CHAPTER 1

Humans and the Geologic environment

# Chapter Outline

Introduction

What is Geology?

Scientific Inquiry

How Science Operates

Science and Society

Environmental Geology

Environmental Problems and Time Scales

Geologic Time

Environmental Risk and Human Reaction

Earth as a System

The Earth and Human Population

Population Growth

Limits to Growth

Sustainability

Ecological Footprint

Environmentalism

**Box Readings:**

*Case Study 1.1: Collapse of a Society Living Unsustainably*

# Student Learning Outcomes

1. Describe the major focus of the discipline called environmental geology.

2. Characterize how scientists develop hypotheses and theories as a means of understanding the natural world.

3. Describe the concept of geologic time and how the geologic time scale was constructed.

4. Explain how geologic time and the rate at which natural processes operate affects how humans respond to environmental issues.

5. Describe how Earth operates as a system and why humans are an integral part of the system.

6. Explain the concept of exponential population growth and how it relates to geologic hazards and resource depletion.

7. Define the concept of sustainability in terms of the living standard of developed nations and also in terms of the human impact on the biosphere.

**Chapter Summary**

This chapter introduces geology as the scientific study of the solid earth and environmental geology as the subset of geology that deals with the study of how humans interact with the geologic environment, especially with regard to geologic resources and hazards. To acquaint students with science and the process of scientific inquiry, the scientific method is described along with the terms hypothesis, scientific theory, and scientific law.

The vastness of geologic time and the interconnectedness of Earth’s systems are emphasized as a basis for understanding how natural geologic processes and human-induced environmental change can have long-term and wide-spread implications for the many interconnected systems within the environment upon which we depend. Exponential population growth has exacerbated problems associated with geologic hazards and resource consumption as exponentially greater demands are placed on Earth’s limited resources. Humanity’s current ecological footprint is not sustainable. Population stabilization and conservation of resources are necessary for humans to live sustainably.

A boxed essay uses Easter Island as a case study to examine unsustainable living and its consequences.

**Contemporary Topics for Discussion**

* What role do you feel science plays in society today? Do you support this role? How would you like to see this role change?
* How do true science and junk science impact politics and society? How profound is this impact?
* What can be learned from the Easter Island example provided in this chapter? How does this apply to us today?
* What do you think about the human population growth trend? What could or should be done to remedy the environmental problems associated with such a large human population?

**Additional Student Activities**

* Junk science, which is discussed briefly in this chapter, has become prolific in society today. Find an example of junk science. How could you distinguish this from true science? Now, briefly research the true science behind this topic. Compare and contrast the information and conclusions provided by junk science and true science. How does your opinion on this topic change based on the two sources of information? What societal ramifications, if any, are there to presenting junk science to the public?
* In this chapter, you learned that Earth has many interconnected systems. Find an example of how a change in one system has implications for other Earth systems.
* Explore the Global Footprint Network page: http://www.footprintnetwork.org. What is your ecological footprint? What could you do to reduce your footprint? Will you make any of these changes? Why or why not?