**Biotic or abiotic?**

An ecosystem is made up of populations of organisms interacting with each other and the environment in which they live.

**Biotic** parts of an ecosystem are the **living** parts of the ecosystem.

**Abiotic** parts of an ecosystem are the **non-living** parts of the ecosystem.

**To do in your pair**

Below is a list of parts of different ecosystems.

|  |  |  |  |
| --- | --- | --- | --- |
| birds | soil | waves | sand |
| weeds | rain | fish | mammals |
| clouds | rivers | plants | trees |
| wind | humans | decomposers | air |
| flowers | snow | insects | vegetables |

1. Decide which parts are biotic and which are abiotic.

|  |  |
| --- | --- |
| **Biotic parts of ecosystems** | **Abiotic parts of ecosystems** |
|  |  |

**To talk about in your pair**

1. Humans are biotic parts of ecosystems.

Explain why.

*Biology > Big idea BOE: Organisms and their environments > Topic BOE2: Organisms in their environments > Key concept BOE2.1: Ecosystem components and dynamics*

|  |
| --- |
| **Response activity** |
| **Biotic or abiotic?** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | The environmental conditions in different ecosystems, and in different parts of an ecosystem, affect and are affected by the organisms that live there. |
| Observable learning outcome: | Identify abiotic and biotic components of an ecosystem. |
| Activity type: | Classifying/sorting, discussion |
| Key words: | ecosystem, biotic, abiotic |

This activity can help develop students’ understanding by addressing the sticking-points revealed by the following diagnostic questions:

* Diagnostic question: Starter for ten
* Diagnostic question: What makes up an ecosystem

|  |  |
| --- | --- |
| **P** | **PRIOR UNDERSTANDING**  This activity explores ideas that are usually taught at age 5-11, to aid transition from earlier stages of learning. |

**What does the research say?**

Research suggests that students lack awareness and understanding of the interactions between the living (biotic) and non-living (abiotic) components of ecosystems. Work conducted by Adeniyi (1985) found some students aged 13-15 years old believed there was no interaction between living and non-living things in an ecosystem. Brehm et al. (1986) found that even some college students perceived that ecosystems consisted only of living things, and Prokop’s (2007) work with students aged 11-12 found that whilst students perceived living things as major components in ecosystems, they considered the abiotic components to be less essential than living things.

Word association tests have been used by researchers to identify misunderstandings about basic ecological concepts. Yucel and Ozkan (2015) using this technique found that students aged 12-14 when presented with the word ‘environment’ failed to mention non-living things other than air. Analysis showed that some of the words used by students, including ‘ecosystem’ and ‘biodiversity’, were being used because they were familiar from everyday life but without understanding of their scientific meanings.

Zak and Munson (2008) used concept maps to determine elementary preservice teachers’ understanding of ecology; they discovered that concepts such as abiotic and biotic were frequently not used, suggesting that unfamiliarity and failure to use these terms is not unique to young students.

**Ways to use this activity**

Students should complete this activity in pairs. The focus of the activity should be on group discussion to decide whether each component is a biotic or abiotic component of an ecosystem.

It is through the discussions that students can check their understanding and develop their explanations. Listening in to the conversations of each pair will often give you insights into how your students are thinking. The quality of the discussions can be improved with a careful selection of pairs, or by allocating specific roles to students in each pair. For example, you may choose to select a student with strong prior knowledge as a scribe, and forbid them from contributing any of their own answers; they may question the others and only write down what they have been told. This strategy encourages contributions from more members of each group.

After their discussions, each pair should be prepared to report the key points of their discussion to another pair, or to the class.

**Expected answers**

**Biotic** parts – insects, mammals, plants, humans, birds, fish, decomposers, trees, flowers, vegetables, weeds

**Abiotic** parts – soil, waves, sand, rain, clouds, rivers, wind, snow

**Acknowledgments**

Developed by Elizabeth Lupton (UYSEG).

**References**

Adeniyi, E. O. (1985). Misconceptions of Selected Ecological Concepts Held by Some Nigerian Students. *Journal of Biological Education,* 19(4)**,** 311-316.

Brehm, S., et al. and Michigan State Univ, E. L. I. f. R. o. T. (1986). Ecology: A Teaching Module. Occasional Paper No. 94.

Prokop, P., Tuncer, G. and Kvasnicak, R. (2007). Short-Term Effects of Field Programme on Students' Knowledge and Attitude toward Biology: A Slovak Experience. *Journal of Science Education and Technology,* 16(3)**,** 247-255.

Yücel, E. Ö. and Özkan, M. (2015). Determination of Secondary School Students' Cognitive Structure, and Misconception in Ecological Concepts through Word Association Test. *Educational Research and Reviews,* 10(5)**,** 660-674.

Zak, K. M. and Munson, B. H. (2008). An Exploratory Study of Elementary Preservice Teachers' Understanding of Ecology Using Concept Maps. *Journal of Environmental Education,* 39(3)**,** 32-46.