World Geography 3202
Unit 3 Ecosystems: Chapter 6 (p92-107)

Due: KEY Bonus dates:

Note: This is how chapter 6 will be covered. When returned, we will discuss it for 2 classes and move on to chapter 7. THIS IS YOUR NOTES!

INTRODUCTION (p92-94)

1. Match the following terms by putting the correct letter in the second column.

a) Consumers	1. G	1. Organic life forms which use the sun's energy to turn oxygen into carbon dioxide and in turn make its own food.
b) Decomposers	2. A	2. Animals which eat other plants or animals to get the energy they need to survive.
c) Ecosystem	3. B	3. These organisms live in water or soil and breakdown waste product or dead tissue in to basic chemical compounds. A recycling system. Eg bacteria, fungi etc
d) food chain	4. f	4. Herbivores or first level consumer. They can only eat plants for energy.
e) food web	5. d	5. A link between organisms of different levels to pass on energy. (5 levels)
f) Primary consumers	6. E	6. A series of overlapping and interconnected food chains.
g) Producers	7. C	7. A community of plants and animals within a particular physical environment.

2. Explain the difference between a food chain & a food web?

FOOD CHAIN
- A SERIES OF RELATIONSHIPS THAT FEATURE THE TRANSFER OF ENERGY FROM ONE ORGANISM TO ANOTHER AS THESE ORGANISMS CONSUME ONE ANOTHER.
- 4 OR 5 LINKS

FOOD WEB:
- A NUMBER OF INTERLINKING FOOD CHAINS.
- MORE REALISTIC THAN FOOD CHAINS AS ANIMALS GET FOOD FROM MANY SOURCES.

3. Referring to figure 6.3 on page 94, give an example of a 4 link food chain.

- ANSWER VARY (EG) PLANKTON, MINNOWS, CARP, HAWK

Food Chains and pyramids (p94-97)

4. Describe the following concepts

a) food pyramid

- A DIAGRAM USED TO REPRESENT THE FLOW OF ENERGY IN FOOD CHAINS & WEBS
- SHOWS THE NUMBER OF ORGANISMS & AMOUNT OF ENERGY AVAILABLE AT EACH LEVEL WHICH DECREASES UP THE PYRAMID
- DECREASING AMOUNT OF ENERGY AVAILABLE AT EACH NEW LEVEL

b) trophic level

- EACH LEVEL REPRESENTS ORGANISMS AT SAME LEVEL
  - FIRST LEVEL PRODUCERS
  - SECOND LEVEL PRIMARY CONSUMERS
  - THIRD LEVEL SECONDARY CONSUMERS ETC
- ANIMAL SIZE INCREASES UP THE PYRAMID BUT THERE ARE FEWER CREATURES
- ONLY 10% OF ONE LAYER'S ENERGY IS AVAILABLE TO THE CREATURES IN THE NEXT LEVEL
- DECOMPOSERS ENTER AT EACH LEVEL

5. At each level of the food chain, energy flows in 3 directions. (p94)

1. LOST IN HEAT

2. * USED UP IN PLANT MAINTENANCE OF LIFE'S PROCESSES
   * ENERGY FLOWS TO DECOMPOSERS IF PLANT DIES WITHOUT BEING EATEN

3. 10-15% IS STORED AS FOOD ENERGY TO BE PASSED ON TO THE HERBIVORES

6. All of the following statements about food pyramids are false. Cross out the word or words which make it incorrect and replace it with the correct words.

1. ~~All~~ 10-15% of the energy in a plant flows to the herbivore upon consumption of the plant.
2. The pyramid shape means that the energy available steadily ~~increases~~ decreases at each new level.
3. ~~Many~~ few carnivores can be supported at the top of the pyramid.
4. The ~~first~~ top consumers in the pyramid obtain the least energy.
5. There are fewer organisms at each trophic level because the amount of energy ~~increases~~ decreases at each new level of a food pyramid.

7. Answer the following based on what you learned so far in this section.

a) Why can people gain more energy by using plants for food than eating animals further up the food chain?

- BECAUSE ENERGY IS LOST WITH EACH LEVEL
- IF WE EAT PLANTS WE GET THE BENEFIT OF MORE ENERGY AS THEY ARE AT THE LOWEST TROPHIC LEVEL

b) If our main concern should be feeding a growing world population, why is growing wheat for humans better than growing hay for cattle?

- MORE FOOD ENERGY CAN BE SUPPLIED TO PEOPLE BY USING LAND TO GROW EDIBLE CROPS THAN IN RAISING CROPS FOR ANIMAL FEED.

TOXINS IN THE FOOD CHAIN (p97-100)

8. *Circle the correct word from the pairs which make this paragraph make sense.*

There is an unfortunate consequence to the food pyramid. Toxins introduced at the ____ (low/high) trophic levels will build up through the food chain and when _____(lower/higher) order consumers eat organisms with toxins in their tissues, they receive _____ (lower/higher) concentrations of toxins than the lower level organisms did. When DDT was used as a _____(fertilizer/pesticide), many carnivores showed signs of _____(decline/growth). Many died, while others had serious _____ (circulatory/reproductive) problems. For example, eggs of peregrine falcon developed _____ (thin/spotted) shells & broke before hatching.

9. Define Biological Amplification

- An increase in the concentration of a toxins along a food-chain, in extreme cases leading to health and environmental problems

10. What are 2 reasons why toxins exist in higher concentrations in higher order consumers?

1.

- TOXIC CHEMICALS ARE FAT SOLUBLE
- THEY COLLECT & REMAIN IN ANIMAL FAT TISSUES
- DO NOT GET FLUSHED OUT IN WASTE WATER

2.

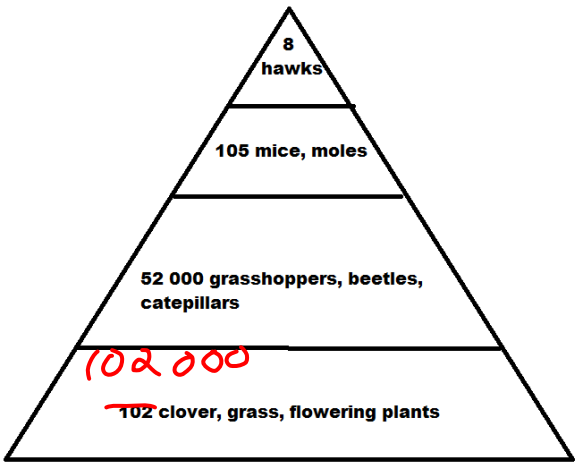
- THE HIGHER UP THE FOOD CHAIN, THE MORE ORGANISMS FROM THE LOWER LEVELS AN ANIMAL HAS TO EAT TO GET ALL THE FOOD ENERGY IT NEEDS.
- LOWER TROPHIC ANIMALS MAY NOT HAVE ENOUGH TOXINS STORED IN ITS BODY TO HURT IT BUT
- IF A CONSUMER EATS A LOT OF THEM, THE CHEMICALS ADD UP TO TOXIC LEVELS

11. What impact does having higher concentrations of toxins have for humans? Refer to DDT & mercury on page 97.

- HURTS HUMANS AS WE ARE AT THE TOP OF THE FOOD PYRAMID
- WE GET THE BIGGEST CONCENTRATION OF TOXINS
- DDT SHOWED UP IN BREAST MILK IN THE 1970'S
- MERCURY POISONING IN JAPAN 1960'S; WASTE MERCURY DUMPED IN THE BAY BY A CHEMICAL FACTORY

12. Answer question 14 (page 98) in this space.

a)



b)

- A FIRE WOULD DESTROY THE GRASSES ON WHICH THE INSECTS LIVE. THEY WOULD BE KILLED,
- THE MICE WOULD STARVE AND DECLINE.
- THE HAWKS FOOD SOURCE REDUCED & THEY DECLINE.
- ALL POPULATIONS WOULD FALL.

c)

- POLLUTANTS WOULD BE CONCENTRATED AT EACH LEVEL AND REACH TOXIC LEVELS FURTHER UP THE PYRAMID.
- IF THE POLLUTANTS ARE INTRODUCED TO EITHER INSECTS OR MICE, THEY MAY DIE DUE TOTHE POISON OR PASS ON THE POISON TO UPPER LEVELS IN THEIR FAT TISSUES.

13. Read the case on pages 99-100 and answer the following questions.

a) What impact do world wind patterns have on the spread of DDT to Northern Canada?

- POLLUTANTS EVAPORATE IN WARMER CLIMATES AND RISE TO LEVELS WHERE THE WIND BLOWS THEM NORTH
- COLDER WEATHER UP NORTH CONDENSES THE POISONS WHICH ENTER THE HYDROLOGIC CYCLE

b) What are some of the chronic problems experienced by people who are exposed to DDT?

- AFFECT IMMUNE & REPRODUCTIVE SYSTEMS
- INDUCE OR PROMOTE CANCERS & TUMORS

c) Are the Aboriginal People able to control the contamination of the Arctic? Why?

- NO, THE POLLUTANT ARE BLOW THERE BY WORLD WIND PATTERNS & NOT PRODUCED THERE.
- CAN'T CONTROL POLLUTANT USE IN OTHER COUNTRIES

d) Why do many countries still use pollutants such as DDT?

- CAN'T AFFORD BETTER ALTERNATIVES
- TOO SUCCESSFUL IN ELIMINATING DISEASES LIKE MALARIA

e) What are some solutions proposed by scientists?

- BANS, PHASE-OUTS, RESTRICTIONS

f) Some countries have reasons for using pollutants like DDT (eg cheap solution, risk is great to human health etc). In your opinion, do these reasons outweigh the risks? Explain.

- WELL SUPPORTED OPINION
- IF POOR AND HAVE MALARIA, THE HUMAN HEALTH COSTS AND PRESSURE ON THE HEALTH CARE SYSTEM IS TOO GREAT TO NOT USE CHEMICAL. THEY MAY HAVE NO OTHER CHOICE UNLESS THE DEVELOPED WORLD IS GOING TO HELP BY FOOTING THE BILL FOR ENVIRONMENTALLY FRIENDLY ALTERNATIVES.

14. **Problems with the spruce bud worm**: Read question 16 on page 98-99 and answer the following questions

a) What do you think was the effect of spraying, which poisoned bees, on the blueberry cultivation in the spray area?

- IF THE BEES DIED, THEY COULD NOT POLLINATE THE FLOWERS WHICH MEANS THE BLUEBERRY BUSHES WILL NOT GROW. LESS FOR COMMERCIAL AND RECREATIONAL PICKERS. LESS FOOD SOURCE FOR OTHER ANIMALS TOO.

b) What effects might spraying have on bird populations and other organisms?

- HIGH LEVELS OF TOXINS MEANS THAT THE BIRDS HAVE HEALTH PROBLEMS AND DO NOT SURVIVE TO REPRODUCE OR INTERFERES WITH THE REPRODUCTION CYCLE AND WITH THE DEVELOPMENT OF YOUNG.
- LOSS OF FOOD SUPPLY
- LOSS OF HABITAT

c) What might happen if the forest was left alone?

- THE NATURAL ECOSYSTEM WOULD TAKE CARE OF ANY INFESTATION THROUGH THE FOOD CHAIN. IE. MORE WORMS SUPPORTS MORE BIRDS AND OTHER INSECTS WHOSE POPULATION EXPLODE WITH A NEW FOOD SOURCE. WILL EVENTUALLY KEEP IT IN CHECK ANYWAY.
- MANY SAID WORMS WOULD KILL THE TREES. HOWEVER, THEY HAVE WORKED IN CHECK FOR THOUSANDS OF YEARS WITHOUT HUMAN INTERFERENCE. NATURE WILL TAKE CARE OF ITS OWN!

d) What concerns would you have if you lived in an area that you had been sprayed for 25 years?

- TOXINS IN HUMANS. EG RISKS OF CANCERS, TUMORS,
- REPRODUCTIVE ISSUES, DEVELOPMENTAL DELAYS AND BIRTH DEFECTS IN BABIES AND CHILDREN
- CONTAMINATED WATER SUPPLY
- CONTAMINATED CROPS/LIVESTOCK ETC

ECOSYSTEMS THROUGHOUT THE WORLD (p101-102)

15. Define climax vegetation and explain why this feature is essential in identifying ecosystems?

- THE DOMINANT PLANT LIFE IN AN ECOSYSTEM FOR MANY YEARS

16. Analyze figure 6.8 on page 102 and answer the following questions

a) What ecosystem is the largest by % of land mass covered? Does this surprise you? Why or why not. What one would you have guessed?

- DESERT, YES. MANY PROBABLY THOUGHT BOREAL FOREST AS IT COVERS A LOT OF NORTHERN CANADA AND RUSSIA

b) What 2 ecosystems are widespread in the high latitudes (eg. Canada, Northern Russia)

1. TUNDRA 2. BOREAL FOREST

c) Name the forest ecosystem in the low latitudes (near the equator).

TROPICAL RAINFOREST

d) What is the predominant ecosystem in South America?

TROPICAL RAINFOREST

e) What 3 continents do NOT experience a tundra ecosystem?

1. SOUTH AMERICA 2. AFRICA 3. AUSTRALIA

f) Name the ecosystem of our province.

BOREAL FOREST

g) What 2 ecosystems dominate Africa?

1. DESERT 2. SAVANNA

h) The temperate grassland (eg Canadian Prairie) would be best for which type of primary economic activity?

FARMING: CROPS OR GRAZING

CLIMATE & ECOSYSTEMS (p102-107)

17. Describe the relationship between climate & ecosystem.

- MAJOR ECOSYSTEMS ARE CLASSIFIED BY THEIR DOMINANT VEGETATION
- THE DOMINANT VEGETATION IS DETERMINED BY CLIMATE
- THEREFORE, MAJOR ECOSYSTEMS ARE PARALLEL WITH CLIMATE ZONES.

18. Examine figure 6.9 (keeping figure 6.8 in mind). Circle the word which makes the sentence make sense.

a) When temperature & precipitation are high, the (boreal/tropical rain) forest ecosystem can be found in the low latitudes.

b) When temperature is high & but precipitation is low, a (desert/tundra) ecosystem exists.

c) A (boreal/tropical/temperate deciduous) forest has the coolest temperatures.

d) The (grasslands/savanna) ecosystem is closest to the tropical rain forest in terms of temperature but receives less rain.

e) The higher the temperature & the lower the precipitation, the (more/less) lush the vegetation will be.

19. Examine figure 6.8 & 6.9 again. Grasslands are in Canada, the United States and in Argentina. Put them in order of the hottest to the coldest. What accounts for this difference?

- ARGENTINA, USA, CANADA
- LATITUDE; TEMPS DROP AS YOU GO TO 90 DEGREES NORTH OR SOUTH

20. Based on figure 6.10, how is altitude (mountains) and latitude similar in terms how ecosystems change from lowest region to highest? (read p103-4 too).

- LATITUDE: AS YOU TRAVEL TO NORTH POLE, TEMPERATURES DROP AND PRECIPITATION IS LESS
- ELEVATION: AS YOU TRAVEL TO UP MOUNTAINS, TEMPERATURES DROP AND PRECIPITATION IS LESS
- A MOUNTAIN AT THE EQUATOR GOES THROUGH THE SAME PATTERN OF ECOSYSTEMS WITH ALTITUDE AS YOU SEE AS YOU TRAVEL TO THE NORTH POLE.
- EG. A HIGH PEAK OF THE HIMALAYAS HAS ICE CAP LIKE AT THE NORTH POLE

21. Read the information on figure 6.12 (p. 106) and write the name of the correct ecosystem to match each letter description.

Ecosystem Letter	Ecosystem Name
A	SAVANNA
B	CONIFEROUS FOREST
C	TEMPERATE FOREST OR DECIDUOUS FOREST
D	TEMPERATE GRASSLANDS OR STEPPE
E	TROPICAL RAINFOREST
F	TUNDRA OR HIGH MOUNTAIN
G	DESERT

22. Refer to figure 6.9 (p.103) and use the statistics in #23 on page 105 to complete table.

Ecosystem?	Average Annual Temperature (^{O}C)	Average Annual Precipitation (cm)
TEMPERATE DECIDIOUS FOREST	5.0	96.5
TROPICAL RAIN FOREST	26.7	200.5
GRASSLANDS	16.7	24.9
SAVANNA	25.6	135.6
TUNDRA	-16.2	13.7
CONIFEROUS FOREST	-1.7	47.1
DESERT	29.4	23.1

23. Refer back to #21 and figure 6.12 (p106) to complete the table.

- SEE PAGE 106 AND MATCH WITH LETTER IN #21

24. Examine the climographs on page 107. Identify each one with the name of its ecosystem & describe the seasonal climatic conditions (eg temp, pptn, seasons etc).

Climograph	Ecosystem	Description of Climatic
A	TROPICAL RAIN FOREST	• HIGH TEMPS ALL YEAR • HEAVY PRECIPITATION ESP DURING ONE SEASON
B	DESERT	• HIGH TEMPS ALL YEAR • LOW PRECIPITATION LESS THAN 50 MM PER MONTH
C	TEMPERATE GRASSLANDS	• HIGH SUMMER TEMPS • LOW WINTER TEMPS • MOST PRECIPITATION IN SUMMER (MODERATE)
D	SAVANNA	• HIGH TEMPS MOST OF YEAR • RAINY SEASON • LONG DRY SEASON