

National Unit Specification: general information

UNIT	Ecosystems (Intermediate 2)
NUMBER	D310 11
COURSE	Managing Environmental Resources (Intermediate 2)

SUMMARY

This unit seeks to develop the concept of ecological inter-relationships. On completion of the unit the candidate will be able to describe and apply ecological principles and investigative techniques and to solve problems related to specified ecosystems and the effects of human influences on them.

OUTCOMES

- 1 Demonstrate knowledge and understanding related to ecological principles and investigations.
- 2 Solve problems related to specified ecosystems and the effects of human activities on them.
- 3 Collect and analyse information related to Intermediate 2 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 3 or 4
- Standard Grade Chemistry, grade 3 or 4
- Standard Grade Geography, grade 3 or 4
- Standard Grade Physics, grade 3 or 4
- Standard Grade Science, grade 3 or 4
- Intermediate 1 Managing Environmental Resources or its component units.

Administrative Information

Superclass:	QA
Publication date:	July 2002
Source:	Scottish Qualifications Authority
Version:	02

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National Unit Specification: general information (cont)

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CREDIT VALUE

1 credit at Intermediate 2.

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 Ecosystems (Intermediate 2)

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 ecological principles and investigations.

Performance criteria

- (a) Selected ecosystems are described correctly using current ecological terms.
- (b) Energy flow in an ecosystem is described correctly with respect to transfer efficiency.
- (c) Nutrient cycling in an ecosystem is described correctly with reference to uptake, transfer and output.
- (d) The effects of human activities on selected ecosystems are explained accurately in terms of positive and negative impacts.

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 specified ecosystems and the effects of human activities on them.

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)

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OUTCOME 3

Collect and analyse information related to Intermediate 2 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 ecological investigative activity concerned with the relationships between environmental factors and the frequency and distribution of selected plant and animal species is required.

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 Ecosystems (Intermediate 2)

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 Ecological concepts.
- 2 Component parts of ecosystems.
- 3 Pyramids of number and biomass.
- 4 Energy and energy conversion.
- 5 Carbon and nitrogen cycles.
- 6 Environmental variables.
- 7 The frequency and distribution of plant and animal species in relation to environmental variables.
- 8 Impact of human activities on ecosystems.
- 9 Pollution and conservation.

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)

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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 Intermediate 2 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 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)

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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)

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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).