IMPORTANT NOTICE

Cambridge International Examinations (CIE) in the UK and USA

With effect from the June 2003 examination Cambridge International Examinations will only accept entries in the UK and USA from students registered on courses at CIE registered Centres.

UK and USA private candidates will not be eligible to enter CIE examinations unless they are repatriating from outside the UK/USA and are part way through a course leading to a CIE examination. In that case a letter of support from the Principal of the school which they had attended is required. Other UK and USA private candidates should not embark on courses leading to a CIE examination after June 2003.

This regulation applies only to entry by private candidates in the UK and USA. Entry by private candidates through Centres in other countries is not affected.

Further details are available from Customer Services at Cambridge International Examinations.

ENVIRONMENTAL MANAGEMENT

GCE Advanced Subsidiary Level 8291, first examination 2005/6

(available in the June and November examinations)

CONTENTS

NOTE

Additional copies of this syllabus can be ordered from CIE Publications. When ordering, please quote the reference number to be found on the back cover of these documents.

INTRODUCTION

This syllabus is concerned with environmental issues and their management and is designed to recognise the internationally diverse nature of its client group. By learning about the details and principles of environmental processes, students are led to an understanding of the causes of key issues affecting the environment on a variety of scales. These topics extend to developing an understanding of the possible ways of managing the environment in the context of the pressures, which both encourage and constrain effective environmental management. The syllabus is designed to encourage learning through suitable case studies, which can be local and global; allowing courses to satisfy a diverse range of interests.

The 'environment', which is the concern of this syllabus is based on the four traditional subdivisions of the global environment. The lithosphere is the upper mantle of rock and crust, that forms the tectonic plates upon which the continents lie. The hydrosphere is the body of water, present as ice, liquid water or water vapour. The atmosphere is the gaseous shell outside these two non-living components. The biosphere is formed by the regions of living organisms that have established themselves in the other three spheres. The specification recognises that human population growth has become the dominant factor driving environmental change, and that the majority of the human population now live in cities.

Issues relating to the growth of urban and industrial areas, and the impact of rapid population growth are incorporated into the modules in the syllabus.

Environmental Management has a strong human dimension and is concerned with both local and global issues. It is concerned with the various ways in which societies, governments and economic activity (industry, agriculture and urban areas) use, misuse and attempt to manage both the local and the global environment. Whilst environmental management can often be negative by emphasising pollution, exploitation and misuse, it is important to give recognition to the positive ways in which we manage our environment. Thus issues such as global warming, industrial pollution and the impact of rapid population growth need to be balanced with the creation of National Parks, sensitive urban design and sustainable management/development.

The syllabus reflects a contemporary concern with sustainable management. The issues have been well outlined by the World Conservation Strategy (1981), the Brundtland Commission (from 1983) and the Report of the Earth Summit at Rio de Janeiro (1992). Through a study of Environmental Management, it is hoped that candidates will learn to perceive that the environment has resources which mankind has exploited through developments which have often had a negative impact and that we should aim for a sustainable management of resources.

AIMS

Through following this syllabus, students should:

1. develop a knowledge of the Earth's natural systems and the effects of human activity on these systems;
2. be challenged to think about important environmental problems, which face the world today;
3. understand that solutions to environmental issues are not easy to find;
4. recognise public concern over the environment; it is an important social and political issue;
5. understand that whilst environmental matters can be debated by government, non-government and scientific organisations, individuals should think for themselves to develop solutions.

The course will address a number of basic issues, which are included as learning objectives within the content of the syllabus:

- people are affected by, and respond to natural phenomena in many different ways;
- rapid human growth is the fundamental environmental issue;
- the sustainable use of resources is fundamental to all solutions;
- human beings affect the environment of the whole planet thus the importance of a global perspective;
- urban environmental issues need to be given an important focus.

Prior level of attainment and knowledge

It is not necessary for candidates to have studied environmental science/management prior to commencing this course. It is designed to attract candidates who possess a good scientific background along with an awareness of broad environmental matters. They may therefore have followed courses in a combination of subjects, which will provide a good foundation; these may have included some but not all of the following: biology, geography, general science, physics, chemistry and of course environmental science and management.

Rationale

The syllabus provides an opportunity to study a range of issues of environmental importance, the scientific principles that underpin them and how they have or are likely to be managed. The specification lays an appropriate foundation for further study of Environmental Science and Management or related subjects in higher education. In addition it provides a worthwhile course for candidates of various ages, background and nationalities in terms of general education and lifelong learning.

ASSESSMENT OBJECTIVES

An Assessment Objective is an area of competency. The Assessment Objectives represent, more precisely, those aspects of the broad aims of the syllabus that will be assessed. Three Assessment Objectives have been identified for the purposes of this syllabus. They are intended to support the curriculum objectives in the syllabus and will be specifically tested in the examination components.

The three Assessment Objectives in Environmental Management are:

AO1 Knowledge and understanding

AO2 Handling information and problem solving

AO3 Enquiry and investigation

Assessment Objective C relates more particularly to Paper 3.

A description of each Assessment Objective follows.

AO1 Knowledge and understanding

Students should be able to demonstrate knowledge and understanding of:

1. within the confines of the syllabus, the important environmental issues facing the world in the 21st century.
2. environmental patterns of organisation, causality and process.
3. policies and mechanisms for managing the environment on local, regional and global scales.
4. critical and supportive evaluations of environmental management policies
5. relevant scientific phenomena, facts, laws, definitions, concepts and theories, with use of scientific vocabulary, terminology, conventions (including symbols, quantities and units) as relevant to the content of the syllabus;

AO2 Handling information and problem solving

Students should be able to:

1. locate, select and organise relevant information from a variety of data sources and communicate it clearly;
2. compare sets of data and translate information from one form into another;
3. manipulate numerical, graphical and other data;
4. use information to identify patterns, report trends and draw inferences.

AO3 Enquiry and investigation

Students should be able to:

1. formulate hypotheses and predictions on the basis of observations and prior research; plan, select appropriate apparatus/materials and carry out experiments in order to test their hypothesis or prediction;
2. make accurate observations and measurements and record these in an appropriate form (e.g. graphs, tables, diagrams etc); use statistical tools to analyse their data;
3. assess the reliability of their data and identify ambiguities; make deductions and formulate conclusions based on their data; evaluate the validity of their method; discuss the implications of findings in terms of the effect on the environment, and value judgements of individuals, organisations and self.

Specification Grid

The approximate weightings allocated to each of the Assessment Objectives in the assessment model are summarised in the table below.

Assessment Objective	Weighting
AO1 Knowledge with understanding	45%
AO2 Handling information and problem solving	35%
AO3 Enquiry and investigation	20%

SCHEME OF ASSESSMENT

Candidates are required to enter for Papers 1, 2 and 3. Details of these Papers are set out below.

THEORY PAPERS

Paper 1	Lithosphere and Atmosphere.	**(1h 30min, 80 marks)**
Paper 2	Hydrosphere and Biosphere.	**(1h 30min, 80marks)**

Papers 1 and **2** are each divided into **two** sections.

Candidates must attempt **Section A** and **one** question from a choice of **three** in **Section B.**

Section A: Short answer questions, based on sets of data, diagrams or extracts set in a variety of forms.

Section B: A two-part essay question, the first part of each question providing a lead in to the second part, which will involve extended writing. Questions in section B are drawn from parts of the syllabus not covered in section A

PRACTICAL ASSESSMENT

Paper 3 (Coursework) (School-based Assessment, 40 marks)

This will take the form of an Individual Research Report of approximately 2000 words, carried out by the candidate, into an issue arising out of their course of study. The report may be focused on a local, regional or global issue. It may be based on secondary source material and/or internet data, although the use of primary sources and field data collection should be undertaken where practicable and desirable.

- It is a requirement of this specification that centres submit a list of report titles no later than November 30th for the examination in the following June or June 30th for the following November. It is only necessary for the board to the review the titles prior to the examination. The reports should be internally assessed and later a sample submitted to CIE for moderation. The sample should be posted to arrive at the board by April 30th for the June examination and October 30th for the November examination.

- Teachers may not undertake School-based Assessment without the written approval of CIE. This will only be given to teachers who have satisfied CIE's requirements concerning moderation and they will have to undergo special training in assessment before entering candidates.

ASSESSMENT GRID

Papers 1 and 2 have identical mark allowances as the papers have a similar format.

Assessment Objectives	Papers 1 and 2 Section A		Papers 1 and 2 Section B	Paper 3 Enquiry
	Question 1	Question 2	3, 4 or5	
AO1	15	15	60	
AO2	25	25	20	
AO3	-	-		40

The mark allowances for papers 1 and 2 are doubled, as they are totalled across both papers.

THE SUBJECT CONTENT OF THE SYLLABUS

The AS syllabus has been constructed around a common core.

The syllabus is concerned with environmental issues, which generate management. The issue can manifest itself on a variety of scales: local, regional or global. The syllabus content meets these requirements through three sections: Key Questions, Content and under Notes for guidance reference to exemplars, topics and teaching guidance. The Key Questions aim at providing an emphasis for a section of the specification and the Notes for Guidance some exemplars for study.

Examination questions will be derived from the content column. Candidates should show knowledge and understanding of the points listed in the content column(s), and be able to handle information and solve problems relating to these points.

Centres should note that the Key questions do not necessarily provide a rigid and prescriptive programme of teaching. The specifications content aims to provide overlap between sections thereby permitting flexibility; hopefully centres will be guided towards case studies, which can be incorporated, into their own schemes of work.

The Lithosphere		
Key Question	**Content**	**Notes for Guidance**
1 What are the key elements of the structure of the earth?	The internal structure of the earth emphasising the difference between oceanic and continental crust. Plate tectonics: the major plates, convection currents; ocean floor spreading; destructive, constructive and conservative plate boundaries; and evidence derived from palaeo-magnetism, palaeontology and geological fit. Seismic wave data as supporting evidence for the structure of the earth.	Global evidence; mapping the earth's plates, fossil record including dinosaurs, coal measures. Examples chosen from two contrasting regions e.g. The Atlantic with its mid-ocean ridge and with the Pacific ring of fire. Case studies of a major volcanic eruption, a major earthquake; these studies can of course be combined with studies in Key Question 2
2 What natural hazards are derived from plate movement and how are they managed? What strategies can be employed to limit damage and loss of life?	Earthquakes: scale; frequency and activity; effects in LEDC's and MEDC's recurrence intervals. Strategies to include: researching the historic record, recurrence intervals, seismic gaps; building design; seismic evidence; rescue and aid. Volcanoes: types of eruption to contrast the explosive andesitic/ and more acid types and basaltic eruptions; effects in LEDC's (Pinatubo) and MEDC's (Etna or Unzun). Studies to include: historic records and recurrence seismic evidence, tiltmeters, chemical analysis; rescue and aid; and damage prevention. Hazards to include tsunamis, landslides, volcanic (ash and lava).	In-depth case studies would be a route for teaching this section. These studies should include examples of earthquake and volcanic activity in both LEDC's and MEDC's. Examples: Earthquakes: Mexico City (1985), Armenia(1988), Loma Prieta (1989), MT. St Helens (1989) Kobe (1995), Colombia (1999), Volcanic eruptions: Ruapehu (1965, 1975, 1995), Mt. Unzun (1991), Pinatubo (1999) Monserrat (1995), Etna (2001), Grimsvotu Jokulhaup (Glacial burst) 1996.
3 What natural and man-made processes contribute to different types and causes of mass-movement on slopes? How are sudden mass-movements managed?	Rock weathering processes and the accumulation of debris on slopes. Causes of mass movement: flows and slides including: rock falls, landslides, earth slumps, soil creep, solifluction and mudflows. Human influences to include; deforestation and building. Slope management policies including; slope angle reduction, drainage and surface protection.	A theoretical introduction backed up by a case study, e.g. Hong Kong, Rio de Janeiro, Sarno in Southern Italy
4 What are the major causes of soil deterioration and erosion and how can they be prevented?	Soil formation and texture. Soil erosion through agriculture, deforestation, grazing, salinisation and compaction; and management using a case study from either a LEDC or MEDC. Soil deterioration through agriculture Methods for the sustainable use of soils for agriculture as applied to both MEDC's and LEDC's.	Case studies where possible should be local or text derived; e.g. Southern England, Himalayan foothills, USA Dustbowl
5 What pressures has human activity placed upon the resources of the lithosphere; how can they be managed sustainably for future generations?	The nature of renewable and non-renewable resources. Energy resources in LEDC's and MEDC's including: demand and the depletion of resources in MEDC's; LEDC priorities in the use of fossil fuels; the depleting of reserves of fossil fuels. Strategies to include: sustainable use of fossil fuels through; developing renewable resources and conserving energy. Land as a resource under pressure from urban sprawl and economic development (surface mining and reservoirs). The management of areas of outstanding natural beauty; conservation areas/National Parks.	Examples should include: non-renewable resources, coal, oil and natural gas; renewable, water (HEP, tide and waves), Wind and Solar energy. Case studies contrasting the policies of one MEDC (e.g. Germany) with a LEDC (India). Strategies may be illustrated by contrasting the policies of two countries or by using resources; e.g Wind, water and nuclear energy in France with coal in India. Urbanisation in an LEDC e.g.. Sao Paolo or Mexico City and economic developments in an LEDC(Amazonia) and an MEDC. Sample studies of National Parks, areas of outstanding natural beauty.

The Atmosphere		
Key Question	**Content**	**Notes for guidance**
1 What are the structural components of the atmosphere and why is it important to understand their characteristics?	The structure of the atmosphere to include: troposphere, stratosphere, mesosphere and thermosphere. Each zone described in terms of composition, temperature and density variation. The interaction of incoming and outgoing radiation within the troposphere and stratosphere.	Reference can be made to models of atmospheric structure, evidence from research (balloons) etc. Ozone and the absorption of uv radiation. The absorption of visible radiation by the earth's surface; emission of thermal infrared radiation and absorption by tropospheric gases.
2 What is the pattern of air movement in the troposphere and how does it influence regional climates and local weather? What methods are employed to forecast weather patterns?	Variations in global insulation. Regions of high and low pressure. Global wind systems. The effects of land, relief and ocean currents. The location and characteristics of Temperate Maritime, Equatorial and Warm Temperate Climates. The formation of temperate and tropical cyclonic conditions and anticyclonic conditions. Weather forecasting in relation to these weather conditions.	The earth's temperature and pressure distribution and seasonal variations. Traditional text based studies or student investigations. The use of weather charts, satellite data in forecasting and recording weather data (visual and infrared photography).
3 How does human activity affect the atmosphere?	The principle sources of CFC's and their role in stratospheric ozone depletion. The effects of stratospheric ozone depletion. The role of gases such as carbon dioxide and methane in the enhanced 'greenhouse effect' and possible climatic consequences. Emissions of sulphur dioxide and nitrogen oxides and the formation of acid rain including effects upon buildings, water courses and soils. Predicted and possible climatic and biospheric effects of global warming.	Examples from the Antarctic and Northern Hemisphere. The likely impact of global warming on raising sea levels, increased storm intensity, climatic change; where possible using local examples. There is an opportunity to link industrial pollution with Key Question 5 in the Lithosphere module. Emissions from industrialised countries and transference to other countries. Reference can be made to studies in the UK and Sweden (1980's)
4 How can atmospheric pollution be controlled and what are the problems involved with the global management of atmospheric pollution?	Reducing emissions through cleaning flue gases, alternative energy, afforestation, CFC free domestic appliances sprays etc. International controls/protocols, recognising that pollution crosses international boundaries. The background to the difficulties in achieving a broad agreement in the reduction of atmospheric pollution.	Reference to controls on CFC emissions; LEDC and MEDC examples: Kyoto and Buenos Aires (1998) and Rio de Janeiro(1992) meetings and the problems in achieving agreement. Afforestation and the use of alternative energy sources. Reference to examples such as an LEDC and an MEDC to illustrate problems in controlling industrial pollution

The Hydrosphere		
Key Question	**Content**	**Notes for Guidance**
1 How is water stored and transferred globally and locally?	The main storage zones of water and the percentages of water held in each. The natural flows and stores within both the global and local (drainage basin) water cycles. The global system includes the transfer between ocean/seas, atmosphere and land; it should refer to the conditions under which the volume of solid, liquid and gaseous water will change. The local water cycle includes: evaporation, precipitation, interception, runoff, infiltration and ground water. Groundwater stores are to include the features of natural aquifers: confined, unconfined and perched.	The global (closed) system in conjunction with the more localised open system, which could be a local drainage basin. It is possible to undertake the local element of this study through field work. Examples of natural aquifers can be on a small local scale or of the scale of the Australian Basin
2 What has been the impact of human activity on the quantities of water in natural stores?	The impact of climatic change and global warming on sea and ice volumes. The impact of rising sea levels; past as with ice ages and currently though the increased likelihood of flooding in low-lying areas. The impact of agriculture and the supply of water for industrial and domestic use upon the natural supplies of water.	Emphasis on the fragility of the global climate with reference to both falling (past) and rising sea levels (current and future). Diminishing water supplies through agriculture could include: The Aral Sea, Prairies, Australian Artesian Basin. Shortages due to urban and industrial demand may include: Mexico City, Middle East, London Basin. Again there is an opportunity to research local water supplies and supply.
3 How can water supply be sustained and what are the environmental consequences of the artificial storage of water?	The management of water supply on a local and regional scale, including disparities in water resources, the demand for water and the supply of water. Dams, barrages and reservoirs. Advantages: water supply recreation, power, environment and local climate. Disadvantages: cost, silting and environment. Water supply in arid countries to include ground water and desalinisation.	Examples chosen from contrasting areas such as: USA (Colorado), China (3 gorges), Nigeria or Ghana. Examples of desalinisation in Persian Gulf states, Malta.
4 How does human activity lead to the pollution of water stores and how can this form of pollution be managed?	Pollution of groundwater by metals, nutrients, and organic compounds. Nutrient enrichment and eutrophication of lakes and rivers; the main sources of eutrophication and its effects. The impact of sewage disposal upon rivers, lakes and seas and the main health and environmental problems associated with the disposal of sewage sludge. Marine pollution and effects on aquatic and bird life and on the coastal environment. Pollution of rivers and lakes by industrial spillage and river/lake pollution. Management via: waste controls, local and regional policies.	There is plenty of scope for candidates to use local studies and link the examination requirements with the wide range of research projects on the topic. Other case studies could include: The Rhine, Ganges, The Mediterranean Sea, and Oil Tanker Spillage.

The Biosphere		
Key Question	**Content**	**Notes for Guidance**
1 What are the major abiotic and biotic factors, which drive and influence the distribution of different ecosystems? What are the main components and characteristics of ecosystems and how are they structured?	The biotic and abiotic factors which control the distribution of the worlds major biomes. Two contrasting ecosystems should be studied to detail the interactions of the components of an ecosystem, (understand and use the terms: trophic levels, food chains and webs biome, succession and NPP). Photosynthesis: requirements and process. Photosynthesis and different wavelengths. The influence of light intensity and rainfall on plant productivity.	A brief survey of the global system followed by a detailed study of the distribution of ecosystems including tropical rain forest, subtropical rain forest, subtropical savannah, desert, temperate deciduous forest and high latitude tundra; from which the two case studies should be chosen.
2 How has human activity both disrupted and destroyed ecosystems?	The impact of agriculture, deforestation, exploitation and fires upon marine and terrestrial ecosystems. The formation of plagioclimaxes, arrested successions and loss of biodiversity. The impact of deforestation for industrial and agricultural purposes in LEDC's. The impact of commercial farming in MEDC's through mechanisation and the expansion of fields leading to the loss of local habitats.	This can extend the previous examples chosen in KQ's 1. Deforestation in LEDC's could use examples from the Tropical Rain Forest (Amazonia) or Tropical Monsoon Forest. MEDC examples can be drawn from Western Europe, USA etc. There is an opportunity to combine these topics with KQ5 in the lithosphere unit.
3 What methods have been employed to preserve, conserve, and restore ecosystems? To what extent have meetings between nations and pressure groups been important in highlighting environmental awareness and managing the biosphere?	Methods to include: national parks, afforestation, maintaining biological diversity through such methods as pollution control, changing agricultural systems, ecotourism, forest conservation, wildlife management, and ecological islands. The impact of international protocol (e.g. Rio de Janeiro and Montreal) and research and pressure from groups such as the WWF. sustainable development within conservation areas.	Case studies as appropriate or a survey of conservation and restoration of ecosystems with reference to a broader range of examples
4 What has been the impact of population growth upon the resources of countries at contrasting levels of economic development?	Population, resources and carrying capacity: the population models of Malthus and Boserup. The concepts of overpopulation, under population and optimum population. Policies aimed at resolving these issues include: sustainable and more productive farming methods in LEDC's and MEDC's; economic and social development; the sustainable provision of energy and industrial raw materials.	A study of the population models followed by contrasting case studies e.g. Mauritius, India, UK. examples can include: China, UK or European country and Canada or Australia. Agricultural improvements can be illustrated through the Green Revolution, biotechnology etc. More general economic and social development through case studies including a MEDC and a LEDC

PAPER 3 (COURSEWORK) SCHOOL BASED ASSESSMENT

At AS level this will take the form of an Individual Research Project of 1500 — 2000 words carried out by the candidate, into an issue arising out of their course of study. The report may be focussed on a local regional or global issue. Whilst the issue may derive out of the traditional areas of environmental science the report must contain an investigation and evaluation of the management issues associated with the topic. The topic should be chosen from any part of the 4 units, which comprise the specification.

As stated the topic should be issue and management based at one of a variety of scales. Whilst secondary source material is useful in providing background information, the use of primary sources and field data collection should be undertaken. This means that it is possible to use information sources other than that obtained from field study and can include: the internet, the media, newspaper data and documented data from companies and organisations.

Centres should recognise that it is a test of a candidate's ability to confine their report to a word limit of 2000 words; long and rambling projects often do not constitute a valid report as they contain too much extraneous material. It is expected that having identified a clear environmental management issue candidates structure their investigation into the following stages of scientific method, namely:

An introduction comprising the identification of an issue expressed through a hypothesis or question.

A methodology, which outlines the investigative avenues, used for the study; these should be justified.

A results and analysis section. This should form the main part of the study and contain data expressed through illustrative techniques such as: pictorial (diagrams and photographs), tables and graphs. This illustrative material should be analysed through detailed descriptions and explanations.

A conclusion which draws together the finding of the investigation.

An evaluation of the study comprising an assessment of the success or shortcomings of the study.

In order to ensure that they comply with the requirements of the syllabus, Centres must seek approval, in advance, from CIE. It is only necessary for each Centre to complete a CIE approval form containing a list of candidates with their project title. This form should be submitted CIE BY November 30th. for a June examination and June 30th for a November examination.

It is the responsibility of teachers within the Centre to monitor the work undertaken by the candidates and make certain that the work complies with the spirit of the specification. The report should be assessed by approved teachers within each Centre; this includes teachers who have satisfied CIE's requirements concerning moderation (it will not be necessary for current approved assessors to seek further approval).

EXAMPLE OF A RESEARCH REPORT

'To what extent has industrial pollution of a nearby river been successfully controlled and reduced'.

(a) The problem identified is the pollution of a river through industrial effluent and the extent to which industries manage their waste and river pollution has been reduced.

(b) This topic relates to waste management, the need to dispose of industrial waste materials and manage /reduce river pollution.

(c) Data sources might include:
counting the variety of species at various points before and after the discharge point and considering the different species present at these points,
testing samples of river water before and after the discharge point.
investigating the policies of contributing industries.
using local or internet data sources

(d) Candidates should ascertain how much data they can collect and analyse in the time available in order to produce viable conclusions.

(e) The scale of the project should not be so small that valid data cannot be identified or that a variety of environments need to be examined. On the other hand, it should not be so big as to make the collection of data too time-consuming.

CRITERIA FOR ASSESSMENT

There are three assessment skills that must be addressed by the Research Report.

Skill	Description	Mark
C1	Research and planning	6
C2	Data collection and presentation	9
C3	Conclusion and evaluation	5

Mark schemes for assessment should be based on the following criteria:

Skill C1: Research and planning

(a) A hypothesis or question clearly stated. 1 mark

(b) An expression of knowledge through a clear explanation of the principle underpinning the hypothesis or question. 2 marks

(c) Plan includes appropriate methods clearly explained. 2 marks

(d) Developed plan is effective at testing the hypothesis. 1 mark

Skill C2: Data collection and presentation

(a)	Data observations clearly presented and presented in a suitable format.	2 marks
(b)	Data collected and recorded accurately and with appropriate degree of precision.	2 marks
(c)	The report is organised with a logical order of presentation (information, description explanation, diagrams)	2 marks
(d)	The quality of written communication .	2 marks
(e)	Suitable statistical tools used to analyse the data.	1 mark

Skill C3: Conclusions and evaluation

(a)	Full conclusions are drawn, supported by reference to data.	2 marks
(b)	Knowledge of environmental and management principles used to explain trends and patterns in own results.	2 marks
(c)	An evaluative assessment of the report in terms of its limitations and level of success.	1 mark

This total of 20 marks will then be doubled to a mark out of 40.

Each Skill criterion is marked on a scale of 0 to 1/2, as follows:

2 = criterion fully met, 1 = criterion partly met, 0 = criterion not met at all.
or 1 = criterion met, 0= criterion not met at all.

Moderation

All aspects of coursework will be moderated. Coursework designs and Schemes of Assessment will be devised by schools, who should ensure that they comply with the course Aims and Assessment Objectives.

(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

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 and the Schemes of Assessment for each assignment. 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, all the coursework that contributed to the final mark for ten of them will be required. 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. A further sample of coursework may subsequently be required. All records and supporting written work should be retained until after the publication of the results.

RESOURCE LIST

J L Chapman & M J Reiss	*Ecology: Principles and Applications* Cambridge University Press, 0521 38951 8
W P Cunningham	*Understanding Our Environment: An Introduction* William C Brown, 0 697 20456 1
B J Neber & R T Wright	*Environmental Science: The Way the World Works* (4th Edition) Prentice Hall, 0 13 285 446 5
Botkin/Keller	*Environmental Science: Earth as a Living Planet* Wiley (2000) 0 471 32173 7
Kevin Byrne	*Environmental Science (Bath Advanced Science)* Nelson Thornes (2001) 0 17 448305 8
G Tyler Miller	*Sustaining the Earth: An Integrated Approach* Wadsworth, 0 534 21 432 0
Andrew Porteous	*Dictionary of Environmental Science and Technology* John Wiley & Sons, 0 471 93544 1
W Ashworth	*The Encyclopaedia of Environmental Studies* Facts on File, 081 601 531 7
P J Alma	*Environmental Concerns* Cambridge University Press (UK), *Cambridge Social Biology Topics* series, (1983), 0 521 42869 6
A Cornwell	*Man and the Environment* Cambridge University Press (UK), *Cambridge Social Biology Topics* series, (1983), 0 521 28892 4
Geoff Hayward	*Applied Ecology*, *University of Bath Science 16-19* series Nelson (UK), (1992), 0 17 448187 X
D Millerchip	*The Food Resources of Man* Cambridge University Press (UK), *Cambridge Social Biology Topics* series, (1984), 0 521 28891 6
Roy Collard	*The Physical Geography of Landscape* Unwin Hyman, 0 7135 2734 X
Greg O'Hare & John Sweeney	*The Atmospheric System* Oliver & Boyd, 0 05 00374 20
W P Cunningham & B Woodworth-Saigo	*Environmental Science – A Global Concern* William C Brown (1995) (3rd Ed), 0 697 15894 2
David Waugh	*Geography: An Integrated Approach* Nelson Thornes (2001) 3rd. Edition 9 780174 447061
Michael Witheric et al	*Environment and People* Stanley Thornes (1995) 9 780748 721207
Judith Woodfield(editor)	*Ecosystems and Human Activity* Collins International (1994) 0 00 326644 3
Jane Crispin & Francis Jegede	*Population, Resources and Development* Collins Landmark Geography (2000) 0 00 780003 266511
Park	*Environmental Hazards* Nelson 0 174 48217 5

MATHEMATICAL REQUIREMENTS

It is assumed that all candidates are able to:

- perform calculations involving addition, subtraction, multiplication and division of numbers;
- take account of accuracy in numerical work and handle calculations so that significant figures are neither lost unnecessarily nor carried out beyond what is justified;
- make approximate evaluations of numerical expressions (e.g. $\pi^2 = 10$) and use such approximations to check the magnitude of machine calculations;
- express fractions as percentages and vice versa;
- recognise and use expressions in decimal and standard form notation;
- use tables or calculators to evaluate powers, roots, reciprocals, arithmetic means;
- substitute physical quantities into equations using consistent units;
- change the subject of an equation;
- solve simple algebraic equations;
- formulate simple algebraic equations as mathematical models of physical situations;
- recognise and use the forms of expressions such as ab, a/b, x^n , x^{-n};
- comprehend the meanings of, and use the symbols/notations: <, >, =, /, α ;
- calculate areas of right-angled and isosceles triangles, circumferences and areas of circles and volumes of rectangular blocks and cylinders;
- test a relationship for direct proportionality graphically and numerically;
- select appropriate variables and scales for plotting a graph, especially to obtain a linear graph of the form $y = mx + c$;
- determine and interpret the slope and intercept of a linear graph;
- choose by inspection a straight line that will serve as the 'least bad' linear model for a set of data presented graphically: use of scatter graphs and lines of best fit.
- understand and use the area below a curve where this has physical significance.

GLOSSARY OF TERMS

It is hoped that the glossary (which is relevant only to science subjects) will prove helpful to candidates as a guide (i.e. it is neither exhaustive nor definitive). The glossary has been deliberately kept brief not only with respect to the number of terms included but also to the descriptions of their meanings. Candidates should appreciate that the meaning of a term must depend in part on its context.

1 *Define* (the term(s)...) is intended literally, only a formal statement or equivalent paraphrase being required.

2 *What is meant by* (the term(s)...) normally implies that a definition should be given, together with some relevant comment on the significance or context of the term(s) concerned, especially where two or more terms are included in the question. The amount of supplementary comment intended should be interpreted in the light of the indicated mark value.

3. *State* implies a concise answer with little or no supporting argument (e.g. a numerical answer that can readily be obtained 'by inspection').

4 *List* requires a number of points, generally each of one word, with no elaboration. Where a given number of points is specified, this should not be exceeded.

5 *Explain* may imply reasoning or some reference to theory, depending on the context.

6 *Describe* requires the candidate to state in words (using diagrams where appropriate) the main points of the topic. It is often used with reference either to particular phenomena or to particular experiments. In the former instance, the term usually implies that the answer should include reference to (visual) observations associated with the phenomena.

In other contexts, *describe* should be interpreted more generally (i.e. the candidate has greater discretion about the nature and the organisation of the material to be included in the answer). *Describe and explain* may be coupled, as may *state and explain.*

7 *Discuss* requires the candidate to give a critical account of the points involved in the topic.

8 *Outline* implies brevity (i.e. restricting the answer to giving essentials).

9 *Predict* or *deduce* implies that the candidate is not expected to produce the required answer by recall but by making a logical connection between other pieces of information. Such information may be wholly given in the question or may depend on answers extracted in an earlier part of the question.

10 *Suggest* is used in two main contexts (i.e. either to imply that there is no unique answer (e.g. in chemistry, two or more substances may satisfy the given conditions describing an 'unknown'), or to imply that candidates are expected to apply their general knowledge to a 'novel' situation, one that may be formally 'not in the syllabus').

11 *Find is* a general term that may variously be interpreted as calculate, measure, determine etc.

12 *Calculate* is used when a numerical answer is required. In general, working should be shown, especially where two or more steps are involved.

13 *Measure* implies that the quantity concerned can be directly obtained from a suitable measuring instrument (e.g. length, using a rule, or mass, using a balance).

14 *Determine* often implies that the quantity concerned cannot be measured directly but is obtained by calculation, substituting measured or known values of other quantities into a standard formula (e.g. relative molecular mass).

15 *Estimate* implies a reasoned order of magnitude statement or calculation of the quantity concerned, making such simplifying assumptions as may be necessary about points of principle and about the values of quantities not otherwise included in the question.

16 *Sketch,* when applied to graph work, implies that the shape and/or position of the curve need only be qualitatively correct, but candidates should be aware that, depending on the context, some quantitative aspects may be looked for (e.g. passing through the origin, having an intercept, asymptote or discontinuity at a particular value).

In diagrams, *sketch* implies that a simple, freehand drawing is acceptable; nevertheless, care should be taken over proportions and the clear exposition of important details.

CAMBRIDGE
INTERNATIONAL EXAMINATIONS

ENVIRONMENTAL MANAGEMENT
Individual Candidate Record Card
GCE AS LEVEL

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

Centre Number						Centre Name		June/November	**2**	**0**	**0**	**5**
Candidate Number						Candidate Name		Teaching Group/Set				

Title of Research Report				
Assessment Skill			Mark Gained	Comment
C1 Research and Planning (total 6)		(a) (1)		
		(b) (2)		
		(c) (2)		
		(d) (1)		**C1** Total Mark
C2 Data Collection and Presentation (total 9)		(a) (2)		
		(b) (2)		
		(c) (2)		
		(d) (2)		
		(e) (1)		**C2** Total Mark
C3 Conclusions and Evaluation (total 5)		(a) (2)		
		(b) (2)		
		(c) (1)		**C3** Total Mark
		Total Mark (max 20)		Marks to be transferred to the Coursework Assessment Summary Form
Amount of scaling if relevant		Internally Moderated Mark (max 40)		

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 scheme should be developed using the criteria listed in the Syllabus.

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.

CAMBRIDGE
INTERNATIONAL EXAMINATIONS

ENVIRONMENTAL MANAGEMENT
Coursework Assessment Summary Form
GCE AS LEVEL

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

Centre Number		Centre Name		June/November	2005

Candidate Number	Candidate Name	Teaching Group/Set	**C1** Research and Planning (total 6)	**C2** Data Collection and Presentation (total 9)	**C3** Conclusions and Evaluation (total 5)	Total Mark (max 20)	Internally Moderated Mark (max 40)

Name of teacher completing this form		Signature		Date	
Name of internal moderator		Signature		Date	

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 that 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 the group or set.

3 Transfer each candidate's marks from his or her Individual Candidate Record Card to this form as follows:

(a) Enter the marks initially awarded for each of skills C1; C2 and C3 in the appropriate column (i.e. before 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 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.