

Ecosystem Project Overview

Dear Students,

Your upcoming project is to design and build an ecosystem. It is important to understand what an ecosystem is and how it works. This is something you should have a working knowledge about from reading your textbook. You will need to do additional research on the Internet and in other books in order to complete this project. To assist you in this effort supplemental handouts are included with this overview. One is a worksheet to help organize the information you find. Once you have done some research and understand the different types of ecosystems that exist, you can then pick out the one that interests you the most to apply your creativeness to put together a model to present.

PLAN, PLAN, PLAN!! Materials can be inexpensive or expensive. For most families, they will not just have items lying around that are going to work, so you must coordinate with your parents as to getting to a store to purchase what you need. Do not wait until the last minute.

MODEL - It needs to be multidimensional. For example, build it in a box. The class needs to be able to view what you are describing. The idea is to use a variety of materials to make a model of an existing ecosystem and have it look as realistic as possible. Make sure to show all the components in the ecosystem you have selected. You can build an actual ecosystem if wanted (ie. terrarium). You may also use purchased small-scale models of animals & plants to use in the ecosystem.

LABELING (*Required*) - You may label directly on your model **or** utilize a board to show a sketch of your ecosystem with labels showing where everything is **or** make a key that has a sketch of each item followed by what it is. The labeling needs to be easy to follow & read.

SCORING - The last page of the handout is the scoring system to be used. It outlines what must be included. Take the time to read this carefully. Twenty-five points are dedicated to the presentation, fifty points are given to the actual items in your model, and fifty cover the components of the ecosystem that are to be discussed.

ECOSYSTEM COMPONENTS – There are 5 areas evaluated. **First** – Ecosystem - Give a detail description of the what makes it up & the type of location it is; **Second** – Physical Environment - Discuss the weather, average temperature (high & low), type(s) of soil, & water sources for your ecosystem; **Third** – Organisms - Identify the producers, consumers, & decomposers; **Fourth** – Relationships - Address the predator & prey relationship **or** the Food Web for your ecosystem. A picture of your Food Web set up like Figure 10.2 in your text can be put on your visual aid to point to as you talk about it; **Fifth** – Interactions – Identify & describe the abiotic vs biotic factors.

PRESENTATION - You should know the material & be able to have a conversation about it. You may refer to note cards while speaking. The best way is to outline on the cards & possibly use highlighting. Long lines of text make it hard to locate information. The idea is to use the cards to assure everything is covered & is presented in an organized manner & not just read them out loud.

#4 & #5 on Scoring Sheet (Section I) – Our journey is about the Lord and science. Put some thought into these points. Please do not spend a lot of time on #8.

SOURCES PAGE – You need a minimum of **3 total sources**; the text, plus two others. Before you speak, hand me your Sources Page listing your 3 sources. Preferably for the extra two use one web site & one book. For web sites, list the name of the site, who put it together, & its web address. Wikipedia is not a legitimate site. For books, list the title & author's name.

This can be a lot of fun and help you to see the intricate working of your world around you and help you to be a good steward of what God has given to us all.

I challenge you to make the most of it!

In Christ,
Mrs. Garza

Links on pgs 2 & 3 no longer work. Encyclopedia Encarta published by MicroSoft is no longer available.

Ecosystem *(Good overview, especially **)*

Encyclopedia Article from Encyclopedia Encarta



I INTRODUCTION

Ecosystem - organisms living in a particular environment, such as a forest or a coral reef, and the physical parts of the environment that affect them. The term *ecosystem* was coined in 1935 by the British ecologist Sir Arthur George Tansley, who described natural systems in “constant interchange” among their living and nonliving parts.

**The ecosystem concept fits into an ordered view of nature that was developed by scientists to simplify the study of the relationships between organisms and their physical environment, a field known as [ecology](#). At the top of the hierarchy is the planet’s entire living environment, known as the [biosphere](#). Within this biosphere are several large categories of living communities known as biomes that are usually characterized by their dominant vegetation, such as grasslands, tropical forests, or deserts. The biomes are in turn made up of ecosystems. The living, or biotic, parts of an ecosystem, such as the plants, animals, and bacteria found in soil, are known as a community. The physical surroundings, or abiotic components, such as the minerals found in the soil, are known as the environment or habitat. **

Any given place may have several different ecosystems that vary in size and complexity. A tropical island, for example, may have a [rain forest](#) ecosystem that covers hundreds of square miles, a [mangrove](#) swamp ecosystem along the coast, and an underwater [coral reef](#) ecosystem. No matter how the size or complexity of an ecosystem is characterized, all ecosystems exhibit a constant exchange of matter and energy between the biotic and abiotic community. Ecosystem components are so interconnected that a change in any one component of an ecosystem will cause subsequent changes throughout the system.

II HOW ECOSYSTEMS WORK

The living portion of an ecosystem is best described in terms of feeding levels known as trophic levels. Green plants make up the first trophic level and are known as primary producers. Plants are able to convert energy from the sun into food in a process known as [photosynthesis](#). In the second trophic level, the primary consumers—known as herbivores—are animals and insects that obtain their energy solely by eating the green plants. The third trophic level is composed of the secondary consumers, flesh-eating or carnivorous animals that feed on herbivores. At the fourth level are the tertiary consumers, carnivores that feed on other carnivores. Finally, the fifth trophic level consists of the decomposers, organisms such as fungi and bacteria that break down dead or dying matter into nutrients that can be used again.

Some or all of these trophic levels combine to form what is known as a [food web](#), the ecosystem’s mechanism for circulating and recycling energy and materials. For example, in an aquatic ecosystem algae and other aquatic plants use sunlight to produce energy in the form of carbohydrates. Primary consumers such as insects and small fish may feed on some of this plant matter, and are in turn eaten by secondary consumers, such as salmon. A brown bear may play the role of the tertiary consumer by catching and eating salmon. Bacteria and fungi may then feed upon and decompose the salmon carcass left behind by the bear, enabling the valuable nonliving components of the ecosystem, such as chemical nutrients, to leach back into the soil and water, where they can be absorbed by the roots of plants. In this way nutrients and the energy that green plants derive from sunlight are efficiently transferred and recycled throughout the ecosystem.

In addition to the exchange of energy, ecosystems are characterized by several other cycles. Elements such as carbon and nitrogen travel throughout the biotic and abiotic components of an ecosystem in processes known as nutrient cycles. For example, nitrogen traveling in the air may be snatched by a tree-dwelling, or epiphytic, lichen that converts it to a form useful to plants. When rain drips through the lichen and falls to the ground, or the lichen itself falls to the forest floor, the nitrogen from the raindrops or the lichen is leached into the soil to be used by plants and trees. Another process important to ecosystems is the [water cycle](#), the movement of water from ocean to atmosphere to land and eventually back to the ocean. An ecosystem such as a [forest](#) or [wetland](#) plays a significant role in this cycle by storing, releasing, or filtering the water as it passes through the system.

Every ecosystem is also characterized by a disturbance cycle, a regular cycle of events such as fires, storms, floods, and landslides that keeps the ecosystem in a constant state of change and adaptation. Some species even depend on the disturbance cycle for survival or reproduction. For example, longleaf pine forests depend on frequent low-intensity fires for reproduction. The cones of the trees, which contain the reproductive structures, are sealed shut with a resin that melts away to release the seeds only under high heat.

III ECOSYSTEM MANAGEMENT

Humans benefit from these smooth-functioning ecosystems in many ways. Healthy forests, streams, and wetlands contribute to clean air and clean water by trapping fast-moving air and water, enabling impurities to settle out or be converted to harmless compounds by plants or soil. The diversity of organisms, or [biodiversity](#), in an ecosystem provides essential foods, medicines, and other materials. But as human populations increase and their encroachment on natural habitats expands, humans are having detrimental effects on the very ecosystems on which they depend. The survival of natural ecosystems around the world is threatened by many human activities: bulldozing wetlands and clear-cutting forests—the systematic cutting of all trees in a specific area—to make room for new housing and agricultural land; damming rivers to harness the energy for electricity and water for irrigation; and polluting the air, soil, and water.

Many organizations and government agencies have adopted a new approach to managing natural resources—naturally occurring materials that have economic or cultural value, such as commercial fisheries, timber, and water—in order to prevent their catastrophic depletion. This strategy, known as ecosystem management, treats resources as interdependent ecosystems rather than simply commodities to be extracted. Using advances in the study of ecology to protect the biodiversity of an ecosystem, ecosystem management encourages practices that enable humans to obtain necessary resources using methods that protect the whole ecosystem. Because regional economic prosperity may be linked to ecosystem health, the needs of the human community are also considered.

Ecosystem management often requires special measures to protect threatened or endangered species that play key roles in the ecosystem. In the commercial shrimp trawling industry, for example, ecosystem management techniques protect loggerhead sea turtles. In the last thirty years, populations of loggerhead turtles on the southeastern coasts of the United States have been declining at alarming rates due to beach development and the ensuing erosion, bright lights, and traffic, which make it nearly impossible for female turtles to build nests on beaches. At sea, loggerheads are threatened by oil spills and plastic debris, offshore dredging, injury from boat propellers, and getting caught in fishing nets and equipment. In 1970 the species was listed as threatened under the Endangered Species Act.

When scientists learned that commercial shrimp trawling nets were trapping and killing between 5000 and 50,000 loggerhead sea turtles a year, they developed a large metal grid called a Turtle Excluder Device (TED) that fits into the trawl net, preventing 97 percent of trawl-related loggerhead turtle deaths while only minimally reducing the commercial shrimp harvest. In 1992 the National Marine Fisheries Service (NMFS) implemented regulations requiring commercial shrimp trawlers to use TEDs, effectively balancing the commercial demand for shrimp with the health and vitality of the loggerhead sea turtle population.

Explanation of Terms

The 3 terms - biome, ecosystem, and habitat - can be confusing when research is being done. The following article and definitions are to assist you in getting an overview of their differences.

Web Article

Utah Education Network

<http://www.uen.org/themepark/systems/ecosystem.shtml>

Ecosystem

What exactly is an ecosystem? How is it different from a biome? Here is one way to think about it:

- Individual plants or animals living together are called a population.
- Several populations are called a community.
- Several communities form an ecosystem.
- Ecosystems sharing the same climate make up a biome.
- All earth's biomes form the biosphere.

What these groups all have in common is interdependence. Living things do not exist in isolation. They constantly interact with each other and with their environment and are dependent upon each other for survival.

The parts that make up an ecosystem are plants, animals, and the environment in which they live, including soil, air, water, sunlight, minerals, and nutrients. All of these parts interact in energy and nutrient cycles.

Enemies to ecosystems are human activity and pollution. How we interact with an ecosystem can have impact thousands of miles away. For example, monarch butterflies that live across the United States migrate to parts of California and Mexico during the winter. In California, many sites historically frequented by monarchs have been destroyed by human development. Destroying habitat in California could potentially bring about monarch butterfly decline throughout North America.

Definitions

bi-ome *n.* A major regional or global biotic community, such as a grassland or desert, characterized chiefly by the dominant forms of plant life and the prevailing climate.

Source: *The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2000 by Houghton Mifflin Company. Published by Houghton Mifflin Company. All rights reserved.*

biome *n.* : a major biotic community characterized by the dominant forms of plant life and the prevailing climate

Source: *WordNet ® 2.0, © 2003 Princeton University*

e-co-sys-tem *n.* An ecological community together with its environment, functioning as a unit.

Source: *The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2000 by Houghton Mifflin Company. Published by Houghton Mifflin Company. All rights reserved*

ecosystem *n.* : a system formed by the interaction of a community of organisms with their physical environment Source: *WordNet ® 2.0, © 2003 Princeton University*

hab-i-tat *n.*

The area or environment where an organism or ecological community normally lives or occurs: *a marine habitat.*

Source: *The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2000 by Houghton Mifflin Company. Published by Houghton Mifflin Company. All rights reserved.*

habitat *n.* : the type of environment in which an organism or group normally lives or occurs; "a marine habitat"; "he felt safe on his home grounds" [syn: home ground]

Source: *WordNet ® 2.0, © 2003 Princeton University*

Ecosystem Resource

This is just one scientist method by which to classify ecosystems. This will help you to get an overview and decide what type of ecosystem you want to put together for your project.

Taken from the following Internet site:

Jerry G. Johnson

FREDERICK HIGH SCHOOL BIOLOGY TEACHER; FREDERICK, OKLAHOMA

<http://www.sirinet.net/~jgjohnso/index.html> (As of Jan '09 link not active)

KINDS OF ECOSYSTEMS

1. The THREE Types of Ecosystems are:

- A. TERRESTRIAL ECOSYSTEMS (LAND MASSES)
- B. FRESH WATER ECOSYSTEMS
- C. OCEAN ECOSYSTEMS

2. The Terrestrial Ecosystems are divided into 7 wide areas of land called BIOMES. Biomes are very large terrestrial ecosystems that contain a number of smaller but related ecosystems within them.

3. A certain biome may exist in more than one location on Earth, but similar biomes have similar climates, and tend to have inhabitants with similar adaptations.

4. Biomes are distinguished by the presence of Characteristic Plants and Animals, but their Dominant Plant Life commonly identifies them.

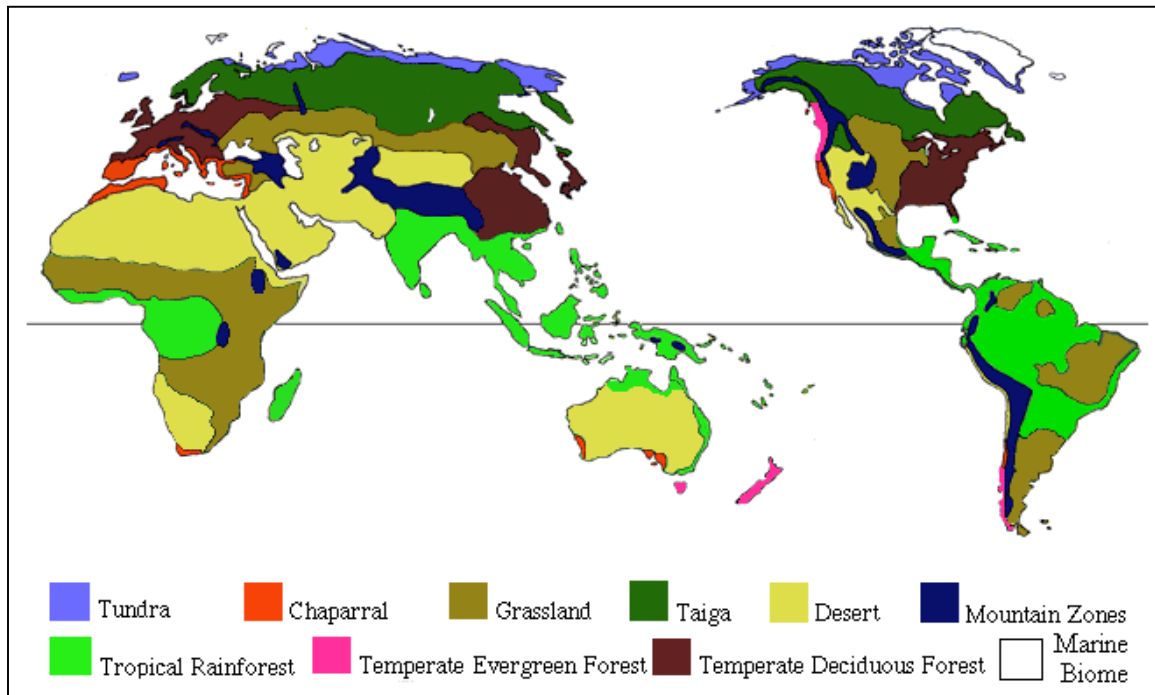
5. The SEVEN LAND BIOMES ARE:

- 1. Tropical Rain Forest
- 2. Savannas – flat grassland with few trees of tropical and subtropical regions (along side deserts/grasslands)
- 3. Deserts
- 4. Grasslands
- 5. Deciduous Forest
- 6. Coniferous (Evergreen) Forest or Taiga - sub arctic forest dominated by conifers, begins where tundra ends
- 7. Tundra

The items below are not listed by the text, but are in the graphic below.

Mountain Zones – They can include several of the above.

Chaparral – a biome characterized by hot dry summers, cool moist winters, and dominated by a dense growth of evergreen shrubs.



Information on Biomes and Habitats from the Internet with Links

<http://www.thebiotechdictionary.com/term/ecosystem>

Ecosystem - An ecosystem is the dynamic and interrelating complex of plant and animal communities and their associated non-living environment. The physical and climactic features and all the living and dead organisms in an area that are interrelated in the transfer of energy and material. An interacting complex of a community and its environment functioning as an ecological unit in nature.

Biome - A region, which has distinct types of organisms, substrates, and climate, all interacting to produce a large, distinct, and complex biotic community.

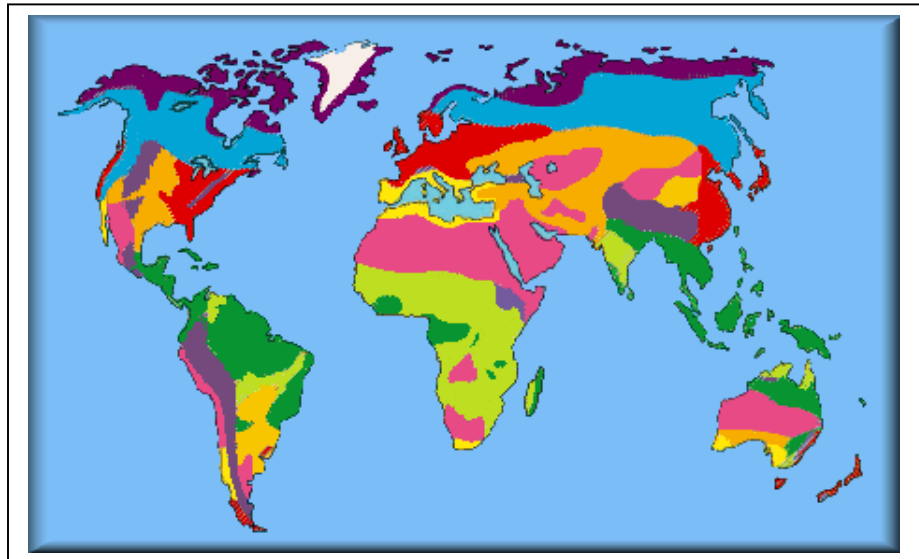
<http://library.thinkquest.org/11922/habitats/habitats.htm>

(As of Jan '09 links not active)

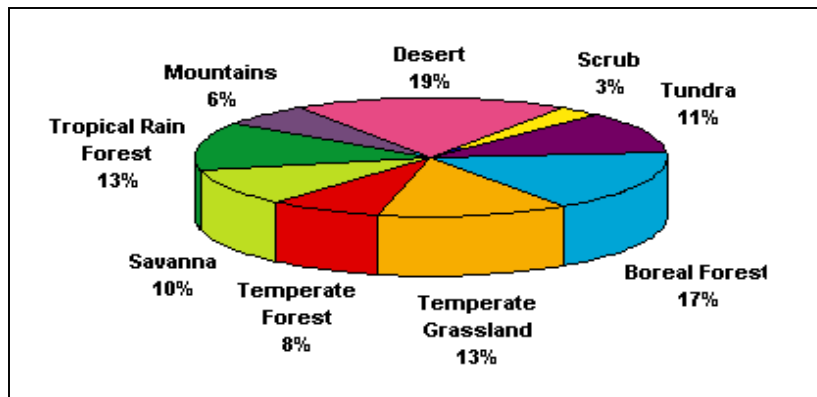
Biomes are ecosystems where several habitats intersect. The Earth itself is one large biome. Smaller biomes include **desert, tundra, grasslands, and rainforest.**

(As of Jan '09 links not active)

1. [desert](#)
2. [scrubland](#)
3. [tundra](#)
4. [boreal forest \(taiga\)](#)
5. [temperate grassland](#)
6. [temperate forest](#)
7. [savanna](#)
8. [tropical rain forest](#)
9. [mountains](#)
10. [oceans](#)



World Biomes



http://www.uen.org/utahlink/activities/view_activity.cgi?activity_id=3792

An animal's living place is called its habitat. Most animals are only adapted to live in one or two habitats. A barracuda, which is a salt-water fish, could not live in a fresh water lake. A walrus could not live in a desert. A rattlesnake could not live for very long in the arctic. Some animals migrate in the spring and again in the fall to find warmer habitats with an abundance of food.

The habitats are:

1. Polar/arctic areas
2. Mountains
3. Oceans
4. Deserts
5. Savannah/grasslands/prairies
6. Tropical rainforest
7. Woodland/forest
8. Tundra
9. Taiga - *sub arctic forest, begins where tundra ends*
10. Wetland areas/marshes
11. Pond
12. Rivers/lakes
13. Coral reef
14. Deciduous forest
15. Tide pool
16. Cave

Here is another way to apply biomes to a specific region, which in this case is North America.

Utah Education Network
Biomes of North America

http://www.uen.org/utahlink/tours/tourFames.cgi?tour_id=14051



Ecosystem Table – **Abiotic** (*physical surroundings*) and **Biotic** (*living*) factors

Directions: Use to collect your information. You can, if wanted, review several ecosystems & then decide which one to use for your model.

Ecosystem: → (Ex. Tropical Rain Forest)	_____	_____
Habitat: → Factors: ↓	_____	_____
Weather		
Temperature		
Precipitation (water)		
Soil type		
Identify producers (Green plants)		
Identify consumers (Animals)		
Identify decomposers		
Identify predator/prey relationships OR detail the Food Web		
Describe the interactions of abiotic and biotic factors in the ecosystem		

Student Name: _____

Date: _____

Biology Science Project – Module 10 Test - Design & Build an Ecosystem

NOTE: Projects are intended for you to learn in depth about the subject.

If you *just* follow the outline to “get by” & don’t apply time & effort, then a B is the highest grade you can earn.

I. PRESENTATION:

1. Demonstrated knowledge of ecosystem _____
2. Made eye contact, spoke clearly and loudly (no distracting movement, gum, etc.) _____
3. Visual aid(s) appropriate and creative display of ecosystem _____
4. Application of theology (What was learned about God from this project?) _____
5. New question resulting from research (What more do you want to know?) _____
6. Information was presented in a clear and organized manner _____
7. **Sources Page** – (include 2 sources *other than text*) - **Turn in** before speak _____
8. Described how and with what materials display was built / created / made _____
9. Presentation was 5 – 10 min. **Time:** _____

25 possible points

Presentation subtotal _____

II. MODEL: *(Plus display board, if used)*

Time spent building model: _____

1. Project reflects that student spent time and effort putting it together _____
2. Components properly labeled (*on model or a display board or a key*) _____
3. Ecosystem is 3-D and properly represents the ecosystem _____

50 possible points

Model subtotal _____

III. ECOSYSTEM COMPONENTS: *(Include what is in parentheses)*

1. Ecosystem (*Detailed description and location*) _____
2. Physical Environment (*Discussed weather, temperature, soil, and water*) _____
3. Organisms (*Identified producers, consumers, and decomposers.*) _____
4. Relationships (*Identified predator / prey **or** detailed the Food Web*) _____
5. Interactions (*Identified and described **abiotic & biotic factors***) _____

50 possible points

Ecosystem subtotal _____

_____ / 125 possible points

Grade _____