

TEACHER NOTES

Geography

Physical Geography: Ecosystems



Contextual Summary

This is a geography (and possible Biology crossover) resource which engages students with the physical Geography of Lymington Harbour, and the surrounding area of the Solent, while on their ferry crossing to/from the Isle of Wight. It includes pre-visit, on-site, and post-visit activities. This resource focuses on students learning about the salt marsh ecosystems which extend along from the Lymington River Estuary to Keyhaven, behind Hurst Spit.

The resource leads students through knowing what salt marshes are and how they develop, including the concept of vegetation succession. All key terms associated with the topic area are highlighted so that students will understand what they mean. Through map work and photo interpretation students then examine the location and extent, and the key characteristics, of the salt marshes here. They also conduct some research to help them to familiarise themselves more closely with the salt marshes in this particular location, including developing an awareness of their importance on a local, national and international scale. While on the ferry crossing, students will be able to observe the salt marshes first-hand. A variety of tasks enables them to fully investigate what they are like, what some of the threats to them are and the impacts of these threats, and also make observations of some of the management strategies that are in place to protect them.

On their return to school, students then work in small groups to research and present on a given topic/role, linked with the management of this stretch of coast and the coastal salt marsh ecosystems here.

SUBJECT	Geography												
UNIT	Ecosystems												
OPPORTUNITIES FOR USE	<ul style="list-style-type: none">✓ Pre-Visit✓ On-Site Activity✓ Post-Visit✗ Peripheral Task  180+ mins												
APPLICABILITY	     Key Stage 4 S4-S5												
CURRICULUM / SYLLABUS	<ul style="list-style-type: none">✓ National Curriculum 2014✓ Curriculum for Excellence												
Applies to Resource numbered: <table border="1"><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>2</td></tr></table>		1	1	1	1	1	1	1	1	1	1	1	2
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Ability Levels

This resource is aimed at students at KS4. There are differentiated variations available for higher and lower ability levels. The lower ability worksheet contains slightly 'easier' tasks and/or further guidance and support within the tasks. The higher ability worksheet requires students to complete the tasks more independently, and also provides plenty of opportunities for extension work. Teachers should view all resources and select the most appropriate level for their students.

Task Implementation

The pre-visit activity starts by introducing what salt marshes are and how they develop over time; students should read this either independently or as a class. Teachers may also want to use Google images/Google Earth to show students images of the marshes and the harbour. The websites provided in the resource should be looked at in preparation – many of them contain extremely useful images, maps and information that could be used to introduce the study.

A variety of tasks, differentiated on the different worksheets, then takes them through understanding the extent of the salt marsh ecosystem in the Lymington / Keyhaven area, and also the key characteristics of the marshes. Task 3 requires students to consider the relative problems and benefits of tidal inundation – two photos of the same area of marsh at high and low tide are given as a stimulus. *(continued...)*



Task Implementation

This then leads on to task 4, whereby students investigate some of the species that live, feed or breed in the marsh ecosystem. More able students should be encouraged to consider the specific adaptations of these to the unique characteristics of the environment, and also investigate different species, other than those given in the worksheet.

At a suitable point, teachers should discuss what students have found out and written, and recap what they have learned so far, to ensure that all students are 'up to speed'. Following on from what they have covered, some preliminary discussion of the 'special' nature of this coastal ecosystem, its rarity and, therefore, importance, can be had before they then complete task 5; the final pre-visit activity. Here, several web-links are provided to help them to research the Lymington – Keyhaven Marshes, the characteristics and features of these marshes and their importance. More able students should recognise that they are important in both a 'natural' (physical), and 'human' sense, and that they are an important resource locally, nationally and also internationally.

Teachers may want to expand on the tasks on the worksheet, depending on the specific requirements of the specification being followed. For example, feeding relationships or energy flows within the ecosystem can be covered at this stage if desired.

On site, on board the ferry, students will work through a variety of activities that are designed to help them to get to know what the salt marshes here are like, by making observations, sketching and taking photos. The activities are as follows:

- Task 1 is a sketching activity, where students should aim to sketch the marshes as far as they can see from the ferry and label their key features, based on what they learnt in the pre-visit activities. More able students should be encouraged to annotate as well as simply label, to describe in more detail and also explain what they see.
- Tasks 2 and 3 revolve around the concept of 'threats' to the ecosystem. Students should make observations of, and consider, what potential threats exist to the salt marsh ecosystem. There is a little information about salt marsh 'die-off' for them to read, and they have some photos to annotate, to describe and explain the causes and effects of this. The link for Task 2 is: <http://www.lucyreading.co.uk/project/anatomy-of-a-salt-marsh/>
- Task 4 then looks into some of the management strategies that are visible from the ferry. There are several techniques that can be seen, which help to protect the salt marshes. Students have to identify these and consider what their role is in conserving and protecting the marsh. More able students should be encouraged to think about other potential techniques that could be used, and also the 'wider' role of these strategies, apart from marsh protection.

The above activities can be 'delivered' or organised by the teacher(s) as they see fit. As they all need to be done within the short time that the ferry takes to travel through the salt marshes/harbor, it may be helpful to assign students specific tasks that they complete and then feed-back to the group/class at a later stage, rather than all students trying to do all activities in a very limited time!

The post visit activity involves students working in groups. Each group should be assigned one of the topic areas / roles given on the worksheet (there are 6 in total). Each examines a different 'angle' in relation to the threats that exist to the salt marsh ecosystem and wider coastal zone here, and what is being done to tackle this. Each group is provided with a set of web-links to use as a starting point. Using these, and their own additional research, students should produce a presentation to deliver to the class. They should also produce an A4 sheet to summarize the key points of their given topic. Teachers should prepare by looking into each role, and the weblinks provided, before-hand and dividing the class into groups as they see fit. The group using the 'Magic Map' GIS application provides an opportunity for all students to examine a 'real' example of GIS in action/use, and teachers may want all students to have a go at using this. The post-visit activity is deliberately flexible to allow teachers to deliver this element as they wish.

The comprehensive and specific, detailed, information covered in this resource could provide an excellent case study for the exam. Teachers can expand on what is covered to make it a 'wider' case study of this stretch of coast to include, for example, physical processes and coastal landforms, as well if desired.

Relationship to Curriculum

Below are the relevant links to the current GCSE/IGCSE Specifications, showing links to this resource:

- ✓ **Pearson Education Ltd (Edexcel) Geography A**, Topic 1: Coastal landscapes and processes. Human activities and impacts, and coastal management. Topic 3: Ecosystems. Importance of marine ecosystems and how human activities are degrading them.
- ✓ **Pearson Education Ltd (Edexcel) Geography B**, Topic 4: Distinct physical landscapes and physical processes. How human activity affects coastal landscapes. Management of coasts.
- ✓ **Pearson Education Ltd (Edexcel) IGCSE Geography**, Topic 2: Coastal Environments. Distinctive coastal ecosystems; their distribution and abiotic/biotic characteristics. Threats and management.
- ✓ **OCR GCSE Geography A**, Living in the UK today: “Environmental Challenges”. How ecosystems are used and modified by human activity. The World Around Us; ‘Ecosystems of the planet’, and ‘Environmental threats to our planet’
- ✓ **OCR GCSE Geography B**, Topic 2: Changing climate. Topic 4: Sustaining ecosystems; the concept of an ecosystem.
- ✓ **AQA GCSE Geography, Section A**: The Challenge of natural hazards – climate change. Section B: The Living World. An example of a small-scale UK ecosystem. Section C: Physical landscapes – coastal management.
- ✓ **WJEC Geography A, Unit 1**, core theme 1: Landscapes and physical processes: The development of distinctive coastal features. Human activity and intervention in coastal landscapes. Unit 2, core theme 5: weather, climate and ecosystems.
- ✓ **WJEC Eduqas GCSE in GEOGRAPHY A**, Unit 1, Core Theme 1: Landscapes and physical processes: Human activity in a distinctive UK landscape, including management of human impacts. Theme 5: weather, climate and ecosystems.
- ✓ **WJEC Eduqas in Geography B**, Theme 2: Changing environments: Human activity has modified coastal processes/landscapes over time. Coastal management. Weather and climate; the consequences of climate change on wildlife and habitats.

BIOLOGY CROSSOVER OPPORTUNITIES

As stated, this resource may also be used as a Geography-Biology combined ‘crossover’ study. Below are the relevant links to the current GCSE/IGCSE Biology specifications:

- ✓ **Pearson Education Ltd (Edexcel) Level1/Level 2 in Biology**: Topic 9: Ecosystems and material cycles. Levels of organization, biotic and abiotic factors, trophic levels and interdependence. Human interactions and maintaining biodiversity.
- ✓ **Pearson Education Ltd (Edexcel) IGCSE Biology: Topic 4**: Ecology and the Environment. Key terms to do with organisms and the environment, feeding relationships, cycles and human influences on the environment.
- ✓ **OCR GCSE Gateway Science Suite, Biology A: Topic B4**: Community level systems: ecosystems. Levels of organization within, and biotic and abiotic components of, ecosystems.
- ✓ **OCR GCSE Twenty First Century Science, Biology B**: Chapter B3 – living together – food and ecosystems. Levels of organization within ecosystems. Interdependence and competition and trophic levels, within ecosystems. Cycling of materials through the biotic and abiotic components of an ecosystem. Chapter B6 – Life on Earth; past, present and future. Positive and negative interactions in ecosystems, and the impact on biodiversity. The benefits and challenges of maintaining biodiversity.
- ✓ **AQA GCSE Biology: Section 4.7 Ecology**. Organization and interdependence/competition within ecosystems, and their biotic and abiotic characteristics. Adaptations of organisms to the conditions in the ecosystem, and the impacts of environmental changes. The effects of human interaction on the ecosystem, and maintaining biodiversity.
- ✓ **WJEC GCSE in Biology: Unit 1, part 1.6: Ecosystems, nutrient cycles and human impacts on the environment**. Food chains/webs and energy transfer, microorganisms and decay, and the role of nutrient cycling, the need to balance economic development and the needs of wildlife.
- ✓ **WJEC Eduqas GCSE in Biology: Topic 6: Ecosystems**. Organisation within ecosystems, material cycling, biodiversity.

In addition to the links and resources provided above, and in the worksheets, some useful links to help develop the content as a biology crossover study are provided below. Teachers should find and adapt appropriate material according to the specification requirements and the needs/abilities of their specific students.

<http://www.biodiversitya-z.org/content/saltmarsh>

<http://study.com/academy/lesson/salt-marsh-definition-ecosystem.html>

<https://www.biology-fieldwork.org/coast/saltmarsh.aspx>

<http://biology.field-studies-council.org/a-level/succession/saltmarsh/>

http://evidence.environment-agency.gov.uk/FCERM/Libraries/FCERM_Project_Documents/Appendix_B.sflb.ashx

http://www.marbef.org/wiki/salt_marshes

<https://ci.coastal.edu/~sgilman/778EcologyFoodWebs.htm>

https://microbewiki.kenyon.edu/index.php/Salt_Marsh

http://jncc.defra.gov.uk/pdf/UKBAP_BAPHabitats-08-CoastSaltmarsh.pdf

https://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=189416

Key skills practised in this unit:

- ✓ Understanding key processes in physical and human geography
- ✓ Conducting fieldwork by making observations and applying their observations to specific tasks, such as field sketching and photo annotation
- ✓ Map work, photo interpretation and use of GIS
- ✓ Development of literacy skills
- ✓ Carrying out independent as well as group activities.

Learning Opportunities

Students will use the resources provided to carry out the activities and tasks as specified on the worksheet. At all stages, students will be using the worksheets linked to this resource - **111111** or **2**

Pre-Visit

- ▶ Students will learn what salt marshes are and how they develop, and will also learn about the characteristics of the salt marsh ecosystems at Lymington and Keyhaven.

During the Visit

- ▶ Students will make observations from the ferry in order to understand the physical characteristics of the salt marsh area, threats to the ecosystem and how these are being managed.

Post-Visit

- ▶ Students work in groups to investigate and present a given topic area to the class, to do with the management of the coastal system/ecosystem in this location.

Enrichment Opportunities

- ▶ Students will be seeing the salt marsh first-hand, and it will really help students to understand the importance of this coastal ecosystem to plants and wildlife. They will also gain an excellent understanding of the potential threats posed by human activities, as well as knowing a variety of ways in which this can be managed.
- ▶ Students will have the opportunity to conduct fieldwork and make first-hand observations of the physical and human geography of this area, and the defense of it against wave erosion and flooding, including the threat of rising sea levels due to climate change. Making first hand observations is a key skill in geographical investigations. Indeed, this is a key skill in many curriculum areas and becomes a valuable skill as they move through to becoming more independent learners.
- ▶ The post visit activity provides an opportunity to use GIS in their geography learning; an increasingly important and widely used tool in our modern world and a core skill in (I)GCSE Geography specifications.
- ▶ Good fieldwork literally brings to life what is learnt in the classroom. Students would not get the same 'sense' of the place from a textbook or still images, as they are able to do being their first-hand and making observations for themselves.
- ▶ Extension tasks and differentiated activities enable more able students to stretch and extend their geographical understanding; challenging questions are posed to get them thinking. Also, less able students are supported through the tasks in a variety of ways, as demonstrated in the worksheets.

Learning Outcomes

- ✓ Students will be able to define what a salt marsh is and be able to describe succession in a salt marsh to explain its development over time.
- ✓ Students will be able to describe the location of, and the key characteristics of, the salt marsh ecosystem at Lymington – Keyhaven.
- ✓ Students will be able to describe the species of flora and fauna that are located here, and describe the importance of the salt marsh ecosystem.
- ✓ Students will be able to name key threats to the ecosystem.
- ✓ Students will be able to describe the likely impacts of climate change on the salt marsh ecosystem.
- ✓ Students will be able to describe and explain a variety of management approaches and techniques, including the role of SMP's and conservation designations, in managing the salt marsh ecosystem and wider coastal area.

