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Climate change for primary schools

Professional Development

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Session overview

1. **Introduction** (climate change basics)
2. **Core climate science** (mechanism, evidence & the ocean)
3. **Teaching Approaches** (assertion vs scaffolding)
4. **Student Wellbeing** (anxiety & agency)
5. **Ocean Heroes Resources** (rationale, features, & overview)
6. **Q&A**

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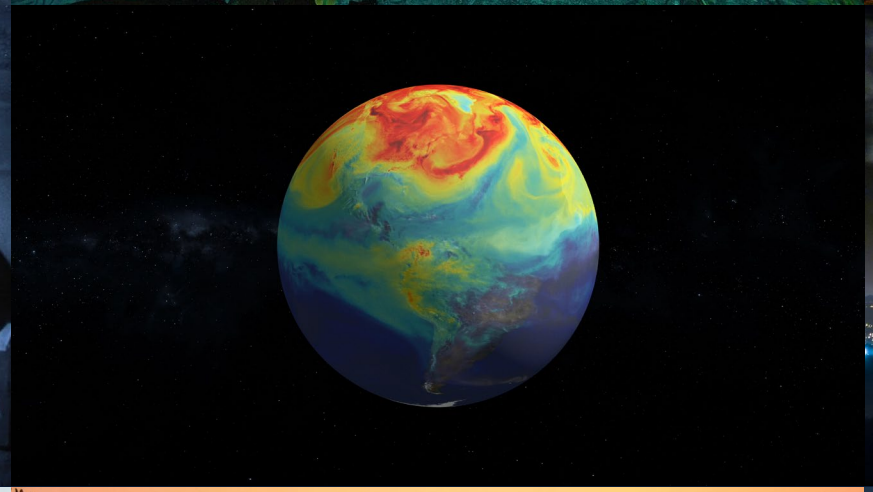
1. Introduction

- Nature of climate change
- Baseline knowledge









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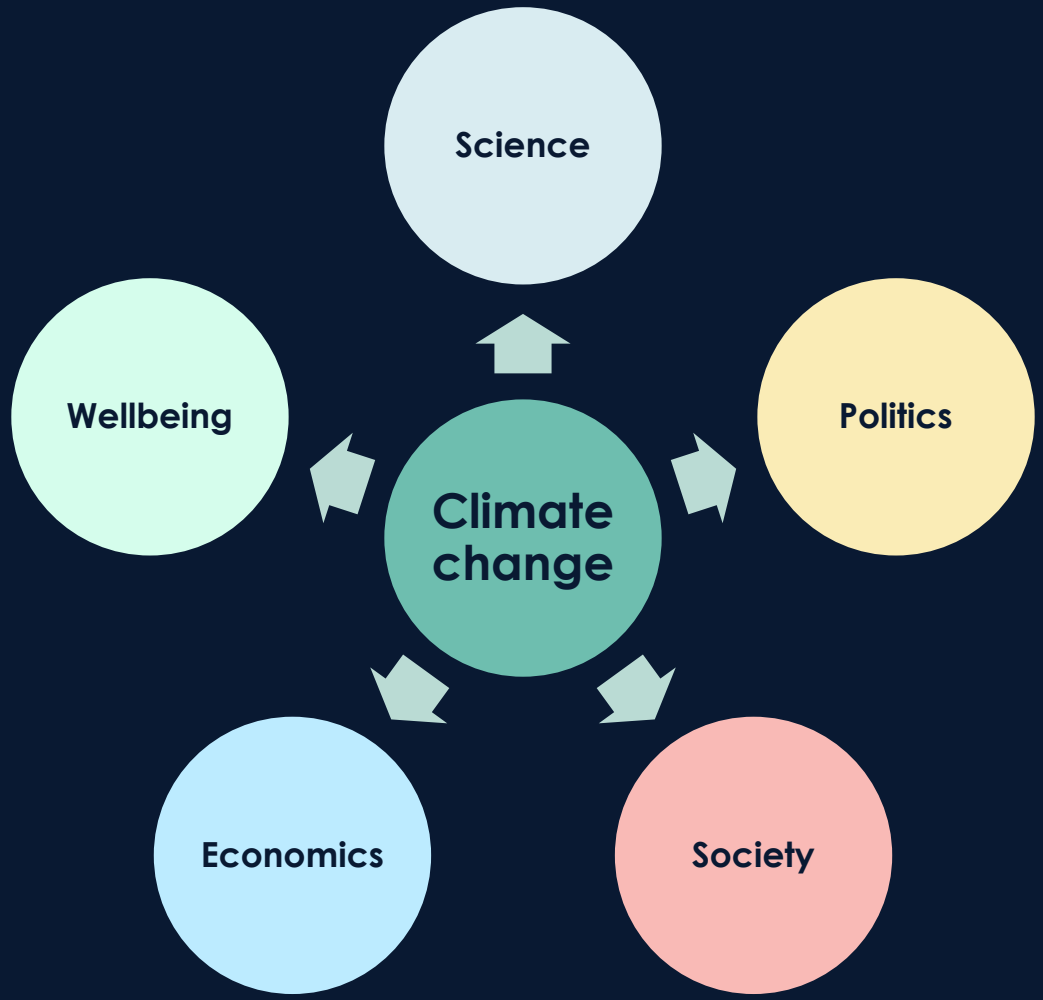
Understanding climate change



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Context of climate education

Child

School

Home

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What do you bring to the classroom?

Science	Politics
Wellbeing	Society & Economics

In groups, think about what you bring to the classroom when you teach climate change.

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2. Core climate science

- Basic mechanism
- Evidence for climate change
- Ocean's role
- Blue carbon

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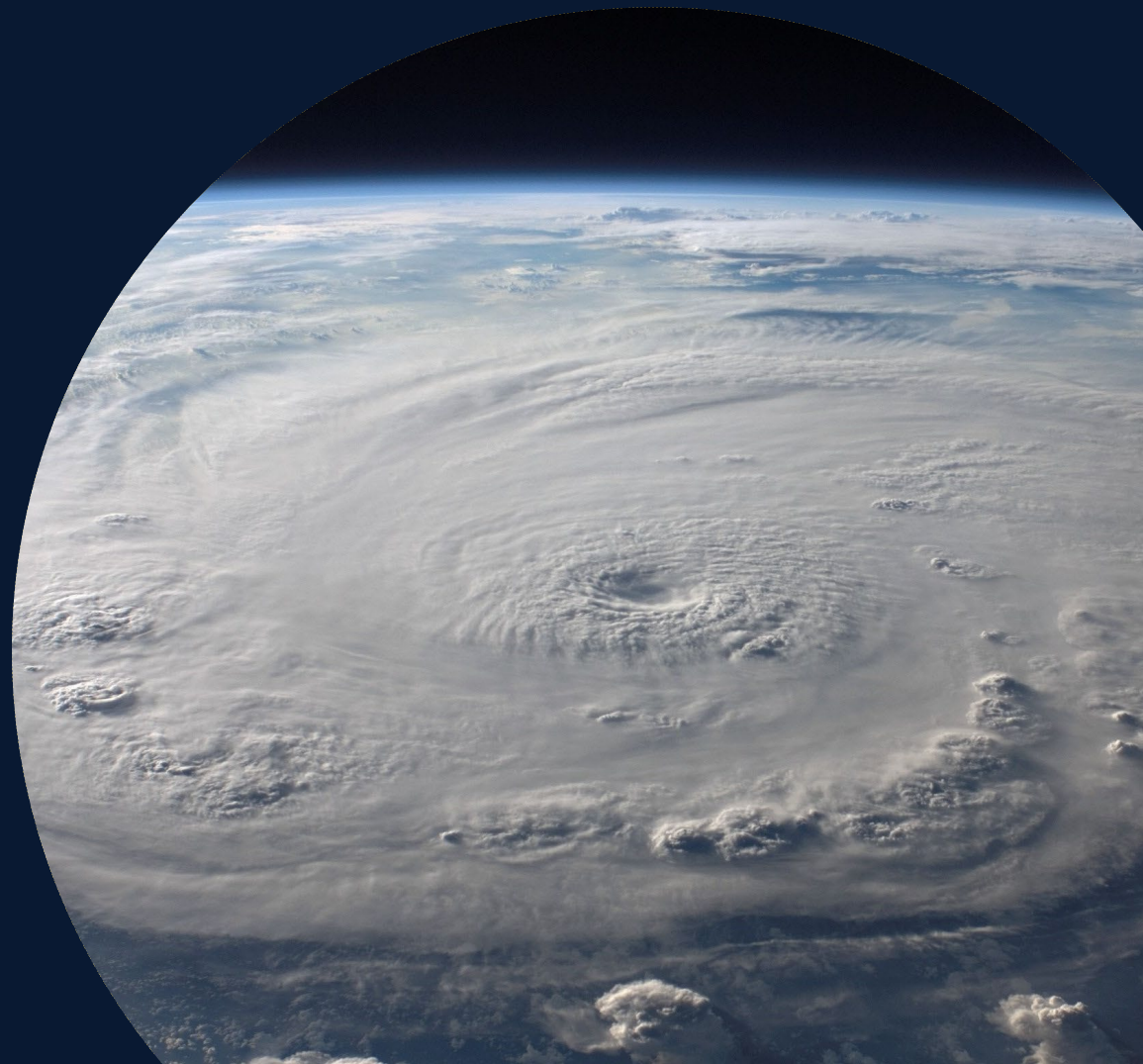
Climate quiz

Let's see how much you know…

https://www.riddle.com/view/rnHBukdt



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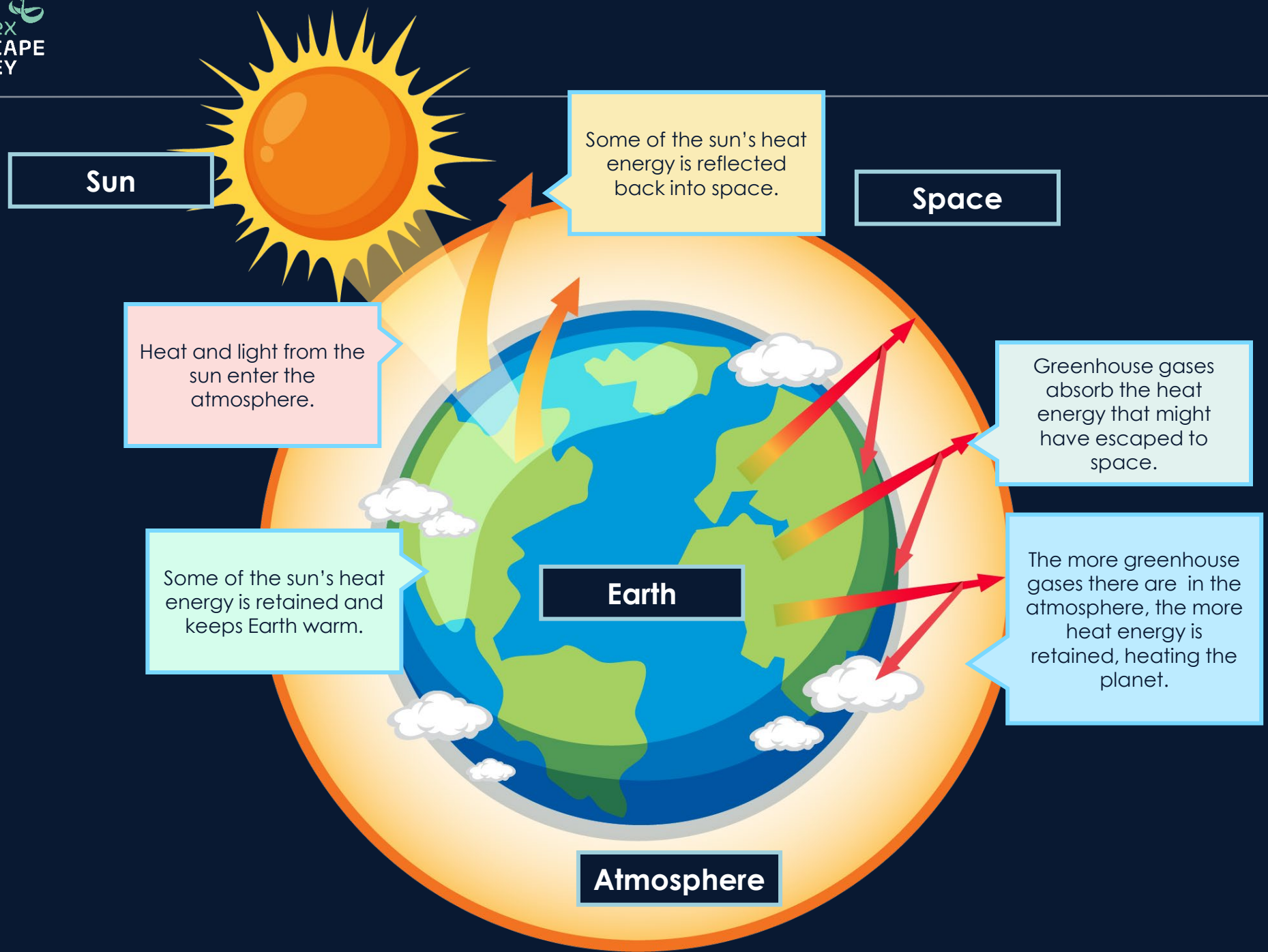

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Well-known science…

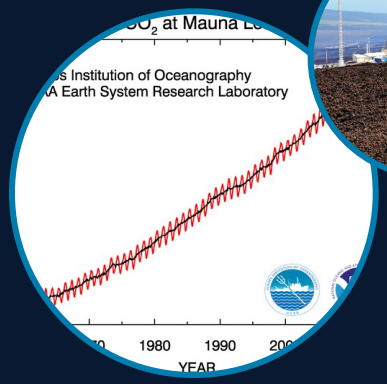
In **1859**, **John Tyndall** discovered that CO_2 is a greenhouse gas that absorbs and holds heat through his groundbreaking laboratory experiments.

In **1938**, **Guy Callendar** analysed data from 147 weather stations and demonstrated that temperatures had risen 0.3°C over 50 years, linking this increase to manmade emissions.

In **1978**, NASA's TIROS-N satellite launched the **modern era** of comprehensive climate monitoring, providing global coverage of temperature trends, sea levels, and atmospheric composition.

1850 1875 1900 1925 1950 1975 2000

In **1896**, **Svante Arrhenius** published the first quantitative prediction of global warming, calculating that doubling atmospheric CO_2 would raise global temperatures by 5-6°C.



In **1958**, **Charles David Keeling** began the first continuous measurements of atmospheric CO_2 at Mauna Loa Observatory, creating the famous "Keeling Curve" that definitively showed rising CO_2 levels.

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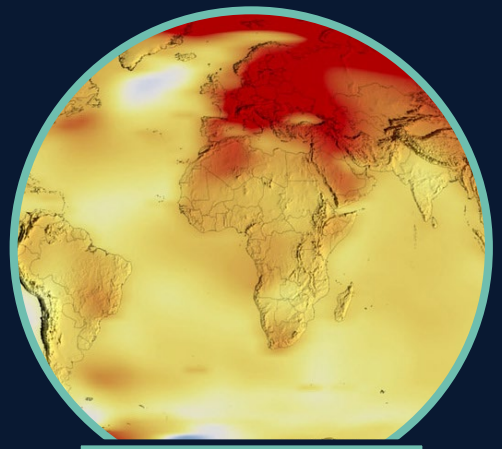
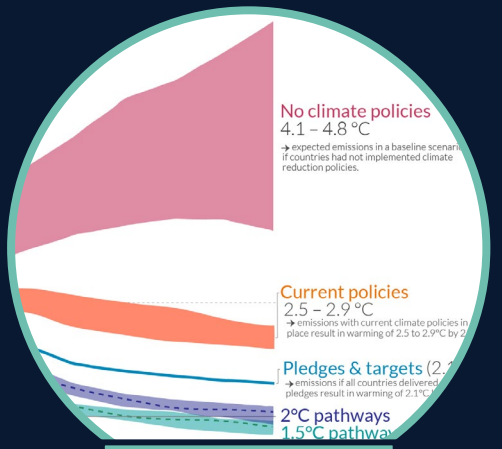
What's complicated then…?

Attribution challenges



Spatial variability



Human behaviour

Solution pathways

Impact prediction

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Evidence for climate change

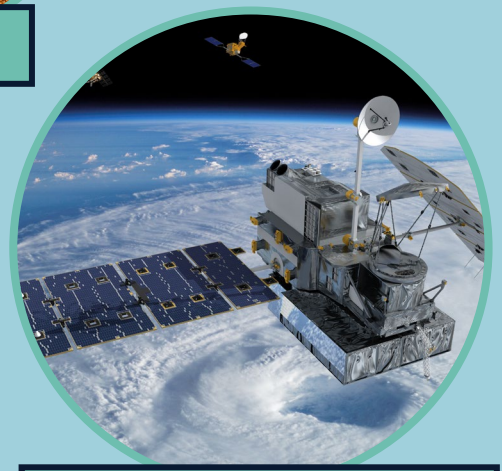
Ice cores

Sediment cores

Tree rings

Coral rings

Historical documents



Scientific instruments

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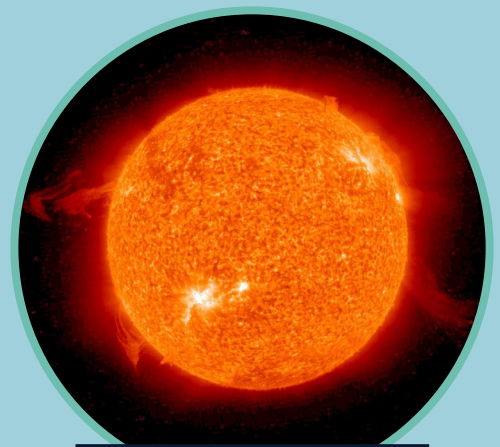
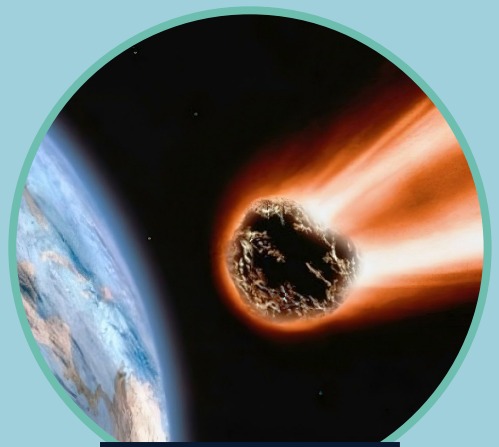
Factors affecting the climate

Earth's orbit



Sun's strength

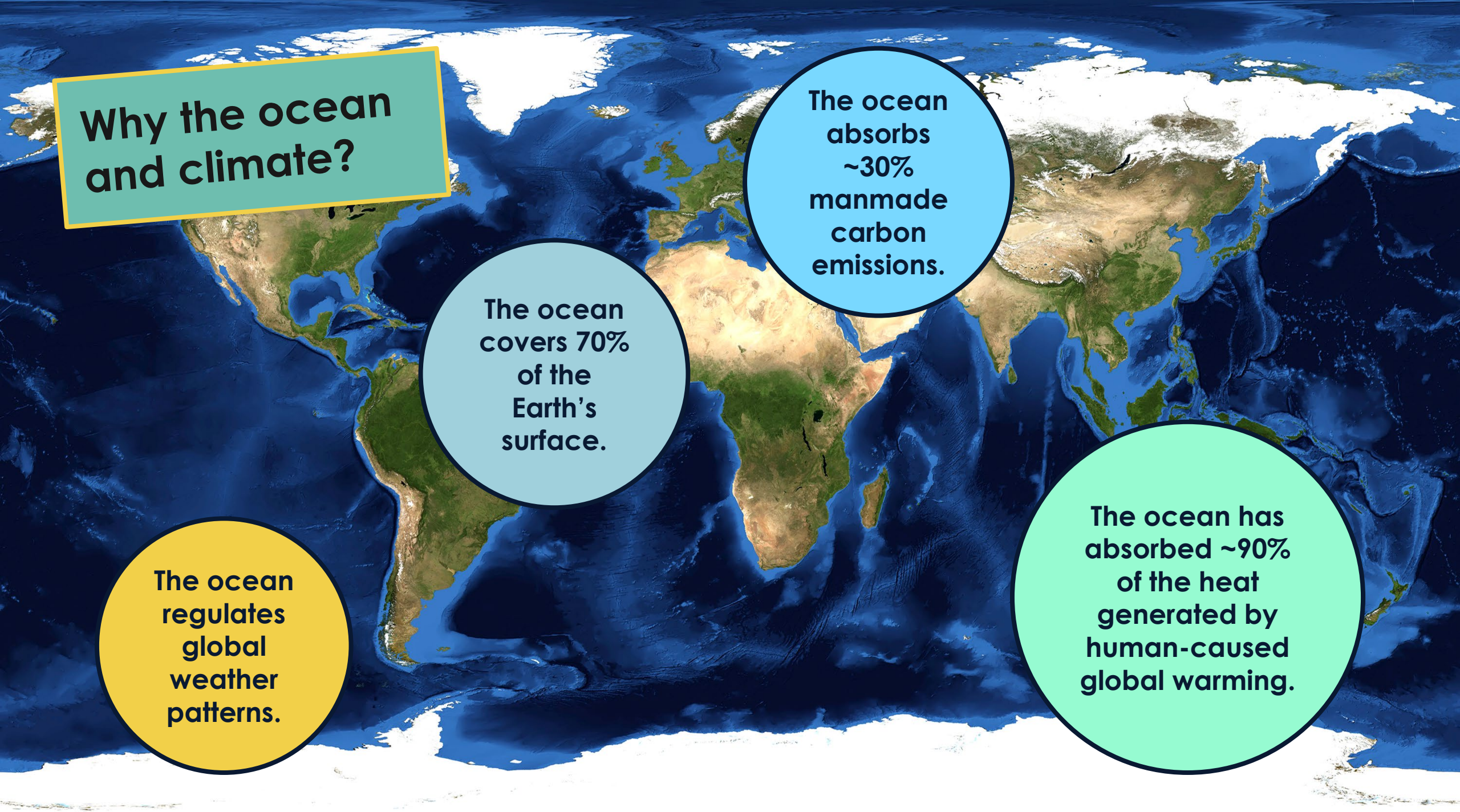


Meteorites

Volcanic eruptions

Greenhouse gases

Deforestation


Why the ocean and climate?
The ocean absorbs ~30% manmade carbon emissions.
The ocean covers 70% of the Earth's surface.
The ocean regulates global weather patterns.
The ocean has absorbed ~90% of the heat generated by human-caused global warming.

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Where is all the carbon?

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Where is all the carbon?

Ocean 38,873 GtC Soil & Sediment 4,650 GtC Atmosphere 870 GtC

Fossil fuels 483 GtC Vegetation 425 GtC

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Climate impacts on the ocean…

Ocean warming

Sea ice loss

Sea level rise

Tropical stroms

Ocean acidification

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How the ocean can help…

One of the ways to protect our ocean is a ‘nature-based’ solution… that lies in the ocean itself!

It’s all thanks to ocean habitats that can rapidly store carbon much faster than other habitats such as forests.

This is blue carbon!!

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Examples of blue carbon habitats

Mangrove forest

Seagrass meadow

Saltmarsh

Kelp forest

Coastal seas of the world's continental shelves are the ocean's biggest carbon store

With careful management, these coastal seas could help to tackle climate change.

This is blue carbon!!

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3. Teaching approaches

- Assertion vs scaffolding
- Curriculum-aligned approach

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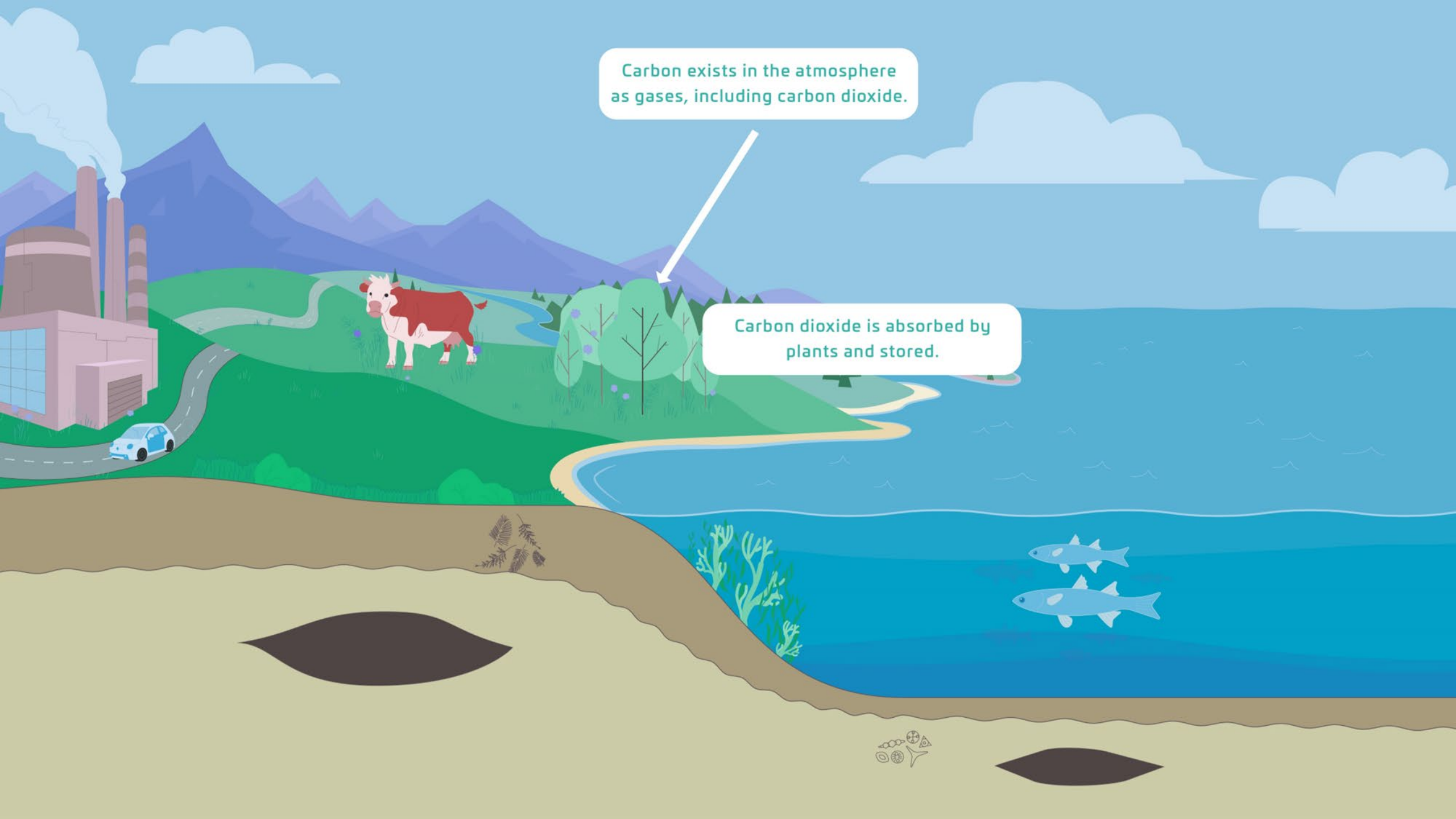
Two approaches to ocean and climate education

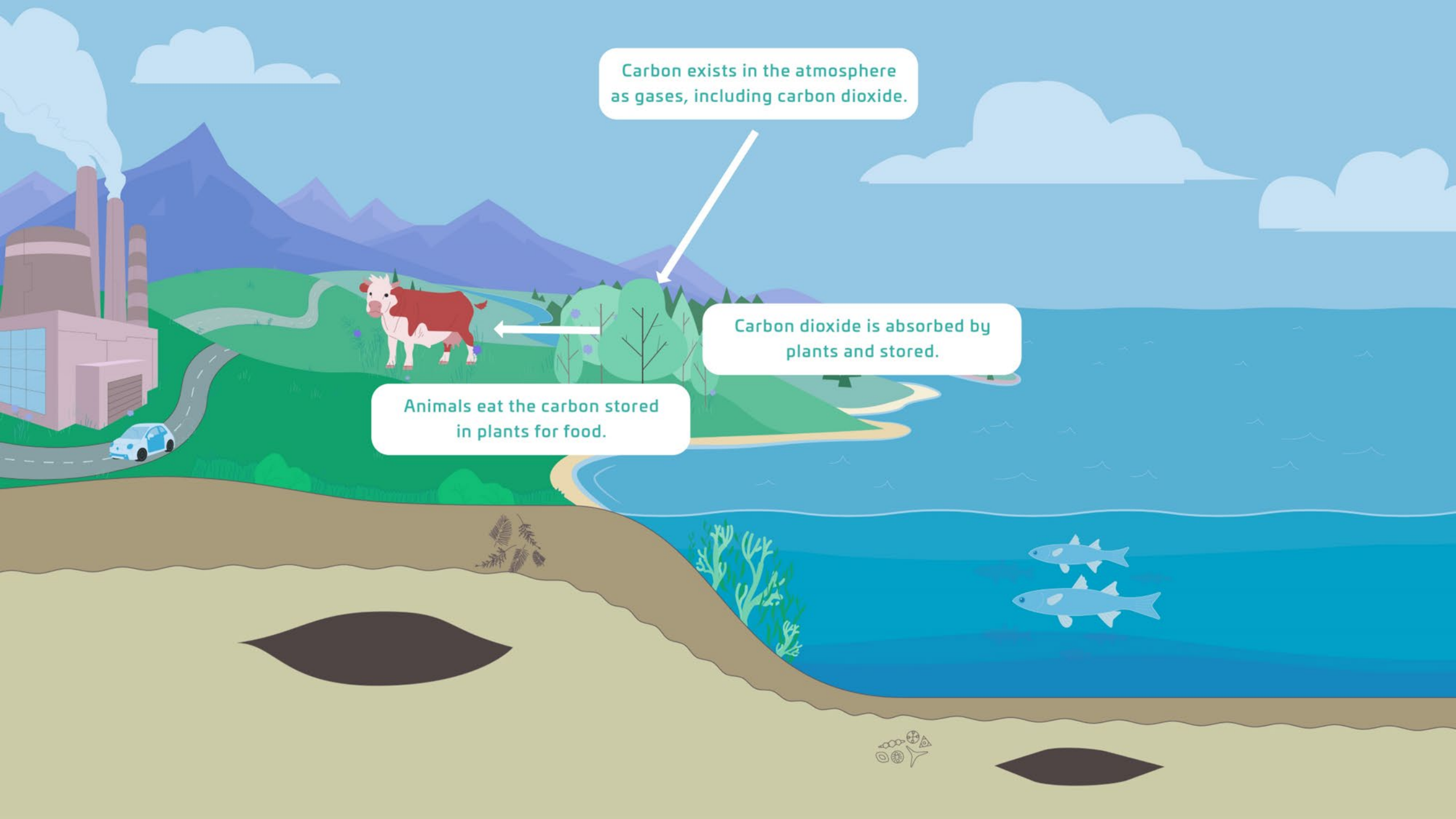
Assertion-based

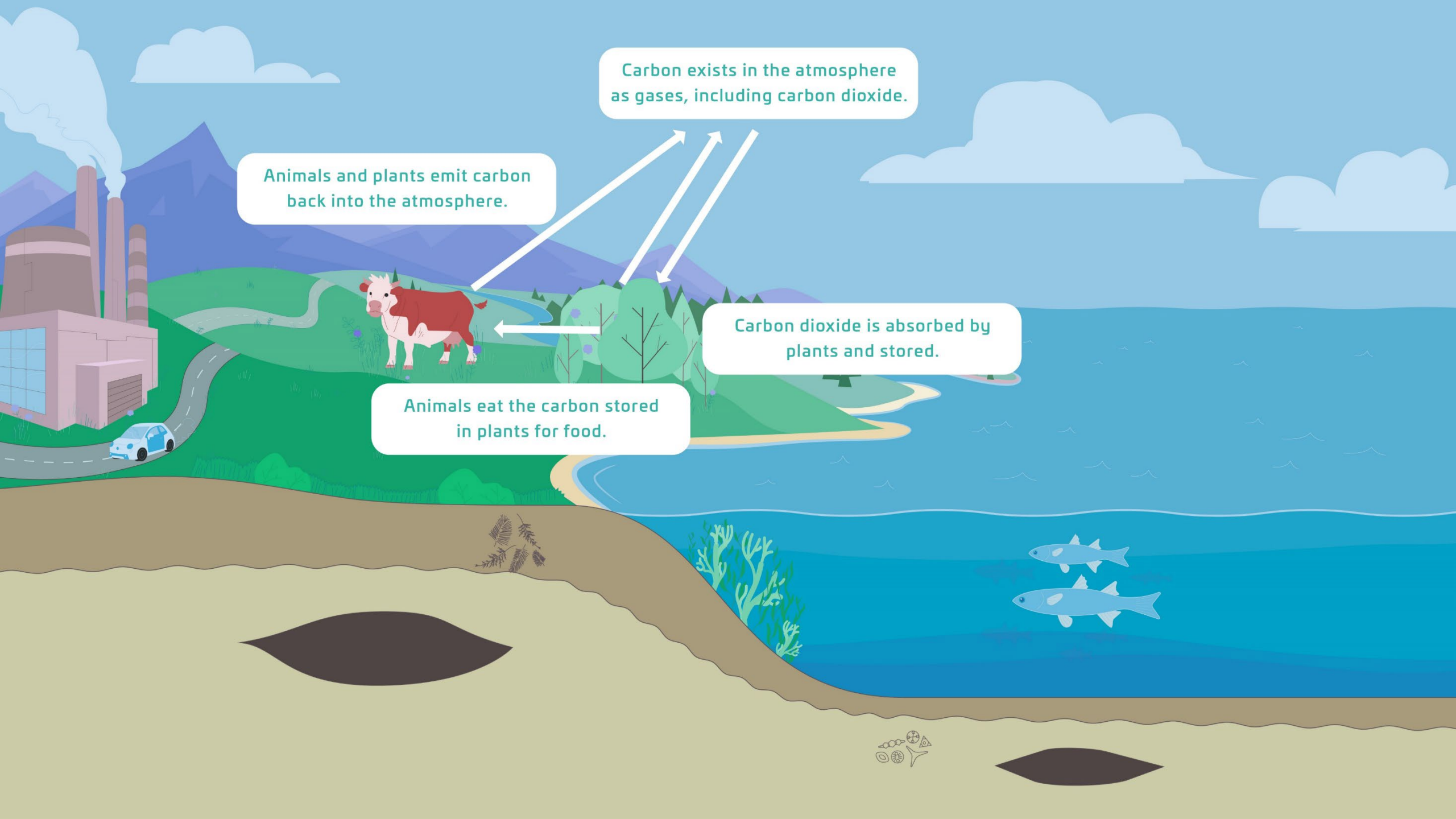
A values-first method that builds environmental behaviours, emotional resilience, and competencies without requiring deep scientific understanding, focusing on developing care for self, others, and the environment through practical engagement and emotional connection.

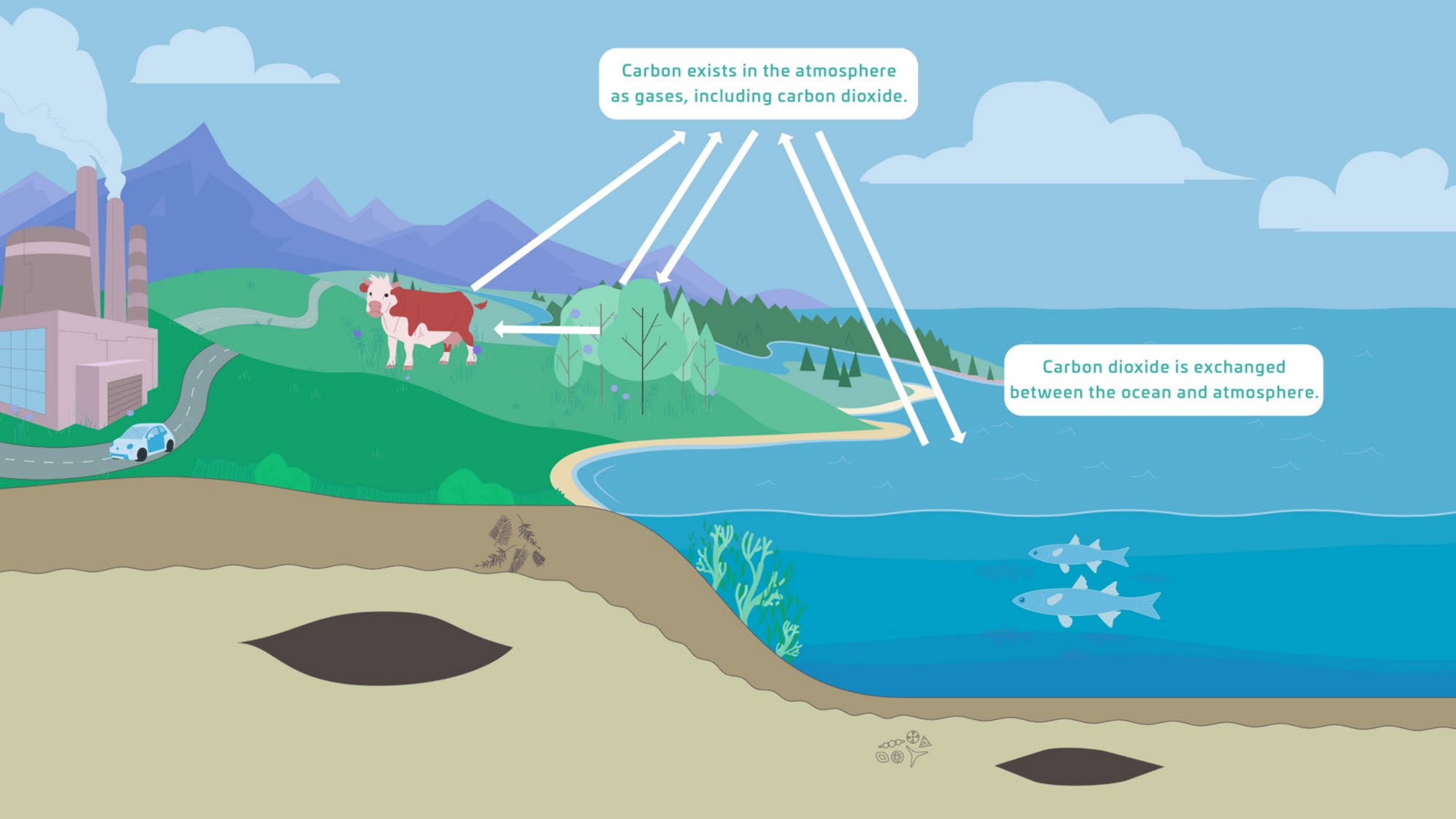
Scaffolding approach

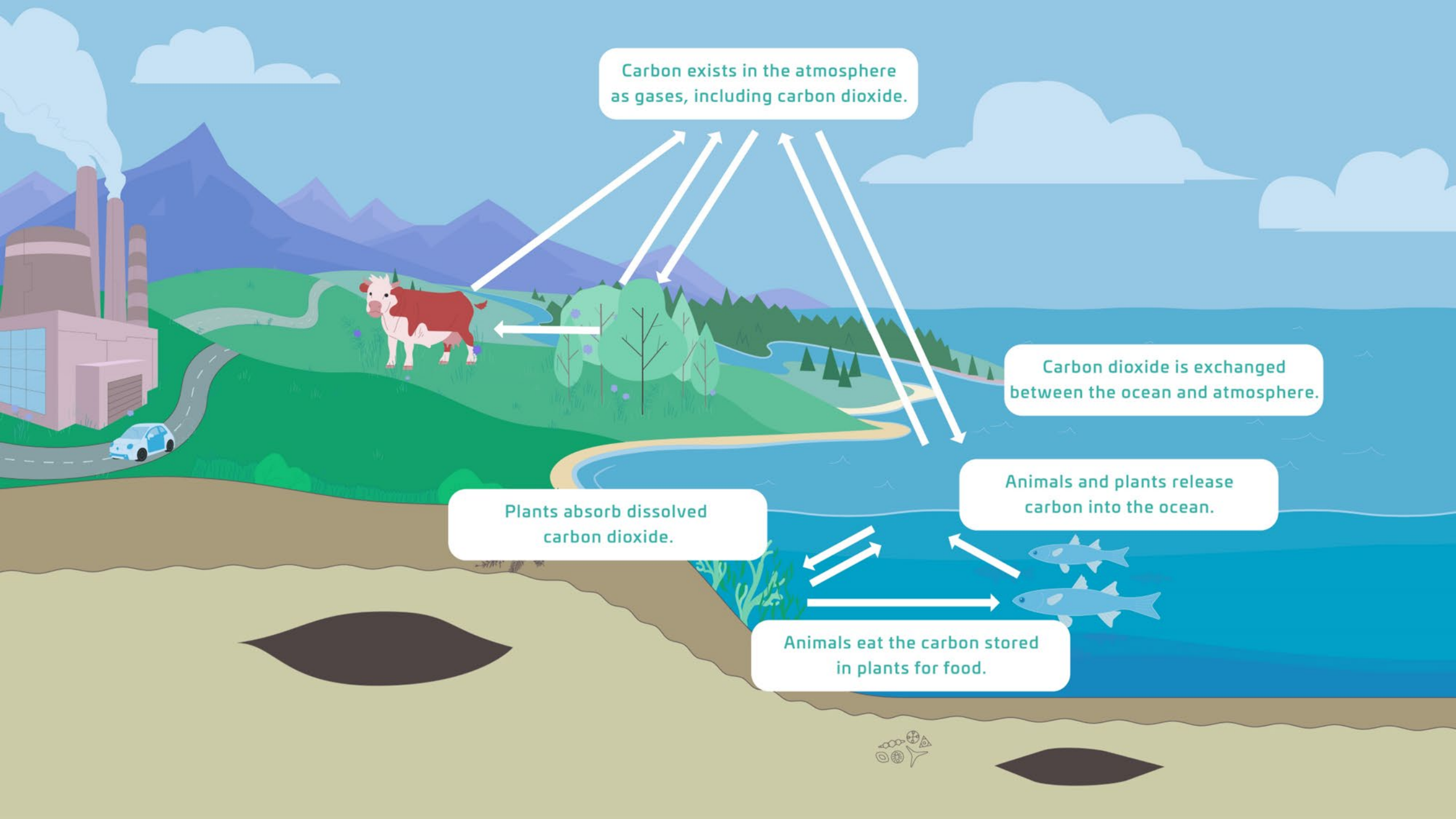
A systematic building of scientific concepts and understanding that follows the primary curriculum progression, gradually constructing a comprehensive grasp of ocean and climate science through connected learning of underlying principles and processes.

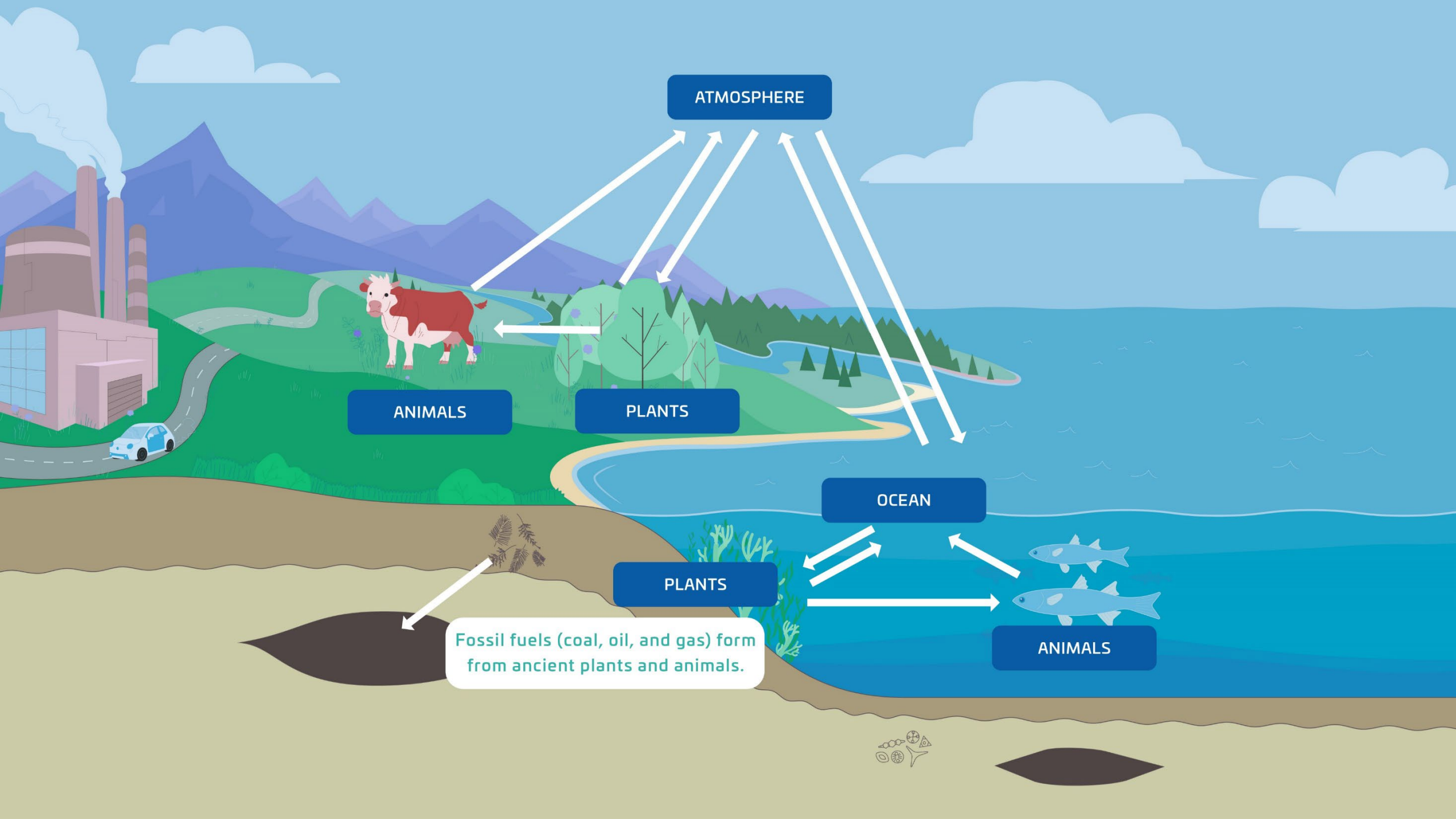

Carbon exists in the atmosphere as gases, including carbon dioxide.
Carbon dioxide is absorbed by plants and stored.

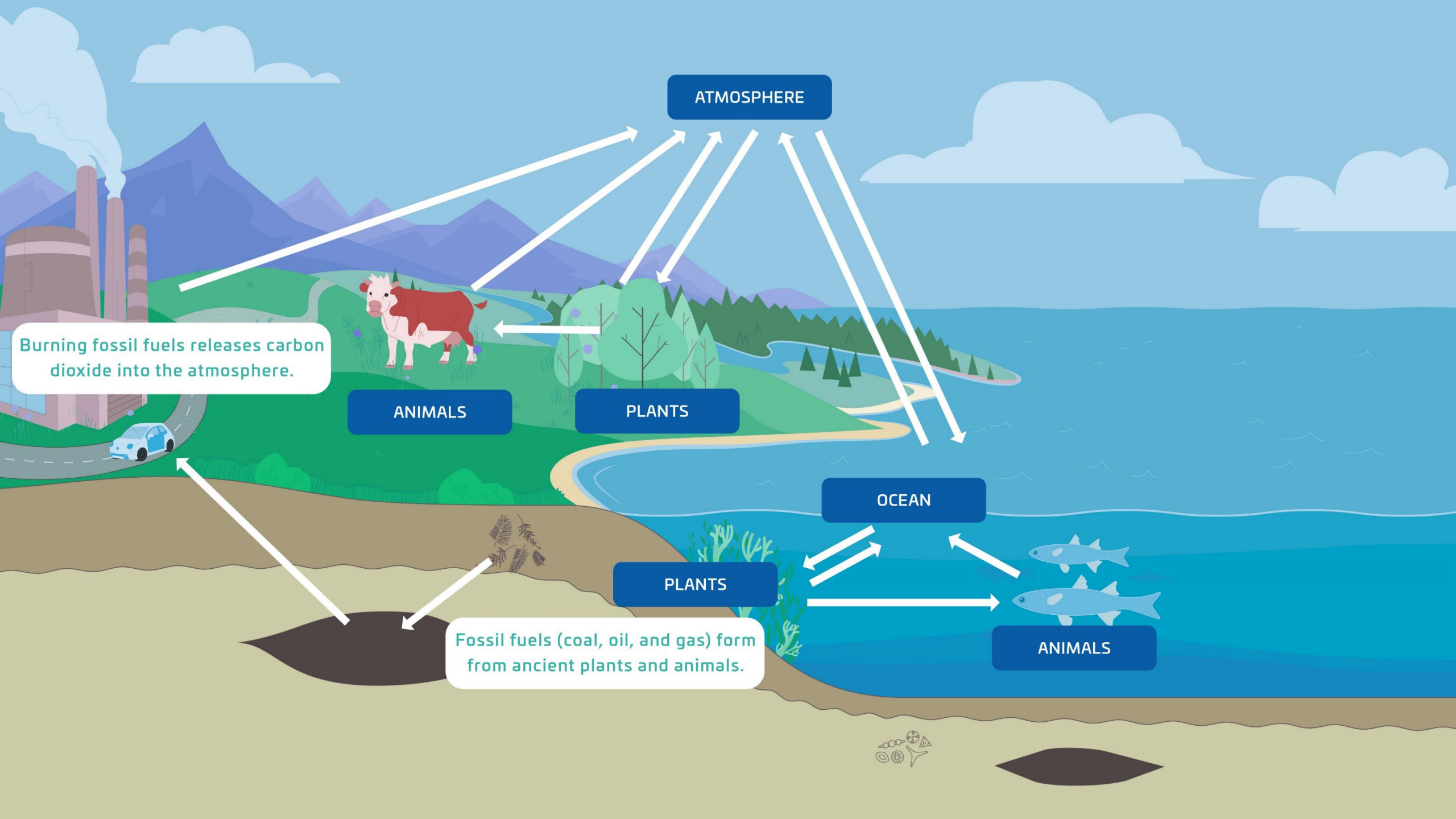

Carbon exists in the atmosphere as gases, including carbon dioxide.
Carbon dioxide is absorbed by plants and stored.
Animals eat the carbon stored in plants for food.


Carbon exists in the atmosphere as gases, including carbon dioxide.
Animals and plants emit carbon back into the atmosphere.
Carbon dioxide is absorbed by plants and stored.
Animals eat the carbon stored in plants for food.


Carbon exists in the atmosphere as gases, including carbon dioxide.
Carbon dioxide is exchanged between the ocean and atmosphere.


Carbon exists in the atmosphere as gases, including carbon dioxide.
Carbon dioxide is exchanged between the ocean and atmosphere.
Animals and plants release carbon into the ocean.
Plants absorb dissolved carbon dioxide.
Animals eat the carbon stored in plants for food.


ATMOSPHERE
ANIMALS
PLANTS
OCEAN
PLANTS
ANIMALS
Fossil fuels (coal, oil, and gas) form from ancient plants and animals.


ATMOSPHERE
Burning fossil fuels releases carbon dioxide into the atmosphere.
ANIMALS
PLANTS
OCEAN
PLANTS
ANIMALS
Fossil fuels (coal, oil, and gas) form from ancient plants and animals.

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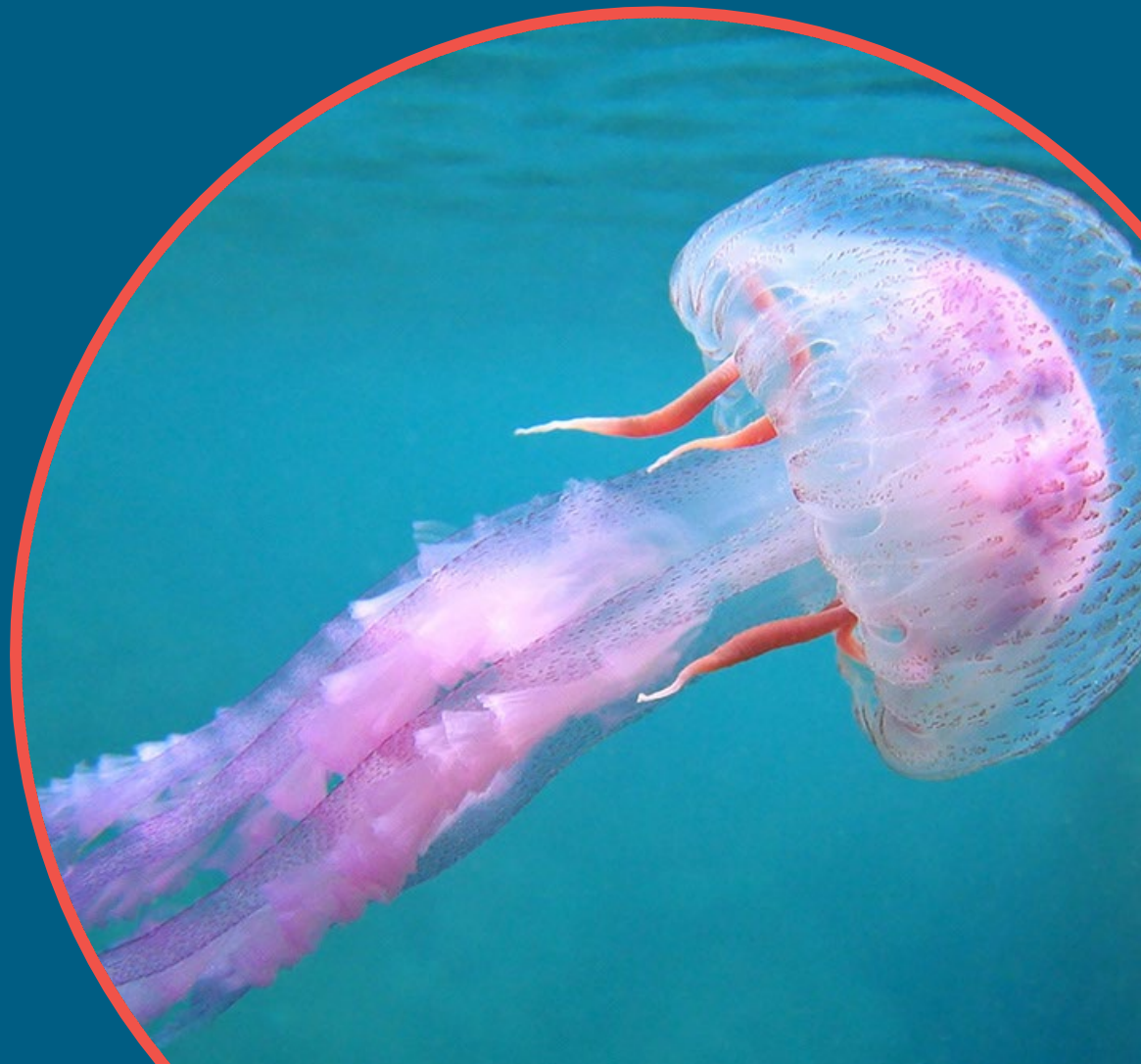
4. Student wellbeing

- Addressing climate anxiety
- Importance of agency



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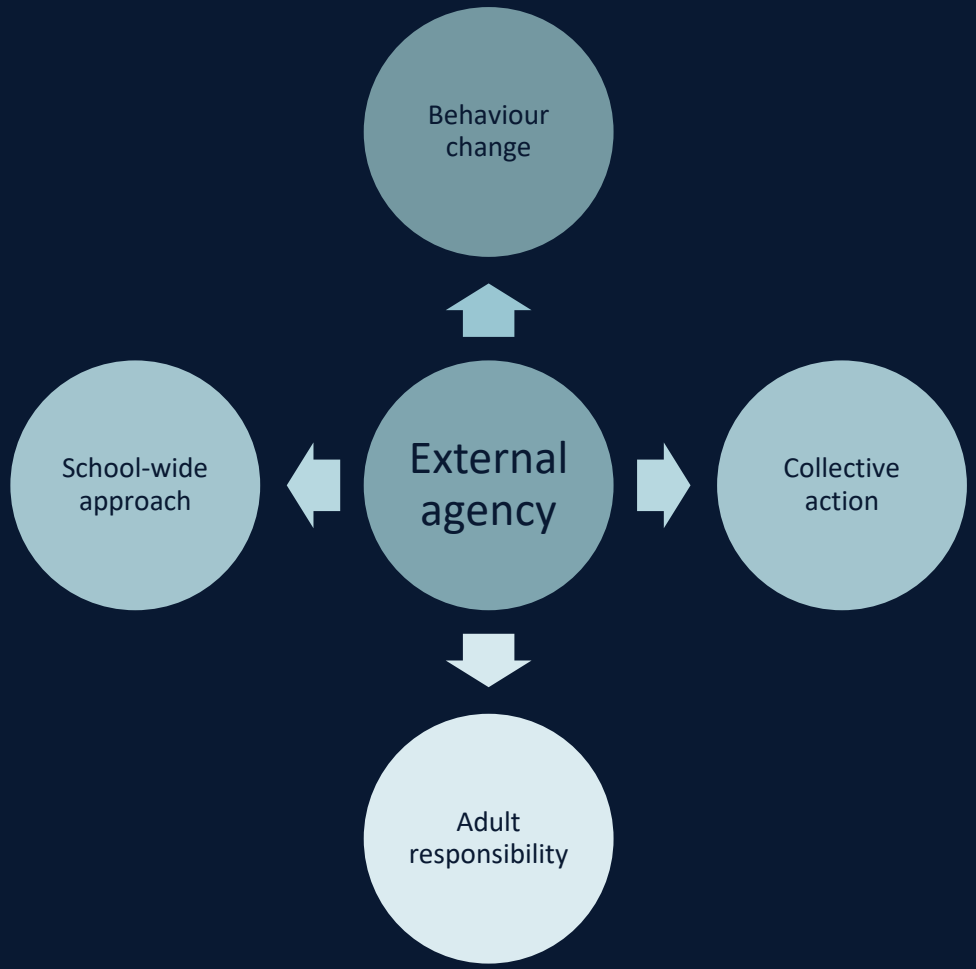
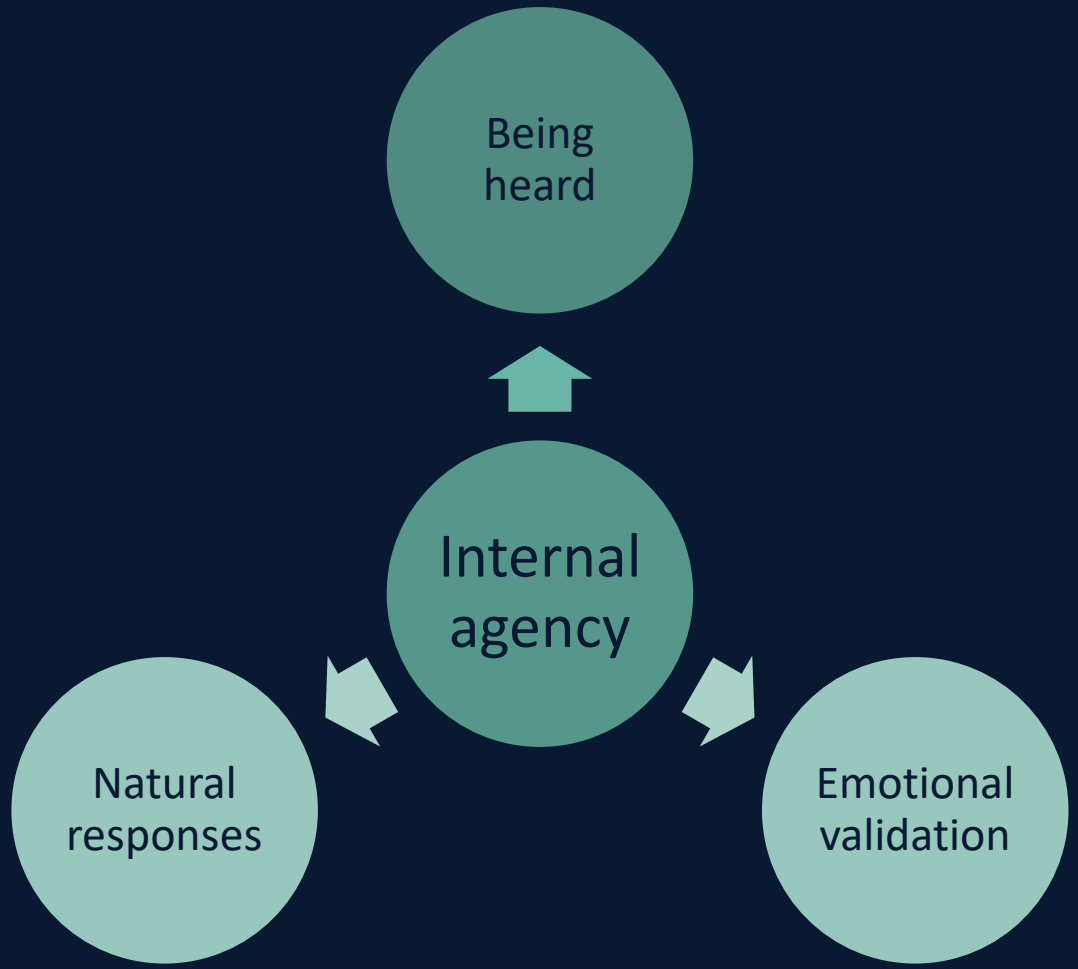
Internal and external agency





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My school ACTS on climate

- **A**dvocate
- **C**ompassion
- **T**ogether
- **S**olutions

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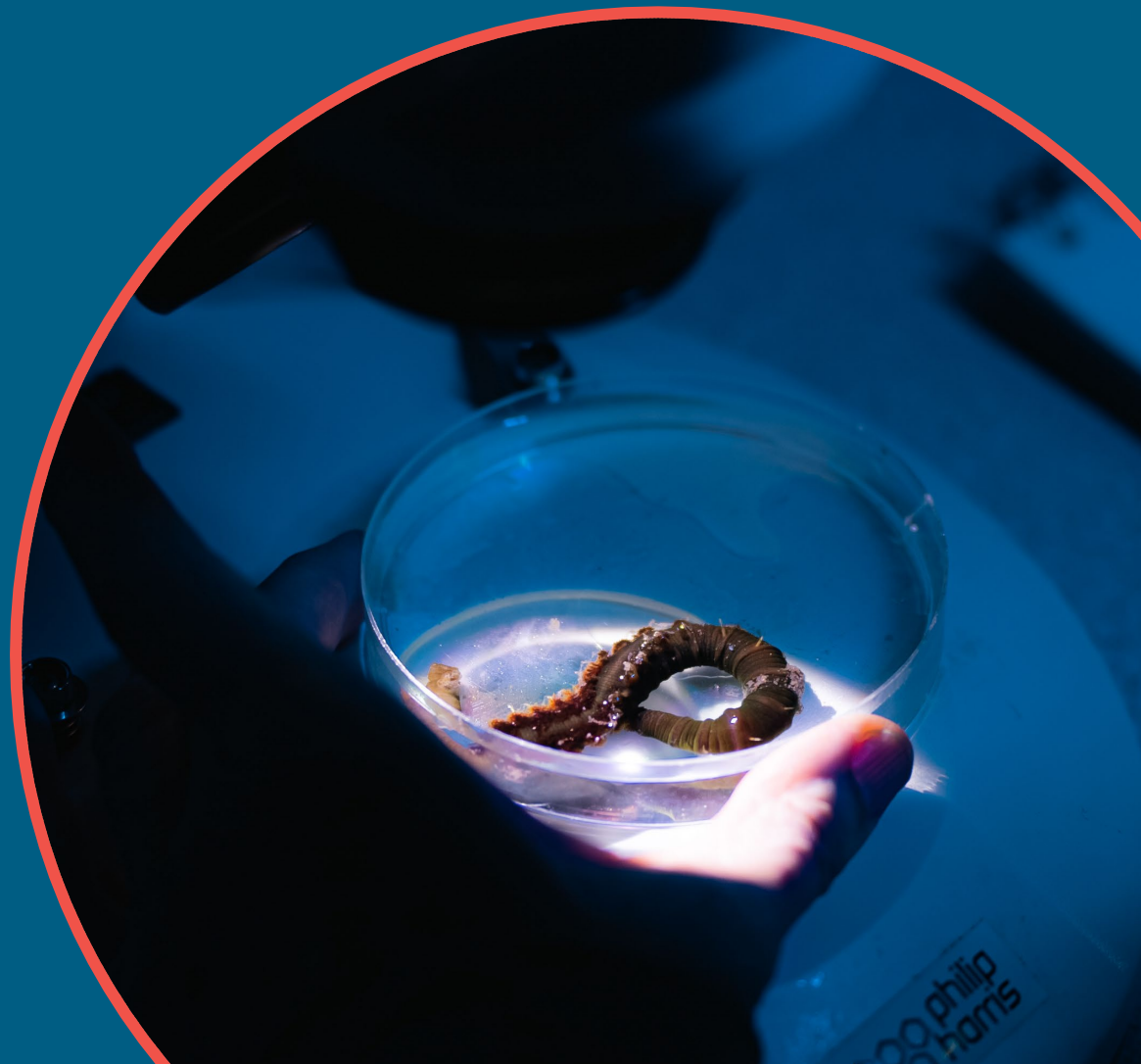
5. Ocean Heroes resources

- Rationale
- Features
- Overview



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6. Any questions