

Serious Gaming: How effective is coastal management along the Rossall–Fleetwood Coastline?

KS3 Geography

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Specialist knowledge for teachers

Decision making exercises in geography are a vital evaluative tool which should be used throughout the curriculum to develop pupils' critical thinking. Data collection, along with map skills and the interpretation of secondary human geography data are important skills that are needed for all young geographers.

'Serious Games' are games-based processes applied to real world challenges. With over 30% of adults playing board games per week, and 70% playing digital games per week, games offer a useful method to explain systems and geography (Geogames).

MAGE (**Morecambe Area Gaming Environment**) is a serious tabletop game that helps players think about coastline management, communities, natural processes, habitats, and climate change. MAGE is a series of tools to build knowledge and learning about our environment. The tabletop game has been developed as part of Our Future Coast, which is led by Wyre Council and funded by DEFRA as part of the £200 million Flood and Coastal Innovation Programmes, which are managed by the Environment Agency. Offering this game to pupils gives them agency and value, allowing them to decide on the future of the coastline at specific locations.

Shoreline Management Plans (SMPs) are detailed technical documents that consider how to manage the influence of coastal processes on the natural and human environment. They focus on how to manage the risk from flooding and erosion.

Pupils will become familiar with using terminology such as: advance the line, hold the line, no active intervention or managed realignment. Pupils will be able to draw informed conclusions using this terminology.

The work supports the collection of primary and secondary data using sources that inform real-world decision making in the workplace and communities our pupils are living in. A useful resource for secondary data is the ONS Website, where two contrasting MSOA areas from the data fields can be selected. The focus can include a wide variety of variables including car ownership (economic factors) and number of bedrooms in the location (social factors), for example. Depending on the cohort, the teacher can select the variables (see example teaching slides on website) or the pupils can research the data themselves.

GIS Mapping has been used to highlight the environmental factors that need to be considered. This can be amended to include any area in the Morecambe Bay area and beyond. A number of maps can be accessed via Ordnance Survey at Digimaps.

Fieldwork is an essential aspect of geography. It ensures that students are given the opportunity to consolidate and extend their geographical understanding by relating learning to real experiences of the world. Therefore, the second lesson is the optional fieldwork visit, where the pupils will visit the two contrasting locations to collect primary data. ▶



► Here they measure the deposition of sand either side of their selected groyne at one location and measure vegetation type and coverage at the other. The University of Lancaster has the industry standard surveying equipment - including Drones, RTK GNSS wand (Satellite Positioning) and 360 Laser scanners (LiDAR scanner). You can contact the MBC to work with us in person! However, Reality Capture with an iPhone works too. Search 'Reality Capture' in Apple Store for a range of free and paid apps. Use your phone to 'scan' the local coastline!

Back in the classroom, lesson 3 focuses on the pupils completing a series of data presentation techniques and they will play the board game with the local map attached. MAGE Mini is a short 15-30 minute game for SMP and coastal Interventions for 2 players. Roll the dice, collect tokens and match the patterns on the cards to win. You can customize the game by replacing the game map for your own site location!

Ultimately, pupils will develop an excellent understanding of local coastal communities and the pressures that they are under. They will focus on the decisions that councils, local government and national government need to take and know that these decisions will impact them now and in the future.

Curriculum aims and objectives

The resource is aimed at KS3 Geography and is designed to build upon the knowledge of coastal environments that KS3 pupils will have studied. This will include identifying the processes that occur at the coastline and understanding the idea of hard and soft engineering solutions to protect the coastline (similar to those at GCSE - AQA Specification: Paper 1 - Physical Landscapes of the UK: Coasts).

Learning objectives

- To build on their knowledge of maps and develop this knowledge routinely in the classroom and in the field
- To interpret Ordnance Survey maps in the classroom and the field, including using grid references and scale, topographical and other thematic mapping, and aerial and satellite photographs
- To use Geographical Information Systems (GIS) to view, analyse and interpret places and data
- To use fieldwork in contrasting locations to collect, analyse and draw conclusions from geographical data, using multiple sources of increasingly complex information
- To introduce the language of Coastal Adaptation Pathways - Advance the line, hold the line, no active intervention or Managed realignment

Sand Dunes



Sand dunes provide natural protection against storms and flooding. Dunes form above the level of high tide when the plants that live in these salty, damp conditions trap wind-blown sand, and the dunes increase in size, more habitat is created in which more plants and ecosystems can live.

Design Life - 20-30 Years



Nature Based Solutions
+7 Points

Head

Using the data to analyse the factors that need to be considered when planning coastal management schemes. Physical collection of data and some graphical and Mathematical skills linked to geography.

Heart

The pupils will have to make decisions based on the effects they may have on local residents in certain areas. How will coastal communities be affected now and in the future?

Hands

Practical activities both during the fieldwork and during the game playing at school. The pupils will learn new fieldwork skills as well as Map skills and data analysis.

Breakwaters



Breakwaters are offshore, sloped or vertical concrete walls designed to reduce the erosive power of waves out at sea so that once they reach the shore, the wave energy is reduced. Breakwaters can be made from rock, stone or concrete and some run parallel to the shoreline.

Design Life - 30-50 years



+3 Points Hard Engineering

Examples in practice

What You Need to Know

Coasts need to be managed to retain a balance between the forces of nature and the needs of people living on the coast.

To be able to analyse secondary data about 2021 census sites along the coast of the UK

To compare two locations and their needs for protection

Collect Primary data about the coastal defences and present them accurately

To use the MAGE resource to inform your decisions.

Objectives

Complete two graphs from the data collected on the visit to the two sites

Play the board game and reach conclusions about how to future proof our two sites.

About

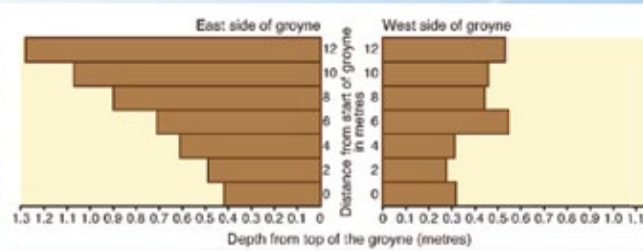


Coastal Communities are at the front-line of climate challenge. It is not possible to protect the whole coast with hard rock and concrete, it is not a good long-term solution and there isn't enough money. So, we need to get really good at working with nature – where possible we can utilise saltmarshes and sand dunes as a coastal defence. The essence of the Our Future Coast approach is designing the coastline together with our communities, putting them at the heart of Our Future Coast.

Activity 1 - Groyne data presentation

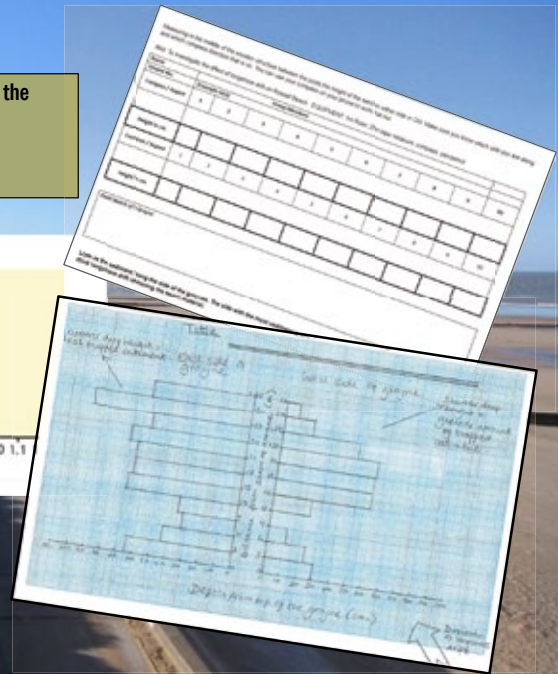
Using the data your group collected on the trip create a graph like this to show the different heights of sediment on either side of the groyne.

Your graph needs labelled axis, coloured bars, drawn with a ruler and a pencil



Write a conclusion under your graph.

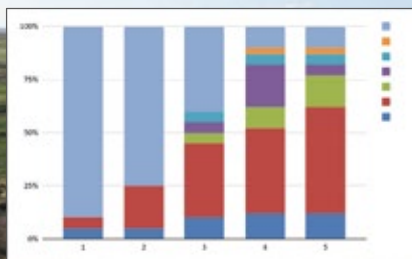
Which side of the groyne had the most sediment? What does this tell you about longshore drift? Can you work out which direction longshore drift is moving material along this coast?



Activity 2 - Vegetation data presentation

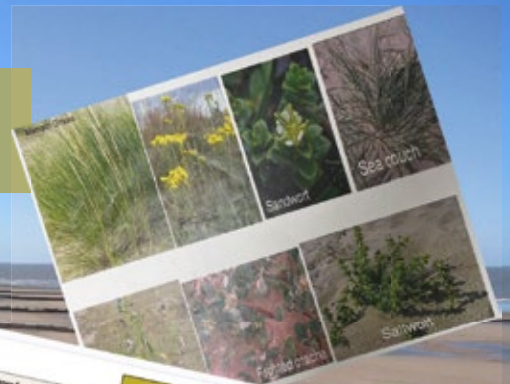
Using the data your group collected on the trip create a divided bar graph like this to show the different types of vegetation recorded with the quadrats

Your graph needs labelled axis, coloured bars, drawn with a ruler and a pencil



Write a conclusion under your Divided Bar graph.

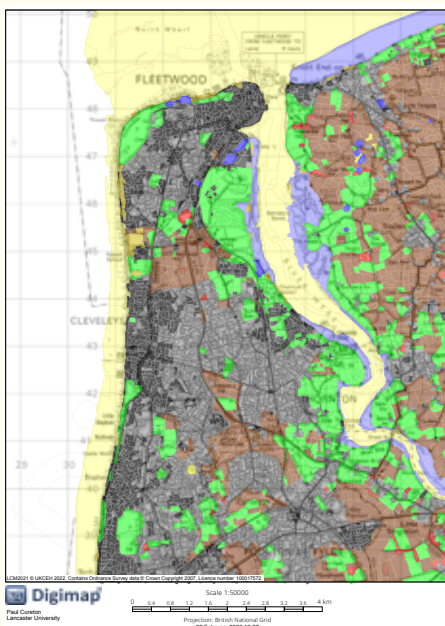
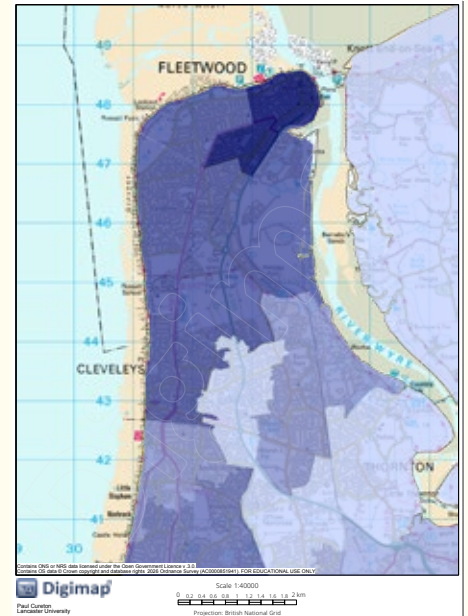
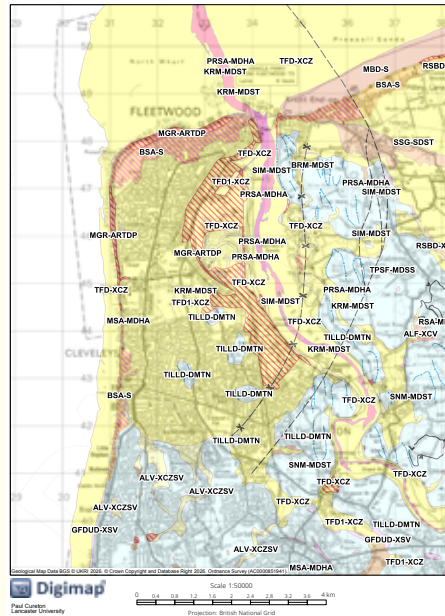
Where was the most vegetation recorded? How many different varieties of vegetation were there? Which types occurred the most and why?



Site 2: Fleetwood Town (MESH - North Coastline Hotel)		
Distance from the promenade (metres)	Description	Vegetation identified including % cover
1-10		
11-20		
21-30		
31-40		
41-50		
51-60		
61-70		

Adaptations to extend impact

The lessons will be transferable to any coastal location within the Morecambe Bay area and beyond. Besides the fieldwork, where primary data will be collected, the pupils will be able to play a scenario-based board game with the key decision-making ideas incorporated into it. The game will be played on a map, which can be amended to use other parts of the Morecambe Bay area. The secondary data is available from the ONS/OS websites and the historical maps can be sourced from Ordnance Survey (See digimaps offer). It can also form the basis of the fieldwork element of the GCSE, where pupils need to undertake geographical enquiries, which must include the use of primary data, collected as part of a fieldwork exercise. This is a fully resourced series of lessons, with optional sections and amendments that can be easily altered to suit the area of the coastline you wish to study. The resources are also compatible with Google Classroom.



For Further Information:

- Find out more about MAGE at: <https://imagination.lancaster.ac.uk/project/mage-a-digital-sandbox-for-coastal-futures/>
- Digimaps information can be accessed here: <https://digimapforschools.edina.ac.uk/>

