

7.3 Theme 3: Resources and the environment

This theme introduces students to studies in the use of resources and their impact on the environment. The theme focuses on issues related to human use of and reliance on the environment. The theme draws on studies in many areas, including physical, economic and political studies.

The complex nature of this relationship is explored in the focus units. Focus unit 7 explores the broad physical relationships that underpin all interactions between systems within the environment, particularly on a regional or global scale, irrespective of political and economic boundaries. Focus unit 8 examines the management of resources sustainably within the environment, often on a local scale. Elective units may explore other issues related to resources and environmental management.

The understanding of environmental issues encourages students to consider the cultural perceptions of resources and environments and the role of political entities in the management of and decision making about these environments.

Key ideas for the introduction to Theme 3

Students should develop some knowledge and understanding of the following key ideas to provide a context within the theme for the focus and elective units.

1. The world's physical environment is composed of systems — atmosphere, (e.g. nitrogen, carbon cycles), biosphere, lithosphere, hydrosphere — that are not separate entities but interact upon each other and have a profound effect on human existence. The systems are dynamic, constantly changing in response to natural processes and human activity.
2. The development of resources is essential to our social and economic wellbeing, but this needs to be balanced against harmful impacts on the natural environment and the potential impact on the quality of life of some people.
3. Individuals and groups have an important role to play in influencing decision makers and in participating in wise management of resources for environmental sustainability.
4. Resource management problems are often difficult to resolve, especially when there are conflicting social, economic and political values within a society and there may be changes in these values over time.
5. The concept of a resource varies over time and between different societies.

Focus units

There are two focus units for Theme 3, at least one of which must be selected for study (see Section 5). Focus units must:

- be allocated a minimum of six and a maximum of ten weeks
- assist students to meet the general objectives of the syllabus
- develop geographical skills
- employ the key questions of geographical inquiry (see Section 6)
- develop the key ideas from the focus unit(s) selected for study, through the selection of appropriate case studies.

Focus unit 5: Living with climate change

Rationale

This unit introduces students to the geographical study of physical systems and specifically to the study of the atmosphere. These systems (atmosphere, biosphere, lithosphere and hydrosphere) are fundamental to the operation of all interactions within the environment, particularly on a regional and global scale.

The geographical investigation of climate change requires an understanding of the structure and patterns of circulation of the global atmosphere. It looks at the natural and human processes that affect the atmospheric system and the resulting changes that can occur. These changes in turn have implications for the nature and pattern of human activities in relation to social, economic and political responses. The consequences of the interactions should be explained and understood.

This unit provides a focus for the study of issues that have implications for human activities and future management.

Key questions

Learning experiences based on this unit involve students in the active investigation of the key questions.

Application of the key questions to Focus unit 5	
What and where are the issues or patterns being studied?	What is climate change? Where is climate change happening? What are the patterns that provide evidence that climate change is occurring?
How and why do these issues and patterns develop?	What are the physical, economic, social and political processes operating that cause climate change? How is climate change occurring? Why is climate change occurring?
What are the impacts of these patterns and issues?	What are the possible social, environmental, economic and political consequences of climate change? How can the impacts of climate change be prioritised?
What is being done or what could be done to sustainably manage these impacts?	Who will make the decisions about managing the impacts and consequences of climate change? How should individuals/communities and governments respond to these issues?

Key ideas

The investigation of these key questions should lead to an understanding and consideration of the following key geographical ideas, using the case studies selected by the school:

- The earth's climate system is influenced by a range of systems (atmosphere, biosphere, hydrosphere, and lithosphere) that have observable processes.
- The earth's climate system has demonstrably changed on both global and regional scales since the pre-industrial era, with some of these changes attributable to human activities.
- These changes can be mapped and observed through a number of indicators: concentration of greenhouse gases, weather (temperatures, temperature range, hot days/heat index, cold/frost days, precipitation, frequency of drought).

- Human activities have increased the atmospheric concentrations of greenhouse gases and aerosols since the pre-industrial era.
- Key biophysical indicators of climate change are sea level changes, duration of ice cover on rivers and lakes, Arctic Sea ice extent and thickness, non-polar glaciers, snow cover, permafrost, El Niño events, growing season, plant and animal ranges, breeding, flowering, migration and coral reef bleaching.
- Rising sea levels are of global significance because of population distributions around low-lying coastal communities and river deltas. Rising sea levels affect food production and drinking water because of salt water intrusion, and therefore have an impact on the quality of human life.
- Observed changes in regional sea levels and their impacts on ecosystems are linked with the increased risk of extinction of some vulnerable species.
- The basis for determining the effect of climate change will depend on the local nature of climate change and the adaptive and mitigating capacity of the region. For example, populations who inhabit small islands and/or low-lying coastal areas are a particular risk of severe social and economic effects from sea level rise and storm surges.
- Resources critical to island and coastal populations such as beaches, fresh water, fisheries, coral reefs and atolls, and wildlife habitat will be at risk from rising sea levels — also necessitating a shift in tourist destinations.
- Rising sea levels are projected to increase threats to human health (loss of life in floods and storms), particularly in lower-income populations, mostly in tropical and subtropical countries.
- The projected rate and magnitude of climate change can be lessened by reducing greenhouse gas emissions. There is a range of strategies: reducing energy use from fossil fuel sources, carbon trading, sequestration, land use, better forestry practices, and fuel cell technology.
- Adaptation is a necessary strategy at all scales to complement the reduction of greenhouse gas emissions — involving risk assessment and management.
- Grassroots strategies have been successful in drawing attention to climate change, such as “think globally, act locally”.
- Cooperation between governments can result in the removal of barriers preventing the introduction of low emission technology (Kyoto Protocol, Asia Pacific Summit).

Sample learning experiences

- Analyse data and hypothesise about future effects of higher maximum temperatures on communities.
- Investigate the patterns and processes evident in different systems that influence climate. Create diagrams or flowcharts to illustrate the processes.
- Read and draw diagrams, maps, tables and charts that reflect these patterns and distributions of the biophysical indicators of climate change.
- Collect newspaper and other media reports about alternative energy use and the impacts of climate change for sharing and class discussion.
- Survey community and class attitudes to the use of renewable resources and emission reduction.
- Construct a rising sea level/climate change consequences wheel for food and water resources, ecosystems and biodiversity, human settlements and human health.
- Investigate the mitigation capacity of different regions (compare and contrast).

- Gather data associated with the effects of heat waves on older people, livestock, shifts in tourist destinations, electric cooling demand, and decreased reliability of electricity supply.
- Construct a decision-making matrix between alternatives for emission reduction and apply appropriate criteria (social, environmental political implications).
- Construct a table that compares and contrasts resourcing in the North and in the South in terms of strategies for adaptation in London (River Thames Tidal Barrier), Bangladesh, Maldives, Pacific Islands (Tuvalu, Kiribati), Senegal, New York, New Orleans, Venice, Florida and the Atlantic Coast.
- Compare and contrast the adaptive capacity of Tuvalu/Bangladesh and New Orleans.
- SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis of local councils' decisions around the implementation of energy efficient housing.

Developing a unit of work for Focus unit 5

Table 8 provides an example of how a unit of work might be developed for Focus unit 5. The case studies and the learning experiences suggested in the sample unit are examples only. The sample unit contributes to the requirements for a course of study as outlined in Section 5.

The study of this sample unit should be contextualised by drawing on a selection of different scales of study (one of these scales may be two or three lessons in the form of an introduction):

- global, e.g. global dimming, changes in ocean currents, incidence of extreme weather events, Kyoto Protocol and USA response
- national, e.g. energy usage and carbon dioxide emissions, alternative energy strategies and national policy
- regional, e.g. environmental changes and responses in Europe, environmental refugees from the Pacific Islands
- local, e.g. danger of rising sea levels causing flooding in London, energy use in the home.

Table 8: Sample unit of work for Focus unit 5: Living with climate change — Environmental changes and responses in Europe

Key questions for the sample unit	Suggested time and scale	Thinking skills, linked to common curriculum elements	Learning experiences	Geographical skills
1. What evidence is there that climate change is occurring in Europe?	3–4 hours Regional (Europe)	Comprehend and collect Structure and sequence	Investigate the physical systems of the earth Identify the physical components of the European region Investigate the changes in the atmospheric system (temperature, precipitation) and its interaction with other physical systems in Europe Examine the role ocean currents play in distributing energy from atmospheric systems Discuss and debate the possibility of the changes being linked to long-term climate change or to natural fluctuations in physical cycles	Retrieving information from a variety of sources including internet, atlas Interpreting tables and graphs Manipulation of data to reveal patterns and trends
2. What activities and factors are contributing to the process of climate change?	3–4 hours Europe Local	Analyse, assess and conclude	Design a flowchart that illustrates energy processes associated with climate change Research information on energy usage, types and carbon dioxide emissions for the EU and selected countries Compare energy patterns with data on climate change Compare these patterns with Australia, low economically developed countries and medium economically developed countries	Construction of flowcharts Interpreting data Creating choropleth maps Construction of graphs
3. What are the environmental, social, economic and political consequences of climate change?	3–4 hours Europe	Analyse, assess and conclude	Construct a consequences wheel of the effects of climate change on food and water resources, human health, human settlements and ecosystems, and biodiversity Research impacts identified in Europe including changes in glaciers, snow cover, biodiversity, river discharge/flooding, crop yield and human health Compare and contrast consequences in richer western Europe to those in poorer eastern Europe	Developing and applying skills in GIS Construction of a consequences wheel Interpreting graphs and tables Researching on the internet
4. What strategies could be adopted individually, locally, nationally and globally to combat the problem of climate change?	3–4 hours Europe Local	Create and present Analyse, assess and conclude	Investigate alternative energy sources and energy conservation in Europe Compare to Australian situation Consider the support from Europe for the Kyoto Protocol versus opposition from USA and Australia Evaluate the strategy of “think global, act local” Identify areas where Australians can make individual or community changes to reduce greenhouse gas emissions Evaluate these strategies in terms of cost, lifestyle change and likelihood of success of widespread adoption	Interviewing and gathering information from the community Developing a willingness to participate in actions that ensure a sustainable future Developing the ability to clarify personal values in relation to environmental and social issues

Assessment technique: Report on attitudes and responses to energy usage and conservation as applied to transportation and domestic use in the local area, applying criteria 2, 3 and 4.

**GEOGRAPHY
SENIOR SYLLABUS**