

**MANAGING ENVIRONMENTAL
RESOURCES
Higher**

5th edition – published May 2008

**NOTE OF CHANGES TO ARRANGEMENTS
FIFTH EDITION PUBLISHED MAY 2008**

COURSE TITLE: Managing Environmental Resources (Higher)

COURSE NUMBER: C055 12

National Course Specification:

Course Details: Clarification to depth of treatment of content throughout.

National Unit Specification:

D316 12 Land Use in Scotland Superclass updated from QA to SM

National Course Specification

MANAGING ENVIRONMENTAL RESOURCES (HIGHER)

COURSE NUMBER C055 12

COURSE STRUCTURE

This course comprises three mandatory units:

<i>D312 12</i>	<i>Natural Resource Use (H)</i>	<i>1 credit (40 hours)</i>
<i>D315 12</i>	<i>Investigating Ecosystems (H)</i>	<i>1 credit (40 hours)</i>
<i>D316 12</i>	<i>Land Use in Scotland (H)</i>	<i>1 credit (40 hours)</i>

All courses include 40 hours over and above the 120 hours for the component units. This may be used for induction, extending the range of learning and teaching approaches, support, consolidation, integration of learning and preparation for external assessment.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following:

- Standard Grade Biology, grade 1 or 2
- Standard Grade Chemistry, grade 1 or 2
- Standard Grade Physics, grade 1 or 2
- Standard Grade Geography, grade 1 or 2
- Standard Grade Science, grade 1 or 2
- Intermediate 2 Managing Environmental Resources (or its component units).

Administrative Information

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National Course Specification: course details (cont)

COURSE Managing Environmental Resources (Higher)

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Course Specification: course details (cont)

COURSE Managing Environmental Resources (Higher)

RATIONALE

The course will provide a balanced consideration of the environment from a mainly national perspective through the study of natural resources, ecology and land use. It seeks to demonstrate the interactions taking place between humans and the environment through a scientific treatment of the principles of ecosystems and contemporary resource use by society as a whole. The implications of these interactions for the future well-being of the environment in its widest context will be a central theme of the course.

The course will contribute to the candidate's general education by helping to promote an awareness of the environment and environmental issues. Consideration of the importance of seeking an enduring balance between the production and consumption of commodities and between material aspirations and the capacity of natural systems will help prepare candidates to become environmentally responsible citizens. This course, with its focus on biodiversity, sustainable development and related concepts, will make a major contribution to environmental education. It will develop knowledge and understanding which will encourage the development of positive attitudes and enable informed judgements to be made on matters of actual or potential environmental conflict.

The course will develop the candidate's scientific knowledge and experience by its consideration of principles, methods, data collection, interpretation and analysis, and emphasis will be placed on investigative fieldwork conducted in local areas. The course will provide a science-based preparation for further and higher education programmes in science, applied science and the land-based sector. It will facilitate links with business and industry and therefore enhance employment and career prospects.

COURSE CONTENT

The course consists of three mandatory units. Each unit reflects one of the strands running through all Managing Environmental Resources courses (natural resources, ecological studies and land use).

Each of the units is free-standing and may be taken on its own. However, there is enrichment value in taking the three units together as a course. The integral nature of the environment in a holistic context rather than in a strictly ecological sense will be more apparent when the course is taken as a complete programme. The course offers excellent opportunities for the development of knowledge and understanding, problem-solving and practical abilities within the context of managing environmental resources.

Seasonality should be borne in mind when deciding the order of delivery of the units.

The following tables indicate the content and suggested learning activities through which knowledge and understanding, problem-solving and practical abilities are to be developed. The Content section (which indicates the broad themes that must be covered) and the Notes section (which provides amplification) provide the mandatory content of the course. Suggested Learning Activities are shown in the right-hand column.

National Unit Specification: course details

Unit 1: Natural Resource Use (Higher)

Introduction

In this unit current practices in the use of non-renewable resources in industrial, rural and domestic situations are analysed alongside existing and predicted problems associated with waste management. Case studies drawn from local, national and international examples are studied. Alternatives in the form of renewable resources are evaluated in the context of increasing legislation and other pressures which are designed to promote a more sustainable approach to resource utilisation. The importance of personal and corporate attitudes to the environment and its sustainability are considered in the context of developing environmentally responsible citizenship.

This unit represents a subject area in which developments are always taking place. It is therefore particularly important that examples should be drawn from as wide a range as possible with recent information being used in the delivery of the unit. Candidates should be encouraged from the outset to prepare a folio of newspaper articles, magazine articles, pamphlets and other materials.

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
1 Resources occurring on the earth	<p>Natural resources – land, air, water, all living things, fossil fuels, metal ores and other minerals, quarried rocks. Links with manufactured materials – purified metals and/ or examples (aluminium, tin, copper), glass, plastics, chemicals and/or examples (fertilisers, salt), building materials (stone, sand, aggregate).</p> <p>The availability, supply and demand for resources with examples at local level (local building rock), national level (oil and oil products), and international level (fresh water, metals, coral).</p>	<p>Introduction to the range of resources using local, national and international examples through discussion/video/personal experience.</p> <p>Use of drift maps/solid geology to show natural resources of Scotland.</p> <p>Estimations of the usage of selected resources such as water, iron needed to make a car, bauxite to make aluminium can, coral.</p>
2 Renewable and non renewable recyclable resources	<p>The difference between renewable and non renewable and recyclable and non recyclable resources.</p> <p>Exhaustion of resources (fossil fuels, metal ores) and the importance of ‘reduce and reuse’.</p>	<p>Investigate examples illustrating the concepts of renewable and recyclable resources. Compare the water cycle and coal formation and extraction to illustrate the concepts. Video or visit to exemplify recycling.</p>

National Unit Specification: course details (cont)

Unit 1: Natural Resource Use (Higher)

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
<p>3 Sustainable use of resources and the management of waste</p> <p>(i) domestic practices</p> <p>(ii) rural practices</p>	<p>Life cycle analysis using quantitative data, to examine the energy, materials and transport involved in making, using and disposing of one named resource e.g. plastic or glass bottles or aluminium cans</p> <p>The concept of sustainability. Historical and current examples of sustainable and non sustainable use of resources as exemplified by:</p> <ul style="list-style-type: none"> • natural resources – forests (commercial and rainforest), minerals/rocks, • peat extraction, • manufactured resources – glass, plastics, metals. <p>Examples of sustainable practices such as reduced use, recycling and waste minimisation, with the emphasis on good and improving practices compared to poor practices, in domestic, rural and industrial practises.</p> <p>Study of domestic practices relating to improving home insulation, reduced use of electricity, supporting recycling schemes, use of garden waste in composting and reduced use of car transport.</p> <p>Appraisal of rural practices relating to farming to include:</p> <ul style="list-style-type: none"> • impacts of intensive agriculture, • controlled use of fertilisers and pesticides, • use of organic methods, • crofting, • diversification in farming 	<p>Examine worked examples of life cycle assessments and construct life cycle assessments.</p> <p>Investigate examples of good and improving practice, and poor practice, from domestic, rural and industrial situations. Use case studies – forestry, peat to illustrate the historical perspective.</p> <p>Personal research, visiting speakers, visits and visual aids should enable the concept of sustainability to be explored in a variety of ways for a variety of resources.</p> <p>Individual, or class, domestic audits to assess current situation in the local area and where improvements can be made. Composting could be investigated practically.</p> <p>Case studies using examples from intensive farming and part time practices such as crofting. Apply systems models using inputs and outputs. Carry out audits of advantages, disadvantages and alternatives. Visit a farm.</p>

National Unit Specification: course details (cont)

Unit 1: Natural Resource Use (Higher)

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
<p>(iii) tourism</p> <p>(iv) leisure & recreation</p> <p>(v) industrial and manufacturing practices</p>	<p>Appraisal of rural practices relating to forestry to include:</p> <ul style="list-style-type: none"> • afforestation, • reforestation, • effective use of waste. <p>Appraisal of sustainable practices in tourism:</p> <ul style="list-style-type: none"> • ecotourism, • green tourism awards. <p>Appraisal of leisure and recreation developments:</p> <ul style="list-style-type: none"> • new leisure facility developments, • water sport developments, • use of forestry land in recreational activities – orienteering, mountain biking. <p>Appraisal of industrial or manufacturing activities to illustrate the following:</p> <ul style="list-style-type: none"> • commercial pressures, • environmental legislation such as duty of care, polluter pays and failure to comply, • control of emissions or effluents, • environmental quality standards such as Eco-management and Audit schemes (EMAS). • Any other current practices relating to sustainability. 	<p>Forestry speaker or visit. Case study on current and past practices.</p> <p>Visit a country park. Internet research on green tourism.</p> <p>Local study of existing/proposed developments in the local area or national examples.</p> <p>Debate the advantages and disadvantages of specific industrial practices.</p> <p>Research current practices in Scotland. Speaker from industry. Practical investigation of suitable site.</p>

National Unit Specification: course details (cont)

Unit 1: Natural Resource Use (*Higher*)

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
<p>4 Renewable and non renewable sources of energy</p>	<p>Environmental effects of waste disposed at local, national and international level resulting from landfill, dumping, waste incineration. Habitat destruction and loss of biodiversity as a result of air, land and water pollution.</p> <p>Coal, oil and natural gas as examples of fossil fuels providing energy. Lifetime (life expectancy) of fossil fuels and the need for their conservation.</p> <p>Wind, wave, tidal, solar, geothermal, nuclear and biomass as examples of non fossil fuels providing energy.</p> <p>Advantages and disadvantages of non fossil fuels as energy sources.</p> <p>Examples of biomass as an energy source – wood, dung, biogas, biofuels, peat and domestic waste incineration.</p> <p>Comparison of sources of energy used and extent of use between economically developed and economically developing countries.</p>	<p>Visit landfill site, dump or waste incineration plant.</p> <p>Case studies/data interpretation of pollution effects on habitats/wildlife.</p> <p>Analysis of data relating to energy production and lifetime of non renewable resources provide opportunities to use a variety of graphical illustrations.</p> <p>Visit a site of renewable energy production (hydro – electric power station, wind farm).</p> <p>Models can be used to illustrate energy production from some renewable sources of energy e.g. wind, solar.</p> <p>Review current practices using biomass for energy production.</p> <p>Research current practices in the use and resources of energy in a variety of countries.</p>

National Unit Specification: course details (cont)

Unit 1: Natural Resource Use (Higher)

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
<p>5 Environmental impacts of energy sources</p>	<p>The impacts on landscape, wildlife and biodiversity, and humans of using non renewable and renewable sources of energy including:</p> <ul style="list-style-type: none"> • greenhouse gases (CO₂, NO₂, methane, CFCs,) their sources and contribution to enhanced greenhouse effect/global warming/climate change, • acid rain production and its local/national/international effects, • consequences of nuclear fuel use – nuclear accidents, environmental monitoring, disposal of waste and decommissioning issues, • land/seascape disturbance as a result of wind/wave/tidal energy turbines. <p>Reduction of environmental effects as a result of - modification of production processes, use of scrubbers and catalytic converters, alternative forms of transport reduced energy demand, implementation of strategic energy management plans.</p>	<p>Study diagrams showing the greenhouse effect. Investigate the effects of emissions, their impact on the environment and national and international measures to deal with the problems.</p> <p>Use Scottish Environmental Statistics to show trends in the level of emissions.</p> <p>Debate the continuing use of nuclear fuel and its potential effects. Case studies of nuclear accidents.</p> <p>Analyse the advantages and disadvantages of alternative sources of energy</p>
<p>6 Sustainable development principles and initiatives</p>	<p>Sustainable use of resources which meet the needs of the present without compromising the ability of future generations to meet their own needs.</p>	<p>Investigate examples of success for local, national and international initiatives.</p> <p>Discuss international problems associated with reaching a consensus.</p>

National Unit Specification: course details (cont)

Unit 1: Natural Resource Use (Higher)

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
<p>(i) at local level</p> <p>(ii) at national level</p> <p>(iii) at international level</p>	<p>The role and aims of one local, one national and one international agencies as exemplified by:</p> <ul style="list-style-type: none"> • local authorities and Local Agenda 21. • Scottish Parliament and Scottish Executive using policies and legislation, • Statutory organisations - Scottish Natural Heritage (SNH) and Scottish Environmental Protection Agency (SEPA), • UK Government using policies and legislation. • EU Parliament initiatives, policies and legislation, • International conferences and initiatives - United Nations Commission on Environment and Development(UNCED)/Earth Summit/Kyoto. <p>The role of voluntary organisations and environmental pressure groups such as Royal Society for the Protection of Birds (RSPB), Friends of the Earth (FoE) and Worldwide Fund for Nature (WWF) in contributing research evidence and/or in consultations on sustainable issues.</p> <p>Examples of local, national and international initiatives, policies and legislation resulting from promotion of the principles of sustainability to be selected from:</p> <ul style="list-style-type: none"> • Agenda 21, • Biodiversity Action Plans (BAPs) or Local Biodiversity Action Plans (LBAPs), 	<p>Illustrate with examples of good practice. Review award winning projects.</p> <p>Investigate the scope and nature of environmental audits.</p> <p>Visiting speaker(s).</p> <p>Visit RSPB reserve or use a speaker from voluntary organisation.</p>

National Unit Specification: course details (cont)

Unit 1: Natural Resource Use (Higher)

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
<p>7 Sustainable use of resources and waste management in an international context</p>	<ul style="list-style-type: none"> • Renewables Obligation or Scottish Renewables Obligation (SRO), • energy efficiency initiatives, • Landfill Tax, • Environmental Awards schemes – Green Tourism Award • eco labelling, • recycling initiatives and schemes – bottle banks, kerbside collections, • agri-environmental measures such as Environmentally Sensitive Areas (ESAs), Nutrient Sensitive Areas(NSAs), landscape enhancement, tree planting schemes, • Water Catchment Act • any other current example. <p>Sustainable use of resources and management of waste in European and other countries using one named example from:</p> <ul style="list-style-type: none"> • recycling schemes in Germany and Switzerland, • waste treatment in the Netherlands, • wind power in Denmark, • polluter pays principle in Finland, • use of biofuel and hydropower in Norway, • use of windpower and traffic control in the USA. 	<p>Research sustainability issues in other countries as examples of good practice.</p>

National Unit Specification: course details

Unit 2: Investigating Ecosystems (Higher)

Introduction

In this unit relevant ecological principles and investigative techniques are applied to a range of ecosystems, one of which will be studied in depth. Issues relating to the environmental impact of human activity are analysed in the context of the management of environmental resources.

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
<p>1 Ecosystems, habitats and communities</p>	<p>The concept of the ecosystem comprising the habitat and the community. The terms biotic, abiotic, biomass, biodiversity, species, niche, population, adaptation and competition should be applied in the study of ecosystems.</p> <p>Methods of sampling organisms within ecosystems – transects, quadrats, netting, traps, Tullgren and Baermann funnels.</p> <p>Examples of terrestrial, freshwater and marine ecosystems with an overview of the habitat and communities found in: woodland, moorland, wetland, heathland, grassland, mountains, freshwater and marine ecosystems.</p> <p>The concept of indicator species in relation to identifying environmental changes should be considered in relation to:</p> <ul style="list-style-type: none"> • lichens/SO₂ levels; • freshwater invertebrates/level of water pollution. <p>The concept of levels of biodiversity should be considered in relation to detrimental human activities affecting ecosystems.</p>	<p>The study of ecology could be introduced from a historical perspective.</p> <p>Carry out fieldwork investigations of a variety of local habitats using appropriate sampling techniques. Analyse data from habitats.</p> <p>Field studies visits, videos, posters, CD roms and internet can be used to explore a range of other ecosystems.</p> <p>Investigate levels of pollution as determined by indicator species Collect specimens and/or analyse data from selected locations to illustrate the concept of indicator species.</p> <p>Use fieldwork studies/visits to identify detrimental activities which result in reduction of biodiversity.</p>

National Unit Specification: course details (cont)

Unit 2: Investigating Ecosystems (Higher)

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
<p>2 Nature and properties of soils</p> <p>3 Dynamics of Ecosystems</p> <p>(i) food chains, webs and pyramids</p>	<p>The need for accurate identification of flora and fauna. Principal features of higher plants, vertebrates and invertebrates should be established in relation to the use and construction of complex keys used for species identification.</p> <p>One ecosystem should be selected for an in depth practical study e.g. soil.</p> <p>The effect of climate, geology and relief on soil formation. Types of soil and soil profiles (podsol, Brown Earth, Gley). Biotic and abiotic factors relating to soil formation and soil properties.</p> <p>The inter relationships and dynamics of terrestrial, freshwater and marine ecosystems.</p> <p>The role of the sun, producers and consumers at primary, secondary and tertiary levels in food chains, webs and pyramids (numbers, biomass, energy). Application of the terms autotrophs, heterotrophs, herbivore, carnivore, omnivore and decomposer in relation to the production and transfer of energy through food chains and trophic levels.</p>	<p>Identify flora and fauna using complex keys during site visits and research. Construct keys using principal features of higher plants, vertebrates and invertebrates.</p> <p>Collect and analyse soil samples associated with particular sites – particle structure, soil moisture, humus content, flora and fauna.</p> <p>Use data collected from field studies sites to investigate feeding relationships and construct food webs. Analyse food webs from various ecosystems. Use food web ‘games’ to show interrelationships. Study decomposers in relation to soil studies/leaf litter analysis.</p>

National Unit Specification: course details (cont)

Unit 2: Investigating Ecosystems (Higher)

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
(ii) energy conversion and transfer	<p>Special feeding relationships as illustrated by the range of symbiotic associations – mutualism, commensalism and parasitism. The beneficial/detrimental effects of mutualism, commensalism and parasitism as exemplified in the following relationships – leguminous plants/nitrogen fixing bacteria, lichens, ticks and fleas, tapeworms and flukes/vertebrates, anemones/crabs, orchid mycorrhizae.</p> <p>Energy conversion and transfer in food chains, webs and pyramids as exemplified by:</p> <ul style="list-style-type: none"> • photosynthesis and respiration (summary equations) as essential energy converting processes. Biomass as a measure of primary productivity. • Efficiency of energy transfer in food chains, webs and pyramids, including calculations of energy losses, the length of food chains related to energy efficiency and processes resulting in energy loss (heat, movement, undigested food). 	<p>Examine audio-visual material and/or specimens to illustrate symbiotic associations. The emphasis should be on a range of examples and no in depth study is necessary. Investigate the beneficial/detrimental effects of symbiotic associations.</p> <p>Carry out investigations to compare primary productivity by measuring biomass.</p> <p>Analyse data on energy transfer in food chains/food pyramids. Calculate percentage of energy transferred in food chains and pyramids.</p>
(iii) cycling of nutrients	<p>The cycling of nutrients and its significance as exemplified in the carbon and nitrogen cycles.</p> <p>Carbon cycle - processing of carbon in photosynthesis and respirations, fossil fuels and combustion, decomposition by detritivores, bacteria and fungi, humus formation in soils.</p>	<p>View audio-visual material on the cycling of nutrients in ecosystems.</p> <p>Measure humus content of different soils.</p>

National Unit Specification: course details (cont)

Unit 2: Investigating Ecosystems (Higher)

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
<p>(iv) effects of abiotic factors</p> <p>(v) effects of biotic factors</p> <p>(vi) population dynamics</p> <p>(vii) succession</p>	<p>Nitrogen cycle – processing of nitrogen by fixation in free living bacteria and root nodules, ammonification, nitrification, assimilation and denitrification.</p> <p>Abiotic factors affect the frequency and distribution of organisms within ecosystems. Examples of abiotic factors: temperature, light intensity, soil moisture and soil pH, water flow rate and water pH, salinity and tidal effects, humidity, wind velocity and direction, precipitation, slope. (Knowledge of the effects of each is not required).</p> <p>Biotic factors: predation including grazing, inter specific and intra specific competition for food, mates, nest sites, shelter.</p> <p>Aspects of population dynamics including: stability in populations, carrying capacity, natural environmental regulation – homeostasis and feedback control. Factors influencing population dynamics:</p> <ul style="list-style-type: none"> • density independent factors – natural disasters, • density dependant factors – disease and parasites, predator/prey dynamics and human intervention. <p>The sequence of succession from primary colonisers to climax community including:</p> <ul style="list-style-type: none"> • succession in terrestrial or aquatic situations, • characteristics of climax community including climatic and edaphic (soil related) factors. 	<p>Examine root nodules in leguminous plants.</p> <p>Measure and analyse data on abiotic factors studied by fieldwork and relate to the distribution of organisms. Analyse data from a variety of other ecosystems.</p> <p>Analyse data on predator/prey cycles and effects of grazing. Investigate case studies illustrating competition.</p> <p>View and discuss audio–visual material showing the effects of natural disasters, disease on ecosystems.</p> <p>Investigate succession in a pond, derelict site, or at sites visited on field studies visits.</p>

National Unit Specification: course details (cont)

Unit 2: Investigating Ecosystems (Higher)

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
4 Human activities, their effects on ecosystems and strategies for improvement	<p>Brief consideration of the impact of human activities on ecosystems and possible strategies for improvement in practices as exemplified by the following:</p> <ul style="list-style-type: none">• use of natural and artificial fertilisers (algal blooms, eutrophication, phosphate enrichment),• use of pesticides and bioaccumulation,• agricultural practices (muir burning, overgrazing, drainage, use of slurry),• recreational activities. <p>Emphasis should be given to good management practice, environmental protection schemes and legislation in reducing the impact of these practices and the monitoring of populations for conservation purposes and identification of endangered species.</p>	<p>Review case studies from other units illustrating the effects of the human activities on ecosystems.</p> <p>Appraisal of strategies used to improve each situation.</p>

National Unit Specification: course details (cont)

Unit 3: Land Use in Scotland (Higher)

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
	<ul style="list-style-type: none"> • leisure and recreation (water sports, hill walking, golf courses, skiing) • industry • urbanisation (residential, industrial sites, shopping centres and other amenities) • transport (motorways, rail network, air transport) • water catchment, River Basin Management Plans and power generation • conservation (National parks, national and local nature reserves, national scenic areas, SSSIs, ESAs, regional, country and forest parks, RSPB and SWT reserves). <p>(Detailed knowledge of each example is not required).</p> <p>A detailed investigation of one land or one water use should be carried out.</p> <p>Human activities and resulting conflict from the changing use of land or water including the advantages and disadvantages associated with:</p> <ul style="list-style-type: none"> • leisure and recreational pursuits (water sports, skiing, mountain biking, hill walking, fishing) • new building development (houses, businesses, hotels, out of town shopping complexes) • transport infrastructure. 	<p>Case studies – Scottish forestry, tourism in the Cairngorms, reclamation of industrial dereliction in Central Scotland, National Parks, farming salmon. Debate current issues – the future of Scottish fishing industry, the development of transport infrastructure, pressure on the urban fringe.</p> <p>Investigation using, where possible, an example of local interest</p> <p>Identify, discuss and analyse examples found locally and/or nationally.</p>

National Unit Specification: course details (cont)

Unit 3: Land Use in Scotland (Higher)

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
<p>3 The influences of European, national and local policies, agencies and legislation in the control of land and water use</p>	<p>The need to control current land and water use through policies, agencies and legislation.</p> <p>Broad understanding of the thrusts of European policies, particularly:</p> <ul style="list-style-type: none"> • the Common Agricultural Policy (CAP), its implications and the reforms resulting from it • the Common Fisheries Policy. <p>The role of agencies including Scottish Natural Heritage (SNH), Scottish Environmental Protection Agency (SEPA) and The Forestry Commission and groups such as the Farming and Wildlife Advisory Group. Current practices in agriculture such as the Rural Stewardship Scheme (RSS) and recent forestry policy as examples of good practice.</p> <p>The role of legislation in planning control; habitat and landscape protection; and national parks, in relation to land/water use and environmental impact assessment.</p>	<p>Investigate and discuss the impact of CAP and CFP reforms and effects in Scotland.</p> <p>Study the aims, role and aspect(s) of the environment affected by agencies such as SNH, SEPA. Discuss the application of the RSS in agriculture.</p> <p>Legislation can be followed historically in relation to awareness of environmental issues and the need to provide better protection for the countryside.</p> <p>Examples could include Town and Country Planning Act, National Parks and Access to the Countryside Act, Countryside (Scotland) Act, Wildlife and Countryside Act (1981), Natural Heritage (Scotland) Act 1991, Environment Act (1995), Landfill Tax 1996 Research national planning policy guidelines (NPPG). Research and debate local and national issues – national parks, planning controls. Investigate the local biodiversity action plan.</p>

National Unit Specification: course details (cont)

Unit 3: Land Use in Scotland (Higher)

CONTENT	NOTES	SUGGESTED LEARNING ACTIVITIES
<p>4 Changes taking place with regard to land and water use</p>	<p>Changes in traditional land and water use in response to economic, social, moral and ethical pressures. Changing emphasis of users and stewards in relation to land/water use. Impact of leisure, recreational pursuits and tourism. Access and conservation.</p>	<p>Case studies to illustrate positive aspects of changes towards a more sympathetic use of land and water – otters and development, cetaceans in the Moray Firth, the Cairngorm partnership. Discuss partnerships, co-operation, visitor management plans and Capital Land Reform (Scotland) Act.</p>
<p>5 Positive and negative effects on the environment of changing land and water use</p>	<p>Positive and/or negative effects and appropriate management strategies applied to the following:</p> <ul style="list-style-type: none"> • drainage of land • leaching of nutrients • removal of hedgerows • aquaculture • recreational use of land/water. <p>(Opportunity exists here to link with Unit 2.3 but the local/Scottish context is emphasised in this unit.)</p>	<p>Assess the positive and negative effects in a local or national context. Review a range of management strategies for dealing with environmental issues and minimising detrimental effects on the environment including the use of Environmental Impact assessments.</p>

National Course Specification: course details (cont)

COURSE Managing Environmental Resources (Higher)

ASSESSMENT

To gain the award of the course, the candidate must achieve all the component units of the course as well as the external assessment. External assessment will provide the basis for grading attainment in the course award.

When units are taken as component parts of a course, candidates will have the opportunity to demonstrate achievement beyond that required to attain each of the unit outcomes. This attainment may, where appropriate, be recorded and used to contribute towards course estimates and to provide evidence for appeals. Additional details are provided, where appropriate, with the exemplar assessment materials. Further information on the key principles of assessment are provided in the paper *Assessment*, published by HSDU in May 1996.

DETAILS OF THE INSTRUMENT FOR EXTERNAL ASSESSMENT

The instrument for external assessment is the external course examination which will sample across the outcomes of all the component units and will consist of a two and a half-hour paper worth approximately 110 marks. The paper will consist of two sections:

Section A

This section will be made up of structured questions, with an allocation of approximately 80 marks, testing knowledge and understanding, problem-solving and/or practical abilities. Candidates will be expected to answer all questions.

Section B

This section will consist of four questions requiring extended responses, of which candidates will be expected to answer two. Section B will have an allocation of 30 marks (15 to each question).

The assessment of knowledge and understanding, problem-solving and practical abilities will be based upon the course content described for the three units. The content statements and the supplementary notes will be sampled in the course examination which will include both familiar contexts as well as less familiar and more complex contexts than in the unit assessments. While there are no compulsory practicals for the purposes of external assessment, there will be questions set in the examination on practical work which will provide an opportunity for candidates to demonstrate skills in less familiar and more complex contexts.

GRADE DESCRIPTIONS

Grade description for C

Candidates demonstrating performance at grade C will have achieved the component units of the course. In addition, in the course assessment, candidates should be able to demonstrate the ability to:

- retain knowledge and skills over a longer period of time
- integrate knowledge and understanding, problem-solving and practical abilities acquired across component units
- select, organise and present relevant knowledge in extended responses.

National Course Specification: course details (cont)

COURSE Managing Environmental Resources (Higher)

Grade description for A

In addition, candidates at grade A should be able to demonstrate:

- the ability to apply knowledge and understanding, problem-solving and practical abilities in contexts less familiar and more complex than in the unit outcomes
- particular proficiency in selecting, organising and presenting relevant knowledge in extended responses.

The overall assessment proposed for the course, ie the combination of internal and external assessment, should provide the necessary evidence for the core skills where an automatic award is proposed. Confirmation of this will be provided at a later date.

APPROACHES TO LEARNING AND TEACHING

Suggestions for appropriate learning activities are contained within the tables of course content. These activities, together with the use of relevant support materials, will provide opportunities for active learning. An investigative approach should be taken to the learning and teaching of Managing Environmental Resources. Such an approach draws heavily on practical work and should provide opportunities to develop individual and group research using a variety of resources alongside the more traditional approaches of whole-class teaching. Although individual evidence of attainment of all learning outcomes is a prerequisite for each candidate, group activities can enhance the value of investigative work and foster personal, interpersonal and organisational skills.

There are opportunities for interaction with the local community in investigative work. Local experts and visiting speakers should be used as appropriate to enhance these learning experiences. Site visits should play an important part in the delivery of all component units. This practical work could provide one way of delivering the requisite knowledge and understanding. Practical investigations should be used to develop problem-solving and practical skills and not just to provide evidence for the purposes of internal assessment.

Use of the additional 40 hours

This time may be best distributed throughout the duration of the course. It should be used:

- to provide an introduction to the course and to assessment methods
- to allow more practical work to be undertaken
- to allow the integration of knowledge and understanding from separate units to enhance the learning experience
- to allow further development of interpretation and problem-solving skills
- to practise applying knowledge and understanding, problem-solving and practical abilities in contexts more complex than in the units
- to develop extended response skills
- for support in particular aspects of units in which candidates require to be reassessed
- to practise techniques in answering the more challenging questions associated with the course assessment
- to prepare candidates for external examination conditions.

National Course Specification: course details (cont)

COURSE Managing Environmental Resources (Higher)

SPECIAL NEEDS

This course specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

National Unit Specification: general information

UNIT	Natural Resource Use (Higher)
NUMBER	D312 12
COURSE	Managing Environmental Resources (Higher)

SUMMARY

This unit seeks to develop environmental awareness in a wide range of programmes. The concept of wise use of resources from individual to global levels will be central to the unit. On completion of the unit the candidate will be able to assess how natural resources are used, the impact this has on the environment and the progress being made towards sustainability. The candidate will be able to solve problems and collect and analyse relevant information.

OUTCOMES

- 1 Demonstrate knowledge and understanding related to the use of renewable and recyclable resources and sustainability.
- 2 Solve problems related to the effects of resource utilisation on the environment.
- 3 Collect and analyse information related to Higher Managing Environmental Resources obtained by investigation.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following:

- Standard Grade Biology, grade 1 or 2
- Standard Grade Chemistry, grade 1 or 2
- Standard Grade Physics, grade 1 or 2
- Standard Grade Geography, grade 1 or 2
- Standard Grade Science, grade 1 or 2
- Intermediate 2 Managing Environmental Resources or its component units.

Administrative Information

Superclass:	QA
Publication date:	July 2002
Source:	Scottish Qualifications Authority
Version:	04

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National Unit Specification: general information (cont)

UNIT Natural Resource Use (Higher)

CREDIT VALUE

1 credit at Higher.

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Unit Specification: statement of standards

UNIT Natural Resource Use (Higher)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Demonstrate knowledge and understanding related to the use of renewable and recyclable resources and sustainability.

Performance criteria

- (a) Domestic, rural and industrial practices are assessed accurately in terms of their use of resources and their effects on the environment.
- (b) Cycles of production and consumption are described accurately in terms of their effects on the environment.
- (c) Initiatives in the principles and practices of sustainable development are described accurately.
- (d) Current practices in the sustainable use of resources are described accurately in an international context.

Evidence requirements

Evidence of an appropriate level of attainment must be generated from a closed book test or tests with items covering all performance criteria.

OUTCOME 2

Solve problems related to the effects of resource utilisation on the environment.

Performance criteria

- (a) Relevant information is selected and presented in an appropriate format.
- (b) Information is accurately processed using calculations where appropriate.
- (c) Conclusions drawn are valid and explanations given are supported by evidence.
- (d) Predictions and generalisations made are based on available evidence.

Evidence requirements

Evidence of an appropriate level of attainment must be generated from a closed book test or tests with items covering all performance criteria including the interpretation and communication of graphical information at the appropriate level. With reference to PCs (c) and (d), the candidate's answers must include valid conclusions and explanations based on an evaluation of supporting evidence. Evidence for Outcomes 1 and 2 can be generated from an integrated test lasting 45 minutes.

National Unit Specification: statement of standards (cont)

UNIT Natural Resource Use (Higher)

OUTCOME 3

Collect and analyse information related to Higher Managing Environmental Resources obtained by investigation.

Performance criteria

- (a) Information is collected by active participation in the investigation.
- (b) Investigative procedures are described accurately.
- (c) Relevant measurements and observations are recorded in an appropriate format.
- (d) Recorded information is analysed and presented in an appropriate format.
- (e) Conclusions drawn are valid.
- (f) Procedures are evaluated with supporting argument.

Evidence requirements

Evidence of an appropriate level of attainment must be generated with items covering all performance criteria. A report of one investigative activity is required in relation to the Higher Managing Environmental Resources course.

The teacher/lecturer responsible must attest that the report is the individual work of the candidate derived from active participation in the investigation. This includes setting objectives for the investigation, planning of appropriate tasks, identifying and obtaining the necessary resources, carrying out the investigation and evaluating all stages. Conclusions and recommendations should be justified by reference to evidence drawn from the investigation.

Depending on the activity, the collection of information may involve group work.

National Unit Specification: support notes

UNIT Natural Resource Use (Higher)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

Full details to assist staff who are delivering the unit as a free-standing unit are given in the Contents section of the course specification. The outline of content and context is as follows:

Outcome 1

- 1 Resources occurring on earth.
- 2 Renewable, non-renewable, recyclable and non-recyclable natural resources.
- 3 Sustainable resource use and management of waste with respect to:
 - i domestic practices
 - ii rural practices
 - iii tourism
 - iv leisure and recreation
 - v industrial and manufacturing practices.
- 4 Renewable and non-renewable sources of energy.
- 5 Environmental impacts of energy sources
- 6 Sustainable development principles and initiatives.
- 7 Sustainable use of resources in an international context.

Outcome 2

Details of problem-solving opportunities are given in the Contents section of the course specification.

Outcome 3

Details of opportunities for investigations are given in the Contents section of the course specification.

For Outcome 3 investigations may be based wholly or in combination on:

- Practical work in the field or classroom
- Research using relevant literature
- Survey of an appropriate topic using relevant sampling techniques.

The nature of the unit will determine the style and scope of the investigation. The support notes on assessment (below) indicate a range of points, which may aid professional judgement in guiding the candidate's investigation and in assessing whether the performance criteria have been met.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

Details of suitable approaches are given in the Tables of Content section of the course specification.

National Unit Specification: support notes (cont)

UNIT Natural Resource Use (Higher)

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2 can be assessed by an appropriate level of attainment in an integrated end-of-unit test with questions covering all performance criteria.

Test items should be constructed to allow candidates to generate evidence relating to the performance criteria as follows:

- a) Selecting and presenting information
 - sources of information include text, tables, charts, graphs, maps, diagrams
 - formats of presentation include written responses, tables, graphs, diagrams
- b) Calculations include percentages, averages and ratios. Significant figures, rounding and units should be used appropriately
- c) Conclusions drawn should include some justification and explanations should be supported by evidence
- d) From given situations, candidates should be able to predict and generalise.

Outcome 3 can be assessed by participation in an investigation and an appropriate level of attainment in the associated report.

The teacher/lecturer should ensure that the investigative activity to be undertaken in relation to Outcome 3 affords opportunities to demonstrate the ability to plan and organise such activity at an appropriate level of demand. The activity will relate to the course content and candidates should be made aware of the range of skills that must be demonstrated to ensure attainment of Outcome 3. Candidates are only required to produce evidence of one Outcome 3 report in relation to Higher Managing Environmental Resources. This report can then be used as evidence for Outcome 3 for the other units of the course.

In relation to PC (a), the teacher/lecturer should check that the candidate participates actively in the planning of the investigation, deciding how it will be managed, identifying and obtaining resources and carrying out the investigation.

Candidates should provide a report with an appropriate title. The report should relate to Outcome 3, PCs (b) to (f) as follows:

b) Investigative procedures are described accurately.	A clear statement of the purpose of the investigation. A few concise sentences including apposite illustrations and, as appropriate: <ul style="list-style-type: none">• A short description of the methods used• A labelled diagram or brief description of equipment used• How variables and controls were used• The range and balance of sources selected• How measurements were taken or observations made. There is no need for a long detailed description. The use of the impersonal passive voice is to be encouraged as an example of good practice but this is not mandatory for meeting the performance criteria.
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National Unit Specification: support notes (cont)

UNIT Natural Resource Use (Higher)

c) Relevant measurements and observations are recorded in an appropriate format.	Readings or observations must be recorded in a clear format, normally a table with correct headings, appropriate units and results/readings entered correctly.
d) Recorded information is analysed and presented in an appropriate format.	Data should be analysed and presented in tabular, graphical, diagram, or other equivalent form as appropriate: <ul style="list-style-type: none"> • For a tabular presentation this may be an extension of the table used for PCs above and must include suitable headings and units and appropriate computations. • For a graphical presentation this must include data presented in appropriate forms such as histograms, bar charts, line graphs with suitable scales and axes labelled with variable and units and with data correctly plotted.
e) Conclusions drawn are valid.	Conclusions should use evidence from the investigation and relate back to the aim of the investigation. At least one of the following, as appropriate, should be included: <ul style="list-style-type: none"> • Overall pattern to findings, readings or observations • Trends in analysed information or results • Connection between variables and controls • Reasons for acceptance or rejection of arguments from sources used.
f) The investigative procedures are evaluated with supporting argument.	The evaluation should cover all stages of the activity, analysis of the activity and the results of the activity. The evaluation must include supporting argument in at least one of: <ul style="list-style-type: none"> • Effectiveness of procedures • Control of variables • Limitations of the range and/or balance of sources used • Limitations of equipment • Possible sources of error • Possible improvements.

The points beside each performance criterion give an indication of what should be addressed to achieve a pass. The relevance of the points will vary according to the style and scope of the investigation. The points are intended as helpful guidance. The decision of pass or fail is made by the professional judgement of staff of the presenting centre (subject to moderation) against the performance criteria.

It is appropriate to support candidates in producing a report to meet the performance criteria. Re-drafting of a report after necessary supportive criticism is to be encouraged both as part of the learning and teaching process and to produce evidence for assessment.

National Unit Specification: support notes (cont)

UNIT Natural Resource Use (Higher)

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

National Unit Specification: general information

UNIT	Investigating Ecosystems (Higher)
NUMBER	D315 12
COURSE	Managing Environmental Resources (Higher)

SUMMARY

The dynamic nature of ecosystems will be the key theme of the unit. On completion of the unit the candidate will be able to assess the main factors influencing ecosystems. The candidate will also be able to collect and analyse information and solve relevant problems.

OUTCOMES

- 1 Demonstrate knowledge and understanding related to the interdependence between organisms and their environment.
- 2 Solve problems related to ecosystems.
- 3 Collect and analyse information related to Higher Managing Environmental Resources obtained by investigation.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following:

- Standard Grade Biology, grade 1 or 2
- Standard Grade Chemistry, grade 1 or 2
- Standard Grade Physics, grade 1 or 2
- Standard Grade Geography, grade 1 or 2
- Standard Grade Science, grade 1 or 2
- Intermediate 2 Managing Environmental Resources or its component units.

Administrative Information

Superclass:	RH
Publication date:	July 2002
Source:	Scottish Qualifications Authority
Version:	04

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National Unit Specification: general information (cont)

UNIT Investigating Ecosystems (Higher)

CREDIT VALUE

1 credit at Higher.

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Unit Specification: statement of standards

UNIT Investigating Ecosystems (Higher)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Demonstrate knowledge and understanding related to the interdependence between organisms and their environment.

Performance criteria

- (a) The characteristics of representative organisms from selected ecosystems are described correctly in terms of key structural and functional features.
- (b) Energy flow and other relationships between organisms in selected ecosystems are identified and explained accurately.
- (c) Succession is explained accurately in terms of the progression from primary coloniser to climax species.
- (d) Negative effects on ecosystems as a result of human activity are described and possible improvement strategies are identified.

Evidence requirements

Evidence of an appropriate level of attainment must be generated from a closed book test or tests with items covering all performance criteria.

OUTCOME 2

Solve problems related to ecosystems.

Performance criteria

- (a) Relevant information is selected and presented in an appropriate format.
- (b) Information is accurately processed using calculations where appropriate.
- (c) Conclusions drawn are valid and explanations given are supported by evidence.
- (d) Predictions and generalisations made are based on available evidence.

Evidence requirements

Evidence of an appropriate level of attainment must be generated from a closed book test or tests with items covering all performance criteria including the interpretation and communication of graphical information at the appropriate level. With reference to PCs (c) and (d), the candidate's answers must include valid conclusions and explanations based on an evaluation of supporting evidence. Evidence for Outcomes 1 and 2 can be generated from an integrated test lasting 45 minutes.

National Unit Specification: statement of standards (cont)

UNIT Investigating Ecosystems (Higher)

OUTCOME 3

Collect and analyse information related to Higher Managing Environmental Resources obtained by investigation.

Performance criteria

- (a) Information is collected by active participation in the investigation.
- (b) Investigative procedures are described accurately.
- (c) Relevant measurements and observations are recorded in an appropriate format.
- (d) Recorded information is analysed and presented in an appropriate format.
- (e) Conclusions drawn are valid.
- (f) Procedures are evaluated with supporting argument.

Evidence requirements

Evidence of an appropriate level of attainment must be generated with items covering all performance criteria. A report of one investigative activity is required in relation to the Higher Managing Environmental Resources courses.

The teacher/lecturer responsible must attest that the report is the individual work of the candidate derived from active participation in the investigation. This includes setting objectives for the investigation, planning of appropriate tasks, identifying and obtaining the necessary resources, carrying out the investigation and evaluating all stages. Conclusions and recommendations should be justified by reference to evidence drawn from the investigation.

Depending on the activity, the collection of information may involve group work.

National Unit Specification: support notes

UNIT Investigating Ecosystems (Higher)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

Full details to assist staff who are delivering the unit as a free-standing unit are given in the Tables of Content section of the course specification. The outline of content and context is as follows:

Outcome 1

- 1 Ecosystems, habitat and communities.
- 2 Nature and properties of soils.
- 3 Dynamics of ecosystems:
 - i food chains, webs and pyramids
 - ii energy conversion and transfer
 - iii cycling of nutrients
 - iv effects of abiotic factors
 - v effects of biotic factors
 - vi population dynamics
 - vii succession.
- 4 Human activities, their effects on ecosystems and strategies for improvement.

Outcome 2

Details of problem-solving opportunities are given in the Contents section of the course specification.

Outcome 3

Details of opportunities for investigations are given in the Contents section of the course specification.

For Outcome 3 investigations may be based wholly or in combination on:

- Practical work in the field or classroom
- Research using relevant literature
- Survey of an appropriate topic using relevant sampling techniques.

The nature of the unit will determine the style and scope of the investigation. The support notes on assessment (below) indicate a range of points, which may aid professional judgement in guiding the candidate's investigation and in assessing whether the performance criteria have been met.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

Details of suitable approaches are given in the course specification.

National Unit Specification: support notes (cont)

UNIT Investigating Ecosystems (Higher)

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2 can be assessed by an appropriate level of attainment in an integrated end-of-unit test with questions covering all performance criteria.

Test items should be constructed to allow candidates to generate evidence relating to the performance criteria as follows:

- a) Selecting and presenting information
 - sources of information include text, tables, charts, graphs, maps, diagrams
 - formats of presentation include written responses, tables, graphs, diagrams
- b) Calculations include percentages, averages and ratios. Significant figures, rounding and units should be used appropriately
- c) Conclusions drawn should include some justification and explanations should be supported by evidence
- d) From given situations, candidates should be able to predict and generalise.

Outcome 3 should be assessed by participation in an investigation and an appropriate level of attainment in the associated report.

The teacher/lecturer should ensure that the investigative activity to be undertaken in relation to Outcome 3 affords opportunities to demonstrate the ability to plan and organise such activity at an appropriate level of demand. The activity will relate to the course content and candidates should be made aware of the range of skills that must be demonstrated to ensure attainment of Outcome 3. Candidates are only required to produce evidence of one outcome 3 report in relation to Higher Managing Environmental Resources. This report can then be used as evidence for Outcome 3 for the other units of the course.

In relation to PC (a), the teacher/lecturer checks by observation that the candidate participates actively in the planning of the investigation, deciding how it will be managed, identifying and obtaining resources and carrying out the investigation.

Candidates should provide a report with an appropriate title. The report should relate to Outcome 3, PCs (b) to (f) as follows:

b) Investigative procedures are described accurately.	A clear statement of the purpose of the investigation. A few concise sentences including apposite illustrations and, as appropriate: <ul style="list-style-type: none">• A short description of the methods used• A labelled diagram or brief description of equipment used• How variables and controls were used• The range and balance of sources selected• How measurements were taken or observations made. There is no need for a long detailed description. The use of the impersonal passive voice is to be encouraged as an example of good practice but this is not mandatory for meeting the performance criteria.
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National Unit Specification: support notes (cont)

UNIT Investigating Ecosystems (Higher)

c) Relevant measurements and observations are recorded in an appropriate format.	Readings or observations must be recorded in a clear format, normally a table with correct headings, appropriate units and results/readings entered correctly.
d) Recorded information is analysed and presented in an appropriate format.	Data should be analysed and presented in tabular, graphical, diagram, or other equivalent form as appropriate: <ul style="list-style-type: none"> • For a tabular presentation this may be an extension of the table used for PCs above and must include suitable headings and units and appropriate computations. • For a graphical presentation this must include data presented in appropriate forms such as histograms, bar charts, line graphs with suitable scales and axes labelled with variable and units and with data correctly plotted.
e) Conclusions drawn are valid.	Conclusions should use evidence from the investigation and relate back to the aim of the investigation. At least one of the following, as appropriate, should be included: <ul style="list-style-type: none"> • Overall pattern to findings, readings or observations • Trends in analysed information or results • Connection between variables and controls • Reasons for acceptance or rejection of arguments from sources used.
f) The investigative procedures are evaluated with supporting argument.	The evaluation should cover all stages of the activity, analysis of the activity and the results of the activity. The evaluation must include supporting argument in at least one of: <ul style="list-style-type: none"> • Effectiveness of procedures • Control of variables • Limitations of the range and/or balance of sources used • Limitations of equipment • Possible sources of error • Possible improvements.

The points beside each performance criterion give an indication of what should be addressed to achieve a pass. The relevance of the points will vary according to the style and scope of the investigation. The points are intended as helpful guidance. The decision of pass or fail is made by the professional judgement of staff of the presenting centre (subject to moderation) against the performance criteria.

It is appropriate to support candidates in producing a report to meet the performance criteria. Re-drafting of a report after necessary supportive criticism is to be encouraged both as part of the learning and teaching process and to produce evidence for assessment.

National Unit Specification: support notes (cont)

UNIT Investigating Ecosystems (Higher)

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

National Unit Specification: general information

UNIT	Land Use In Scotland (Higher)
NUMBER	D316 12
COURSE	Managing Environmental Resources (Higher)

SUMMARY

The development of land and water use and the increasing role of European Union (EU) and national legislation on these activities are underpinning concepts in the unit. On completion of the unit the candidate will be able to assess the key factors influencing land and water use in Scotland, collect and analyse relevant information and solve associated problems.

OUTCOMES

- 1 Demonstrate knowledge and understanding related to land and water use in Scotland.
- 2 Solve problems related to aspects of land and water use in Scotland.
- 3 Collect and analyse information related to Higher Managing Environmental Resources obtained by investigation.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following:

- Standard Grade Biology, grade 1 or 2
- Standard Grade Chemistry, grade 1 or 2
- Standard Grade Physics, grade 1 or 2
- Standard Grade Geography, grade 1 or 2
- Standard Grade Science, grade 1 or 2
- Intermediate 2 Managing Environmental Resources or its component units.

Administrative Information

Superclass:	SM
Publication date:	May 2008
Source:	Scottish Qualifications Authority
Version:	06

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National Unit Specification: general information (cont)

UNIT Land Use In Scotland(Higher)

CREDIT VALUE

1 credit at Higher.

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Unit Specification: statement of standards

UNIT Land Use In Scotland (Higher)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Demonstrate knowledge and understanding related to land and water use in Scotland.

Performance criteria

- (a) Developments in land and water use in Scotland are described accurately.
- (b) The control of land and water use is explained accurately in terms of the roles of a range of agencies.

Evidence requirements

Evidence of an appropriate level of attainment must be generated from a closed book test or tests with items covering all performance criteria.

OUTCOME 2

Solve problems related to aspects of land and water use in Scotland.

Performance criteria

- (a) Relevant information is selected and presented in an appropriate format.
- (b) Information is accurately processed using calculations where appropriate.
- (c) Conclusions drawn are valid and explanations given are supported by evidence.
- (d) Predictions and generalisations made are based on available evidence.

Evidence requirements

Evidence of an appropriate level of attainment must be generated from a closed book test or tests with items covering all performance criteria including the interpretation and communication of graphical information at the appropriate level. With reference to PCs (c) and (d), the candidate's answers must include valid conclusions and explanations based on an evaluation of supporting evidence.

Evidence for Outcomes 1 and 2 can be generated from an integrated test lasting 45 minutes.

National Unit Specification: statement of standards (cont)

UNIT Land Use In Scotland (Higher)

OUTCOME 3

Collect and analyse information related to Higher Managing Environmental Resources obtained by investigation.

Performance criteria

- (a) Information is collected by active participation in the investigation.
- (b) Investigative procedures are described accurately.
- (c) Relevant measurements and observations are recorded in an appropriate format.
- (d) Recorded information is analysed and presented in an appropriate format.
- (e) Conclusions drawn are valid.
- (f) Procedures are evaluated with supporting argument.

Evidence requirements

Evidence of an appropriate level of attainment must be generated with items covering all performance criteria. A report of one investigative activity is required in relation to the Higher Managing Environmental Resources course.

The teacher/lecturer responsible must attest that the report is the individual work of the candidate derived from active participation in the investigation. This includes setting objectives for the investigation, planning of appropriate tasks, identifying and obtaining the necessary resources, carrying out the investigation and evaluating all stages. Conclusions and recommendations should be justified by reference to evidence drawn from the investigation.

Depending on the activity, the collection of information may involve group work.

National Unit Specification: support notes

UNIT Land Use In Scotland (Higher)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

Full details to assist staff who are delivering the unit as a free-standing unit are given in the Contents section of the course specification. The outline of content and context is as follows:

Outcome 1

- 1 Development of land and water use.
- 2 Current land and water uses.
- 3 The influence of European, national and local policies, agencies and legislation in the control of land and water use.
- 4 Changes taking place within land and water use.
- 5 Positive and negative effects on the environment of a land or water use.

Outcome 2

Details of problem-solving opportunities are given in the Contents section of the course specification.

Outcome 3

Details of opportunities for investigations are given in the Contents section of the course specification.

For Outcome 3 investigations may be based wholly or in combination on:

- Practical work in the field or classroom
- Research using relevant literature
- Survey of an appropriate topic using relevant sampling techniques.

The nature of the unit will determine the style and scope of the investigation. The support notes on assessment (below) indicate a range of points, which may aid professional judgement in guiding the candidate's investigation and in assessing whether the performance criteria have been met.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

Details of suitable approaches are given in the Contents section of the course specification.

National Unit Specification: support notes (cont)

UNIT Land Use In Scotland (Higher)

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2 can be assessed by an appropriate level of attainment in an integrated end-of-unit test with questions covering all performance criteria.

Test items should be constructed to allow candidates to generate evidence relating to the performance criteria as follows:

- a) Selecting and presenting information
 - sources of information include text, tables, charts, graphs, maps, diagrams
 - formats of presentation include written responses, tables, graphs, diagrams
- b) Calculations include percentages, averages and ratios. Significant figures, rounding and units should be used appropriately
- c) Conclusions drawn should include some justification and explanations should be supported by evidence
- d) From given situations, candidates should be able to predict and generalise.

Outcome 3 can be assessed by participation in an investigation and an appropriate level of attainment in the associated report.

The teacher/lecturer should ensure that the investigative activity to be undertaken in relation to Outcome 3 affords opportunities to demonstrate the ability to plan and organise such activity at an appropriate level of demand. The activity will relate to the course content and candidates should be made aware of the range of skills that must be demonstrated to ensure attainment of Outcome 3. Candidates are only required to produce evidence of one Outcome 3 report in relation to Higher Managing Environmental Resources. This report can then be used as evidence for Outcome 3 for the other units of the course.

In relation to PC (a), the teacher/lecturer checks by observation that the candidate participates actively in the planning of the investigation, deciding how it will be managed, identifying and obtaining resources and carrying out the investigation.

Candidates should provide a report with an appropriate title. The report should relate to Outcome 3, PCs (b) to (f) as follows:

b) Investigative procedures are described accurately.	A clear statement of the purpose of the investigation. A few concise sentences including apposite illustrations and, as appropriate: <ul style="list-style-type: none">• A short description of the methods used• A labelled diagram or brief description of equipment used• How variables and controls were used• The range and balance of sources selected• How measurements were taken or observations made. There is no need for a long detailed description. The use of the impersonal passive voice is to be encouraged as an example of good practice but this is not mandatory for meeting the performance criteria.
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National Unit Specification: support notes (cont)

UNIT Land Use In Scotland (Higher)

c) Relevant measurements and observations are recorded in an appropriate format.	Readings or observations must be recorded in a clear format, normally a table with correct headings, appropriate units and results/readings entered correctly.
d) Recorded information is analysed and presented in an appropriate format.	Data should be analysed and presented in tabular, graphical, diagram, or other equivalent form as appropriate: <ul style="list-style-type: none"> • For a tabular presentation this may be an extension of the table used for PCs above and must include suitable headings and units and appropriate computations. • For a graphical presentation this must include data presented in appropriate forms such as histograms, bar charts, line graphs with suitable scales and axes labelled with variable and units and with data correctly plotted.
e) Conclusions drawn are valid.	Conclusions should use evidence from the investigation and relate back to the aim of the investigation. At least one of the following, as appropriate, should be included: <ul style="list-style-type: none"> • Overall pattern to findings, readings or observations • Trends in analysed information or results • Connection between variables and controls • Reasons for acceptance or rejection of arguments from sources used.
f) The investigative procedures are evaluated with supporting argument.	The evaluation should cover all stages of the activity, analysis of the activity and the results of the activity. The evaluation must include supporting argument in at least one of: <ul style="list-style-type: none"> • Effectiveness of procedures • Control of variables • Limitations of the range and/or balance of sources used • Limitations of equipment • Possible sources of error • Possible improvements.

The points beside each performance criterion give an indication of what should be addressed to achieve a pass. The relevance of the points will vary according to the style and scope of the investigation. The points are intended as helpful guidance. The decision of pass or fail is made by the professional judgement of staff of the presenting centre (subject to moderation) against the performance criteria.

It is appropriate to support candidates in producing a report to meet the performance criteria. Re-drafting of a report after necessary supportive criticism is to be encouraged both as part of the learning and teaching process and to produce evidence for assessment.

National Unit Specification: support notes (cont)

UNIT Land Use In Scotland (Higher)

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).