

Unit 8 Coastal environments

About the unit

The focus of this unit is geomorphological patterns and processes. Pupils learn about the process of weathering and investigate the stages of development of a coastal landform. They go on to investigate the environmental planning and management of coastal areas and consider the tensions between development and conservation. Through this work they are introduced to two techniques they may not have met previously – cost-benefit analysis and impact matrices. The unit draws heavily on the *Optional tests and tasks for geography* (SCAA, 1996).

This unit is expected to take 8–11 hours.

Key aspects

Geographical enquiry and skills

Pupils will:

- ask geographical questions
- suggest investigation sequences
- collect/record/present evidence
- analyse evidence and draw conclusions
- communicate appropriately
- use fieldwork techniques
- use extended geographical vocabulary
- use atlases/globes/maps
- use secondary evidence
- draw maps, plans and graphs
- communicate, including using ICT
- experience decision making

Knowledge and understanding of places

Pupils will:

- locate places and environments
- describe and explain physical and human features
- investigate change in places

Knowledge and understanding of patterns and processes

Explored through:

- geomorphological processes
- environmental issues

Knowledge and understanding of environmental change and sustainable development

Pupils will study:

- environmental change and management
- sustainable development

Expectations

At the end of this unit

most pupils will: begin to suggest relevant geographical questions and a sequence to investigate weathering of the school buildings and grounds and environmental issues; describe and begin to explain how wave action and weathering processes are responsible for the development of particular coastal landforms; describe and begin to explain how wave action and weathering processes affect coastal landforms, land use and, consequently, people; recognise some of the links between causes and consequences of cliff collapse and people's responses to it; understand how conflicting demands on an environment may arise and how people may damage and improve such environments; compare different approaches to managing coastal erosion in a sustainable way and their effects on people and the environment; select and use appropriate geographical skills and sources of evidence to present information; suggest plausible conclusions and present their findings both graphically and in writing

some pupils will not have made so much progress and will: begin to suggest suitable geographical questions and a sequence to investigate weathering of the school buildings and grounds; describe and begin to understand how wave action and weathering processes are responsible for the development of particular coastal landforms; describe and begin to understand how wave action and weathering processes affect coastal landforms, land use and, consequently, people; begin to recognise the causes and consequences of cliff collapse and people's responses to it; describe how conflicting demands on an environment may arise; recognise how people try to manage environments sustainably and how they may be affected; use a range of appropriate geographical skills and secondary sources of evidence in their investigations of coastal environments and present their findings both graphically and in writing

some pupils will have progressed further and will: identify relevant geographical questions and a sequence to investigate weathering of the school buildings and grounds and environmental issues; describe interactions within and between physical and human processes responsible for the weathering of buildings, the formation of selected coastal landforms and the occurrence of hazards; recognise that human actions may have unintended environmental consequences and that change sometimes leads to conflict; appreciate that considerations of sustainable development affect the planning and management of coastal environments; select and use effectively a wide range of skills; begin to evaluate critically sources of evidence, present well-argued reports of coastal environmental management and reach substantiated conclusions

Prior learning

It is helpful if pupils have:

- prior knowledge and understanding of the physical features and processes affecting coasts from key stage 2
- undertaken and practised geographical enquiries, asked and answered questions and developed their research skills
- developed their map skills, especially in relation to the use of OS maps at different scales
- experienced group work, eg in unit 3 'People everywhere'

Language for learning

Through the activities in this unit pupils will be able to understand, use and spell correctly:

- words relating to the coast, eg *arch, backwash, beach, cave, cliff, coast, deposition, ebb, fault, fetch, freeze–thaw, groundwater, groynes, headland, high water mark, impermeable, landslide, longshore drift, low water mark, permeable, revetments, salt marsh, sand dune, slump, spit, stack, storm surge, stump, swash, tides, water table, wave, wave-cut notch, wave-cut platform, weathering*
- other specialist vocabulary, eg *attrition, beach nourishment, corrosion, hydraulic action, solution, tidal range, cost–benefit analysis, impact matrix*

Speaking and listening – through the activities pupils could:

- listen for a specific purpose, note the main points and consider their relevance

Writing – through the activities pupils could:

- group sentences into paragraphs that are focused and well developed
- use correctly full stops, brackets, dashes and colons

Resources

Resources include:

- materials from *Optional tests and tasks for geography*, which include geology and OS maps
- photographs/postcards of coastal landforms
- video footage of coasts to show wave action and resulting landforms, especially cave, arch, stack and stump, cliff collapse and spit formation, and coastal protection strategies
- newspaper articles on storm action, cliff collapse and other coastal hazards
- textbook resources
- local experts to advise on planning and management of coastal areas
- supporting video programmes:
 - *Geography in animation, programme 1: Coastal erosion; programme 2: Coastal deposition; programme 4: Coastal management* (BBC Schools)
 - *Geographical eye over Britain, programme 2: Shifting coastline* (Channel 4 Education)

Future learning


This unit provides a base for further enquiries and decision-making exercises in the key stage 3 programme of study and for GCSE coursework enquiries and a base for units on geomorphology, especially coasts. Techniques used here can be applied to other contexts where similar evaluation of a proposed development is required. Pupils may need reminding that they now have knowledge of these strategies and should be able to draw on them if appropriate.

Links


The activities in this unit link with:

- other geography units – unit 13 ‘Limestone landscapes’
- mathematics – using and interpreting scale (maps)
- ICT – using digital images, word-processing and desktop-publishing packages, using the internet
- citizenship – investigating responsibilities of school governors, local and central government, expressing and explaining views, considering other people’s experiences
- science – work on the weathering of rocks

What is weathering? How does weathering affect different types of rocks?

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| <ul style="list-style-type: none"> • to practise their developing enquiry, recording and analytical skills • to identify the environmental conditions which cause weathering • to identify agents of erosion | <ul style="list-style-type: none"> • As a general introduction to rocks and how they are worn away, organise an exercise for pupils to match rock types and their descriptions. If possible follow this with simple experiments relating to strength, <i>eg how readily a rock sample crumbles, porosity and reaction with acid.</i> • Ask pupils to plan a survey (drawing on their previous experience of enquiry questions and the investigative sequence) of evidence of weathering in the school grounds and buildings. Discuss with them the questions they might investigate, <i>eg Is one side of the school more prone to weathering than another? Which materials are more prone to weathering and were they poorly chosen? Is there a link between the amount of weathering and height? Which types of weathering are most common?</i> Pupils will need to make decisions about how they will record the evidence, <i>eg annotated sketches of parts of buildings, noting process, height and aspect, or a recording grid with suitable column headings.</i> • Using appropriate textbooks help pupils to understand the two main types of weathering (mechanical/chemical) and to show these in the form of annotated diagrams. Distinguish between weathering and erosion and identify the main erosion agents. Weaker readers will need more structured guidance on researching and note making. | <ul style="list-style-type: none"> • accurately match information to identify the characteristics of different rock types • understand how rock characteristics vary • produce a map and annotated sketches identifying weathered surfaces of the school buildings and reasons for them • name the main types of weathering and the processes involved • name the main agents of erosion and how erosion differs from weathering | <ul style="list-style-type: none"> • Science: links with work on physical weathering of rock in science. • Citizenship: this activity provides pupils with the opportunity to consider the responsibilities of the governing body for the upkeep of the school. • Homework activity: ask pupils to conduct a survey of their homes to raise awareness of managing the upkeep of houses, painting, repair of leaks, etc. <p> Safety – use of acid and other issues: consult with the science department</p> |
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How is the coast shaped by wave action?

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| <ul style="list-style-type: none"> • to use an extended vocabulary • to identify characteristic landforms using photographs • how wave action can shape the coastal landscape • to practise map-reading skills and to use and draw a map for a particular purpose • to describe the geographical context of an area using maps | <ul style="list-style-type: none"> • Show pupils a video excerpt of wave action and coastal landforms and ask them to note five things it shows about the effects of wave action on shaping the coastline. It is helpful if features resulting from both erosion and deposition are shown, <i>eg cave/spit</i>. Ask pupils to draw an annotated sketch of a chosen landform to identify its main features and to suggest the processes responsible for producing those features. For less able pupils cards with appropriate words/descriptions on them might help. • Provide pupils with an OS map of a stretch of coastline which includes some of the landforms they are familiar with from the video. Ask them to plan a coastal walk to include a range of landforms, and to mark this on an outline map of the coast with notes on what they would see and where. Less able pupils might benefit from being given a part-drawn outline map and some prompts to get them started. | <ul style="list-style-type: none"> • show understanding of coastal processes which shape landforms by labelling sketches from photographs • correctly name and recognise coastal landforms on an OS map • produce a guided walk along a stretch of coast to note important features • accurately describe the national context of the area of coastline studied | <p> Safety – there is an opportunity here to remind pupils of the need to be aware of danger when walking along clifftops and to make some reference to it in their planned walk</p> |
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How do erosion and deposition create coastal landforms?

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| <ul style="list-style-type: none"> • to interpret geology maps and link them to photographs • to transform photographs into annotated sketches • to communicate using IT • how processes and rock type are responsible for the development of selected landforms | <ul style="list-style-type: none"> • Use a geology map (possibly in simplified form), OS maps and photographs to help pupils analyse the relationship between geology and coastal landforms and link this to the results of their experiments earlier in the unit on rock strength, etc. Ask them to write sentences to make the links explicit, <i>eg Cliffs tend to be found where ... ; Bays tend to be found where ...</i>. Emphasise how the sea erodes, transports and deposits material. • Using a video excerpt or a series of photographs discuss with pupils the stages of development of one or more landform(s) as appropriate, <i>eg present them with a cartoon storyboard with the first and final frames completed</i>. Ask them to speculate about the processes leading to the final outcome by sketching in the stages of development, adding labels to explain, <i>eg from sea cliff to stump, stages in the growth/development of a spit across a river mouth</i>. Then ask them to check and correct their ideas with reference to textbooks. • As a final task, ask pupils to produce an information leaflet illustrating coastal landforms in Dorset (or another suitable location) for a visiting geography fieldwork group. | <ul style="list-style-type: none"> • obtain information from a variety of maps and recognise the links between them • explain how rock type and wave action affect the type and scale of coastal landform development | <ul style="list-style-type: none"> • ICT: pupils can produce and amend annotated diagrams using digital images. • Commercially produced information leaflets and guides may be useful as models. • Pupils may need reminding/instructing about the features of information leaflets, depending on previous experience, and about the need for accuracy in presentation. A particular feature might be the quality of annotated diagrams. • ICT: a word-processing package or desktop-publishing package could be used to develop an information leaflet combining text and images. • For more detail see <i>Optional tests and tasks for geography</i> (SCAA) – ‘Coastal environments’. |
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What causes cliff collapse? How can this hazard affect people and how do people respond to this hazard?

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| <ul style="list-style-type: none"> • to analyse secondary data (moving image) • to communicate in ways appropriate to task and audience • about the causes and effects of a hazard and human responses to such environmental issues | <ul style="list-style-type: none"> • Ask pupils to watch a video of a cliff collapse <i>without the commentary</i> to improve observational skills, and then, in pairs, to discuss what they saw. Replay the video with the commentary and ask them to sort out any inaccuracies/misconceptions they had. • Discuss with pupils newspaper reports of cliff collapse, highlighting/underlining the points which indicate the processes that cause the event and its consequences. Ask them to use these to draw a series of sketches (with notes from photographs) to emphasise the impact of weathering and erosion on a cliff face. • Ask pupils to write an explanation of why cliffs collapse for a newspaper article, making special reference to examples provided from Scarborough and the Sussex Downs. Pupils' accounts should include what happened, how people responded, and advice to the local authority on how to control the hazard or prevent a recurrence. | <ul style="list-style-type: none"> • describe and explain the causes and consequences of cliff collapse • make judgements about different strategies for reducing the hazard of cliff collapse • write a well-structured explanation, incorporating evidence, examples and future implications | <ul style="list-style-type: none"> • Economic and industrial understanding (EIU): this activity provides an opportunity for pupils to consider the possible loss of tourist revenue to hotels and the local area resulting from a hazard. • ICT: this activity provides an opportunity for pupils to investigate web-based sources and use a desktop-publishing package to write a newspaper article. • Language for learning: this activity provides an opportunity for pupils to group sentences into paragraphs that are clearly focused and well developed. • Citizenship: this is an opportunity for pupils to learn about central and local government, the public services they offer and how they are financed. |
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Learning objectives

Pupils should learn:

Possible teaching activities**Learning outcomes**


Pupils:

Points to note

How are coastal areas used by people? What conflicts of interest occur over the use of coastal areas and how can they be resolved?

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| <ul style="list-style-type: none"> • about a land-use issue and how to evaluate impact • to make decisions about the likely environmental impact of a leisure development • to explore the idea of sustainable development and its implications within the study context | <ul style="list-style-type: none"> • Give pupils various maps, photographs and video evidence to show the variety of ways coastal areas are used by people. Ask them to use this information to investigate a particular stretch of coast to identify different land uses. • Introduce pupils to a decision-making exercise: it is proposed that a holiday leisure complex be built on this stretch of coastline. Ask them to evaluate its likely economic, social and environmental effects, <i>eg in a cost–benefit analysis</i>, and its potential impact on each of the other land uses there. Discuss with pupils the views of different interest groups. | <ul style="list-style-type: none"> • describe how coastlines are used • make and justify reasoned decisions about land-use choice in a coastal area • effectively evaluate a proposed development for impact and within the context of sustainability | <ul style="list-style-type: none"> • Mathematics: use and interpret maps and scales. • Language for learning: this activity provides pupils with an opportunity to listen for a specific purpose, note the main points and consider their relevance. • An impact matrix (with the land uses on both axes) is helpful for pupils to tick/cross and comment on how one land use affects another. |
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How can coastal areas be managed? What are the effects of environmental planning and management on coastal landscapes and the people who use them?

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| <ul style="list-style-type: none"> • to describe and explain how physical and human processes affect specific locations (coastline) • to evaluate different strategies used to manage environmental change | <ul style="list-style-type: none"> • Involve pupils in a role-play exercise on coastal protection of the north Norfolk coast. • Full details for this exercise can be found in <i>Optional tests and tasks for geography</i> (SCAA) – ‘Coastal environments’ (Unit 1, task 2, pages 7 and 8). • Then ask pupils, in groups, to produce either a poster or an information sheet which describes and explains their position in relation to the issue, and to present it to the whole class. • Ask pupils to investigate different strategies of coastal management, <i>eg do nothing, build sea walls, build groynes</i>, and to write a summary of the different viewpoints, listing points for and against particular proposals. They should add their own viewpoint and justify it. (Some pupils may be given the option of presenting their report in the style of different newspapers, <i>eg tabloid, broadsheet</i>, or as a report for television.) | <ul style="list-style-type: none"> • understand the viewpoints of different groups • describe and explain available strategies and understand the complexities of issues relating to coastal protection • present viewpoints succinctly and accurately for readers and audience in writing and speech | <ul style="list-style-type: none"> • Citizenship: this activity provides pupils with opportunities to justify orally or in writing a personal opinion about such issues, problems or events. • There is an opportunity to video pupils, to provide evidence of achievement of weaker writers. • Language for learning: the writing tasks provide opportunities to emphasise to pupils the importance of accurate punctuation in their presentations and how use of full stops, brackets, dashes and colons can improve their writing. <p> Safety – all off-site visits must be carried out in accordance with LEA and school guidelines</p> |
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