

WE UNDERSTAND

REVIEW SESSION

MAIN SUBJECTS

Natural sciences / Geography / Physics

DURATION

- ~ Preparation: 25 min
- ~ Activity: 1h30

AGE GROUP

9-15 years

LEARNING OUTCOMES

The students create a conceptual framework showing the scientific basis of climate change and its impacts on land and services provided, and figuring out the causes and consequences of the different phenomena.

They learn to:

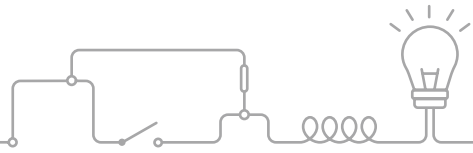
- ~ Develop a systemic view of this topic.
- ~ Draw links between the Earth's four systems, called the spheres: hydrosphere (water), atmosphere (air), geosphere (land) and biosphere (living organisms).
- ~ Bring together all their knowledge on the subject of climate change.

KEYWORDS

Climate change, ecosystem services, complex system, human activity, land

TEACHING METHOD

Conceptual framework



→ TEACHER TIP

This lesson has two main objectives:

- to review the links between climate change and land, studied in the previous lessons;
- to understand how these links will have consequences on terrestrial ecosystems and human livelihoods.

Depending on the level of your students and the lessons in this handbook you have carried out with your class, choose which boxes to distribute to your students.

INTRODUCTION 20 MIN

Start by asking the students to think about the different effects of climate change on land, discussed in the previous lessons, and note each concept on the whiteboard.

Continue the discussion with your students: *Why do we care about these changes to the land? What may be the consequences for humans and other living beings?* Note the answers on the whiteboard, again, in the form of concepts. Some of the ideas suggested by the students will certainly match the stickers provided in **WORKSHEETS 1** and **2**.

→ TEACHER TIP

“Concept” refers to a simple statement that corresponds to an idea you want the students to take away (validated by the scientific community, and not an initial representation). One concept equals one sentence. It is not a keyword, a question or even a “notion” (which tends to involve intuitive knowledge). Example: “The concentration of CO₂ in the atmosphere is increasing.”

PREPARATION 25 MIN

EQUIPMENT

- **WORKSHEETS 1** and **2**
- A large sheet of paper for each group of students (for their stickers)
- Glue
- Post-its

LESSON PREPARATION

1. Print **WORKSHEETS 1** and **2**, one copy for each group of 3 to 4 students.
2. Cut out the different boxes and collect them together according to their colour.

PROCEDURE 40 MIN

1. Divide the class into groups and give each group the list of concepts needed to build the first part of the conceptual framework (“climate physics” stickers, **WORKSHEET 1**). If some of the concepts suggested

by the students are pertinent but not mentioned in the list provided, allow the students to add a new sticker (post-it) for each concept suggested and validated by the class.

2. Ask the students to place the stickers in a logical order, indicating the connections between them with arrows. For example, an arrow could mean leads to or is due to.

3. Once they have managed to put all the “Climate physics” stickers into a logical order, give them the “water” stickers on **WORKSHEET 1**, and then do the same with every set of stickers on the two worksheets.

→ **TEACHER TIP**

Depending on the level of your students, you could give them the stickers set by set or all at the same time.

4. Explain to the students that when they receive a new set of stickers, they must connect them with the others.

5. A representative from each group presents the conceptual framework.

WRAP-UP 30 MIN

Compare and discuss the different conceptual frameworks (one example is given on the next page), and how climate change affects many spheres of our lives, as well as many species. You can also take advantage of the discussion to go further into the social consequences of climate change. Some communities can adapt, others cannot: *What does the ability to adapt depend on? Resources? Education? Other factors?* Some people will have to migrate, becoming climate refugees.

Finally, depending on the time you have, you can finish up the discussion by asking them to find solutions to reduce the impacts of climate change. For instance, if we change the way we consume food, we can reduce the impact of agriculture on deforestation. *How does this positively affect the climate and what would be the impact on human activities?*

→ **TEACHER TIP**

This lesson also helps evaluate what the students have learned during the previous lessons. Mistakes or missing parts may lead to a deeper discussion to recall the logical sequence that may have been poorly retained or not completely understood. For this activity, there is no single right answer, and the conceptual frameworks prepared by the different student groups may all be different. What is important is the thought process involved in their organisation and linkage of the concepts. The main objective of the activity is that students, in groups, discuss with each other and explain to each other what they understood about the topic. It is important to place them in an atmosphere where they can discuss freely with no fear of making mistakes.

POSSIBLE EXTENSION

Work with a visual arts teacher to produce a mural painting about the impacts of climate change on land (considering humans and other living beings as well).



Presentation in front of the whole class.

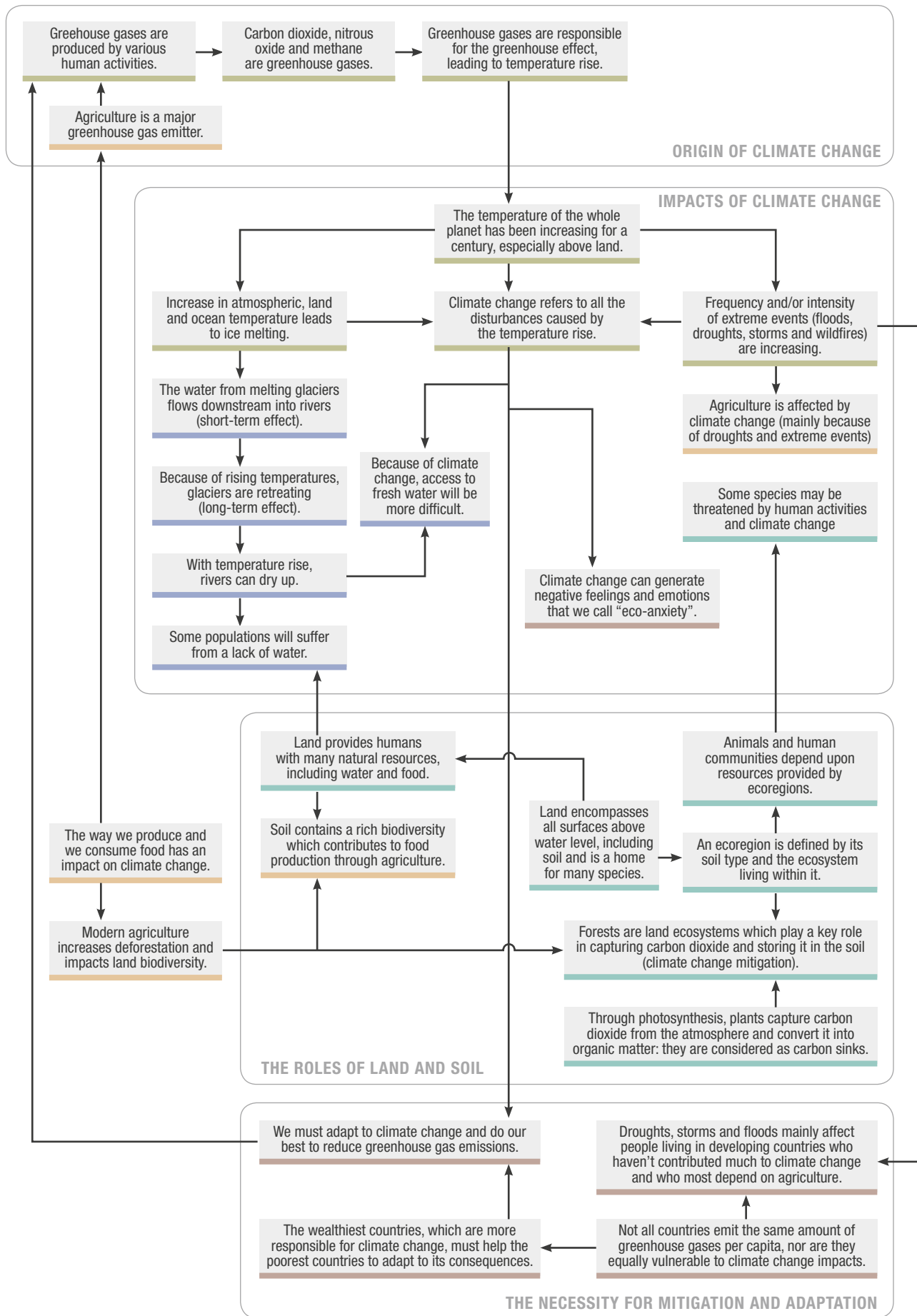
BACKGROUND FOR TEACHERS

This lesson is based on constructing a conceptual framework, consisting of fundamental concepts on the topic of climate change, formulated using simple and clear sentences (one box refers to one concept). Your students will have to connect the concepts using logical links (“this happens because of that”). By doing this, the students will get an overview of the whole subject “Climate Change and Land”, and it will help them review some of the knowledge covered during the previous lessons.

Here are some principles around conceptual frameworks:

- It is a list of scientific concepts organised using logical links.
- Concepts are written as short, simple sentences, using a phrasing level expected from a student.
- It may be used to build a mind map that can be kept to conclude this part of the handbook.

ONE OF THE MANY POSSIBLE FRAMEWORK SOLUTIONS



Topics:


- Climate change and humans
- Agriculture
- Climate physics
- Land and biodiversity
- Water




WORKSHEET 1

CLIMATE PHYSICS


Carbon dioxide, nitrous oxide and methane are greenhouse gases.



Frequency and/or intensity of extreme events (floods, droughts, storms and wildfires) are increasing.




Greenhouse gases are produced by various human activities.




Climate change refers to all the disturbances caused by the rise in temperature.




Increase in atmospheric, land and ocean temperature leads to ice melting.



The temperature of the whole planet has been increasing for a century, especially above land.




Greenhouse gases are responsible for the greenhouse effect, leading to temperature rise.



WATER


The water from melting glaciers flows downstream into rivers (short-term effect).




With temperature rise, rivers can dry up.




Some populations will suffer from a lack of water.



Because of climate change, access to fresh water will be more difficult.




Because of rising temperatures, glaciers are retreating (long-term effect).




CLIMATE CHANGE AND HUMANS

Climate change can generate negative feelings and emotions that we call "eco-anxiety".



We must adapt to climate change and do our best to reduce greenhouse gas emissions.




The wealthiest countries, which are more responsible for climate change, must help the poorest countries to adapt to its consequences.



Not all countries emit the same amount of greenhouse gases per capita, nor are they equally vulnerable to climate change impacts.



Droughts, storms and floods mainly affect people living in developing countries who have contributed least to climate change and who most depend on agriculture.





WORKSHEET 2

LAND AND BIODIVERSITY

Some species may be threatened by human activities and climate change.



An ecoregion is defined by its soil type and the ecosystem living within it.



Land encompasses all surfaces above water level, including soil, and is a home for many species.



Land provides humans with many natural resources, including water and food.



Animals and human communities depend upon resources provided by ecoregions.



Forests are land ecosystems which play a key role in capturing carbon dioxide and storing it in the soil (climate change mitigation).



Through photosynthesis, plants capture carbon dioxide from the atmosphere and convert it into organic matter: they are considered as carbon sinks.



AGRICULTURE

Modern agriculture increases deforestation and impacts land biodiversity.



Soil contains a rich biodiversity which contributes to food production through agriculture.



The way we produce and consume food has an impact on climate change.



Agriculture is affected by climate change (mainly because of droughts and extreme events).



Agriculture is a major greenhouse gas emitter.

