

# Elaborate: Biodiversity Across Biomes

INSTRUCTOR:

no\_reply@example.com



**Objective:** To understand how different living things interact within unique ecosystems called biomes.

## What You'll Learn About:

- **Biomes:** These are huge areas on Earth with similar climates, plants, and animals. Think of them as Earth's different "homes" for living things!
- **Biodiversity:** This means the amazing variety of life you find in a specific place. It's like a giant puzzle with many different pieces, all working together.
- **Biotic & Abiotic Factors:** Biotic factors are the living parts of an ecosystem (like plants and animals), while abiotic factors are the nonliving parts (like sunlight, water, and rocks).
- **Food Webs:** Imagine a tangled web where energy flows from one living thing to another. This is a food web!
  - **Producers:** These are like the chefs of the ecosystem, making their own food using sunlight (like plants).
  - **Consumers:** These are the eaters!
    - **Herbivores:** These guys munch on plants.
    - **Carnivores:** These guys eat meat!
  - **Trophic Levels:** Think of these as the "dining tables" in the ecosystem. Each level shows who eats who in the food web.



## Your Mission:

1. **Choose Your Biome Adventure:**
  - Pick one of these amazing biomes:
    - Tundra (icy and cold)
    - Taiga (snowy forests)
    - Wetlands (wet and marshy)
    - Tropical Rainforest (hot and humid)
    - Coniferous Forest (trees with needles)
    - Deciduous Forest (trees that lose their leaves)

- Desert (hot and dry)
- Marine (the ocean!)

## 2. Become a Biome Explorer:

- **Research your chosen biome:** Use these awesome resources to learn all about it:
  - **World Wildlife Fund (WWF):** <https://www.worldwildlife.org/>
  - **National Geographic:** <https://www.nationalgeographic.com/>
  - **The Nature Conservancy:** <https://www.nature.org/en-us/>
  - **Arizona State:** <https://askabiologist.asu.edu/explore/biomes>
  - **Nasa - Mission Biomes:** <https://earthobservatory.nasa.gov/biome>

## 3. Show What You've Learned:

- **Write a Biome Summary:**
  - **Describing Weather:**
    - ***"The weather in the [Biome Name] is typically..."***
      - (e.g., "The weather in the Tundra is typically very cold with long, dark winters and short, cool summers.")
    - ***"Temperatures in the [Biome Name] can range from..."***
      - (e.g., "Temperatures in the Desert can range from extremely hot during the day to very cold at night.")
    - ***"[Biome Name] experiences..."***
      - (e.g., "The Tropical Rainforest experiences heavy rainfall throughout the year.")
    - ***"[Biome Name] is characterized by..."***
      - (e.g., "The Taiga is characterized by long, cold winters with heavy snowfall.")
  - **Describing Soil:**
    - ***"The soil in the [Biome Name] is..."***
      - (e.g., "The soil in the Desert is sandy and dry.")
      - (e.g., "The soil in the Rainforest is rich and fertile due to the constant decomposition of plant matter.")
    - ***"[Biome Name] soil is often..."***
      - (e.g., "[Biome Name] soil is often nutrient-poor due to..." )
  - **Identifying Plants:**
    - ***"Five unique plants found in the [Biome Name] include..."***
    - ***"[Plant Name] is a [type of plant] that..."***
      - (e.g., "Cactus is a succulent plant that..." )
    - ***"A fascinating plant in the [Biome Name] is the [Plant Name], which..."***

- **Identifying Animals:**
  - **"Five amazing animals that inhabit the [Biome Name] are..."**
  - **"[Animal Name] is a [type of animal] that..."**
    - (e.g., "Polar bears are marine mammals that...")
  - **"A remarkable animal in the [Biome Name] is the [Animal Name], which..."**
  
- **Explaining Adaptations:**
  - **"[Plant/Animal Name] has adapted to survive in the [Biome Name] by..."**
    - (e.g., "Cacti have adapted to survive in the desert by storing water in their stems.")
    - (e.g., "Polar bears have thick fur and a layer of blubber to stay warm in the Arctic.")
  - **"One of the most significant adaptations of [Plant/Animal Name] is..."**
  - **"This adaptation allows [Plant/Animal Name] to..."**
- **Addressing Challenges:**
  - **"A major challenge facing the [Biome Name] is..."**
    - (e.g., "A major challenge facing the Arctic Tundra is climate change, which is causing the ice to melt.")
  - **"[Biome Name] is threatened by..."**
    - (e.g., "The Amazon Rainforest is threatened by deforestation.")
  - **"Pollution is a significant threat to the [Biome Name] because..."**
  - **"These challenges can impact the biodiversity of the [Biome Name] by..."**
- **Build a Biome Food Web:**
  - Use the provided graphic organizer to create a food web for your biome.
  - Include:
    - **4 Abiotic Factors** (like sunlight, water, rocks, soil)
    - **4 Biotic Factors** (like plants, animals, fungi, bacteria)
    - **6 Producers** (plants that make their own food)
    - **5 Herbivores** (plant-eaters)
    - **4 Carnivores** (meat-eaters)
    - **3 Tertiary Consumers** (carnivores that eat other carnivores)
    - **2 Quaternary Consumers** (top predators!)
  - Use arrows to show who eats who in your food web.

| BIOME                            |  |                    |  | NAME    |  |
|----------------------------------|--|--------------------|--|---------|--|
| QUATERNARY CONSUMERS             |  |                    |  |         |  |
|                                  |  |                    |  |         |  |
|                                  |  |                    |  |         |  |
| Biotic                           |  | TERTIARY CONSUMERS |  | Abiotic |  |
| SECONDARY CONSUMERS / CARNIVORES |  |                    |  |         |  |
|                                  |  |                    |  |         |  |
| PRIMARY CONSUMERS / HERBIVORES   |  |                    |  |         |  |
|                                  |  |                    |  |         |  |
| PRODUCERS                        |  |                    |  |         |  |

**Reflect on Your Journey:**

1. How does your biome compare to the other biomes you learned about?
  2. What makes your biome so special and diverse?
  3. How can we help protect the amazing plants and animals in your biome?
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**Sentence Frames:****1. Comparing Biomes:**

- ***"Compared to the [Biome 1] and [Biome 2], the [Your Biome] is..."***
  - (e.g., "Compared to the Tundra and the Desert, the Tropical Rainforest is much warmer and wetter.")
- ***"The [Your Biome] is similar to the [Biome] in that..."***
  - (e.g., "The Taiga is similar to the Tundra in that both biomes experience cold winters.")
- ***"One key difference between the [Your Biome] and the [Biome] is..."***
  - (e.g., "One key difference between the Desert and the Rainforest is the amount of rainfall they receive.")

**2. What Makes Your Biome Special:**

- ***"The [Your Biome] is special because..."***
  - (e.g., "The Tropical Rainforest is special because it has the highest biodiversity on Earth.")
  - (e.g., "The Ocean is special because it covers most of the planet and supports a vast array of marine life.")
- ***"[Your Biome] is known for its..."***
  - (e.g., "The Tundra is known for its unique adaptations to extreme cold.")
- ***"The diversity in the [Your Biome] is due to..."***
  - (e.g., "The diversity in the Rainforest is due to the abundance of sunlight and rainfall.")

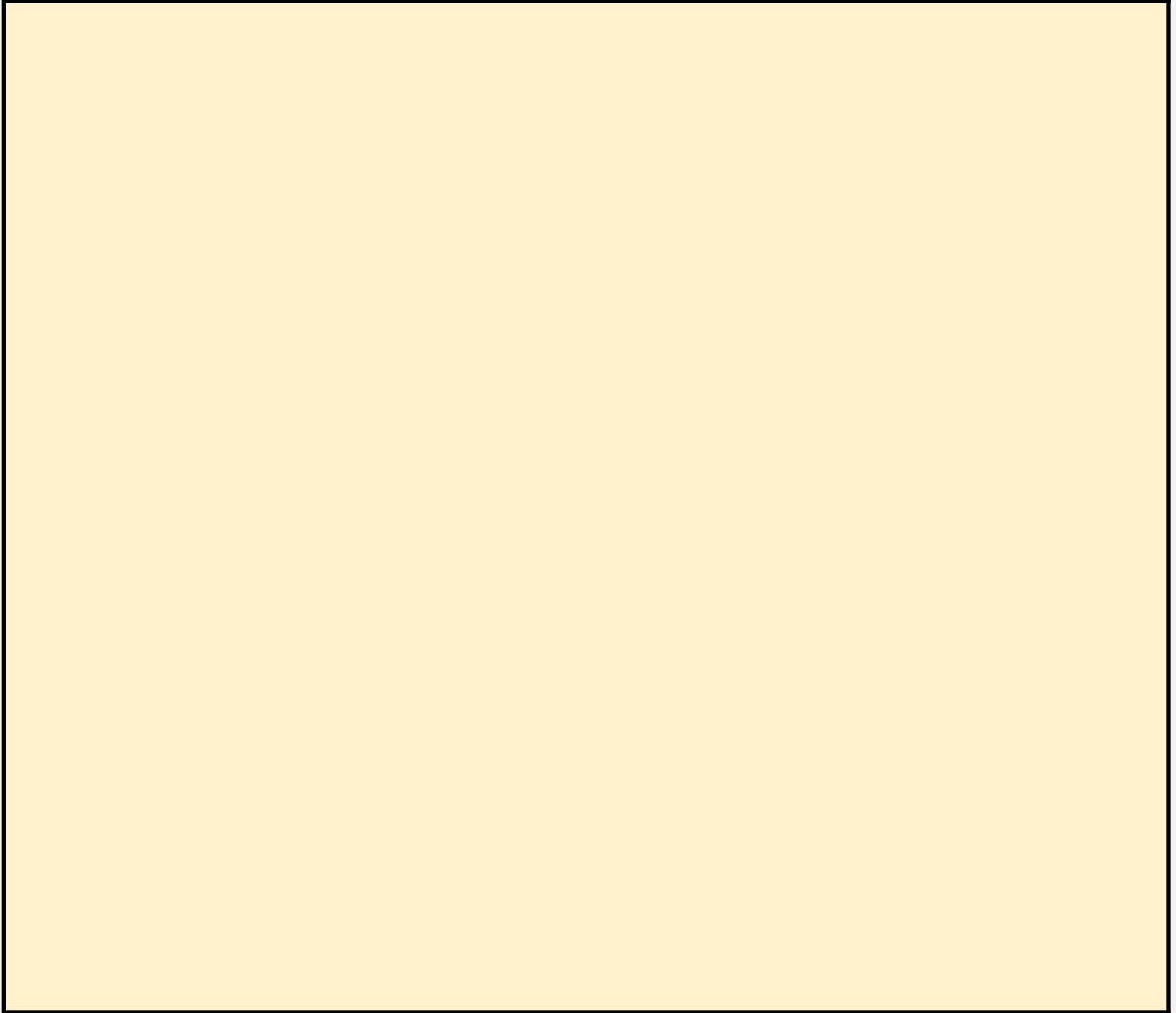
**3. Protecting Your Biome:**

- ***"We can help protect the [Your Biome] by..."***
  - (e.g., "We can help protect the Amazon Rainforest by reducing deforestation.")
  - (e.g., "We can help protect the oceans by reducing plastic pollution.")
- ***"It is important to conserve the [Your Biome] because..."***

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- (e.g., "It is important to conserve the Tundra because it plays a crucial role in regulating the Earth's climate.")
- ***"By [Action], we can help ensure the long-term survival of the [Your Biome] and its inhabitants."***



**Remember:** Have fun exploring the incredible diversity of life on Earth!

## Teacher Instructions – Biodiversity Across Biomes

**Subject: Biology**

**Time Allotment: 60 minutes**

### Learning Objectives:

- *Students will be able to define and explain the concept of biodiversity.*
- *Students will be able to identify and describe key characteristics of different biomes (Tundra, Taiga, Wetlands, Tropical Rainforest, Coniferous Forest, Deciduous Forest, Desert, Marine).*
- *Students will be able to identify and describe biotic and abiotic factors within an ecosystem.*
- *Students will be able to construct a simple food web for a chosen biome.*
- *Students will be able to explain the importance of biodiversity within an ecosystem.*
- *Students will be able to identify threats to biodiversity in different biomes.*

### Materials:

- **Whiteboard/Projector**
- **Markers/Pens**
- **Student copies of the "Biodiversity Across Biomes" student document**
- **Access to computers or tablets with internet access**
- **Access to research resources (WWF, National Geographic, etc.)**
- **Graphic organizers (for food web activity)**
- **Optional: Images/videos related to different biomes**

### Lesson Procedure:

#### 1. Introduction (5 minutes)

- **Engagement:**
  - Begin with a captivating image or video showcasing the diverse beauty of different biomes (e.g., a vibrant coral reef, a majestic polar bear in the Arctic).
  - Pose a thought-provoking question: "What do you think it means to have 'biodiversity'?"

- Encourage a brief class discussion to elicit initial ideas and prior knowledge.

## **2. Exploring Biomes (15 minutes)**

- **Instruction:**

- Introduce the concept of biomes, explaining their defining characteristics (climate, plants, animals).
- Briefly discuss each of the eight biomes listed in the student document, highlighting key features.
- Use visuals (images, maps) to illustrate the location and characteristics of each biome.

- **Guided Practice:**

- Have students work in pairs or small groups to brainstorm characteristics of a biome they are familiar with (e.g., the local forest or a nearby park).

## **3. Research and Exploration (20 minutes)**

- **Independent Work:**

- Assign each student a specific biome.
- Guide students to use the provided research resources to gather information about their chosen biome.
- Encourage students to take notes and record their findings.

- **Differentiation:**

- Provide different levels of reading materials and research resources based on student reading levels.
- Offer alternative research methods (e.g., videos, documentaries, interviews with local experts).

## **4. Food Web Construction (15 minutes)**

- **Guided Practice:**

- Introduce the concept of food webs, explaining trophic levels (producers, consumers).
- Provide students with the graphic organizer and guide them through the process of constructing a simple food web for their chosen biome.
- Encourage students to use images or drawings of organisms to represent the different trophic levels.

## 5. Reflection and Discussion (5 minutes)

- **Class Discussion:**

- Have students share their findings about their chosen biome.
- Facilitate a discussion using the following guiding questions:
  - "How does your biome compare to the other biomes you learned about?"
  - "What makes your biome so special and diverse?"
  - "How can we help protect the amazing plants and animals in your biome?"
- Encourage students to connect their findings to real-world issues (e.g., climate change, deforestation).

### Assessment:

- **Informal Assessment:** Observe student participation in discussions, engagement with research activities, and the quality of their food web models.
- **Formal Assessment:** Collect and review student research reports and food web models. Assess their understanding of key concepts and their ability to communicate their findings effectively.

### Differentiation Strategies:

- **For students who need additional support:**
  - Provide simplified research materials and graphic organizers.
  - Offer peer tutoring or small group support.
  - Allow for more time for research and completion of tasks.
- **For students who excel:**
  - Encourage independent research and in-depth exploration of a specific topic related to their chosen biome.
  - Have students create presentations or multimedia projects to share their findings with the class.
  - Challenge students to investigate more complex ecological concepts (e.g., keystone species, invasive species).

### Engagement Strategies:

- Use interactive online resources and multimedia presentations.

- Incorporate hands-on activities (e.g., creating a 3D model of a biome, role-playing as different organisms in a food chain).
- Invite a guest speaker (e.g., a local environmental scientist) to share their expertise.
- Connect the lesson to real-world issues and student interests.

**Inspection Strategies:**

- Circulate around the classroom to monitor student progress and provide individual assistance.
- Review student work periodically to ensure understanding and identify areas for improvement.
- Encourage students to self-assess their work and identify areas for growth.