### Chapter 8 – Earth 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 what they are, be able to name several types and describe how we benefit from those services.

Core

Mantle

Asthenosphere

Lithosphere

Crust

Hot spots

Plate Tectonics

Oceanic Plates

Continental Plats

Seafloor spreading

Subduction

Divergent boundary

Convergent boundary

Transform boundary

Fault zones

**Earthquake**

Epicenter

Ring of Fire

Richter scale

Minerals

**Rock cycle**

Igneous rocks

Sedimentary rocks

Metamorphic rocks

Physical weathering

Chemical weathering

Erosion

Deposition

Ores

Metals

Known reserves

**Strip mining**

**Tailings**

**Open-pit mining**

**Subsurface mining**

Mining spoils (tailings)

**Mountaintop removal**

Mining Law of 1872

Surface Mining Control and Reclamation Act of 1977

Smelting

Gangue

Area strip mining

Contour strip mining

Acid Mine Drainage

**Reading Outline**

**Are Hybrid Electric Vehicles as Environmentally Friendly as We Think?**

1. List the environmental pros and cons of hybrid cars.

**8.1 The availability of Earth’s resources was determined when the planet formed**

1. Fill in the chart below for the layers of the earth. Do your best given that several of the layers overlap.

|  |  |  |  |
| --- | --- | --- | --- |
| **Layer** | **State (solid, liquid, etc)** | **Made of** | **Order (from outside to inside)** |
| Asthenosphere |  |  |  |
| Crust |  |  |  |
| Inner core |  |  |  |
| Lithosphere |  |  |  |
| Mantle |  |  |  |
| Outer Core |  |  |  |

**8.2 Earth is dynamic and constantly changing**

1. Fill in the chart below for the different geologic features on earth

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Feature** | **Image** | **Results in** | **Where found?** | **Example** |
| Hot Spot | [https://encrypted-tbn2.gstatic.com/images?q=tbn:ANd9GcTqBd-9Njh0L-wtW5itb5J52IM9yLHHHKHhQJ6smJdvTI2L_aJpnQ](http://www.google.com/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&docid=wRae1LLq5_8L1M&tbnid=79qWqGIfdgVsaM:&ved=0CAUQjRw&url=http://zebu.uoregon.edu/disted/ph121/l13.html&ei=oeCgUr6OGtjYoASI9YKoDw&bvm=bv.57155469,d.cGU&psig=AFQjCNFJuOVYToqW9fQ33u3UXuFSb755AQ&ust=1386361357782351)  [http://abyss.uoregon.edu/ ~js/images/hotspot.gif](http://abyss.uoregon.edu/%20~js/images/hotspot.gif) | Volcanoes | In the middle of plates | Hawaiian Islands |
| Sea Floor Spreading |  |  |  |  |
| Subduction |  |  |  |  |
| Volcano |  |  |  |  |
| Divergent Plate boundary |  |  |  |  |
| Convergent plate boundary |  |  |  |  |
| Transform fault boundary |  |  |  |  |

1. What are the differences between oceanic and continental plates?
2. What environmental impacts do earthquakes cause? How can we protect humans during and after an earthquake?
3. What environmental impacts do volcanoes cause? How can we protect humans during and after a volcano?

**8.3 The Rock Cycle**

1. Go to <http://www.learner.org/interactives/rockcycle/change.html> and complete the Rock Cycle Tutorial. Explain how each type of rock and can change into another type.

**8.4 Uneven distribution of mineral resources**

1. What three elements (IN ORDER) make up the Earth’s crust?

**8.5 Types of Mining**

1. Mining Methods Fill out the following chart on mining methods. You might like the following videos in addition to your textbook.

* Surface Mining: <http://www.youtube.com/watch?v=2LQwxTm94Ps>
* Subsurface Mining: <http://www.youtube.com/watch?v=Bk-jrbCi7Sc&feature=related>
* Area Strip Mining: <http://www.hippocampus.org/AP%20Environmental%20Science>
* Open Pit Mining: <http://www.hippocampus.org/AP%20Environmental%20Science>
* Mountain Top Removal: <http://www.youtube.com/watch?v=9Z0RzDEPF6E>
* Ore Processing: <http://www.hippocampus.org/AP%20Environmental%20Science>

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Mining** | **Type**  **(surface, subsurface, underwater)** | **Used to mine for:** | **Description** | **Environmental Impacts** |
| Dredging |  |  |  |  |
| Area Strip Mining |  |  |  |  |
| Contour Strip mining |  |  |  |  |
| Open pit mining |  |  |  |  |
| Underground coal mining |  |  |  |  |
| Mountain Top Removal |  |  |  |  |

1. What three elements (IN ORDER) make up the Earth’s crust?
2. What do the Mining Law of 1872 and the Surface Mining Control and Reclamation Act of 1977 do?
3. What are the basic steps in reclaiming a mining site?

Additional Work:

Answer the MC questions at the end of the chapter and review the FRQs.

### Chapter 9 – Water Resources

### Reading Guide

**Vocabulary**

Learn the definition of each term. The *italicized* words are not necessarily in the textbook (Check the lecture). The **bold** words require you to know more than just the definition. For example: Ecosystem service - you should what they are, be able to name several types and describe how we benefit from those services.

**Aquifer**

*Watershed*

Unconfined aquifer

Confined aquifer

Artesian Well

**Water table**

Recharge zone

**Cone of Depression**

**Salt water intrusion**

***Subsidence***

Floodplain

Oligotrophic lake

Mesotrophic lake

Eutrophic lake

Impermeable surfaces

**Levee**

Dike

**Dam**

Reservoir

Fish ladder

**Aqueduct**

**Desalination**

Distillation

Reverse osmosis

**Furrow irrigation**

**Flood irrigation**

**Spray irrigation**

**Drip irrigation**

Hydroponics

**Gray water**

*Tiered water pricing system*

*Xeriscaping*

**Disasters**

Aral Sea

Three Gorges Dam

Ogallala Aquifer

James Bay Project

CA water project

Colorado River

Aswan Da

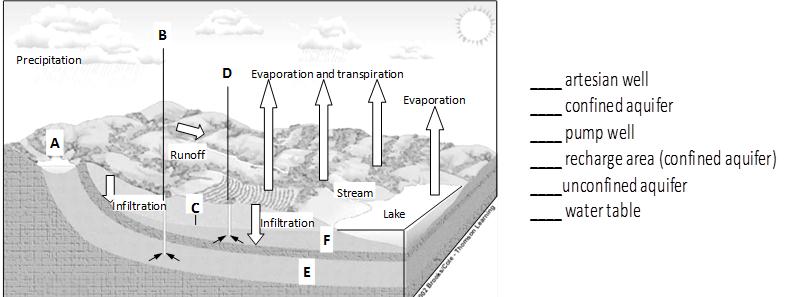
**Reading Outline**

**Dams and Salmon on the Klamath River**

1. What caused the drop in Salmon populations in the Klamath River?
2. Who are the major interest groups competing over the Klamath River, and what does each one want?
3. How was the conflict over Salmon and water in the Klamath River resolved?

**10.1 Water is abundant, but usable water is rare**

1. Label the diagram below by matching the letters to the terms



1. Why are unconfined aquifers more likely to be contaminated than confined aquifers? Why are confined aquifers more likely to be depleted than unconfined aquifers?
2. Describe two negative effects of overpumping groundwater.
3. How can lakes form? Give a few examples.
4. Eutrophication is a natural aging process for lakes, but when humans cause it, it is called cultural eutrophication. What are the differences between natural eutrophication and cultural eutrophication?
5. Match the name to each description. Choices: oligotrophic lake, mesotrophic lake, eutrophic lake
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - Highly productive ecosystem with high levels of organic matter, murky water and thick mud on the bottom. Oxygen levels may be depleted and desirable fish populations are often low.
7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - A deep lake with clear water that has low productivity, little organic matter and high oxygen levels. Desirable fish populations are usually abundant and the lake is visually attractive.
8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - A productive ecosystem that has some organic matter, medium nutrient levels and somewhat clear water. A thick layer of decomposing organic matter is forming on the bottom of the lake and plants may be growing in the shallow zones near the lake boundaries. On particularly hot sunny days, oxygen levels may drop, but in general the lake has the oxygen to support desirable fish populations.
9. List the negative impacts of a drought.
10. Describe some ways that humans contribute to droughts.

1. How do humans contribute to flooding?

**9.2 Humans can alter the availability of water**

1. Fill in the chart below for ways humans alter waterways.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Engineered Structure** | **Description** | **Purpose** | **Benefits** | **Drawbacks** |
| Levee |  |  |  |  |
| Dike |  |  |  |  |
| Dam |  |  |  |  |
| Aqueduct |  |  |  |  |

1. Summarize each of the following water related case studies. Include what happened, where and why, the environmental impacts and any human health or economic impacts.
   1. Hurricane Katrina and the New Orleans Levees
   2. Three Gorges Dam
   3. Aral Sea Disaster
   4. Ogallala aquifer

1. What is desalination or desalinization? Describe both processes: distillation and reverse osmosis.

**9.3 Water is used by humans for agriculture, industry and household needs**

1. Worldwide, list the three top uses of water, in order including percentages.
2. Put the 4 irrigation techniques in order from most efficient to least efficient.
3. How does hydroponic agriculture works? What are the benefits and drawbacks?
4. Describe 3 different ways industry uses water.

1. What three household activities have the largest impact of water consumption in the United States?
2. In the US, we rarely think about our drinking water. Why would someone in a less developed country think about drinking water on a daily basis?

**9.4 The future of water availability depends on many factors**

1. Water ownership is complicated.
   1. Why is it harder to determine ownership of water than for many other resources?
   2. Briefly describe 3 water conflicts (from this chapter or previous units).
   3. How do economists suggest that we resolve these conflicts?
2. What methods have wealthier, developed countries made to conserve water? Describe one option for each of the following activities:
   1. toilet flushing -
   2. bathing -
   3. laundry -
   4. outdoor usage -
   5. industry -
   6. runoff -
3. How do recent trends in global water consumption compare with recent trends in US water consumption? Given these trends, what do you think will happen to global water use in the near future?
4. What is grey water? What can it be used for? Are there any concerns about re-using grey water?
5. What kinds of household water would not be reusable without treatment?

Additional Work: Answer the **MC questions** and **Measuring Your Impact** at the end of the chapter.