7 Coasts

chapter overview

The big picture

These are the big ideas behind the chapter:

- The British Isles is continually shaped and changed by physical and human processes – and that includes the coast.
- The waves shape the coast by eroding, transporting and depositing material, producing special coastal landforms – and weathering contributes.
- We humans also change it, through the way we use the land.
- There is a limited amount of coast, and many conflicting demands on it. So it needs to be managed, and used, in a sustainable way.
- In many areas along the south and east coasts, where the rock is soft or fairly soft, erosion is threatening settlements.
- The challenge is to defend the coast against erosion in a sustainable way, weighing up economic, social and environmental costs and benefits.

Note that the pupils' version of the big picture is given in the pupils' chapter opener.

Chapter outline

Use this, and the pupils' chapter opener, to give pupils a mental roadmap for the chapter.

7 **Coasts** As the pupils' chapter opener, this unit is an important part of the chapter; see page 11 for notes about using chapter openers

7.1 **Waves and tides** What they are and what causes them

7.2 **The waves at work** How waves erode, transport, and deposit material

7.3 **Landforms created by the waves** The landforms you find along the coast, created by the waves – some through erosion, some through deposition

7.4 **Along the East Lothian coast** Brush up on OS map skills, around the Dunbar area

7.5 **Managing land use in coastal areas** Why it needs managing, and who does it

7.6 **How long can Happisburgh hang on?** How and why the village of Happisburgh (pronounced *Haisbro*) is being nibbled away by the sea

7.7 **The war against erosion** Where erosion is a problem along the coast, and how it can be slowed down

7.8 **Managing the defence of the coast** The problems with defending the coast against erosion – and who decides

Objectives and outcomes for this chapter

Objectives	Unit	Outcomes
Most pupils will understand:		Most pupils will be able to:
• that our coastline is shaped by both physical and human processes	all	• give examples of physical and human processes that shape the coastline
• what causes waves, and tides	7.1	• explain that waves are caused by the wind, and say how its strength, duration and fetch affect them; explain that the pull of the moon (and the sun, to a lesser extent) on the sea causes the tides
• how the waves shape the coast, and that weathering contributes	7.1, 7.2, 7.3, 7.6	• describe the processes of erosion, transport and deposition by the waves; say how weathering helps to make erosion easier
• that the action of the waves leads to characteristic coastal landforms	7.3, 7.4	• name, describe and identify the coastal landforms covered in the chapter; explain how they are formed
• that you can identify coastal landforms on photos and OS maps	7.4	• use photos and OS maps to identify coastal landforms
• that land use along the coast needs to be managed	7.5	• give at least six examples of land use along the coast; describe how decisions about land use are made
• that erosion is causing serious problems along some parts of the coast	7.6, 7.7	• point out the main stretches of our coast where erosion is causing problems; describe the problems at Happisburgh
• that there are things we can do to prevent, or at least reduce, coastal erosion	7.7	• give four ways to prevent, or reduce, coastal erosion; and one way to reduce weathering of soft cliffs
• that the current strategy is to defend the coast in a sustainable way	7.8	• give at least three reasons why building coastal defences is not always a sustainable solution; give the current strategy for defending the coast

These tie in with 'Your goals for this chapter' in the pupils' chapter opener, and with the opening lines in each unit, which give the purpose of the unit in a pupil-friendly style.

Opportunities for assessment

See the assessment package for this chapter, on pages 218–228 of the *geog.scot1 teacher's resource file*. It includes a level-marked assessment, and suggestions for interim assessments using *geog.scot1* materials.

Getting ready for this chapter

Some of the suggestions for starters and plenaries, for the units in this chapter, need resources prepared in advance. Check out the *Resources* section on the 'Help at a glance' pages that follow. Other essential or useful resources for the chapter are:

- *geog.scot1 teacher's resource file*
- the *geog.world* CD-ROM

Using the chapter starter

Why does the coast look so different in different places? It's largely down to geology. Page 110 of the *geog.scot1* students' book has a simplified map of the geology of the UK, which you could ask pupils to refer to. The hardest rock is the most resistant. The Old Man of Stoer (photo **A** on page 96) is a stack made of ancient Torridonian sandstone, around 1.2 billion years old. Morston Marshes (photo **B**) are on the North Norfolk coast, where the rock is a mixture of materials deposited by melting glaciers around 400 000 years ago, and easily eroded. Sennen beach (photo **C**) nestles in a sandstone area surrounded by granite. And the Seven Sisters (photo **D**) are chalk, packed with fossils.

7.1 Waves and tides

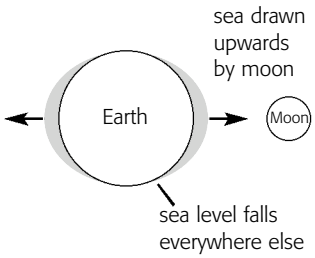
help at a glance

About this unit

This unit explains what causes waves, and the tides, and introduces swash and backwash. In 'Your turn', pupils apply what they've learned – in response to questions about a diagram and photos – and then do some creative writing.

Key ideas

- Waves are caused by wind dragging on the surface of the water.
- The length of water the wind blows over is called the fetch. The stronger the wind, the longer it blows for, and the longer the fetch, the larger the waves will be.
- Waves 'break' in shallow water. The water that rushes up the sand is the swash; it rolls back into the sea as backwash.
- When the swash is stronger than the backwash, material is added to the beach. If the backwash is stronger the beach is eroded.
- The moon and sun exert a gravitational force on the Earth; so they draw the seas upwards, on the side facing them; at the same time, on the opposite side of the Earth, the seas are pulled upwards by a centrifugal force. As a result, the water level falls everywhere else around the Earth.
- The rises and falls in water level are called tides. There are high tides at a place twice a day, and low tides in between.
- As the moon travels around the Earth, and the Earth around the sun, the combined pull of the moon and sun changes; so the heights of the tides change too.



Key vocabulary

fetch, swash, backwash, tides, high tide, low tide, tidal range

Skills practised in 'Your turn'

- Geography skills: drawing conclusions about the height of waves, from maps; analysing photos and answering questions about them
- Literacy skills: using the glossary; giving definitions; writing a dramatic diary entry
- Thinking skills: coming up with reasons and explanations

Unit outcomes

By the end of this unit, most pupils should be able to:

- define the terms given in 'Key vocabulary' above
- explain that:
  waves are caused by wind, and say how wind strength, duration and fetch affect them;
  tides are caused by the pull of the moon (and the sun, to a lesser extent) on the sea

Resources

For starter **1**: images of waves
For starter **2**: shallow tray, water and a straw
For starter **3**: a collection of objects found washed up on a beach

Ideas for a starter

1 Show images of waves, or sketch waves on the board. Ask what causes the waves.

2 Make waves by blowing on the surface of water in a shallow tray, with a straw.

3 Ask: Have you ever been beach combing? What kinds of things have you found? How did they end up there? (Take in some beach trophies if you have some.)

4 Mind-movie time! You are on a beach, all alone. What can you see and hear? Tell us.

Ideas for plenaries

Plan plenaries for strategic points throughout the lesson, as well as at the end.

1 Use any of questions **1**–**5** in 'Your turn' as a plenary about waves.

2 How do waves affect us? (Help, or hinder?)

3 How do we use waves?

4 Do we get waves in rivers? Why are they much bigger in the sea?

5 Use question **6** in 'Your turn' as a plenary about tides.

6 Ask pupils to read out their work for question **7** in 'Your turn'.

7 Make cards with the words *wave*, *fetch, swash, backwash, prevailing wind, tide, tidal range* on, and put them face down. Ask a pupil to choose a card, and act out (or describe) what is on the card, for the rest of the class to guess. The pupil must not say the word on the card.

8 (With books closed.) What have waves got to do with geography? What do you think they are leading onto?

9 Take two minutes to work with a partner and think up one interesting question about waves, that we have not covered today. (This could produce a good enquiry question which the class could follow through.)

Further class and homework activities

Suggestions 6–12 on page 136 of this book

Shipwrecked! (a webfile with two worksheets) in *geog.2, Coasts* on the *geog.world* CD-ROM

Answers to 'Your turn'

1 Strength of wind; how long the wind has been blowing; length of the fetch.

2 a B, because it is the strongest, with the longest fetch.

b A, because it is light, like C, but has a shorter fetch.

3 a prevailing wind: the wind that blows most often

south west wind: the wind that blows *from* the south west

b Winds from the south west have a long fetch, over the Atlantic Ocean. If they are strong too, this means high along the south west tip of England.

c Surfers like big waves. South west England, and Wales, can get big waves because of the long fetch of the prevailing south west wind. So they're good places for surfing schools.

4 a Swash is the water that rushes up the beach when a wave breaks.

b Backwash is the water that then runs down the beach after the wave has broken.

5 a Beach D appears to have the stronger backwash. Not much material has been deposited below the cliffs. Beach C has all that sand between the sea and the land.

b Morston Marshes (photo B) looks as if it gets hardly any waves – the water shown here is sheltered by land. So it's a good place to tie a boat up. It will of course get tides.

6 a Tides are the rise and fall of the sea. As the moon travels around the Earth, it attracts the sea and pulls the water upwards. (The sun also attracts sea that's turned towards it – but to a lesser extent, since the sun is much further away.)

b There would be more water and the boats would be floating higher.

c The water would reach further up the sand – so less beach to see.

d At high tide the water reaches the cliffs. Pupils might guess this from the damp look of the cliff base. This photo appears to have been taken when the tide was going out.

7.2 The waves at work

help at a glance

About this unit

This unit explains how the waves shape the coast, by eroding, transporting and depositing material. In 'Your turn' pupils apply what they've learned, in response to questions about a diagram and photos.

Key ideas

- Waves continually shape the coastline by eroding, transporting and depositing material. Weathering helps this process by making erosion easier.
- The waves erode rock by: hammering into cracks at high pressure (hydraulic action); dissolving any soluble material (solution); flinging pebbles and sand at it, which scrape it away (abrasion); and finally by knocking stones and rock fragments together so that these get smoothed and worn away (attrition).
- The end products of erosion are pebbles (shingle), sand, and mud.
- The way waves roll in and out, and their direction, means eroded material is carried *parallel* to the shore. This is called longshore drift. (Some also gets carried out to sea.)
- Beaches form in sheltered areas where the waves deposit sand or shingle.
- Some resorts have groynes (barriers of wood or stone) down the beach, to stop sand being carried away by longshore drift.

Key vocabulary

erode, transport, deposit, weathered, hydraulic action, solution, abrasion, attrition, shingle, sand, longshore drift, groynes, prevailing wind

Skills practised in 'Your turn'

- Geography skills: working out compass directions; identifying connections between landforms; analysing a photo and drawing
- Literacy skills: finding facts within text
- Thinking skills: coming up with reasons and explanations

Unit outcomes

By the end of this unit, most pupils should be able to:

- explain the terms given in 'Key vocabulary' above
- describe the processes of erosion, transport and deposition by the waves
- say how weathering helps to make erosion easier

Resources

For starter **1**: beach pebbles; garden stones for comparison; sand
For starter **2**: photos or video of the waves at work
For plenary **2**: photos connected with erosion/transport/deposition in rivers
For plenaries **2** and **3**: class sets of the *geog.scot1* students' book would be useful

Ideas for a starter

1 Show some rounded beach pebbles (and garden stones for comparison), and sand. Ask: Why are the pebbles round? Where do you think they came from originally? Where did the sand come from? Why are the grains so small?

2 Show photos or a video of the waves at work.

3 Write the words erosion, transport, deposition, and their meanings, each on a large sheet of paper. Six pupils hold the six sheets up. The rest of the class match them.

4 Who can remind me of the work rivers do? Do you think the waves do the same?

Ideas for plenaries

Plan plenaries for strategic points throughout the lesson, as well as at the end.

1 Ask a pupil to mark the different processes that contribute to erosion, on a spider map. The pupil nominates four other pupils to explain what each term means.

2 (If starter **4** not used.) Write headings on the board: *The sea* *Rivers* Ask: What work does the sea do, through its waves? Write *erosion/ transport/ deposition* on the board. Now who can remind me of the work that rivers do? Is it the same as for the sea? What differences are there? (You could show photos connected with river erosion/transport/deposition.)

3 Who can remind me about what weathering is? Does it happen along the coast? (Give a brief recap of weathering or give out a summary sheet for weathering.) Why would weathering along the coast make erosion easier?

4 Look at the photo on page 101. What would happen if the groynes weren't there? Where would the sand go? Where do you think it would end up?

5 Use question **6** in 'Your turn' as a plenary.

6 Do you think erosion along the coast is as fast on a calm day as on a windy day? Explain.

7 So is the sea wearing the British Isles away and making them smaller? Discuss.

8 Do you think erosion and deposition could be causing us problems? Discuss.

9 A quickfire test: call out a pupil's name and a definition (e.g. for erosion, attrition, hydraulic action). The pupil has five seconds to give you the term.

10 You have one minute to work with a partner and decide on four key things you learned today.

Further class and homework activities

Suggestions 13–17 on page 136 of this book

Worksheets 7A and 7B, on pages 192 and 193 of the *geog.scot1 teacher's resource file*

Around our coastline (a webfile with one worksheet) in *geog.2*, *Coasts* on the *geog.world* CD-ROM

Answers to 'Your turn'

1 They erode, transport and deposit material.

2 hydraulic action, solution, abrasion, attrition

3 **a** The right-hand one. It is smoother, because its edges and corners have been worn away through collisions with other pebbles.

b attrition

4 **a** To stop the beach being eroded away.

b Yes; more sand has built up on one side of each groyne (the side facing the waves) than the other.

c **i** (from the south west); the longshore drift flows past the groynes from that direction and some of the sand gets trapped.

5 **a** south east

b It is not sheltered enough. The waves at A are eroding material.

c It is sheltered so sand is deposited.

d from the erosion of rocks; at least some would have come from the rocks at A.

6 No. There are lots of different types of rocks; some are harder, and these erode more slowly than softer rocks do. Also, wave action around the coast varies depending on the strength of the prevailing winds, their fetch, and other local conditions (tides, currents, etc). The extent to which weathering occurs will also vary with the climate – and heavy weathering will help erosion.

7.3 Landforms created by the waves

help at a glance

About this unit

This unit shows coastal landforms and explains how they're formed, with detail about wave-cut platforms, and the progress from cave to arch, stack and stump. In 'Your turn' pupils identify the processes responsible for the different landforms, draw two annotated sketches from photos, and do a drawing to show how erosion will affect a piece of coast.

Key ideas

- Erosion and deposition by the waves results in different coastal landforms.
- Waves erode different types of rock at different rates. Hard rock erodes more slowly than adjacent soft rock. The result is headlands, and adjoining bays.
- Waves carve notches in a cliff face. When these get deep enough, the overhanging cliff topples into the sea. So the cliff face recedes, leaving a wave-cut platform of rock.
- Waves can attack cracks in headlands, enlarging them into caves. In time these wear right through to form arches. Arches collapse leaving pillars called stacks, which wear away to stumps.
- Sand carried by longshore drift may be deposited in bays, forming beaches. Or in the sea, where the coast changes direction sharply, forming spits.
- Silt and mud collect in the sheltered area behind a spit, forming a salt marsh.

Key vocabulary

headland, wave-cut notch, wave-cut platform, bay, cave, arch, stack, stump, beach, spit, salt marsh

Skills practised in 'Your turn'

- Geography skills: identifying the processes that created different landforms; making annotated sketches of landforms from photos; using compass directions
- Thinking skills: predicting how erosion will affect a stretch of coast made up of different rocks

Unit outcomes

By the end of this unit, most pupils should be able to:

- define the terms given in 'Key vocabulary' above
- identify, and sketch, the coastal landforms that have been covered in this unit
- explain how they are formed
- draw an annotated sketch of a coastal landform, from a photo
- show, by means of a sketch, that they understand that different rock types erode at different rates

Resources

For starter **1**: photos or video showing coastal landforms

Ideas for a starter

1 Show photos, or video, of different coastal landforms. Ask pupils to describe the landforms they see. Ask: Why do you think we get all these different shapes?

2 Look at the photos on page 96 of the *geog.scot1* students' book. Describe them. Why do you think they are all so different?

Ideas for plenaries

Plan plenaries for strategic points throughout the lesson, as well as at the end.

1 Give pupils a few minutes to look closely at photo B on page 103 of the *geog.scot1* students' book. Then ask questions about it. How was it formed? What's it made of? Is it large? Has it been here a long time? Is it quite solid? Do you think it's still growing? Ask for evidence where appropriate.

2 Turn to page 96 of the students' book. See if you can identify the landforms in A, B and C. (Pupils could work in pairs and give feedback.) What will happen to A in the future?

3 Look at photo D on page 96 of the students' book. These chalk cliffs are retreating at a rate of about 60 cm a year. Why? Can you see any signs of a wave-cut platform? Describe anything you notice. What can you conclude about chalk, and its resistance to erosion? How long will it take the cliffs to retreat 10 metres? (16.6 years.) What would happen if you had a house on the cliff top?

4 Pupils silently draw landforms on the board, for the rest of the class to guess.

5 Play *Taboo*, for the landforms in this unit.

6 So – who can give me a reason why the coast of Britain is so different in different places? Pupils could have a few minutes to discuss this in pairs.
(Note: geology is a key factor in determining what the coastline is like; but many other factors affect the rate of erosion, including extent of exposure to strong waves.)

7 Did you find anything difficult about the work in this unit? What? Why? What would help to make it less difficult?

Further class and homework activities

Worksheet 7C, on page 194 of the *geog.scot1 teacher's resource file*

Suggestions 18–24 on pages 136–137 of this book

Investigating weathering (an enquiry) on pages 213–217 of the *geog.scot1 teacher's resource file*

The history of Spurn Head (an enquiry) on pages 205–212 of the *geog.scot1 teacher's resource file*

Answers to 'Your turn'

1

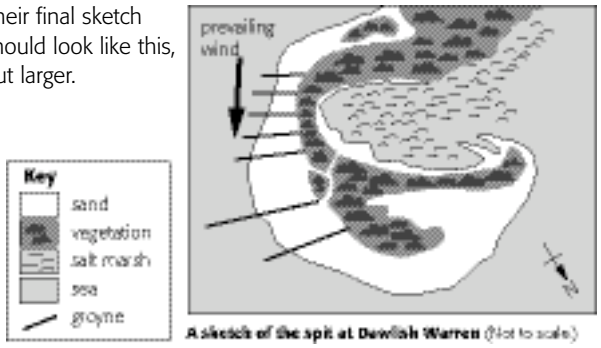
Landform	Created by . . . erosion	deposition
headland	✓	
wave-cut platform	✓	
bay		✓
cave	✓	
arch	✓	
stack	✓	
beach		✓
spit		✓
salt marsh		✓

2 a Note that the photo shows several wave-cut notches.

b First the waves eroded a hollow in the rock of the headland. This deepened to form a cave. (In fact two caves may have formed opposite each other, because waves at a headland get bent around or refracted, attacking the headland from both sides.) Then the cave eroded right through, leaving an arch.

d It will be completely eroded away.

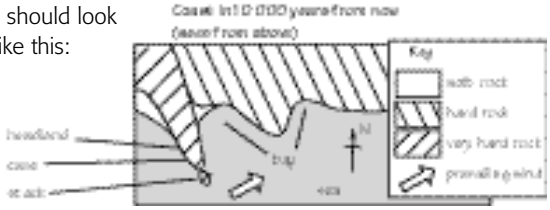
3 a Their final sketch should look like this, but larger.



A sketch of the spit at Dawlish Warren (Not to scale)

b South west. The direction the spit grows from gives wave direction, which in turn tells you wind direction. Then use the N arrow.

4 Their sketch should look something like this:



7.4 Along the East Lothian coast

help at a glance

About this unit

This unit presents a 1:50 000 OS map of part of the East Lothian coast, south of Edinburgh. 'Your turn' gives pupils practice in OS map skills, using a geology map, and drawing a route map for a group of students, from an OS map.
(**Note**: there is an OS map key on page 126 of the *geog.scot1* students' book.)

Key idea

This is a skills based unit focusing on an OS map and photos. See below for the skills practised in 'Your turn'.

Key vocabulary

geology

Skills practised in 'Your turn'

- Geography skills: analysing photos; identifying landforms from photos; matching photos to an OS map; using grid references; explaining the formation of landforms; identifying OS symbols and coastal landforms on an OS map; using a geology map; drawing a sketch map from an OS map; sketching and annotating a route map from an OS map
- Literacy skills: making a list
- Thinking skills: making connections; giving evidence; coming up with reasons

Unit outcomes

By the end of this unit, most pupils should be able to:

- define the term given in 'Key vocabulary' above
- identify coastal landforms on an OS map and on photos
- draw a sketch map from an OS map
- recognise that there is a connection between the geology of the coastline, and the shape of the coastline on the map

Resources

For starter **1**: outline map of the UK, for the board
For starter **3**: class set of atlases
For starter **4**: flash cards with OS coastal symbols on, but no labels
For plenary **2**: further images of the East Lothian coast, in the OS map area

Ideas for a starter

1 Mental map time! Ask: What is East Lothian? Where is it? With all books closed, and no clues on walls, ask pupils to mark it on an outline map of the UK, on the board.

2 Point out the area covered in this unit, on the map on page 127 of *geog.scot1* students' book. Ask pupils to give you some geographical facts about the coastline.

3 As for **2**, but have atlases ready on the desk, and ask pupils to find East Lothian and Dunbar in an atlas, and give you further geographical facts about the area and the coastline.

4 Hold up flash cards with OS coastal symbols on. Pupils try to identify them – without looking at the OS key – and write down their answers. One pupil could call out correct answers from the OS key, and pupils self-mark, with one mark for each correct one.

Ideas for plenaries

Plan plenaries for strategic points throughout the lesson, as well as at the end.

1. Why are there headlands sticking out on some parts of this coastline, and beaches and bays in other parts?
2. Show further images of the East Lothian coast, in the OS map area. Ask for comments. Ask pupils to give four- or six-figure grid references for them.
3. Ask pupils to sum up the East Lothian coast as a mind map, individually, for one minute, then refine them in twos for two minutes, then in fours for a further two minutes. (Pupils could go on to use this as the basis for an extended piece of writing.)
4. Did you find anything difficult about the work in this unit? What? Why? What would help to make it less difficult?

Further class and homework activities

Suggestions 25–29 on page 137 of this book

Answers to 'Your turn'

1 a A spit.

b 6479

c Sand and shingle.

d From the north east. The end of the spit is curving away from the wind.

e The North Sea.

f The River Tyne.

2 a 6779

b Pupils may find this difficult.

3 a Igneous rock

b It is a mixture of mudstone, siltstone and sandstone.

c The mix of mudstone, siltstone and sandstone. The coastline is more indented where this rock type occurs, indicating more erosion than in other areas of harder rock.

d Spits are made of sand and shingle and can change shape quite quickly. They can be breached or destroyed by storms, hence can be seen as temporary features.

4 a 677794

c It is a good defensive position – high up so that it would be difficult for people to reach there unnoticed. People living in the castle would be able to see others approaching from along the coast, overland or by sea.

d The photographer was most likely to be standing at 680793.

7.5 Managing land use in coastal areas

help at a glance

About this unit

This unit is about why land use along the coast needs managing, and how this is done. In 'Your turn', pupils identify different types of coastal land use, and draw a conflict grid for them. They then explore the pros and cons of a proposal for a new leisure complex at Dunbar (in the OS map area, in Unit 7.4).

Key ideas

- There are many conflicting demands on coastal areas – so land use along the coast has to be managed.
- Decisions about land use are generally made by local councils.
- The public gets a chance to comment on planning proposals, and there may be a public enquiry where there is a lot of conflict over plans.

Key vocabulary

managed, local council, public inquiry, conflict grid (in 'Your turn')

Skills practised in 'Your turn'

- Geography skills: identifying land use from a drawing, and from an OS map; matching a low aerial photo to a location on an OS map
- Literacy skills: writing a letter of persuasion to the local council; writing a speech for a public enquiry
- Thinking skills: filling in a conflict grid; thinking up ways to resolve these conflicts; identifying pros and cons for a development proposal; reaching a conclusion

Unit outcomes

By the end of this unit, most pupils should be able to:

- explain the terms given in 'Key vocabulary' above
- give at least six examples of land use along the coast
- say who is involved in making decisions about land use
- recognise that making decisions is a case of weighing up pros and cons

Resources

For starter **3**: images of land use along the coast (hotels, restaurants and cafes, beaches, swimming, sailing, golf, aquariums, walks, parks, farming, homes, etc.)

Ideas for a starter

1 What can we do at the coast? Ask pupils to create a graffiti wall on the board, about uses of the coast. All pupils should contribute.

2 Ask: Who decides what you can do at the seaside? Discuss regulations about parking and camping and swimming, and move on to other issues. For example: What if you want to build a hotel overlooking the beach?

3 Show images of land use along the coast. Ask pupils to identify where there might be conflicts.

4 Which is the odd-one-out, and what links all four items in each group?
a) swimming, sunbathing, windsurfing, surfboarding
b) tourists, lifeguards, hotel staff, ice cream sellers
c) light houses, bed-and-breakfast, hotels, cafes
d) farmland, caravan parks, campsites, public toilets

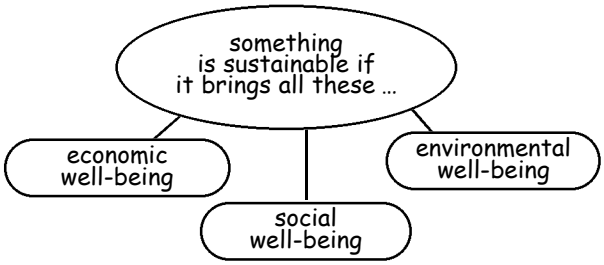
Ideas for plenaries

Plan plenaries for strategic points throughout the lesson, as well as at the end.

1 Question **1** in 'Your turn' could be done as a plenary, written on the board.

2 Question **3c** in 'Your turn' could be done as a plenary. Pairs of pupils act out conflicts over land use (or water use). The class suggests a way to solve them.

3 Discuss whether the Dream Developments leisure complex would be an example of *sustainable* development, using this diagram. Do you know enough about it to decide? What else would you like to know?



4 Ask some pupils to make their speech, for question **8** of 'Your turn', to the class. (Pupils can say in their speech that they need more information, if they feel they do.)

5 Do you think decisions about land use inland are made in the same way as decisions about land use along the coast? How would you find out? (This could be a homework activity.)

6 Tell your neighbour the two most important things you learned today.

Further class and homework activities

Worksheet 7D, on page 195 of the *geog.scot1 teacher's resource file*

Suggestions 30–33 on page 137 of this book

Answers to 'Your turn'

1 How the coast is used

Work	Leisure
farming	sailing
fishing	wind surfing
oil extraction	swimming
as a good location for setting up and running hotels, caravan and camping sites, cafés and funfairs and other attractions and services for visitors	boating/canoeing
	water skiing
	walking
	golf
	climbing/abseiling
army practice range	staying in hotels
as a source of construction materials (eg sand, shingle)	caravanning
	camping
	eating snacks
	visiting funfairs
	sunbathing

2 a Walkers may leave gates open, drop litter, trample crops; their dogs may chase farm animals. Farmers may try to keep walkers off public rights of way.

b The hotels may buy fresh fish from the fishing fleet; the hotel attracts visitors, who may book fishing trips.

c Walking is done on land, and sailing in the sea!

3 c This introduces ideas of coastal management, and could provoke a lot of discussion. Pupils should suggest restricting areas to different activities, for safety (eg no walking on the army range, no water skiing in the swimming area). Building should also be controlled so that for example the funfair (noisy) is not too close to hotels. The fishing fleet should be forced to operate well away from water sports, since fishing nets are dangerous. The oil rig should not be set up near a beach resort, since there is a risk of oil pollution.

4 Remind pupils that the question asks for four-figure grid references. The OS map shows evidence of these activities: enjoying nature, e.g. the John Muir Country Park (6479 and 6579); Farm Park (6478); caravan sites (6678); swimming, sunbathing and other beach activities (sand at Peffer Sands, Ravensheugh Sands, Tyne Sands, etc for example in square 6282); picnic sites and car parks (6578 and 6678); visiting ancient monuments (standing stones in squares 6177 and 6876, dovecot in 6676); information centre (6879); museum (6878); viewpoint (6779); golf (6679, 6978); rock pooling and scrambling at various points along the coast (for example in square 6381).

5 a South west.

b Developers are people, or companies, who want to change the use of an area or building.

c A greenfield site is an area of countryside, or open space, that has not yet been built on.

7 The 'model' of the complex will help them do this exercise.

8 Pupils need to think about the site, good and bad points about the proposed development and decide whether it should go ahead (giving their reasons).

7.6 How long can Happisburgh hang on?

help at a glance

About this unit

This unit tells about the village of Happisburgh (*Haisbro*) on the North Norfolk coast, which is losing 2–8 m of land a year to the sea. In 'Your turn', pupils compare photos of Happisburgh, taken 8 years apart. They use an OS map to work out how long it will take take for the sea to reach certain landmarks, if nothing more is done to protect the village.

Key ideas

- Erosion by the waves can cause cliffs to collapse, and homes to fall into the sea.
- This is a particular problem in places along the North Norfolk coast, such as Happisburgh, where the cliffs are soft (made of sand and clay).
- The cliffs are weakened by weathering, and eroded from below by the sea.

Key vocabulary

weathering, revetments

Skills practised in 'Your turn'

- Geography skills: comparing photos; analysing photos; working out a compass bearing; locating features, and measuring distance, on an OS map
- Numeracy skills: simple calculations
- Thinking skills: explaining the effect of different factors; finding evidence in photos

Unit outcomes

By the end of this unit, most pupils should be able to:

- explain the terms given in 'Key vocabulary' above
- explain why coastal erosion is happening so quickly, at Happisburgh
- describe the effects of erosion, at Happisburgh

Resources

For starter **1**: small folded strips of paper with a different number on each, from 1 up to the number of pupils in the class; a box or bowl to put them in

Ideas for a starter

1 As pupils come in, give each a piece of paper with a number on. Then call out a number (in order or randomly), and ask a quickfire revision question, such as:
- What causes waves?
- What makes waves grow bigger?
- Name the three kinds of work that the waves do.
- What happens to the material that the waves erode?
- Does all rock erode at the same speed?
- Which will erode faster, granite cliffs or clay cliffs?
- If the waves are big and strong, will erosion be faster or slower?
- What is weathering?
- What are the three types of weathering?
- Does weathering make erosion harder or easier?
- Why does weathering makes erosion easier?

If the numbered pupil can't answer, pass the question to another.

2 Ask pupils to find Happisburgh, on the map on page 127 of the *geog.scot1* students' book, and give you at least three geographical facts about it.

3 Ask pupils to sit very quietly and read the account at the top of page 108 of the *geog.scot1* students' book. (Or ask one pupil to read it aloud.) Discuss any difficult words.

Ideas for plenaries

Plan plenaries for strategic points throughout the lesson, as well as at the end.

1 Question **1** of 'Your turn' could be used for a plenary.

2 Why did people build homes in such a risky place?

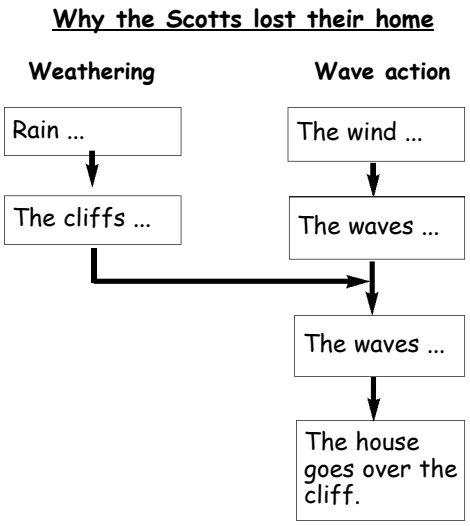
3 When rain soaks into clay it makes the clay slippery. How do you think that might affect cliffs?

4 What if … the North Norfolk council had replaced the revetments below the Scotts' home, after the storm had damaged them?

5 What if … the present barriers get destroyed in a storm, and are not replaced?

6 Do you think the Scotts should have got compensation from the council, for the loss of their home? Two pupils could act out a conversation between Mr Scott, and an official from the North Norfolk council, about this. (Give five minutes to prepare.)

7 Start a flowchart on the board, like the one on the right. Each box will eventually contain a full sentence. Ask pupils to suggest sentences for some of the boxes, using your starter words.
Then pupils work in pairs to create a similar flowchart on sugar paper. They can add more boxes, on both branches, if they like.
Encourage pupils to use as many correct terms as they can (for example the term *hydraulic action*).
At the end pupils complete / modify the flowchart on the board, with feedback from the class.



8 What do you think could be done, to save the other houses in Happisburgh?

Further class and homework activities

Suggestions 34–36 on page 137 of this book

Answers to 'Your turn'

1 a The cliffs are made of easily-eroded materials: sand and clay. They could not stand up to the waves. They also let rain soak in, and this weakens them. (For example it makes the clay slippery, so blocks of clay can slide downhill.)
b Rain soaks into the soft cliffs and weakens them. The weaker they are, the more easily eroded they'll be.
c Strong north winds coming down the North Sea (a long fetch) will drive big waves against the soft cliffs, eroding them rapidly.

2 a caravans
b towards the north west
c i groynes; they prevent sand being carried away by longshore drift
ii revetments; they make the waves break early, reducing their energy – so the waves won't erode the cliffs so fast
iii rock armour; again it soaks up the waves' energy

3 a Pupils should mention that the road curving down towards the lower right of the photo (it's called Cliff Road) has got shorter over the eight-year period, and several of its houses have disappeared. Above Cliff Road, a group of buildings that stood on the edge of the cliff have also gone. At the end of Cliff Road, by 2004, there was a much bigger bite out of the coastline. Revetments at the bottom of the 1996 photo had disappeared by 2004, and those further up are showing more damage. But rock armour had appeared at the foot of Cliff Road by 2004, clearly in an attempt to slow erosion there.
b i The barriers don't appear to have prevented erosion completely. Even where the revetments appear undamaged, some land has gone.
ii However they do appear to have slowed erosion. Look at the big chunk of land lost where there are no barriers, or only broken-down ones.

4 a Around 81 years. (Pupils' answers will vary, depending on which part of the church symbol they measure to.) Some pupils may need to be told to measure to the cliff edge, not to the sea.
b Around 34 years. (Again, pupils' answers will vary.)

7.7 The war against erosion

help at a glance

About this unit

This unit presents a map showing where coastal erosion is a problem in the UK, and looks at ways to reduce or prevent it. The defences at Mappleton, on the north east coast, are shown as an example. In 'Your turn' pupils study the map, and the Mappleton defences. They then make suggestions for Happisburgh, in a letter to a newspaper.

Key ideas

- Erosion is a big problem on stretches of the south and east coasts, that have soft or fairly soft rock.
- Defences against it include: seawalls; groynes; rock armour; beach replenishment.
- In addition, weathering of soft cliffs can be reduced by draining rainwater from them.
- Protecting places against erosion is very costly.

Key vocabulary

sea walls, rock armour, groynes, beach replenishment

Skills practised in 'Your turn'

- Geography skills: analysing a map and a photo
- Numeracy skills: some simple cost calculations may be needed
- Literacy skills: writing a letter to a newspaper
- Thinking skills: coming up with explanations and reasons

Unit outcomes

By the end of this unit, most pupils should be able to:

- define the terms given in 'Key vocabulary' above
- give four ways to prevent, or reduce, coastal erosion
- give one way to reduce weathering of soft cliffs
- identify coastal defences on a photo

Resources

For starter **2**: a set of True/False statements about the map on page 110 of the *geog.scot1* students' book; a pair of True/False cards for each pupil (green for true, red for false)
For starter **3**: a postcard from a lady who lives in Happisburgh – see below.
For plenary **1**: a set of images of coastal erosion around the UK; a set of atlases
For plenary **2**: a set of images of coastal defences around the UK; a set of atlases

Ideas for a starter

1 Who can remind me about what's happening in Happisburgh? Do you think it's the only place in the UK where this is happening? Why do you think that?

2 This can be used instead of Question 1 of 'Your turn'. Have a set of True/False statements ready about the map on page 110 of the *geog.scot1* students' book, e.g.:
- Most of the UK is hard rock.
- The soft rock is mainly in northern Scotland.
- Erosion is mainly a problem on the south and west coasts of England.

Give pupils a few minutes to study the map. Call out the statements one by one. Pupils hold up True/False cards or call out *True* or *False*.

3 A pupil reads out a postcard from a lady who lives in Happisburgh, and is worried about her home falling into the sea. She wants ideas for how this could be prevented. Pupils come up with suggestions (with books closed). Note these on the board. You can come back to them later (in plenary **6**).

Ideas for plenaries

Plan plenaries for strategic points throughout the lesson, as well as at the end.

1 Show a set of images of coastal erosion around the UK. Pupils can locate roughly where they are, on the map on page 110 of the students' book, with help from an atlas.

2 Show a set of images of coastal defences around the UK. Ask pupils to describe them. Again pupils may be able to locate them, on the map on page 110 of their books.

3 The scale of the map on page 110 of *geog.scot1* is 1 cm:74 km. About much would it cost to put rock armour along all the bits of coast where erosion is a problem?

a) £14 million b) £140 million c) £14 billion d) £1400 billion
The answer is d.

4 Ask selected pupils to read out their letters for question **3a** of 'Your turn'. The class discusses the proposed solutions / cost.

5 Write a summary of the key things you have learned today, in exactly 45 words. You could do it as bullet points.

6 Look back at your suggestions for the lady who sent the postcard. Would you change any now?

Further class and homework activities

Suggestions 37 and 38 on page 137 of this book

Worksheet 7E on page 196 of the *geog.scot1 teacher's resource file*

Answers to 'Your turn'

1 a i in Scotland and Northern Ireland
ii mostly in the lower half of England, running in from the east coast

b The hardest rock does seem to jut out as headlands, which suggests that it is the most difficult to erode. Look at the west coast of Scotland, for example, and the toe of Cornwall.
By contrast the parts of the east coast with the softest rock are generally smooth. This could suggest that soft rock is easy to wear away.
Pupils will probably find this challenging. Remind them that it is not only rock type that affects the rate of erosion. Other factors, such as amount of exposure to the prevailing wind, also play a part.

c Pupils should be able to say that it is a problem on long stretches of the east coast of England, and especially on the bulge north of London (or below the Wash). It is also a problem at intervals along the south coast (but not in the south west corner). In general, it's a problem where the rock is softest.

2 a Barriers of rock armour were built at A and C; these will absorb the energy of the waves, and so protect the foot of the cliff from erosion. A groyne of rock armour was built at B; it will stop sand being eroded and carried southwards by longshore drift. The sand in turn will help to protect the cliffs.

b The rock armour at C appears to have helped to prevent erosion. At D, where it stops, the coastline has a little bite out of it, showing that erosion is continuing there.

c i Rock armour is very expensive, so it is used only to protect more important features – in this case a car park, largely for day trippers, with access to the beach. Clearly at D the farmland was not thought worth protecting. (Note: a condition of Mappleton's grant was that tourism would be encouraged.)
ii The unprotected coast will continue to erode.

3 a,b Pupils will probably suggest rebuilding the broken revetments, or adding more rock armour. The cost may be a surprise!

7.8 Managing the defence of the coast

help at a glance

About this unit

This unit shows the problems there are in trying to defend the coast against erosion, and gives a brief summary of the government strategy. In 'Your turn' pupils explore North Norfolk Council's plans for protecting the coast around Happisburgh. They then put themselves in the shoes of a Happisburgh house owner, facing a dilemma.

Key ideas

- There are many problems with trying to defend the coast against erosion. These include: cost; the need for continual maintenance; the predicted need for continual upgrading, as a result of climate change; and the fact that preventing erosion in one place can make it worse somewhere else, by upsetting the balance of erosion and deposition along a stretch of coastline.
- For hundreds of years the policy was to go for 'hard' defences, such as groynes and rock armour. Now over 10% of the British coastline is protected by hard defences.
- More recently the idea of 'soft' defences such as beach replenishment, that worked with natural processes, gained ground.
- Now, the strategy is one of *sustainable* defence. Places are to be defended if the economic, social and environmental benefits outweigh the costs.
- Clearly, coastal defence needs managing, just as other aspects of coastal land use.

Key vocabulary

global warming, sustainable

Skills practised in 'Your turn'

- Geography skills: analysing a map
- Thinking skills: coming up with reasons and explanations; deciding on a plan of action

Unit outcomes

By the end of this unit, most pupils should be able to:

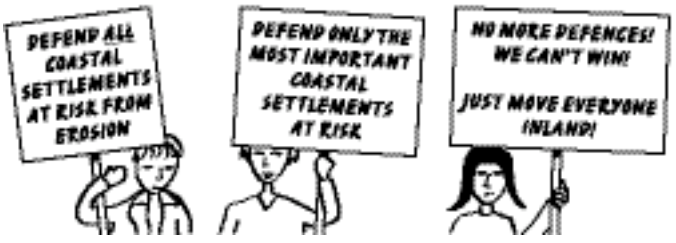
- define the terms given in 'Key vocabulary' above
- give three examples of problems in defending the coast against erosion
- say what the current strategy is, for defending the coast against erosion

Resources

No special resources

Ideas for a starter

1 Say: Coastal defences cost a lot.
Then draw three figures on the board, like these.
Ask: Which one would you agree with? (Take a vote, and record it.)
How would you decide which places to defend? What would you want to know about the places?
Write suggestions on the board. You can come back to them later (in plenary **4**).



2 Look back at the defences at Happisburgh, in the photos on page 17 of the students' book. Do defences last forever? Can we really stop the sea eroding places? Why do we bother? What if we didn't bother, and gave people money to move inland instead?

3 You saw that land use at the coast is managed. Should defence against erosion be managed too? Why? / Why not? Who should manage it?

Ideas for plenaries

Plan plenaries for strategic points throughout the lesson, as well as at the end.

1 Questions **1** and **2** of 'Your turn' could be used for a plenary.

2 Three pupils become a panel of government advisers. One explains to the class the strategy for defending the coast in a sustainable way, against erosion. Then all three take questions from the class.

3 Pupils make a larger copy of this table, and work in pairs to fill it in. They should fill in as many advantages and disadvantages as they can, and then give feedback to the class.

Building defences against erosion		
	Advantages	Disadvantages
Economic		
Social		
Environmental		

4 (If starter **1** was used) Look back at starter **1**, and take a new vote. Have the numbers changed?
Now look at the points you noted. Can you add any more?
(This would be best left until after question **4** of 'Your turn'.)

5 Starter **2** could be used as a plenary, if not already used.

6 Question **5** of 'Your turn' could be done in pairs, and feedback given to the class.

7 Work with your neighbour to identify the three most important points you learned today. Then tell me!

Further class and homework activities

Suggestions 39–45 on page 137 of this book

Worksheet 7F on page 197 of the *geog.scot1 teacher's resource file*

Protecting Tunstall (a role play) on pages 199–204 of the *geog.scot1 teacher's resource file*

Review of 'Your goals' on page 97 of the *geog.scot1* students' book

Assessment package for Chapter 7 on pages 218–228 of the *geog.scot1 teacher's resource file*

Answers to 'Your turn'

1 Pupils' lists should include: cost of building defences; need for continual maintenance; rising sea levels and more storms (thanks to global warming) requiring ever larger, stronger defences; effect of defences in one place on the rate of erosion in other places.

2 Pupils are not likely to agree. First, sea walls would not be needed where erosion is not a problem. Then the cost, at £5000 a metre, would be enormous. They would not suit some locations, eg Happisburgh, which is on a clifftop. In other scenic locations they might spoil a sea view. And finally, we don't know what negative effects this solution would have. For example it could lead to beaches being scoured away.

3 a The main reason is likely to be the cost.
b Happisburgh and Winterton.

4 a It's a town rather than a village, which implies greater economic importance in the area, and more valuable property. If it were not defended it could mean businesses would move away, and jobs would be lost. Clues: the size of the dot used for it on the map, and the main roads, and railway, going to it.
b This is to prevent the sea breaking through to the Norfolk Broads.
c You could find out the population of Winterton, and how many houses it has, and how near the sea they are. And also whether there's a risk that the sea could breach the Norfolk Broads from here. (Presumably there is very little risk of that.)

5 Raffle it or auction it on e-Bay, as a unique disappearing property? Let it out as a holiday home with a difference? Persuade the council to pay you compensation? Pupils may come up with better ideas.

7 Further suggestions for class and homework

Most of these suggestions are addressed to your pupils. Where research, or further resources, are needed, the internet will almost certainly provide the answer. (Try a search engine such as *google*, and *google images*.)

Coasts: general

1 Coastal places in the British Isles Collect postcards and photos of coastal places around the British Isles, especially places pupils have visited. Make a collage of them around a map of the British Isles. Give some information below each. *

2 Coastal places around the world Like **1**, but this time choose places all around the world. *

3 Has it a coast? Start three lists on the board: countries that are islands, countries with some coastline, and countries with none. Pupils call out five examples for each, and say what continent they are on. This should lead to some interesting discussions. For example is Australia an island? And where should the UK go? *

4 Did we always have this much coast? No, because Britain was once joined up to Ireland on one side, and the rest of Europe on another. Find out what happened to split us up, and do a class presentation. ***

5 Media watch The coast and sea are often used as a setting. Draw up a list of books, poems, TV series, films or adverts set on the coast or at sea. (You could divide the class into groups to research these.) **

Waves and tides

6 Go surfing! This watersport is growing in popularity. Surf the internet to find out about surfing in the UK. Write an information sheet about the sport. Mention the equipment needed, plus any dangers attached to the sport. Add a map of the British Isles showing where the best surfing spots are. **

7 Go windsurfing! Like **6** but for windsurfing. **

8 Track those tides Only for the most determined! Find out the predicted high and low tides, and their times, for a UK location (eg Bristol) for the next fortnight, or even better, a month. Then plot a graph – you'll need a long strip of paper – to show how the sea level rises and falls. Can you correlate the graph to the phases of the moon? ***

9 Great British sailing ships Where there are waves and wind there were sailing ships. Collect images of famous British sailing ships, including warships, cargo ships, and vessels used on explorations. You could show them on a timeline along the classroom wall, with a paragraph about each one. */**/***

10 And more ships … Activity **9** could be extended, through the first steam ships up to the present, including modern Royal Navy ships, cargo containers and cruise liners. */**/***

11 Sea fever Find John Masefield's poem *Sea fever* and read it to the class. What does the last stanza mean? *

12 Cargoes The sea means trading. Find John Masefield's poem *Cargoes* and read it to the class. *

The waves at work

13 What's weathering? Pupils create an information unit about weathering. The unit should contain: three labelled diagrams showing physical, chemical and biological weathering, OR three photos (annotated) showing examples; a short paragraph for each type of weathering, explaining what it is; and an example of where each can be found around the school. **

14 Why are bits of Beachy Head falling down? – an enquiry Carry out the enquiry and write a report. Your report must say something about the role of weathering! **/***

15 Longshore drift: the demo Ask pupils to devise a game using just a small ball, eraser, or similar light object, and themselves, to show longshore drift. (Hint: pupils could stand facing each other in two parallel rows. One row represents the swash, the other the backwash. Take it from there!) **

16 A poem about longshore drift? A pupil reads *Beachcomber* by George Mackay Brown. (Do an internet search.) Pupils could write it down and illustrate it. *

17 Another poem … Try *maggie and millie and mollie and me* by ee cummings. An internet search will find it. *

Landforms created by the waves

18 Arch: the movie Divide a sheet of A4 paper into eight equal parts by drawing a line down the middle and three lines across. In each part draw one stage of a sequence to show how an arch forms. Match your drawings in size and position, with space on the left to staple them. Cut up the sheet. Staple the drawings together, staggered so that the bottom one sticks out furthest. Flick them and watch that arch grow. *

19 My life as a sand grain You started life as a silica crystal embedded in a cliff. (Silica is what sand is made of.) What happened to you? Where are you now? Tell your story in any form you like – as prose, a poem or a strip cartoon. **

20 Adopt a headland Choose any headland from a map of the British Isles. Research it in the travel section of your local library, and on the internet. Concentrate on the geology of the area, that produced this landform. Write a report. ***

21 Study a spit A variation on **20**. Choose one of Britain's spits, such as The Sandbanks in Poole Harbour, or Spurn Head. Find an aerial view of it, and draw a field sketch, and a map to show its location. Describe what it is used for, if anything, and what there is to do there. **

22 Famous British coastal landforms Collect images of famous British coastal landforms (for example Beachy Head). Stick them on cards with a paragraph of text below each. Then place them around a map of the British Isles, with the locations marked on. (The map could be a simplified geology map as on page 110 of the *geog.scot1* students' book.) **

23 Get sketching Laminate a set of colour prints of coastal landforms. (Try for at least 10 or 12 different images.) Give them out to pairs of pupils to identify and sketch. They must add a paragraph to say how the landforms were formed. **

24 Make a model of the coast How would you make a realistic model of the coast, showing different coastal landforms? Pupils could compete in groups to design and create the best model. ***/**/*****

Along the East Lothian Coast

25 Defending Dunbar Dunbar Castle had a defensive role – but against who, and why? Can you find out? And when, and why, was the castle destroyed? ******

26 An East Lothian holiday brochure Make a fold-out holiday leaflet to encourage people to visit the Dunbar area. It should include a sketch map, a map of how to get there, photos, and information about things to do. Pupils can handwrite it or use a desktop publishing package. ******

27 Or a holiday brochure for … Pupils do a brochure like the one in **26** but for another resort. Encourage pupils to choose different resorts around the British Isles. Their leaflets could be displayed on the wall around a map of the British Isles. ******

28 Coast! How many different coastal landforms can you spot on the OS map on page 105 of the students' book? Make a table. Have landforms in one column, a grid reference for the landform in the next column and how it was formed in the third column. ******

29 Seaside safety The seaside can be dangerous. Strong currents can carry poor swimmers away. Design a poster for display at the seaside, with advice about swimming safely. *****

Managing land use in coastal areas

30 Seaside poem/rap Make up a poem or rap about why everyone loves being by the sea, or a seaside holiday you had in the UK. ***/**/*****

31 Coastal settlements around the British Isles Coastal settlements have many functions – but usually one main one, e.g. port, fishing port, seaside resort.
Pupils choose one coastal settlement each (all different) anywhere in the British Isles. Encourage them to cover the whole coastline and go for places they know nothing about. Then they have to find out some information about their choice, e.g. population, main function (port? seaside resort? fishing town?) and get a photo or two from brochures or the internet. They present the information on a small sheet of paper. They mark their settlements on a large blank wall map of the British Isles, and arrange the sheets around the map, linked to it by paper ribbon, or thread, or coloured string. ******

32 The geography of smuggling Much of the south coast was famous for smuggling. Find out more about the history of smuggling in Cornwall, for example. How did its geography help? Draw a map to show coves where smuggling took place, and add interesting facts around the border of the map. *******

33 Make up your ideal British seaside resort Give it a name, say where it is on the coast, and do a sketch map for it. Do drawings to show land use in it, and say a bit about the different activities you can do there. *****

How long can Happisburgh hang on?

34 If only a house could talk Write a diary entry for the Scotts' house for the day before it went over the cliff. You could mention all the stresses and strains it has been feeling over the last few months, and how it's feeling now. *****

35 Happisburgh field sketch Draw a field sketch based on the lower right photo in the *geog.scot1* students' book page 17, and annotate it. ***/**/*****

36 Happisburgh TV report You were there when the final section of the Scotts' house went over the cliff. Prepare a storyboard and script for a 90-second TV news report. Say who you interviewed, and what they said. Your storyboard should show the images being used for each part of the audio. (It could sometimes be you!) ***/**/*****

The war against erosion

37 Dredging the sea bed Huge quantities of gravel are dredged from the sea bed. Some think that may be contributing to erosion. Find out more and give your findings as a short radio report OR a 'serious' strip cartoon. ****/*****

38 Is beach replenishment a good idea? Find out more about beach replenishment, and where it's used in the UK. Do you think it's a good idea? Is it sustainable? Give your answer in an interesting form: for example as interviews with an engineer and an environmentalist, or an interview with the sea, or as a 'serious' strip cartoon. ***/**/*****

Managing the defence of the coast

39 No more defences It's the year 2050. Global warming has caused rising sea levels around the British Isles, and many more storms. Every year, more coastal defences are shattered. You're the minister in charge of the coast. You've decided there will be no more sea defences. Write an action plan. ******

40 What about the Norfolk Broads? Everyone agrees that the sea must not be allowed to breach the Norfolk Broads. Find out what they are and why they are important. Then write a unit on them, based on the units in the *geog.scot1* students' book. You can even add questions if you like. ******

41 What's happening at Happisburgh now? Find out what's happening about defences at Happisburgh by visiting www.happisburgh.org.uk. Prepare a 45-second radio report to keep *geog.scot1* users up to date. ******

42 Should Happisburgh be defended? Hold a class debate. But first decide what else you'd need to know about Happisburgh, and do an internet search. ****/*****

43 Should there be compensation? Should people who lose their homes through coastal erosion be given compensation? Hold a class debate. ****/*****

44 The last word to the sea Pretend you're the sea. Make up a monologue or poem about humans and their attempts to keep you at bay. ***/**/*****

45 Alphabet run Do an alphabet run from A–Z, with a word to do with coasts and the sea for each letter. *****