CLIMATE CHANGE

Resources For Teachers of Key Stages 1-5

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CLIMATE EDUCATION PRINCIPLES

UNESCO, the Department for Education, the Met Office and the Royal Meteorological Society broadly agree that climate education should be:

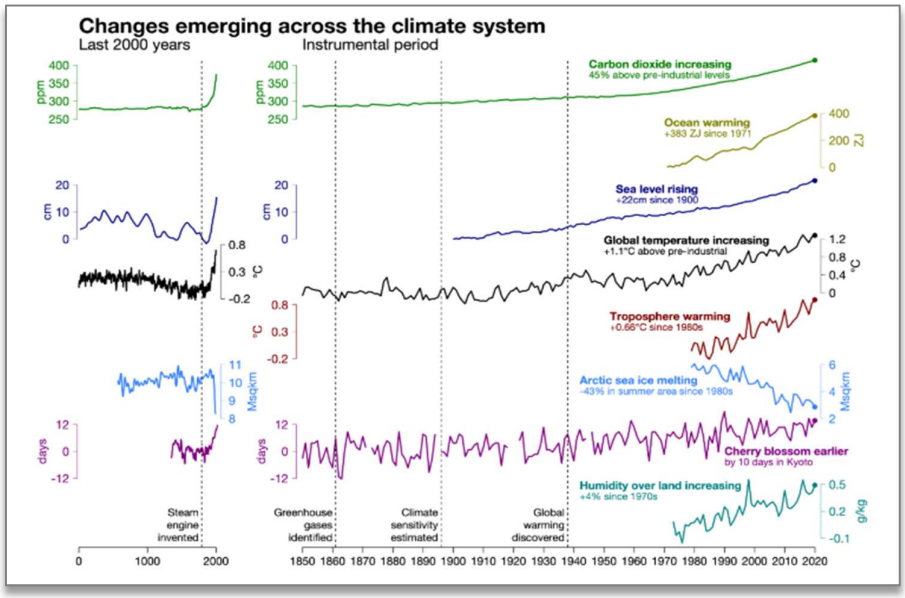
- **Age-appropriate:** matched to pupils' development and prior knowledge.
- **Evidence-based:** grounded in accurate science and reliable data.
- **Interdisciplinary:** connected across subjects.
- **Relevant:** linked to local and global examples.
- **Enquiry-led:** built around investigation and real-world problem-solving.
- **Solutions-focused:** balanced between climate impacts and practical responses.

Teaching should help pupils evaluate evidence, compare viewpoints and understand uncertainty, building knowledge and agency without increasing anxiety.

OVERVIEW OF CLIMATE CHANGE FOR TEACHERS

How scientists know the climate is changing

Scientists use a range of long-term measurements to track changes across the climate system. Taken together, these indicators show that the atmosphere, oceans, ice, ecosystems and weather patterns are changing in connected ways.



The chart summarises key climate indicators, including atmospheric carbon dioxide, ocean heat content, sea level, surface temperature, lower-troposphere temperature, Arctic sea ice, Kyoto cherry blossom dates and land humidity. It also marks important milestones in climate science, from James Watt's steam engine to early discoveries about greenhouse gases and global warming.

Forecast climate effects for the UK

UK Climate outlook

The Met Office coordinates UK climate projections. Overall, the UK is expected to experience:

- warmer, wetter winters;

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- hotter, drier summers; and
- more frequent and more intense weather extremes.

Familiar weather patterns will still occur, but some are likely to become more intense or less predictable. The scale of future change will depend on global emissions and climate policy.

Projected changes by 2070

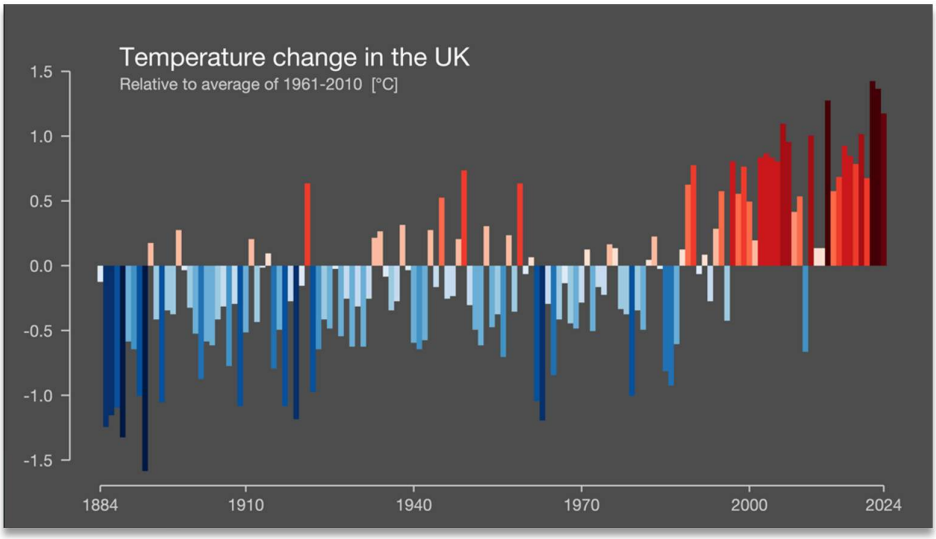
Compared with the UK climate of the 1990s, projections suggest:

- **Winter temperature and rainfall:** winters could be 1–4.5°C warmer and up to 30% wetter.
- **Rainfall intensity:** rainfall could become up to 20% more intense in summer and 25% more intense in winter.
- **Summer temperature and rainfall:** summers could be 1–6°C warmer and, depending on the region, up to 60% drier.
- **Extreme heat:** hot summer days could be 4–7°C warmer. Exceeding 40°C could become as likely as exceeding 32°C was 30 years ago, with average hot summer days in southern regions potentially reaching 40°C.

What the forecast could mean locally

1. Rising temperatures

The trend towards a warmer climate is expected to continue. The extent of warming will depend on whether global temperature rise is limited to 1.5°C, reaches 2°C, or increases further.



Ed Hawkins of Reading University's 'warming stripe' graphics are visual representations of the change in temperature as measured in the UK over the past 100+ years. Each stripe or bar represents the temperature averaged over a year. The stripes turn from mainly blue (colder) to mainly red (warmer) in more recent years, illustrating the rise in average temperatures. The graphic illustrates how recent years have been relatively warmer than the average of 1961-2010.[i]

Annual average temperatures: Average temperatures are expected to rise, especially in summer, making hotter summers and milder winters more likely in southern England.

Summer and winter temperature changes: By the 2050s, under higher emissions scenarios, average summer temperatures in southern England could rise by 2–3°C, or more in warmer scenarios. Winters are also expected to warm, though by less.

2. More Frequent Heatwaves

Longer, hotter summers are likely, increasing the risk of drought, water restrictions and heat-related health impacts.

More extreme summer events: As temperatures rise, heatwaves may become more frequent and intense, bringing longer periods of hot summer weather.

Prolonged heat and drought could increase the risk of grass and wildfires. Repeated heatwaves may also place woodlands under stress, making some established native species less viable in the local area.

Heat Stress: Longer heatwaves could increase heat-related illness and strain infrastructure, particularly during very hot spells. Vulnerable groups, including people who are ill, elderly people and very young children, may face a higher risk of serious health impacts. Medical services could come under greater pressure from heatstroke, sunburn and other heat-related conditions, increasing the need for better shelter and protection.

Working outdoors could become unsafe during extreme heat, leading to changes in working patterns.

Road surfaces can reach around 50°C even when air temperatures are only in the 20s, because dark asphalt absorbs and stores heat. As high temperatures become more common, bitumen may soften and rise to the surface, making roads sticky and more vulnerable to damage from heavy vehicles, including ridging, rutting and potholes. Road impacts are therefore likely to become more frequent.

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Unexpected Events: During prolonged heatwaves, ponds, lakes and streams could dry up, with serious consequences for the wildlife and farm animals that depend on them.

Sudden summer storms in hot weather could lead to sewage discharges into streams. Warmer water holds less oxygen and can encourage algal blooms, while lower river levels reduce dilution. Even where water bodies do not dry out, low water and oxygen levels may mean fish and amphibians need rescuing.

High temperatures could make electricity lines and rail tracks more likely to fail or buckle, increasing the risk of power cuts and travel disruption. During dry spells, litter and weeds could also block gullies and ditches, creating flood problems when rain returns.

3. Changing Rainfall Patterns

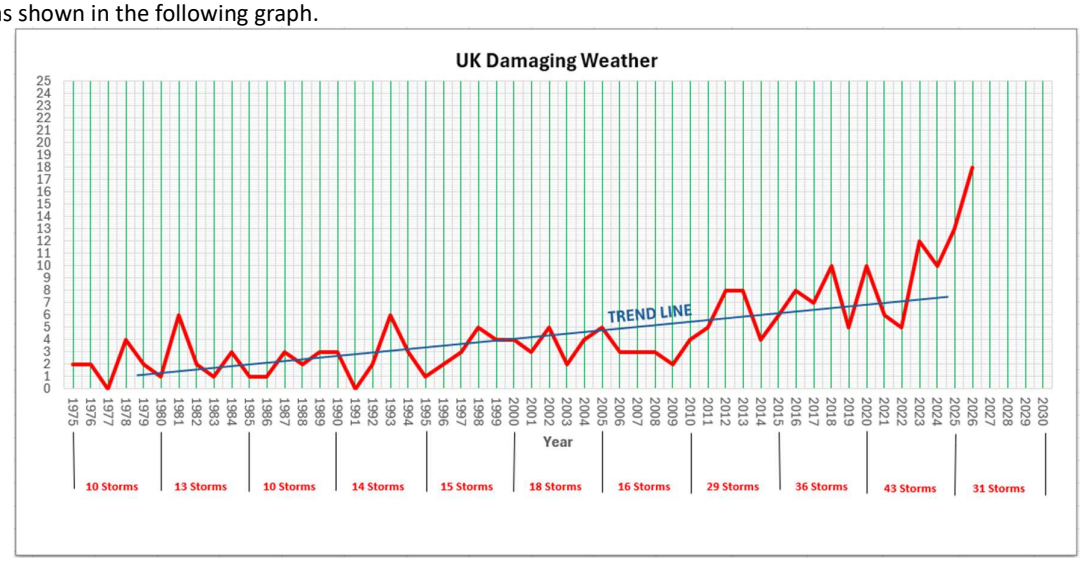
Hotter, drier summers will not rule out heavy rain. Sudden summer storms on baked ground can increase the risk of flash flooding, sometimes in unexpected places.

Drier summers: Rainfall in southern England may become more erratic, with drier summers and a greater risk of drought. Longer dry spells could put pressure on water supplies and lead to restrictions.

During prolonged hot weather, the clay beneath much of the land in southern England could dry out and shrink, causing subsidence to buildings and roads. Ground movement could also damage underground pipes and cables, increasing maintenance needs and insurance costs.

Increased stormy weather

Damaging weather patterns were stable until around 2010, when the number of damaging events in each five-year period rose sharply, as shown in the following graph.



This graph was drawn up by FFRG and shows in 5-year blocks how weather events that cause damage have been changing. Publicly available information on storms is difficult to source prior to 2010 so, as best as we can, we have blended data from the Met Office Storm Centre,[ii] with the personal records of Professor Trevor Harley.[iii]

Wetter winters: Winter rainfall is expected to increase, raising flood risk, especially in towns and villages with poor drainage or older Victorian combined sewers built for smaller populations and fewer roads.

More intense rainfall: Rainfall is also likely to become heavier, with longer rainstorms that could cause localised flooding and make surface-water runoff harder to manage.

4. Increased Risk of Flooding

Flooding from heavy rain: Increased winter rainfall and heavier short bursts of rain are expected to raise the flood risk, especially in low-lying communities and areas near rivers, streams and brooks.

Urban flooding: More development and impermeable surfaces such as concrete and tarmac could make heavy rainfall harder to absorb and increase flood impacts.

5. Changes to Ecosystems and Agriculture

Shift in growing seasons: Warmer temperatures may lengthen growing seasons, but more erratic weather, including droughts and excessive rainfall, could create challenges and increase risks to food security.

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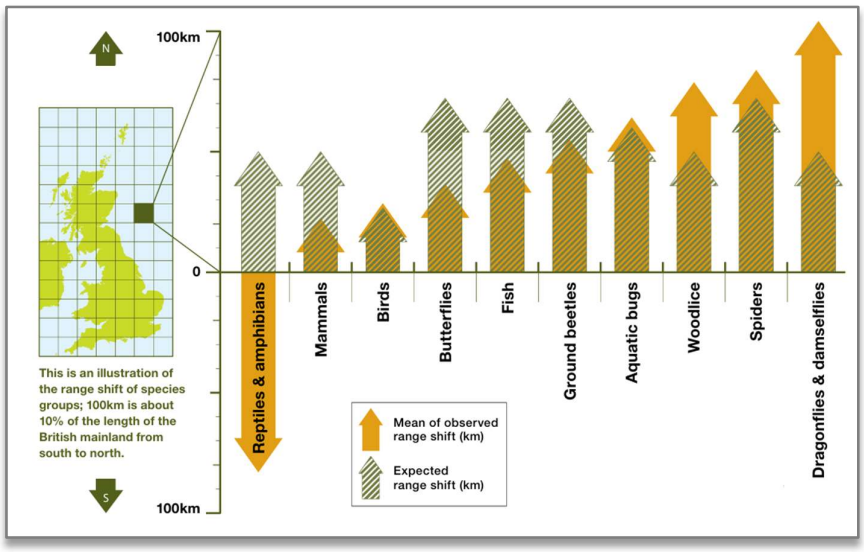

This chart illustrates data on the mean observed shifts in northern range margin for a range of species studied within species groups (Hickling R. et al 2006. Global Change Biology, 12, 450-455) across 20–25-year timescales spanning 1960-2000 alongside data on the expected range shift of these species groups across the same timescale responding to current levels of climate change (Chen I-C et al 2011. Science, 333, 1024-1026). This is to show whether species groups are keeping up with their expected range shifts using this data and to highlight that it is not just changes in climate that species must deal with, other issues affect species ability to keep pace with what is expected.[iv]

Wild species that are able to move are likely to continue shifting northwards. Native species that cannot move, or move too slowly, may find it harder to survive in local conditions.

Biodiversity risks: Local ecosystems may change as some species fail to adapt quickly enough while others thrive, potentially disrupting biodiversity.

If insects adapt to seasonal change faster than their predators, species such as amphibians, bats, fish, and birds may struggle to keep pace. Reduced predation could allow some insects to swarm, while already vulnerable species, including some butterflies, could disappear if conditions remain unsuitable over several years.

Climate change could increase biodiversity loss and allow invasive species better suited to new conditions to become established locally.

6. Future Projections (2050s, 2080s)

Medium-high emissions scenario (RCP8.5): If emissions remain high, average temperatures could rise by about 4°C by the 2080s, with the greatest warming in summer. Winters may warm by around 2.5°C.

Low emissions scenario (RCP2.6): If emissions fall sharply, warming would be lower but still noticeable, with summer temperatures potentially rising by about 2°C by the 2080s.

7. Wind Patterns

Changes in winds: Although wind changes are likely to be less marked than shifts in temperature or rainfall, stronger and more damaging winds may become more common, especially during winter storms as a warmer atmosphere holds more energy.

WHAT IT MEANS FOR YOUR SCHOOL

As weather becomes less predictable, schools should prepare for more frequent hot and wet conditions.

The UK government's 2025 overheating assessment shows that some schools already experience 1–2 days a year where indoor temperatures reach 35°C, a level at which learning becomes "very difficult." Under a +4°C global warming scenario, this could rise to 7–8 days per year without adaptation.

Possible impacts include the following:

Hot weather

- **Cognitive performance**: High temperatures reduce concentration, test performance, and behaviour regulation. Children are more vulnerable to heat stress than adults.
- **Health impacts**: Fainting, vomiting, dehydration, and heat exhaustion were reported during UK heatwaves, with more than 1,000 schools closing during a June 2026 event.
- **Infrastructure limitations:** Many schools lack air-conditioning, have restricted window openings, poor blinds, and heat-absorbing tarmac playgrounds.
- **Outdoor learning disruption**
- **Reduced water availability** for hygiene, kitchens, and sports facilities.

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- **Other:** hot weather can disrupt journeys to and from school; is a greater risk of fire caused by wildfire embers igniting leaf residue in gutters or flammable materials stored against buildings; and cause more frequent power cuts that reduce available teaching time.

Wet weather

- **Building damage**: Floodwater can enter classrooms, damage flooring, electrics, and teaching materials.
- **Drainage overload**: Gutters, downpipes, and school drainage systems are often undersized for modern rainfall extremes.
- **Site-level vulnerability**: Many schools have large impermeable surfaces (tarmac, concrete) that increase runoff and localised flooding.
- **Learning disruption**: Flooded buildings can close for days or weeks, affecting attendance and exam schedules.
- **Higher indoor humidity** during wet periods increases mould risk, especially in older buildings.
- **Need for water-efficient fixtures** and landscaping.
- **Other**: Disrupted travel through flash flooding or storm damage; pupils required to shelter indoors more often; weaknesses in school buildings through water ingress revealed.

CLIMATE CHANGE LESSON PLANNING, STRATEGIES AND GLOSSARY BY KEY STAGE

Using the key-stage guidance

Each key-stage section is designed to help teachers move quickly from curriculum intent to practical lesson planning. Use the guidance to identify the most relevant subject link, focus on a small number of essential concepts, choose an age-appropriate enquiry question, and plan one practical or evidence-based activity. Each lesson should also include a clear learning outcome that pupils can revisit later.

A simple planning sequence can help keep climate learning embedded within existing schemes of work rather than added as a disconnected activity:

1. Check pupils' prior knowledge.
2. Introduce the essential vocabulary.
3. Set an enquiry question.
4. Teach the subject content.
5. Use evidence, fieldwork or practical investigation.
6. Set a pupil task.
7. Build in an assessment checkpoint.
8. Add an extension or follow-up action.

Curriculum progression from KS1 to KS5

Climate learning should build progressively across the key stages, moving from observation and care for the natural world towards evidence-based analysis, evaluation and informed action.

- **KS1 — Caring for our world:** pupils explore nature, seasons, weather, habitats and resources.
- **KS2 — Understanding change:** pupils study climate, ecosystems, resources, human impact and environmental change.
- **KS3 — Explaining climate change:** pupils develop understanding of the greenhouse effect, the carbon cycle, evidence, impacts and systems.
- **KS4 — Evaluating responses:** pupils evaluate evidence, mitigation, adaptation, policy, economics and ethics.
- **KS5 — Responding as a society:** students develop systems thinking, independent research and understanding of uncertainty, justice, policy, economics and technology.

Key Stages 1 & 2 (Ages 5–11)

DfE expectations for Key Stage 1 and Key Stage 2 compared:

Area	Key Stage 1 (Ages 5–7)	Key Stage 2 (Ages 7–11)
Overall approach	Early foundations	Developing understanding
Climate change teaching	Not taught directly	Introduced explicitly (mainly in geography & science)
Focus of learning	Weather, seasons, local environment	Climate, human impact, global issues
Level of complexity	Very simple, observational	More detailed, explanatory
Scientific understanding	Basic awareness of natural world	Causes and effects (e.g. human activity, pollution)
Geography content	Weather patterns, local area	Climate zones, environmental change, sustainability
Science content	Seasons, plants, animals, habitats	Earth processes, environments, human impact
Skills developed	Observing, asking questions	Explaining, reasoning, analysing
Environmental responsibility	Simple actions (e.g. caring for nature)	Understanding actions and their impact (e.g. reducing emissions)
Scale of thinking	Local and immediate	Local, national, and global

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Key Stage 1 (Ages 5–7) KS1

Simple ideas and basic vocabulary:

For teachers:

- Climate education should begin early and build progressively through school
- Teachers should give pupils basic understanding of the environment and sustainability
- Climate change is taught through existing subjects (not separately)

In simple terms:

This means building simple foundations rather than giving detailed scientific explanations.

Climate change should be introduced through children's interest in the natural world, avoiding complex science or worrying predictions. Pupils should learn the difference between weather and climate and understand that everyone can help care for the environment.

The aim is to build children's awareness, curiosity and care for nature, creating a foundation for later learning about environmental and climate issues.

Suggested KS1 curriculum strategy

Core knowledge

Pupils should develop understanding of:
- the natural world;
- seasons and weather;
- plants, animals and habitats;
- trees and vegetation;
- water;
- materials and resources;
- caring for living things;
- simple human impacts on environments.

The **KS1 geography curriculum** already includes seasonal and daily weather patterns, hot and cold areas, local environments and fieldwork**. KS1 science** also emphasises observation, questioning, classification, simple testing and gathering data. (GOV.UK)

Curriculum opportunities

Science: seasonal change, plants, animals, habitats, materials and everyday uses of electricity.
Geography: weather, seasons, local environments, places and landscapes, and human and physical features.
English: nature stories, poetry, persuasive writing, environmental vocabulary and non-fiction texts.
Maths: temperature, rainfall, species counts, simple graphs and measurement.
Art and design: natural materials, seasonal art and environmental sculpture.
Design and technology: bird feeders, bug hotels and recycled-material construction.

Example lessons
- **Our changing seasons:** pupils create a seasonal observation diary, recording temperature, rainfall, plants, animals, daylight and observed changes.
- **What does a tree do?** Pupils investigate how trees provide habitats, shade, cooling, food, beauty, protection from rain and carbon storage.
- **Wildlife detectives:** pupils survey the school grounds and identify living things and their habitats.
- **Where does our rubbish go?** Pupils follow a familiar object from purchase to disposal and explore reuse and recycling.

Authentic opportunities

Wildlife gardens, tree planting, bug hotels, weather stations, school nature maps, litter audits, gardening and outdoor learning.

Teacher planning prompts

Before teaching a KS1 lesson, decide what children will observe directly, what vocabulary they will use, and how they will record their findings through drawing, talk, simple tables, photographs or class displays. Keep the focus concrete, local and hopeful.

- Prior knowledge: seasons, weather, plants, animals, materials and familiar local places.
- Core vocabulary: weather, season, habitat, living thing, material, reuse, recycle, care.
- Lesson structure: observe, discuss, sort, record, explain and make one small improvement.
- Assessment: pupils can name what they observed and explain one-way people can care for the environment.

Outcome:

By the end of KS1, pupils should notice weather, seasons, plants and animals, and show awareness of the natural world. They should understand that their surroundings can change over time and begin to recognise how people's actions can help or harm the environment.

End-of-KS1 entitlement

Every pupil should be able to say: "I understand that I am part of the natural world and that people can help look after it."

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KS1 GLOSSARY KS1

Word	Child-friendly definition
Animals	Living creatures
Climate	The usual weather over a long time
Earth	The planet we live on
Environment	All the things together that surround animals and humans in the natural world, including the air, the water, and the soil
Ice	Frozen water, found at the North and South Poles
Pollution	Dirty air, water, or land
Recycle	Using things again instead of throwing them away
Sun	The star that gives us heat and light
Weather	What it's like outside (sunny, rainy, windy, snowy) each day

Key Stage 2 (Ages 7–11) KS2

Building understanding of causes and effects:

For teachers:

- Climate change and sustainability should be included in teaching and curriculum planning
- Teachers should receive training and CPD on climate education
- Schools should use high-quality, evidence-based resources shared by government and partners

In simple terms:

Teachers are expected to embed climate change across subjects and teach the scientific facts clearly and accurately.

Suggested KS2 curriculum strategy

Core knowledge

Pupils should progressively understand:
- climate zones and biomes;
- ecosystems;
- the water cycle;
- natural resources;
- energy and food systems;
- human impacts;
- environmental change;
- extreme weather;
- the difference between weather and climate.

The KS2 geography curriculum already includes climate zones, biomes, vegetation belts, rivers, mountains, the water cycle and the distribution of natural resources, including energy, food, minerals and water. (GOV.UK)

Curriculum opportunities

Science: habitats, food chains, the water cycle, adaptation, electricity, evolution and living things.
Geography: climate zones, biomes, rivers, coasts, natural resources, energy and human impact.
Maths: data collection, graphs, percentages, averages, measurement and comparison.
English: newspaper reports, persuasive speeches, non-fiction, environmental literature and research.
Computing: data collection, spreadsheets, graphs and data visualisation.
Design and technology: sustainable materials, repair, reuse and renewable energy design.
Religious education: stewardship, responsibility and environmental ethics.

Example lessons

- **Is our school getting hotter?** Pupils measure temperatures in grassed areas, concrete spaces, classrooms, shaded areas and playgrounds, then analyse differences and investigate the urban heat island effect.
- **Where does our food come from?** Pupils map the journey of a meal and investigate farming, transport, seasonality, packaging and waste.
- **Climate detectives:** pupils examine temperature records, rainfall data, photographs, glacier data, sea-level data and species observations, then identify what can be concluded from the evidence.
- **Flood-proof our community:** groups redesign a local area using trees, wetlands, permeable surfaces, sustainable drainage and flood barriers.

Authentic opportunities

School biodiversity surveys, food-growing projects, energy audits, sustainable travel surveys, river investigations, local environmental projects, climate newspapers and school eco-design challenges.

Teacher planning prompts

For KS2, lessons should help pupils connect observable environmental change with evidence. Plan opportunities for pupils to collect, compare and interpret simple data, then use that evidence to explain a local or global environmental issue.

- Prior knowledge: habitats, food chains, water cycle, climates, resources and human impact.

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- Core vocabulary: climate, biome, ecosystem, resource, impact, evidence, adaptation, renewable. **KS2**
- Lesson structure: question, investigate, record data, compare patterns, explain causes and suggest responses.
- Assessment: pupils can use evidence to explain an environmental change and identify a realistic action.

Outcome:

By the end of KS2, pupils should understand climate change, its causes and its effects. They should recognise how human actions, including energy use and deforestation, can harm the environment, and describe impacts such as changing weather, habitat loss and wildlife damage. They should also know simple ways to help, such as saving energy and reducing waste, and begin to explain how their choices can make a difference.

End-of-KS2 entitlement

Every pupil should be able to say: "I can explain that human activities can affect the environment and climate, use evidence to investigate change, and identify ways communities can respond."

KS2 GLOSSARY

Word	Child-friendly definition
Adaptation	When living things change over time so that they can survive in new conditions
Biodiversity	The variety of animal and plant life in any environment
Carbon Dioxide (CO_2)	A greenhouse gas released by burning fuels
Climate Change	Long-term changes in Earth's climate
Deforestation	Cutting down large areas of forest
Fossil Fuels	Coal, oil, and gas used to produce energy
Global Warming	The increase in the Earth's average temperature
Greenhouse Gases	Gases that help to trap heat in the atmosphere (e.g. carbon dioxide)
Habitat	The natural home of plants and animals
Renewable Energy	Energy produced by sources that won't run out (solar, wind)
Sea Level Rise	Oceans getting higher as ice melts
Sustainability	Being careful with our resources, so they are available for future generations, and we minimise or prevent harm to the environment.

Key Stages 3 & 4 (Ages 7–14)

DfE expectations for Key Stage 2 and Key Stage 3 compared:

Area	Key Stage 2 (Ages 7–11)	ey Stage 3 (Ages 11–14)
Overall aim	Build understanding	eepen and apply knowledge
Climate change teaching	Introduced explicitly	udied in more depth and detail
Focus of learning	Causes, effects, basic solutions	stems, processes, global impacts, and responses
Level of complexity	Simple explanations	More detailed, analytical understanding
Scientific understanding	Basic greenhouse effect (simple explanation)	ore detailed processes (e.g. carbon cycle, mospheric processes)
Geography content	Climate zones, environmental change, sustainability	imate systems, global warming, resource anagement
Science content	Human impact on environments	rth systems, energy, ecosystems, and human impact depth
Skills developed	Explain, describe, give examples	nalyse, evaluate, interpret data, form arguments
Use of evidence	Simple examples and observations	ata analysis, graphs, trends, and evidence-based asoning
Human–environment relationship	Understand impact of actions	aluate different viewpoints and long-term nsequences
Solutions and action	Identify simple actions (reduce, reuse, recycle)	Evaluate solutions (renewables, policies, global cooperation)
Scale of thinking	Local and global awareness	Strong global perspective and interconnections

Key Stage 3 (Ages 11–14) KS3

More scientific explanations:

For teachers:

- Develop a deeper understanding of climate change
- Learn scientific causes (e.g. carbon dioxide, atmosphere)
- Explore links between human and physical processes
- Understand global impacts on environments and societies
- Interpret data and evidence
- Evaluate different solutions and responses

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- Think critically about sustainability and human responsibility **KS3**

In simple terms:

Teachers should encourage a deeper, evidence-based understanding of climate change, including its causes, impacts, and possible responses, enabling pupils to analyse and evaluate environmental issues.

Outcome:

By the end of Key Stage 3, pupils should have a secure, evidence-based understanding of climate change, including its causes, impacts and links to human activity. They should be able to analyse data, explain connections between environmental systems and evaluate possible solutions. Pupils should also think critically about sustainability and recognise how individuals and society can respond to environmental challenges.

Suggested KS3 curriculum strategy

KS3 should provide the transition from general environmental awareness to rigorous climate literacy. The KS3 geography programme explicitly includes weather and climate, climate change from the Ice Age to the present, natural resources, and interactions between human activity, natural systems, environments and climate. (GOV.UK)

Core knowledge

Pupils should understand:
- the atmosphere;
- the natural and enhanced greenhouse effect;
- the carbon cycle;
- greenhouse gases;
- energy balance;
- evidence for climate change;
- human drivers;
- climate impacts and feedback;
- mitigation, adaptation and resilience;
- climate data.

Curriculum opportunities

Science: energy, carbon dioxide, combustion, photosynthesis, ecosystems and atmospheric processes.
Geography: climate systems, hazards, glaciation, coasts, rivers, resources, development and urbanisation.
Maths: statistics, rates of change, correlation, modelling and graph interpretation.
Computing: data analysis, modelling, visualisation and coding.
Design and technology: renewable energy, sustainable design, circular economy and materials.
Citizenship: democracy, policy, collective action and international cooperation.
Economics: externalities, market failure, government intervention, costs and benefits.

Example lessons

- **The greenhouse effect:** pupils model the difference between the natural greenhouse effect, which makes Earth habitable, and the enhanced greenhouse effect, which causes additional warming.
- **Follow a carbon atom:** pupils trace carbon through the atmosphere, plants, animals, soil, fossil fuels, combustion and back to the atmosphere.
- **Climate evidence courtroom:** pupils evaluate evidence for human influence on climate without presenting climate science as a false “two equal sides” debate.
- **Renewable energy challenge:** pupils design an energy system for a fictional community while balancing cost, reliability, emissions, biodiversity, landscape, energy security and public opinion.
- **Climate data laboratory:** pupils analyse real datasets and distinguish observation, correlation, causation, uncertainty and prediction.

Authentic opportunities

Energy monitoring, climate data clubs, local adaptation plans, biodiversity mapping, student climate conferences, renewable energy feasibility studies and community partnerships.
Teacher planning prompts

In KS3, teachers should plan for conceptual precision. Lessons should explicitly distinguish weather from climate, natural from enhanced greenhouse effect, observation from prediction, and correlation from causation. Use models, datasets and case studies to develop disciplinary understanding.

- **Prior knowledge**: ecosystems, atmosphere, energy transfer, resources, maps and graphs.
- **Core vocabulary**: greenhouse effect, carbon cycle, emissions, feedback, mitigation, adaptation, uncertainty.
- **Lesson structure**: introduce concept, model process, analyse evidence, address misconception and apply to a case study.
- **Assessment**: pupils can explain a climate process accurately and use evidence to support a conclusion.

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Outcome: KS3

By the end of Key Stage 3, pupils should have a secure, evidence-based understanding of climate change, including its causes, impacts and links to human activity. They should be able to analyse data, explain connections between environmental systems and evaluate possible solutions. Pupils should also think critically about sustainability and recognise how individuals and society can respond to environmental challenges.

End-of-KS3 entitlement

Every pupil should be able to say: "I understand the scientific basis of climate change, can evaluate evidence, and recognise that responding to climate change involves scientific, social, economic and political decisions."

KS3 GLOSSARY

Word	Child-friendly definition
Adaptation	Adjusting to the effects of climate change
Atmosphere	The layers of gases around Earth
Biodiversity	Variety of living things in an area
Carbon Cycle	The path that carbon follows through the atmosphere, oceans, soil, and plants and animals.
Carbon Footprint	The amount of CO_2 a person or activity produces
Climate Model	A computer simulation used to investigate future climate settings
Ecosystem	Living things interacting with their environment
Extreme Weather	Unusual or severe weather events
Greenhouse Effect	Heat trapped by gases in the atmosphere
Mitigation	Actions to reduce climate change
Ocean Acidification	Oceans becoming more acidic due to CO_2
Renewable Energy	Power that comes from perpetual natural sources, like the sun, wind, and water.
Sustainability	Being careful with our resources, so they are available for future generations, and we minimise or prevent harm to the environment.

Key Stage 4 (Ages 14–16) KS4

More detailed and analytical concepts:

DfE expectations for Key Stage 3 and Key Stage 4 compared:

Area	Key Stage 3 (Ages 11–14)	Key Stage 4 (Ages 14–16)
Overall aim	Build deeper understanding	Apply, evaluate, and prepare for exams (GCSE)
Climate change teaching	Taught across subjects in detail	Studied in depth through GCSE courses (e.g. geography science)
Focus of learning	Causes, systems, impacts	Detailed processes, consequences, and solutions
Level of complexity	Analytical understanding	Advanced, exam-level depth and precision
Scientific understanding	Atmosphere, CO_2, Earth systems	Detailed greenhouse effect, carbon cycle, energy trans
Geography content	Climate systems, environmental change	Climate change, resource management, sustainability case studies
Skills developed	Analyse, interpret data, explain	Evaluate, justify, argue, and apply knowledge to case studies
Use of evidence	Interpret graphs and trends	Use detailed data, case studies, and extended writing
Human–environment relationship	Understand interactions	Critically evaluate impacts, inequalities, and responsibilities
Solutions and action	Consider and evaluate solutions	Assess effectiveness of solutions (e.g. mitigation vs adaptation)
Scale of thinking	Global systems and interconnections	Global, national, and local case studies with depth
Assessment style	Teacher assessment	Formal GCSE assessment (exams and coursework wher applicable)

For teachers:

- Develop pupils detailed and critical understanding of climate change
- Teach key scientific processes (e.g. greenhouse effect, carbon cycle)
- Explore impacts at local, national, and global scales
- Use case studies and data to support learning
- Enable pupils to analyse and evaluate responses (e.g. mitigation and adaptation)
- Support pupils in applying knowledge to real-world contexts
- Encourage well-reasoned arguments and justified viewpoints on sustainability

In simple terms:

Teachers should build pupils' detailed understanding of climate change, including its scientific processes, impacts and global context. They should also help pupils analyse evidence, evaluate solutions and develop well-supported arguments about sustainability.

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Suggested KS4 curriculum strategy KS4

KS4 should deepen disciplinary understanding and develop pupils' ability to evaluate competing responses. The statutory KS1–4 framework includes science, geography, citizenship, computing, English, mathematics and other subjects through which climate learning can be embedded. (GOV.UK)

Subject opportunities

Science: greenhouse gases, atmospheric processes, energy transfer, carbon dioxide, combustion, climate evidence, environmental impacts, mitigation and adaptation.
Geography: climate hazards, vulnerability, development, resource management, energy, urbanisation, adaptation and inequality.
Mathematics: percentages, ratios, statistics, rates of change, exponential change, probability, modelling, misleading graphs and uncertainty.
English: scientific communication, journalism, speeches, political rhetoric, advertising and misinformation, leading to evidence-based communication for different audiences.
Citizenship: government policy, international agreements, climate justice, democratic participation, protest and collective responsibility.
Economics: externalities, carbon pricing, taxation, subsidies, regulation, green investment and transition costs.
Design and technology: low-energy products, repairable products, sustainable packaging, circular economy solutions and energy-efficient buildings.
Food: food systems, farming, food waste, seasonality, land use and food security.

Example lessons

- **Carbon budget challenge:** students design a pathway for a fictional country to reduce emissions while considering transport, homes, electricity, agriculture, industry and cost.
- **Should we build this?** Students evaluate a proposed infrastructure project through climate impact, jobs, biodiversity, economic benefits, local community and energy security.
- **Climate misinformation laboratory:** students assess claims using source reliability, evidence quality, methodology, correlation and causation, date and uncertainty.
- **Community adaptation plan:** students identify local risks and develop a realistic adaptation strategy.

Teacher planning prompts

At KS4, climate lessons should support examination specifications while developing evaluation. Plan tasks that require pupils to compare evidence, assess trade-offs, justify decisions and communicate conclusions clearly. Teachers should avoid presenting established climate science as a debate between equal scientific positions.

- Prior knowledge: greenhouse gases, energy, hazards, development, resource management and data interpretation.
- Core vocabulary: vulnerability, resilience, carbon budget, policy, adaptation, mitigation, trade-off, reliability.
- Lesson structure: retrieve key knowledge, analyse source material, compare options, evaluate consequences and write a justified response.
- Assessment: pupils can evaluate climate risks and responses using subject-specific evidence.

Outcome:

By the end of Key Stage 4, pupils should have a detailed, critical understanding of climate change, including its scientifically proven causes, impacts and global importance. They should be able to analyse data, apply knowledge to real-world case studies, and evaluate responses such as mitigation and adaptation. Pupils should also be capable of constructing evidence-based arguments, justify their views and show informed understanding of sustainability and environmental responsibility.

End-of-KS4 entitlement

Every pupil should be able to say: "I can use scientific and geographical evidence to evaluate climate risks, compare possible responses, and communicate an informed position on complex environmental issues."

KS4 GLOSSARY

Word	Child-friendly definition
Anthropogenic	Caused by human activity
Carbon Cycle	Movement of carbon through Earth systems
Climate Models	Computer simulations of climate systems
Feedback Loops	Processes that amplify or reduce changes
Albedo Effect	How much sunlight a surface reflects
Sustainability	Meeting needs without harming future generations
Decarbonisation	Reducing carbon emissions
Paris Agreement	International treaty to limit global warming
Net Zero	Balancing emissions with removal of carbon

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Key Stage 5 (Ages 16–18) KS5

Advanced and evaluative terminology:

DfE expectations for Key Stage 4 and Key Stage 5 compared:

A key difference is that Key Stage 4 follows a defined National Curriculum and GCSE framework, while Key Stage 5 (ages 16–18) has no single national curriculum. The DfE's climate strategy therefore focuses on progression to further study, green skills and careers, and a deeper understanding of sustainability.

Area	Key Stage 4 (Ages 14–16)	Key Stage 5 (Ages 16–18)
Overall aim	Develop a detailed understanding of climate change and sustainability	Develop deeper, more specialised knowledge and prepare students for further study, employment and green careers
Curriculum context	Climate change can be studied through GCSE subjects such as Geography and Science, alongside other subjects	No single national curriculum; climate change is developed through A levels, T Levels, vocational qualifications and other post-16 programmes
Knowledge	Understand causes, impacts and responses to climate change	Develop advanced and subject-specific understanding of climate and environmental issues
Scientific understanding	Study processes such as the greenhouse effect, carbon cycle and human impacts	Apply scientific knowledge to complex environmental systems, sustainability and climate solutions where relevant to the subject
Geographical understanding	Explore climate change through global, national and local case studies	Analyse complex relationships between climate, people, economies, resources and environments
Use of evidence	Interpret data, graphs, maps and case studies	Critically analyse research, data and evidence and assess reliability where appropriate
Critical thinking	Analyse and evaluate different causes, impacts and responses	Critically evaluate competing perspectives, policies, technologies and approaches to sustainability
Solutions	Understand and evaluate mitigation and adaptation strategies	Assess more complex approaches to decarbonisation, resilience, sustainability and the transition to a low-carbon economy
Practical application	Apply knowledge to real-world examples and case studies	Apply knowledge through research, practical work, projects, fieldwork or vocational contexts, depending on the course
Skills and careers	Begin to understand the importance of sustainability and future environmental challenges	Develop **green skills** and awareness of opportunities in sustainability-related and emerging green careers
Outcome	Students can explain, analyse and evaluate climate change using evidence	Students can apply specialist knowledge, critically evaluate complex environmental issues and use their knowledge to support further study or employment
Curriculum context	Climate change can be studied through GCSE subjects such as Geography and Science, alongside other subjects	No single national curriculum; climate change is developed through A levels, T Levels, vocational qualifications and other post-16 programmes

For teachers:

- Develop deeper, more specialised knowledge of climate change and sustainability.
- Encourage independent research, critical analysis and evaluation of evidence.
- Explore complex relationships between climate, ecosystems, society, resources and the economy.
- Evaluate mitigation, adaptation and decarbonisation strategies.
- Use current data, research, case studies and real-world issues to develop informed discussion.
- Develop green skills and environmental awareness relevant to further study and employment.
- Encourage students to form evidence-based arguments and critically evaluate different perspectives.

In simple terms:

Teachers should help students develop advanced understanding of climate change through independent research, critical evaluation of evidence, and applying knowledge to real-world sustainability issues and future careers.

Suggested KS5 curriculum strategy

KS5 should develop advanced systems thinking, research skills and independent judgement. The emphasis should shift from "What is climate change?" to "Given the evidence, how should societies respond?"

Curriculum opportunities

Geography: carbon cycles, water, hazards, globalisation, development, governance, sustainability.
Environmental science: ecosystems, biodiversity, pollution, energy, resources, conservation, climate systems.
Biology: ecosystems, adaptation, population dynamics, biodiversity, conservation.
Chemistry: atmospheric chemistry, fuels, materials, industrial processes, carbon capture.
Physics: energy, radiation, thermodynamics, electricity, efficiency.
Economics: externalities, market failure, public goods, carbon pricing, international economics.
Politics: environmental policy, international governance, climate diplomacy, political participation.
Business: sustainable supply chains, transition risk, green innovation, corporate responsibility.

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KS5 Climate Futures Lab KS5

Every sixth-form or college student should have the opportunity to undertake an interdisciplinary climate investigation.

Possible research questions include:
- Can our town become net zero?
- How should cities adapt to extreme heat?
- Should the UK expand nuclear power?
- How can aviation decarbonise?
- Who should pay for climate adaptation?
- What should a sustainable food system look like?
- How should energy security be balanced with decarbonisation?
- Can economic growth continue while emissions fall?

Students complete:
- a research question;
- an evidence review;
- data analysis;
- stakeholder analysis;
- options appraisal;
- a recommendation;
- evaluation of uncertainty.

Possible outcomes include a policy briefing, research paper, documentary, exhibition, consultancy report, presentation, business proposal or prototype.

Teacher planning prompts

At KS5, planning should emphasise independent enquiry, disciplinary depth and informed judgement. Teachers should define the research frame clearly, provide high-quality evidence sources, teach students how to handle uncertainty, and require students to justify recommendations against competing criteria.

- Prior knowledge: climate systems, subject-specific theory, research methods, data analysis and argument construction.
- Core vocabulary: systems thinking, uncertainty, scenario, stakeholder, transition, justice, risk, resilience.
- Lesson structure: frame problem, review evidence, analyse data, compare stakeholder perspectives, appraise options and defend a recommendation.
- Assessment: students can produce a reasoned, evidence-based response to a complex climate question.

Outcome:

By the end of Key Stage 5, students should demonstrate a sophisticated and critical understanding of climate change, including its scientific, social, and economic dimensions. They should be able to independently analyse and evaluate complex evidence, apply their knowledge to real-world contexts, and assess the effectiveness of different solutions. Students are expected to construct well-informed, evidence-based arguments and show readiness for further study, employment, or careers linked to sustainability and the low-carbon economy.

End-of-KS5 entitlement

Every learner should be able to say: “I can independently research a climate-related problem, evaluate evidence and uncertainty, consider competing interests, and develop a justified response.”

KS5 GLOSSARY

Word	Child-friendly definition
Radiative Forcing	Change in energy balance in Earth’s atmosphere
Carbon Sequestration	Storing carbon in forests, soil, or underground
Tipping Point	Critical threshold causing major change
Geoengineering	Large-scale interventions to alter climate
Climate Justice	Fair treatment of people affected by climate change
Resilience	Ability to cope with climate impacts
Emission Scenarios	Predictions of future emissions
Intergovernmental Panel on Climate Change (IPCC)	Global scientific body assessing climate science

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CLIMATE CHANGE RESOURCES FOR TEACHERS

COLOUR KEY
Government & Public Bodies (Black)
Research Organisations & Academic Centres (Purple)
International Think Tanks & NGOs (Red)
International Bodies Used By The UK Government (Green)
Other (Orange)

- **Agriculture and Horticulture Development Board (AHDB):** https://projectblue.blob.core.windows.net/media/Default/Environment/Climate_Change_Report%20(ARP4)%20250218_WEB.pdf
- **Carbon Brief:** https://www.carbonbrief.org/
- **The Centre for Climate Change Economics and Policy:** https://www.cccep.ac.uk/
- **The Energy & Climate Intelligence Unit:** https://eciu.net/
- **Grantham Institute:** https://www.imperial.ac.uk/grantham/
- **The Green Alliance:** https://green-alliance.org.uk/
- **The Guardian Interactive:** How Climate Change Is Putting The Worlds Food In Peril. https://www.theguardian.com/environment/ng-interactive/2025/dec/18/how-climate-breakdown-is-putting-the-worlds-food-in-peril-in-maps-and-charts
- **The Intergovernmental Panel on Climate Change.** https://www.ipcc.ch/
- **Living With Environmental Change (LWEC) partnership.** The Biodiversity Report Card 2015. https://www.ukri.org/wp-content/uploads/2021/12/101221-NERC-LWEC-BiodiversityClimateChangeImpacts-ReportCard2015-English.pdf
- **Met Office Education:** https://weather.metoffice.gov.uk/learn-about/met-office-for-schools
- **Met Hadley Centre for Climate Science and Services:** https://weather.metoffice.gov.uk/climate/met-office-hadley-centre
- **Met Office Storm Centre:** https://weather.metoffice.gov.uk/warnings-and-advice/uk-storm-centre
- **Natural England.** The Climate Change Adaptation Manual 2020. https://publications.naturalengland.org.uk/publication/5679197848862720
- **The Natural History Museum:** https://www.nhm.ac.uk/schools/teaching-resources.html
- **The Royal Geographical Society:** https://www.rgs.org/schools/resources-for-schools
- **The Royal Society:** https://royalsociety.org/news-resources/projects/climate-change-evidence-causes/
- **RSPB:** https://www.rspb.org.uk/helping-nature/what-we-do/education-and-inspiring-the-next-generation
- **Save Our Wild Isles:** https://www.saveourwildisles.org.uk/schools/schools-resources
- **Tyndall Centre.** https://tyndall.ac.uk/
- **United Kingdon Centre for Ecology and Hydrology.** https://www.ceh.ac.uk/strategy2030/building-resilience-changing-climate
- **United Kingdom Climate Change Committee (UKCCC):** https://www.theccc.org.uk/
- **United Kingdom Climate Risk (UKCR):** https://www.ukclimaterisk.org/
- **United Kingdom Health Security Agency:** Health Effects of Climate Change in the UK, Report 2023. https://assets.publishing.service.gov.uk/media/659ff6a93308d200131fbe78/HECC-report-2023-overview.pdf
- **United Nations Climate Change Committee (UNCCC):** https://unfccc.int/
- **University of Reading:** Professor Ed Hawkins. https://www.climateassembly.uk/about/meetings/january-24/professor-ed-hawkins-university-reading-impacts-climate-change/
- **Woodland Trust:** https://www.woodlandtrust.org.uk/support-us/act/your-school/resources/
- **WWF:** https://www.wwf.org.uk/get-involved/schools

This Guidance is brought to you by the Future Flood Resilience Group and the Vale of White Horse District Council Climate Action Fund.

DISCLAIMER

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[i] © University of Reading, Ed Hawkins, National Centre for Atmospheric Science.

[ii] UK Storm Centre - Met Office

[iii] Trevor Harley, Emeritus Professor of Psychology at the University of Dundee, Extreme Weather, by Month, Extreme weather in Britain by month

[iv] 101221-NERC-LWEC-BiodiversityClimateChangeImpacts-ReportCard2015-English.pdf