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The EcoMystery Project:

Interactive Escape Rooms for Climate Crisis

Awareness and Civic Engagement in School Education

WP3

'Escape the Climate Crisis' Coursework

Module 2

How Will the Climate Change?

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Module 2 – How Will the Climate Change?

The EcoMystery Project: Interactive Escape Rooms for Climate Crisis Awareness and Civic Engagement in School Education

(2024-1-IT02-KA220-SCH-000248873)

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Module 2 – How Will the Climate Change?

Module 2 – How Will the Climate Change?

This module supports teachers in introducing one of the central questions of climate education: how and why the climate is changing, and how those changes can be understood through evidence. The purpose of the module is to give pupils a clear and age-appropriate framework for understanding the basic processes behind climate change and the kinds of changes these processes can produce in the world around them.

The sequence of ideas is important. Pupils first need a simple understanding of Earth's energy balance, the greenhouse effect, and the human activities that are increasing greenhouse-gas concentrations. Once these foundations are in place, they can better understand why global temperatures are rising, why some types of extreme events are becoming more likely, and why ecosystems are under growing stress. The module helps pupils connect scientific concepts with everyday realities such as heat, water, biodiversity, and local decision-making.

Teachers are encouraged to present the topic carefully and concretely. Climate change can sometimes feel distant because it is discussed at the global scale, but it can also feel overwhelming if it is presented only through disasters and alarming headlines. A balanced classroom approach should therefore combine scientific clarity, visual evidence, and opportunities for discussion. Graphs, simplified diagrams, classroom comparisons, and local observation tasks can all help pupils move from abstract statements to structured understanding. The practical activities in this module are designed with that goal in mind: they help pupils read evidence, distinguish observation from projection, compare weather with climate, and think about realistic responses at school or in the community.

Teachers are encouraged to frame the module as a starting point rather than a finished endpoint. Pupils who show curiosity, ask follow-up questions, or need further support should be guided toward the module's learning materials. Student-friendly glossaries,



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short presentations, carefully chosen videos, printable worksheets, and reliable climate portals can help extend learning without overloading the core module. In this way, the module remains manageable in class while still leaving room for deeper exploration, revision, and adaptation to local teaching contexts.

Possible Discussion Questions:

- How could climate change affect ordinary parts of school life, such as outdoor play, sports, shade, or water access?
- What are some realistic things a school or local community could do to respond to hotter days or heavier rainfall?

Teaching Tip!

Link global climate ideas to local school life.

Teachers may find it easier to sustain discussion when pupils are invited to think about global ideas in concrete ways regarding their own surroundings: hotter classrooms, more shade in the playground, water use, trees near school, local rivers, or seasonal changes in plants and animals. Similar to another ‘Teaching Tip’ in this module (‘Start from everyday experience before moving to scientific explanation’): much like with science, the concepts behind European ecological values are better understood when these values are connected to the students’ everyday experience.



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Learning Objectives

By the end of this module, pupils will be able to:

- explain in simple terms how Earth's energy balance and the greenhouse effect influence climate
- identify the main human drivers of current climate change, including greenhouse-gas emissions, fossil-fuel use, and land-use change
- distinguish between weather and climate, and between short-term variability and long-term climate trends
- interpret simple climate graphs and explain what they show about temperature change, projections, and possible future pathways
- describe how climate change can affect extreme weather, ecosystems, biodiversity, and ocean systems
- connect global climate processes to local impacts on school life, health, water, biodiversity, or community planning
- discuss climate evidence carefully, using observations, graphs, and examples rather than unsupported claims
- propose simple and realistic adaptation or mitigation responses relevant to their school or local area.

This module also supports the development of 21st century skills, especially:

- critical thinking, through interpreting graphs, comparing evidence, and testing claims
- collaboration, through pair and group discussion, shared observation, and joint problem-solving



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- communication, through short explanations, presentations, and evidence-based discussion
- digital literacy, where pupils use projected resources, digital charts, or simple online materials
- civic and environmental awareness, through linking scientific understanding with local choices and community responses.

Possible Sustainable Development Goals addressed in this module include:

- SDG 4 – Quality Education
- SDG 13 – Climate Action
- SDG 14 – Life Below Water
- SDG 15 – Life on Land

Time required

This module can be taught as a short coherent sequence or adapted flexibly across several lessons. The theoretical section may be introduced in approximately **2-3 teaching hours**, depending on how much time is given to discussion, figure interpretation, and teacher explanation. The practical part can then be used either selectively or as a short sequence of activities, about 1 hour each.



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Unit 1 - Energy balance, forcings, and radiative physics

Earth's climate depends on a simple rule: over time, the amount of energy coming in from the Sun and the amount going back out to space need to stay roughly in balance (Forster et al., 2021; IPCC, 2021). Sunlight reaches Earth, and some of it is reflected straight back to space by clouds, ice, snow, and other bright surfaces. The rest is absorbed by land and oceans, which then warm up and release energy back as longwave, or infrared, radiation. If more energy enters the system than leaves it, Earth warms. If more leaves than enters, Earth cools.

This is where the greenhouse effect comes in. Certain gases in the atmosphere, especially carbon dioxide, methane, and water vapour, absorb part of the outgoing infrared radiation and send some of that energy back toward the surface. Without this natural greenhouse effect, Earth would be far too cold for most life as we know it. The problem today is not the existence of greenhouse gases (abbreviated GHGs), but their rapid increase because of human activities. When GHG concentration rises, the planet's energy balance is disturbed and extra heat builds up in the climate system (Forster et al., 2021; IPCC, 2021). Observations show that Earth is now retaining more energy than it releases back to space, which is a clear sign of planetary warming (Hansen et al., 2005).

Teaching Tip!

Start from everyday experience before moving to scientific explanation.

If you are unsure how to begin, start with ordinary observations pupils can recognise, such as very hot summer days, heavy rain, changes in seasons, or the need for more shade and water at school. This makes the topic feel concrete, real, and part of everyday life—more a matter of fact than abstract theory or opinion.



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Teaching Tip!

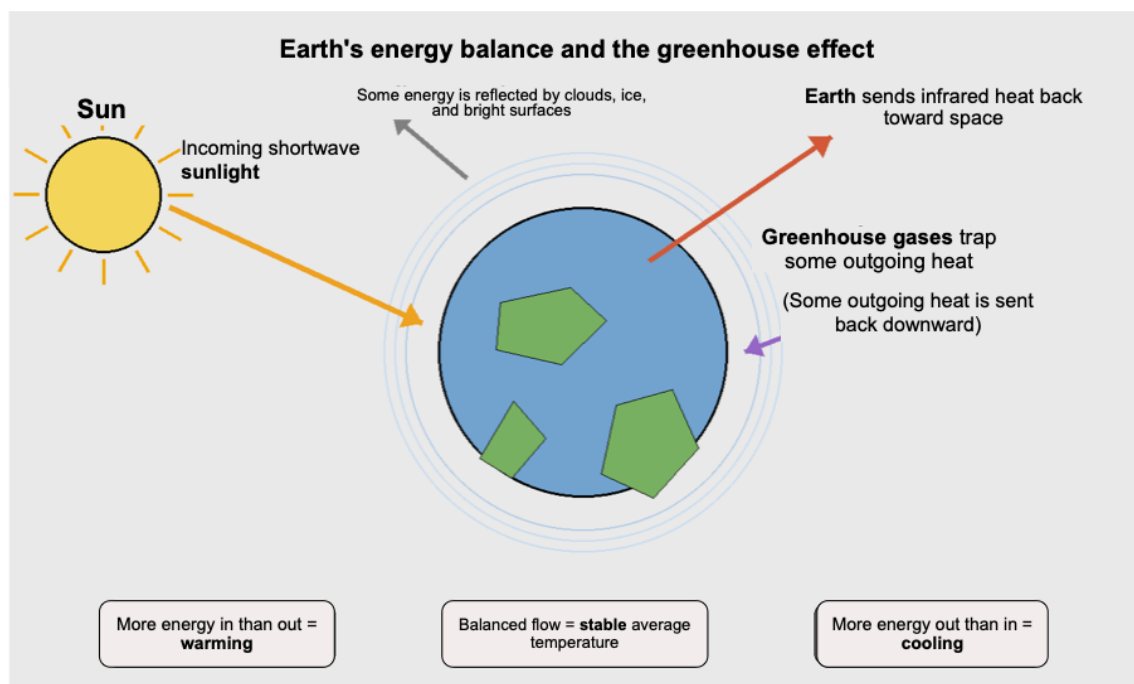
Keep greenhouse-effect-related language simple and non-alarming.

You can make points like: “Earth needs warmth to stay habitable—but human activities are making that warming effect stronger.” Avoid beginning with complex terminology; a calm explanation is often the best entry point.

Scientists call anything that changes Earth’s energy balance a *forcing*. Greenhouse gases are a warming forcing because they make it harder for heat to escape. Some tiny particles in the air, called aerosols, can have a cooling effect because they reflect sunlight. Changes in land cover also matter. For example, fresh snow reflects much more sunlight than dark soil or open water. This is why melting ice matters twice: it is a sign of warming, but it can also speed warming up, because darker surfaces absorb more energy than bright ice does (Forster et al., 2021).

A useful way to picture this is to imagine a bathtub. The tap is the Sun’s energy coming in. The drain is the heat leaving Earth. If the drain becomes partly blocked, the water level rises until a new balance is reached. In the climate system, that higher ‘water level’ is a higher average temperature. Figure 1 shows this idea in a simplified way.

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(Figure 1. A simple visual explanation of how energy enters and leaves the climate system.)



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Unit 2 - Rising global temperatures and their drivers

Global temperatures have been rising for decades, and the pattern is clear when scientists look at long records from thermometers, satellites, ocean measurements, and other sources. This does not mean every year is hotter than the one before, or that every place warms at the same speed. Weather still moves up and down from day to day and year to year. Climate, however, is the long-term trend—and that long-term trend does show a warming planet (IPCC, 2021).

The strongest reason for this warming is the increase in greenhouse gases caused by people. Burning coal, oil, and gas releases large amounts of carbon dioxide. Agriculture, waste, and energy production also release methane and nitrous oxide. Deforestation makes the problem worse because forests remove carbon dioxide from the atmosphere; when forests are cut down or burned, that protective role is reduced. Natural factors such as volcanic eruptions and small changes in solar activity still affect climate, but they cannot explain the steady warming observed since the industrial period. The evidence shows that human influence is the main driver (IPCC, 2021).

Teaching Tip!

Balance difficult information by cultivating agency and an urge for response.

If pupils seem worried, it can help to add a response-oriented sentence such as: “People cannot fix everything at once, but schools, communities, and governments can make choices that reduce harm and protect living systems.”



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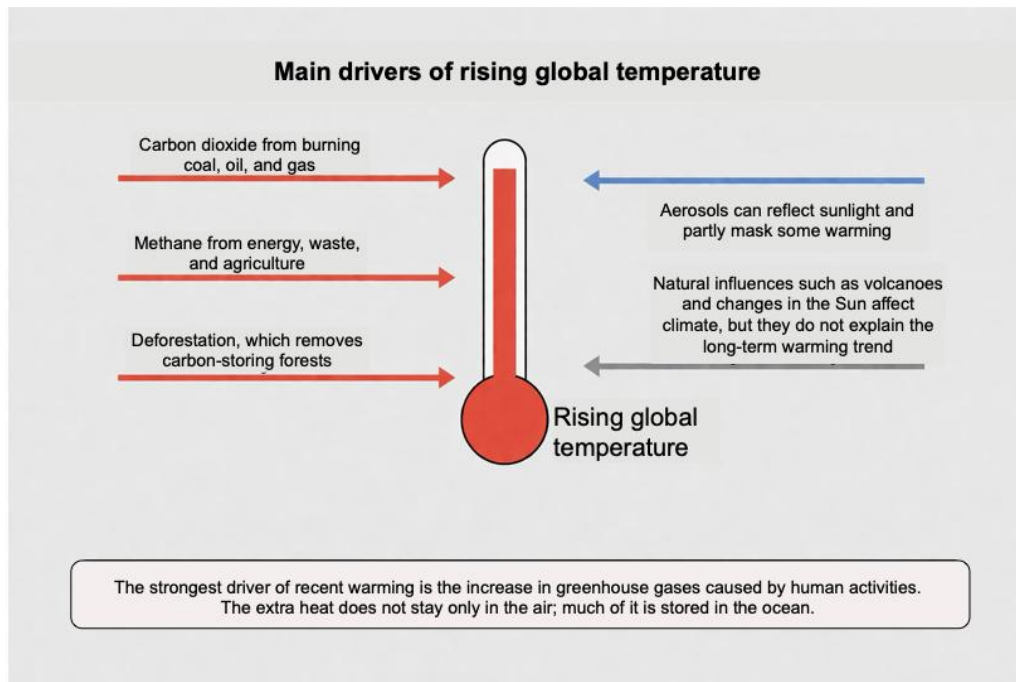
Not all drivers work in the same direction. Some aerosols, produced for example by industry or biomass burning, can temporarily reflect sunlight and cool the surface slightly. That does not cancel greenhouse warming, but it can mask part of it for a while. Another important thing to know is that the extra heat does not stay only in the air. Much of it is stored in the ocean, and long-term measurements show that ocean heat content has continued to rise as the planet warms (Cheng et al., 2019). This is one reason why climate change can continue even if short-term surface temperatures vary from one year to another (IPCC, 2021).

Possible Discussion Questions:

- What is the difference between weather we feel today and climate patterns we notice over many years?
- Why do you think scientists use graphs, measurements, and rely on long records of time instead of just measuring what the climate is like today?

Warming is also uneven. Land tends to warm faster than the ocean, and the Arctic is warming especially quickly. This is an important reminder: 'global warming' does not mean the exact same change everywhere. It means the whole climate system is gaining heat, while the local expression of that heat can differ from one region to another. Figure 2 summarises the main drivers in a simple classroom-friendly way.

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(Figure 2. The main causes behind the rise in global temperature, shown in simplified form.)



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Unit 3 - Extreme weather events: floods, droughts, heatwaves, storms

One of the hardest parts of climate science is understanding the link between long-term climate change and single weather events. A heatwave, a flood, or a storm always has more than one cause. Local geography, season, air pressure, winds, and ocean conditions all play a role. Even so, climate change can shift the odds; in other words, it does not cause every extreme event on its own, but it increases the likelihood of some kinds of extremes, especially heat extremes and some heavy rainfall events (Coumou & Rahmstorf, 2012). A warmer climate “loads the dice” so that some extreme events become more likely, more intense, or longer-lasting than they would have been in a cooler world (Seneviratne et al., 2021).

Teaching Tip!

When discussing extreme weather, avoid suggesting that every single event has one simple cause.

A helpful phrase is: “Climate change can increase the likelihood or intensity of some extreme events, but local conditions matter too.” This supports accurate understanding and also reduces oversimplification.

Possible Discussion Questions:

- Have you noticed any changes in the weather or seasons where you live? Have you noticed summers becoming hotter or winters becoming different than before?
- Have you ever experienced a very hot day, heavy rain, or a strong storm? What was it like?



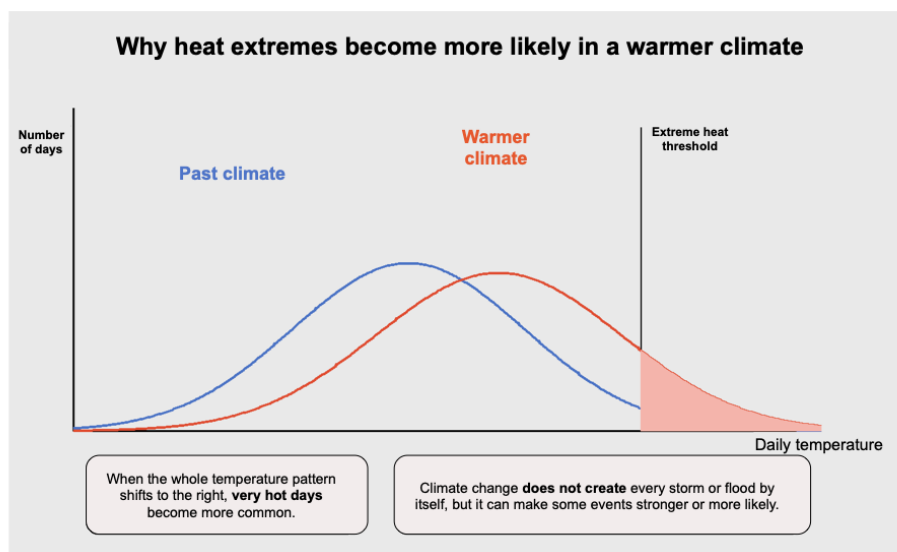
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Heatwaves are the clearest example. As average temperatures rise, hot days begin from a higher starting point. That makes record-breaking heat more likely. In many parts of the world, heat extremes have already become more frequent and more severe. This matters not only because heat is uncomfortable, but because it affects health, crops, water demand, transport, and learning conditions in schools (IPCC, 2021; Seneviratne et al., 2021).

Heavy rainfall can also become stronger in many regions because warmer air can hold more moisture. When conditions trigger rain, there may be more water available to fall in a short time, which raises the risk of flash floods and overflow in rivers or urban drainage systems. Droughts are more complex, because they depend not only on rainfall but also on temperature, soil moisture, evaporation, and water use. In some places, higher temperatures dry soils faster and make drought conditions worse even when rainfall does not decrease dramatically (Seneviratne et al., 2021).

Storms are another area where climate change can raise risks, though not always in the same way everywhere. Warmer seas can provide more energy to some intense storms, and sea-level rise makes coastal storm surges more damaging because the water starts from a higher level. The key idea is this: climate change does not mean every day is a disaster, but it increases the chance that some events will cross dangerous thresholds. Figure 3 helps explain why heat extremes become more common when the whole temperature pattern shifts toward warmer conditions.

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(Figure 3. A warmer climate shifts the temperature pattern, making extreme heat more likely.)



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Unit 4 - Ecosystem impacts: biodiversity loss, shifting species, ocean acidification

Climate change affects ecosystems because plants and animals are closely tied to temperature, rainfall, seasons, and the chemistry of air and water. When these background conditions change, living things react to these changes: some species move toward cooler areas, often poleward or uphill; some change the timing of important life events, such as flowering, breeding, or migration; others struggle to adapt quickly enough, especially if they already live in very specific habitats or if roads, cities, farms, and other barriers block their movement (Pecl et al., 2017).

This is one reason biodiversity loss becomes a climate issue. Biodiversity means the variety of life in an area: different plants, animals, fungi, and microorganisms, and the relationships between them. If species disappear or become badly out of sync with one another, ecosystems can weaken. A plant may flower earlier than usual, for example, but the insects that pollinate it may not be active yet. Fish may move into cooler waters, while the communities that depend on them for food or work remain in the same place. In this way, ecological changes can quickly become social changes too (Pecl et al., 2017; IPCC, 2022).

Teaching Tip!

When discussing biodiversity, use sensitive, age-appropriate wording.

You may find it helpful to say: “Some animals and plants are becoming harder to find in nature.” “Certain species are losing the places where they live.” “Biodiversity is changing, and people can help protect it.” “Some animals need extra care because their habitats are sensitive to climate, and with climate changes these habitats are disappearing.”

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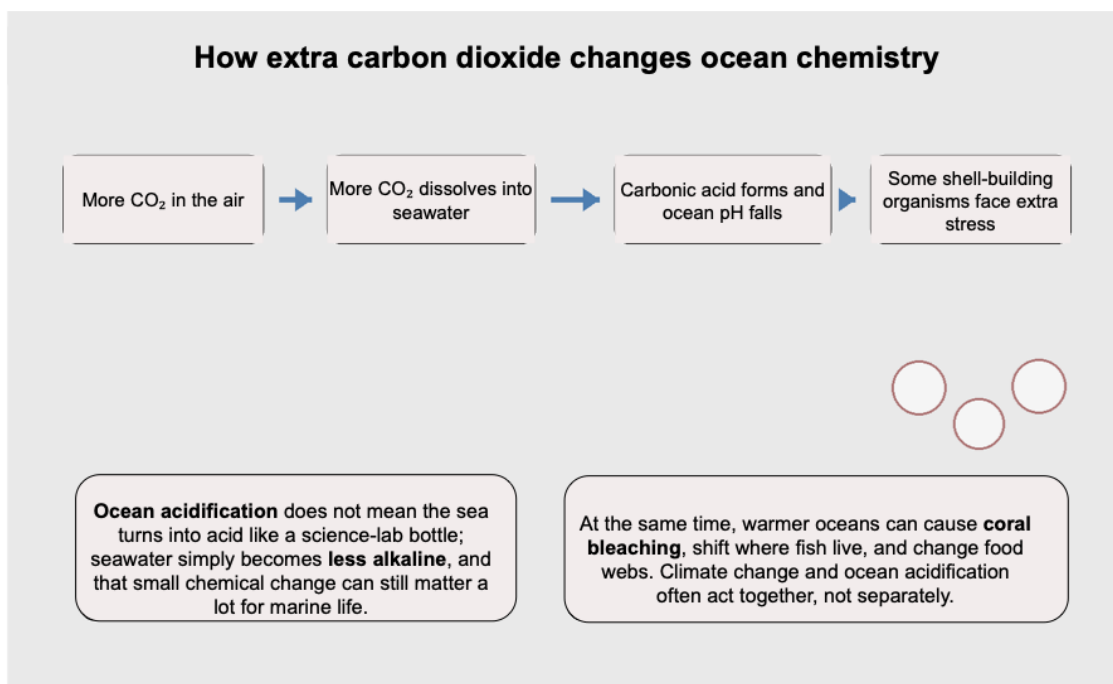
The ocean shows another important impact: ocean acidification. When extra carbon dioxide from the atmosphere dissolves in seawater, it changes the chemistry of the water and lowers its pH. The sea does not become 'acid' in the everyday sense, but it becomes less alkaline, and that small shift can make life more difficult for corals, shellfish, and plankton that build shells or skeletons from calcium carbonate. Ocean warming and ocean acidification often happen together, which means marine organisms can face several kinds of stress at the same time (Doney et al., 2009; Cooley et al., 2022).

Possible Discussion Questions:

- Have you noticed any changes in nature locally—for example in plants, insects, birds, or water levels?
- Why might some species find it harder to live in the same place if temperatures, seasons, or rainfall change?

The main message is not only that climate change harms nature, but that people are part of these ecosystems too. Healthy ecosystems help regulate water, support food production, store carbon, protect coastlines, and provide places for recreation and cultural life. When ecosystems are damaged, these benefits become less reliable. Figure 4 shows the basic chemistry behind ocean acidification in a simple step-by-step form.

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(Figure 4. Extra carbon dioxide changes ocean chemistry and can add stress to marine life.)



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Classroom activities

The activities below can be used separately or as a short sequence. Together they move pupils from reading evidence, to observing their own surroundings, to discussing local consequences and responses.

Teachers are encouraged to adapt examples and datasets to their own country, region or municipality. Throughout the activities, a sensitive approach is recommended: some pupils may already associate climate change with fear, loss or uncertainty, so the emphasis should remain on understanding, discussion and constructive action.

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Activity 1 - Graph Detective: Reading Climate Futures

Subject or subjects	Science, Geography, Mathematics, ICT (Possible extension: Language learning and Citizenship Education.)
Age/Level	This activity is suited for students aged 11–15.
Time required	60 minutes (one classroom period).
Learning goals	At the end of the activity students will be able to: • identify the difference between observed data and projected data; • read the axes, trend and key message of a simple climate graph; • compare two emissions pathways and explain why they diverge over time; • support a claim with evidence from a graph and state one limit of that evidence; connect a global graph to one realistic local effect for school or community life.
Prior knowledge & skills	Students should already know the difference between weather and climate. They should also have basic experience with line graphs (axis, unit, trend, highest and lowest value).
Materials, resources & settings	Classroom or online setting. Use the ready-made materials included in this document: • Exercise Graph A: Global temperature change, 2000–2024; • Exercise Graph B: Number of very hot days per year in a fictional town, two pathways; • Graph Detective question card; • Claim-test grid; • exit ticket sentence starters. Teachers will also need: projector or printed copies, pencils/highlighters, and one answer sheet per group.



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Community/Stakeholder Involvement (optional)

Optional: a local meteorological service, or municipal climate office, may bring one local graph after the class has first practised with the exercise graphs provided here.

Activity description

Step 1: Fast warm-up (5 minutes). Project Exercise Graph A. Ask three quick questions exactly in this order: “What is on the horizontal axis?”, “What is on the vertical axis?”, and “What is the main pattern you notice in one sentence?” Do not correct immediately; collect several answers first.

Step 2: Small-group detective work (15 minutes). Put students in groups of 3 or 4. Give each group Exercise Graph A and the Graph Detective question card. Each group must answer Questions 1–6 on the card. Require students to point to evidence on the graph when they speak.

Step 3: Observed or projected? (10 minutes). Hand out Exercise Graph B. Ask students to underline the clue that tells them this is a projection rather than an observation. Then ask them to compare the two pathways and complete the sentence: “The two futures stay fairly similar until about ..., then they”

Step 4: Claim-test grid (10 minutes). Each group writes three statements: one supported claim, one uncertain claim, and one claim the graph does not allow them to make. Example sentence frames are provided below. This step gives the activity direction: students must move beyond simply reading and into judging claims carefully.

Step 5: Local bridge (10 minutes). Give each group one local decision card: hotter classrooms, water use, sports day safety, or urban trees. They must connect one graph result to one local consequence and one practical response. Each group presents a 30-second evidence-based conclusion.

Step 6: Exit ticket (5 minutes). Students complete two prompts: “One thing the graph clearly shows is ...” and “One thing I should be careful not to assume is ...”.

Accessibility & Inclusion

Provide large-print graph copies and read the axes aloud before group work starts. Students may answer by speaking, writing, using sticky notes, or recording a short audio explanation. Mixed-ability groups work well if roles are shared clearly: axis reader, evidence finder, sentence writer, presenter.

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References / Bibliography	Teacher-created exercise graphs and question cards for Module 2. Teachers who want to extend the lesson may later compare the class answers with real graphs from Copernicus, NASA Climate, or the IPCC.
Assessment	
Formative Assessment	Monitor whether students read axes correctly, separate observation from projection, and support claims by preferring evidence over guesswork. Use the answer key and claim-test grid to see where confusion appears.
Summative Assessment (if applicable)	Each group submits one completed claim-test grid and one short “local bridge” statement linking the graph to a local effect and one response.
Student Self-Assessment	Students rate themselves from 1 to 3 on three statements: “I can read the axes correctly”; “I can describe a trend”; “I can explain one thing a graph does not tell us”.
Peer Feedback	Tell-Ask-Give Feedback Protocol. (Link: https://letstalkscience.ca/educational-resources/teaching-stem/tag-feedback)
Documentation, Evidence & Follow-Up	
Evidence to Collect	Completed question cards, claim-test grids, exit tickets, and one photographed or scanned group sheet.
Impact Tracking	Useful indicators: students stop calling a projection a “prediction”; they mention evidence from axes and time span; they can explain why two scenarios separate over time.
Dissemination	Display the strongest annotated graphs on a noticeboard or school website during a climate week.
Next Steps	Use the local decision cards as a bridge to Activity 3, where students must choose responses to concrete climate-risk situations.
Teacher Reflection	

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Which graph was easier for students to read?

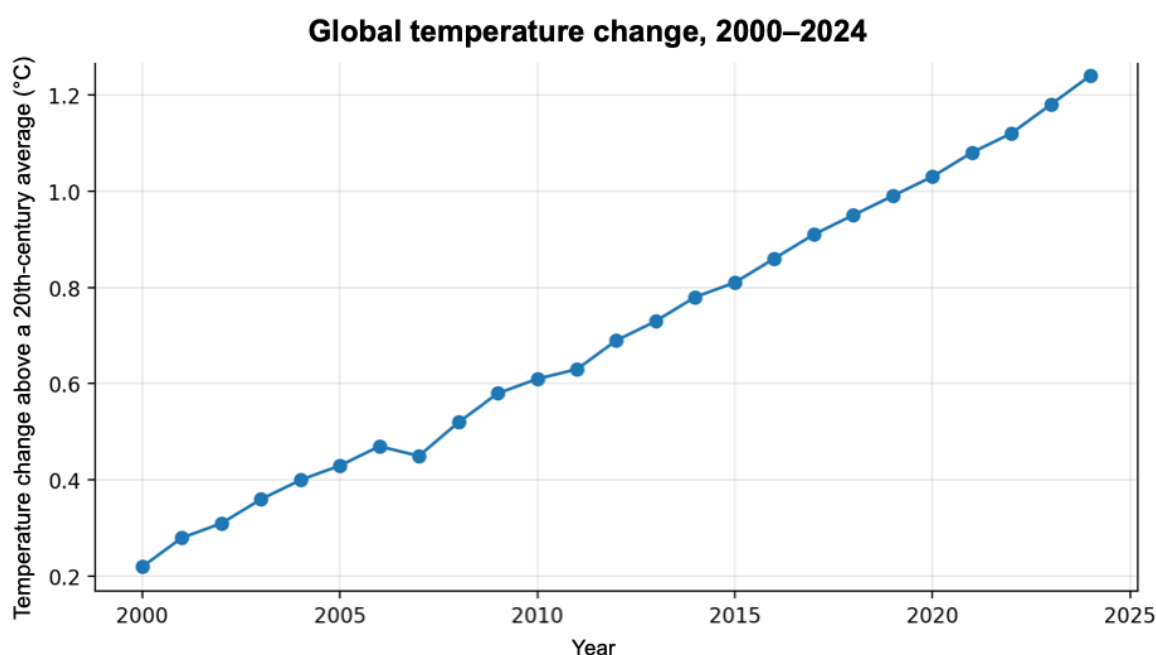
Did groups move beyond description and begin to test claims?

Which local decision card produced the strongest discussion?

Ready-to-use materials for Activity 1

Teacher note: The two graphs below are classroom exercise graphs. They are intentionally simple so students can practise reading trends and comparing pathways before they meet real-world graphs.

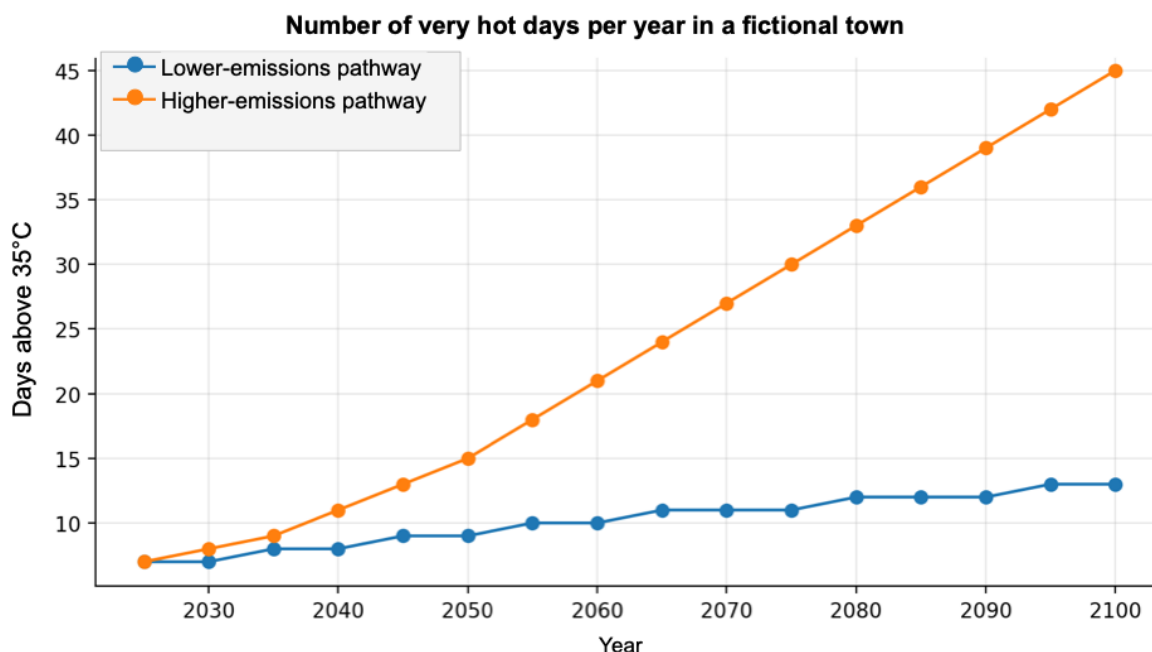
Exercise Graph A



(Figure A1. Exercise graph for observed temperature change.)

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Exercise Graph B



(Figure A2. Exercise graph for two future pathways.)

Graph Detective question card

Question	Student response space
1. What variable is shown on the vertical axis?	
2. What time period is shown on the horizontal axis?	
3. Is this graph showing observations, projections, or both? How do you know?	
4. Write one sentence that begins: "The main trend is ..."	
5. Write one sentence that begins: "One thing the graph does not tell us is ..."	



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6. What local effect could this trend have for our school or town?	
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Claim-test grid (teacher can print one copy per group)

Supported claim	Uncertain claim / needs more evidence	Claim not supported by the graph
Example: “The higher-emissions pathway shows more very hot days by the end of the century.”	Example: “Our town will definitely have exactly 45 very hot days in 2100.”	Example: “This graph proves what the weather will be on one specific day in 2085.”

Teacher answer guide

- Graph A is observed data: the period is 2000–2024 and the overall pattern is upward, even though individual years vary.
- Graph B is projected data: students should notice two pathways and the growing separation later in the century.
- Accept more than one local connection if it is evidence-based: hotter classrooms, more water use, safer sports scheduling, more shade planning, urban heat, or pressure on local vegetation.



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Activity 2 - Local Climate Diary and Historical Comparison

Subject or subjects	Science, Geography, Mathematics, Language learning, ICT (Possible extension: Art, Citizenship Education and Biology.)
Age/Level	This activity is suited for students aged 10–15 and can be run either as a one-week observation task or as a one-lesson simulation using the sample materials included here.
Time required	Option A: one 30-minute launch, 7 days of short observations, and one 45-minute follow-up lesson. Option B (ready-to-run one-lesson version): 60 minutes using the sample diary and comparison chart in this document.
Learning goals	At the end of the activity students will be able to: • record local weather conditions in a consistent way; • compare short-term observations with a longer-term average or sample historical record; • explain why one week of weather is not the same as climate; • identify one local effect on school life, biodiversity or comfort; propose one realistic adaptation measure for the school or neighbourhood.
Prior knowledge & skills	Students should know common weather terms such as temperature, rainfall, wind, cloud cover, shade and evaporation. No advanced data work is required.
Materials, resources & settings	Classroom plus optional outdoor observation. Use the ready-made materials included in this document: • printable Local Climate Diary sheet; • sample completed 7-day diary; • exercise comparison chart: school-week temperatures versus long-term average; • claim-sorting statements; • school response prompt. Optional materials: thermometer, phone camera, clipboards, pencils, and a simple map of the school grounds.



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Community/Stakeholder Involvement (optional)

Optional: school gardener, caretaker, local park ranger, or municipal climate office can comment on heat, shade, drainage, water use, or local species changes after students have completed the basic activity.

Activity description

Step 1: Choose the version (2 minutes). Teachers may run Option A with real observations over 7 days, or Option B immediately with the completed sample diary provided below, so that the activity is usable even when no local dataset has been prepared in advance.

Step 2: Observe or read the diary (10–15 minutes). If using Option A, students record conditions at the same time each day using the diary sheet. If using Option B, groups receive the completed sample diary and highlight the warmest day, the wettest day, and one note about how the weather affected people or nature.

Step 3: Compare with the longer pattern (10 minutes). Show the exercise comparison chart. Students answer: On which days is the sample week warmer than the long-term average? By how much? What pattern appears across the week?

Step 4: Sort claims carefully (10 minutes). Give groups three statement cards: one supported by the evidence, one possible but not proven, and one not supported. Example: “This week was warmer than the long-term average” is supported; “Climate change caused every event in this week” is not supported. This step makes the task more precise and avoids vague conclusions.

Step 5: Produce action from evidence (10 minutes). Give each group the school response prompt: “If our school experienced more weeks like this, what should change first?” Students choose one practical response such as more shade, water refill points, rain gardens, native plants, or changed sports schedules. They must justify the choice with one piece of diary evidence and one piece of comparison evidence.

Step 6: Share and compare (8–10 minutes). Groups present their chosen response in one minute. The class then votes on which response is most useful, most affordable, and most inclusive.

Accessibility & Inclusion

Students may record observations using words, icons, colours, or photos. Group roles can rotate: observer, recorder, photographer, presenter. For students who find outdoor work difficult, the ready-to-run sample diary provides full participation without disadvantage.



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References / Bibliography	Teacher-created diary template, exercise comparison chart, and claim-sorting statements for Module 2. Teachers who wish to extend the activity may later compare it with national meteorological service summaries or local adaptation plans.
Assessment	
Formative Assessment	Monitor whether students record observations consistently, compare the sample week with the longer pattern accurately, and avoid over-claiming from one short dataset.
Summative Assessment (if applicable)	Each group submits one completed response card with: one evidence-based observation, one cautious conclusion, and one school adaptation proposal.
Student Self-Assessment	Students finish the sentence: "One thing a short diary can show is ..." and "One thing a short diary cannot prove by itself is ...".
Peer Feedback	<u>Tell-Ask-Give</u> Feedback Protocol. (Link: https://letstalkscience.ca/educational-resources/teaching-stem/tag-feedback)
Documentation, Evidence & Follow-Up	
Evidence to Collect	Diary sheets, highlighted comparison charts, claim-sort decisions, and final response cards.
Impact Tracking	Useful indicators: students become more precise about weather versus climate; they begin to notice schoolyard factors such as shade, hard surfaces, soil dryness, or standing water; they learn to turn complaint into practical response.
Dissemination	The final school-response cards can be displayed during a science fair.
Next Steps	Repeat the activity in another season or compare two locations around the school, such as the asphalt yard and the shaded green area.
Teacher Reflection	



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The following questions can help guide teacher self-reflection:

Was Option A or Option B a better fit for the class? Did students understand the difference between a short observation and a climate conclusion? Which adaptation ideas were both realistic and inclusive?

Ready-to-use materials for Activity 2

Teacher note: This activity includes both a blank diary sheet and a completed sample set. The completed set allows the activity to work immediately in one lesson.

Printable Local Climate Diary sheet

Date	Time	Temp.	Sky	Rain	Wind	Nature note	People/place note

Sample completed diary (for the one-lesson version)

Date	Time	Temp.	Sky	Rain	Wind	Nature note	People/place note



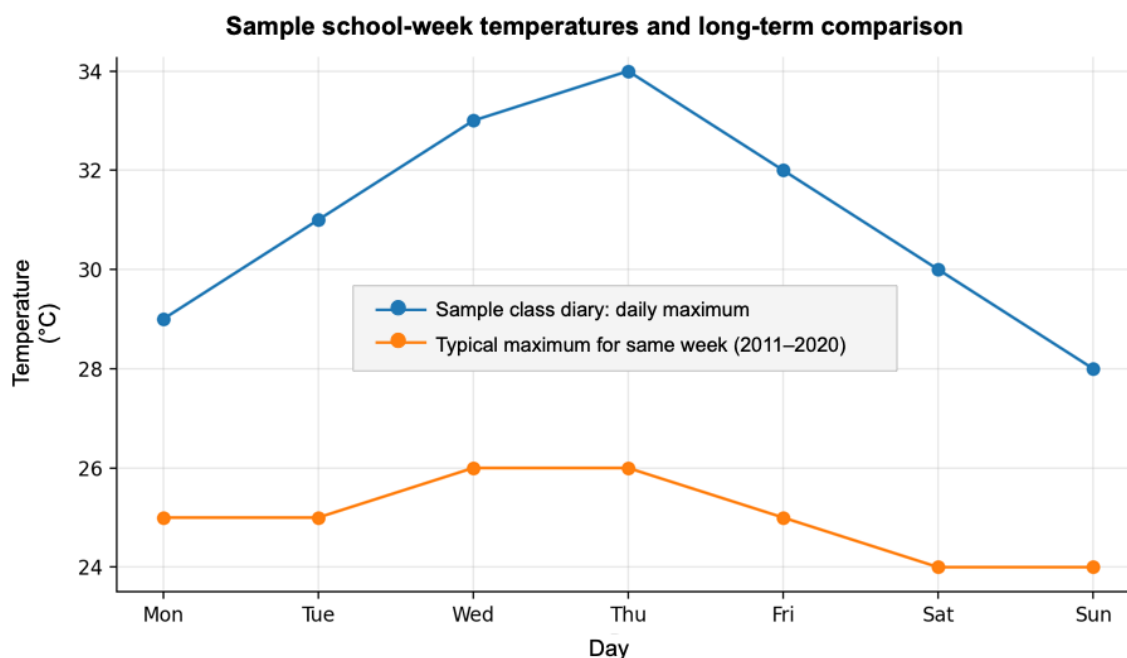
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Mon	12:30	29°C	Sunny	0 mm	Light	Dry grass near fence	Shaded bench used more than sunny benches
Tue	12:30	31°C	Sunny	0 mm	Light	Bee activity near flowers	Two students refilled water bottles twice
Wed	12:30	33°C	Sunny	0 mm	Very light	Soil dry in planters	PE lesson moved to a shaded area
Thu	12:30	34°C	Sunny	0 mm	Light	Leaves drooping in one planter	Classroom felt stuffy after lunch
Fri	12:30	32°C	Cloudy later	2 mm	Moderate	Dust on asphalt before short rain	Windows opened during lesson
Sat	12:30	30°C	Cloudy	8 mm	Moderate	Puddles near drain after rain	Football area partly unusable

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Sun	12:30	28°C	Rainy	14 mm	Moderate	Wet soil and standing water	Path near gate slippery
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Exercise comparison chart



(Figure A3. Sample school-week temperatures compared with a longer-term average.)

Claim-sorting statements

- Supported: “This sample week was warmer than the long-term average on every day shown in the chart.”
- Possible but not proven: “If weeks like this become more common, the school may need more shade and water access.”
- Not supported: “This single week proves exactly how the climate will change in our town.”

School response prompt

Choose one response for the school. Your group must include one piece of diary evidence and one piece of chart evidence in your answer.



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Possible response	Why it might help	Who benefits most?
Plant or protect shaded areas	Reduces heat stress in outdoor spaces	Students during breaks, sports groups, staff on duty
Add water refill points	Helps during hotter periods	All students, especially those active outdoors
Create a rain garden / improve drainage	Reduces puddles and runoff after intense rain	Students near entrances and paths
Use more native and drought-tolerant plants	Needs less water and supports biodiversity	School garden, insects, maintenance staff

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Activity 3 - Escape the Forecast: Global vs Local Impacts Challenge	
Subject or subjects	Science, Geography, Citizenship Education, Language learning, ICT (Possible extension: Drama or Design and Technology.)
Age/Level	This activity is suited for students aged 10–14.
Time required	60 minutes (can be shortened to 45 minutes by using three stations instead of four).
Learning goals	At the end of the activity students will be able to: - connect climate risks with likely local effects on health, infrastructure, water or biodiversity; - choose between adaptation and mitigation responses and justify that choice; - work collaboratively under time pressure while sharing roles fairly; - recognise that climate impacts and solutions are shaped by place, vulnerability and resources; use evidence from Module 2 in a gamified but purposeful way.
Prior knowledge & skills	Students should know basic terms from the module: heatwave, heavy rainfall, drought, biodiversity, mitigation, adaptation, projection and vulnerable groups.
Materials, resources & settings	Classroom or online setting. Use the ready-made materials included in this document: - four station cards with scenario, choices and local-layer question; - one team answer sheet; - one teacher answer key; - one final “Town Council Challenge” card; - a timer and one envelope (real or digital) for the final code. No extra research is needed; all clues are provided below.



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Community/Stakeholder Involvement (optional)	Optional: student council member, municipal officer, or civil protection volunteer, may listen to the final proposals after the class game is complete.
Activity description	
Step 1: Set the mission (5 minutes). Tell students: “Your team must unlock the final envelope by solving four climate-risk stations. Each correct station gives you one letter. When you have all four letters, you can open the final challenge.” Assign roles: reader, recorder, timekeeper, spokesperson. Step 2: Station round (20 minutes). Teams move through the four station cards provided below: Heatwave at School, Sudden Downpour, Dry Summer, and Water-Life Stress. At each station they must choose the best response from three options and answer one local-layer question. Step 3: Teacher check and code letters (10 minutes). After each station, the teacher quickly checks the answer using the key below and gives the team one code letter. Step 4: Final envelope: Town Council Challenge (10 minutes). The code spells CARE. Teams open the final card and must choose two actions for their school or town: one adaptation and one mitigation measure, with a total budget of 6 tokens. They must explain who benefits, who might still be left out, and why the pair of actions works together. Step 5: Present and defend (10 minutes). Each team has one minute to present its two chosen actions. The class votes on which team built the most balanced and realistic response. Step 6: Debrief (5 minutes). End with three questions: Which impact felt closest to our lives? Which response was adaptation? Which response reduced future emissions?	
Accessibility & Inclusion	Provide printed, large-font versions of the station cards or audio versions if needed. Allow role rotation so that reading speed is not the same thing as success. If needed, use fewer stations and more thinking time. Encourage cooperative problem-solving rather than competition only.
References / Bibliography	Teacher-created station cards and final challenge for Module 2. The activity is inspired by EcoMystery’s escape-room logic but is fully classroom-ready in paper form.
Assessment	



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Formative Assessment	Monitor whether teams justify answers, share roles, and distinguish adaptation from mitigation. Listen especially for whether students notice vulnerable groups in their reasoning.
Summative Assessment (if applicable)	A completed answer sheet plus a short final proposal for the Town Council Challenge can be used as the assessed product.
Student Self-Assessment	Students tick three statements: “I contributed evidence”; “I listened to others”; “I can now name one adaptation and one mitigation action”.
Peer Feedback	Tell-Ask-Give Feedback Protocol. (Link: https://letstalkscience.ca/educational-resources/teaching-stem/tag-feedback)
Documentation, Evidence & Follow-Up	
Evidence to Collect	Team answer sheets, final challenge choices, and one short recorded or written explanation per team.
Impact Tracking	Useful indicators: students connect climate risk to practical choices; they stop using “solution” as a single vague word and instead name concrete actions; they recognise that different groups are not affected in the same way.
Dissemination	The best station cards or student-made extra cards can be re-used during an open day, EcoMystery event or school climate week.
Next Steps	Invite students to design a fifth station based on a real issue in their own community.
Teacher Reflection	
The following questions can help guide teacher self-reflection: Did the gamified structure deepen understanding or create hurry without reflection? Which station produced the strongest discussion? Were quieter students able to contribute meaningfully?	



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Ready-to-use materials for Activity 3

Teacher note: Everything needed for the game is included below. Print the station cards, place them at four tables, and keep the answer key with you.

Station cards

Station 1: Heatwave at School

Forecast: 6 very hot days in a row, with afternoon temperatures above 35°C. Sports day is planned for 14:00 on the asphalt court.

A. Move activities to the early morning, provide shade and water refill points, and reduce strenuous outdoor time.

B. Keep the same timetable and tell students to try harder because summer is normal.

C. Plant trees next week and do nothing today.

Local-layer question: Which students might be affected first during a heatwave, and why?

Correct answer: A. Code letter: C

Station 2: Sudden Downpour

Scenario: 40 mm of rain falls in two hours. The school entrance area is mostly concrete and puddles quickly block the walkway.

A. Clear drains, add a rain garden or permeable surface, and keep one safe dry route open.

B. Add more concrete so water has nowhere to soak in.

C. Wait and hope the next storm goes somewhere else.

Local-layer question: Which places around our school already collect water after heavy rain?

Correct answer: A. Code letter: A



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Station 3: Dry Summer

Scenario: Five weeks of low rainfall. The school garden is stressed and the grass field is turning brown.

- A. Water at midday, keep thirsty plants only, and ignore leaking taps.
- B. Mulch soil, water early or late, fix leaks, and use more native or drought-tolerant plants.
- C. Cover the whole garden with artificial turf.

Local-layer question: Which school areas would stay useful in a dry summer, and which would struggle?

Correct answer: B. Code letter: R

Station 4: Water-Life Stress

Scenario: A nearby river or lake becomes warmer in summer and has lower oxygen levels. Fish and insects are under stress.

- A. Protect shaded banks, reduce pollution, and restore habitat near the water.
- B. Feed the fish more bread and leave the banks unshaded.
- C. Remove all riverside plants so the area looks tidier.

Local-layer question: Even if our town is not coastal, how can warmer water affect living things and people here?

Correct answer: A. Code letter: E

Team answer sheet

Station	Chosen answer	Why? (one sentence)	Local-layer answer	Code letter
1				
2				
3				



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4				
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Final Town Council Challenge

The code word is CARE. Once teams have all four letters, give them the table below. They must choose one adaptation action and one mitigation action. Total budget: 6 tokens.

Action	Type	Cost (tokens)	Who benefits?
Plant shade trees and protect shaded seating	Adaptation	3	Students outdoors, staff, biodiversity
Install water refill points	Adaptation	2	All students, especially during heat
Start a bike/walk-to-school campaign	Mitigation	1	Air quality, emissions, school community
Replace old lights with efficient LEDs	Mitigation	2	School budget, energy use, emissions
Add more parking spaces	Neither priority here	2	Limited short-term benefit, more sealed ground
Buy a diesel generator for routine use	Poor mitigation choice	3	Not suitable as a climate measure



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Winning-condition prompt

- Choose one adaptation and one mitigation action within 6 tokens.
- Write one sentence explaining why your pair works together.
- Name one group that benefits and one group you should still think about.
- Be ready to defend your choice in one minute.



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6 - Assessment and evaluation

Assessment in this module should be understood as a continuous and formative process. Progress has less to do with pupils being able to repeat definitions and more with being able to interpret evidence, explain relationships in simple terms, use climate vocabulary carefully, and connect scientific concepts to real-life situations. The practical activities already included in the module offer natural moments for observation, feedback, and reflection, so assessment can be integrated into teaching.

A variety of assessment methods should be used across the module. Teacher observation can be used during graph interpretation, pair discussions, and local problem-solving tasks. Short written responses, annotated graphs, exit tickets, oral explanations, mini-presentations, or photographed group outputs can all serve as evidence of learning.

Evaluation should cover both factual understanding and 21st century skills. In cognitive terms, pupils should show that they can explain the difference between weather and climate, recognise the role of greenhouse gases and human drivers, interpret a simple trend in a graph, and connect global climate processes with local effects. In skills terms, the module should also support critical thinking, collaboration, careful communication, and basic digital literacy where digital materials or projected resources are used. Pupils should be encouraged not merely to give answers, but to justify them with evidence and to listen to other interpretations before reaching conclusions.

Affective outcomes also matter in this topic. Teachers should pay attention to whether pupils are developing curiosity, caution in the face of simplified claims, and a sense that climate learning can lead to constructive action. In practice, this means noticing: Have pupils begun to distinguish between alarmist statements and evidence-based statements? Can they discuss local impacts without exaggeration? Do they respond to the topic with engagement or do they withdraw?



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Assessment criteria should be transparent and measurable. Suitable criteria for this module include: conceptual accuracy; correct use of evidence; clarity of explanation; ability to distinguish observation from projection; participation in group work; and the realism of any local link or proposed response. These criteria should be shared in simple classroom language. For example, pupils should know that strong work in this module is work that is clear, evidence-based, cautious about overclaiming, and connected to the question being discussed.

Feedback should be used to support growth, autonomy, and transfer. Rather than simply marking an answer as right or wrong, feedback should help pupils refine the way they read data, explain uncertainty, and apply what they have learned to everyday contexts such as school heat, water use, shade, or local biodiversity. A short teacher comment such as 'good evidence, but the conclusion is too certain' is more useful here than a simple mark. Over time, this kind of feedback helps pupils become more independent readers of climate information.



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Suggested assessment focus	What progress looks like
Conceptual understanding	Pupil explains key ideas accurately and distinguishes important pairs such as weather/climate or adaptation/mitigation.
Use of evidence	Pupil refers to graphs, case text, data, or planning information; does not rely on guesswork or unsupported claims.
21st century skills	Pupil collaborates, communicates clearly, listens to others, and contributes to shared problem-solving.
Affective development	Pupil shows engagement, caution about overclaiming, and a constructive sense that climate learning can connect to action.
Transfer to real life	Pupil can suggest a realistic school or community response and explain why it fits the local problem.



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7 - Student material

Student material for Module 2 should be directly usable during and after the lessons, and it should remain accessible to pupils who need repetition, support, or a slower route into the topic. The core student-facing material includes a short presentation that collects and organises the main ideas of the module in a clear visual form.

Alongside the presentation, pupils should have access to short explanatory notes written in simple language. These notes do not need to repeat the whole theoretical section; instead, they should summarise the most important ideas in a form pupils can revisit independently. A short glossary is especially useful for this module because several terms (e.g. greenhouse gas, forcing, projection, heatwave, biodiversity and ocean acidification) can otherwise remain vague or be confused with everyday language.

The ready-to-use classroom materials already embedded in the practical part should also be treated as student material. These include the exercise graphs, the Graph Detective question card, the claim-test grid, the Local Climate Diary sheet, the sample completed diary, the comparison chart, the claim-sorting statements, the school-response prompt, and the station cards for the gamified activity. Where possible, these materials should be made available both in print and in simple digital form so that they can be reused for homework, revision, pair work, or support sessions.

Accessible learning materials are particularly important in this module. Large-print graph copies, read-aloud support, icon-based weather recording, simplified sentence starters, and oral alternatives to written answers should all be considered valid versions of student material. The purpose is to make sure that pupils who find scientific language or graph interpretation difficult still have a clear entry point into the module.

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8 - Extra resources / further learning materials

Resource	What it offers	Language note	Why it fits this module
ESA Teachers' Corner: Weather vs Climate	Classroom activities that help pupils distinguish weather from climate through observation, data collection, and simple analysis.	English	Useful as a follow-up or support resource for the weather–climate distinction at the start of the module.
ESA Teachers' Corner: Nose up high in the sky	A practical weather-observation activity in which pupils build or use simple tools to observe local weather conditions.	English	Supports the local diary and observation logic developed in Activity 2.
EU Learning Corner: EU Climate Action	Short student-friendly videos on causes and consequences of climate change, EU climate action, and related topics.	English on this page; many Learning Corner items are available in several EU languages	Useful for brief recap, homework, or extension with older pupils.
EU Learning Corner: Climate action board game / 2050: It's up to you	Interactive climate material that links climate impacts, adaptation, and action in a simplified format.	Available in all EU languages for some items	Useful when the teacher wants a lighter revision activity after the core module.
GreenComp: The European sustainability competence framework	European reference framework describing sustainability competences such as systems thinking, futures literacy, and responsibility.	English	Useful for teachers who want to align climate learning with broader competence development.



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Track Your Atmosphere (Erasmus+ project result platform)	An Erasmus+ project entry focused on open educational resources for environmental and digital competences.	Project-platform entry in English	Included as an Erasmus+ example that may help teachers look for further classroom-ready outputs.
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