



Dawlish

Enquiry 2: What coastal processes are occurring at Dawlish Warren and how can they be most effectively managed in the future?

Context and Learning Aims

Pupils will be supported in and outside of the classroom to:

- Identify and describe the main physical and human geographical features of Dawlish Warren and the coastal processes of *erosion*, *transportation* and *deposition*;
- Recognise, describe and explain the difference between 'hard' and 'soft' engineering responses to the effects of coastal change at Dawlish Warren;
- Understand in relation to coastal management at Dawlish Warren the concept of *stakeholder*; identify the major stakeholders and evaluate what they feel to be the relative 'value' and 'importance' of each;
- Explain the different ways in which the changing geography of Dawlish Warren is impacting on stakeholders and understand that because of this each stakeholder is likely to advocate different approaches to managing the environment;
- Evaluate the effectiveness of existing coastal management schemes at Dawlish Warren using a range of statistical methods and analysis;
- Appreciate why Dawlish Warren is vulnerable to being breached as a consequence of coastal processes and explain why climate change is likely to increase this vulnerability;
- Have an awareness of what the implications might be of leaving Dawlish Warren unmanaged in the future;
- Compile an analytical presentation which advocates the 'best' option for managing Dawlish Warren in the short, medium and long term.

Learning and teaching activities and curriculum progression

Key Question 2.1: What are the physical and human geographical features of Dawlish Warren?

This initial enquiry provides continuity with the foundation work on Dawlish Warren in the primary school enquiry programme and serves also as an introduction to Dawlish Warren. The main outcomes are for pupils to be able to identify the key physical and human features of the coastline at Dawlish Warren and recognise evidence of coastal processes. To begin play the short video in **Resource 2.1** and encourage pupils to make brief notes about five key points or issues that they identify in the film. Encourage discussion about what kind of place Dawlish Warren is and take feedback from pupils. What physical and human features did the pupils see and what coastal processes did they recognise occurring? Before moving on ensure that the pupils understand that human features of an environment are those created by the activities of people and can include things such as property, roads, railways as well as car parks and camping grounds. At Dawlish Warren many human features have been created through demand from the tourist industry and the need over many decades to manage the coast against erosion of the coast. Physical features are those that naturally exist and have formed as a result of processes such as *erosion; transportation and deposition*. Erosional features at Dawlish Warren include *cliffs, bays and headlands; arches; caves; stacks; stumps and islands*. Depositional features include *beaches; sand dunes; bars; spits and tombolos*.

Divide the pupils into pairs or groups of three and give each a copy of the Ordnance Survey map extract and associated keys in **Resources 2.2 – 2.4**. Ask pupils firstly to identify one human feature and one physical feature of Dawlish Warren from the map. Project the map onto the whiteboard and invite individual pupils to come up and circle and describe a feature they have identified on the map. Invite discussion about each feature relating to why it might be located in Dawlish Warren e.g. *the car park was built to provide parking for visitors and holiday makers*. Continue inviting pupils to contribute in this way until an exhaustive list has been compiled.

Now distribute the blank outline map of Dawlish Warren in **Resource 2.5** On to this outline support the pupils to locate and label all of the human and physical features which have been identified by members of the whole group during feedback. The PowerPoint in **Resource 2.6** will support this process. As well as labelling the diagram challenge the pupils to also provide annotations which give more detail and explanation e.g. *a campsite shows that people visit and also indicates that Dawlish Warren is a popular place for visitors and holiday makers using the beach or a beach is a depositional feature made up of sand eroded from cliffs*. Some pupils can be encouraged to think about grouping adjacent and similar activities into distinct land use areas such as *shops and services or leisure and recreation*. The final slide of the PowerPoint will be of use here. Before moving on there is an opportunity for pupils to peer assess each other's work. Pupils can provide feedback to each other e.g. *what went well (WWW)* or *even better if (EBI)*.

Key Question 2.2: Who visits Dawlish Warren?

The objective of this enquiry is to help the pupils to understand the different functions of Dawlish Warren. Divide the pupils into pairs and give them three minutes to consider why people might visit Dawlish Warren? To assist with this the pupils can be given **Resource 2.7** which will help the generation of ideas. On a copy of **Resource 2.8** the pupils can identify the users of Dawlish Warren in the inner circle and add notes to explain why they use it in the outer circle. The pupils can be asked to exchange ideas and suggestions. Any ideas that the pupils gather that they have not considered can be added to their diagram. Try to extend the thinking of the pupils away from just humans. Wildlife visits Dawlish Warren also, especially migrating birds. How can we discover which birds, where they come from and why? The next task is for the pupils to categorise the main users of Dawlish Warren into *social*; *economic* and *environmental consumers*. Spend time discussing what each of these categories covers and then ask the pupils to colour code their diagram in **Resource 2.8** appropriately. Encourage discussion by asking the pupils whether any of the uses and users of Dawlish Warren could be allocated to one or more category? If so which and why? Next, hand out a copy of **Resource 2.9** to each pupil and take time to explain to the pupils the concept of *key stakeholders* i.e. someone or something that has a particular interest in or connection with Dawlish Warren e.g. a shop keeper; Go-Kart operator or Brent Goose. Encourage the pupils to select a stakeholder and write who or what it is on the top of the sheet. They can then write down under the correct heading – *social*; *economic* and *environmental* the reasons why their stakeholder comes to Dawlish Warren. The third activity asks pupils to reflect upon whether some stakeholders are of greater ‘value’ to Dawlish Warren than others? Can the pupils prioritise who are the more ‘important’ stakeholders and be able to justify their decisions? What is Dawlish Warren most used for? Who are the most important or valuable people who use this space and why?

Key Question 2.3: Which stakeholders are impacted upon most by the changing geography of Dawlish Warren?

This investigation assists pupils to consider how people are impacted upon by changes occurring at Dawlish Warren and also the decisions which will need to be made regarding its management in the future. It would be worthwhile here to revisit the LiCCo film in Resource 1.49 to review management issues. This is an interactive session in which pupils will develop an understanding of different people’s point of view. Introduce this investigation through the PowerPoint presentation in **Resource 2.10**. The key thing for the pupils to understand here is that the physical geography of Dawlish Warren is *dynamic* i.e. in a constant state of change. Long shore drift is moving beach material along the coast which is a threat to the maintenance of its beautiful beaches. Erosion is occurring towards the centre and eastern arm of the spit where gabions (wire baskets of stones and pebbles) are being exposed as the sand dunes are broken down by storms and tides. There is a real danger that in the middle term i.e. 40 - 60 years the spit may be breached altogether as a result of rising sea levels and increasingly severe southerly storms resulting from climate change.

Divide the pupils into groups of four and provide each group with one of the stakeholder information cards in **Resource 2.11**. Encourage the groups to ‘get into character’ and role play as much as possible. How would this person talk? What clothes might they wear? It is important that pupils remain in character particularly when they are answering questions from

members of other groups. Each group needs to decide collectively what their position statement is in relation to the changes occurring at Dawlish Warren and how they think these processes would be best managed in the future. As a starting point in the activity the pupils in each group can highlight four key areas from the information they have been given (this is also known as *open coding*) – *main jobs; evidence to support being in favour of protection; evidence to indicate likely opposition to protection and key facts and figures to support their arguments one way or another.* The pupils in each group can also research further information about the likely position of their stakeholder from the list of websites on the second slide of the PowerPoint presentation in **Resource 2.10**. Keep the pupils on task by regularly reminding them that they are considering how important Dawlish Warren is to their stakeholder and whether or not they would want to see the place protected in the future? As a summative piece each group will need to create an A4 sheet of valuable things about Dawlish Warren from the perspective of their stakeholder that they can then refer to during the stakeholder interview sessions which follow.

The aim of the interview sessions is for each pupil to understand and evaluate the position statement of each of the other stakeholders in relation to coastal protection. Each pupil will then need a copy of **Resource 2.12** for this exercise. Before whole group feedback the pupils will be aware of everyone's view of key issues such as protection for the railway, the future of the spit and the challenge of flooding. They can also be encouraged to prioritise the key stakeholders if they feel the views of one group should outweigh those of other groups. Pupils will then need to decide on whose opinion is most important? As with so much geographical enquiry there are no right or wrong answers here but pupils must be ready to justify their decisions. It is worthwhile here to compare across the groups which stakeholder has been prioritised and which has been given least consideration. Is there any commonality amongst the pupils? The pupils can now write their top priority stakeholder on 'post it' notes and create a tally chart on the whiteboard at the front of the room. This can be repeated for the stakeholder considered to have lowest priority. Take time to discuss the results of the interview and prioritising process. Encourage the pupils to consider whether in reality the views of every stakeholder are equal to each other? Are some people or organisations more powerful in situations such as this than others? If so, who? Who do they feel is most powerful in swaying opinion at Dawlish Warren?

The next task, and an extension to ascertaining stakeholder views, is for the pupils to identify which groups of people might be like minded in their opinions. This will also help the pupils to appreciate that the more people and associated groups there are of a similar opinion then the greater the collective pressure they will be able to bring to bear. Using a copy of **Resource 2.13** and three different colours, the pupils can go through the matrix and shade the boxes where two groups may agree (green) or disagree (red) or undecided (orange) about the future of Dawlish Warren. In many situations pupils will find that stakeholders want some of the things of other interested parties but not everything. In this case the relevant box is shaded orange. Once the pupils have decided who might agree or disagree with each other, they can consider how strongly they might feel the way they do using the scale -3 (strongly disagree) to +3 (strongly agree) and write the score in the shaded box. This is a high level learning activity and through discussion the pupils can come to appreciate that almost all the pressure groups will share something in common with at least one other collection of stakeholders and that ultimately decision making involves compromise or consensus of some kind in which most people may get something of what they are seeking but not everything.

Key Question 2.4: Why do we manage the coast?

2.4.1: What are the causes, effects and responses to coastal change at Dawlish Warren?

Through this enquiry pupils gain an understanding of the three elements of coastal change occurring anywhere around the coast of Britain i.e. its *causes*; *effects* and *response* which is represented as a flow diagram in **Resource 2.14** using the destruction of the railway at Dawlish in February 2014 as an example. Discuss this with the pupils and identify the three categories of information required and summarise on the board. Encourage the pupils to provide as much detail as possible using key terms and vocabulary and to think as broadly as possible about the effects (e.g. local and regional impacts such as the economic isolation of Cornwall) and responses (e.g. short term immediate involving repairs as quickly as possible and longer term which might involve adapting by rerouting the rail line). Now working individually give each pupil copies of the differentiated **Resources 2.15 – 2.17**. Pupils now need to colour code the information cards according to whether each provides evidence of a *cause*; *effect* or *response* to coastal change. Several slides in the PowerPoint presentation in **Resource 2.18** provide annotated examples of how the pupils should complete this task. As an extension exercise some pupils could also read the newspaper article in **Resource 2.19** and annotate it in the same way as they did for the information cards. As a summative piece of extended writing the pupils can summarise their thinking and findings in the relevant boxes in **Resource 2.20**.

2.4.2: How is the train line being managed at Dawlish Warren?

Print off copies of the historic images of the Dawlish railway in **Resource 2.21** and encourage the pupils to generate key geographical questions relating to the images using *who*; *what*; *where*; *when*; *how* and *why* questions. Try to get the pupils to include questions about both the physical and human environment they can see in the images. Now divide the pupils into pairs and provide each pair with the set of six images in **Resource 2.22**. For each of the coastal change issues shown in the six images the pupils need to annotate with notes that address the questions:

- *Who uses the coast here?*
- *What processes are happening at the coast here?*
- *What are the problems being created at the coast here?*
- *What could be done to manage the situation here?*

The three films in **Resource 2.23** can be shown during this exercise with the purpose of the pupils extracting from them any additional information to add to their annotated images. At the end of the activity encourage the pairs of pupils to feedback their responses. As each pair provides their ideas the other pairs of pupils in the groups can update their annotated images with new information as appropriate. As a summative piece at the end of this investigation the pupils can use all of the information they have gathered to complete the four boxes in **Resource 2.24**. *What are the causes and effects of coastal erosion at Dawlish?* **Resource 2.25** is a model answer against which the pupils can compare their finished work.

Key Question 2.5: How effective are the existing coastal management strategies at Dawlish Warren?

The purpose of this enquiry is for the pupils to understand what has been done to date at Dawlish Warren to manage the coastline and to evaluate the effectiveness of each method. In **Resource 2.26** all of the types of 'hard' and 'soft' engineering approaches to managing the coast at Dawlish Warren have been outlined in tables. For each method there are three blank boxes – *description*; *advantages* and *disadvantages*. Print off and cut up the information cards about each approach and challenge the pupils to allocate them correctly to each strategy. The table will be complete when every method of managing the coast has a *description*; *advantages* and *disadvantages*. To support this activity the PowerPoint presentation in **Resource 2.27** provides a visual overview of each method for the pupils and encourages them to consider advantages and disadvantages. It can be used as an introduction or to provide a focus for a plenary session at the end of the activity. Copies of the correctly filled in tables can be found in **Resource 2.28**. Before moving on spend a moment with the pupils considering which method of coastal management they think might work 'best' or 'worst'? In the next enquiry they will attempt to provide an 'effectiveness score' for each one.

The pupils can now undertake their own personal evaluation of the effectiveness of each coastal management strategy at Dawlish Warren using *bi-polar analysis*. This can be carried out in the field or via remote fieldwork in the classroom. To begin remind pupils of the location of the coastal defence strategies used at Dawlish Warren using **Resource 2.29**. Next provide the pupils with the more detailed bi-polar analysis sheet in **Resource 2.30**. Explain to the pupils that for each method of coastal management they need to provide a score ranging from -3 (the most negative) to +3 (the most positive) for nine factors i.e. a score along the scale of -3; -2; -1; 0; +1; +2; +3. Pupils need to put a cross in the corresponding box for their allocated score for each factor. Emphasise that this evaluation is known as bi-polar analysis and is a personal perception of advantages and disadvantages and that everyone is likely to have different perceptions and that's fine! Separate tables which can be used for this exercise can be printed off from **Resource 2.31**. At the end of the exercise the pupils can add up all of their scores, (remembering to subtract the negative numbers) which will then provide a total which can be compared across all of the coastal management methods used at Dawlish Warren. Encourage discussion and feedback. Are the results common across all of the pupils in terms of what they consider to be the 'best' and 'worst'? How straightforward did they find the task? How valid and reliable do they feel their results are? Does an analysis based on personal subjective judgements and entirely qualitative data have any validity? As a summative exercise the pupils can produce a table of whole group results and calculate an average score for each method. This can then if desired be graphed in a variety of ways.

Key Question 2.6: How does a cost – benefit analysis of coastal management schemes at Dawlish Warren help to evaluate their effectiveness?

This investigation supports pupils to undertake a *cost – benefit analysis* of each of the coastal management schemes through creating a score for each method based on the cost of the defence over 100 years compared with the value of property, business and infrastructure that it is protecting. The pupils can use copies of **Resource 2.32** to do this exercise and the first calculation for rip rap/rock armour has been completed for them. Using this as a model they

can then calculate the remainder. There is no unit of measurement for the final score – the larger the value the ‘better’ it is. After working out a cost-benefit score for each scheme the pupils can compare it with their bi-polar analysis scores. Did the coastal management schemes that performed ‘best’ in the bi-polar analysis also score equally well in the cost-benefit analysis? If not, why not? Were there any surprises? As a summative piece of work the pupils can produce a piece of extended writing which answers the question: *Which method of coastal management at Dawlish Warren is the most effective?* Provide a clear structure or frame for the pupils to write to e.g.

- An introductory paragraph which locates Dawlish Warren using a map and provides an outline of the physical processes presently operating and how climate change is likely to present additional challenges here in the future;
- A second paragraph providing an overview of the coastal management schemes which have already been used at Dawlish Warren (including images to illustrate each one);
- A third paragraph detailing the methods used to provide an evaluation of the effectiveness of these schemes (i.e. bi-polar and cost-benefit analysis);
- A concluding paragraph which presents the data and findings and makes a judgement about which scheme or schemes appear to be the most effective.

Key Question 2.7: Where is Dawlish Warren most vulnerable ?

Through this enquiry pupils are able to understand that, despite the creation of a range of coastal management schemes since the 1970s, the Warren remains vulnerable to being breached and that with rising sea levels and the increased frequency of southerly storms resulting from climate change, this vulnerability will increase. A breach in the spit would have very serious consequences for communities such as Starcross; Lympstone; Exmouth and Topsham which are situated along the banks of the Exe Estuary. If the Warren were breached then the Exe Estuary would be less sheltered from southerly storms, storm waves and storm surges. Ask the pupils to examine the located data in **Resource 2.33**. What pattern of beach width can they identify? What is the general trend in beach width and where is the major exception? Where is the Warren most susceptible to erosion and to being breached? The KML file in **Resource 2.34** is a *Google Earth* image with located proportional bars to show the pattern of beach width which the pupils can refer to also. To view the file a connection to the Internet and having *Google Earth* installed are required. Using **Resource 2.35** the pupils can make notes about what they feel should be done about the Warren. Should it be left to erode through? Should it be protected in some way? If so, are ‘hard’ or ‘soft’ engineering schemes the most appropriate? In their deliberations the pupils can draw upon the results of both their bi-polar and cost-benefit analysis to support their argument.

Key Question 2.8: What would happen if Dawlish Warren was left unmanaged?

This exercise allows pupils to consider the most appropriate way to manage Dawlish Warren in the future – particularly over the next 100 years. With rising sea levels and increased severity and frequency of southerly storms which will be associated at times with high spring tides the Warren will undoubtedly change during this century. To begin thinking about this issue print off and distribute all of the images in **Resource 2.36**. Working in pairs or in small groups

the pupils can sequence the images to create a time line. Encourage discussion. What do the images show happening to Dawlish Warren? What will the likely effect of this be on the Exe Estuary – impacts on places where people live; wildlife; businesses etc. Might there be any advantages or benefits at all? Now provide the pupils with the four images of Exmouth in **Resource 2.37**. What do these images show occurring? Again, what would the likely impacts be for places along the Exe Estuary as well as property, businesses, infrastructure and wildlife?

Key Question 2.9: What should be done at Dawlish Warren in the future?

In order to come to an informed judgement about how Dawlish Warren might be most effectively managed in the future then the pupils need a sound understanding of the likely implications of climate change on the Exe Estuary over the next 100 years so that they can choose the most appropriate option. The PowerPoint presentation in **Resource 2.38** provides this. Ensure that the pupils understand how global atmospheric temperatures are changing and how they are projected to change over the next century and the implications of this for sea level rise. The third element of the climate change story is for the pupils to reflect upon the possible impacts of the increased frequency of southerly storms combined at times with high tides. This combination could result in tidal or storm surges and the presentation provides ten different scenarios for Dawlish Warren and the Exe Estuary based on heights ranging from 1 to 10 metres. Each of the slides of the PowerPoint presentation is available in **Resource 2.39** to be printed off as single resources to use with pupils as required and appropriate. The KLM files in **Resource 2.40** (*Google Earth* needs to be downloaded and an Internet connection established) enable pupils to examine the detail of the likely impact of any of the projected storm surges for individual communities along the Exe Estuary.

Working in groups of four the pupils must now plan a detailed presentation of what they consider to be the best approach to managing Dawlish Warren in the future. This presentation needs to be centred around considering three scenarios – *hold the line*; *managed realignment of the coast* or *no active intervention*. The PowerPoint presentation in **Resource 2.41** provides the guidelines for the presentation with the slides available separately for printing off in **Resource 2.42**. The guidelines for creating and delivering presentations in **Resource 2.43** can be used to establish the appropriate conventions with the pupils and the checklist in **Resource 2.44** is available for pupils to use as they prepare. The groups of pupils need to ensure that their presentations include all of the following elements:

- An introduction which locates Dawlish Warren and provides an overview of the physical processes occurring there;
- A section which explains why coastal management has been necessary and what has been done in the way of ‘hard’ and ‘soft’ engineering schemes in the past;
- The present situation in regard to erosion occurring along Dawlish Warren;
- The likely implications of climate change for coastal management in the future;
- What the group feels is the best approach to managing Dawlish Warren for the remainder of the century and the reasoning behind this decision.

Sample Resources from Enquiry 2. The complete set of resources supporting learning in this enquiry are available on the accompanying DVD and online at www.licco.eu

Resource 2.2



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Resource 2.5

What are the features of Dawlish Warren?

Box 2

Box 1

- 1) Using the outline above and the maps provided label some of the key features in the area in Box 1.
- 2) Try and add detail in Box 2. You could try and explain how or why those things are there or give a fact.

Credit: Andy Schindler www.outdoorlearningforschools.co.uk

Resource 2.7

Who visits Dawlish Warren?



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Resource 2.8

Who visits Dawlish Warren?

With a partner try and list as many uses of Dawlish Warren as you can. Use the image to help you. (Remember they don't all have to be human uses!)

Why?



Credit: Andy Schindler www.outdoorlearningforschools.co.uk and www.google.com/earth/

Resource 2.12

Stakeholder Interviews

Stakeholder Interviews

Task: Using your knowledge of the issues we have investigated, you must decide who is in favour of coastal management and who is against. In order to gather a clear understanding and access the higher levels you must collect details on why each stakeholder feels as they do.

Stakeholder A stakeholder is a person or group who have an involvement in an issue or decision	Summary of issues			Detail Ask questions to get a clear idea of why each stakeholder thinks like they do. Why do they want/not want the managements and/or the reserve? Do they have more than one reason? Do they fully understand the issue? Do you agree with them?	Priority Number the arguments best to worst
	Should the railway be protected?	Should the Nature Reserve be protected?	Are you worried about flooding?		
Tourist					
English Nature					
Environment Agency					
Conservationist					
Railways Manager					
Town Councillor					
Local Resident					
Exmouth representative					
Geologist					

Finally: Think about the opinions and prioritise, 1-9, who has the strongest, is most convincing and will help you come to a decision.

Credit: Andy Schindler www.outdoorlearningforschools.co.uk

Resource 2.13

Who agrees with who? Management Matrix for Dawlish Warren

The more people that stick together the greater their persuasive power. Decide which groups of people will have the same point of view and which won't!

	Conservationist									
Conservationist		Tourist								
Tourist			Railways Manager							
Railways Manager				Geologist						
Geologist					Natural England					
Natural England						Local				
Local							Exmouth Hotel Owner			
Exmouth Hotel Owner								Environment Agency		
Environment Agency									Town Councillor	
Town Councillor										

1. Using 3 colours go through the matrix and shade the boxes where 2 groups may agree (green) or disagree (red) or undecided (orange) about the future of Dawlish Warren.
2. Now you know who is on who's side (if they need to take sides), decide how strongly they agree or disagree. Use the scale -3 (strongly disagree) to +3 (strongly agree) and write the score in the shaded box

Credit: Andy Schindler www.outdoorlearningforschools.co.uk

Resource 2.12



Credit: © Dartmoor Trust and Archive

Resource 2.13

Who uses the coast?

What processes happen at the coast?



What are the problems?

What could be done to help?

Credit: Andy Schindler www.outdoorlearningforschools.co.uk

Resource 2.29

Management Bi-polars
 A way to score your opinions on the coastal defences
 For each defence mark a score for every category.
 The higher the score the better it is.



Credit: Andy Schindler www.outdoorlearningforschools.co.uk and www.google.com/earth/

Resource 2.31

LOCATION:		TYPE OF DEFENCE:					
NEGATIVE EVALUATION FACTOR	SCORE					POSITIVE EVALUATION FACTOR	
	-3	-2	-1	1	2		3
Easily eroded (worn away)						Good protection	
Waves can easily overtop						Stops flooding	
Ugly						Beautiful	
Difficult to get to beach						Easy to get on to beach	
Dangerous						Safe	
Short lifespan and lots of repairs needed						Will last a long time with no repairs	
Takes a long time to build						Quick to build or little disturbance	
Disturbs natural coastal processes						Keeps the beach natural	
Destroys habitat areas						Helps protect and improve habitat areas	
Total score =							

Credit: Andy Schindler www.outdoorlearningforschools.co.uk

Resource 2.32

Evaluation of Dawlish Warren Coastal Defence Schemes

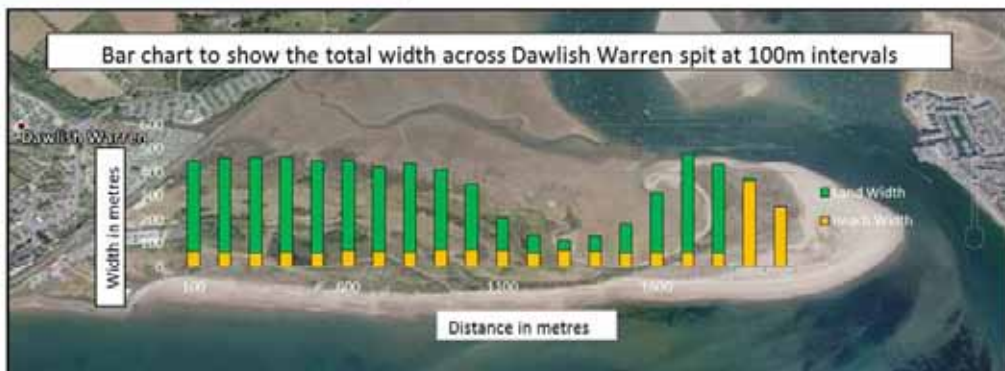
What is the difference between hard engineering and soft engineering?

	Defence scheme	Date built	Approx. estimate Cost @ 2009 Prices	Estimated life span	What is it protecting?	Est. Value of property 2009	Cost Benefit = Cost of property/cost of defence for 100 years
	1 Rip Rap + Rock Armour	1920 1962 1993	£644 000	40	Amusement complex Trainline	£2.25m	$\frac{2\,250\,000}{((644000/2)*5)} =$
	2 Wave-return sea wall	1843 1860 1960s 1993	£3.8m	100	Amusement complex Trainline	£2.25m	$\frac{2\,250\,000}{3\,800\,000}$
	3 Groynes	1963-4	£1.4m	30	Warren Nature Reserve		
	4 Revetment	1962	£825 000	50	Beach huts	£300 000	
	5 Dune Stabilisation and beach nourishment	n/a	£300 000	10	Nature Reserve		
	6 Gabions	1970s	£600 000	25	Nature reserve and golf course	£500 000	

Credit: Credit Andy Schindler www.outdoorlearningforschools.co.uk

Resource 2.33

Managing the coast



1. Describe using the data the shape of Dawlish Warren

2. Which areas do you think are most vulnerable to erosion and what may happen in the future?

Credit: Andy Schindler www.outdoorlearningforschools.co.uk and www.google.com/earth/