

The interactions and interrelationships among the different components of the eco...

[Environment](#), [Ecology](#)



I. Introduction

Ecology is the study of environmental systems, or as it is sometimes called, the economy of nature (Hall and Weiss, 2010). It studies interactions between different organisms and their environments, including relations within its own species and members of others. Ecology focuses more on the population, community, and ecosystem ecology although it also includes a wide variety of fields. Both the living (biotic) and the non-living (abiotic) components of the natural world is its subject matter. Processes like primary production, nutrient cycling, and various niche construction energies are sustained by the biodiversity within them and regulate the flux of energy and matter through an environment. Biodiversity is the variety and also the abundance of plants and animals in a particular environment and the processes that are functionally enriched by ecological interactions.

The ecosystem is defined as a unit of biosphere which has the structural and functional parts. It consists of the biotic components and the physical environment including the interactions between them. There are different kinds of ecosystem. Some are temporary and some are permanent. They may be natural which includes the freshwater systems and the forest ecosystems. There are also manmade which includes the agroecosystem like rice fields. It can be small as a fallen log or as big as an ocean. There is also a small ecosystem known as the micro ecosystem. The distinct community consisting of number of different species forms an ecosystem.

Students of environmental biology and other enthusiasts in the field of ecology will be able to identify the different components of an ecosystem and their interactions by observing the organisms in their own environment.

II. Objectives

At the end of the exercise, the student should be able to:

1. enumerate the different compositions of the ecosystem;
2. describe the interaction of the different components of the ecosystem;
and
3. understand the functioning of the ecosystem.

III. Methodology

To determine the interactions between the physical and biotic components in an ecosystem, three different types of ecosystems found in the vicinity of the University of the Philippines Los Baños campus, namely agroecosystem, freshwater ecosystem, and forest ecosystem has been visited by a group of environmental biology students from the class of section Z-3R.

A 10x10m area is first chosen in each ecosystem. Students were given 20 minutes in each site to survey the surrounding. The autotrophic and heterotrophic organisms present in the Phil Rice for the agroecosystem, Molawe Creek for the freshwater ecosystem, and the Mt. Makiling Forest Reserve and a fallen log for the forest ecosystem were observed and listed in Tables 1. 1, 1. 2, and 1. 3 respectively. The number of identified organisms

and their distribution patterns along with the physical factors affecting the organisms were also listed in the same tables. The physical factors together with their interactions and their role in each ecosystem were also observed and listed in Tables 2.

After visiting and observing all of the ecosystems, individual data of the group members were gathered for comparison. The group deliberated and formalized a general conclusion for the report.

V. Discussion

In Table 1. 1, results show that there is less number of heterotrophic organisms than autotrophic organisms. This is due to the controlled environment they are in. An agroecosystem, or specifically a rice field, is a manmade ecosystem. Many aspects are controlled in this kind of environment like the even distribution of rice and also their rate of growth with the kind of soil and fertilizer that are used on them. This is the same with the heterotrophic organisms, the population of animals is controlled because they can destroy crop fields and can destroy the ecosystem. In addition, people who work in the field of agriculture will be affected.

In Tables 1. 2 and 1. 3, results show that these two ecosystems, the freshwater and forest have a more diverse number of both autotrophic and heterotrophic organisms than a manmade ecosystem. These environments are less manipulated by a person that is why there are a lot of different species of plants and animals living in these areas. With many nutrients and

food dispersed in the area, there is a random distribution for most of the organisms here.

Physical factors of the environment that interact with the plants are light intensity, temperature, relative humidity, wind velocity and wave velocity. Plants rely on these factors for many functions like growth, germination, flowering, and photosynthetic activity. Plants also adapt to some changes in the physical environment. In a forest ecosystem, little light is received by plants in the forest floor so plants have broader and greener leaves for better absorption of light. In an agro-ecosystem however, plants like rice are distributed evenly so no competition is present for the absorption of light. Instead, their leaves are composed of hair-like structures or cuticles to retain more moisture against the intense light of the sun.

Temperature controls growth, flowering, germination, ripening of fruit and transpiration of plants. Since the plants listed from the three ecosystems visited are from the tropics, warmer temperature is essential for the processes of the plants. Relative humidity indicates also the rate of transpiration of plants. Plants respond to this physical factor with their stomata.

(Retrieved from <http://www.croking.com/articlerrh>)

Wind affects the rate of pollination in plants. Faster air current increases the rate of pollination of the plants. Wave velocity determines the temperature of the water and its surrounding. In a freshwater ecosystem in the tropics,

warmer temperature is essential for the growth of plants therefore the wave velocity of most streams and rivers here are slow.

(Retrieved from <http://www.thebigger.com/section/biology/ecosystem/>)

Plants contribute to the environment by cleaning up the air. Plants lessen the carbon content of the atmosphere contributing to climate change. Plants are also responsible in landscaping the land by holding the soil with their roots and also serve as natural barriers of the environment. Many plants may exist in the same environment. This may cause them competition for nutrients of the soil and light absorption. Plants of the same species may be clumped in one area and some may be random. However in a manmade ecosystem like a rice field, plants like rice are evenly distributed.

Besides shrubs, herbs and large trees like dipterocarps, there are other groups of photosynthetic organism present in the different ecosystems. In an agroecosystem, algae and Azolla are present in the watery parts of the field while phytoplanktons are found in the freshwater ecosystem. Near the water are ferns, mosses and vines. Like the freshwater ecosystem, the forest ecosystem also has ferns and vines living in it. The presence of water affects most of these organisms since it is essential for their growth. These organisms are classified as non-vascular plants. Mosses and ferns can be further classified as bryophytes.

(Retrieved from http://www.cliffsnotes.com/study_guide/Nonvascular-Plants-Defined.topicArticleId-8741, articleId-8671.html)

One major difference of plant and animals is that plants are producers which mean they can produce their own food. On the other hand, animals are called consumers, which rely on plants for food. Since not all plants can be eaten by animals, they are more numerous than animals. They are also found at the start of the food chain, which means, if there are no plants then there are no animals. If there are more animals present in the food chain, then there is an imbalance. Aside from food, other benefits that animals receive from plants are oxygen and plants also provide shelter for the animals.

Animals of the same species can be in a mutual or competitive relationship. Different species however can prey on other animals depending on what type of consumers they are. Primary consumers eat only plants meaning they are herbivores. Secondary and tertiary consumers eat other consumers so they are considered carnivores. In some cases, consumers can eat both producers and other consumers, thus they are considered as omnivores. Animals of the same species usually group or are clumped while other organisms that thrive alone are in random distribution.

Like in plants, light intensity, temperature, relative humidity, wind velocity and wave velocity affects animals. The presence of animals also balances the number of organism in an ecosystem. If animals did not exist then there will be overgrowth of plants. Certain animals can be found in certain ecosystems. This is because there are different environmental characteristics that only certain species can adapt to. Since all of the

ecosystems visited are in the tropics then only animals that can thrive in warm temperatures can exist here.

Most fungi live in wet places because they need moisture to live. Fungi are usually saprophytic; thriving on dead organic matter like a fallen log. Fungi are capable of breaking down dead organic materials; furthermore they can pair with algae to form white thread-like structures called lichens that are found in the soil and many places that indicate the environmental pollution of an area. (Retrieved from <http://www.ispot.org.uk/fungi-and-lichens>)

Other organism present in the soil that have similar roles in the ecosystem as the fungi are algae, actinomycetes, bacteria, cyanobacteria, annelids (segmented worms) and nematodes (commonly known as threadworms or roundworms). These are called decomposers. The type of food web decomposers form is called a detrital food web. Some factors of the soil environment affecting the growth of soil organisms are the moisture present in the ground and also the amount of plant litter. Since these soil organisms do not produce their own food, they thrive in getting the nutrients from dead organic matter. They cannot store water long enough which they need to break down or decompose the organic material they feed on. (Retrieved from http://www.landfood.ubc.ca/soil200/soil_organisms/flora_fauna.htm)

An ecosystem can come in different sizes. One common ecosystem we often overlook is a fallen log or a rotting tree. This small community is a home to beetles and other insects. The dampness of the fallen tree makes it a good place also for mushrooms and other fungi. It provides food for plants and

animals such as termites. Many of those organisms in turn become food for larger animals.

VI. Conclusion

Every living and non-living thing in the natural world is connected. An ecosystem is a community of organism together with physical factors that affect them. Ecosystems have no particular size. An ecosystem can be as large as an ocean or as small as a tree. If you have a rice field, that is a manmade ecosystem. The light, water, wind, and soil all work together. If the plants lack the amount of light or water or if the soil doesn't contain sufficient nutrients, it will die. If the plants die, animals that depend on them will die. If the animals that depend on the plants die, any animals that depend on those animals will die. All the components work together to make a balanced ecosystem.

Each organism has a role in its ecosystem that helps keep the system healthy. If the ecosystem is healthy then it will be less disturbed by humans and climate changes. Every day we discover different species of organisms in different types of ecosystems, we have yet to discover many of its functions. By studying and maintaining biodiversity, we help keep our planet healthy.

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