



Engage: Human Footprints: Tracking Urban Impact

INSTRUCTOR:

no_reply@example.com

Objective: Students will investigate how human activities in urban environments impact ecosystems, identify specific examples of disruption, and propose solutions to mitigate harm while enhancing ecological balance.

Background: *Ecosystems are communities of living organisms (plants, animals, and microorganisms) interacting with their physical environment (air, water, soil). Urban areas, with their bustling cities and human-made structures, can significantly affect these ecosystems. Academic vocabulary such as "biodiversity" (the variety of life in a particular habitat) and "pollution" (harmful substances introduced into the environment) are crucial to understanding these impacts. For instance, building roads and factories can fragment habitats, making it harder for species to survive and thrive. By studying these interactions, we can find ways to reduce harm and create healthier urban environments.*



*When ecosystems are disrupted, they lose their ability to provide essential services like clean air, water, and soil. "Habitat fragmentation" (breaking up natural areas into smaller pieces) is a common problem in cities. This makes it challenging for animals to find food, mates, or shelter. Pollution from factories or cars adds to the problem by contaminating air and water. Additionally, disruptions to the carbon and water cycles have profound effects on the environment. The **carbon cycle**, which involves the movement of carbon between the atmosphere, land, and oceans, is impacted by increased emissions from vehicles and industries. This leads to higher levels of greenhouse gases, contributing to climate change. Similarly, the **water cycle** is affected when urbanization reduces natural areas like wetlands that absorb and filter water. Impervious surfaces such as roads and buildings increase runoff, leading to pollution and reduced groundwater replenishment.*

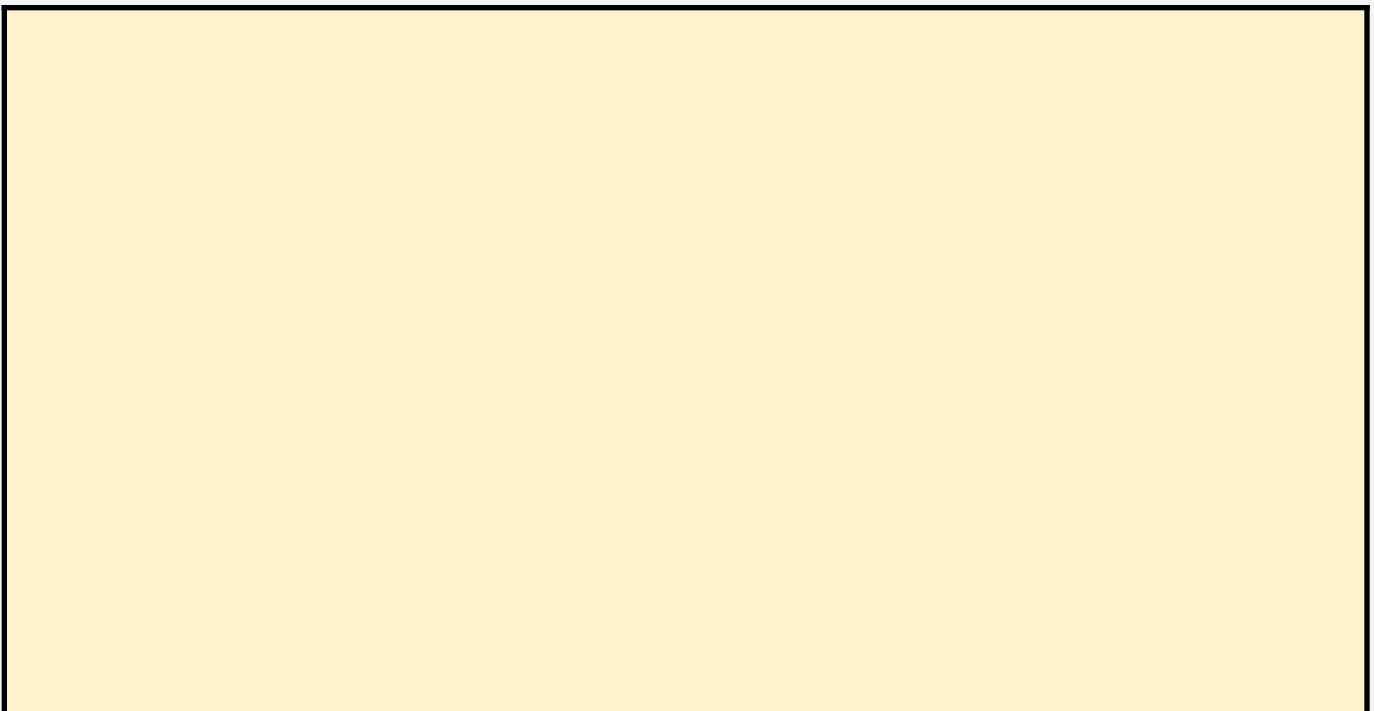
These disruptions have cascading effects, such as altering weather patterns, reducing the availability of clean water, and threatening biodiversity. However, by learning about these challenges, we can design creative solutions to make cities more sustainable and eco-friendly.

Student Reflection Questions:

- 1. How do cities change ecosystems?**
- 2. What are some examples of human activities that disrupt ecosystems?**
- 3. What solutions can help reduce the negative impacts of urban activities on ecosystems?**
- 4. How can you personally contribute to creating healthier urban environments?**

Sentence Stems for Student Reflections:

- *Cities change ecosystems by _____ because _____.*
- *One example of a human activity that disrupts ecosystems is _____. This disrupts ecosystems by _____.*
- *A solution to reduce the negative impact of urban activities is _____ because _____.*
- *I can personally contribute to a healthier urban environment by _____. This would help because _____.*



Activity Instructions:

- A.** See a detailed map of an urban area.
- B.** Identify human activities that might disrupt ecosystems, such as roads, factories, and housing developments.
- C.** Facilitate a discussion about how these activities change the ecosystem.
- D.** Brainstorm and predict solutions to mitigate harm, such as green roofs, wildlife corridors, or stricter pollution controls.

Student Output Expectations: Students will complete the following tasks:

- 1. Observation Notes:** Use the map to list at least three human activities and explain how each disrupts ecosystems.
 - Sentence Stem: "The activity of _____ disrupts ecosystems by _____."
- 2. Solution Brainstorming:** Suggest two solutions to reduce harm and explain why they would work.
 - Sentence Stem: "One solution is _____ because _____. Another solution is _____ because _____."
- 3. Reflection Paragraph:** Write a short paragraph summarizing their understanding of human impacts on urban ecosystems and their role in creating positive change.
 - Sentence Stem: "From this activity, I learned that _____. I can help improve ecosystems by _____."

Observations**Brainstorming****Solutions**

Name: _____

Date: _____

Reflections: Write a short paragraph summarizing their understanding of human impacts on urban ecosystems and their role in creating positive change.

- *Sentence Stem: "From this activity, I learned that _____. I can help improve ecosystems by _____."*



Teacher Instructions:

- **Preparation:**

1. Select a map that clearly shows urban features like roads, factories, parks, and waterways. If possible, use a map of the local area to make the activity relatable.
2. Prepare guiding questions to help students analyze the map, such as "Where are the green spaces?" or "What human activities do you see near water sources?"

- **Facilitation Hints:**

1. Encourage students to think critically by asking open-ended questions like, "How might building a road through this area affect animals living here?"
2. Use real-life examples to explain concepts, such as discussing a local factory's impact on air quality.
3. Provide visuals or videos to explain the carbon and water cycles if students need additional support.

- **Differentiation Strategies:**

1. **For advanced learners:** Challenge them to research specific policies or technologies (e.g., permeable pavement or carbon capture systems) that mitigate urban impact.
2. **For struggling learners:** Pair them with peers or provide sentence stems with additional examples (e.g., "Factories pollute the air by releasing _____.") to scaffold their understanding.
3. **For visual learners:** Use diagrams or infographics of disrupted ecosystems and solutions to complement the map analysis.
4. **For hands-on learners:** Have students create a model of an urban area using materials like clay or recycled items, highlighting both disruptions and potential solutions.

- **Assessment Tips:**

1. Review students' observation notes for accuracy and depth.
2. Evaluate their solutions for feasibility and creativity.
3. Use the reflection paragraphs to gauge their overall understanding and personal connection to the topic.