Unit 20: Understanding Coastal Management

Unit code: M/600/9175

QCF Level 3: BTEC National

Credit value: 10

Guided learning hours: 60

Aim and purpose

This unit aims to introduce learners to coastal management 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.

The aim of this unit is to provide learners with an understanding of the processes affecting the coastal zone and the management of coastal habitats.

Unit introduction

The interface between the land and sea that makes up the coastal zone is vital to both humans and wildlife. In the UK, 10 of the 20 most populated cities are on the coast and 95 per cent of Britain's trade is conducted through its ports. Many important wildlife sites, particularly for migrating waterfowl, are found along the coast. The management of these sites and the balancing of diverse interests such as tourism, fishing and shipping are becoming increasingly important. Another major factor, climate change, is affecting the way that coastal areas are utilised. Due to the abundance of available, renewable energy from wave, tidal and onshore and offshore wind sources, many new sites may be developed.

This unit gives learners an opportunity to investigate the different habitats that can be found along the coastline. They will study the wildlife found in rock pools, on sand dunes and in other coastal habitats. Learners will investigate some of the threats to coastal environments and the solutions that are being developed to control them.

On completion of the unit, learners will be familiar with a variety of coastal habitats. They will also have developed the ability to assess threats to coastal wildlife and propose solutions to reduce their harmful effects. Learners will become familiar with some of the organisations with responsibilities within the coastal zone.

Coastal environments can be hazardous, with rapidly advancing tides, changing weather conditions and substrates, such as soft mud, which make walking difficult. Throughout the unit learners will need to be made aware of these hazards and the importance of good planning in relation to coastal field studies, for example using tide tables.

Learning outcomes

On completion of this unit a learner should:

1 Understand the physical processes affecting coastal habitats

2 Be able to carry out ecological surveys of coastal habitats

3 Know the threats to coastal habitats

4 Understand suitable coastal management techniques.

Unit content

1 Understand the physical processes affecting coastal habitats

Coastal habitats: eg sand dunes, salt marshes, estuaries, sea cliffs, sandy beaches, rocky shores, islands, mudflats, lagoons, shingle; ecological zones

Structural features: sediment size, geomorphologic formations (eg headlands and bays, wave cut platforms, caves, blowholes and sea stacks, sand spits, tombolos, bars), profiles

Physical processes: as appropriate to habitats investigated eg wind action, wave action, erosion, attrition, corrosion, hydraulic pressure, accretion, deposition, long shore drift, saltation, tidal currents

2 Be able to carry out ecological surveys of coastal habitats

Indicator species: identification of indicator species for the above habitats; ecological position within habitat; structural adaptations

Surveys: measuring zonation using surveying equipment eg sights, surveying poles, levels, line quadrat surveys, random quadrat surveys, coring, grab sampling, dredge netting, plankton netting, photographic documentation, analysis of photographic records, humane trapping, mark-recapture; use of sampling techniques (random, systematic, stratified); health and safety; current legislation

3 Know the threats to coastal habitats

Human threats: intensive agricultural practices eg application of pesticides, application of fertilisers, grazing; recreational use and development including mountain biking, walking/hiking, horse riding, motoring activities, caravan parks, marinas, campsites; transport, industrial and energy generation activities including petrochemical activities, shipping, dredging, sediment extraction, quarrying, mining, fishing activities, onshore and offshore wind generation, wave power generation, barrage construction, tidal current turbines; sea defences (sea walls, groynes); introduction of alien species both intentionally eg aquaculture, and accidentally eg ballast water

Natural threats: erosion due to wind and sea, attrition, erosion of river banks, sea level changes, shifts in thermohaline circulation, tidal surges, atmospheric factors (climate, changes in solar energy), changes in morphology of the sea bed and coastline, sea water corrosion

Effects: reduction in flora and fauna; loss of species diversity; habitat loss; trampling; soil compaction; erosion; deflected erosion; reduction in sediment supply; lowering of water table; eutrophication; displacement of indigenous species by invasive species; effects of pollution eg domestic sewage, toxic and heavy metals; flooding

4 Understand suitable coastal management techniques

Legislative and planning: European legislation eg Habitats Directive, Bathing Water Directive, Water Framework Directive; UK legislation eg Wildlife and Countryside Act 1981, Countryside and Rights of Way Act 2000, Marine and Coastal Access Bill; site designations (Site of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Marine Nature Reserve (MNR), Special Protection Area (SPA), Special Area of Conservation (SAC), Natura 2000, Areas of Outstanding Natural Beauty (AONB), No-Take Zone (NTZ), Ramsar); shoreline management plans

Practical management techniques: practical conservation eg planting windbreaks; visitor management techniques (access control, construction of boardwalks); use of environmental information media; hard defences (rock or gabion headlands, nearshore breakwaters, artificial reefs, groynes, rock armour or rip-rap, revetments, sea walls); soft defences (dune grass planting, dune fencing, beach recycling, sand bag structures, beach nourishment); cliff stabilisation (underpinning, drains, gully blocking, interlocking piles, deep bore wells, reprofiling)

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 discuss the structural features of coastal habitats	**M1** explain how physical processes can both destroy and create coastal features and habitats	**D1** discuss how species found in selected coastal habitats have adapted to physical processes
P2 explain the influences of relevant physical processes on coastal habitats		
P3 identify indicator species of selected coastal habitats [TW1]	**M2** interpret the results of ecological surveys of selected coastal habitats	
P4 complete ecological surveys of selected coastal habitats using appropriate methods [IE2; TW1]		
P5 evaluate the threats to coastal habitats	**M3** compare the impact of natural and human threats on selected coastal habitats	**D2** evaluate the effectiveness of coastal management for controlling threats at a selected coastal habitat, providing and justifying recommendations for improvement.
P6 explain the effects of threats on coastal habitats		
P7 explain the importance of legislation and planning for managing the coastal zone [EP2]	**M4** review the threats on selected coastal sites and the techniques used to protect the sites.	
P8 discuss the uses of practical management techniques for protecting coastal habitats.		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. 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

This unit has been designed to familiarise learners with coastal habitats and the different techniques available for their management and protection. Although there will be classroom sessions, it is envisaged that most learning will be through independent enquiry in the field. This will be enhanced by independent research and the use of software to analyse and interpret the results from field surveys. Visits led by local site managers to discuss threats to coastal habitats and the different management practices used to reduce damaging effects will be valuable.

A variety of techniques can be used to deliver the unit. Once the different terms have been explained, interactive activities in the classroom are encouraged to maintain learner interest. This is particularly useful when discussing legislation, the different threats to coastal habitats, their effects and the relevant techniques to ameliorate the effects. In addition to engaging learners, these activities will help to develop the skills of effective participators and team workers. These skills can be developed further in the field when learners are surveying habitats.

In common with many of the habitat units, there will be an element of seasonality in the delivery of this unit. Coastal habitats are best studied in the spring and early summer, particularly when specialist plant species are being identified. Some threats, such as landslips, are often most dramatic following winter storms, while other threats, such as tourism, are most evident during the warmer months. However, in general, threats and management techniques have less of a seasonal element than the field study components.

For centres without easy access to coastal environments, much of the *Unit content* can be covered using classroom discussion, independent research and interactive resources. These can be supplemented with a week at an educational or field study centre located near the coast, where all the practical fieldwork can be carried out. These centres will also have the equipment and expertise learners need to complete the field studies.

As there are numerous hazards associated with coastal habitats, priority must be given to health and safety considerations and the general welfare of learners. Before any studies in the tidal zone are carried out, tide tables must be consulted and mobile phone signals checked to ensure communication with the emergency services. Learners must be made aware of their responsibilities for maintaining their own safety and that of others and be fully informed of the consequences of irresponsible behaviour whilst on coastal sites.

Consideration should also be given to coastal wildlife and it is important that learners appreciate the sensitivity of life in coastal environments. Most plant species have adapted to light disturbance, but care should be taken not to damage sensitive species. Some field studies may involve the capture and handling of animals. Marine species which depend on moist conditions should be observed for a short period only before being returned to their natural environment. Slow moving or stationary species, such as limpets, should be studied *in situ* and not removed from their substrate.

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 demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and assessment
Overview of unit and assessment.
Assignment 1: Coastal Habitats (P1, P2, P3, P4, M1, M2, D1) Tutor introduces the assignment brief.
Tutor introduces types of coastal habitats and key species.
Discussion on physical processes, particularly the impact of wind and wave action in creating and destroying coastal features and habitats, and effects on coastal habitats.
Identification of key species in the field.
Surveys of selected coastal habitats.
Discussion on adaptations of species to coastal environments. Includes time allocated for independent research.
Assignment 2: Managing Threats to Coastal Habitats (P5, P6, P7, P8, M3, M4, D2) Tutor introduces the assignment brief.
Discussion on threats to coastal habitats and their effects – natural and human threats.
Discussion on the importance of legislation for protecting coastal sites. Includes time allocated for independent research.
Consideration of different practical solutions to these threats – investigate case study material where management techniques have been successful and where they have caused consequential problems.
Visits to see the management of important coastal sites.
Discussion on effectiveness of the different management practices observed.
Unit review and evaluation.

Assessment

For P1, learners need to discuss the structural features of coastal habitats. A minimum of three habitats should be included. Suitable evidence could be a leaflet, or a verbal presentation using appropriate software. If presentations are chosen as the assessment method, tutors must complete appropriate observation records to confirm learner achievement.

For P2, learners need to explain how physical processes affect coastal habitats. Although there are several processes listed in the *Unit content*, only certain ones will be relevant for a particular habitat. It is expected that learners will discuss the effects of physical processes on the habitats used for P1 and the evidence produced could be the same as for P1, with the extra information included.

For P3, learners should use field guides to identify indicator species in selected habitats. Learners should demonstrate an understanding of which species are indicators for at least two coastal habitats. The information obtained will form part of their field survey for P4. A practical observation record or logbook could be used to provide evidence.

For P4, learners are expected to carry out ecological surveys of coastal habitats. A minimum of three coastal habitats should be studied and these could be the same ones as used for P1. A minimum of two surveying techniques should be used. Studies will need to include some measure of distance to enable the different ecological zones to be measured. Learners will work in small groups and the evidence obtained can be used towards M2. Suitable evidence would be a logbook or completed worksheets.

For P5 and P6, learners need to evaluate the threats to coastal habitats (P5) and explain their effects (P6). Not all effects listed in the *Unit content* will be relevant for each threat. Learners need to evaluate the threats thoroughly before explaining their effects on coastal habitats. Learners can develop their own criteria for evaluation (such as economic damage, effects on wildlife or human settlements destroyed or displaced) and scales of importance (numerical, such as 1-5 or 1-10, or the use of symbols) or they can be supported by tutor guidance. Evidence can be in the form of a written report or a verbal presentation using suitable software.

For P7 and P8, learners need to explain how the different threats described in P5 can be controlled using legislation and discuss practical management techniques. Evidence can be an expansion of the work produced for P5 and P6.

For M1, learners need to extend the evidence created for P1 and P2 to explain how physical processes can both destroy and create coastal features and habitats. This explanation should include at least two coastal features and two habitats.

For M2, learners need to interpret and present their results of ecological surveys using graphs and tables. It is recommended that learners use relevant software for this task. Evidence can be in the form of an illustrated report or a verbal presentation using appropriate software.

For M3, learners need to build on evidence created for P5 and P6 to compare the impact of natural and human threats on two selected coastal habitats. These habitats may be selected by the tutor, or through discussion with learners.

For M4, learners need to research different coastal areas and produce case studies on threats to these areas and management solutions. A minimum of three case studies should be produced and it is recommended that these are agreed or provided by the tutor. Evidence could be in the form of an illustrated report or a verbal presentation using appropriate software.

For D1, learners need to discuss how species identified during the field studies have adapted to the relevant physical processes. A minimum of three species should be included. Suitable evidence would be an illustrated report for each habitat studied written as a scientific paper.

For D2, learners need to evaluate the effectiveness of coastal management for controlling threats at one of the sites investigated for M3 or M4 and suggest and justify recommendations for improvement. Suitable evidence would be an illustrated report.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and 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, M2, D1	Coastal Habitats	As an assistant warden for Natural England, you have been asked to carry out a series of surveys of coastal habitats. Create a coastal interpretation leaflet which includes the results of your surveys, together with an explanation of the physical processes affecting the coast, and how species have adapted to these processes.	Annotated poster. Leaflet. Illustrated report. Practical observation record.
P5, P6, P7, P8, M3, M4, D2	Managing Threats to Coastal Habitats	You are a countryside officer for a local authority running a local coast forum. You need to assess potential threats to your coastline and potential solutions. Include case studies to highlight successful and unsuccessful strategies that have been used for the British coastline. Recommend and justify improvements for the management of a selected coastal habitat.	Illustrated report. Presentation. Witness statement.

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 the following units in the BTEC Land-based suite and the BTEC Environmental Sustainability suite:

Level 2	Level 3
Introduction to Coastal Zone Management	Understanding Land Use and Environmental Issues
	Understanding Countryside Tourism and Recreation
	Understanding Principles of Physical and Biological Environmental Processes
	Understanding Water Quality
	Pollution Control and Management

Essential resources

Learners need access to different coastal environments to carry out field studies. They also need access to the internet to obtain information for coastal management case studies.

Employer engagement and vocational contexts

This unit introduces learners to a wide variety of habitats and organisations working in coastal zones. Centres are encouraged to establish links with professionals working for local authorities and wildlife charities. This would best be carried out within a field context, such as a guided walk around a nature reserve, coastal development site or popular beach area, to see and discuss management issues.

Indicative reading for learners

Textbooks

Beatley T, Brower D J and Schwab A K – *An Introduction to Coastal Zone Management* (Kogan Page, 2002) ISBN 9781559639156

Bird E – *Coastal Geomorphology: An Introduction* (Wiley-Blackwell, 2007) ISBN 9780470517307

Brooks A and Agate E – *Sand Dunes: A Practical Handbook* (BTCV, 2001) ISBN 9780946752324

Hill M – *Coasts and Coastal Management* (Hodder Murray, 2004) ISBN 9780340846384

Little C – *The Biology of Soft Shores and Estuaries* (Oxford University Press, 2000) ISBN 9780198504269

Little C and Kitching J A – *The Biology of Rocky Shores* (Oxford University Press, 1996) ISBN 9780198549352

Ray G C and McCormick-Ray J – *Coastal-Marine Conservation: Science and Policy* (Blackwell Publishing, 2004) ISBN 9780632055371

Stott T, Hindson J and Crump R – *Sand Dunes: A Political Coursework Guide* (Field Studies Council, 1993) ISBN 9781851538256

Waugh D – *Geography: An Integrated Approach* (Nelson Thornes, 2000) ISBN 9780174447061

Websites

Department for Environment, Food and Rural Affairs	www.defra.gov.uk
Environment Agency	www.environment-agency.gov.uk
Living with the Sea project	www.eclife.naturalengland.org.uk
Marine Conservation Society	www.mcsuk.org
Natural England	www.naturalengland.org.uk
Saltmarsh Management Manual	www.saltmarshmanagementmanual.co.uk
SCOPAC (Standing Conference on Problems Affecting the Coastline)	www.scopac.org.uk

Journal

British Wildlife

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are ...
Independent enquirers	conducting ecological surveys of coastal habitats
Team workers	identifying indicator species of selected habitats conducting ecological surveys of coastal habitats
Effective participators	explaining the importance of legislation and planning for managing the coastal zone.

Although PLTS 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	carrying out research using coastal case studies interpreting data obtained from coastal studies
Creative thinkers	proposing solutions to the problems associated with managing coastal habitats
Reflective learners	considering their own impact on coastal environments and how this could be reduced evaluating their field study methods and considering alternatives
Self-managers	completing field study reports as they occur and storing completed work in an orderly manner.

Functional skills – Level 2

Skill	When learners are ...
ICT – using ICT	
Plan solutions to complex tasks by analysing the necessary stages	planning and undertaking surveys of coastal habitats
Select, interact with and use ICT systems safely and securely for a complex task in non-routine and unfamiliar contexts	using software to analyse data obtained during field studies
ICT – finding and selecting information	
Select information from a variety of sources to meet requirements of a complex task	researching case studies on coastal management
ICT – developing, presenting and communicating information	
Enter, develop and refine information using appropriate software to meet requirements of a complex task	presenting the results of coastal field studies in a written report or verbal presentation
Combine and present information in ways that are fit for purpose and audience	adapting information obtained during coastal studies for a presentation, using appropriate software
Mathematics – representing	
Identify the situation or problems and identify the mathematical methods needed to solve them	analysing data obtained during field studies of coastal habitats
Mathematics – interpreting	
Draw conclusions and provide mathematical justifications	recommending coastal management options
English – Speaking, Listening and Communication	
Make a range of contributions to discussions in a range of contexts, including those that are unfamiliar, and make effective presentations	discussing and deciding on different management options for coastal habitats
English – Reading	
Select, read, understand and compare texts and use them to gather information, ideas, arguments and opinions	researching information for case studies of different coastal development situations
English – Writing	
Write a range of texts, including extended written documents, communicating information, ideas and opinions, effectively and persuasively	producing scientific reports based on field studies of coastal habitats.