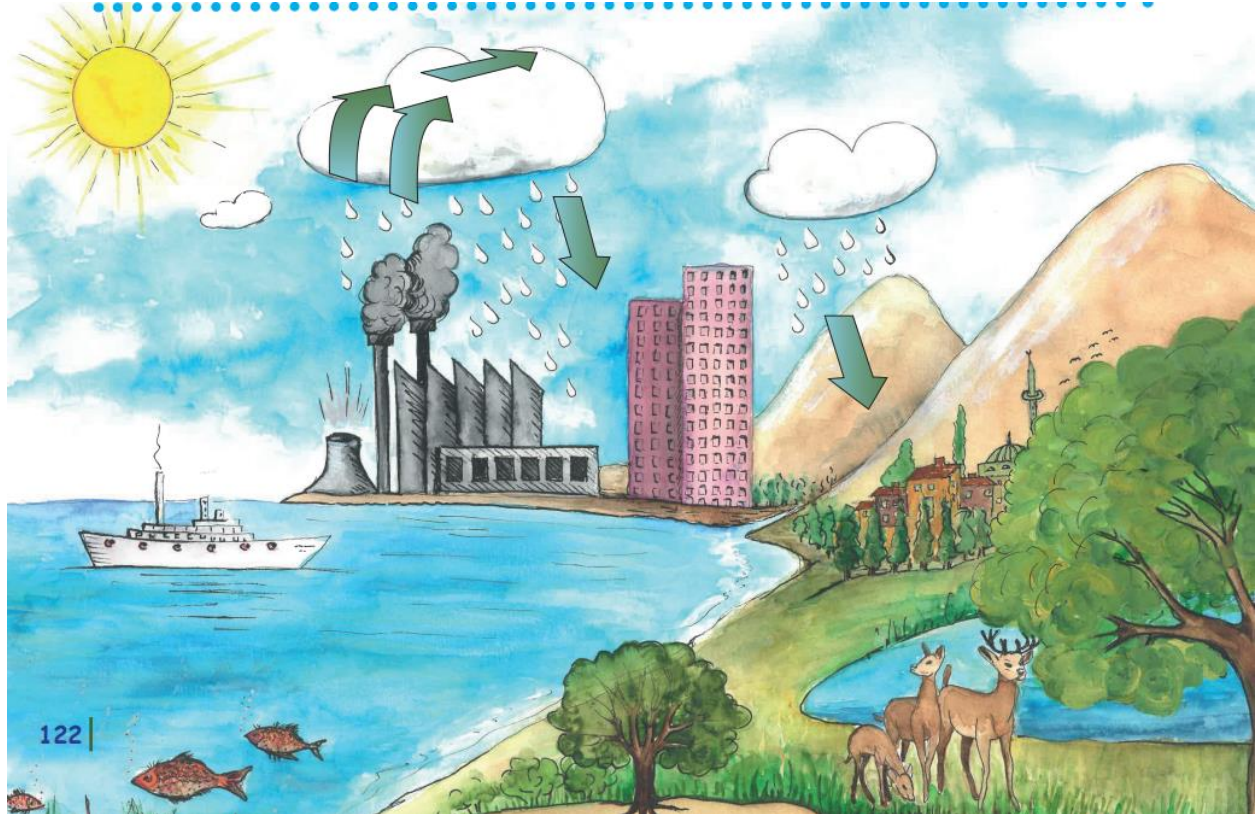


A Guide for Teachers to Implement an Conventional Activity Plan for Climate Change and its Impact on the Ocean

Climate change is among the main threats to marine and coastal ecosystems. Understanding how warming in oceans and seas affects the structure and functioning of ecosystems is crucial for developing conservation strategies. In this course, students will learn about the effects of rising water temperatures due to climate change on biodiversity and the chemical composition of aquatic environments, particularly in oceans .



Plan	
Grade Level	8th grade
Course Duration	240 minutes (6 lessons)
Learning Outcome	This is one of the learning outcomes under the learning outcome " CEID.4.4 . Interprets the effects of global climate change through case studies". • <i>a) Problems such as biodiversity loss, melting glaciers and rising sea levels, changes in coastal ecosystems, drying up of lakes, changes in the chemical composition of aquatic environments, decrease in clean water resources, changes in animal migration and breeding seasons, etc., are made clear to students through case studies .</i>
What will the students do?	• It interprets and evaluates the effects of global climate change through case studies.
Questions	• What is the impact of global climate change on biodiversity loss? • What is the impact of global climate change on the alteration of the chemical composition of aquatic environments? • What is the importance of the ocean for life? • What is its impact on the ocean ecosystem? • What is the impact of greenhouse gases on changes in the chemical composition of aquatic environments, the depletion of clean water resources, and alterations in animal migration and breeding patterns? • What is ocean acidification and how does it occur?
Materials	☐ Smart board that will display IVR content. ☐ Teacher content on the impact of global climate change and greenhouse gases on ocean ecosystems.
Material Preparation	☐ Sharing the content prepared within the context of the teacher's plan with the teacher. ☐ Uploading the video developed within the scope of the project to the interactive whiteboard.
Keywords	Global warming: Greenhouse gases: Ocean acidification: Aquatic environment: Biodiversity:
Teaching strategies	Presentation Method / Discussion

Weekly Lesson Summaries

The weekly activities listed below are for suggestion purposes only. While the stated objectives and content for the three weeks remain unchanged, activities, practices, and content presentations may be modified at the teacher's discretion.

Week 1 / Lesson 1

Global Warming and Its Effects (40 minutes)

The lesson Their objectives :

- Spherical warming the concept explanation
- Spherical warming environmental effects argument
- Spherical warming inhibitor solution suggestions to develop

Introduction (10 min):

- To the students This questions can be directed :
 - " Today weather How ?"
 - "In recent years weather something you noticed in that situation Are there any changes ?"
 - What is global warming?
 - Students' prior knowledge of the topic is assessed by asking questions such as, "What are the effects of global warming?"

Mind Mapping Activity: A mind mapping activity can be done based on these questions.

- Spherical warming concept daily from life with examples It will be explained .
 - Spherical Warming concept This can be explained by : greenhouse gases in the atmosphere . increase result World surface average temperature rise aspect It is defined .
 - Do not mix. required Concepts : Global warming $\neq$ climate change .

Lecture Notes (25 min):

Spherical Warming up Reasons

- Natural And Person Welding Reasons :
 - Natural : Volcanic activities , sun cycles .
 - Person Source : Fossil fuel land use , deforestation , industry production .
 - The most important greenhouse gases are: Carbon dioxide (CO₂), Methane (CH₄), and Nitrogen. Oxides (N₂O).
- Chart And With images Explanations :

- Industry From the Revolution This side increase in CO₂ in the atmosphere showing graph .
- From glaciers received Examples And past heat changes .

Environmental Effects

- Impacts on Climate Change:
 - An increase in average temperatures.
 - Extreme weather events (hurricanes, droughts, floods).
 - Rising sea levels.
- Effects on Ecosystems:
 - Melting polar ice caps → Habitat loss for species such as polar bears.
 - Ocean acidification → Coral reef destruction.
 - Deforestation → Reduction of rainforests and loss of biodiversity.
- Effects on Human Life:
 - Decline in agricultural yields, depletion of water resources.
 - Climate migration and social issues.
 - Global health impacts (heat waves, disease spread).

Proposed Solutions

- Students above stated problems towards solution suggestions discussions It may be requested .
 - International at the level what It can be done (Example : Treaty of Paris)
 - Individual contributions what possible (energy) saving , returning transformation etc.)

Week 1 / Lesson 2

Global Warming and the Impact of Greenhouse Gases on the Ocean (40 minutes)

Course Objectives:

- To explain the basic components of the ocean ecosystem.
- To introduce the physical and chemical properties of the oceans.
- To provide a general overview of the effects of greenhouse gases on the oceans.

Introduction and Lecture Notes (25 min):

- The question, "What gases are called 'greenhouse gases'?" is used to test students' prior knowledge of greenhouse gases. The gas names suggested by the students can be written on the board.
- Information about what greenhouse gases are is shared with the students.

- The activity "It's your turn to find greenhouse gases" is held.
- The question "What are the effects of greenhouse gases?" encourages students to think about the impacts of greenhouse gases on climate and the environment.
- It is emphasized that the increase in greenhouse gas levels leads to many negative consequences, one of which is its impact on the ocean ecosystem.
- shown about the effect of greenhouse gases on changes in ocean chemistry (<https://www.youtube.com/watch?v=0a2QNmKeVQQ>) .
- The teacher provides information about the ocean ecosystem, marine life, and the physical and chemical properties of the oceans.
- Photographs of marine life and ecosystem diagrams are shown.

Question and Answer Session (10 min):

- "What organisms live in the ocean ecosystem?"
- "What are the physical and chemical properties of the oceans?"
- "How do greenhouse gases affect the oceans?"

Week 2 / Lesson 1:

Ocean Acidification and Its Effects on Ecosystems (40 minutes)

Course Objectives:

- Explaining the causes and consequences of ocean acidification.
- To help understand the effects of acidification on marine life.
- Understanding the process by which CO₂ passes from the atmosphere to the oceans .

Introduction and Lecture Notes (25 min):

- It explains how carbon dioxide dissolves in the oceans and the process by which carbonic acid is formed.
- pH changes on marine life.
- It explains how coral reefs and shellfish are affected by acidification.

VR Application or Video Demonstration (6-7 min)

- Groups that do not receive VR training will be shown a video. The video will demonstrate how greenhouse gases affect underwater life and the changes between specific chemicals. The problem-solving activity below can be completed based on the content shown in this video.

Activity / Working Through Sample Problems (10 min):

- "How do low pH levels affect shell formation in marine organisms?"
- "What are the long-term effects of acidification on fish populations?"
- A concept map titled "Ocean Acidification" is created.

Week 2 / Lesson 2:

Ocean Acidification The experiment (40 minutes)

Course objectives:

- Greenhouse gases oceans on it effects experimental aspect to show
- Data scientific by method How analysis will be done to teach

Demonstration Experiment

- Experiment : Lemon juice + baking soda dust using CO₂ 's water pH How that he dropped display
- Students pH paper or digital pH meter using change observations
- Results to the board is written And teacher explanation does

Class Debate:

- " Real in the oceans This period How work ?"
- What do you think ? this situation sea living things How effects ?"
- What do you think ? this situation sea living things How effects ?"

Week 3 / Lesson 1:

Data Interpretation And Exercises (40 minutes)

Course Objectives:

- Experiment results chart And table shaped interpretation
- Science people's CO₂ levels How that it measured explanation

Working with Sample Data:

- To the students different pH levels and CO₂ levels including ready data is given
- This data analysis Edip interpretations is provided
- Summary don't write event It is done .

Assignment: Students will conduct a short research project and prepare a report on ocean acidification and its effects on marine life.

Week 3 / Lesson 2:

General Evaluation And Presentation (40 minutes)

Course objectives:

- To the students what they learned again making
- Scientific information written And oral offer skills development
- First week created concept new information on the map added
- Students own what they learned information by visualizing again does

Mini Project: “What Can We Do to Prevent Ocean Acidification?”

- Small groups is created And ocean acidification to reduce for They are asked to develop solutions .
- Groups create mini posters and present them to the class.
- All proposals are discussed in class.
- Students learn to think in a solution-oriented way and generate ideas on sustainability.

Individual or Group Presentations:

- Groups , ocean acidification And climate change about short One presentation does
- Each group , what they learned to the class He explains .

Teacher Feedback And General Evaluation :

- Presentations evaluates And missing remainder points gaps
- All topics again from the eye is passed And from students what they learned summaries is desired