

The Environment and You (Christensen)

Chapter 1 Environmental Science as a Human Endeavor

1.1 Multiple-Choice Questions

1) The 1987 UN World Commission on Environment and Sustainability first introduced the concept of _____ as a necessary focus for maintaining sustainability.

- A) human well-being
- B) renewable energy
- C) environmental sustainability
- D) cultural services
- E) human population growth

Answer: A

Skill: Knowledge/Comprehension

Module: 1.1

2) The current total world population is _____.

- A) 5 billion
- B) 6 billion
- C) 7 billion
- D) 8 billion
- E) 9 billion

Answer: C

Skill: Knowledge/Comprehension

Module: 1.0

3) The increase in atmospheric carbon dioxide is a direct result of all of the following activities *except* _____.

- A) burning coal
- B) cutting forests
- C) burning oil
- D) smoking
- E) increasing natural gas emissions

Answer: D

Skill: Knowledge/Comprehension

Module: 1.0

4) Which of the following is *not* an abiotic factor?

- A) Bacteria
- B) Temperature
- C) Rainfall
- D) Sunlight
- E) Carbon and nitrogen levels

Answer: A

Skill: Knowledge/Comprehension

Module: 1.2

5) An ecosystem is best defined as _____.

- A) a regional grouping of plants, animals and abiotic factors
- B) the total population of a specific kind of plant, animal or microbe and all members of which do or potentially can interbreed and produce young
- C) all the organisms and their physical and chemical environment within a specific area where energy and matter influence the distribution and abundance of organisms present
- D) a grouping of plants and animals that interacts with one another in a way that causes the grouping to die
- E) abiotic factors affecting a grouping of plants, animals and organism trying to survive in a given area

Answer: C

Skill: Knowledge/Comprehension

Module: 1.2

6) Which of the following is *not* a principle of Ecosystem function?

- A) Ecosystems are always open to gains and losses of matter and energy.
- B) Ecosystems have distinct boundaries that are influenced by the abiotic factors in the ecosystem.
- C) Matter and energy are neither created nor destroyed.
- D) Ecosystems processes are self-regulated by interactions among their living and nonliving components.
- E) Ecosystem change is inevitable and essential.

Answer: B

Skill: Knowledge/Comprehension

Module: 1.3

7) A hypothesis can best be described as _____.

- A) a proven fact
- B) an explanation that has been tested many times
- C) a proposed explanation based on observation
- D) the science of asking questions and finding concrete answers
- E) a comparison between groups with an explanation for differences

Answer: C

Skill: Knowledge/Comprehension

Module: 1.5

8) All the organisms and their physical and chemical environment within a specific area best describes _____.

- A) the biosphere
- B) ecological communities
- C) populations
- D) ecosystems
- E) biomes

Answer: D

Skill: Knowledge/Comprehension

Module: 1.2

9) Sustainable use of resources requires _____.

- A) knowledge of all non-renewable resources
- B) knowledge of all finite resource locations
- C) an understanding of ecosystem models
- D) an understanding of rate of resource renewal and ability to manage rate of use
- E) a thorough understanding of the scientific method

Answer: D

Skill: Knowledge/Comprehension

Module: 1.4

10) The ecosystem boundary of a drainage basin can be defined by _____.

- A) the streams that flow into the basin
- B) mountains, hills and valleys that determine where the water flows
- C) the amount of water flowing into the basin from a mountain
- D) local legislative decisions designed to clarify jurisdiction of the ecosystem
- E) the rivers that divide the basins between counties, cities and states

Answer: B

Skill: Application/Analysis

Module: 1.3

11) A *key factor* in the ability of ecosystems to provide ecosystem services is _____.

- A) the presence of both renewable and nonrenewable resources
- B) the presence of essential abiotic factors
- C) the maintenance of a high level of diversity of species
- D) a steady rate of growth of the ecosystem
- E) a sustainable energy cycle

Answer: C

Skill: Application/Analysis

Module: 1.1

12) What is one barrier that makes it difficult for scientists to forecast environmental changes?

- A) Simplicity of ecosystems
- B) Unpredictable behavior of ecosystems that cause unpredicted environmental changes
- C) The certainties of ecosystem function which humans ignore
- D) The diversity of views based on cultural and religious differences
- E) Environmental conflict that leads to ecosystem sustainability

Answer: B

Skill: Application/Analysis

Module: 1.5

13) At virtually any level of use, nonrenewable resources can be _____.

- A) converted to renewable ones
- B) exhausted or depleted
- C) recycled or reused
- D) converted to nonmetallic minerals
- E) replenished once depleted

Answer: B

Skill: Knowledge/Comprehension

Module: 1.4

14) In human-dominated ecosystems, which of the following features is often lacking?

- A) An ecosystem's ability to grow sufficient food
- B) Homeostatic regulation
- C) The presence of sufficient human infrastructure
- D) The presence of positive feedback systems
- E) Drought resistant regulation

Answer: B

Skill: Application/Analysis

Module: 1.6

15) Global population is projected to be about _____ in 2050.

- A) 7 billion
- B) 8 billion
- C) 9 billion
- D) 10 billion
- E) 11 billion

Answer: C

Skill: Knowledge/Comprehension

Module: 1.0

16) Environmental science is *best* described as _____.

- A) focusing on organism relationships within an ecosystem
- B) studying all aspects of an environment
- C) studying the physical and chemical aspects of an environment
- D) focusing on renewable resource sustainability
- E) studying ecosystem sustainability and destruction

Answer: B

Skill: Knowledge/Comprehension

Module: 1.1

17) Negative feedback processes tend to function within ecosystems to _____.

- A) cause further ecological destruction.
- B) cause ecological relationships to flourish
- C) cause ecological relationships to disintegrate
- D) stabilize the ecosystem
- E) reinforce harmful changes

Answer: D

Skill: Application/Analysis

Module: 1.6

18) As human population and demands for resources have changed, our definition of sustainability has also changed. One hundred and fifty years ago, human resource use was *largely* determined by _____.

- A) human needs or perceived needs
- B) the necessity to avoid human conflict
- C) the understanding of resource supply
- D) the need for balancing multi-uses/demands for a resource
- E) consideration of human justice

Answer: A

Skill: Application/Analysis

Module: 1.1

19) Ecosystems are connected by _____.

- A) energy cycling and nutrient flow
- B) the essential flow of water through the ecosystem
- C) the flow of energy and matter through the ecosystem
- D) individual species competing for space with other species in the ecosystem
- E) the movement of pollutants between ecosystems

Answer: C

Skill: Knowledge/Comprehension

Module: 1.1

20) Throughout any introductory examination of ecosystems and environmental sustainability, the importance of human population numbers is cited. Currently, the world and U.S. populations are closest to _____.

- A) 7 billion; 200 million
- B) 9 billion; 400 million
- C) 3.5 billion; 300 million
- D) 7 billion; 300 million
- E) 7 billion; 500 million

Answer: D

Skill: Knowledge/Comprehension

Module: 1.1

21) What ecosystem services from U.S. national forests had the *greatest* demands placed on them following World War II and the country's rapid population growth?

- A) Grazing, recreation and timber resources
- B) Grazing and agriculture
- C) Soil formation and agriculture
- D) Food, fiber and plant growth
- E) Soil formation and wilderness protection

Answer: A

Skill: Application/Analysis

Module: 1.1

22) What makes up an ecosystem?

- A) Living and nonliving parts and the processes that disconnect them
- B) Living and nonliving parts and the processes that connect them
- C) Living and nonliving parts and energy movement created by the sun
- D) Energy and matter and the organisms functioning apart
- E) Energy and matter and the organisms competing for resources in the ecosystem

Answer: B

Skill: Knowledge/Comprehension

Module: 1.2

23) Which of the following is *not* considered Biota?

- A) Animals
- B) Plants
- C) Rainfall
- D) Bacteria
- E) Fungi

Answer: C

Skill: Application/Analysis

Module: 1.2

24) Resources are _____.

- A) finite
- B) available in ample quantities
- C) infinite
- D) used at a slow rate so that they will last forever
- E) available in sufficient quantities to sustain all of our futures

Answer: A

Skill: Knowledge/Comprehension

Module: 1.3

25) What is required to be considered sustainable use of resources?

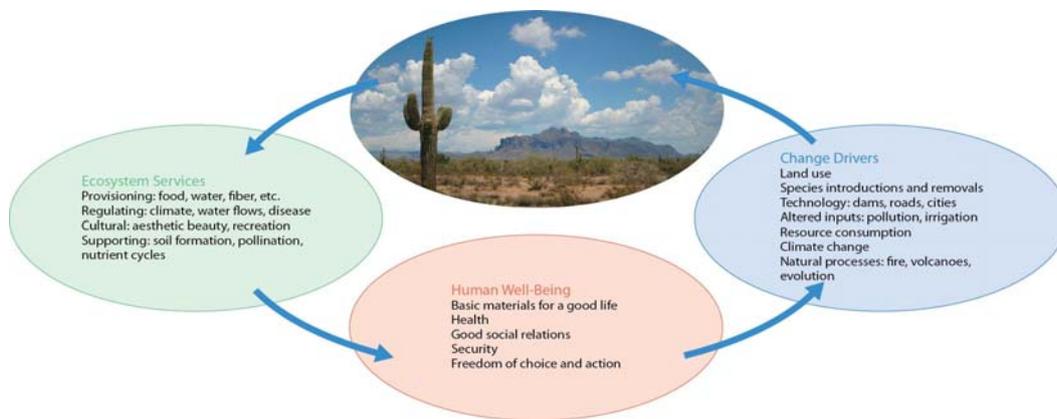
- A) Understanding the rate of exhaustion and the ability to manage the rate of the use
- B) Understanding the rate of renewal and the ability to manage the rate of the use
- C) Understanding that resources are finite
- D) Understanding that resources are infinite
- E) Understanding ecosystem function in relation to resource use

Answer: B

Skill: Knowledge/Comprehension

Module: 1.4

1.2 Graph and Figure Questions



1) What are examples of provisioning ecosystem services ?

- A) Climate, water flow, and disease
- B) Aesthetic beauty and recreation
- C) Soil formation and nutrient cycles
- D) Food, water, and fiber
- E) Pollination and chlorophyll

Answer: D

Skill: Application/Analysis

Module: 1.2

2) What are examples of regulating ecosystem services?

- A) Climate, water flow and disease
- B) Aesthetic beauty and recreation
- C) Soil formation and nutrient cycles
- D) Food, water and fiber
- E) Pollination and chlorophyll

Answer: A

Skill: Application/Analysis

Module: 1.2

3) Which of the following is an example of positive feedback?

- A) A change in body temperature causing you to develop a fever that fights off a disease
- B) World population growth with a changing birth rate
- C) A household thermostat
- D) Soil erosion resulting from deforestation nuclear chain reaction
- E) Decrease in ocean temperatures that cause less melting of ice bergs

Answer: D

Skill: Synthesis/Evaluation

Module: 1.3

4) A *cultural* ecosystem service might be _____.

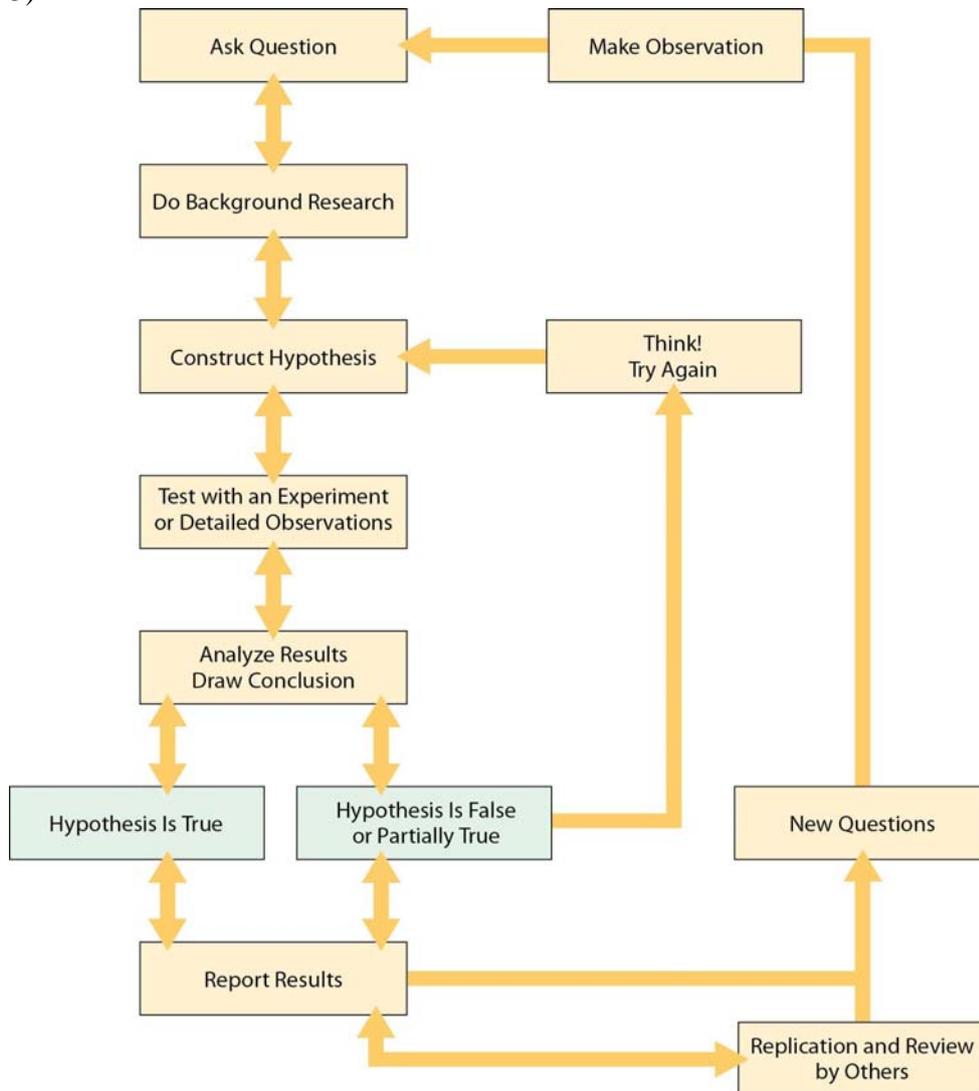
- A) providing food to the malnourished
- B) the beauty or inspiration provided by a forest
- C) ensuring flow of traffic in and out of a city
- D) constructing a "green" building
- E) good health access for populations in a community

Answer: B

Skill: Application/Analysis

Module: 1.2

5)



What is an *essential* characteristic of the scientific method?

- A) Questions are asked in an unbiased way such that new information always results.
- B) Accurate questions limit hypotheses from being generated.
- C) Scientific observations always support the questions asked.
- D) The questions asked are designed to always prove the hypothesis incorrect.
- E) Uncertainty of the question becomes an absolute certainty after using the method the hypotheses formulated is always testable by careful observation and/or experiment.

Answer: E

Skill: Synthesis/Evaluation

Module: 1.5

1.3 Matching Questions

1) *Match each term with the correct description.*

- | | |
|---------------------------|------------------------------------------------------------------------------|
| I. Ecosystem services | A. Basic ecosystem processes that are needed to maintain other services |
| II. Provisioning services | B. The multitude of resources that ecosystems supply to humans |
| III. Regulating services | C. Food, water and air we breathe |
| IV. Cultural services | D. Spiritual and recreational benefits that an ecosystem provides |
| V. Supporting services | E. Ecosystem control of climate, flows of water and absorption of pollutants |

Answer: I. B, II. C, III. E, IV. A, V. D

Skill: Knowledge/Comprehension

Module: 1.2

1.4 Scenario Questions

Read the scenario and answer the accompanying questions.

Sustainable management requires us to examine the "big picture" of an ecosystem's context, even though we may not understand every piece and process in that ecosystem. Systems thinking recognizes and addresses the essential connections between the pieces of any system to be analyzed.

1) Which of the following environmental examples represents systems thinking?

- A) Emission control devices on California automobiles
- B) Undertaking a long-term study of Lake Michigan ecology
- C) Examining the beetle life cycle that is posing a threat to local forests
- D) Studying the behavior of a global invasive species
- E) Planting grass for cattle to feed on in desert regions

Answer: B

Skill: Application/Analysis

Module: 1.5

2) Ecosystem services are often classified into 4 *different* categories that include provisioning services (supplying us with food, air, and water), as well as _____.

- A) aesthetic, cultural, and sustainable services
- B) aesthetic, ecological, and regulating services
- C) regulating, sustainable, and homeostatic services
- D) regulating, cultural, and supporting services
- E) aesthetic, spiritual, and recreational services.

Answer: D

Skill: Application/Analysis

Module: 1.2

1.5 Essay Questions

1) Assuming that a city wishes to manage its water supply in a sustainable manner. describe/explain two specific factors that must be considered in order to accomplish this.

Answer: To be sustainable, actions must conform to the laws of mass and energy conservation. This is, something cannot be created from nothing, and everything goes somewhere. In order to manage a municipal water supply sustainably, one must understand the *rate of renewal* of the water source (is the source a mountain snowfield, constantly renewed, or is the source a more finite groundwater aquifer?). Secondly, one must have the ability and take the initiative to manage the *rate of use* of this water supply, based on changes in the area's population growth, also factoring in any new demands for this water supply with time (new land uses evolving, such as increased levels of agriculture).

Skill: Synthesis/Evaluation

Module: 1.4

2) In the course of one day, a human experiences several dozen ecosystem services other than the essential provisioning services supplying us with food, water, and the air we breathe. Explain three additional ecosystem services that are essential to maintaining life on Earth.

Answer: One might begin with a focus on the ecosystem services that regulate climate (solar energy budget), the flow of water through ecosystems (water cycle), or the absorption of pollutants (microbial decomposition and the essential recycling of matter). One could also describe the basic ecosystem processes such as any of the nutrient cycles (N cycle, which provides the critical N-compounds to plants that humans consume in order to build their essential N-containing compounds of DNA/RNA, enzymes, and proteins). The carbon cycle, moving O₂ and CO₂ through the ecosystem via the processes of photosynthesis and cellular respiration could also be described.

Skill: Application/Analysis

Module: 1.0