Chapters 1 and 2: The State of our Earth & Environmental Systems
Reading Guide

Vocabulary

Learn the definition of each term. The **bold** words require you to know more than just the definition. For example, ecosystem service: you should know what they are, be able to name several types and describe how we benefit from those services.

System
Ecosystem
Biotic
Abiotic
Ecosystem Services
Environmental Indicators
Sustainability
Biodiversity
Genetic Diversity
Species Diversity
Ecosystem Diversity
Speciation
Background Extinction Rate
Greenhouse Gases
Anthropogenic
Sustainable Development
Ecological Footprint

Scientific Method
Hypothesis
Null Hypothesis
Replication
Sample Size
Accuracy
Precision
Uncertainty
Inductive Reasoning
Deductive Reasoning
Theory
Natural Law
Control Group
Natural Experiment
Environmental Justice
Isotopes
Radioactive Decay

Half-Life
pH
Law of Conservation of Matter
Potential Energy
Kinetic Energy
Chemical Energy
1st Law of thermodynamics
2nd Law of thermodynamics
Energy Efficiency
Energy Quality
Open System
Closed System
System Analysis
Steady State
Negative Feedback Loops
Positive Feedback Loops
Adaptive Management Plan

Reading Outline-Chapter 1

The Mysterious Neuse River Fish Killer

1. **What is Pfiesteria?**

2. **What does Pfiesteria do to humans? Fish?**

3. **What triggers Pfiesteria change from a harmless algae feeder to a toxin producing fish killer?**

4. **What are three different lessons we can learn from the Neuse River Mystery?**

1.1 Environmental science offers important insights into our world

5. **Explain how the Neuse River is part of a larger system.**

6. **Fill in the chart below to learn about biotic and abiotic factors**

Factor	Abiotic (A) or Biotic (B)	If abiotic, describe one biotic factor that is influenced by or impacted by the factor	If biotic, describe one abiotic factor that is influenced by or impacted by the factor
Sunlight			
Bacteria			

Water temperature			
Trees			
Soil nutrients			

1.2 Humans alter natural systems

7. **How does new technology generally impact resource use?**

8. **Who uses more resources per capita: a child born in Los Angeles or a child born in rural India? Why?**

1.3 Scientists monitor natural systems for signs of stress

9. **Fill out the following chart about the five global environmental indicators outlined in Table 1.2 and pages 5-11**

Indicator	Increasing, decreasing or staying the same right now?	To achieve sustainability, does it need to increase, decrease or stay the same in the future?	Why should you (personally) care about this indicator?	How does this indicator connect to ONE other indicator?
Biological Diversity				
Food production				
Average Global Temperature and [CO_2]				
Human Population				
Resource depletion				

1.4 Human well-being depends on sustainable practices

10. **What happened on Easter Island and what should we learn from their mistakes?**

11. **Pick a resource that you use on a daily basis (food, gasoline, paper, whatever you want) and describe how that resource could be used sustainably and unsustainably.**

12. **List 10 things you NEED in order to survive and be a happy, well adjusted human being.**

13. **Go to http://www.myfootprint.org/ and determine your ecological footprint. Record the following information at the end:**

a. **How many earths would we need if everyone lived like you**:
b. **Global acres required to support you**:

1.5 Science is a Process

14. **Describe how you use the scientific process to investigate the following two situations. Be sure to include**
    a. **You like to eat french fries, but only on Fridays. However, the commons is almost always sold out of french fries, but only on Fridays.**

    b. **There are fewer roly polies around the science building than over by the ceramics studio.**

1.6 Environmental science presents unique challenges

15. **Why is it more difficult to study environmental science that other science disciplines such as biology and chemistry?**

16. **What is environmental justice and why should you care about it?**

Additional Work:

Answer all the MC questions and FRQ #1 at the end of Ch 1.

Reading Outline-Chapter 2

A Lake of Salt Water, Dust Storms, and Endangered Species

1. **In class activity.**

2.1 Earth is a single interconnected system

2. **Using the fisheries of the North Atlantic as an example, come up with a list of ten systems within the larger system that is Westridge. Five should be whole school systems and five should be smaller systems.**

3. **Make a list of 5 environmental systems.**

2.2 All environmental systems consist of matter

4. **What is radioactive decay and why would we study it in environmental science? (see if you can come up with more than one reason)**

5. **What is a half life and why would we study it in environmental science?**

6. **How does carbon dating work?**

7. **Water has four important properties that help it support life on earth. List the four properties and define any that you are not familiar with.**

8. **The pH scale is logarithmic. How much more basic is something with a pH of 10 than something with a pH of 7?**

2.3 Energy is a fundamental component of environmental systems

9. **What is energy? Name three types of energy.**

10. **For each situation below, state whether the 1st or 2nd law of thermodynamics applies**
    a. **In a car, only some of the energy from the gasoline is used to propel the car. The rest is lost as heat.**
    b. **Nothing can ever be 100% efficient in terms of converting energy to work.**
    c. **When you walk up a hill you gain the same amount of energy you will lose as you walk down.**
    d. **Your computer, TV, and refrigerator all need a fan to keep from overheating.**
    e. **There is no such thing as perpetual motion.**

11. **What is the difference between energy efficiency and energy quality?**

2.4 Energy conversions underlie all ecological processes

12. **Why are there very few plants near the poles? On the bottom of the ocean?**

2.5 Systems analysis shows how matter and energy flow in the environment

13. **What is the difference between an open and a closed system? Give an example of each.**

14. **Feedback loops (VERY IMPORTANT). Label the following as a positive or negative feedback loop:**
    a. **The baby boom resulted in lots of children which meant the US population grew. Those children grew up and had more babies making the population continue to grow -**
    b. **Cole takes a nap and gets a sticker when he gets up (yay stickers!) so the next day he takes a nap so that he will get another sticker -**
    c. **Cole does not take a nap and has to go to bed 1 hour earlier meaning he misses out on taking a walk, so the next day he takes a nap so he can stay up for the walk –**
    d. **Cole throws a temper tantrum, which means that Mommy stops doing whatever she is doing and he gets to sit in Mommy's lap and "talk" about what he did wrong and then Daddy "talks" to him about it later that night, so he keeps throwing temper tantrums so he can have Mommy and Daddy's undivided attention -**
    e. **Air conditioner and thermostat –**
    f. **Compounding interest –**

15. **Positive and negative just indicate the direction of change (positive = keeps going in the same direction, negative = a change in direction). We use the words constructive and destructive to indicate whether or not the feedback loop is good (constructive) or bad (destructive). Give an example of a constructive negative feedback loop and a destructive positive feedback loop (you can make it up or use one of the above)**

Additional Work:
Answer all the MC questions and FRQ #1 at the end of Ch 2.