Life Science
Mr. Galloway

Biblical Ecology I
Eden – Sin – New Earth

Recommended Websites:
www.soulcare.org
www.icr.org
www.AnswersInGenesis.org

God's Desire & Design

Eden to New Earth

God's Garden of Eden

- Genesis 1-2
- Peaceful harmony
- Vegetarian "nephesh" animals and man
- NOT the "Wild Kingdom"
- Man responsible to manage GOD'S Garden

Adam, the Zookeeper

"The Oldest Profession"

15 Then the LORD God took the man and put him into the garden of Eden to cultivate [**SERVE**] it and keep [**GUARD**] it.
GENESIS 2:15

- **Gen 1:26** And God said, Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth.

  Gen 1:27 So God created man in his [own] image, in the image of God created he him; male and female created he them.

- **Gen 1:28** And God blessed them, and God said unto them, Be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth.

- **Gen 1:29** And God said, Behold, I have given you every herb bearing seed, which [is] upon the face of all the earth, and every tree, in the which [is] the fruit of a tree yielding seed; to you it shall be for meat.

  Gen 1:30 And to every beast of the earth, and to every fowl of the air, and to every thing that creepeth upon the earth, wherein [there is] life, [I have given] every green herb for meat: and it was so.

- **Gen 1:31** And God saw every thing that he had made, and, behold, [it was] very good. And the evening and the morning were the sixth day.
- **Gen 2:7** And the LORD God formed man [of] the dust of the ground, and breathed into his nostrils the breath of life; and man became a living soul.
- **Gen 2:8** And the LORD God planted a garden eastward in Eden; and there he put the man whom he had formed.

- **Gen 2:9** And out of the ground made the LORD God to grow every tree that is pleasant to the sight, and good for food; the tree of life also in the midst of the garden, and the tree of knowledge of good and evil.
- **Gen 2:15** And the LORD God took the man, and put him into the garden of Eden to dress it and to keep it.
- **Gen 2:16** And the LORD God commanded the man, saying, Of every tree of the garden thou mayest freely eat:
- **Gen 2:17** But of the tree of the knowledge of good and evil, thou shalt not eat of it: for in the day that thou eatest thereof thou shalt surely die.

The Worst Ecological Disaster in Creation's History

The Rebellion of God's Creatures

The FALL by SIN
NOT the FLOOD

- **Gen 3:17** And to Adam [God] said, Because you have followed the voice of your wife, and have eaten of the tree, of which I commanded you, saying, You shall not eat of it: **cursed** [is] the ground for thy sake; in sorrow shall you eat [of] it all the days of thy life;

Gen 3:18 **Thorns also and thistles** shall it bring forth to you; and you shall eat the herb of the field;

Gen 3:19 In the **sweat** of your face shall you eat bread, till you return unto the ground; for out of it were you taken: for dust you [are], and unto dust shall you return.

- **Gen 6:12** And God looked upon the earth, and, behold, it was **corrupt**; for all flesh had corrupted his way upon the earth.

Gen 6:13 And God said unto Noah, The end of all flesh is come before me; for the earth is **filled with violence** through them; and, behold, I will destroy them with the earth.

Ecology is the study of how living things interact with one another and with their environment.

- What was Eden's ecology like?

- What is different now?

Chapters 22-24

- Ch 22 – Populations and Communities
- Ch 23 – Ecosystems and Biomes
- Ch 24 – Living Resources

Ch 22 Populations & Communities

- 22.1 Living Things and the Environment
- 22.2 Studying Populations
- 22.3 Interactions Among Living Things

22.1 Living Things and the Environment

- **Abiotic Factors**
  - These are the nonliving parts of an ecosystem.
  - (Water, Sunlight, Oxygen, Temperature, Soil)
- **Biotic Factors**
  - These are the living parts of an ecosystem.
- **Habitats**
  - Habitat is the place where an organism lives.
  - It provides the things the creature needs.

- **Populations**
  - A population is all the members of one species in a particular area.
  - In 1900 in Texas, there was a prairie dog town covering twice the size of Dallas.
  - Its population was over 400 million prairie dogs.
- **Communities**
  - A community is all the different populations that live together in an area.

Levels of Organization in an Ecosystem

- **Organism**
- **Population**
- **Community**
- **Ecosystem:**
  - **An ecosystem includes all the communities in a specific area.**

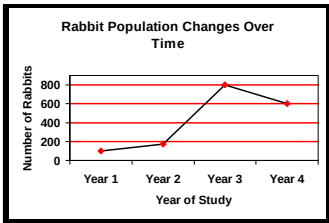
Go to the following link to view a chart showing the levels of organization:

http://www.learnbiznow.com/uploads/1/4/0/1/14012789/177980_orig.jpg

22.2 Studying Populations:

- Determining Population Size:
  - Direct Observation *(Count the actual animals)*
  - Indirect Observation *(tracks, nests, droppings, …)*
  - Sampling *(Estimate using large, random sample)*
  - Capture, Mark, Recapture *(Calculate % marked)*
- Population Density =
  - Number of Individuals ÷ Unit Area
  - Example: 50 Anole Lizards in a 10 m^2 area.
  - Density = 50 ÷ 10 = 5 anoles / m^2

- Changes in Population Size:
  - Changes occur when members enter or leave.
  - Births, deaths, Immigration, Emigration, etc.
  - **Birth Rate** = number of births over a certain time.
  - **Death Rate** = # of deaths over a certain time.
  - "**Population Statement**" indicates whether pop. is increasing or decreasing based on births vs. deaths
  - **Immigration** = moving into a population
  - **Emigration** = moving out of a population



- At what year was the rabbit population highest?
- What was the size of the population in that year?
- What might be the reason it decreased after that year?

Factors Limiting Pop. Increase

- Food
- Space
- Weather
- Predators
- Disease
- Pollution
- . . . What else?

22.3 Interactions Among Living Things

- Adapting to the Environment
  - Suited (fit) to specific environments
  - Niche = how the organism makes its living
    - The niche is the creature's role or profession
- Three Major Types of Interactions:
  - Competition
  - Predation
  - Symbiosis

Competition

- Occurs between two organisms that occupy the same "habitat".
- It is their struggle to survive in a "habitat" with limited resources, such as food, water, and shelter.
- Example = Red-Tailed Hawk and Elf Owl
  - They reduce competition by the hawk being active during the day, and the owl during the night.

Predation

- Predation is an interaction when one creature hunts and kills another for food.
- The killer is called the PREDATOR
- The creature killed is called PREY
- Populations of both predators and prey can adapt as they struggle in this fallen world.
  - Predators develop longer teeth, strategies, etc
  - Prey develop camouflage and other defenses
  - Predation affects population size.

Symbiosis

- It is a close relationship between two species.
- Three types of symbiotic relationships:
  - **Mutualism** is when BOTH species benefit. (Flowers give bees food / Bees spread pollen)
  - **Commensalism** is when ONE BENEFITS , and the other is neither harmed nor helped. (Red-tailed hawk gets a nest from Saguaro Cactus)
  - **Parasitism** is when ONE BENEFITS and the other, the **HOST** is HARMED. (Fleas, ticks, worms steal from host's bodies.)

Ch 23 Ecosystems and Biomes

- **23.1 Energy Flow in Ecosystems**
- **23.2 Cycles of Matter**
- **23.3 Biogeography**
- **23.4 Earth's Biomes**
- **23.5 Succession**

23.1 Energy Flow: Energy ROLES

- Producers – autotrophs that use photosynthesis to make their own food.
- Consumers – gets energy by eating other organisms (plants or animals)
  - Herbivore: eats only plants
  - Carnivore: eats other animals
    - Scavenger: eats dead animal bodies
  - Omnivore: eats both plants and animals
- Decomposers – Bacteria and fungi because they break down waste and dead tissues

Food Chains and Food Webs

- **Food Chain** = a series of events in which one organism eats another to get energy.
- **Food Web** = many overlapping food chains.
- **Energy Pyramid** = diagram showing the amount of energy that moves from one feeding level to another in a food web.
  - The **most** energy is available at the bottom (the producer level), with energy **decreasing** as you go up the pyramid levels.

Go to the following link to view a food CHAIN:

http://heightstechnology.edublogs.org/files/2011/05/Temperate-Forest-Food-Chain-2a4qqyj.jpg

- **Food Web**
  - **Interconnected**
  - **Interdependent**

Go to the following link to view a food web:

http://images.tutorvista.com/content/ecosystem/food-web-forest.jpeg

23.2 Cycles of Matter

- **Recycling Matter** – a natural, necessary process
- **The Water Cycle**
  - Evaporation
  - Condensation
  - Precipitation
- **The Carbon and Oxygen Cycles**
  - Producers use C from CO_2 to make organic compounds.
- **The Nitrogen Cycle**
  - Air = 78 % "free" (loose) nitrogen gas
  - **Nitrogen Fixation** is done by bacteria. Some live in **nodules** on roots of plants (legumes: beans, clover, etc.)

Go to GOOGLE and search for images of CYCLES OF MATTER

Biogeography

- **Continental Drift** (Dr. Baumgardner – Creation)
  - Continents are huge flat blocks of rock floating on "lava".
- **Means of Dispersal** of Organisms
  - Wind, Water, and Other Living Things
- **Limits to Dispersal**
  - Climate
  - Physical Barriers
  - Competition

23.4 Earth's Biomes

- A "Biome" is a group of ecosystems with similar climates and organisms.
- Climate is the main thing that determines what type of a biome it is.
  - Rain Forest
  - Desert
  - Grasslands
  - Deciduous Forest
  - Boreal Forest
  - Tundra
  - Mountains & Ice
  - Freshwater
  - Marine (Salt Water)

- **Rain Forest:** wet, warm,
- **Desert:** dry, usually hot unless high altitude
- **Grasslands:** enough rain for grass, but not trees
- **Deciduous** Forest: trees shed leaves each winter
- **Boreal Forest:** conifer (evergreen) trees
- **Tundra:** dry, very cold, far northern areas
- **Mountains & Ice:** do not fit into other categories
- **Freshwater:** ponds, lakes, rivers, streams, bayous
- **Marine:** salt water, including estuaries where freshwater rivers empty into the ocean.

Go to the following link to view images of BIOMES:

http://earthobservatory.nasa.gov/Experiments/Biome/Images/mission.jpg

23.5 Succession

- **Succession** is a series of predictable changes that occur in a community over time.
- **Primary Succession** = occurs in an area where no ecosystem previously existed.
  - New volcanic island
- **Secondary Succession** = occurs after a disturbance in an existing ecosystem.
  - Fires, hurricanes, etc.

Go to the following link to view an image of succession:

PRIMARY
http://media-2.web.britannica.com/eb-media/97/95197-004-7F9B8F09.jpg

SECONDARY
http://study.com/cimages/multimages/16/stages_ofsecondary_succession.jpg

Ch 24 Living Resources

- **24.1 Environmental Issues**
- **24.2 Forests & Fisheries**
- **24.3 Biodiversity**

- "Environmental Science" is the study of the natural processes that occur in the environment and how HUMANS can affect them.

24.1 Environmental Issues

- **Types of Problems**:
  - Resource Use
  - Population Growth
  - Pollution
- **Approaches to Solving Problems**
  - Many efforts to solve problems have created bigger ones
- **Weighing Costs and Benefits**
  - Values: (scenic, economic, recreational, etc.)

Fisheries

- Louisiana's economy depends on its fisheries.
- A fishery is an area with a large population of valuable ocean organism.
- This could also include freshwater organisms.
  - Oysters
  - Fish
  - Crawfish

Biodiversity

- Biodiversity is the number of different species.
- Value of Biodiversity
  - Economic Value (Money)
  - Ecosystem Value (Interconnected species)
- Factors Affecting Biodiversity
  - Area
  - Climate
  - Different Niches

Gene Pool Diversity

- Traits in a population should be preserved.
- Mutations must not become concentrated.
- Extinction should be avoided.
  - Causes of Extinction
    - Habitat Destruction
    - Poaching
    - Pollution
    - Exotic Species Invasion

Protecting Biodiversity

- Captive Breeding
- Laws and Treaties
- Habitat Preservation