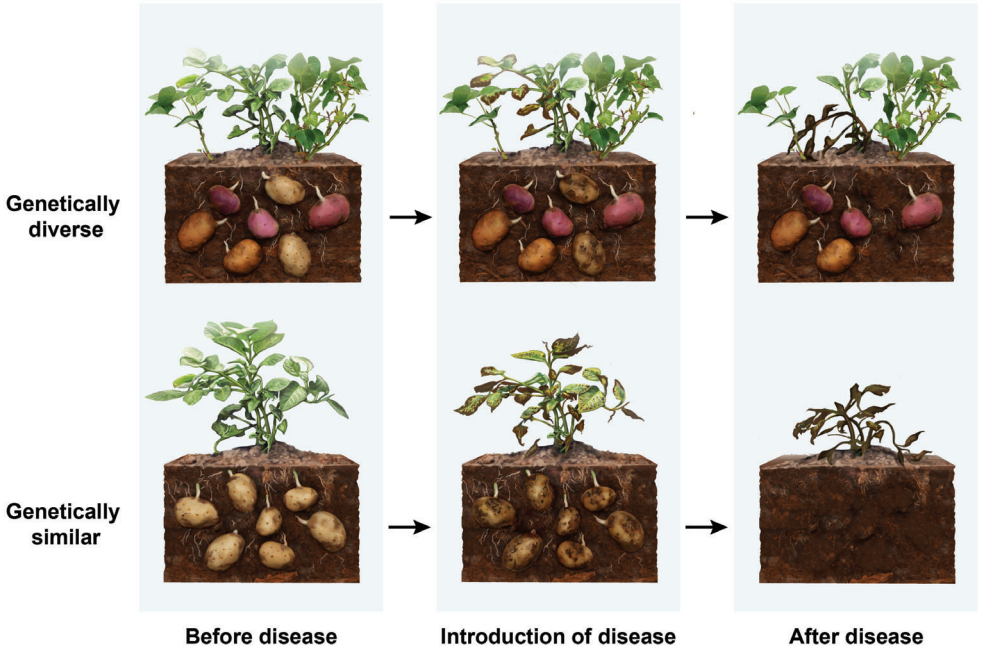


Biodiversity (the variety of life present in an ecosystem), can indicate the health of an ecosystem. Types of biodiversity in ecosystems include:

- **Genetic diversity**—the variety of genes present in a single species.
- **Species diversity**—the combination of **species richness** (number of different species) and species evenness.
- **Habitat diversity**—the variety and availability of habitats.

When an ecosystem experiences an **environmental stressor** (factor that negatively affects an organism) or disruption, each component of the ecosystem's biodiversity impacts its response and the potential survival and recovery of species.

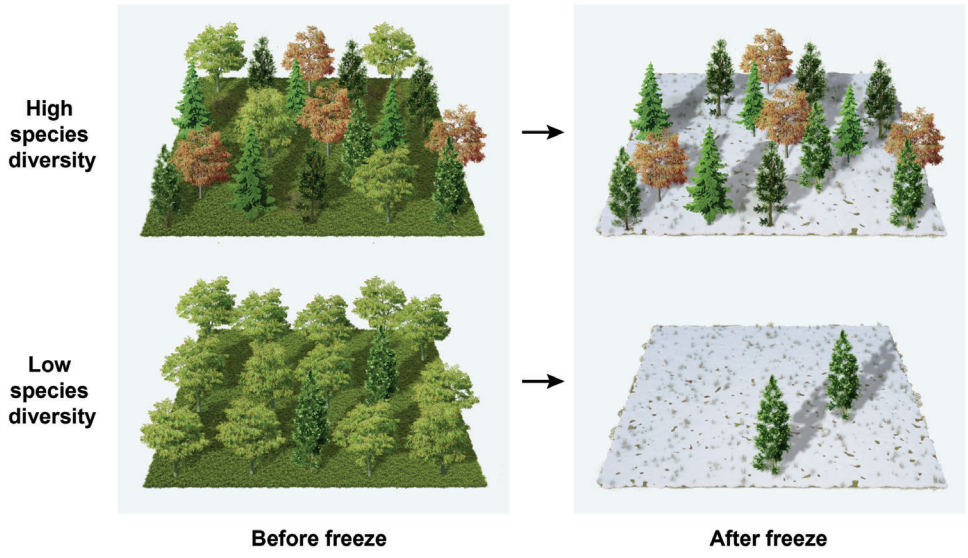
Genetic Diversity



The genetic diversity of a population can determine the population's response to environmental stressors. For example, when a new disease emerges, a species with greater genetic diversity is more likely to survive than a species with lower genetic diversity because a genetically diverse species is more likely to have some individuals that are unaffected by the disease while others die.

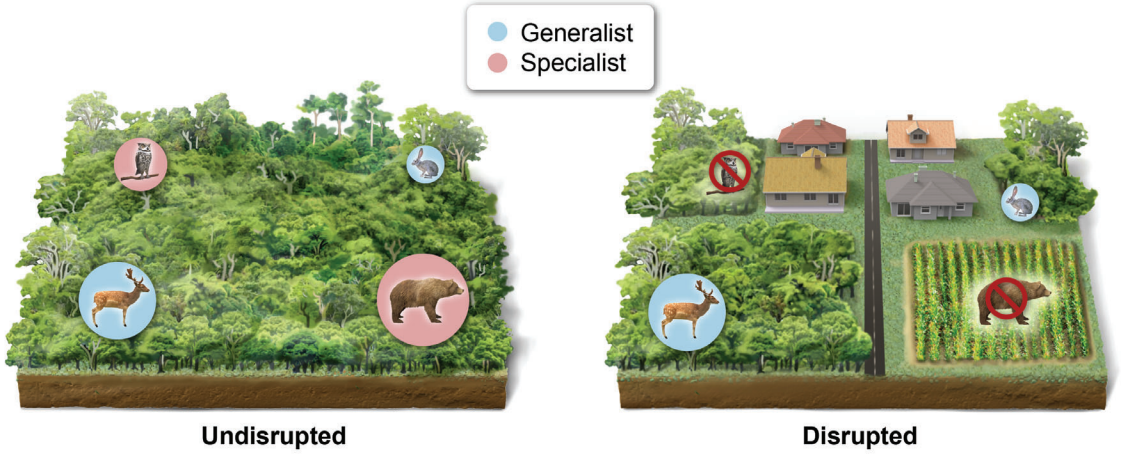
The genetic diversity and ability of a population to respond to future environmental stressors can be impacted by environmental disruptions that cause a **population bottleneck**. During a population bottleneck event, such as a wildfire, the population size of a species significantly decreases, which results in the loss of genetic diversity.

Species Diversity



Species diversity also impacts an ecosystem's response to an environmental disruption. Ecosystems with high species diversity are resilient and are more likely to recover after a disruption due to the large number of species within the population. High species richness and evenness allow for the greatest probability that some organisms will survive and contribute to the recovery.

Habitat Diversity



Similarly, when habitat diversity is reduced by disruptions, destruction, or habitat fragmentation, the survival of species within the ecosystem is at risk. Because habitat fragmentation increases the amount of edge habitat, species that are better able to survive in smaller habitats are less impacted by habitat loss.

As a result, a loss of habitat first results in a loss of **specialist species** (species that require specific environmental conditions to survive) and species with large territorial requirements. However, if the habitat loss is significant, it can also result in the loss of **generalist species** (species that can survive in a variety of environmental conditions).

Things to Remember

- Biodiversity consists of the genetic, species, and habitat diversity of an ecosystem.
- Populations that are more genetically diverse have a better chance to respond to and recover from environmental stressors than populations that are less genetically diverse.
- An ecosystem with a large number of species is better suited to recover from an ecological disruption because there are increased opportunities for some organisms to survive, and eventually thrive, in the newly disturbed environment.
- In general, the loss of habitat results in the loss of specialist species before the loss of generalist species, and habitat loss negatively impacts species with large territorial requirements.

2.1 Vocabulary

Biodiversity	The variety of life in an ecosystem, and includes genetic diversity, species diversity, and ecosystem diversity.
Environmental stressor	A factor that negatively affects an organism.
Generalist species	Species that can survive in a variety of environmental conditions and tend to not be affected by changing habitats.
Genetic diversity	The variety of genes present in a single species within an ecosystem.
Habitat diversity	The variety and availability of habitats within an ecosystem.
Population bottleneck	A significant reduction in a species population size and genetic diversity due to an environmental disruption.
Specialist species	Species that require specific environmental conditions to survive and tend to primarily thrive in stable, unchanging habitats.
Species diversity	The variety of species within an ecosystem, measured by species richness and species evenness.
Species richness	The number of different species in an ecosystem.

2.1 Check for Understanding

1. **Which component of biodiversity indicates the richness and evenness within an ecosystem?**

   A. Genetic diversity

   B. Species diversity

   C. Habitat diversity

   D. Ecological diversity

2. **Which of the following ecosystems is most likely to survive an ecological disruption?**

   A. An ecosystem with a large number of genetically similar organisms

   B. An ecosystem that has a large number of specialist species

   C. An ecosystem that has experienced a population bottleneck

   D. An ecosystem with a large number of species that live in a variety of habitats

3. **An ecological disruption that can result in a significant loss of organisms and a reduction in genetic diversity is called:**

   A. Population bottleneck

   B. Species richness

   C. Ecological niche

   D. Biodiversity