

Lesson Plan

Description
 Biodiversity is all around us – from animals to plants to fungi to microorganisms! Biodiversity operates in a careful balance that has developed over millions of years. With the changing climate, this careful balance is in jeopardy. In this lesson, students will simulate population dynamics and how these dynamics change in different climate scenarios.

<p>Learning Outcomes</p> <ul style="list-style-type: none"> • Biodiversity is the variety of life found on Earth • Biodiversity is important for the health of our planet • Biodiversity is interconnected • Climate change negatively affects biodiversity by disrupting connectedness 	<p>Specific Expectations</p> <p>A3.2 investigate how science and technology can be used with other subject areas to address real-world problems</p> <p>B2.7 explain how climate change contributes to a loss of biodiversity, and describe the impact of this loss</p>
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Introduction
Biodiversity

Biodiversity is a term used to describe the enormous **variety of life** found on Earth – from animals to plants to fungi and even microorganisms like bacteria! There are 3 types of biodiversity:

- Species diversity: Many different species exist (ex. lions vs dandelions)
- Genetic diversity: Diversity within species (ex. different colour bell peppers)
- Ecological diversity: Many different ecosystems exist throughout the planet (ex. marine ecosystem vs rainforest ecosystem)

All three types of biodiversity are important for life. Biodiversity is important for healthy ecosystems. The more species that are lost from an ecosystem, the more impacted the ecosystem will be. Without biodiversity, we do not have the services that biodiversity provides, such as fresh water, food, and medicine.

Climate Change and Biodiversity

The term climate change refers to a long-term shift in temperatures and weather patterns. These shifts can be natural, such as **gradual** cycles of cooling and warming. However, since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels. This **faster rate of change** is what makes it more difficult for biodiversity to survive.

When an environment changes too quickly, organisms don't have enough time to **adapt**. An adaptation is when an organism becomes better suited to its environment. For example, plants that live in desert regions have specialized leaves to better hold water, while plants in environments with more rainfall do not have this adaptation. Climate change causes extreme weather phenomena that make it difficult for organisms to survive. For example, fires and droughts are becoming more frequent in many parts of the world.

In this lesson, students will simulate population dynamics and how these dynamics change in different climate scenarios.

Materials

- PowerPoint
- Hand-out

Action

Show students the provided PowerPoint to introduce them to the concepts of biodiversity and climate change.

Students will play an interactive game to demonstrate how biodiversity is connected, and subsequently how climate change can affect this connectedness.

Divide students into 3 equal groups: plants, hares, and lynx. The students will form 3 concentric circles:

- The outer circle are the plants (standing)
- The middle circle are lynx (standing)
- The inner circle are hares (kneeling)

On your signal, the first round starts, during which:

- Plants stay still and wait to be tagged by a hare
- Hares run to tag a plant without being captured by a lynx – they can avoid being captured by a lynx by using camouflage (touching one knee to the ground)
- Lynx try and catch hares before they reach the plants – before following a hare they must turn 360° on the spot

Each round lasts just 10 seconds. Tagged plants become hares and captured hares become lynx. Unsuccessful hares or lynx become plants for the next round.

Play 5 rounds with equal numbers of students in each group. Record the number of students in each group after each round on the handout provided. Students will see that the populations fluctuate, but they should stay stable.

Create a scenario for the next 5 rounds. Tell the students that this year the snow melted faster than usual due to rising temperatures associated with climate change. Now there is no more snow, but the hares have not changed from white to brown yet, as they are adapted to change later in the year when the snow normally melts. Unfortunately, their white fur no longer acts as camouflage and makes it easy for the lynx to see them. The hares are no longer able to use their camouflage (kneeling) to stay safe from lynx during the game.

Record the population numbers after each round for each group on the handout. Students will be able to see how the population of hares declined due to climate change. The lynx population will also crash as prey declines, demonstrating the collapse of a food chain within an ecosystem.

Consolidation/Extension

To extend this lesson, students could graph the results of the game to better visualize the results.

To consolidate learning, have students answer the questions provided on the handout. Facilitate an open discussion among the class about the impacts of climate change on biodiversity.

Accommodations/Modifications

The activity could be completed outside.

Font on handout and slideshow can be modified to be larger or a different colour according to visual needs.

Assessment

The handout can be collected and utilized as an Assessment *for* Learning to evaluate how well students have understood the lesson’s content and if they require anymore clarification. Furthermore, it can be used as an Assessment *of* Learning if you wish to evaluate your students in a summative manner.