

International General Certificate
of Secondary Education

Syllabus

ENVIRONMENTAL MANAGEMENT 0680

For examination in June and November 2009

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Environmental Management

Syllabus code: 0680

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Exclusions

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

5014 Environmental Management

INTRODUCTION

International General Certificate of Secondary Education (IGCSE) syllabuses are designed 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. Classroom studies and optional Coursework 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'.

The IGCSE syllabuses follow a general pattern. The main sections are:

Aims

Assessment Objectives

Assessment

Curriculum Content.

The IGCSE subjects have been categorised into groups, subjects within each group having similar Aims and Assessment Objectives.

Environmental Management falls into

either

Group II, Humanities and Social Science, of the International Certificate of Education (ICE) subjects;

or

Group III, Sciences.

AIMS

The aims of the syllabuses are the same for all students. These are set out below and describe the educational purposes of a course in Environmental Management for the IGCSE 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. In IGCSE the Assessment Objectives are skills-oriented rather than content-oriented.

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;
9. plan and carry out an individual enquiry.

These assessment objectives will be met throughout all parts of the syllabus.

C EVALUATION, JUDGEMENT AND DECISION MAKING

Students 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

Scheme of assessment

All candidates will take Papers 1, 2 and *either* Paper 3 or 4.

Paper 1 (1½ hours)

This will consist of six compulsory structured short-answer questions. (60 marks)

Paper 2 (1¾ hours)

This 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)

Either

Paper 3, Coursework (School-based assessment)*

All candidates entered for Paper 3 must submit coursework consisting of one project for school-based assessment with external moderation. The project will consist of a **maximum** of 3,000 words in addition to relevant illustrative material. (60 marks)

*Teachers may not undertake school-based assessment of coursework without the written approval of CIE. This will only be given to teachers who satisfy CIE requirements concerning moderation and they will have to undergo special training in assessment before entering candidates.

CIE offers schools in-service training in the form of courses held at intervals in Cambridge and elsewhere and also via distance training.

Or

Paper 4 (1½ hours) (Alternative to School-based assessment)

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	60	30%
2	80	40%
3 } 4 }	60	30%

Specification grid

<i>Paper</i>	<i>Assessment Objective</i>					
	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
Overall		30		37		33

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 on the following page 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.

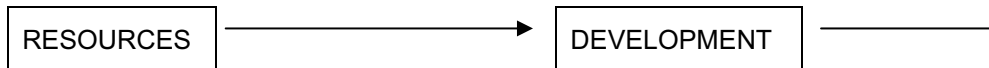
In the detailed curriculum, examples (in italics) are given to amplify many of the objectives. These are to guide teachers in teaching a topic and examiners in setting papers. They are not intended to be definitive or prescriptive, for there are a range of factors bearing on any topic and a range of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

The curriculum is designed for all students. Question papers are set to provide an opportunity for the full range of students to demonstrate their ability. Grading is therefore by outcome, not by papers of stepped difficulty.

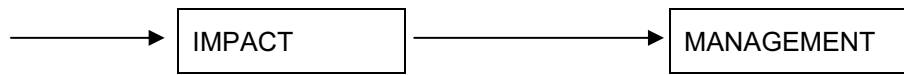
The Syllabus Matrix

	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



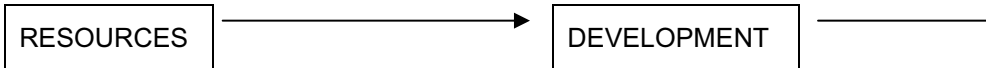
Lithosphere

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, volcanicity</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>



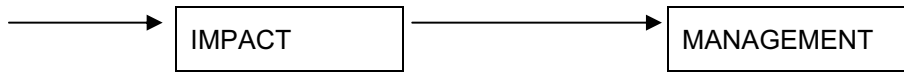
HOW DOES DEVELOPMENT CHANGE THE ENVIRONMENT?	HOW CAN THE ENVIRONMENT BE DEVELOPED SUSTAINABLY?
<p><i>All students should be able to analyse and discuss:</i></p> <p>4. Lithosphere in crisis</p> <p>4.1 the impact of mineral exploitation on the environment and on human activity and health</p> <p>4.2 the 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



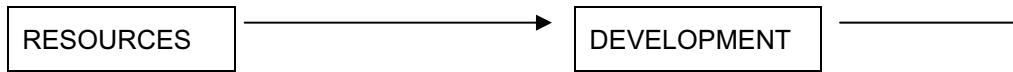
Hydrosphere

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 environmental 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>

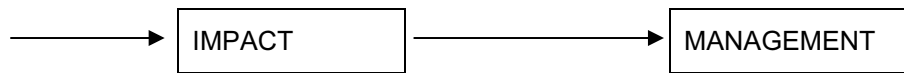


HOW DOES DEVELOPMENT CHANGE THE ENVIRONMENT?	HOW CAN THE ENVIRONMENT BE DEVELOPED SUSTAINABLY?
<p><i>All students should be able to analyse and discuss:</i></p>	<p><i>All students should be able to analyse and discuss:</i></p>
<p>10. Water hazards</p>	<p>12. Clean, safe water strategies</p>
<p>10.1 the 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

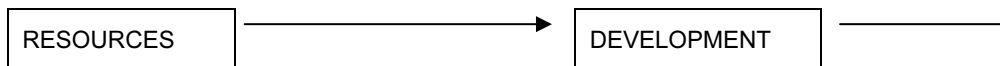


	HOW DOES THE NATURAL SYSTEM WORK?	HOW DO PEOPLE USE NATURAL RESOURCES?
Atmosphere	<p><i>All students should have knowledge and understanding of:</i></p> <p>14. The atmospheric system</p> <p>14.1 the sun as an energy source; varying rates of surface insolation</p> <p>14.2 the factors which contribute 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>Tropical - 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>



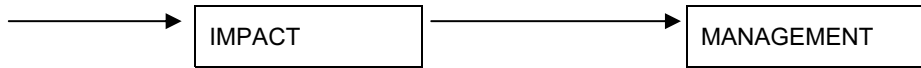
HOW DOES DEVELOPMENT CHANGE THE ENVIRONMENT?	HOW CAN THE ENVIRONMENT BE DEVELOPED SUSTAINABLY?
<p><i>All students should be able to analyse and discuss:</i></p> <p>16. Atmosphere in crisis</p> <p>16.1 human activities which alter the composition of the atmosphere and climate <i>deforestation, burning of fossil fuels, industrial and vehicle emissions, use of CFCs</i></p> <p>16.2 causes of atmospheric pollution <i>carbon dioxide, CFCs, methane, sulphur and nitrogen oxides, lead</i></p> <p>16.3 damage to the ozone layer and links to atmospheric pollution</p> <p>16.4 the effects of pollution on atmospheric conditions <i>acid rain, the greenhouse effect, temperature inversion</i></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>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>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>	<p><i>All students should be able to analyse and discuss:</i></p> <p>18. Action on the atmosphere</p> <p>18.1 strategies to reduce atmospheric pollution and climatic change <i>CFC replacement, reduction of pollutant emissions, reforestation</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>18.3 strategies to reduce the negative impact of climatic hazards <i>improved forecasting, appropriate settlement patterns and buildings, disaster relief</i></p> <p>19. Managing agriculture</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>19.2 harvesting energy from living resources to provide power <i>biomass, biogas (methane), fuel from organic waste</i></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 and soils</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</p> <p><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</p> <p><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</p> <p><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</p> <p><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</p> <p><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</p> <p><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</p> <p><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</p> <p><i>family planning, improved health and education, national policies</i></p> <p>29.2 strategies for managing the urban and rural environments</p> <p><i>planning, environmental improvement, community participation</i></p> <p>29.3 strategies for overcoming world inequalities</p> <p><i>improved trade and aid conditions, governmental and non-governmental aid, food aid</i></p> <p>29.4 managing tourism</p> <p><i>National Parks, ecotourism</i></p> <p>30. Managing the land</p> <p>30.1 strategies for soil conservation</p> <p><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</p> <p><i>agro-forestry, community forestry, reforestation, sustainable harvesting of hardwoods, fuelwood planting, genetic engineering</i></p> <p>30.3 alternatives to deforestation</p> <p><i>more efficient use of timber, recycling (paper/timber), alternative materials to timber</i></p>

Biosphere

COURSEWORK (SCHOOL-BASED ASSESSMENT)

Introduction

Coursework in Environmental Management offers the opportunity for students to apply their knowledge and skills in an individual project investigating an environmental issue in the local context. It is hoped that candidates opting for Paper 3 will approach this aspect of the examination in a positive and creative way and see coursework as a means of enhancing and enlivening the Environmental Management curriculum.

Essential features of coursework

Candidates must offer one project consisting of a **maximum** of 3,000 words in addition to relevant illustrative material, e.g. photographs, diagrams and maps.

It is **essential** that the chosen topic leads to a project which is consistent with the aims, and addresses the assessment objectives outlined in the syllabus.

The project **must** involve:

1. the identification of a **local** environmental problem, which is specific, accessible and measurable;
2. concise analysis of the Resources and Development aspects, as the setting for more detailed consideration of Impact and Management aspects;
3. collection and selection of data, which **must** include some primary data, and the use of a suitable range of research techniques, including some element of fieldwork;
4. in-depth analysis of the data and an attempt to produce some meaningful conclusions;
5. presentation of findings and conclusions in an orderly and reasoned way involving a suitable range of illustrative techniques.

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

Production of coursework

It is expected that the investigation involved in the project will be undertaken after introductory work on research methods has taken place and candidates have acquired a foundation of knowledge and understanding of environmental problems, concepts and strategies. However, candidates should be made aware of the nature of coursework requirements early on. This will enable them over a period, in consultation with the teacher, to:

1. identify a local topic of particular interest to them;
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 project plan for implementation, with sufficient time for successful completion given the topic chosen and the resources available.

The project should be candidates' own work, although teachers may legitimately give assistance and guidance, particularly in the planning and preparation of the investigation and during data collection, through discussion and supervision of activities. However, the extent of guidance during data collection, analysis and the production of the written reports must be taken into account when marks are awarded.

The teacher may give assistance by:

- (a) preparing candidates individually to undertake their projects or together as part of a class (e.g. by making them aware of a range of local environmental problems, of the scope of topics or of the range of research methods available);
- (b) guiding candidates in the selection of their project topics (e.g. by preparing a list of suggested topics or discussing the implications and difficulties of various alternatives devised by candidates, particularly in the light of available local resources);
- (c) suggesting possible project strategies and stimulating new lines of activity;

- (d) guiding candidates as to how the aspects of Resources, Development, Impact and Management can be incorporated;
- (e) discussing problems and difficulties encountered;
- (f) supervising candidates in their investigative work;
- (g) making candidates aware of what is expected of them in terms of presentation and suggesting appropriate presentation techniques.

Examples of coursework topics

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/clearing oil spills so far as it affects the ecosystem?

Is solar energy a viable technology for energy production in our locality?

How can our school/community use more recycled material and generate more recycling?

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 steps can be taken to reduce the effects of wind damage X on settlement Y?

What weather conditions prevail when air pollution from traffic is most damaging and how can the damage be limited?

How can the effect 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 promoted?

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

The project report

The project 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 the total of words);
- (b) a clear title and 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) description of the context: concise and relevant background information on the place and processes involved;
- (d) description of the main research methods employed 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 purposes 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 concerning 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 as they stand, as if the report were a scrap-book. Candidates should translate such data into a form of their own. Similarly, wholesale 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

ASSESSMENT CRITERIA FOR COURSEWORK (SCHOOL-BASED ASSESSMENT)

Assessment and marking of coursework

The project will be assessed by using the criteria below. The criteria are derived from the assessment objectives listed earlier in the syllabus. Marking should be positive and must reward a candidate's achievements rather than penalise his/her failings.

Each criterion carries a maximum of 6 marks. The general principle underlying the award of marks for achievement at various levels should be:

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

The higher the mark, the greater the breadth and depth of the candidate's insight into, and handling of topic, methods, data and conclusions.

Criteria for the assessment of coursework

Assessment Objective A: Knowledge with understanding

Criterion 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

- 5 - 6 Aspects interrelated using appropriate terminology
- 3 - 4 Aspects interrelated
- 1 - 2 Aspects identified

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

3: Data collection: using sources

- 5 - 6 Extensive range of sources used, including collection of primary data
- 3 - 4 Limited range of sources used, including collection of primary data
- 1 - 2 Limited range of sources used

4: Data collection: using research techniques

- 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

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

6: Analysing data

- 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**

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

8: Evaluating choices

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

9: Evaluating strategies

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

10: Making reasoned judgements

- 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

PRE-MODERATION MONITORING

In order to give guidance and assistance to Centres preparing candidates for the Environmental Management examination for the first time, each Centre is required to submit an outline of the types of coursework projects which candidates will undertake. This outline should be presented on one sheet of A4 paper, preferably using a duplicate of the form included in this syllabus, and submitted to CIE at least 8 months before the date of the examination. The outline should give an indication of the types of project to be undertaken and list a few different projects as examples, with a brief statement concerning the purpose and investigation strategies likely to be associated with these example projects, including how Impact and Management aspects are to be incorporated. Centres will be informed as quickly as possible of the suitability of the types of projects candidates will be undertaking as coursework.

Precise details of individual projects for each student are not required as it is appreciated that they may change from original plans in the light of the outcomes of investigation, and other circumstances. Rather, CIE wishes to be informed of the nature of the work to be undertaken and the manner in which coursework objectives will be satisfied.

The purpose of this exercise is advisory. Once CIE is satisfied that the Centre is able to devise and support suitable coursework projects with students it will not be necessary to submit a coursework summary in subsequent years.

MODERATION**(a) Internal Moderation**

When several teachers in a Centre are involved in internal assessments, arrangements must be made within the Centre for all candidates to be assessed to a common standard.

It is essential that within each Centre the marks for each skill assigned within different teaching groups (e.g. different classes) are moderated internally for the whole Centre entry. The Centre assessments will then be subject to external moderation.

(b) External Moderation

All coursework submitted for moderation must be kept in a flat card file (not a ring binder) which must be clearly marked with the candidate's name and number, the Centre name and number and the coursework title. Each piece of coursework should be accompanied by the appropriately completed Candidate Record Card, signed by the teacher in charge.

Individual Candidate Record Cards and Coursework Assessment Summary Forms must be received by CIE no later than 30 April for the June examination and 31 October for the November examination along with a sample of the coursework undertaken by the candidates. The samples should cover the full ability range. If there are ten or fewer candidates all the coursework that contributed to the final mark for all the candidates must be sent to CIE. Where there are more than ten candidates the size of the coursework sample to be sent is as shown on the reverse of the Coursework Assessment Summary Form. The Centre should select candidates covering the whole mark range, with the marks spaced as evenly as possible from the top mark to the lowest mark. If appropriate the samples should be selected from the classes of different teachers. Further samples of coursework may subsequently be required. All records and supporting written work should be retained by the Centre until after the publication of the results.

Further advice on coursework in Environmental Management is given in 'A Teacher's Guide to Environmental Management' available from CIE.

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.

ENVIRONMENTAL MANAGEMENT
Individual Candidate Record Card
IGCSE 200

Please read the instructions printed overleaf and the General Coursework Regulations before completing this form.

Centre Number						Centre Name	June/November	2	0	0
Candidate Number						Candidate Name	Teaching Group/Set			

Title of Assignment											
Domain						Mark gained		Comment			
A	Knowledge with Understanding					1					
		(max 12)				2					
B	Investigation					3					
						4					
						5					
		(max 24)				6					
C	Evaluation, Judgement and Decision Making					7					
						8					
						9					
				10							
					Total Mark (max 60)		Marks to be transferred to the Coursework Assessment Summary Form				
Amount of scaling if relevant				Internally Moderated Mark (max 60)							

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INSTRUCTIONS FOR COMPLETING INDIVIDUAL CANDIDATE RECORD CARDS

1. Complete the information at the head of the form.
2. Mark the Coursework assignment for each candidate according to the mark scheme devised by the Centre for the Coursework unit. This mark should be developed using criteria comparable to that listed in the Syllabus booklet.
3. Enter marks and total marks in the appropriate spaces. Complete any other sections of the form required.
4. Ensure that the addition of marks is independently checked.
5. **It is essential that the marks of candidates from different teaching groups within each Centre are moderated internally.** This means that the marks awarded to all candidates within a Centre must be brought to a common standard by the teacher responsible for co-ordinating the internal assessment (i.e. the internal moderator), and a single valid and reliable set of marks should be produced which reflects the relative attainment of all the candidates in the Coursework component at the Centre. The outcome of internal moderation, in terms of the number of marks added to or subtracted from the initial total, must be clearly written in the box marked 'Amount of scaling if relevant'. If no scaling is necessary, please indicate by writing a zero in this box.
6. Transfer the marks to the Coursework Assessment Summary Form in accordance with the instructions given on that document.
7. Retain all Individual Candidate Record Cards and Coursework which **will be required for external moderation.** Further detailed instructions about external moderation will be sent in late March of the year of the June examination and early October of the year of the November examination. See also the instructions on the Coursework Assessment Summary Form.

Note: These Record Cards are to be used by teachers only for students who have undertaken Coursework as part of their IGCSE.

A. INSTRUCTIONS FOR COMPLETING COURSEWORK ASSESSMENT SUMMARY FORMS

1. Complete the information at the head of the form.
2. List the candidates in an order which will allow ease of transfer of information to a computer-printed Coursework mark sheet MS1 at a later stage (i.e. in candidate index number order, where this is known; see item B.1 below). Show the teaching group or set for each candidate. The initials of the teacher may be used to indicate group or set.
3. Transfer each candidate's marks from his or her Individual Candidate Record Card to this form as follows:
 - (a) Where there are columns for individual skills or assignments, enter the marks initially awarded (i.e. before internal moderation took place).
 - (b) In the column headed 'Total Mark', enter the total mark awarded before internal moderation took place.
 - (c) In the column headed 'Internally Moderated Mark', enter the total mark awarded *after* internal moderation took place.
4. Both the teacher completing the form and the internal moderator (or moderators) should check the form and complete and sign the bottom portion.

B. PROCEDURES FOR EXTERNAL MODERATION

1. University of Cambridge International Examinations (CIE) sends a computer-printed Coursework mark sheet MS1 to each centre (in late March for the June examination and in early October for the November examination) showing the names and index numbers of each candidate. Transfer the total internally moderated mark for each candidate from the Coursework Assessment Summary Form to the computer-printed Coursework mark sheet MS1.
2. The top copy of the computer-printed Coursework mark sheet MS1 must be despatched in the specially provided envelope to arrive as soon as possible at CIE but no later than 30 April for the June examination and 31 October for the November examination.
3. Send samples of the candidates' work covering the full ability range with the corresponding Individual Candidate Record Cards, this summary form and the second copy of MS1, to reach CIE by 30 April for the June examination and 31 October for the November examination.
4. Indicate the candidates who are in the sample by means of an asterisk (*) against the candidates' names overleaf. The size of the coursework sample should be as follows:

number of candidates entered	number of candidates in sample
0-10	all candidates
11-50	10
51-100	15
above 100	20

5. Where more than one teacher is involved in marking the work, the sample must include candidates marked by all teachers. Candidates must be selected so that the whole range is covered, with marks spaced as evenly as possible from the top mark to the lowest mark.
6. CIE reserves the right to ask for further samples of Coursework.
7. Send, with the sample work, instructions given to candidates and information as to how internal moderation was carried out.

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
INTERNATIONAL GENERAL CERTIFICATE OF SECONDARY EDUCATION

ENVIRONMENTAL MANAGEMENT

Centre's Coursework Proposal

Centre Name: Centre Number:

It is appreciated that the examples of projects described below are developed for advisory purposes and may be amended when undertaken by individual candidates.
Please outline between three and five possible projects.

Title	Related Area of Syllabus: IMPACT	Related Area of Syllabus: MANAGEMENT	Possible Methods