**Stage 1 Earth and Environmental Science 10 Credit**

**Water: Past and Present Environments**

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| **Week** | **Topic and Subtopics** | **Science Understanding** | **Possible Teaching Strategies** | **Science Inquiry ❓** | **SHE ideas** | **Assessment** |
| 1-2 | **Topic 5 Importance of the Hydrosphere** | The hydrological cycle | Use infographics to discuss aspects related to the water cycle such as global and local distribution of water, water capture, storage and recovery, pollution, salinity and consequences of human interactions. | Apply the water cycle concept to water at the local level (e.g. the School Grounds, a park, of household.  <http://www.yourhome.gov.au/water/stormwater> | Look for evidence that water management has been influenced by scientific knowledge of water management. |  |
| 3-4 | **Glaciers** | Water occurs in three phases on the Earth, one of them is as a solid.   * Describe examples of water as a solid. | Describe glaciation.  Investigate weathering and erosion caused by glaciers, including unconsolidated material deposited by glaciers e.g. including till and erratics.  Explore current glaciers that occur around the world and investigate evidence for past glaciers e.g. striations.  Discuss Hallett Cove:  <http://www.sa.gsa.org.au/Brochures/HallettCoveBrochure.pdf>  Geological Features: striations, erratics, changes in sea level, folding, weathering, erosion, load casts, ripple marks, graded bedding and unconformities.  Rock Types: calcrete, silts and clays, iron rich soils, Hallett Cove Sandstone, till, Precambrian siltstones and sandstones | **Practical Activities:**  Make Glacier Goo  <http://www.mykidsadventures.com/glacier-goo-project/>  Other glacier activities  <https://rockpaperglacier.wordpress.com/glacier-basics-for-kids/glacier-activities/>  Fieldwork skills; note taking, drawing diagrams, Stratigraphic Columns | Explore how ice cores can be analysed for Methane, Oxygen and Carbon Dioxide to provide information about past climates. | Formative Field Investigation: Hallett Cove |
| 5-6 | **Topic 6 Biosphere**  **Fossils** | The characteristics of past environments and communities can be inferred from the sequence and internal textures of sedimentary rocks, and from enclosed fossils and trace fossils.   * Explain ways in which fossils form. * Relate the present environment of living organisms to the past environment of fossils of similar organisms. * Describe the formation of sedimentary structures that are used to determine the facing of beds. | Investigate various aspects of past environments using numerous ‘Earthlearningideas’ activities.  <http://www.earthlearningidea.com/English/contents_alphabet.html>  Examine how factors such as the presence of water, nature of the substrate, atmospheric and water temperature impact on the organism assemblages in a past environment.  Investigate sedimentary structures that are used to determine the facing of beds   * cross bedding and way up * graded bedding * ripple marks | **Practical Activity:**  Make your own fossils  <http://www.wikihow.com/Make-Fossils-Using-Plaster-of-Paris> | Explore:  Could we really bring back dinosaurs like in *Jurassic Park*?  Review the article:  <http://blogs.discovermagazine.com/d-brief/2015/06/09/blood-cells-dinosaur-bones/#.V20aaLh97IU> |  |
| 7-8 | **Fossils** | The diversification and proliferation of living organisms over time and the catastrophic collapse of ecosystems can be inferred from the fossil record.   * Explain the relationship between the fossil record and the eras in the geological timescale. * Explain why some fossils are useful as index fossils. * Explain the significance of fossils within the geological timescale and as indicators of past environments. * Describe the Cambrian Explosion and its significance. * Discuss possible theories about the extinction of Dinosaurs the end of the Cretaceous Period. | Investigate the Ediacaran fauna at the palaeontology exhibit at a state, territory, or national museum.  Model the geological timescale using ‘Earthlearningidea’ *A time-line in your own backyard.*  Identify specimens of each of the following and describe the time and environment in which they lived:  Ediacaran fauna, Trilobites, Dinosaurs, Ammonites, Archaeocyatha, Graptolites,  What can scientists learn from past catastrophic ecosystem changes relevant to today’s ecosystems? | **Virtual Lab Activity:**  How can fossils and rock data determine when an organism lived  <http://www.glencoe.com/sites/common_assets/science/virtual_labs/ES12/ES12.swf> | Explore the similarities and differences between ancient ammonites and current day nautiloids. | **Summative AT2: SAT** Fossils: analysis of the evidence that has developed our understanding of the Permian–Triassic extinction event |
| 9-10 | **Biotic Responses** | Biomes are Biotic Responses to water distribution on a global scale.  In any one location, the characteristics and interactions of the atmosphere, geosphere, hydrosphere, and biosphere give rise to unique and dynamic communities. | Investigate the community associated with one chosen biome identifying the interactions of the atmosphere, geosphere, hydrosphere and biosphere that give rise to a major world community. Introduce concepts of ecosystems at the local national and global scales.  <http://www.ucmp.berkeley.edu/glossary/gloss5/biome/deserts.html>  Research background information of a local aquatic environment and the associated ecosystem.  Or organise a class visit to Urrbrae wetland  <http://www.urrbraewetlandlc.org/education.html> | **Practical/Field Investigation** of a local waterway and the associated Biotic responses.  As a class, students work in groups of between 2 & 4 to Collect & Record information on aspects of the local waterway and the associated vegetation.  Data collected is shared and analysed back in the classroom. | Scientific knowledge, understanding, and inquiry can enable scientists to develop solutions, make discoveries and design action for sustainability. | **Summative AT1: SHE Investigation**  Water Quality  **Summative AT1: Design Practical/Field Investigation**  Water Quality |
| 11-12 |  | Explain the link between Biodiversity and Ecosystem services. | Humans and biodiversity Communities and Citizenship Science (e.g. Water and Frog Watch, bird counts data feeds.)  Explore the importance of using scientific methods to collect data to inform decision-making.  Students organise and conduct a biodiversity restoration activity using ‘best practice’ for biodiversity restoration. | Using KESAB Water Watch processes and equipment, Students work in small groups in the laboratory to test water for key indicators of water quality (E. G. Turbidity, pH, Acidity).  **Draft Report Due and Feedback provided.** | The acceptance and use of scientific knowledge can be influenced by social, economic, cultural, and ethical considerations.  Students participate in an activity that influences others and leads to improved biodiversity at the local level. |  |
| 13-14 | **Biotic Responses**  Biodiversity & Threatened species | Explain why current biodiversity loss is almost entirely caused by humans. | Scientists recognise 6 waves of extinction in the past half billion years Although extinction is a natural phenomenon, it occurs at a natural “background” rate of about one to five species per year. Scientists estimate we’re now losing species at 1,000 to 10,000 times the background rate.   * Explain how past mass extinctions, were caused by events like asteroid strikes, volcanic eruptions, and natural climate shifts, |  | Investigation **Biodiversity Issue. Threatened species.** |  |
| 15-16 |  | Explain why biodiversity loss is a threat to ecosystem stability.  Use the example of the Southern Brown Bandicoot to show how scientific method is used to gather evidence to produce meaningful data that informs actions within a community. | Conduct background research using scientific and community based research.  <http://www.surlg.org.au/>  [Southern Brown Bandicoot - naturalresources.sa.gov.au](http://www.naturalresources.sa.gov.au/files/sharedassets/public/plants_and_animals/threatened_species/pa-fact-southernbrownbandicoot.pdf)  <http://www.surlg.org.au/faunaguide/FactSheet_KLong.pdf> | Visit a field site where work has been carried out to restore bandicoot habitat in order to obtain meaningful data.  Use clear and concise scientific communication. | Students explore how scientific progress and discoveries are influenced and shaped by a wide range of social, economic, ethical and cultural factors. | **Summative AT2: SAT**  Biodiversity and Threatened Species |