

Ecosystem doctors

GLOBE		Associated SDG	Type of Activity
Sphere	Protocols		
Atmosphere	Temperature Precipitation	15: Life on Land	Exploratory
Biosphere	Green-Up Green-Down Land Cover Classification	12: Responsible Consumption and Production	
Pedosphere	Soil pH Soil Fertility	4: Quality Education	

Overview

Ecosystems present different characteristics according to the place where they are located, depending on the influences they receive from biotic, abiotic and social elements at a given time. When the composition or the relationship among these elements is altered, environmental problems can occur that often result in an alteration of the services provided by the ecosystems to meet the needs of people. Through this activity, students will describe an ecosystem and identify potential alterations in the elements that compose them.

Time

60 minutes

Prerequisites

To have completed at least two of the protocols related to this activity.

School level

Secondary

Purpose

To identify all the elements of an ecosystem and diagnose the existence of potential environmental problems

Students Outcomes

- Students will explore an ecosystem in order to identify the main elements that make up the ecosystem and recognize problems that have arisen in them
- Students will define the concept of ecosystem in their own words
- Students will elaborate a diagnosis of their ecosystems
- Students will make a proposal to improve or maintain the conditions of their ecosystems



Background

Ecosystems are spatial and temporal units where we can find living beings interacting with each other and with the environment that surrounds them (Mazparrote and Romero, 2020). Have you ever heard of ecosystem doctors? Well, this is the name given to the group of scientists who are dedicated to conserving and restoring ecosystems to ensure that plants, animals, water, soil and many other elements of the environment are in good condition; that is, functioning properly.

Many ecosystems have been modified by human activities, which end up causing environmental problems. In this regard, environmental problems can be defined as the negative conditions that have occurred in the environment, either by the alteration in the composition of any of its variables or by a bad relationship of humans with the environment. In this sense, it is important to identify the environmental problems that have occurred in an ecosystem in order to plan the steps to follow for their solution.

When we go to the doctor, the first thing he/she does is ask his/her patients for their name, their age and why they have come to visit him/her. In the same way as ecosystem doctors, the first activity will be to identify the ecosystem, where it is and what are the "symptoms" it presents to need the doctor. We hope that this activity will be useful to begin to have contact with the environment that surrounds the students.

Guiding Research Questions

- What is the type of ecosystem in which we live?
- What are the problems with our ecosystem?

Scientific Concepts

- Ecosystems
- Conservation
- Environmental problems

Materials and Tools

- Pencils
- Color Pencils
- Paper

What to Do and How to Do It

- ***Beginning***
 - Students, with the help of their teacher, pick an ecosystem of their choice that is close to their school so that they can visit it.
 - Working in groups, the students make a list of everything they like about the selected place and what they would like to improve.
 - Then, the students go to the selected location.

- **Development**

- Once the students are at the selected location, they describe all the types of cover it has in a range of approximately radius 30 m around it, considering the 4 cardinal points. Figure 1 can be used as a guide to complete Table 1.

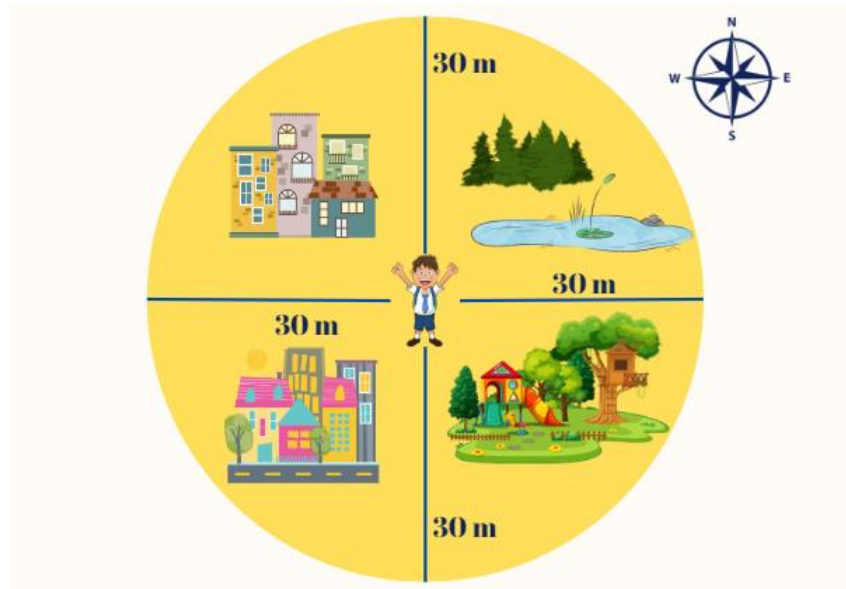


Figure 1: Representation of an ecosystem to be assessed

Table 1 Description of the main elements of the Ecosystem

NE	SE	SW	NW	Elev	Lat	Long	Average T of the place (warmest and coldest month)	Annual cumulative rainfall
Trees	Park	Houses	Houses					
Lagoon								

Note: NE, SE, SW and NW are the cardinal points that can be seen in Figure 1. Alt. represents the altitude at which the ecosystem is located, while Lat. is the altitude and Long. represents the longitude.

- With the description derived from Table 1, students can detect the type of ecosystem they are describing based on its cover type. To do this they can use the MUC code, or at its simplest level, the Table 2 as a guide.

Table 2
Description of the types of cover according to the GLOBE Program

Type of cover	Description	MUC Code
Closed forests	Trees with an average height of 5 m, with intertwined canopies covering at least 40% of the area	0
Closed evergreen forests	When the leaves never fall off the trees	01
Closed deciduous forests	When the leaves of more than 50% of the trees fall off at some time during the year	02
Wooded area	Trees whose canopies never touch are also called open forests	1
Evergreen wooded area	When the leaves never fall off the trees	11
Deciduous wooded area	When the leaves of more than 50% of the trees fall off at some time during the year.	12
Dry forests	When trees grow in arid areas	13
Shrubland	When the shrub canopies (small woody plants whose branches grow from the base) cover at least 40% of the space. Consider shrubs taller than half a meter.	2
Dwarf shrubland	When shrubs less than 50 cm in height cover at least 40% of the space.	3
Herbaceous vegetation	When more than 60% of the space cover is covered by grasslands and herbs	4
Small grasses	Dominance of graminoid plants, or grasses (elongated leaves and parallel veins) less than 50 cm high.	43
Broadleaf weed	Dominance (more than 50%) of broad-leaved herbaceous plants where a midrib and secondary veins can be recognized. Many of the flowers fall into this classification.	44
Soil without vegetation	Soil with less than 40% vegetation cover with a limited capacity to support life (often due to lack of water). It is common to find fine soil, sand or rocks.	5
Wetlands	At least 40% of the area covered by estuaries, marshes, mangroves, wetlands. These are areas saturated with water	6
Riparian wetlands	Wetlands adjacent to a freshwater channel	61
Estuaries	Wetlands adjacent to a intertidal zone	63
Lake wetlands	Wetlands surrounding open water (e.g. ponds and lakes) which have a size greater than 1 hectare in size and more than 2 meters deep.	7
Open water	Lakes, ponds, rivers and oceans. All these bodies of water are more than 2 m deep and more than 1 ha in size.	71
Lakes, lagoons and rivers	It includes fresh open water	72
Sea	Salty open water	8
Green areas	When the soil is covered with more than 60% of non-native cultivated species. These are areas developed by people	
Agricultural areas	When the soil is used for different crops	81
Non-agricultural areas	When the soil is destined for gardens, parks, golf courses, etc.	82
Urban areas	When more than 40% of the land is allocated to areas developed for residential, commercial, industrial or transport uses.	9

Frequently Asked Questions

For a more detailed determination of the ecosystem, can we follow the GLOBE Program Classification protocol?

Of course, that would help a lot to have a proper classification of the type of ecosystem the students are describing.

Can we apply the GLOBE protocols we know to improve our description?

This would be the most advisable. For example, you could apply atmosphere protocols such as temperature or precipitation, and you could also use water transparency and soil pH and fertility protocols, for example.

Suggested Resources

- GLOBE Program MUC Field Guide: <https://bit.ly/3wYkhMV>

Bibliography

Kottek, M., Grieser, J., Beck, C., Rudolf, B., Rubel, F. 2006. World Map of the Köppen-Geiger climate classification Meteorologische Zeitschrift 15 (3) 259 - 263 DOI: 10.1127/0941-2948/2006/0130.

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