**Lesson plan**

**Course:** **SNC 1D**

**Unit 1: Biology:** Sustainable Ecosystems

**Topic:** Unit Review

**Lesson:**

**Grade and Level:** Grade 9 Academic

**Date:**

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| **Description of Topic:** Today the students will review the unit. |

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| **Learning Expectations** |
| **Overall Expectations:**  B1. assess the impact of human activities on the sustainability of terrestrial and/or aquatic ecosystems, and evaluate the effectiveness of courses of action intended to remedy or mitigate negative impacts;  B2. investigate factors related to human activity that affect terrestrial and aquatic ecosystems, and explain how they affect the sustainability of these ecosystems;  B3. demonstrate an understanding of the dynamic nature of ecosystems, particularly in terms of ecological balance and the impact of human activity on the sustainability of terrestrial and aquatic ecosystems. |
| **Specific Expectations:**  Unit Review |

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| **Teacher Resources:**   * Projector, PP, laptop | **Student Resources:**   * Textbook, handout |

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| **Teaching / Learning Strategies** |
| Note taking, analysis, rubric |

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| **Steps: (sequence, time lines, teacher/ student roles)** |
| 1. Students will start working on the review 2. Review note |

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| **Accommodations / Modifications** |
| * The notes will be done on Power Point. This allows the students to see the text better; it is also easier to include multimedia such as pictures and diagrams that help the more visual learners. Key words will also be highlighted. * Students will have access to the notes online where programs such as Premier can read the note to them. |

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| **Assessment & Evaluation** |
| * The student’s homework will be assessed when they write the unit test |

**SNC1D: U1 Date:**

**Unit 1 Review: Ecology**

**Chapter 1: Ecosystems are complex, self regulating systems of organisms and their abiotic environments –**

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| **Key Concepts** | **Summary** |
| • Abiotic and biotic characteristics  • Photosynthesis and cellular respiration  • Nutrient cycles and energy flows  • Equilibrium and carrying capacity | • The biodiversity on Earth is found in the biosphere, which includes the lithosphere, atmosphere, and hydrosphere. All of these spheres interact.  • Energy in ecosystems comes from the Sun. It is transformed into chemical energy by plants. As energy travels along food chains, the amount of usable energy decreases.  • Matter is recycled in ecosystems. Plants use matter from the soil and air to make their tissues. Matter then passes along food chains, which are the biotic parts of ecosystems.  • Decomposers release the substances in organic matter back into the soil, and the substances are reused by plants.  • Abiotic and biotic factors affect the size of populations in ecosystems.  • A population’s carrying capacity is the maximum number of animals that the habitat can support over a long period.  • When a population is at carrying capacity, it is at equilibrium. The number of births equals the number of deaths, and the population is steady. |

**Key Terms**

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| abiotic  aquifer  atmosphere  biodiversity  biome  biosphere  biotic  boreal forest  carnivores  cellular respiration  chlorophyll  community | components  consumers  decomposers  denitrifying bacteria  detritivores ecology  ecosystem  elements  environment  freshwater  grasslands  habitat  herbivores | hydrosphere  lithosphere  marine  niche  nitrifying bacteria  nitrogen fixation  Nutrient  nutrient cycle  omnivores  organic matter  species  stewardship | sustainability  system  temperate coniferous forest  tertiary consumers  tundra photosynthesis  population  primary consumers  producers  reservoir  scavengers  secondary consumers |

**Chapter 2: Human Activity Affects the Sustainability of Ecosystems**

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| **Key Concepts** | **Summary** |
| • Factors affecting biodiversity  • Soil profile and soil types  • Factors affecting water quality  • Bioaccumulation and biomagnification | • Biodiversity includes species diversity, genetic diversity, and ecosystem diversity.  • Overexploitation, habitat destruction, pollution, invasive species, and climate change are factors that decrease biodiversity.  • Soil is made up of humus, rock particles, and living organisms. Soil can be clay, sandy or loam, and it can vary in acidity.  • Water’s quality is assessed by its oxygen levels and acidity as well as by the presence of heavy metals, nitrogen, phosphorus, and pesticides. Poor water quality affects organisms that depend on the water. |

**Key Terms**

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| acid rain  acidity  bedrock bioaccumulation  biological oxygen demand  biomagnification  clay soil  clearcutting  climate | climate change  crop rotation  dissolved oxygen  eutrophication  extinction genetic diversity global warming  habitat change  habitat fragmentation | heavy metals  invasive species  loam soil  native species  non-point source pollution  overexploitation  pesticides | point source pollution  pollution  sandy soil  soil  soil erosion subsoil sustainable use  topsoil |

**Chapter 3: Governments, groups, and individuals work together to promote sustainable ecosystems.**

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| **Key Concepts** | **Summary** |
| • Conserving biodiversity  • Conservation strategies  • Environmental stewardship and  sustainable use | • Extinction means the loss of biodiversity. Ex-situ and in-situ conservation strategies work to protect at-risk species.  • Governments use legislation to enact programs to protect ecosystems.  • Ecological footprints are a way of representing our resource use.  • Environmental stewardship means using resources in a sustainable way. Groups and individuals are taking action to increase sustainable use. |

**Key Terms**

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| at risk  conservation biology  ecological footprint  endangered | environmental steward  ex situ conservation  extirpated  in situ conservation | integrated pest management  organic farming | soil conservation  special concern  threatened |

**Questions**

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| **2.** Describe an abiotic factor that could affect a population of squirrels.  **3.** How is a food chain related to a food web?  **4.** Snapping turtles eat frogs, frogs eat grasshoppers, and grasshoppers eat grass.  (a) Construct a food chain using the above organisms.  (b) Add a decomposer to your diagram.  (c) Add a source of energy for the producers to your diagram.  **5.** The nitrogen cycle relies on the actions of several distinct types of bacteria. List and describe the function of each.  **6.** Describe three types of symbiotic relationships, and give an example for each one.  7. Define the term “genetic diversity.”  8. List five major factors that affect biodiversity. | 9. List the elements that make up soil.  10. Which type of soil would most gardeners prefer to have? Why?  11. What type of measurement can be used to determine the acidity of the soil?  12. What method can farmers use to restore nutrients in the soil of their fields?  13. Do “dissolved oxygen” and “biological oxygen demand” describe the same phenomenon? If not, how are the two terms different?  14. How are modern pesticides an improvement over earlier ones? |

15. Place the following categories in order from the least serious to most serious: extirpated, special concern, extinct, endangered, and threatened.

16. How can soil erosion be reduced?

17. What is one measure the federal government takes to prevent invasive species from being accidentally introduced into Canada?

18. Name an international treaty that protects biodiversity in Canada and around the world.

More Questions:

19. Explain why it is more accurate to define the biosphere as a global ecosystem rather than a global community.

20. Hypothesize what would happen to an ecosystem that had all of its decomposers removed.

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| 21. Bacteria are bad for your health and are responsible for many diseases that hurt humans, animals, and plants. All efforts should be taken to completely eradicate bacteria on the planet.  (a) Evaluate the validity of this statement. Support your answer.  (b) If necessary, modify the statement to make it more accurate.  22. Study the following energy pyramids.  (a) Which pyramid best represents a sustainable ecosystem?  (b) Explain why each of the other two pyramids is unsustainable.  (c) Suppose data were collected from the ecosystem represented by B in 10 years’ time. Draw an energy pyramid that might describe energy flow in the ecosystem at that time. Explain why you drew it the way you did |  |

**5.** Name four elements that are found in most organisms.

**6.** Give an example of an abiotic reservoir

**7.** (a) What do nitrifying bacteria do?

(b) What do denitrifying bacteria do?

**8.** What is the difference between a habitat and a niche?

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Page 152 Self Quiz – all questions

**Unit 1: Review - Answers**

**Chapter: 1**

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| **2.** Students’ answers may vary but could include water availability, temperature, space for home, or inclement weather.  **3.** A food chain shows the flow of energy through a single feeding path in an ecosystem. A food web is made up of many interconnected food chains.  **4. (a)** grass => grasshoppers => frogs => snapping turtles  **(b)** grass => grasshoppers => frogs => snapping turtles bacteria  **(c)** Sun => grass => grasshoppers => frogs => snapping turtles  **5.** Bacteria involved in the nitrogen cycle include: nitrogen-fixing bacteria that convert atmospheric nitrogen gas into ammonia; nitrifying bacteria that convert ammonia into nitrates; denitrifying bacteria that convert nitrates back into nitrogen gas; decomposing bacteria that break down the tissues of dead or decaying organisms and release nitrogen compounds into the ecosystem.  **6.** Three types of symbiosis include: commensalism, where one organism benefits from another’s actions and the second organism neither benefits nor is harmed, such as a bird building a nest on a tree; mutualism, where both organisms benefit from interacting with one another, such as leaf-cutter ants and fungus; parasitism, where one organism benefits at the expense of another, such as ticks living on mammals. |

**Chapter: 2**

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| **7.** Genetic diversity is a specific type of biodiversity that focusses on the differences among individuals of the same species.  **8.** Five major factors that affect biodiversity include habitat change, overexploitation, pollution, invasive species, and climate change.  **9.** Elements that make up the soil include litter, topsoil, humus, organic matter, rock particles, subsoil, and bedrock.  **10.** Most gardeners would prefer loam soil. It has lots of humus, which provides nutrients for plant growth; air pockets to allow water to drain but still support plant growth; air pockets that hold air for important bacteria to grow and assist with cycling of nutrients.  **11.** pH measures the acidity of substances including soil.  **12.** Students’ answers may vary but could include crop rotation, use of manure, or addition of fertilizers.  **13.** No. Dissolved oxygen measures the amount of oxygen present in water. Biological oxygen demand measures the rate at which oxygen is used up by the micro-organisms in a given body of water.  **14.** Modern pesticides are designed to last one growing season and then break down into less harmful substances. |

**Chapter: 3**

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| **15.** Special concern, threatened, endangered, extirpated, and extinct.  **16.** Practising soil conservation and reducing farming practices that remove or damage the topsoil can reduce soil erosion.  **17.** Students’ answer may vary but could include by-laws that prevent the movement of materials that may carry invasive species, or laws against bringing foreign food, produce, and animals into the country.  **18.** The Convention on Biological Diversity  **19.** A community describes several interacting populations. The biosphere is defined as the area on the planet where all life exists. Since this involves all the biotic components interacting with abiotic factors, ecosystem would be a better description than community.  **20.** Energy and nutrients would be trapped in the tissues of all the organisms that ever existed in the ecosystem. There would likely be a shortage of nutrients and energy available for the environment.  **21. (a)** This statement is too wide-sweeping. Bacteria play critical roles in all the nutrient cycles and, without them, life on the planet would not be possible.  **(b)** Students’ answers may vary but could include the following: Certain bacteria are bad for your health and are responsible for many diseases that hurt humans, animals, and plants. However, not all bacteria are harmful.  **22. (a)** Pyramid A best represents a sustainable ecosystem.  **(b)** Pyramid B does not follow the 10 percent rule as you move up the feeding levels. Not enough energy is available to support the top two feeding levels. Pyramid C does not make sense, as the bottom level has to have the most energy.  **(c)** Assuming that scenario B survives past the next couple of generations, it would likely look like Pyramid A in 10 years’ time. The second level would outstrip the energy in the bottom level and eventually most of these animals would die out.  However, the producers would likely recover and a sustainable number of consumers would follow. |

**5.** Carbon, hydrogen, oxygen, and nitrogen are elements found in most organisms.

**6.** Students’ answers may vary but could include oceans and forests.

**7. (a)** Nitrifying bacteria convert ammonia into nitrates, which plants absorb through their roots and use to grow.

**(b)** Denitrifying bacteria convert nitrates back into nitrogen gas, which returns to the atmosphere.

**8.** A habitat is where organisms live, but a niche represents all the interactions of a given species within its ecosystem.