

Unit 21: Undertaking Urban Habitat Conservation

Unit code:	J/600/9196
QCF Level 3:	BTEC National
Credit value:	10
Guided learning hours:	60

● Aim and purpose

This unit aims to introduce learners to urban habitat conservation skills and knowledge and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or onto further/higher education.

● Unit introduction

Urban habitats were once thought of as having little significance, providing only amenity and recreational use. However, it is now well recognised that the urban environment can offer a wide range of habitats and encourage species biodiversity. It is therefore important for those working in the countryside management sector to understand urban habitats, their characteristics and ecological significance.

For some native species, urban habitats provide better conditions than those found in the wider countryside and are therefore of great conservation value. Introduced exotic species comprise major elements of the urban biota and some have become invasive and problematic while other 'garden introductions' provide valuable nectar and food for our native wildlife. Changes in the urban environment have also led to a decline in some formerly abundant urban species.

The management of urban habitats must take account of ecological factors and processes that are different to those in rural habitats, accommodate a wider range of human uses, influences and expectations (with all the associated conflicts and dilemmas) and operate within a different set of constraints. An understanding of these issues is essential for managers of urban habitats.

This unit will enable learners to study the ecological characteristics and conservation value of urban habitats, together with the processes that affect them. They will also gain an understanding of the effects of pollutants and invasive species and of the strategies used to counter the associated problems. Learners will develop their practical surveying skills in an urban habitat context.

● Learning outcomes

On completion of this unit a learner should:

- 1 Be able to survey the ecological characteristics of urban habitats
- 2 Understand ecological processes influencing urban habitats
- 3 Understand the problems caused by pollution and invasive species
- 4 Know the conservation value of urban habitats.

Unit content

1 Be able to survey the ecological characteristics of urban habitats

Plan a survey: identify area for survey, risk assessment, correct identification of equipment, methodology, sources of error, methods of minimising error; health and safety

Environmental surveying techniques: eg water sampling (eg N and P sampling, biotic kick sampling); air sampling (eg particulate measurements, lichens as indicators of air quality); soil sampling (eg N-P-K, pH, depths of top soil, soil texture)

Species surveying techniques: eg mammal surveying (eg from tracks and feeding signs, Longworth trapping, bait tubes); invertebrate sampling (eg pitfall traps, moth traps, butterfly transects, sweep nets); bird surveying (eg transects, bird census techniques such as Garden Birdwatch)

Recording and reporting data: recording and storing data, use of statistical analysis presentation and interpretation of results, quantitative results (eg tables, charts, scatter graphs, histograms, pie charts); qualitative results (eg annotated map, diagram, written report)

2 Understand ecological processes influencing urban habitats

Physical processes: characteristics and ecological effects of urban soils; urban micro-climates and effects on biota; disturbance

Spatial processes: theory of island biogeography; habitat fragmentation; connectivity; edge effects; ecotones; linear habitats eg road verges, railways, river and canal banks; metapopulation concept

Biotic processes: dispersal, movement between habitats, mechanisms, distances; soil transfer, escapes; factors affecting establishment of exotic species, r/K and CSR characteristics; urban food chains; human effects (eg provision of food, introduction of non-native nectar and fruiting plants, rubbish, pets); species adaptations to urban environments; adaptations of native species to exotics

3 Understand the problems caused by pollution and invasive species

Terrestrial air pollution and related problems: pollution definition; major types of pollutants eg heavy metals, heat, light, noise, particulates, road salt, sulphur dioxide, oxides of nitrogen, rubbish; biological and ecological effects of pollution, toxicity, bioaccumulation and trophic transfer, physiological responses, behavioural avoidance; pollution reduction mechanisms and mitigation, legislation; conservation management

Water pollution and related problems: characteristics of domestic and industrial effluents; eutrophication, N, P, input and mobility, algal blooms, fish kills, biological oxygen demand, oxygen availability, thermal pollution; toxicity and fecundity effects on aquatic invertebrates eg heavy metals, oral contraceptives, pesticides, polychlorinated biphenyls (PCBs); biotic indices of pollution; reduction of water pollution, legislation, technology, mitigation; conservation management strategies

Invasive species: origin, spread and management of exotic plants eg Japanese knotweed, Indian balsam, *Rhododendron ponticum*, Giant hogweed, Oxford ragwort; urban population dynamics of problematic native animals eg gulls, foxes, feral pigeons, exotic animals and pests eg cockroaches, rodents, grey squirrels; conservation management

Management strategies: invasive species reduction (eg planned cull programmes, capture and release for animals, use of herbicides, weeding for plants), introduction of competitor species, changes to habitats to favour non-invasive species; air, water and soil monitoring; pollution reduction and avoidance; compliance with legislation

4 Know the conservation value of urban habitats

Values of urban biodiversity: conservation value, effects of urban habitats on human quality of life, amenity value, educational value, recreational value; conservation value of urban habitats in contrast to rural habitats; conflicting management requirements for differing values

Managing urban biodiversity: urban biodiversity action plans; planning process and constraints; planning and managing sites for multiple use; small-scale and larger-scale opportunities eg wildlife gardens, green roofs, local nature reserves, urban green spaces, urban renewal; funding; community involvement

Differences between urban and rural habitat conservation: management strategies; conservation objectives; size and scale; species types and diversity; problems encountered; other land uses

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 plan an urban habitat survey [RL, SM]	M1 discuss the ecological importance of surveyed terrestrial and aquatic urban habitats	D1 discuss the impact of ecological processes on the species and characteristics of terrestrial and aquatic urban habitats
P2 select appropriate survey techniques and equipment [TW]		
P3 carry out urban terrestrial and aquatic habitat surveying safely		
P4 report on the structures, features and ecosystem of an urban habitat [IE]		
P5 explain physical processes affecting urban habitats	M2 compare the ecological processes affecting selected urban habitats	
P6 explain spatial processes affecting urban habitats [IE]		
P7 explain biotic processes affecting urban habitats		
P8 assess problems associated with urban pollutants and invasive species [IE]	M3 review the management strategies used to counter the problems associated with selected pollutants and invasive species	D2 evaluate management strategies to improve the conservation value of a given urban habitat.
P9 identify management strategies to counter urban pollutants and invasive species [IE]		
P10 describe the conservation value of a given urban habitat	M4 explain the importance of urban habitat conservation.	
P11 identify differences between urban and rural habitat conservation. [IE, CT]		

PLTS: This summary references where applicable in the pass criteria, in the square brackets, the elements of the personal, learning and thinking skills. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Tutors delivering this unit have opportunities to use as wide a range of techniques as possible. Lectures, site visits, discussions, guest speakers, seminar presentations, practical surveying, internet and/or library-based research and the use of personal and/or industrial experience would all be suitable.

It may be suitable for learners to become involved in a community project to improve an urban habitat which will further their understanding of the ethos of community work and the importance of the urban habitat at a social level.

Where work placements are used to support the delivery of this unit they should be monitored regularly in order to ensure the quality of the learning experience. It would be beneficial if learners and supervisors were made aware of the requirements of this unit before any work-related activities are undertaken so that naturally occurring evidence can be collected at the time. For example, learners may have the opportunity to survey urban habitats and they should ask for observation records and/or witness statements to be provided as evidence of this. Guidance on the use of observation records and witness statements is provided on the Edexcel website.

Health and safety issues relating to working in and around water must be stressed and reinforced regularly. Learners must be made fully aware of health issues that can occur due to contact with water, such as Weil's disease. Health and safety issues must be addressed before learners carry out any practicals or visit any sites. Adequate personal protective equipment (PPE) must be provided and used following the production of suitable risk assessments.

It is essential that delivery of this unit includes supervised field visits, as learners need to carry out practical urban habitat surveying. This needs to include at least one aquatic and one terrestrial survey and learners will need ample opportunity to develop their practical skills.

Delivery will be most effective if learners are able to visit a range of urban habitats, which may be contrasted with more rural habitats studied in other units. It will be helpful if learners can experience urban habitats of different scales and with different species diversity. It will also be helpful if they witness the effects of the different ecological processes on habitats, either first hand or through real case study material. Guest speakers such as a county ecologist or environmental health officer may add interest and vocational relevance.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives **an indication of the volume of learning it would take the average learner** to achieve the learning outcomes. It is **indicative and is one way of achieving the credit value**.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment

Introduction to unit. Tutor gauges current levels of knowledge amongst learners, discuss types of urban habitats and their importance.

Assignment 1: Survey of Urban Habitats (P1, P2, P3, P4, M1)

Visit selection of urban habitats to discuss their key features and importance to urban biodiversity.

Topic and suggested assignments/activities and/assessment
Surveying theory – possible relevant surveys, methodology, equipment, planning, possible sources of error, recording data and presenting.
Practical field surveys of terrestrial and aquatic urban habitats.
Assignment 1 class work – compilation of field data, comparison of results, discussion on sources of error, methods of presenting data, summarising results and analysing findings.
Ecological processes theory
Assignment 2: Ecological Processes examples of physical, spatial and biotic processes (P5, P6, P7, M2, D1) Learners investigate topics and present back to the class, relate to sites surveyed for learning outcome.
Site visit to two urban habitats to look at examples of ecological processes as a basis for Assignment 2.
Assignment 2 – learner work and further research
Assignment 3: Pollution and Invasive Species (P8, P9, M3)
Theory session on examples, learners to research further examples.
Case study and guest speaker to discuss urban pollutants.
Visit to site where management of an invasive species is being undertaken as case study.
Assignment 4: Conservation Value of Urban Habitats (P10, P11, M4, D2). Theory session and class discussion on the importance of urban habitats to wildlife and humans, issue with conflicting land use.
Learners design questionnaire on how a specific urban habitat affects the quality of life for the community and carry out research using the questionnaire.
Site visit and guided walk to look at a similar habitat in a rural context and learn about how it is managed. Learners to compare management techniques, pressures and conservation value of both habitats.
Unit review.

Assessment

For P1, P2, P3 and P4, learners are expected to participate in surveys adhering to health and safety requirements and showing due care and attention. Learners need to complete a plan for P1 and P2, showing the planned survey sampling methods, the survey objectives and any required resources and equipment. For P3 learners need to carry out a survey of one aquatic and one terrestrial urban habitat safely. The form of survey will depend on the chosen habitat, and it will be necessary for the tutor to agree with learners the habitats to be surveyed. Suitable methods of assessment include witness statements, observation records, photographic evidence and the completion of survey recording forms. For P4, learners need to present a report from their surveys commenting on the structures, features and ecosystem. They should be able to identify the context in which the habitat is found, including surrounding land use, size of habitat, dominant species, communities present and conclusions from their survey. Evidence may take the form of a written report or annotated map.

For P5, P6 and P7, learners need to explain how ecological processes influence urban habitats. Learners may explain the influence of ecological processes on urban habitats in general or through the study of specific habitats. Learners could produce evidence as a presentation or a mini-lecture with visual aids, or as a written report or article.

For P8 learners are required to investigate a range of relevant pollutants and invasive species and assess the associated problems. One suitable method of assessment might be learners identifying the pollutants and invasive species present on a specific site and discussing the impact on the ecology of that habitat. This could be carried out as an oral assessment in the field, with learners identifying the species or sources of pollution. It would also be acceptable for evidence to be produced as a report or poster.

For P9, learners need to identify the range of management strategies that may be used to minimise the problems caused by pollutants and invasive species. Evidence could be linked to P8 and presented as a verbal or written report, poster or leaflet.

For P10, learners must describe the conservation value of a given urban habitat. They could choose the habitat and agree it with the tutor. Learners need to consider the variety of land use and the biodiversity of the site and draw conclusions on the value of the site to both wildlife and humans. Evidence could be presented in the same format as for P9, or as an annotated map of the habitat site.

For P11, learners need to identify at least six key differences between urban and rural habitat conservation. This could be a general identification of the common differences or through a specific case study comparing two similar habitats, one rural and one urban. Learners will describe the differences in the management techniques used at the two sites and demonstrate an understanding of the pressures that drive these management decisions. Evidence could be in a written or verbal format.

For M1, learners are required to extend the evidence created for P1, P2, P3 and P4 to discuss the ecological importance of the habitats surveyed. Evidence could be an extension of the report produced for P4.

For M2, learners need to apply their knowledge of ecological processes to compare the processes affecting at least three urban habitats. It would be helpful if the selected habitats clearly show the effects of different ecological processes. The habitats may be selected by the tutor or agreed through discussion with learners.

For M3, learners need to review at least three of the management strategies identified in P9 and explain how effectively they counter the problems identified in P8. Evidence may be in the same format as for P9.

For M4, learners are required to explain the importance of urban habitat conservation. This should be in the context of both the human and conservation perspective and evidence may be in the same format as for P10.

For D1, learners need to extend the evidence created for M1 and M2 to explain how the species and characteristics of urban habitats are affected by ecological processes. Evidence may be a verbal or written discussion.

For D2, learners need to evaluate the management strategies used at a particular urban habitat and assess their effectiveness in improving the conservation value of the habitat. Evidence may be in the same format as for M3 or M4.

Programme of suggested assignments

The following table shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4, M1	Survey of Urban Habitats	You are working as a seasonal ranger for a local county council and you are involved in an urban regeneration programme. You are required to carry out surveys of specific urban habitats to assess the current environmental condition. Include in your survey report a discussion of the ecological importance of the surveyed habitats.	Observation records. Photographic evidence. Survey recording forms. Written reports.

Criteria covered	Assignment title	Scenario	Assessment method
P5, P6, P7, M2, D1	Ecological Processes	Three specific habitats are being investigated for potential improvement under the urban regeneration scheme and you have been asked to assess and compare the ecological processes that affect these habitats. Include in your presentation a discussion of the impact of the ecological processes on the species and characteristics of the habitats reviewed.	Presentation.
P8, P9, M3	Pollution and Invasive Species	You have been asked to give an advisory talk to a local land owner who is worried about the pollution and invasive species on his site. You will know of the species and pollutants before visiting the site to allow time for you to research your topics. At the site you will have to identify the species or sources of pollution and be able to discuss the problems associated with them. You will be asked to identify and compare management techniques which could help to counter the problems.	Oral evidence. Camcorder evidence. Written observations by tutor following oral assessment.
P10, P11, M4, D2	Conservation Value of Urban Habitats	As part of the urban regeneration programme the council is producing a 5-year management plan for the main urban habitats in your area. You are required to assess one specific urban habitat and describe its conservation value in detail. To assist in the management planning for the site you need to consider traditional, rural management in similar habitats. Identify the differences between urban and rural habitat conservation, and explain the importance of urban habitat conservation. Evaluate management strategies which could be used to improve the conservation value of the urban habitat.	Written report.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC land-based sector suite. This unit has particular links with:

Level 2	Level 3
Introduction to Urban Habitat Ecology	Element EC23.1 Prepare for field surveys Element EC23.2 Collect and record data through field surveys Element EC23.3 Interpret survey data and report on findings
	Undertake an Investigative Project in the Land-based Sector
	Undertake and Review Work Related Experience in the Land-based Industries

Essential resources

Learners will need access to basic equipment to carry out ecological surveys, for example quadrats, tapes, sweep nets, sampling pots and identification books and keys. They will also need access to equipment for environmental monitoring and the measurement of soil pH, temperature, oxygen and soil analysis.

Up-to-date books, IT and internet access should be available to underpin learner knowledge of the issues covered in this unit.

Tutors delivering this unit should have a good level of experience in ecological surveying, with good identification skills in relation to both native and non-native flora and fauna.

Employer engagement and vocational contexts

Learners will require access to a variety of urban habitats, so centres should develop good links with local councils to aid access to sites and the potential for guided visits or guest speakers to discuss issues particular to the locale. Local biological recorders could be useful guest speakers or may be willing to get involved with learners' fieldwork.

Indicative reading for learners

Textbooks

Carr S, Lane A and Tait J – *Urban Habitats* (Hodder Arnold, 1993) ISBN 0340533692

Emery M – *Promoting Nature in Cities and Towns: A Practical Guide* (Packard Publishing, 1986) ISBN 0709909667

Gilbert O and Anderson P – *Habitat Creation and Repair* (Oxford University Press, 1998) ISBN 0198549660

Kendle T and Forbes S – *Urban Nature Conservation: Landscape Management in the Urban Countryside* (Taylor and Francis, 1997) ISBN 0419193006

Sutherland W and Hill D – *Managing Habitats for Conservation* (Cambridge University Press, 1995) ISBN 0521447763

Sutherland W – *Ecological Census Techniques* (Cambridge University Press, 1998) ISBN 978-0521478151

Wheater C – *Urban Habitats* (Routledge, 1999) ISBN 0415162653

Other publications

Field Studies Council – wide selection of good quality keys to UK species

Journals

BBC Wildlife Magazine

Conservation Land Management

ENACT

Websites

www.abdn.ac.uk/mammals

www.bto.org/gbw

www.defra.gov.uk

www.environment-agency.gov.uk/homeandleisure/wildlife

www.rspb.org.uk

www.ukmaburbanforum.org.uk

www.urbanecology.org.uk

British Mammal Society

British Trust for Ornithology – Garden Birdwatch

Department for Environment, Food and Rural Affairs

Environment Agency invasive species advice

Royal Society for the Protection of Birds

UK-MAB Urban Forum

Trust for Urban Ecology

Delivery of personal, learning and thinking skills (PLTS)

The following table identifies the PLTS opportunities that have been included within the assessment criteria of this unit:

Skill	When learners are ...
Independent enquirers	carrying out research on pollutants and invasive species they are appreciating the consequences of decisions
Creative thinkers	considering the differences in management techniques used in rural and urban habitats generating ideas and exploring possibilities
Reflective learners	planning their survey work, setting goals with success criteria for their development and work
Team workers	carrying out survey work and collaborating with others to work towards common goals debating the appropriate survey techniques and deciding the correct equipment, reaching agreements and managing discussions to achieve results
Self-managers	planning survey work, organising time and resources, prioritising actions carrying out survey work, working towards goals, showing initiative, commitment and perseverance.

Although PLTS opportunities are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Independent enquirers	participating in class discussions exploring issues, events or problems from different perspectives
Creative thinkers	participating in group work or class discussions generating ideas and exploring possibilities and asking questions to extend their thinking
Reflective learners	carrying out field survey techniques assessing themselves and others, identifying opportunities and achievements
Team workers	on site visits adapting their behaviour to suit different roles and situations including leadership roles
Self-managers	working on assessments organising their time and resources, prioritising actions and dealing with competing pressures, including personal and work-related demands
Effective participators	choosing suitable habitats for assessments in discussion with their tutor, influencing others, negotiating and balancing diverse views to reach workable solutions.

● Functional Skills – Level 2

Skill	When learners are ...
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	designing and producing an urban habitat survey
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	
Manage information storage to enable efficient retrieval	
Follow and understand the need for safety and security practices	
Troubleshoot	
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	researching pollution and invasive species
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: <ul style="list-style-type: none"> • text and tables • images • numbers • records 	designing presentations on ecological processes
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	
Evaluate the selection and use of ICT tools and facilities used to present information	
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	
Identify the situation or problem and the mathematical methods needed to tackle it	analysing urban habitat survey results

Skill	When learners are ...
Select and apply a range of skills to find solutions	compiling field data
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	analysing urban habitat survey results
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	discussing the importance of urban habitats presenting research findings.
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	