



ACTIVITY

BIODIVERSITY FOR THE PLANET: INTEGRATING MATHEMATICS WITH CLIMATE ACTION

Time: 180 minutes

Days of Implementation: 2-3 days

Grade Level: Lower and Upper Secondary

Designed by: Sanam Arzoo

Alignment with STEAM subjects

Science: Examining concepts such as carbon sequestration, climate change, and the importance of protecting biodiversity.

Technology: Using various digital tools to analyze and monitor biodiversity.

Arts: Creating charts, posters, graphs, infographics, etc. around the themes in the lesson.

Mathematics: Utilizing mathematical formulas to analyze data and determine factors such as carbon absorption.

Related or achieved SDGs

- SDG 13: Climate Action: Promotes understanding of technical and mathematical concepts related to climate change.
- SDG 15: Life on Land: Showcases how protecting various land ecosystems can combat climate change.

Objectives

By the end of the class, students will be able to:

- Discuss the concepts of carbon sequestration and how it contributes to mitigating climate change.
- Utilize mathematical formulas and statistical techniques to assess the environmental benefits of biodiversity.
- Develop graphs and charts to illustrate the correlation between the quantity of trees planted and their CO₂ absorption over time.
- Engage in practical efforts by participating in biodiversity initiatives within their school or local community.
- Analyze and share insights that connect mathematical computations to tangible environmental gains.

Materials Needed

- Graphing paper or digital graphing tools (like spreadsheets, online graphing software)
- Calculators
- Data recording sheets or digital devices for measurements
- Presentation materials (including poster boards, computers/tablets for digital presentations)

Lesson Plan

Introduction

Biodiversity includes all life forms across different environments, from insects and mammals to reefs and trees. It helps combat climate change by storing carbon and regulating temperature, and it plays an essential role in keeping the planet safe for future generations. However, biodiversity is threatened by deforestation, overfishing, and pollution, which are degrading ecosystems.

1. Inquiry & Exploration

Start by having students explore the topic of biodiversity, ecosystems, and life on land.

- [SDG13](#) (The Global Goals).
- [SDG15](#) (The Global Goals).
- [What is biodiversity?](#) (Our Planet).

Discussion Questions:

Ask the students:

- How does biodiversity help mitigate climate change?
- Why is it essential to maintain a biodiverse local environment?
- What type of ecosystem is your school located in?

2. Investigation & Research

- Students begin by investigating the types of local plants and trees that are in their surrounding school community. They should record the type and number of species they find. They should indicate whether or not these species are native to their region.
- Students reflect on trees' role in maintaining biodiversity. They research the basics of carbon sequestration and the relevant formulas to calculate CO₂ absorption by trees, [such as this one](#).
- Students review case studies or local data and the effects of deforestation/reforestation on biodiversity. Some examples include:
 - [Case Studies](#) (Climate Transformation)
 - [How Costa Rica Reversed Deforestation](#) (Earth.org)
 - [Deforestation and Forest Loss](#) (Our World in Data)

3. Implementation & Design

- Students should design a chart or graph showing the estimated CO₂ absorption of the local area chosen over a specific period.
- Students can organize a biodiversity event involving students, teachers, and community members.

4. Testing & Reflection

- Testing the chart or the graphic:
 - Have students estimate CO₂ absorption using tree species data and compare results to published data (e.g., from scientific studies).
 - Students present charts to classmates for feedback on accuracy and clarity.
 - If the project spans more time, compare original estimates to actual growth data to assess accuracy.
- During the biodiversity event:
 - Measure awareness or attitudes towards biodiversity before and after the event.
 - Count attendance, activities joined, and follow-up actions taken.
 - Collect input from attendees on what they learned and areas for improvement.

Reflection Questions:

- What did you learn about the value of using data and graphs in understanding environmental processes?
- How did descriptive statistics like mean and standard deviation help you interpret tree growth data?
- In what ways did this project strengthen your math or analytical skills?
- How can statistical tools help predict the long-term impact of environmental actions like tree planting?
- What challenges did you face in collecting or analyzing the data?
- What improvements would you make in future data collection efforts?

5. Presentation & Action

- Students present their findings, using graphs, charts, and visuals to illustrate the environmental benefits of biodiversity.
- Share the results within the school and local community, raising further awareness about the importance of sustainable urban development and the benefits of tree planting.

Criteria

- Completeness, accuracy, and clarity in recording and analyzing measurements; correct application of mathematical formulas.
- Effectiveness of visual aids (graphs, charts, posters, digital presentations) in conveying findings.
- Active involvement in the tree-planting event and cooperation in collaborative tasks.
- Critical analysis of the project's challenges, learnings, and environmental impact, as reflected in discussion and written responses.

Reflection

- Did students fully understand?
- What should I improve for next time?
- Was the lesson interesting enough for the students?