# The RESIST Project:
# Coastal Salt Marshes Teacher Information

## 1. Background Information

RESIST(UK) stands for '**R**esponse of **E**cologically-mediated **S**hallow **I**ntertidal **S**hores and their **Tr**ansitions to extreme hydrodynamic forcing in **UK** settings'.

RESIST is a Natural Environment Research Council (NERC) funded project involving a team of internationally respected coastal scientists from the Cambridge Coastal Research Unit, University of Cambridge, Queen Mary University of London, University of Cumbria, Trinity College Dublin and the British Geological Survey. Its unique multi-disciplinary approach combines insights into the ecology, biogeochemistry, geomorphology, sedimentology and ecosystem services provided by salt marshes.

The project aims to:

- Understand how soil type and biology affect the resistance of exposed salt marsh areas to the eroding forces of waves and tides and
- Develop methods for mapping such resistance and its variability across space to allow prediction of marsh loss in different areas of the marsh, for any given set of sea level, wave and tide conditions.

Ultimately, the project's vision is to provide the foundations for a 'Physical Vulnerability Index' for salt marshes. This index will allow those responsible for the conservation of marshes and their flood and erosion risk reduction function to map and monitor how likely they are to degrade under increasing physical stress from waves, tides, and storms.

Armed with this information, we can be better prepared for the next big coastal storm surge and reduce its impact on people, property, and infrastructure.

If you are interested in the results or would like to play a more active part in shaping the direction of our research, please contact us! Our details are at the end of this document.

## 2. The Resource Pack

The attached PowerPoint and associated student resources are designed to complement the **GCSE and/or A-Level curriculum in Geography** regarding coastal landscapes and processes; with reference to biodiversity, changing weather and climate, and implementing fieldwork techniques, data analysis and enquiry.

The resources are intended to be used:

- To support student understanding of salt marshes, and
- As a project spanning several lessons, with differentiation for different ability students.

It is our intention and hope that these resources can be used flexibly and can be shared and amended to suit need. They can be implemented in class led by teachers, with online delivery if required, or set for use in independent study.

## 3. Teacher Planning Information

The following notes relate to the PowerPoint as a whole or to individual slides. They are intended to give some insight to our intention or provide further suggestions as to how they could be used or built upon.

### 3.1 General Notes

- **Purple colour text or boxes** indicate extension information
- **Red boxes** indicate key vocabulary or concepts to be copied down
- **Key words** are listed at the bottom of the slide
- **Section of the teaching cycle** is demonstrated by the terms on the bottom left corner

### 3.2 PowerPoint Information

- Slide 2: This could be an opportunity to have a discussion or 'flat chat' with students to ascertain prior understanding regarding coasts, and before revisiting or introducing salt marshes. Keywords, concepts or questions the students have could be added to post-its, a class mind map or collated using a site such as mentimeter.com These can then form a summary for the project. Have key themes and questions been addressed? Do the students have new questions?

- Slide 3: Learning outcomes taken from key GCSE specification points to relate to the project resources.

- Slide 4: This is an opportunity to test students' note taking skills, as the teacher explains the depositional process as a result of longshore drift, students should take notes and annotate their diagram, providing the opportunity to introduce more extended concepts and vocabulary.

- Slide 5: The video here from the RESIST project will introduce their research and fieldwork, with a comprehension activity and questions for the students to answer. The questions relate to the video up to around 1.53s and should lead to interesting discussion points regarding the research and impacts.
  **RESIST video: https://www.youtube.com/watch?v=4ZoPBfm2aBY**
  In relation to the extension question, this is an opportunity to reflect on current news or research. For example, there have been some recent articles relating to Fairbourne, Wales which may be of interest:
  https://www.theguardian.com/environment/2019/may/18/this-is-a-wake-up-call-the-villagers-who-could-be-britains-first-climate-refugees this topic is also visited later in slide 11.

- Slide 6: Students will have a clear definition of salt marshes and need for conservation. The map is taken from The Saltmarsh App which contains some very useful information and provides opportunity for students to explore salt marsh locations in the UK.

- Slide 7/8/9: These should provide the opportunity for students to annotate and/or draw a salt marsh and understand some of the succession of plant and animal life which depends on the marsh. Slide 8 is a short basic animation resource which can be replicated by students. Discussion points are added to check understanding and highlight relevance of plant life/impacts. Slide 9 contains some panoramic artist renders of the marsh landform and ecosystem. They were produced for another NERC-funded project

(CoastWEB - https://www.pml.ac.uk/CoastWeb/Home) and offer a beautiful resource and representation of a salt marsh at high and low tide. This resource could be provided to the students and annotated using slide 8. Students could then research the plant and animal life depicted and label the diagram, individually or as a group – this could be used subsequently as 'remote' fieldwork.

- Slide 10: This is an opportunity to reflect on the previous slides, and review the findings of the project: https://www.youtube.com/watch?v=4ZoPBfm2aBY

- Slide 11: This fun resource has been curated by the LA times and begins to introduce some of the management techniques and impacts each of these can have to a coastal community, socially and financially: https://www.latimes.com/projects/la-me-climate-change-ocean-game/

- Slide 12: Students will revisit managed retreat and understand advantages and disadvantages, this is an opportunity for 'think, pair, share' or other discussion activities, to see what ideas students can come up with.

- Slide 13: Using some of the ideas discussed in relation to the previous slides, students can begin to construct and link coastal processes and management, with reference to fieldwork.

- Slide 14: In support of this slide, it may be useful to provide a list of the key fieldwork techniques, such that the students can then group and discuss the points suggested. The key terms in bold should be defined to support student understanding. This slide contains a lot of key concepts, and may need to be broken down, depending on student ability.

- Slide 15: There are a few options for discussion of different quantitative and qualitative fieldwork methods. A useful source is the Saltmarsh App website (listed in resources below). This could be set as an independent study/fieldwork exercise. The Geography Fieldwork website (see also resources below) also contains useful instructions for conducting some of these techniques. Again, the use of these resources should be adapted depending on need, curriculum and resources available.

- Slide 16: This is an opportunity for students to work as a group or independently and produce a presentation pitch for studying and visiting a particular field site. This should allow them to demonstrate their understanding of the concepts covered so far. Exam focus is more weighted on understanding fieldwork theory and variables, so this is an opportunity to build on the methods and their usage or on issues around data measurement and collection that students need to be aware of. These resources are thus also well suited for online delivery.

- The student pack contains information on 6 different field sites (two of which are higher level material – marked in purple), and a planning fieldwork information page to support this activity. The sheets contain useful information, resources and site information. Students could research their own site outside of these suggestions, or an area close to where they live to further stretch and extend their knowledge and understanding. Some questions and a flow diagram are provided as prompts and this may be an opportunity to incentivise their final presentations through competition and reward.

- Slide 17: Students will present their findings. To ensure engagement of the whole class, those not presenting should focus on reviewing others' output, which could culminate in scoring the best presentations where appropriate.

- Slide 18/19: These two slides contain some examples of possible exam style questions relating to fieldwork in physical geography and to salt marshes and should test data understanding and the ability to write up and present field study results. The students could attempt to write up a fieldwork report from the second **RESIST video: https://www.youtube.com/watch?v=P9m7vAdqsWc** (a full transcript to support this is provided at the end of the student pack). This also provides opportunity for peer marking, reviewing model answers and rewriting their answers to include comments. Review of past paper questions from specific exam boards with a focus on map skills or transport and deposition areas of the curriculum to demonstrate understanding may also be useful.

- Slide 20: This slide provides a quick review activity, but may also be a good opportunity to revisit the discussion/summary from slide 2: how have students progressed?

## 4. Additional Resources

### 4.1 Further Information Relating to the RESIST, FAST and CoastWEB Projects

- https://www.nerc-resist.uk/
- http://www.fast-space-project.eu/
- https://www.pml.ac.uk/CoastWeb/Project_team
- Twitter @NercResist

### 4.2 Vocabulary

We anticipate that in some cases there may be the need for a vocabulary list, or that words should be substituted for different levels or exam boards. In some cases, student understanding will be better supported with in-text terminology. Some useful resources for coastal processes and coastal management vocabulary and key information can be found here:

- http://www.coastalwiki.org/wiki/Main_Page
- https://geographyfieldwork.com/GeographyVocabularyGCSECoasts.htm

### 4.3 Fieldwork Resources

- Field Studies Council website www.geography-fieldwork.org
- The Saltmarsh App https://www.saltmarshapp.com/get-involved/ quick survey and full survey information using the app and basic equipment, and useful section on safety
- Each exam board has useful documentation on expectations and requirements for the fieldwork portion of the geography curriculum e.g. https://qualifications.pearson.com/content/dam/pdf/GCSE/Geography-A/2016/teaching-and-learning-materials/Fieldwork-Guide.pdf
- Virtual fieldwork resources such as http://www.geography.org.uk/projects/makingmyplaceintheworld/virtualfieldwork and google earth manual http://digitalexplorer.com/ge/adf/advanced-google-earthmanual.pdf

- The RGS website has many journal articles on fieldwork methods https://www.rgs.org/schools
- Salt marsh management resource produced by the UK Government (DEFRA/Environment Agency) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/290974/scho0307bmkh-e-e.pdf

4.4 Other Resources that can be used to Support Student Research and Presentations

Below are some sources to support students, alongside the options mentioned in the fieldwork pack:

- Geofile case study and Geo Factsheet Subscriptions
- Newspapers and the BBC website e.g. Independent, Guardian, Telegraph, The Times
- YouTube may provide clips of documentaries, as well as videos of your local area
    - FAST methods play list https://www.youtube.com/watch?v=FqkcA7-cm-M&list=PLf1IPygSvdgswSCuVfQh-Dq0ms4uQuHpP&index=2
- Magazine series from Topic Eye Geography http://crossacademe.co.uk/series/23/a-level-geography
- Digimap for Schools mapping tool for creating GIS maps and researching the area http://digimapforschools.edina.ac.uk
- Geography teacher revision site http://geographyrevisionaqa.weebly.com/salt-marshes.html
- Stretch students by steering/providing accessible and up to date research e.g. New Scientist or Nature websites, Geography Review and Wideworld magazine access

## 5. Acknowledgements

These resources have been produced in association with the NERC-RESIST project by Professor Iris Moeller and Clare Sydney.

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Please contact Clare Sydney via her LinkedIn profile to discuss teaching resource development: https://uk.linkedin.com/in/clare-sydney-96364b47