

## Teaching The River Chess : Module plan

Lesson/s theme	Using key concepts of:	To be able to demonstrate their understanding of this question / task	To include these terms and vocabulary	Sources for teacher reference	Student resources
<b>1. Hydrology in chalk catchments</b>	The hydrological cycle	Label the inputs, throughputs, outputs and storage on a water cycle diagram	Runoff Groundwater flow Surface flow Soil storage Vegetation	Powerpoint slides 1-7  See teachers notes at footer of slides  Note that many slides have essential clickable links so you will need access to show the presentation	Note and explain, using PP slides 3, 4 & 5 how hydrological characteristics of a chalk drainage basin differ from a standard drainage basin.  Locate River Chess on a map (you could use the interactive map on the ChessWatch website).
	The hydrological cycle in chalk drainage basins	Create an annotated diagram to illustrate the unique features of a chalk hydrological cycle in a) summer and b) winter	Winterbournes Aquifers Catchment Artesian well		
	The hydrological cycle in the Chess Catchment	Why might a flash flood create problems for water quality in the River Chess? What changes could be made near the River Chess to improve the quality of water and regulate the flow?	River Chess River Colne River Thames tributary confluence Chesham Rickmansworth Chalfont Aylesbury		

<b>2. River health</b>	The chalk aquatic ecosystem	<p>Why is a chalk stream environment such good news for aquatic life?</p> <p>What are the implications of water acidity for aquatic life?</p> <p>What causes the pH of river water to change?</p>	<p>Brown Trout Mayfly Crayfish</p>	<p>Powerpoint slides 8-12</p> <p>River Trout worksheet answers</p> <p>The River Chess association to be found at <a href="http://www.riverchessassociation.co.uk/">http://www.riverchessassociation.co.uk/</a></p> <p>Chalk streams of the Chilterns video by Matthew Plato ( 30 minutes ) to be found at <a href="https://www.youtube.com/watch?v=7Z-Tp9G0dig">https://www.youtube.com/watch?v=7Z-Tp9G0dig</a></p> <p>Chalk streams in crisis by Slater M and Singleton-White S, June 2019 to be found at <a href="http://www.riverchessassociation.co.uk/uploads/Chalk%20streams%20dossier_June%202019_FINAL_FINAL%20(1).pdf">http://www.riverchessassociation.co.uk/uploads/Chalk%20streams%20dossier_June%202019_FINAL_FINAL%20(1).pdf</a></p>	River trout worksheet
	Good ecological water quality status	<p>Design a leaflet explaining the optimal conditions for a healthy brown trout population.</p>	<p>Nutrient balance fish health water flow</p> <p>77% of UK chalk streams found to be below good standard of health in 2014</p>		
	Measuring and monitoring river health	<p>The importance, to river health of</p> <ul style="list-style-type: none"> <li>• flow/ water level</li> <li>• turbidity</li> <li>• pH</li> <li>• dissolved oxygen</li> </ul>	<p>The importance of</p> <ul style="list-style-type: none"> <li>• flow/ Water level</li> <li>• turbidity</li> <li>• pH</li> <li>• dissolved oxygen</li> </ul>	<p>Powerpoint slide 10 : Click on each water quality indicator on the slide to be directed to the relevant Chess Watch website page <a href="https://www.qmul.ac.uk/chesswatch/water-quality-sensors/">https://www.qmul.ac.uk/chesswatch/water-quality-sensors/</a></p>	Data exercise using data from the ChessWatch water quality sensors

<p><b>3. Human interactions in the drainage basin</b></p>	<p>Human disruption to the drainage basin</p>	<p>How might decreasing water quality affect watercress farming?</p> <p>Under what conditions does sewerage outflow cause problems in the river?</p> <p>How do urban areas affect the quality of the water and the amount of runoff?</p>	<p>Abstraction Sewerage Urban growth Industrial pressures Transport infrastructure Channelling and changes to the channel course Weirs Flood control measures Pollution Invasive species Climate change</p>	<p>PowerPoint slides 13, 14 and 16 Click on each interactive link in each thumbnail for further information</p> <p>See teachers notes at footer of slides</p> <p><b>Either</b> work individually and each student produce a SWOT on one key stakeholder <b>Or</b> work in groups to produce a variety of SWOTS.</p> <p>These SWOTS should then be shared across the group. This is essential background to their final task in Part 5- Creating a sustainable water futures.</p>	<p>SWOT worksheet : Undertake a SWOT analysis for a variety of stakeholders and players in the Chess catchment</p> <p>Refer to at least one verified source of data and research for each of the statements you make in your SWOT</p> <p>Ensure that all sources are correctly referenced</p>
<p><b>4. Managing water demand</b></p>	<p>Demand for water</p>	<p>What are the strategies to get people to use less water?</p> <p>Explain and give examples how these factors create challenge for water companies</p> <ul style="list-style-type: none"> <li>• Climate change</li> <li>• Storage capacity</li> <li>• Water Infrastructure</li> <li>• Increasing demands</li> <li>• Affordability and profitability</li> </ul>	<p>Water footprinting Reducing demand</p> <ul style="list-style-type: none"> <li>• Water butts</li> <li>• Hippos</li> <li>• Water meters</li> <li>• Water pricing</li> </ul> <p>Water abstraction licences issued by the EA Water use forecasting</p>	<p>PowerPoint slides 14 and 15</p> <p>See teachers notes at footer of slides</p>	<p>Use stimulus sheet one: Water use in the UK</p> <p>Research at :</p> <ul style="list-style-type: none"> <li>• Water footprinting to be found at <a href="https://waterfootprint.org/">https://waterfootprint.org/</a></li> </ul>

<p><b>5. Creating sustainable water futures</b></p>	<p>Water resource long term planning</p>	<p>How does the source of water supply in The Thames valley differ from water supply in the UK as a whole?</p> <p><b>Present a plan for sustainable water resource management in the River Chess catchment which meets the needs of the present while safeguarding the needs for the future for all the stakeholders involved.</b></p>	<p>Resilience Sustainability Climate change Population growth Standard of living and quality of life Adaptation Mitigation Risk</p>	<p>PowerPoint slides 19</p> <p>Refer to the worksheet: Researching key stakeholders and players in the River Chess catchment</p>	<p>Use the worksheet :</p> <p>Researching key stakeholders and players in the River Chess catchment</p>
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