

Botkin & Keller- *Earth as a Living Planet*: 8th Edition

Guided Reading Assignment

**Chapter #11- Agriculture, Aquaculture and the Environment**

Name: \_\_\_\_\_

**Case Study: Biofuels and Banana Chips: Food Crops vs. Fuel Crops**

1: Why do pig farmers have to feed their pigs “*junk-food*”?

**Agroecosystems:**

2: Explain how agroecosystems halt ecological succession.

3: What is the problem with growing “*monocultures*”?

4: *Why* does growing plants in neat rows and fields make it easier for pests?

5: How does plowing fields over and over damage the soils? **Explain.**

6: What are the other 2 ways that agrocultures are harmful to ecosystems?

**The Plow Puzzle**

7: How much of the top soil in the U.S. has been lost since European settlement?

**Can We Feed the World?**

8: What percentage of the world’s land area is used for agriculture?

## **How We Starve**

9: What is the difference between *undernourishment* and *malnourishment*?

10: Why does providing food aid to countries in need actually work against increased availability of locally grown food?

## **What We Grow on the Land**

11: Most of the world's food is produced by only \_\_\_\_\_ species. List them below in order of importance:

12: What is a *forage* crop?

13: Define the following:

**Rangeland:**

**Pasture:**

14: *What impact* does the number of livestock around the world have on rangeland and pasturelands?

15: Why are **feedlots** considered to be a big source of local pollution?

16: What is a benefit of farming animals rather than crops?

## **Soils**

17: How does rainwater affect the soil horizon? **Explain.**

18: What is *soil fertility*? How it is determined?

19: Why are soils in humid and tropical areas considered to be poor? *What happens to them after deforestation?*

20: What is the problem with soils in *semi-arid regions*?

21: Why are *coarse-grained soils* more susceptible to erosion than soils that contain more clay?

22: **Soil Horizons:** *Define each of the soil horizons*

**Horizon O:**

**Horizon A:**

**Horizon E:**

**Horizon B:**

**Horizon C:**

**Horizon R:**

## **Restoring Our Soils**

23: What is the difference between organic and inorganic (artificial) fertilizers?

24: *Define the following:*

**Macronutrient:**

**Micronutrient:**

**Limiting Factor:**

**Controlling Pests**

25: In the U.S, how much of the potential harvest is lost to pests?

26: What is the definition of a *weed*?

**Pesticides**

27: What are the differences between *inorganic and organic pesticides*?

28: What are some of the reasons why pesticides are considered to be ineffective?

29: Define **Integrated Pest Management (IPM)** AND *explain* HOW it works:

30: What is the use of **biological control** and *give an example*:

31: What was the "*green revolution*"?

## **Genetically Modified Food: Biotechnology, Farming and Environment**

32: What are the *3 practices* of genetic engineering?

33: What are the PROS and CONS of developing **hybrid crops**?

34: What is the **terminator gene** and *what does it do*?

35: What are the political and social concern with companies using seeds with terminator genes?

36: How are **GMO (Genetically Modified Organisms)** helpful?

37: How can GMO's be *harmful*?

### **Aquaculture**

38: What is **aquaculture** and how can it be *helpful*?

39: What is **mariculture**?

40: How can aquaculture and mariculture harmful to the environment?

***Critical Thinking Issue: Will There Be Enough Water to Produce Food for a Growing Population?***

1: How might *dietary changes* in developed countries affect water availability?

2: How might *global warming* affect estimates of the amount of water needed to grow crops in the 21st century?

3: Withdrawing water from aquifers faster than the replacement rate is sometimes referred to as "*mining water*". Why do you think this term is used?

4: Many countries in warm areas of the world are unable to raise enough food, such as wheat, to supply their populations. Consequently, they import wheat and other grains. *How is this equivalent to importing water?*

5: **Malthusians** are those who believe that sooner or later, unless population growth is checked, there will not be enough food for the world's people. **Anti-Malthusians** believe that technology will save the human race from a Malthusian fate. **Analyze the issue of water supply for agriculture from both points of view.**

**Interactive Soil Pyramid- Understand How to Calculate the Soil Composition Type**  
go to: <http://courses.soil.ncsu.edu/resources/physics/texture/soiltexture.swf>

**Understand and Using Soil Pyramids**

go to: <http://soils.usda.gov/technical/aids/investigations/texture/>

**Directions:** *Using the Soil Pyramid Program- Identify the Type of Soil with the Following Percent Compositions:*

Sand: 30

Clay: 30

Silt: 40

**Answer:** \_\_\_\_\_

Sand: 45

Clay: 10

Silt: 45

**Answer:** \_\_\_\_\_

**Understand Soils in Biomes Around the World**

*Go to:* <https://php.radford.edu/~swoodwar/biomes/>

**Directions:** **Determine the Type of Soils that are Characteristics of Each Specific of These Terrestrial Biomes and List Why?**

**Tundra:**

**Taiga (Boreal Forest):**

**Temperate Broadleaf Deciduous:**

**Mediterranean Scrub:**

**Temperate Grassland:**

**Scrubland:**

**Tropical Rainforest:**

**Tropical Savannah:**

**Control of Soil Erosion-** go to: <http://www2.kenyon.edu/projects/farmschool/types/tillage.htm>

**Directions:** *Define and describe each of the alternative methods to traditional soil tillage*

**Windbreaks:**

**Cover Crops:**

**Grassed Waterways:**

**Contour Cultivation:**

**Strip Cropping:**

**Forages:**

**Conservation Tillage:**

**No-Till:**

**Ridge Tillage:**