

SYLLABUS

Cambridge IGCSE®
Environmental Management
0680

For examination in June and November 2016

Changes to syllabus for 2016

This syllabus has been updated, but there are no significant changes.

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1. Introduction

1.1 Why choose Cambridge?

Recognition

Cambridge International Examinations is the world's largest provider of international education programmes and qualifications for learners aged 5 to 19. We are part of Cambridge Assessment, a department of the University of Cambridge, trusted for excellence in education. Our qualifications are recognised by the world's universities and employers.

Cambridge IGCSE® (International General Certificate of Secondary Education) is internationally recognised by schools, universities and employers as equivalent in demand to UK GCSEs. Learn more at www.cie.org.uk/recognition

Excellence in education

Our mission is to deliver world-class international education through the provision of high-quality curricula, assessment and services.

More than 9000 schools are part of our Cambridge learning community. We support teachers in over 160 countries who offer their learners an international education based on our curricula and leading to our qualifications. Every year, thousands of learners use Cambridge qualifications to gain places at universities around the world.

Our syllabuses are reviewed and updated regularly so that they reflect the latest thinking of international experts and practitioners and take account of the different national contexts in which they are taught.

Cambridge programmes and qualifications are designed to support learners in becoming:

- **confident** in working with information and ideas – their own and those of others
- **responsible** for themselves, responsive to and respectful of others
- **reflective** as learners, developing their ability to learn
- **innovative** and equipped for new and future challenges
- **engaged** intellectually and socially, ready to make a difference.

Support for teachers

A wide range of materials and resources is available to support teachers and learners in Cambridge schools. Resources suit a variety of teaching methods in different international contexts. Through subject discussion forums and training, teachers can access the expert advice they need for teaching our qualifications. More details can be found in Section 2 of this syllabus and at www.cie.org.uk/teachers

Support for exams officers

Exams officers can trust in reliable, efficient administration of exams entries and excellent personal support from our customer services. Learn more at www.cie.org.uk/examsOfficers

Not-for-profit, part of the University of Cambridge

We are a not-for-profit organisation where the needs of the teachers and learners are at the core of what we do. We continually invest in educational research and respond to feedback from our customers in order to improve our qualifications, products and services.

Our systems for managing the provision of international qualifications and education programmes for learners aged 5 to 19 are certified as meeting the internationally recognised standard for quality management, ISO 9001:2008. Learn more at www.cie.org.uk/ISO9001

1.2 Why choose Cambridge IGCSE?

Cambridge IGCSEs are international in outlook, but retain a local relevance. The syllabuses provide opportunities for contextualised learning and the content has been created to suit a wide variety of schools, avoid cultural bias and develop essential lifelong skills, including creative thinking and problem-solving.

Our aim is to balance knowledge, understanding and skills in our programmes and qualifications to enable candidates to become effective learners and to provide a solid foundation for their continuing educational journey.

Through our professional development courses and our support materials for Cambridge IGCSEs, we provide the tools to enable teachers to prepare learners to the best of their ability and work with us in the pursuit of excellence in education.

Cambridge IGCSEs are considered to be an excellent preparation for Cambridge International AS and A Levels, the Cambridge AICE (Advanced International Certificate of Education) Group Award, Cambridge Pre-U, and other education programmes, such as the US Advanced Placement program and the International Baccalaureate Diploma programme. Learn more about Cambridge IGCSEs at www.cie.org.uk/cambridgesecondary2

Guided learning hours

Cambridge IGCSE syllabuses are designed on the assumption that learners have about 130 guided learning hours per subject over the duration of the course, but this is for guidance only. The number of hours required to gain the qualification may vary according to local curricular practice and the learners' prior experience of the subject.

1.3 Why choose Cambridge IGCSE Environmental Management?

Cambridge IGCSE Environmental Management is accepted by universities and employers as proof of knowledge and understanding of issues concerning sustainable development and how the Earth's resources are used. Students studying this syllabus:

- draw upon disciplines such as biology, Earth science, geography, economics and anthropology;
- consider the interdependence of the Earth's natural systems and how people use natural resources;
- examine the impact of development on the environment considering issues such as environmental pollution and resource depletion;
- explore ways in which we may change the nature of future development to make it more sustainable.

Environmental Management is concerned not only with the impact of humankind on the planet but also with the patterns of human behaviour necessary to preserve and manage the environment in a self-sustaining way. Study is linked to the areas of new thinking in environmental management, environmental economics and the quest for alternative technologies. Classroom studies and optional coursework allow candidates to obtain a local as well as a global perspective.

Environmental Management recognises that human behaviour towards the environment is guided by the survival needs, perceptions and values of people. Underlying the syllabus there is a recognition that cultural, social and political attitudes directly influence the economy of nature. A core principle of the syllabus is that sustainability will only be achieved by changes in the ways in which people think and make decisions. A course in Environmental Management therefore calls upon young people to be participants in defining the future of their world.

Prior learning

Candidates beginning this course are not expected to have studied Environmental Management previously.

Progression

Cambridge IGCSE Certificates are general qualifications that enable candidates to progress either directly to employment, or to proceed to further qualifications.

Candidates who are awarded grades C to A* in Cambridge IGCSE Environmental Management are well prepared to follow courses leading to Cambridge International AS Level Environmental Management, or the equivalent.

1.4 Cambridge International Certificate of Education (ICE)

Cambridge ICE is a group award for Cambridge IGCSE. It gives schools the opportunity to benefit from offering a broad and balanced curriculum by recognising the achievements of learners who pass examinations in at least seven subjects. To qualify for the Cambridge ICE award learners are required to have studied subjects from five groups: two languages from Group I, and one subject from each of the remaining four groups. The seventh subject can be taken from any of the five subject groups.

Environmental Management (0680) is in either Group II, Humanities and Social Science or Group III, Science.

Learn more about Cambridge ICE at www.cie.org.uk/cambridgesecundary2

The Cambridge ICE is awarded from examinations administered in the June and November series each year. In India, the Cambridge ICE is also awarded from examinations administered in the March series each year.

1.5 How can I find out more?

If you are already a Cambridge school

You can make entries for this qualification through your usual channels. If you have any questions, please contact us at info@cie.org.uk

If you are not yet a Cambridge school

Learn about the benefits of becoming a Cambridge school at www.cie.org.uk/startcambridge. Email us at info@cie.org.uk to find out how your organisation can become a Cambridge school.

2. Teacher support

2.1 Support materials

Cambridge syllabuses, past question papers and examiner reports to cover the last examination series are on the *Syllabus and Support Materials* DVD, which we send to all Cambridge schools.

You can also go to our public website at www.cie.org.uk/igcse to download current and future syllabuses together with specimen papers or past question papers and examiner reports from one series.

For teachers at registered Cambridge schools a range of additional support materials for specific syllabuses is available from Teacher Support, our secure online support for Cambridge teachers. Go to <http://teachers.cie.org.uk> (username and password required).

2.2 Resource lists

We work with publishers providing a range of resources for our syllabuses including textbooks, websites, CDs, etc. Any endorsed, recommended and suggested resources are listed on both our public website and on Teacher Support.

The resource lists can be filtered to show all resources or just those which are endorsed or recommended by Cambridge. Resources endorsed by Cambridge go through a detailed quality assurance process and are written to align closely with the Cambridge syllabus they support.

2.3 Training

We offer a range of support activities for teachers to ensure they have the relevant knowledge and skills to deliver our qualifications. See www.cie.org.uk/events for further information.

3. Syllabus content at a glance

The content of this syllabus is designed to encourage reflection on the limits to growth and sustainable development.

- The content is divided into four broad areas:
 - Lithosphere – rocks, minerals, soils, plate tectonics.
 - Hydrosphere – water cycle, oceans.
 - Atmosphere – air, climate, weather.
 - Biosphere – biomes, ecosystems, populations.
- In each case, these are explored through an analytic process of consideration of:
 - Resources – How does the natural system work?
 - Development – How do people use natural resources?
 - Impact – How does development change the environment?
 - Management – How can the environment be developed sustainably?
- The content is structured as a series of learning outcomes that lay out what candidates should know, understand and be able to analyse and discuss.

4. Assessment at a glance

This syllabus is available for examination in both the June and November series.

All candidates take Papers 1 and 2 and then choose either Papers 3 or 4.

Paper 1	1 hour 30 minutes	Paper 2	1 hour 45 minutes
Six compulsory structured short-answer questions. 60 marks: 30% of total assessment		A number of compulsory structured questions, involving short-answer and free response, based on related source material concerning environmental issues of global impact. Candidates are expected to use case studies to illustrate issues of environmental management. 80 marks: 40% of total assessment	

Either

Paper 3 Coursework

All candidates entered for Paper 3 must submit coursework consisting of one project. This will be assessed by the school, with external moderation by Cambridge. The project will consist of a **maximum** of 3000 words in addition to relevant illustrative material.

60 marks: 30% of total assessment

School-based assessment*

or

Paper 4 Alternative to coursework

1 hour 30 minutes

This paper primarily tests skills in Assessment Objectives B and C. Candidates are given data about an environmental problem which could provide the basis for a project. They will be required to identify issues raised by the data and to indicate ways in which a project could be organised to identify a possible management strategy.

60 marks: 30% of total assessment

* Teachers may not undertake school-based assessment of coursework without the written approval of Cambridge. This is normally given to teachers who satisfy Cambridge requirements concerning moderation and who have undertaken special training in assessment before entering candidates. Cambridge offers in-service training in the form of courses held at intervals in Cambridge and elsewhere and also via distance training. Please contact Cambridge for further details.

Availability

This syllabus is examined in the June and November examination series.

This syllabus is available to private candidates.

Detailed timetables are available from **www.cie.org.uk/examsOfficers**

Centres in the UK that receive government funding are advised to consult the Cambridge website **www.cie.org.uk** for the latest information before beginning to teach this syllabus.

Combining this with other syllabuses

Candidates can combine this syllabus in an examination series with any other Cambridge syllabus, except:

- syllabuses with the same title at the same level

Please note that Cambridge IGCSE, Cambridge International Level 1/Level 2 Certificate and Cambridge O Level syllabuses are at the same level.

5. Syllabus aims and assessment objectives

5.1 Syllabus aims

The aims are not listed in order of priority. Aims 7, 8 and 11 are intended as general course outcomes, but are not directly assessed in the examination.

The aims are to enable candidates to acquire:

1. knowledge of the functioning of the natural system which makes life possible on Earth;
2. an understanding that humankind is part of this system and depends on it;
3. an appreciation of the diverse influences of human activity on the natural system;
4. an awareness of the need for management and human responsibility to keep the system in a healthy condition if life as we know it is to continue;
5. an understanding of sustainable development and management to meet the needs of the present, without compromising the ability of future generations to meet their own needs;
6. an understanding of how local environments contribute to the global environment;
7. a sensitivity to, and a sense of responsibility and concern for, the welfare of the environment and all other life forms which share this planet;
8. an awareness of their own values concerning environmental issues;
9. an awareness of the values of others;
10. a willingness to review their own attitudes in the light of new knowledge and experiences;
11. a sound basis for further study, personal development and participation in local and global environmental concerns.

5.2 Assessment objectives

Assessment objectives are relatively independent sets of skills and activities. In Cambridge IGCSE Environmental Management, the three Assessment Objectives are skills-oriented rather than content-oriented.

A Knowledge with understanding

Candidates are expected to demonstrate knowledge and understanding of:

1. the wide range of processes contributing to
 - (a) the functioning of the Earth's natural, geophysical and ecological systems;
 - (b) human development within the natural system and the impact of human activity on the total environment;
2. the concept of environmental interdependence and should be able to place local environmental questions in an international or global setting;
3. the implications of the unequal distribution of resources and of the unequal patterns of human development;
4. the concept and practice of sustainable development;
5. ways of reducing and repairing environmental damage.

These assessment objectives will mainly be covered in the **Resources and Development** elements of the syllabus.

B Enquiry, presentation and analysis

Candidates are expected to demonstrate the ability to:

6. select and use suitable basic techniques to
 - (a) observe, record and classify relevant primary data;
 - (b) extract and classify relevant secondary data from appropriate sources;
7. organise and present their findings
 - (a) in a logical and concise manner;
 - (b) in a clear and coherent form, using appropriate techniques including graphs, diagrams, maps and tables;
8. analyse data to
 - (a) recognise patterns and deduce relationships;
 - (b) draw reasoned conclusions;
9. plan and carry out an individual enquiry.

These assessment objectives will be covered throughout the syllabus.

C Evaluation, judgement and decision making

Candidates should be able to:

10. recognise that cultural, economic, social, and political factors influence the different ways in which people perceive, value, use and make decisions about the environment;
11. discuss and evaluate choices available to decision makers and the influences and constraints in which they operate;
12. recognise, analyse, discuss and evaluate strategies for sustainable development;
13. make reasoned judgements about environmental issues.

These assessment objectives will mainly be covered in the Impact and Management elements of the syllabus.

Assessment specification grid

Paper	Assessment Objective					
	A		B		C	
	Marks	%	Marks	%	Marks	%
1	24	12	18	9	18	9
2	24	12	32	16	24	12
3 or 4	12	6	24	12	24	12
Total	60	30	74	37	66	33

6. Syllabus content

6.1 Themes

This syllabus is centred around the concept of: **sustainable development**. This may be defined as

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Two concerns are fundamentally tied to the process of sustainable development of the Earth's resources:

- (i) The basic needs of humanity – for food, clothing, shelter and jobs – must be met.
- (ii) The limits to development are not absolute but are imposed by present states of technology and social organisation and by their impacts upon environmental resources and upon the biosphere's ability to absorb the effect of human activities. Technology and social organisation can be both managed and improved to make way for a new era of economic growth.

Underlying questions

Whatever particular issue is being studied, candidates should consider the following central questions:

- Can the resources involved – whether they are non-living, living or human – be defined as renewable or non-renewable in relation to the pace, scale and character of development?
- To what extent, and why, do people use and value the same natural resource in different ways?
- What dilemmas face individuals, communities and countries in their use and management of natural resources?
- How compatible and how viable are different economic approaches in tackling an environmental issue?
- What are the relative costs, advantages and disadvantages of different strategies for managing the environment?
- What are the factors influencing dispute and co-operation over the use of natural resources?
- What are the current and potential roles of the following:
 - international organisations,
 - national and local governments,
 - environmental organisations,
 - aid agencies,
 - industry and commerce,
 - community groups,
 - individuals?

These questions should be presented in an open-ended way. This syllabus does not prescribe solutions as to how environments should be managed. The relationship between environment and development is dynamic. Strategies have to be altered, adjusted and changed as new problems arise. The same solutions may not be applicable in all regions or cases. Candidates should be encouraged to look for and evaluate alternative solutions, rather than to expect or reproduce the 'right answer'. Candidates need to understand the role played by value judgements and be able to accept that other people in their own society and elsewhere may hold values different from their own.

Candidates should be able to show a basic knowledge and understanding of the processes listed under Resources and Development and give examples to illustrate their understanding. In discussing Impact and Management, they should be able to analyse, discuss and draw conclusions based on reasoned evidence. Teaching methods should encourage enquiry and discussion as much as possible and this should be based as far as possible on case studies, at an appropriate level. The emphasis should be on applying knowledge and understanding to international, national and local environmental problems to enable candidates to become involved in both current and future environmental management issues.

The syllabus matrix

The Environmental Management syllabus is organised as a matrix (see the diagram on the following page).

The syllabus is designed to emphasise that

- (a) life on Earth as we know it is an integrated and interdependent whole;
- (b) its future is endangered by the impact of human development on natural resources;
- (c) its survival for future generations will depend on concerted action to conserve and manage the environment as a self-sustaining resource base.

For each of the four spheres of the Earth's environment (lithosphere, hydrosphere, atmosphere and biosphere), the following aspects are considered.

1. **Resources:** How does the natural system work?
2. **Development:** How do people use natural resources?
3. **Impact:** How does development change the environment?
4. **Management:** How can the environment be developed sustainably?

The divisions between the four spheres should not be seen as rigid or exclusive. Many environmental issues, e.g. water pollution, soils/agriculture, etc., involve more than one sphere. Teachers should be aware of the links between different parts of the matrix and by using suitable cross references they should emphasise environmental interdependence. The syllabus does not prescribe a particular sequence of study.

About 35% of the teaching time should be devoted to the curriculum objectives on resources and development. These can be dealt with in a largely descriptive way to give students a basic knowledge and understanding of processes. This will provide the foundation for the analysis and discussion of impact and management, to which the remaining 65% of teaching time should be allocated.

In this syllabus we give examples (in *italics*) to illustrate many of the objectives. These are not intended to be definitive or prescriptive; a range of factors influence any topic and we encourage teachers to adopt a similar range of teaching strategies.

The curriculum objectives should be covered by investigating specific examples and case studies from both the 'Developed' and the 'Developing World'.

The syllabus matrix

	Resources	Development	Impact	Management
Lithosphere	The lithosphere: structure and processes	Human activity and the lithosphere	Lithosphere in crisis	Action on the lithosphere
Hydrosphere	The water cycle The oceans	Human intervention in the water cycle Exploitation of the oceans	Water hazards The oceans at risk	Clean, safe, water strategies Managing the oceans
Atmosphere	The atmospheric system	Human activity and the atmosphere	Atmosphere in crisis Agriculture development consequences	Action on the atmosphere Managing agriculture
Biosphere	The ecosystem Elements of vegetation Elements of soil	The changing role of people in the environment Population growth Modification of vegetation and soils	Ecosystems at risk People in crisis Land at risk Agriculture: development consequences	Conservation of the ecosystem Population management Managing the land Managing agriculture

RESOURCES



DEVELOPMENT

HOW DOES THE NATURAL SYSTEM WORK?

All candidates should have knowledge and understanding of:

1. Lithosphere: structure and processes

- 1.1 the structure of the Earth
core, mantle, crust
- 1.2 the types of rock
igneous, sedimentary, metamorphic
- 1.3 the distribution, types and reserves of major minerals
metal ores and fossil fuels (oil, gas, coal)
- 1.4 the formation of fossil fuels
- 1.5 the crust/tectonic cycle
plate tectonics, earth movements (folding, faulting, mountain building), earthquake zones, vulcanicity

2. Elements of soil

- 2.1 the formation and composition of soils
mineral and organic content, air, water, role of soil organisms, particle size (clay, silt, sand), soil texture
- 2.2 soil as a medium for growth and land use potential
nutrients, pH, pore space, aeration, drainage

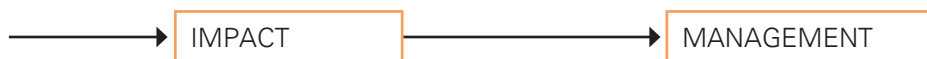
HOW DO PEOPLE USE NATURAL RESOURCES?

All candidates should have knowledge and understanding of:

3. Human activity and the lithosphere

- 3.1 the methods of search and extraction of rocks, minerals and fossil fuels
- 3.2 the uses of rocks and minerals in industrial processes
- 3.3 types of energy production from fossil and nuclear fuels
- 3.4 the location of the main centres of mining and energy production in relation to major centres of population and industry
- 3.5 main supply and demand constraints in exploiting mineral resources
geological factors, depletion rates, climatic factors, transport, fluctuations of prices
- 3.6 the economic aspects and limitations of earthquake and volcanic zones
- 3.7 the implications of the patterns of global trade in minerals and energy
- 3.8 how industrial development is used to achieve social and economic goals

Lithosphere



HOW DOES DEVELOPMENT CHANGE THE ENVIRONMENT?	HOW CAN THE ENVIRONMENT BE DEVELOPED SUSTAINABLY?
<p><i>All candidates should be able to analyse and discuss:</i></p> <p>4. Lithosphere in crisis</p> <p>4.1 the impact of mineral exploitation on the environment and on human activity and health</p> <p>4.2 the global economic consequences of the over-exploitation and depletion of mineral and fossil fuel reserves</p> <p>4.3 the implications in social, economic and environmental terms of different types of energy production <i>fossil fuels compared with nuclear</i></p> <p>4.4 the impact of earthquakes, volcanic eruptions on human communities <i>damage, loss of life, danger to health in aftermath, economic dislocation</i></p> <p>4.5 the impact of industrial development on the environment and on human activity and health</p> <p>4.6 causes and consequences of land pollution <i>salination, toxic waste, nuclear waste, domestic waste, harmful effects of pesticides and fertilisers; groundwater contamination, health risks.</i></p>	<p><i>All candidates should be able to analyse and discuss:</i></p> <p>5. Action on the lithosphere</p> <p>5.1 conservation schemes for damaged environments <i>landscaping, restoration, reclamation, filtration, waste management</i></p> <p>5.2 technologies and viability of alternative energy sources <i>solar, wind, wave, geothermal, hydro-electric, biomass</i></p> <p>5.3 strategies for conservation and management of mineral and fossil fuel resources <i>increased efficiency in use, insulation, recycling, power from waste, new technology</i></p> <p>5.4 strategies for managing the impacts of earthquakes and volcanic activity <i>planning site of settlement (land use zoning) and structure of buildings, disaster relief</i></p> <p>5.5 industrial materials, technologies, and approaches which can contribute to solving environmental problems <i>monitoring, remedial action, recycling (processing wastes and industrial products at end of life), low waste technology (developing cleaner processes and products, conservation and efficiency)</i></p>

RESOURCES



DEVELOPMENT

HOW DOES THE NATURAL SYSTEM WORK?

All candidates should have knowledge and understanding of:

6. The water cycle

- 6.1 how the water cycle operates
- 6.2 how the natural availability of water varies from place to place
- 6.3 the role of the water cycle within ecosystems

links between rainfall, vegetation and soils (interception, infiltration, surface run-off)

7. The oceans

- 7.1 the role of the ocean as an environment for interdependent ecosystems
- 7.2 the resource potential of the oceans
- 7.3 the distribution of ocean currents and their effects
on climate and on fisheries
- 7.4 reversal of ocean currents, e.g. el Nino and its effects

HOW DO PEOPLE USE NATURAL RESOURCES?

All candidates should have knowledge and understanding of:

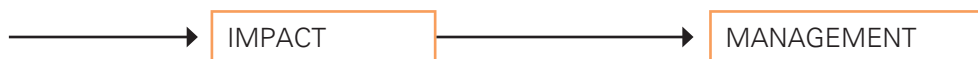
8. Human intervention in the water cycle

- 8.1 collection and control of water for a variety of uses
water supply (storage, transfer, dams, reservoirs); industry and domestic use; waste disposal; power; agriculture (irrigation)
- 8.2 competing demands for water
- 8.3 mismatch between water supply and demand
- 8.4 the ways in which processes operating within the water cycle affect development
causes and effects of flooding and drought

9. Exploitation of the oceans

- 9.1 the environmental and human factors in the distribution and exploitation of the world's ocean fisheries
- 9.2 factors that limit full exploitation of the ocean's potential resources

Hydrosphere



HOW DOES DEVELOPMENT CHANGE THE ENVIRONMENT?	HOW CAN THE ENVIRONMENT BE DEVELOPED SUSTAINABLY?
<p><i>All candidates should be able to analyse and discuss:</i></p> <p>10. Water hazards</p> <p>10.1 the causes and consequences of water pollution <i>impact on natural ecosystems, the physical environment, human activity and health</i></p> <p>10.2 contrasts in availability of water in terms of quality, quantity and access <i>between urban and rural communities; between countries</i></p> <p>10.3 the cycle of water-related diseases, and their impact on human activities and development <i>water-based (bilharzia); water-borne (typhoid, cholera); water-bred (malaria)</i></p> <p>11. The oceans at risk</p> <p>11.1 the implications of uncontrolled exploitation of marine resources <i>fishing, continental shelf and deep-sea mineral resources</i></p> <p>11.2 causes of marine pollution and its impact on the marine ecosystem and on coastal zones <i>raw sewage, heavy metals, oil and plastics</i></p>	<p><i>All candidates should be able to analyse and discuss:</i></p> <p>12. Clean, safe water strategies</p> <p>12.1 ways of improving water quantity, quality and access <i>pollution control, improved sanitation, distribution for more efficient water use, desalination</i></p> <p>12.2 strategies to control and eradicate water-related diseases <i>drugs, vector control and eradication, improved sanitation, clean water supply, chlorination</i></p> <p>13. Managing the oceans</p> <p>13.1 strategies for the sustainable harvesting of ocean fisheries <i>net types and sizes, quotas, conservation laws, territoriality</i></p> <p>13.2 marine pollution controls and remedial action <i>international co-operation and legislation, dealing with oil spills, managing raw sewage</i></p>

RESOURCES



DEVELOPMENT

HOW DOES THE NATURAL SYSTEM WORK?

All candidates should have knowledge and understanding of:

14. The atmospheric system

- 14.1 the sun as an energy source; varying rates of surface insolation
- 14.2 the factors which contribute to solar heat balance of earth and atmosphere
radiation, absorption, reflection
- 14.3 the structure and composition of the atmosphere
importance of the ozone layer, oxygen, carbon dioxide and water vapour in the air
- 14.4 the balances which maintain the Earth's atmosphere as a mixture of gases
oxygen, carbon dioxide and nitrogen
- 14.5 how the elements of weather are measured, recorded, and interpreted
temperature, precipitation, atmospheric pressure, wind, sun
- 14.6 location of major climatic types and their main characteristics through interpretation of climatic graphs and maps
Tropical - equatorial, savanna
Dry - desert
Temperate - cool interior
Cold - tundra
- 14.7 'climatic hazards' (extremes of weather): causes and occurrence
cyclone, flood, drought

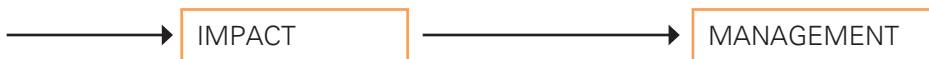
HOW DO PEOPLE USE NATURAL RESOURCES?

All candidates should have knowledge and understanding of:

15. Human activity and the atmosphere

- 15.1 water, solar and wind as power resources
- 15.2 use of the atmosphere as a dispersal medium for waste gases
smoke particles and exhaust fumes
- 15.3 the interaction between climate and human activity
shelter; farming affected by climate
- 15.4 the different types and systems of farming
croplands/grazing lands, intensive/extensive, subsistence/commercial
- 15.5 the environmental, technological, economic and social factors which influence the distribution of different types and systems of farming
- 15.6 new agricultural techniques which increase yields
irrigation, biological controls, the benefits of chemicals (fertilisers and pesticides), mechanisation, capital subsidies
- 15.7 the factors which influence the patterns of agricultural output and trade
North-South trade in commodities, cash crops vs food crops

Atmosphere



HOW DOES DEVELOPMENT CHANGE THE ENVIRONMENT?	HOW CAN THE ENVIRONMENT BE DEVELOPED SUSTAINABLY?
<p><i>All candidates should be able to analyse and discuss:</i></p>	<p><i>All candidates should be able to analyse and discuss:</i></p>
<p>16. Atmosphere in crisis</p>	<p>18. Action on the atmosphere</p>
<p>16.1 human activities which alter the composition of the atmosphere and climate <i>deforestation, burning of fossil fuels, industrial and vehicle emissions, use of CFCs</i></p>	<p>18.1 strategies to reduce atmospheric pollution and climatic change <i>CFC replacement, reduction of pollutant emissions, reforestation</i></p>
<p>16.2 causes of atmospheric pollution <i>carbon dioxide, CFCs, methane, sulfur and nitrogen oxides, lead</i></p>	<p>18.2 the need for international action and changing attitudes to deal with the causes and consequences of the damage to the atmosphere</p>
<p>16.3 damage to the ozone layer and links to atmospheric pollution</p>	<p>18.3 strategies to reduce the negative impact of climatic hazards <i>improved forecasting, appropriate settlement patterns and buildings, disaster relief</i></p>
<p>16.4 the effects of pollution on atmospheric conditions <i>acid rain, the greenhouse effect, temperature inversion</i></p>	<p>19. Managing agriculture</p>
<p>16.5 the implications of changes in the atmosphere and climate <i>effects on health, food production, water supply, ecosystems</i></p>	<p>19.1 strategies for sustainable agriculture <i>plant breeding, integrated pest control, mixed cropping, gene banks, new crop strains, trickle drip irrigation, organic alternatives to inorganic fertilisers</i></p>
<p>16.6 the impact of climatic hazards on human communities <i>damage, loss of life, danger to health in aftermath, loss of production</i></p>	<p>19.2 harvesting energy from living resources to provide power <i>biomass, biogas (methane), fuel from organic waste</i></p>
<p>17. Agriculture: consequences of development</p>	
<p>17.1 the impact of indiscriminate agricultural practices <i>overuse of pesticides and inorganic fertilisers, crops requiring irrigation, traditional crop varieties disappearing, overproduction and waste in developed countries, concentration of land in hands of fewer owners, environmental damage (pollution, soil erosion)</i></p>	
<p>17.2 the advantages and disadvantages of the 'green revolution'</p>	

RESOURCES

DEVELOPMENT

HOW DOES THE NATURAL SYSTEM WORK?

HOW DO PEOPLE USE NATURAL RESOURCES?

All candidates should have knowledge and understanding of:

20. Biomes

- 20.1 the concept of an ecosystem
- 20.2 organisation within an ecosystem
population, community, habitat, niche
- 20.3 physical factors
temperature, humidity, water, salinity, light, pH, soils, nutrients, wind
- 20.4 relationships of living organisms
producers, consumers, food chains and webs, competition, predation, pollination, dispersal, vegetational succession
- 20.5 energy flow
photosynthesis, respiration, food chains, food webs
- 20.6 nutrient cycling
carbon and nitrogen cycle
- 20.7 resource potential
biodiversity as a genetic resource, and as a food base

21. Types of vegetation

- 21.1 the distribution and main characteristics of natural vegetation zones (biomes) and relationship to climatic zones
- Forest - tropical rainforest, monsoon forest, taiga*
- Grassland - savanna*
- Desert - desert, tundra*

All candidates should have knowledge and understanding of:

22. The changing role of people in the environment

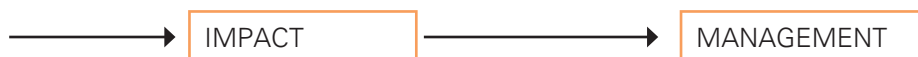
- 22.1 how different types of human society use and value their natural environment
hunter-gatherer, nomadic pastoralist, farming, industrial, tourism
- 22.2 the increasing ability of humankind to create artificial environments as a result of economic and technological development and social and cultural change
e.g. in agriculture: domestication of plants and animals, modern agricultural methods, genetic engineering

23. Human population

- 23.1 population growth
rates of birth, death and fertility, life expectancy, infant mortality
- 23.2 population structure
population pyramids, young and ageing populations
- 23.3 migration
push/pull, urban/rural
- 23.4 the model of demographic transition and its limitations

24. Modification of vegetation and soils

- 24.1 factors influencing the clearance of natural vegetation over time
farming (crops, grazing), timber (fuel, building, furniture), paper (pulp), chemicals (gums, resins), settlement (towns, cities)



HOW DOES DEVELOPMENT CHANGE THE ENVIRONMENT?	HOW CAN THE ENVIRONMENT BE DEVELOPED SUSTAINABLY?
<i>All candidates should be able to analyse and discuss:</i>	<i>All candidates should be able to analyse and discuss:</i>
25. Ecosystems at risk	28. Conservation of the ecosystem
25.1 habitat destruction, loss of biodiversity, genetic depletion	28.1 strategies for conservation of biodiversity and the genetic resource
25.2 the effect of loss of habitat on wildlife and on the food chain <i>draining of wetlands, impounding water, deforestation, intensive agricultural practices</i>	<i>sustainable harvesting of wild plant and animal species, national parks, wildlife reserves, world biosphere reserves, gene banks</i>
25.3 the impact of tourism	28.2 world conservation strategies and legislation
26. People in crisis	<i>the work of organisations such as UNEP, IUCN, WWF, CITES</i>
26.1 social, economic and environmental implications of population growth rates and structures	29. Population management
26.2 measures of world poverty and the North-South divide	29.1 strategies for managing population growth <i>family planning, improved health and education, national policies</i>
26.3 the implications of the cycle of poverty, as it effects individuals and communities, for the environment <i>per capita incomes, inadequacy of housing, levels of disease and nutrition</i>	29.2 strategies for managing the urban and rural environments <i>planning, environmental improvement, community participation</i>
26.4 urbanisation <i>causes (push/pull factors), problems (housing, congestion, pollution, loss of agricultural land, provision of services)</i>	29.3 strategies for overcoming world inequalities <i>improved trade and aid conditions, governmental and non-governmental aid, food aid</i>
27. Land at risk	29.4 managing tourism <i>National Parks, ecotourism</i>
27.1 causes and consequences of rapid and progressive deforestation <i>clearance for fuelwood, subsistence and cash crop farming, settlement, timber extraction and grazing; links with soil erosion and desertification, climate changes, effect on people (displacement, lack of fuel)</i>	30. Managing the land
27.2 causes and consequences of soil erosion and desertification <i>removal of vegetation, overgrazing, overcultivation, clearance of slopes, poor irrigation; food shortage and water shortage, displacement of people</i>	30.1 strategies for soil conservation <i>tree planting, terracing, contour ploughing, dry land farming, wind breaks, integrated rural development programmes, land reform, community participation</i>
	30.2 sustainable forest management techniques <i>agro-forestry, community forestry, reforestation, sustainable harvesting of hardwoods, fuelwood planting, genetic engineering</i>
	30.3 alternatives to deforestation <i>more efficient use of timber, recycling (paper/timber), alternative materials to timber</i>

7. Coursework: guidance for centres

7.1 Introduction

Coursework in Environmental Management offers candidates the opportunity to apply their knowledge and skills in an individual project investigating an environmental issue in the local context.

Candidates must produce a project consisting of a **maximum** of 3000 words in addition to relevant illustrative material, e.g. photographs, diagrams and maps. It is **essential** that the topic chosen leads to a project which is consistent with the aims and assessment objectives outlined in the syllabus.

In completing the project the candidate **must**:

1. identify a **local** environmental problem, which is specific, accessible and measurable;
2. analyse the Resources and Development aspects of the problem, as the setting for more detailed consideration of Impact and Management aspects;
3. collect and select data, which **must** include some primary data, and use a suitable range of research techniques, including some fieldwork;
4. carry out in-depth analysis of the data and attempt to draw some meaningful conclusions;
5. present their findings and conclusions in an orderly and reasoned way, supported by a suitable range of illustrative techniques.

The project **must** involve analysis, discussion and judgement and not merely description.

7.2 Producing the coursework

The investigation involved in the project should be carried out after candidates have done introductory work on research methods and acquired some knowledge and understanding of environmental problems, concepts and strategies. However, teachers should explain the nature of coursework requirements to the candidates early in the course. This will give candidates time, in consultation with the teacher, to:

1. identify a local topic in which they are interested;
2. identify the particular **environmental** problem involved, using the knowledge and skills developed in and out of the classroom;
3. explore the range of resources available to them to support their investigation;
4. develop a plan for implementation, allowing enough time to successfully complete the project. This should take into consideration the topic chosen and the resources available.

The project should be the candidate's own work. Teachers are allowed, through discussion and supervision of activities, to give assistance and guidance, particularly in the planning and preparation of the investigation and during data collection. However, the extent of guidance during data collection, analysis and the writing of the report must be taken into account when marks are awarded.

Teachers may give assistance by:

- (a) preparing candidates either individually or as part of a class (e.g. by making them aware of a range of local environmental problems, by explaining the scope of topics or the range of research methods available);
- (b) helping candidates to choose project topics (e.g. by preparing a list of suggested topics or discussing the implications and difficulties of the alternatives suggested by candidates, particularly in the light of available local resources);
- (c) suggesting possible strategies and encouraging new lines of enquiry;
- (d) suggesting ways to incorporate the aspects of Resources, Development, Impact and Management into their projects;
- (e) discussing problems and difficulties encountered;
- (f) supervising candidates in their investigative work;
- (g) explaining to candidates what is expected of them in terms of presentation and suggesting appropriate presentation techniques.

7.3 Coursework topic examples

These suggestions are intended only as **examples**. Topics will depend on specific circumstances, e.g. the school's local area and resources, the special interests and expertise of teachers, and (not least) the interests of candidates.

- How can industry X be managed to the benefit of the environment?
- How effective is the technology for preventing oil spills and/or reducing their impact on the ecosystem?
- Is solar energy a viable technology for producing energy in our locality?
- How can our school/community recycle more of its waste and/or use more recycled material?
- How can people be made more aware of the potential resource value of household waste?
- Can the local disused quarry at A be adapted for use as a conservation and recreation area?
- How can water storage and control in our region be improved to ensure a fair distribution of water supply?
- How can the quality of our tap water be improved?
- Are the marine and recreational resources of coastline Z maintained well enough to be sustained in their use for future generations?
- How can pollution of lake C be reduced and its water cleaned?
- What can be done to manage the tourist beach at Y sustainably?
- What can be done to reduce the effects of wind damage X on settlement Y?
- Under what weather conditions is air pollution from traffic most damaging and how can this damage be reduced?
- How can the effects of acid rain on forest B be reduced by action at different levels of society?
- Can our local zoo/botanical garden be regarded as a means of saving endangered species?
- How can hardwood forest Z best be managed to provide materials and to sustain itself?
- How can the local population of animal X be managed sustainably given available natural resources and their economic use?
- What strategies are available for controlling population growth in city Z?
- Is the replacement of existing ecosystems with plantations of X sustainable development?
- How can farming in area A be improved to prevent further soil erosion?
- Is intensive farming doing long-term damage to the local environment?
- Could crop wastes be used more efficiently in local agriculture and how can alternative uses be encouraged?

Candidates should be encouraged to select topics which have **particular interest for them**, with appropriate advice and guidance from their teacher. Alternatively candidates can select from a range of possible topics introduced by their teacher. Candidates from the same school may choose the same topic, and work together as a group. However, as individual members of the team they should have different responsibilities and aspects to investigate, so that each candidate's abilities can be assessed separately. Candidates working in groups must submit individual reports and indicate which parts of the project were carried out jointly and give the names of those students with whom this joint work was done. Schools are responsible for ensuring that candidates submit projects which are **their own** work.

7.4 The coursework report

The report should include the following:

- (a) title, contents page, a number of logically ordered sections, lists of sources, a bibliography and acknowledgements
(evidence of raw data in summary form should be included in an appendix, e.g. collated questionnaire responses: this is not counted in word total);
- (b) a clear title and a statement of the purpose and aims of the project
(this should be question- or problem-oriented or concerned to test a hypothesis, since this will provide a definite focus for the project. It should be fairly narrowly defined and limited in scope);
- (c) a description of the context (concise and relevant background information on the place and processes involved);
- (d) a description of the main research methods used to collect data and other resources and of how any practical activities were planned, showing how all these relate to the aims, purpose and background of the project
(data which is gathered should be of a kind that can be easily presented without overgeneralisation. The research strategy should relate to the aim of the investigation. A range of research techniques should be considered e.g.
 - (i) gathering and analysis of primary data
e.g. surveys, participant and non-participant observation, questionnaires, interviews, experiments, case studies
 - (ii) selection and analysis of secondary data
e.g. official and other statistics, published studies, media material, documents);
- (e) presentation of the main information, data and evidence discovered, to form a basis for the conclusions of the project;
- (f) an analysis and evaluation of the findings in relation to the initial aims of the project;
- (g) a reasoned conclusion, based upon the evidence, giving recommendations for sustainable development concerning the issue;
- (h) an evaluation of the project with reasoned judgements about its value and implications and the problems encountered, together with suggestions for improvements.

Candidates should be encouraged to produce their own maps, photographs and other suitable means of presentation. Photographs, tables of data, etc. from other sources, such as magazines, should not be copied and included in their original form; instead candidates should translate such data into a form of their own. Similarly, plagiarism from library, Internet or other sources is **not** acceptable as coursework.

Given the limit on number of words (3000) the following approximate balance is recommended.

Description of context	400 words
Data presentation and analysis	1300 words
Discussion and conclusions	1300 words

8. Coursework: assessment

8.1 Assessment criteria

The project will be assessed using the criteria below which are based on the assessment objectives listed earlier in the syllabus. Marking should be positive and candidates should be rewarded for their achievements rather than penalised for their failings.

A maximum of 6 marks are available for each of the criteria. Marks should be awarded for achievement as follows:

- 5–6 excellent,
- 3–4 competent,
- 1–2 some positive achievement,
- 0 no evidence of positive achievement for this criterion.

Assessment Objective A: Knowledge with understanding

1: Understanding the processes involved in the environmental problem

Marks available

- 5–6 Processes identified and fully explained using appropriate terminology
- 3–4 Processes identified and partially explained using appropriate terminology
- 1–2 Processes identified, with minimal explanation

2: Understanding the resource, development, impact and management aspects of the problem

Marks available

- 5–6 Aspects of the problem interrelated using appropriate terminology
- 3–4 Aspects interrelated without appropriate terminology.
- 1–2 Aspects identified

Assessment Objective B: The Investigation (data acquisition, analysis, presentation)

3: Data collection: using sources

Marks available

- 5–6 Wide range of sources used, including primary data
- 3–4 Limited range of sources used, including primary data
- 1–2 Limited range of sources used, without primary data.

4: Data collection: using research techniques

Marks available

- 5–6 Wide range of appropriate techniques selected and used effectively
- 3–4 Range of appropriate techniques used
- 1–2 Limited range of techniques used

5: Presenting findings

Marks available

- 5–6 An appropriate range of presentation techniques used accurately
- 3–4 A range of appropriate presentation techniques used but with minor errors
- 1–2 Limited presentation techniques with basic level of accuracy and clarity

6: Analysing data

Marks available

- 5–6 Thorough interpretation, discerning patterns of cause and effect and recognising limitations of data
- 3–4 Valid, straightforward interpretation, discerning some patterns of cause and effect
- 1–2 Mainly descriptive, with limited interpretation

Assessment Objective C: Evaluation, judgement and decision making**7: Recognising values**

Marks available

- 5–6 Recognition of the values of people involved, and some assessment of relative importance of possible factors influencing those values
- 3–4 Recognition of the values of people involved, and some assessment of possible factors influencing those values
- 1–2 Some recognition of the values of people involved

8: Evaluating choices

Marks available

- 5–6 Evaluation of choices open to decision-makers, and some assessment of relative importance of influences and constraints on those choices.
- 3–4 Evaluation of choices open to decision-makers, and some assessment of possible influences and constraints on those choices
- 1–2 Some appreciation of the choices open to decision-makers

9: Evaluating strategies

Marks available

- 5–6 Thorough identification and explanation of a possible strategy for sustainable development, with some evaluation of its advantages and disadvantages
- 3–4 Identification and explanation of a possible strategy for sustainable development
- 1–2 Identification of a possible strategy for sustainable development, with limited explanation

10: Making reasoned judgements

Marks available

- 5–6 Judgements made about Impact and Management issues involved in the topic with explanation, and with some recognition of limiting factors
- 3–4 Judgements made about Impact and Management issues involved in the topic with explanation
- 1–2 Judgements made about Impact and Management issues involved in the topic, with limited explanation

8.2 Pre-assessment monitoring of coursework topics

Centres preparing candidates for the Environmental Management examination for the first time must submit an outline of the types of coursework projects which candidates will undertake. This is to enable Cambridge to offer guidance and assistance. Precise details of each candidate's project are not required as it is appreciated that these may change in the light of the results of their investigation and/or other circumstances. Rather, Cambridge requires an outline of the general nature of the work to be undertaken and how coursework objectives will be satisfied.

This outline should be presented on one sheet of A4 paper, preferably using a copy of the form included in this syllabus, and submitted to Cambridge at least 8 months before the date of the examination. The outline should give an indication of the types of project which are proposed and list a few different projects as examples, with a brief statement of the purpose and the investigation strategies likely to be used for these projects. This must also explain how Impact and Management aspects will be incorporated. Cambridge will reply to Centres as quickly as possible to inform them of the suitability of the types of projects proposed.

The purpose of this exercise is provide advice and support. Once Cambridge is satisfied that the Centre is able to devise and support suitable coursework projects with students a coursework summary will not be required.

8.3 Moderation of coursework

Internal Moderation

If two or more teachers in a Centre are involved in internal assessment of coursework, the Centre must make sure that all candidates are assessed to a common standard.

External Moderation

External moderation of internal assessment is carried out by Cambridge. Centres must submit candidates' internally assessed marks to Cambridge. The deadlines and methods for submitting internally assessed marks are in the Cambridge Administrative Guide available on our website.

On receiving internally moderated marks, Cambridge selects a sample of candidates whose work will be externally moderated. Cambridge will ask Centres to send the coursework of these candidates to Cambridge as soon as possible, together with Individual Candidate Record Cards and Coursework Assessment Summary Forms. Copies of these forms can be found at the back of this booklet.

For more information about external moderation please consult the *Cambridge Handbook* and the *Cambridge Administrative Guide*.

For more advice on coursework in Environmental Management see *A Teacher's Guide to Environmental Management* which is available from Cambridge.

9. Appendix

9.1 Grade descriptions

The following grade descriptions are intended to give a general indication of the standards of achievement likely to have been achieved by candidates awarded Grades A, C and F.

Grade A

The candidate has demonstrated the ability to:

- understand the wide range of processes involved in the functioning of the Earth's resources, human development within the natural system, and the impact of human activity on the total environment;
- understand in detail the patterns of behaviour needed to manage the environment sustainably, in the context of environmental interdependence;
- plan and carry out individual environmental investigation, using a suitable range of techniques of data collection, analysis and presentation;
- apply the extensive understanding and investigative skills above in making reasoned and balanced judgements on environmental questions of a local and international character with an appreciation of the different value positions of, and the variety of influences and constraints on the decision makers concerned.

Grade C

The candidate has demonstrated the ability to:

- understand the main processes involved in the functioning of the Earth's resources, human development within the natural system, and the impact of human activity on the total environment;
- understand in general terms the patterns of behaviour needed to manage the environment sustainably, in the context of environmental interdependence;
- plan and carry out individual environmental investigation using suitable techniques of data collection, analysis and presentation;
- apply the understanding and investigative skills above in making reasoned and balanced judgements on environmental questions of a local and international character with an appreciation of the different value positions and some of the influences and constraints on the decision makers concerned.

Grade F

The candidate has demonstrated the ability to:

- understand at a basic level the main processes involved in the functioning of the Earth's resources, human development within the natural system, and the impact of human activity on the total environment;
- understand in basic terms the patterns of behaviour needed to manage the environment sustainably, in the context of environmental interdependence and crisis;
- carry out individual environmental investigation, using basic techniques of data collection, analysis and presentation;
- apply the basic understanding and investigative skills above in discussing environmental questions of a local and international character, with an awareness that different value positions and constraints can exist.

10. Additional information

Equality and inclusion

Cambridge International Examinations has taken great care in the preparation of this syllabus and assessment materials to avoid bias of any kind. To comply with the UK Equality Act (2010), Cambridge has designed this qualification with the aim of avoiding direct and indirect discrimination.

The standard assessment arrangements may present unnecessary barriers for candidates with disabilities or learning difficulties. Arrangements can be put in place for these candidates to enable them to access the assessments and receive recognition of their attainment. Access arrangements will not be agreed if they give candidates an unfair advantage over others or if they compromise the standards being assessed.

Candidates who are unable to access the assessment of any component may be eligible to receive an award based on the parts of the assessment they have taken.

Information on access arrangements is found in the *Cambridge Handbook* which can be downloaded from the website www.cie.org.uk/exams/officer

Language

This syllabus and the associated assessment materials are available in English only. Grading and reporting

Cambridge IGCSE results are shown by one of the grades A*, A, B, C, D, E, F or G indicating the standard achieved, A* being the highest and G the lowest. 'Ungraded' indicates that the candidate's performance fell short of the standard required for grade G. 'Ungraded' will be reported on the statement of results but not on the certificate. The letters Q (result pending), X (no results) and Y (to be issued) may also appear on the statement of results but not on the certificate.

Entry codes

To maintain the security of our examinations, we produce question papers for different areas of the world, known as 'administrative zones'. Where the component entry code has two digits, the first digit is the component number given in the syllabus. The second digit is the location code, specific to an administrative zone. Information about entry codes can be found in the *Cambridge Guide to Making Entries*.

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