SDG14 Future of the Ocean
MM1: Introduction to Ocean Literacy

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Research and Development

Lesson 3: Interconnectedness: Ocean and Climate

Subject Areas: CSPE, Climate Action and Sustainability, Geography, Science, SPHE

Lesson Title and Summary: Interconnectedness: Ocean and Climate

The ocean plays a vital role in regulating Earth's climate, acting as a vast heat sink and redistributing warmth across the globe through ocean currents. It helps regulate temperatures, mitigates extreme weather events and providing a more moderate climate for many regions, as well as absorbing a significant volume of CO2 of atmospheric carbon dioxide, aiding in the regulation.

In this lesson, learners will gain an awareness of the connectedness of the ocean and climate and begin to sort their knowledge on the topic, engaging in rapid research.

Vocabulary: Climate, Climate change, Carbon sink, Heat distribution

In this lesson, the learner will:

- increase their ocean literacy skills
- begin to understand the connection between ocean and climate
- become aware of the role the ocean plays in climate
- engage in research
- work individually and as part of a group
- summarise and sort ideas

Materials

- Worksheet: Ocean and Climate
- Teacher's Guide: Ocean and Climate
- Poster paper
- Post it notes
- Access to the internet

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Activity Instructions

Activity 1: Ocean and climate (20 mins)

1. Ask learners to form pairs and using Worksheet: Ocean and Climate, complete the active listening task, watching Video: Oceans & Climate [3:33 min].
2. Consolidate task by discussing the following questions in small groups:

    - How important is the ocean to climate on Earth?
    - What connections can you make between human action, consequence in the ocean and impact on climate?

Activity 2: What I Know," "What I Want to Know," and "What I Learned." (KWL) (30 mins)

1. Set up a large chart on the wall or whiteboard with the title ‘The ocean and climate change’ and three columns:

    - What do you already ‘know’?
    - What things do you ‘want’ to learn?
    - What did you ‘learn’ from doing your research?

2. Based on their responses to the video and discussion task in Activity 1, give each learner some Post-It notes and ask them to contribute to the first two columns on the KWL chart from their own perspective.
3. Review the chart as a whole class, clarifying any points.

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks
- Two things they found most interesting and would like to explore more
- One opinion they have about the activities, what did they like or how they would improve them

Use Post-its or a Mentimeter survey - mentimeter.com to gather reflections

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EXTENSION / REDUCTION ACTIVITIES

Reduction: For a shorter class, reduce the time and Activity 1 & 2.

Extension: For a longer class, develop research skills with a rapid research share task.
Rapid research share

- Ask learners to select one point from the second column of the chart (What things do you 'want' to learn?).
- They are going to spend 10 minutes doing rapid research on this point, making a list of 3-5 key pieces of information. They need to add this completed list to the third column on the chart (What did you 'learn' from doing your research?).
- Organise learners into groups of four to share the outcome of their research.

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Video: Ocean and Climate [3:33 mins] https://www.youtube.com/watch?v=zO2153cJORI

Video: How the ocean impacts global weather [2:30 mins]
https://youtu.be/Vf7_cVfIyZ0?si=2srDpHhYhH76-qL2

Website: ESA Climate Office https://climate.esa.int/en/

Game: Albedo (melting sea ice) https://climate.esa.int/en/educate/climate-for-the-public/albedo-game/

Local Trip / Expertise / Additional Work and Assessments

Experiment: Conduct a medium to long-term assessment of ocean water temperature in Ireland, using data from NOAA.

Use the KWL chart to develop learner-led project ideas by completing the rapid research share task (see Extension Activity). Learners can work in small groups based on an idea that interests them to find out more about.

MM1: L3 TEACHERS' GUIDE OCEAN AND CLIMATE

Activity 1- Answer Key

The Earth has just one big ocean that is connected across the globe, we simply name different parts to help with geography! This means that heat gathered in one area can then be transported thousands of miles by the ocean currents – which for us is good news, as the gulf stream helps to keep us a little warmer than we should be considering the high latitude at which we sit. The actions of the oceans also help to shape the features of our coastline from our famous sea cliffs to the sandy beaches we laze about on in the summer.

What does 'the ocean is a heat store' mean?

- Soaked up 93% of the excess heat from human activity over the past 70 years.

What role do ocean currents play in heat distribution?

- Currents redistribute heat around the planet- from Equator to poles.
- Driven by winds on ocean surface and at depth due to density from temperature and salinity.

What influence does heat distribution have on the planet (both positive and negative)?

- Where the heat goes = weather patterns and regional climate (i.e. the mild climate of Europe is due to the warm Gulf Stream and North Atlantic current).
- Heat waves in the ocean can result in coral bleaching and habitat loss (e.g. Great Barrier Reef).

What is a carbon sink and what are the effects on the planet?

- Carbon sink = absorbing carbon from the atmosphere.
- The ocean is a natural carbon sink (like bogs for example).
- The ocean absorbs about 1/4 of carbon dioxide emissions from human activity.
- This has lead to ocean acidification which impacts biodiversity, habitats, marine life.

What role does 'cold, salty, dense' water play in regulating climate? What effects do we see?

- Ocean salinity rises in areas where sea ice forms.
- This water sinks to the ocean depths over centuries, crucial for regulating global climate and driving surface currents like the Gulf Stream.

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Activity 1

Watch Ocean and Climate and answer the following questions.
https://youtu.be/zO2153cJORI?si=2QUxDyhxzEQQYx0I

What does ‘the ocean is a heat store’ mean?

What role do ocean currents play in heat distribution?

What influence does heat distribution have on the planet (both positive and negative)?

What is a carbon sink and what are the positive and negative effects on the planet?

What role does ‘cold, salty, dense’ water play in regulating climate? What effects do we see?