

General Certificate of Education
Ordinary Level

Syllabus

ENVIRONMENTAL MANAGEMENT 5014

For examination in June and November 2009

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ENVIRONMENTAL MANAGEMENT GCE ORDINARY LEVEL

Syllabus code: 5014

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Exclusions

This syllabus must not be offered in the same session with the following syllabus:

0680 Environmental Management

INTRODUCTION

GCE Ordinary level syllabuses are designed as two-year courses for examination at age 16 plus. This syllabus is available for examination in both the June and November sessions.

Environmental Management is concerned with education for sustainable development in a world where the security of resources and life-sustaining systems is endangered by human impact. It is wide-ranging in its scope, topical in its coverage and targeted on important skills that young people need for life.

As a syllabus Environmental Management draws upon disciplines such as Biology, Earth Science, Geography, Economics and Anthropology. Its starting-point is the functioning interdependence of the Earth's natural systems, and how people use natural resources. It moves on to examine the impact of development on the environment. Such issues as environmental pollution and resource depletion are examined, but the view of them is forward-looking, to see how we may change the nature of development towards future sustainability. Environmental Management is thus 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. For this reason study is linked to the expanding areas of new thinking in environmental management, environmental economics and the quest for alternative technologies. Case studies enable students 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 framework there is a firm recognition that cultural, social and political attitudes directly influence the economy of nature.

Environmental Management, therefore, seeks to present not only a global view of human ecology but one in which the student is a participant as well as an observer, formulating opinion ahead of environmental policymaking. In this direct sense the examination syllabus aims to enhance education for sustainable development, by providing for students a deeper insight into processes and, long term, a greater capacity for change in their knowledge, skills and values. It is a fundamental principle of the syllabus that the achievement of sustainability will be governed by the way 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. In this it encourages the prospective view that 'we have not so much inherited the world from our parents as borrowed it from our children'.

AIMS

The aims of the syllabus are set out below and describe the educational purposes of a course in Environmental Management for the GCE examination. They 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 students 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.

ASSESSMENT OBJECTIVES

Assessment Objectives are relatively independent sets of skills and activities. The three Assessment Objectives in Environmental Management are:

- A Knowledge with understanding
- B Skills of enquiry, presentation and analysis
- C Evaluation, judgement and decision making.

A description of each Assessment Objective follows.

A KNOWLEDGE WITH UNDERSTANDING

Students should be able 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, with the ability 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 SKILLS OF ENQUIRY, PRESENTATION AND ANALYSIS

Students will be 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 met throughout all parts of the syllabus.

C EVALUATION, JUDGEMENT AND DECISION MAKING

Students 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 the choices available to decision makers and the influences and constraints within 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

Scheme of assessment

All candidates will take Papers 1 and 2.

Paper 1 (2¼ hours)

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)

Paper 2 (1½ hours)

This paper will primarily test skills in Assessment Objectives B and C. Candidates will be provided with 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 in order to identify a possible management strategy. (60 marks)

Weighting of papers

<i>Paper</i>	<i>Marks</i>	<i>Weighting</i>
1	120	60%
2	60	40%

Specification grid

<i>Paper</i>	<i>Assessment Objective</i>		
	A	B	C
	Marks	Marks	Marks
1	40	44	36
2	12	24	24
Overall	52 (30%)	68 (37%)	60 (33%)

Marks and percentages are approximate.

CURRICULUM CONTENT

INTRODUCTION

The Environmental Management syllabus can be seen as a positive educational response to the Report of the World Commission on Environment and Development, 'Our Common Future' (1987: published by Oxford University Press), commonly known as the 'Brundtland Report'.

The Commission and the Report arose from a deep concern among world leaders and experts over both the speed and apparent irreversibility with which the planet's environmental resources are being exploited.

The Commission's main task was to come up with a 'global agenda for change'. Its mandate spelled out three objectives:

- to re-examine the critical environment and development issues and to formulate realistic proposals for dealing with them;
- to propose new forms of international co-operation on these issues that will influence policies and events in the direction of needed changes;
- to raise the levels of understanding and commitment to action of individuals, voluntary organisations, businesses, institutes and governments.

The core concept in the Report from which this Environmental Management syllabus has evolved is that 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. But technology and social organisation can be both managed and improved to make way for a new era of economic growth.

The Environmental Management syllabus is not tied to the Brundtland Report directly, but reflects its thinking and relates to the ongoing debate that Brundtland initiated, such as the UNCED World Summit in Brazil in June 1992. Agenda 21 of the United Nations Environment Programme (UNEP) addresses the pressing problems facing the world in the 21st century and reflects the global consensus and political commitment to development and environmental co-operation.

UNDERLYING QUESTIONS

There are certain dimensions which should be considered by students as they work on examples and case studies, whatever the issue involved, and these can usefully be phrased as 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?

Impact and Management should be presented in an open-ended way. The syllabus does not prescribe solutions as to how environments should be managed. As the Brundtland Report and its successors such as the 1992 Rio de Janeiro UNCED conference indicate, 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. Students should be encouraged to look for and evaluate alternative solutions, rather than to expect or reproduce the 'right answer'. Students 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 that understanding. With Impact and Management, they should be able to analyse, discuss and draw conclusions based on reasoned evidence. Teaching methods should encourage student enquiry and discussion as much as possible and this should be based, as far as possible, on case studies, at an appropriate scale. The emphasis should be on applying knowledge and understanding to international, national and local environmental problems such that students are prepared to be involved in both current and future environmental management issues.

THE SYLLABUS MATRIX

The Environmental Management curriculum 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?

This matrix of aspects and spheres frames the detailed curriculum objectives (page 7). It serves as a map of the ground to be covered.

The divisions between the four spheres should not be regarded 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 which exist between various parts of the matrix and by using suitable cross references emphasise environmental interdependence. There are many different ways of making a journey, using the same map: similarly, the syllabus does not prescribe a particular sequence of study.

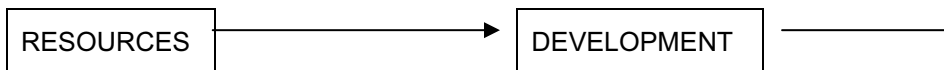
The approach in considering the curriculum objectives relating to resources and development should be largely descriptive, leading to a basic knowledge and understanding of processes. It is recommended that these should occupy some 35% of teaching time. They provide the foundation for the analysis and discussion of impact and management, to which the remaining 65% of teaching time should be allocated.

In the detailed curriculum, examples (in italics) are given to amplify many of the objectives. These are to guide teachers in teaching a topic and examiners in setting papers. They are not intended to be definitive or prescriptive, for there are a range of factors bearing on any topic and a range of possible strategies that might follow.

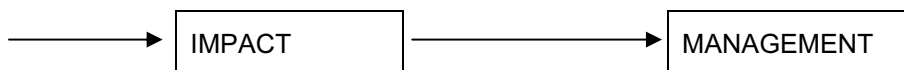
It is recommended that the curriculum objectives should be covered by investigating specific examples and case studies from both the 'Developed' and the 'Developing World'.

	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 Agriculture as a response to climate	Atmosphere in crisis Agriculture: development consequences	Action on the atmosphere Managing agriculture
Biosphere	The ecosystem 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

The Syllabus Matrix

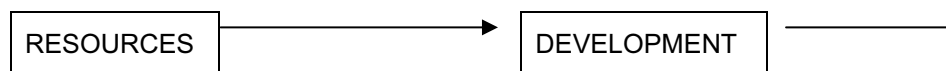


Lithosphere	HOW DOES THE NATURAL SYSTEM WORK?	HOW DO PEOPLE USE NATURAL RESOURCES?
	<p><i>All students should have knowledge and understanding of:</i></p> <p>1. Lithosphere: structure and processes</p> <p>1.1 the structure of the Earth <i>core, mantle, crust</i></p> <p>1.2 the types of rock <i>igneous, sedimentary, metamorphic</i></p> <p>1.3 the distribution, types and reserves of major minerals <i>metal ores and fossil fuels (oil, gas, coal)</i></p> <p>1.4 the formation of fossil fuels</p> <p>1.5 the crust/tectonic cycle <i>plate tectonics, earth movements (folding, faulting, mountain building) earthquake zones, vulcanicity</i></p> <p>2. Elements of soil</p> <p>2.1 the formation and composition of soils <i>mineral and organic content, air, water, role of soil organisms, particle size (clay, silt, sand), soil texture</i></p> <p>2.2 soil as a medium for growth and land use potential <i>nutrients, pH, pore space, aeration, drainage</i></p>	<p><i>All students should have knowledge and understanding of:</i></p> <p>3. Human activity and the lithosphere</p> <p>3.1 the methods of search and extraction of rocks, minerals and fossil fuels</p> <p>3.2 the uses of rocks and minerals in industrial processes</p> <p>3.3 types of energy production from fossil and nuclear fuels</p> <p>3.4 the location of the main centres of mining and energy production in relation to major centres of population and industry</p> <p>3.5 main supply and demand constraints in exploiting mineral resources <i>geological factors, depletion rates, climatic factors, transport, fluctuations of prices</i></p> <p>3.6 the economic aspects and limitations of earthquake and volcanic zones</p> <p>3.7 the implications of the patterns of global trade in minerals and energy</p> <p>3.8 how industrial development is used to achieve social and economic goals</p>

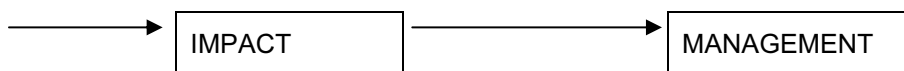


HOW DOES DEVELOPMENT CHANGE THE ENVIRONMENT?	HOW CAN THE ENVIRONMENT BE DEVELOPED SUSTAINABLY?
<p><i>All students should be able to analyse and discuss:</i></p> <p>4. Lithosphere in crisis</p> <p>4.1 the impact of mineral exploitation on the environment and on human activity and health</p> <p>4.2 the 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</p> <p><i>fossil fuels compared with nuclear</i></p> <p>4.4 the impact of earthquakes, volcanic eruptions on human communities</p> <p><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</p> <p><i>salination, toxic waste, nuclear waste, domestic waste, harmful effects of pesticides and fertilisers; groundwater contamination, health risks.</i></p>	<p><i>All students should be able to analyse and discuss:</i></p> <p>5. Action on the lithosphere</p> <p>5.1 conservation schemes for damaged environments</p> <p><i>landscaping, restoration, reclamation, filtration, waste management</i></p> <p>5.2 technologies and viability of alternative energy sources</p> <p><i>solar, wind, wave, geothermal, hydro-electric biomass</i></p> <p>5.3 strategies for conservation and management of mineral and fossil fuel resources</p> <p><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</p> <p><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</p> <p><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>

Lithosphere

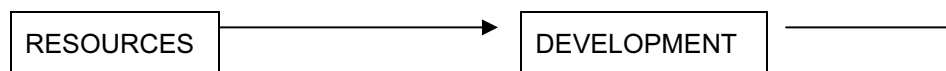


Hydrosphere	HOW DOES THE NATURAL SYSTEM WORK?	HOW DO PEOPLE USE NATURAL RESOURCES?
	<p><i>All students should have knowledge and understanding of:</i></p> <p>6. The water cycle</p> <p>6.1 how the water cycle operates</p> <p>6.2 how the natural availability of water varies from place to place</p> <p>6.3 the role of the water cycle within ecosystems</p> <p><i>links between rainfall, vegetation and soils (interception, infiltration, surface run-off)</i></p> <p>7. The oceans</p> <p>7.1 the role of the ocean as an environment for interdependent ecosystems</p> <p>7.2 the resource potential of the oceans</p> <p>7.3 the distribution of ocean currents and their effects</p> <p><i>on climate and on fisheries</i></p> <p>7.4 reversal of ocean currents, e.g. el nino and its effects</p>	<p><i>All students should have knowledge and understanding of:</i></p> <p>8. Human intervention in the water cycle</p> <p>8.1 collection and control of water for a variety of uses</p> <p><i>water supply (storage, transfer, dams, reservoirs); industry and domestic use; waste disposal; power; agriculture (irrigation)</i></p> <p>8.2 competing demands for water</p> <p>8.3 mismatch between water supply and demand</p> <p>8.4 the ways in which processes operating within the water cycle affect development</p> <p><i>causes and effects of flooding and drought</i></p> <p>9. Exploitation of the oceans</p> <p>9.1 the environment and human factors in the distribution and exploitation of the world's ocean fisheries</p> <p>9.2 factors that limit full exploitation of the ocean's potential resources</p>

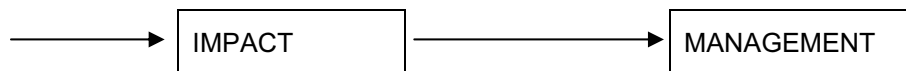


HOW DOES DEVELOPMENT CHANGE THE ENVIRONMENT?	HOW CAN THE ENVIRONMENT BE DEVELOPED SUSTAINABLY?
<p><i>All students should be able to analyse and discuss:</i></p>	<p><i>All students should be able to analyse and discuss:</i></p>
<p>10. Water hazards</p>	<p>12. Clean, safe water strategies</p>
<p>10.1 the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

Hydrosphere

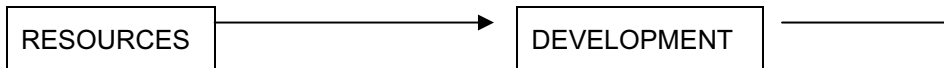


Atmosphere	HOW DOES THE NATURAL SYSTEM WORK?	HOW DO PEOPLE USE NATURAL RESOURCES?
	<p><i>All students should have knowledge and understanding of:</i></p> <p>14. The atmospheric system</p> <p>14.1 the sun as an energy source; varying rates of surface insolation</p> <p>14.2 the factors which contribute to solar heat balance of earth and atmosphere <i>radiation, absorption, reflection</i></p> <p>14.3 the structure and composition of the atmosphere <i>importance of the ozone layer, oxygen, carbon dioxide and water vapour in the air</i></p> <p>14.4 the balances which maintain the Earth's atmosphere as a mixture of gases <i>oxygen, carbon dioxide and nitrogen</i></p> <p>14.5 how the elements of weather are measured, recorded, and interpreted <i>temperature, precipitation, atmospheric pressure, wind, sun</i></p> <p>14.6 location of major climatic types and their main characteristics through interpretation of climatic graphs and maps <i>Tropica - equatorial, savanna Dry - desert Temperate - cool interior Cold - tundra</i></p> <p>14.7 'climatic hazards' (extremes of weather): causes and occurrence <i>cyclone, flood, drought</i></p>	<p><i>All students should have knowledge and understanding of:</i></p> <p>15. Human activity and the atmosphere</p> <p>15.1 water, solar and, wind as power resources</p> <p>15.2 use of the atmosphere as a dispersal medium for waste gases <i>smoke particles and exhaust fumes</i></p> <p>15.3 the interaction between climate and human activity <i>shelter; farming affected by climate</i></p> <p>15.4 the different types and systems of farming <i>croplands/grazing lands, intensive/extensive, subsistence/commercial</i></p> <p>15.5 the environmental, technological, economic and social factors which influence the distribution of different types and systems of farming</p> <p>15.6 new agricultural techniques which increase yields <i>irrigation, biological controls, the benefits of chemicals (fertilisers and pesticides), mechanisation, capital subsidies</i></p> <p>15.7 the factors which influence the patterns of agricultural output and trade <i>North-South trade in commodities, cash crops vs. food crops</i></p>



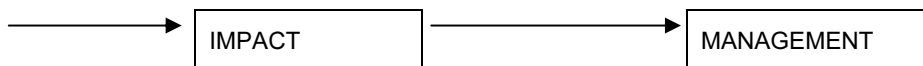
HOW DOES DEVELOPMENT CHANGE THE ENVIRONMENT?	HOW CAN THE ENVIRONMENT BE DEVELOPED SUSTAINABLY?
<p><i>All students should be able to analyse and discuss:</i></p>	<p><i>All students should be able to analyse and discuss:</i></p>
<p>16. Atmosphere in crisis</p>	<p>18. Action on the atmosphere</p>
<p>16.1 human activities which alter the composition of the atmosphere and climate</p> <p><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</p> <p><i>CFC replacement, reduction of pollutant emissions, reforestation</i></p>
<p>16.2 causes of atmospheric pollution</p> <p><i>carbon dioxide, CFCs, methane, sulphur 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</p> <p><i>improved forecasting, appropriate settlement patterns and buildings, disaster relief</i></p>
<p>16.4 the effects of pollution on atmospheric conditions</p> <p><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</p> <p><i>effects on health, food production, water supply, ecosystems</i></p>	<p>19.1 strategies for sustainable agriculture</p> <p><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</p> <p><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</p> <p><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</p> <p><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>	

Atmosphere



Biosphere

HOW DOES THE NATURAL SYSTEM WORK?	HOW DO PEOPLE USE NATURAL RESOURCES?
<p><i>All students should have knowledge and understanding of:</i></p> <p>20. Biomes</p> <p>20.1 the concept of an ecosystem</p> <p>20.2 organisation within an ecosystem <i>population, community, habitat, niche</i></p> <p>20.3 physical factors <i>temperature, humidity, water, salinity, light, pH, soils, nutrients, wind</i></p> <p>20.4 relationships of living organisms <i>producers, consumers, food chains and webs, competition, predation, pollination, dispersal, vegetational succession</i></p> <p>20.5 energy flow <i>photosynthesis, respiration, food chains, food webs</i></p> <p>20.6 nutrient cycling <i>carbon and nitrogen cycle</i></p> <p>20.7 resource potential <i>biodiversity as a genetic resource, and as a food base</i></p> <p>21. Types of vegetation</p> <p>21.1 the distribution and main characteristics of natural vegetation zones (biomes) and relationship to climatic zones</p> <p><i>Forest - tropical rainforest, monsoon forest, taiga</i></p> <p><i>Grassland - savanna</i></p> <p><i>Desert - desert, tundra</i></p>	<p><i>All students should have knowledge and understanding of:</i></p> <p>22. The changing role of people in the environment</p> <p>22.1 how different types of human society use and value their natural environment <i>hunter-gatherer, nomadic pastoralist, farming, industrial, tourism</i></p> <p>22.2 the increasing ability of humankind to create artificial environments as a result of economic and technological development and social and cultural change <i>e.g. in agriculture: domestication of plants and animals, modern agricultural methods, genetic engineering</i></p> <p>23. Human population</p> <p>23.1 population growth <i>rates of birth, death and fertility, life expectancy, infant mortality</i></p> <p>23.2 population structure <i>population pyramids, young and ageing populations</i></p> <p>23.3 migration <i>push/pull, urban/rural</i></p> <p>23.4 the model of demographic transition and its limitations</p> <p>24. Modification of vegetation</p> <p>24.1 factors influencing the clearance of natural vegetation over time <i>farming (crops, grazing), timber (fuel, building, furniture), paper (pulp), chemicals (gums, resins), settlement (towns, cities)</i></p>



HOW DOES DEVELOPMENT CHANGE THE ENVIRONMENT?	HOW CAN THE ENVIRONMENT BE DEVELOPED SUSTAINABLY?
<p><i>All students should be able to analyse and discuss:</i></p> <p>25. Ecosystems at risk</p> <p>25.1 habitat destruction, loss of biodiversity, genetic depletion</p> <p>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></p> <p>25.3 the impact of tourism</p> <p>26. People in crisis</p> <p>26.1 social, economic and environmental implications of population growth rates and structures</p> <p>26.2 measures of world poverty and the North-South divide <i>per capita incomes, inadequacy of housing, levels of disease and nutrition</i></p> <p>26.3 the implications of the cycle of poverty, as it effects individuals and communities, for the environment</p> <p>26.4 urbanisation <i>causes (push/pull factors), problems (housing, congestion, pollution, loss of agricultural land, provision of services)</i></p> <p>27. Land at risk</p> <p>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></p> <p>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></p>	<p><i>All students should be able to analyse and discuss:</i></p> <p>28. Conservation of the ecosystem</p> <p>28.1 strategies for conservation of biodiversity and the genetic resource <i>sustainable harvesting of wild plant and animal species, national parks, wildlife reserves, world biosphere reserves, gene banks</i></p> <p>28.2 world conservation strategies and legislation <i>the work of organisations such as UNEP, IUCN, WWF, CITES</i></p> <p>29. Population management</p> <p>29.1 strategies for managing population growth <i>family planning, improved health and education, national policies</i></p> <p>29.2 strategies for managing the urban and rural environments <i>planning, environmental improvement, community participation</i></p> <p>29.3 strategies for overcoming world inequalities <i>improved trade and aid conditions, governmental and non-governmental aid, food aid</i></p> <p>29.4 managing tourism <i>National Parks, ecotourism</i></p> <p>30. Managing the land</p> <p>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></p> <p>30.2 sustainable forest management techniques <i>agro-forestry, community forestry, reforestation, sustainable harvesting of hardwoods, fuelwood planting, genetic engineering</i></p> <p>30.3 alternatives to deforestation <i>more efficient use of timber, recycling (paper/timber), alternative materials to timber</i></p>

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