


Session title	Environmental change in freshwater ecosystems	
Key question	What effects do humans have on freshwater habitats and how can these be measured?	
Session description	Investigate environmental change and human impacts on freshwater habitats. Discover the interdependence of organisms and how they affect and are affected by their environment. Work scientifically to identify which organisms are present and use the correlation between water quality and biodiversity to determine the health of the pond.	
Key Stage suitability	KS3/4	
Duration	1 hour	

Curriculum links	<p><b>Science and Technology</b></p> <p>Being curious and searching for answers is essential to understanding and predicting phenomena</p> <ul style="list-style-type: none"> <li>▪ Progression step 4 <ul style="list-style-type: none"> <li>○ I can explain how the impact of our actions contribute to the changes in the environment and biodiversity.</li> </ul> </li> <li>▪ Progression step 5 <ul style="list-style-type: none"> <li>○ I can evaluate contemporary issues that affect the planet and biodiversity.</li> </ul> </li> </ul> <p>The world around us is full of living things which depend on each other for survival</p> <ul style="list-style-type: none"> <li>▪ Progression step 4 <ul style="list-style-type: none"> <li>○ I can describe the interdependence of organisms in ecosystems and explain how this affects their chances of survival.</li> <li>○ I can explain how reproduction, mutations and the environment can lead to variation and adaptations within organisms which can affect their chances of survival.</li> <li>○ I can explain the threats to the development and health of organisms and describe how the effects of these are reduced by natural defences, preventions and treatments.</li> </ul> </li> <li>▪ Progression step 5 <ul style="list-style-type: none"> <li>○ I can explain how variation of organisms within a changing environment leads to natural selection which drives evolution.</li> <li>○ I can explain how biological processes and control mechanisms enable organisms to function, develop, reproduce and survive.</li> <li>○ I can evaluate the factors which affect the development and health of organisms.</li> <li>○ I can explain how prevention and treatment can support natural defence systems and enhance the health of organisms.</li> </ul> </li> </ul> <p><b>Humanities</b></p> <p>Our natural world is diverse and dynamic, influenced by processes and human actions</p> <ul style="list-style-type: none"> <li>▪ Progression step 4 <ul style="list-style-type: none"> <li>○ I can understand and explain how human actions affect the physical processes that shape places, spaces, environments and landforms over time.</li> <li>○ I can understand and explain the range of factors that affect the interrelationships between humans and physical processes. (KS4)</li> <li>○ I can describe and explain the distinctive features of places, spaces and landscapes at a variety of scales, in my locality and in Wales, as well as in the wider world, along with the processes at work in them.</li> <li>○ I can describe and explain why spatial patterns of places, environments and landforms may change over time in my locality and in Wales, as well as in the wider world.</li> <li>○ I can describe and explain how places, spaces, environments and landforms have changed over time and outline the processes that cause these changes in the natural world.</li> </ul> </li> <li>▪ Progression step 5</li> </ul>
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	<ul style="list-style-type: none"> <li>○ I can explain and analyse the wide range of interrelationships and interdependencies between the human actions and physical processes that shape places, spaces, environments and landforms over time.</li> <li>○ I can evaluate the extent to which economic, social, political, cultural, religious and non-religious beliefs, practices and actions have led to changes to the natural world. (KS4)</li> <li>○ I can give comprehensive explanations for the distinctive features of places, spaces and landscapes at a variety of scales in my locality and in Wales, as well as in the wider world, along with the processes at work in them.</li> <li>○ I can give comprehensive explanations for the spatial patterns of places, environments and landforms at a range of scales and predict how patterns and trends may continue or change in the future in my locality and in Wales, as well as in the wider world.</li> <li>○ I can give comprehensive explanations and analysis of how and why places, spaces, environments and landforms have changed over time.</li> </ul> <p>Informed, self-aware citizens engage with the challenges and opportunities that face humanity, and are able to take considered and ethical action</p> <ul style="list-style-type: none"> <li>▪ Progression step 4 <ul style="list-style-type: none"> <li>○ I can analyse and explain the impact of decisions made by individuals, local, national or global governance, and non-governmental organisations on people, their rights and the environment. (KS4)</li> </ul> </li> <li>▪ Progression step 5 <ul style="list-style-type: none"> <li>○ I can explain the importance of the role played by groups, governments, businesses and non-governmental organisations in the creation of a sustainable future, and how they impact on people and their rights and on the environment. (KS4)</li> </ul> </li> </ul>		
Learning outcomes	<p><b>All learners</b></p> <p><u>All learners</u> will be able to use scientific equipment to catch and observe pond creatures.</p> <p><u>All learners</u> will identify at least four types of freshwater invertebrate.</p> <p><u>All learners</u> will use the results of their survey to decide whether the pond is healthy.</p>	<p><b>More able learners</b></p> <p><u>Some learners</u> will identify factors that could have affected the results of their survey.</p> <p><u>Some learners</u> will be able to describe an adaptation that allows one freshwater invertebrate to survive in polluted water.</p>	
Key vocabulary	Biodiversity Ecosystem Population Habitat Microhabitat Invertebrate	Carnivore Omnivore Herbivore Detritivore Decomposer Larva	Arthropod Arachnid Biotic/abiotic factor Water quality indicator Pollution

Session Outline	Time
Introduction	5 mins
Learners are introduced to the centre, staff and volunteers running the session and the key question, explaining what we will be focusing on today.	
Section 1: What effects do humans have on freshwater habitats and how can these be measured?	5 mins
Before disturbing the water with nets, learners will use nitrate and phosphate testing strips to test the water quality and learn about the impacts that eutrophication has on ponds.	
Section 2: Pond Dipping	20 mins
Using nets, learners will dip in our purpose built ponds to discover as many different species as possible.	

Section 3: Identification & Exploration	15 mins
Learners will Identify the creatures using ID charts and create a record of the species found. They will record the number of each species (tally) to determine which creature is more abundant. Using OPAL charts learners will look at water quality indicators. How healthy are the ponds?	
Section 4: Observation	10 mins
Learners will look at some of the species more closely under a microscope looking at their adaptations and how they are interdependent on each other, creating food chains and webs.	
Plenary	5 mins
Learners will review what they have learnt and ask any further questions	