CAMBRIDGE
International Examinations

Cambridge
O Level

SYLLABUS

Cambridge O Level
Environmental Management
5014

For examination in June and November 2016

Cambridge Secondary 2

Changes to syllabus for 2015

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

Contents

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 O Level is internationally recognised by schools, universities and employers as equivalent in demand to Cambridge IGCSE® (International General Certificate of Secondary Education). 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 O Level?

Cambridge O Levels have been designed for an international audience and are sensitive to the needs of different countries. These qualifications are designed for learners whose first language may not be English and this is acknowledged throughout the examination process. The Cambridge O Level syllabus also allows teaching to be placed in a localised context, making it relevant in varying regions.

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 O Levels, 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 O Levels 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 O Levels at **www.cie.org.uk/cambridgesecondary2**

Guided learning hours

Cambridge O Level 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 O Level Environmental Management?

Cambridge O Levels are established qualifications that keep pace with educational developments and trends. The Cambridge O Level curriculum places emphasis on broad and balanced study across a wide range of subject areas. The curriculum is structured so that students attain both practical skills and theoretical knowledge.

Cambridge O Level Environmental Management is accepted by universities and employers as proof of knowledge and understanding. Successful Cambridge O Level Environmental Management candidates gain lifelong skills, including:

- an ability to draw upon disciplines such as biology, Earth science, geography, economics and anthropology;

- an understanding of the interdependence of the Earth's natural systems, and how people use natural resources;
- an understanding of how development impacts on the environment consideration of issues such as environmental pollution and resource depletion;
- the ability to explore ways in which we may change the nature of future development to make it more sustainable.

Cambridge O Level Environmental Management is an ideal foundation for further study at Cambridge International A Level and the skills learnt can also be used in other areas of study and in everyday life.

Students may also study for a Cambridge O Level in other subjects such as Agriculture, Food and Nutrition, Human and Social Biology. In addition to Cambridge O Levels, Cambridge also offers Cambridge IGCSE and Cambridge International AS & A Levels for further study in Environmental Management as well as other related subjects. See **www.cie.org.uk** for a full list of the qualifications you can take.

Prior learning

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

Progression

Cambridge O Levels 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 O Level Environmental Management are well prepared to follow courses leading to Cambridge International AS Level Environmental Management, or the equivalent.

1.4 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 register to 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/olevel** 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 online 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.

Paper 1	2 hour 15 minutes	Paper 2	1 hour 30 minutes
This will consist of two sections. Section A will consist of four compulsory structured short-answer questions, each based on one of the four spheres (lithosphere, hydrosphere, atmosphere, biosphere). (40 marks) Section B will consist of a number of compulsory structured questions, involving short-answer and free response, based upon several pieces of related source material concerning environmental issues of global impact. Candidates will be expected to use case studies to illustrate issues of environmental management. (80 marks) **120 marks: 60% of total assessment**		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: 40% of total assessment**	

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**

Cambridge O levels are available to Centres in Administrative Zones 3, 4 and 5. Centres in Administrative Zones 1, 2 or 6 wishing to enter candidates for Cambridge O Level examinations should contact Cambridge Customer Services.

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 O Level, Cambridge IGCSE and Cambridge International Level 1/Level 2 Certificate 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 O Level 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;

These assessment objectives will be covered throughout the syllabus.

C Evaluation, judgement and decision making

Candidates should be able to:

9. recognise that cultural, economic, social, and political factors influence the different ways in which people perceive, value, use and make decisions about the environment;
10. discuss and evaluate choices available to decision makers and the influences and constraints in which they operate;
11. recognise, analyse, discuss and evaluate strategies for sustainable development;
12. 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	40	23	44	24	36	20
2	12	7	24	13	24	13
Total	52	30	68	37	60	33

6. Curriculum 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 Elements of soil	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	Biomes Types of vegetation	The changing role of people in the environment Human population Modification of vegetation and soils	Ecosystems at risk People in crisis Land at risk	Conservation of the ecosystem Population management Managing the land

RESOURCES → DEVELOPMENT

Lithosphere

HOW DOES THE NATURAL SYSTEM WORK?	HOW DO PEOPLE USE NATURAL RESOURCES?
All candidates should have knowledge and understanding of:	*All candidates should have knowledge and understanding of:*
1. Lithosphere: structure and processes	**3. Human activity and the lithosphere**
1.1 the structure of the Earth *core, mantle, crust*	3.1 the methods of search and extraction of rocks, minerals and fossil fuels
1.2 the types of rock *igneous, sedimentary, metamorphic*	3.2 the uses of rocks and minerals in industrial processes
1.3 the distribution, types and reserves of major minerals *metal ores and fossil fuels (oil, gas, coal)*	3.3 types of energy production from fossil and nuclear fuels
1.4 the formation of fossil fuels	3.4 the location of the main centres of mining and energy production in relation to major centres of population and industry
1.5 the crust/tectonic cycle *plate tectonics, earth movements (folding, faulting, mountain building), earthquake zones, vulcanicity*	3.5 main supply and demand constraints in exploiting mineral resources *geological factors, depletion rates, climatic factors, transport, fluctuations of prices*
2. Elements of soil	3.6 the economic aspects and limitations of earthquake and volcanic zones
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*	3.7 the implications of the patterns of global trade in minerals and energy
2.2 soil as a medium for growth and land use potential *nutrients, pH, pore space, aeration, drainage*	3.8 how industrial development is used to achieve social and economic goals

IMPACT → MANAGEMENT

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

Lithosphere

RESOURCES → DEVELOPMENT

Hydrosphere

HOW DOES THE NATURAL SYSTEM WORK?	HOW DO PEOPLE USE NATURAL RESOURCES?
All candidates should have knowledge and understanding of:	*All candidates should have knowledge and understanding of:*
6. The water cycle	**8. Human intervention in the water cycle**
6.1 how the water cycle operates	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)*
6.2 how the natural availability of water varies from place to place	8.2 competing demands for water
6.3 the role of the water cycle within ecosystems *links between rainfall, vegetation and soils (interception, infiltration, surface run-off)*	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*
7. The oceans	**9. Exploitation of the oceans**
7.1 the role of the ocean as an environment for interdependent ecosystems	9.1 the environmental and human factors in the distribution and exploitation of the world's ocean fisheries
7.2 the resource potential of the oceans	9.2 factors that limit full exploitation of the ocean's potential resources
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	

IMPACT → MANAGEMENT

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

Hydrosphere

RESOURCES → DEVELOPMENT

Atmosphere

HOW DOES THE NATURAL SYSTEM WORK?	HOW DO PEOPLE USE NATURAL RESOURCES?
All candidates should have knowledge and understanding of:	*All candidates should have knowledge and understanding of:*
14. The atmospheric system	**15. Human activity and the atmosphere**
14.1 the sun as an energy source; varying rates of surface insolation	15.1 water, solar and wind as power resources
14.2 the factors which contribute to solar heat balance of earth and atmosphere *radiation, absorption, reflection*	15.2 use of the atmosphere as a dispersal medium for waste gases *smoke particles and exhaust fumes*
14.3 the structure and composition of the atmosphere *importance of the ozone layer, oxygen, carbon dioxide and water vapour in the air*	15.3 the interaction between climate and human activity *shelter; farming affected by climate*
14.4 the balances which maintain the Earth's atmosphere as a mixture of gases *oxygen, carbon dioxide and nitrogen*	15.4 the different types and systems of farming *croplands/grazing lands, intensive/ extensive, subsistence/commercial*
14.5 how the elements of weather are measured, recorded, and interpreted *temperature, precipitation, atmospheric pressure, wind, sun*	15.5 the environmental, technological, economic and social factors which influence the distribution of different types and systems of farming
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*	15.6 new agricultural techniques which increase yields *irrigation, biological controls, the benefits of chemicals (fertilisers and pesticides), mechanisation, capital subsidies*
14.7 'climatic hazards' (extremes of weather): causes and occurrence *cyclone, flood, drought*	15.7 the factors which influence the patterns of agricultural output and trade *North-South trade in commodities, cash crops vs food crops*

→ IMPACT → MANAGEMENT

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

Atmosphere

RESOURCES → DEVELOPMENT

Biosphere

HOW DOES THE NATURAL SYSTEM WORK?	HOW DO PEOPLE USE NATURAL RESOURCES?
All candidates should have knowledge and understanding of:	*All candidates should have knowledge and understanding of:*
20. Biomes	**22. The changing role of people in the environment**
20.1 the concept of an ecosystem	22.1 how different types of human society use and value their natural environment *hunter-gatherer, nomadic pastoralist, farming, industrial, tourism*
20.2 organisation within an ecosystem *population, community, habitat, niche*	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*
20.3 physical factors *temperature, humidity, water, salinity, light, pH, soils, nutrients, wind*	**23. Human population**
20.4 relationships of living organisms *producers, consumers, food chains and webs, competition, predation, pollination, dispersal, vegetational succession*	23.1 population growth *rates of birth, death and fertility, life expectancy, infant mortality*
20.5 energy flow *photosynthesis, respiration, food chains, food webs*	23.2 population structure *population pyramids, young and ageing populations*
20.6 nutrient cycling *carbon and nitrogen cycle*	23.3 migration *push/pull, urban/rural*
20.7 resource potential *biodiversity as a genetic resource, and as a food base*	23.4 the model of demographic transition and its limitations
21. Types of vegetation	**24. Modification of vegetation and soils**
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*	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)*

IMPACT → MANAGEMENT

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

Biosphere

7. Other 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/examsofficer**

Language

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

Grading and reporting

Cambridge O Level results are shown by one of the grades A*, A, B, C, D or E, indicating the standard achieved, A* being the highest and E the lowest. 'Ungraded' indicates that the candidate's performance fell short of the standard required for grade E. '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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