

OCR A Science – Aquatic habitats – West Reservoir

B3.4 Life on Earth: Why do some species become extinct, and does it matter? What is the importance of biodiversity?

Specification Objectives:

Candidates should use their skills, knowledge and understanding of how science works:

- 1 understand that living organisms are dependent on the environment and other species for their survival
- 2 understand that there is competition for resources between different species of animals or plants in the same habitat
- 3 relate changes affecting one species in a food web to the impact on other species that are part of the same food web
- 4 understand that a rapid change in the environment may cause a species to become extinct, for example if:
 - the environmental conditions change
 - a new species that is a competitor, predator or disease organism of that species is introduced
 - another organism in its food web becomes extinct

Their skills, knowledge and understanding of how science works should be set in these substantive contexts:

- 1 To survive, organisms require a supply of materials from their surroundings and from the other living organisms there.
- 2 Plants often compete with each other for light and for water and nutrients from the soil.
- 3 Animals often compete with each other for food, mates and territory.
- 4 Organisms have features (adaptations) which enable them to survive in the conditions in which they normally live.
- 5 Animals and plants may be adapted for survival in the conditions where they normally live e.g. deserts, the Arctic.
- 6 Animals and plants may be adapted to cope with specific features of their environment e.g. thorns, poisons and warning colours to deter predators.

Assessment Objective 3 (AO3): Practical, enquiry and data-handling skills:

- carry out practical tasks safely and skillfully
- evaluate the methods they use when collecting first-hand and secondary data
- analyse and interpret qualitative and quantitative data from different sources
- consider the validity and reliability of data in presenting and justifying conclusions (25.2%)

Candidates either singly or collaboratively take part in a practical procedure in order to collect primary data. Candidates are assessed on their ability to analyse and evaluate the data collected and the limitations of the techniques used.

Freshwater Ecology Study**Session 1: Pre-fieldwork activities in the classroom (1 hour)**

Time	Teacher Activity	Student Activity / Differentiation	Resources
Starter (10 min)	<p>Heading on board: <i>Why are plants and other animals so important to us; even those we do not eat?</i></p> <p>In pairs students to discuss a food chain and any related vocabulary they know. Several pupils state their food chains to class. Note down any vocabulary on board.</p> <p>On White Board have some pictures of organisms, arrows and key words that can be arranged made into a food chain by pupils. Q: What do these words mean? What does the arrow represent? What can we see from the size of the organisms along this chain – give reasons? (general ideas for now)</p> <p>Learning objectives: agree these with the pupil (have on board) and related relevance to the heading on the board and extending KS3 work</p>	<p>Pupil pair work.</p> <p>Pupils state known food chains. <i>Ask from a range of ability pupils.</i></p> <p>A pupil builds a food chain.</p> <p>Pupils may discuss in pairs first – depending on ability.</p> <p>Listen to pupil objectives.</p> <p>Related to KS3 work</p>	<p>Tables arranged for group work.</p> <p>White Board</p> <p>Interactive board – organism picture, arrows and keywords</p> <p>Objectives on board.</p>
Activity One (15 min) Presenting New information	<p>Newspaper article – Discusses the large amount of 'biodiversity' that can be seen and studied at a local level.</p> <p>The questions on the sheet can be answered by pupils.</p>	<p>Get article.</p> <p>Read and complete exercise.</p>	<p>Sheet 1: Directed reading – newspaper-style article with questions</p>
Activity Two (20min) Assessing risks	<p>We are going to complete a study with the aims in mind;</p> <ul style="list-style-type: none"> How can we best study the relationships between the environment and other species of organisms in a water ecosystem? What would occur if the ecosystem changed? <p>PowerPoint presentation on the site that is to be visited.</p> <p>Using the photos ask the pupils in groups to note down risks that will be likely at the site and what controls they could would put into place to lower the risks.</p> <p>Pupils can present risks as group and add to whole class table on the whiteboard. Consolidate the main risks and what behaviour is expected to decrease the chance of the risk occurring.</p>	<p>Listen</p> <p>Watch</p> <p>Group work complete a table; one column with risks noted and the other with controls put in place.</p> <p>Groups present and add other risks to their tables.</p>	<p>PowerPoint Notes on history of site</p> <p>Sheet 2: Can you spot the risks?</p> <p>Whiteboard.</p>

Activity Three/ Plenary Review (10 min)	Using the worksheet review the key words that have been discussed in the starter, the first activity and KS3 work from previous. These keywords and definitions could be cut up and then used as a starter in lesson three. They should be saved in envelopes with pupil names on.	Complete keywords / definitions. Use textbooks to help. Cut up and place into envelope.	Sheet 3: Ecology terminology
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Homework

This could be a research and record homework:

- either to find out more on 3 named aquatic invertebrates (what do they look like, what do they feed on, how do they have their young, what conditions do they prefer to live in? etc)
- or to find out more about the site that is to be visited (where is it, what is the history of the site, what is it special, what can be found there inc. facilities and plant and animal species)

Session 2: First fieldwork session (1½ hours)

Fieldwork activities	Resources needed
<ul style="list-style-type: none"> • Teacher introduction to West Reservoir and a brief history and overview of the site • Pupils sketch the pond and label the biotic and abiotic features – aim for at least 5 of each • Teacher models use of pond net for sampling • Pupils use pond nets, white trays and identification guides to sample the pond (it is useful for pupils to sample at least two micro-habitats, e.g. surface water, river bottom, among weeds) 	Site background information for teachers Sheet 4: Habitat observations Pond nets, white trays, id guides Sheet 4: Habitat observations Pond nets, white trays, id guides

Session 3: Classroom review of first fieldwork session (1 hour)

Fieldwork activities	Resources needed
<ul style="list-style-type: none"> • Pupils to finish sharing group data and identifying organisms as necessary • Pupils to use adaptation cards to list adaptations for movement, buoyancy and oxygen supply • Discussion to prepare for fieldwork session 2 - How can we compare the biodiversity in three aquatic areas? 	Sheet 5: Adaptations Sheet 6: Adaptations cards

Session 4: Second fieldwork session (1 hour)

Fieldwork activities	Resources needed
<ul style="list-style-type: none"> Teacher to check that pupils remember how to use pond nets for sampling Pupils to collect biotic and abiotic data at three different sites Pupils to share data in groups / class 	Pond nets, white trays, id guides, thermometers, light meters, pH meters or kits, oxygen probes OR dataloggers Sheet 7: Comparing different areas

Session 5: Classroom review of second fieldwork session (1 hour)

Fieldwork activities (1 hour)	Resources needed
<ul style="list-style-type: none"> Pupils to use trophic level cards to construct food webs Pupils to use data collected to construct pyramids of numbers for the four trophic levels Pupils to calculate a pollution index for each of the 3 sample sites 	Sheet 8: Trophic level cards Results recorded on Sheet 7 Sheet 9: Assessing pollution

Post-fieldwork activities

These activities may be carried out for homework after each of the fieldwork sessions or in the lessons following a 'field day'.

- Analyse data from the three habitats. How could such material be used to answer questions on biodiversity? Graphing techniques?
- A discussion of the usefulness of qualitative and secondary sources.
- Present findings in a report / spoken presentation.
- Consider the validity and reliability of data in presenting and justifying conclusions-
- Consider the conclusion drawn from the investigation from the view point of the developers how could they argue against the findings? Where and how might more data need to be collected?
- Using an up-to-date newspaper article on the decline on biodiversity consider how the report is written and what evidence is given for the importance of biodiversity. Some suggestions...
Article on why suburban biodiversity is important

<http://news.bbc.co.uk/1/hi/magazine/4579333.stm>

How the changes in the food web is pollutants are removed;

<http://www.guardian.co.uk/conservation/story/0,,1677851,00.html>

How changes occur in the food web if mammals are culled

<http://www.guardian.co.uk/conservation/story/0,,1692824,00.html>