

Physical Geography

Unit 3 - Ecosystems

Unit 3 focuses on the interrelationships between landforms and water forms on the one hand and climate on the other, and how these interrelationships make up the earth's ecosystems. Soils, which result from a complex interaction among climate, land, flora and fauna, form a vital resource that humans use to satisfy needs and wants. Students will understand that humans must exercise wise stewardship in order to conserve resources

Unit 3: Ecosystems

Outcomes

SCO 3.1: The student will be expected to demonstrate an understanding that an ecosystem consists of a complex network of organisms, including the following delineations:

- 3.1.1 Define the term ecosystem. (k)
- 3.1.2 Differentiate the terms food chain and food web. (k)
- 3.1.3 **Outline the energy flow through an ecosystem. (k)**

Sample Learning/Teaching Strategies

Teachers can have students

- given an illustration, give an example of a food chain.
- use a diagram to describe the energy flow through an ecosystem.

Unit 3: Ecosystems

Sample Assessment Strategies

Students could, for example:

- draw an example of a food web of which the human being is a part.
- analyze a short story to describe the features of the ecosystem(s) in which the action takes place.

Teacher Notes

- Many of the delineations for SCOs 3.1, 3.2, and 3.3 are covered in Science 1206, Science 2000, and Canadian Geography 1202. These delineations are still listed for purposes of review, particularly for World Geography 3200 students.
- The BBC school website <http://www.bbc.co.uk/schools/gcsebitesize/geography/> has excellent information on ecosystems (e.g., definitions, sample questions, and diagrams).

Unit 3: Ecosystems

Outcomes

SCO 3.2: The student will be expected to demonstrate an understanding that the relationships among the living and non-living elements of an ecosystem are delicately balanced, including the following delineations:

- 3.2.1 Define the term biological amplification. (k)
- 3.2.2 Explain why there are fewer organisms at each trophic level. (k)
- 3.2.3 **With reference to a food pyramid, explain how pesticides can reach toxic levels for organisms at a higher trophic level. (a)**
- 3.2.4 Predict the effect on an ecosystem of the introduction of a new organism. (i)

Sample Learning/Teaching Strategies

Teachers can have students

- explain how a food pyramid helps one to understand how pesticides such as DDT can reach toxic levels for organisms at a higher trophic level.
- given an illustration of a particular ecosystem (e.g., a marine ecosystem), describe the effect that the introduction of a pollutant would have on a food web.
- given a description of the introduction of a new organism into a particular ecosystem, draw a diagram to show the probable impact of the new organism on the ecosystem (see teacher note 1).

Unit 3: Ecosystems

Sample Assessment Strategies

Students can, for example:

- given the population numbers for organisms in an ecosystem, draw a food pyramid and label each level with the names of organisms and their populations (see teacher note 2).
- conduct a study of a local ecosystem to identify the consumers, decomposers and food relationships. Develop a display consisting of maps, charts, diagrams, and photographs.

Teacher Notes

- Refer to BBC school website for support for this SCO.
- For delineation 3.2.4, simple examples would suffice. For example, students should be able to infer what the probable impact that the recent arrival of coyotes on the island of Newfoundland may have on the local ecosystem.
- Refer to ST, Exercise 13, page 98. (1)
- Refer to ST, Exercise 14a, page 98. (2)

Unit 3: Ecosystems

Outcomes

SCO 3.3: The student will be expected to examine general interrelationships within and among world ecosystems, including the following delineations:

- 3.3.1 List the general characteristics of a given ecosystem. (k)
- 3.3.2 **Analyze patterns in the distribution of world ecosystems. (a)**
- 3.3.3 **Predict which kind of ecosystem is likely to result from a stated set of climatic conditions (i)**

Sample Learning/Teaching Strategies

Teachers can have students

- analyze a world ecosystems map and identify
 - the most predominant ecosystem in the high latitudes
 - the name of the forest ecosystem in the low latitudes
 - the most predominant ecosystem in South America
 - the continents that do not experience a tundra ecosystem
 - the name of the ecosystem in the local area
- given a photograph of a vegetated landscape, determine the type of ecosystem it illustrates.
- briefly describe the relationship between climatic conditions and the type of ecosystem they produce (see teacher note 1).
- describe the general characteristics of a given world ecosystem.
- describe the structure of an equatorial rainforest.
- given a schematic showing the relationship among temperature, rainfall, and ecosystems, predict the ecosystem once given the rainfall and temperature combination.

Unit 3: Ecosystems

Sample Assessment Strategies

Students could, for example:

- write a sentence to describe the climax vegetation in the local area.
- given a world climate map and a world ecosystems map, complete the following table to relate climate and ecosystems.

Ecosystem	Climatic Conditions

- given a description of climatic conditions and vegetation in a particular area, identify the ecosystem described.
- given several climographs and a series of descriptions of ecosystems, match each climograph to the correct description (see teacher note 2).

Teacher Notes

- Refer to <http://www.teachersfirst.com/lessons/biomes/biomes.html> for illustrations and information on world ecosystems.
- Refer to ST, Exercise 23, page 105. (1)
- Refer to ST, Exercise 25, page 107. (2)

Unit 3: Ecosystems

Outcomes

SCO 3.4: The student will be expected to demonstrate an understanding of the characteristics of soil quality and the need to reduce the threat to our soils, including the following delineations:

- 3.4.1 Describe the factors that affect soil quality. (k)
- 3.4.2 Analyze the quality of a soil in terms of its soil texture. (a)
- 3.4.3 Draw conclusions about global patterns related to soil loss. (a)
- 3.4.4 Assess statements about soil availability. (i)

Sample Learning/Teaching Strategies

Teachers can have students

- analyze a triangular graph of soil texture to
 - describe the amount of sand, silt, and clay a given soil contains
 - comment on its usefulness for farming
- refer to ST, Exercise 16, page 137. (2)
Refer to a world ecosystems map and explain why each of the following patterns occur:
 - in Africa, only 16% of the land is considered suitable for farming
 - in Southern Asia, only 20% of the land is arable
- analyze a table of statistics showing soil loss by continent. Briefly describe the spatial pattern shown.
- evaluate the validity of the following statement:
Soil is a plentiful resource.

Unit 3: Ecosystems

Sample Assessment Strategies

Students could, for example.

- examine photos of two soil profiles and explain which is more suited to agriculture (see teacher note 2).
- refer to a world ecosystems map and explain why each of the following patterns occur:
 - only 10% of northern and central Asia is used to support crops
 - in Europe, a fairly large share of the soil is suited to farming
- analyze a table of statistics to:
 - identify the two regions suffering most from desertification
 - explain why by referring to an ecosystems map (see teacher note 1)

Teacher Notes

- This activity should be very basic, since the linking of soil types to their ecosystems can be very complex. Select several of the more common soil types (e.g., the chernozem and latosol) that students will link to their ecosystems (e.g., temperate grassland and tropical rainforest). Refer students to Figure 6.8, page 102, and Figure 137, page 137. (2)
- The issue of desertification is extensively treated in the ST, pages 121-124. (1)
- Refer to the FAO forestry website <http://www.fao.org/forestry/index.jsp> - the section on desertification contains maps and graphs about trends in soils at risk.

Unit 3: Ecosystems

Outcomes

SCO 3.5: The student will be expected to recognize the need for humans to be sensitive to the fragile nature of ecosystems, including the following delineations:

- 3.5.1 Draw conclusions about possible short-term and long-term impacts of a threat to an ecosystem (a)
- 3.5.2 **Anticipate actions needed to help ameliorate an environmental risk. (i)**
- 3.5.3 Relate climatic zones to areas of environmental risk. (a)
- 3.5.4 **Analyze value positions taken on environmental issues. (a)**

Sample Learning/Teaching Strategies

Teachers can have students

- analyze a case study of a traditional cultural group to determine how they successfully used the environment to meet their needs and wants (e.g., the Yanomamo of the Amazon rainforest).
- analyze a case study to determine how a given economic activity has disrupted fragile relationships in a particular ecosystem (e.g., the draining of wetlands for residential and agricultural use; acid rain as a result of industrial activity; deforestation as a result of farming and ranching; the removal of grass cover due to overgrazing).
- compare a world ecosystems map with a world map showing areas at risk of desertification. Identify the ecosystems where the threat of desertification is greatest and describe the underlying causes.
- analyze a case study to determine the extent, causes and effects of desertification.
- research and report on the goals, strategies, activities, and effectiveness of a humanitarian organization that has been involved in reducing the effects of drought on peoples in a desert ecosystem.
- analyze a map to develop a generalization about worldwide patterns related to environments naturally at risk.
- take a stand on the following position: Canada should be more concerned with solving its own economic problems rather than extending aid to peoples affected by a natural disaster.

Unit 3: Ecosystems

Sample Assessment Strategies

Students could, for example.

- examine a table of statistics on a negative ecological trend for a specific time period (e.g., rate of forest removal; decline in spawning biomass of a fish stock) and write a statement to show the pattern reflected (see teacher note 1).
- given a world map showing, by country, the percentage of plant species under threat of extinction, briefly describe the major patterns shown.
- through the use of case study material, analyze the position of selected groups toward the natural environment (e.g., environmentalists, industrialists, governmental officials, indigenous peoples). Identify the underlying values of the group. Briefly explain how your values compare with those of the group(s) on the position(s) taken (see teacher note 2).
- develop a position for or against a government official who argues that the economic use of the Amazon rainforest is strictly an economic resource for Brazilians to develop as they see fit.
- conduct research and write a report on the state of forests in the local area.

Teacher Notes

- Refer to ST, Exercise 4, page 117. (1)
- This assessment strategy lends itself to a cooperative group structure such as jigsaw. (2)

