**What makes up an ecosystem?**

The photographs each show a different ecosystem.

**Part 1**

Look closely at the photograph.



Write down all the biotic and abiotic parts of the ecosystem.

|  |  |  |
| --- | --- | --- |
| **Biotic parts** | **Abiotic parts** | **Not part of the ecosystem** |
|  |  |  |

**Part 2**

Look closely at the photograph.



Write down all the biotic and abiotic parts of the ecosystem.

|  |  |  |
| --- | --- | --- |
| **Biotic parts** | **Abiotic parts** | **Not part of the ecosystem** |
|  |  |  |

**Part 3**

Look closely at the photograph.



Write down all the biotic and abiotic parts of the ecosystem.

|  |  |  |
| --- | --- | --- |
| **Biotic parts** | **Abiotic parts** | **Not part of the ecosystem** |
|  |  |  |

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

|  |
| --- |
| **Diagnostic question** |
| **What makes up an ecosystem?** |

**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. |
| Question type: | Classifying/sorting |
| Key words: | Ecosystem, biotic, abiotic |

|  |  |
| --- | --- |
| **P** | **PRIOR UNDERSTANDING**  This diagnostic question probes understanding of 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 question**

Students should complete the questions individually. This could be a pencil and paper exercise, or you could use the presentation with an electronic voting system or mini white boards.

*Differentiation*

You may choose to read the question to the class, so that everyone can focus on the science. In some situations it may be more appropriate for a teaching assistant to read for one or two students.

**Expected answers**

**Biotic parts**– all plants (grasses, trees, flowers, seaweed), horse, human, seals, badger, deer.

**Abiotic parts** – snow, wind, seawater, waves, sand soil, rocks, clouds, air.

Research suggests that some students do not realise that humans are part of an ecosystem. In this activity those that fail to note the horse and rider as part of the ecosystem may have this misunderstanding.

**How to respond - what next?**

If there is a range of answers, you may choose to respond through structured class discussion. Ask one student to explain why they gave the answer they did; ask another student to explain why they agree with them; ask another to explain why they disagree, and so on. This sort of discussion gives students the opportunity to explore their thinking and for you to really understand their learning needs. Responses often work best when the activities involve paired or small group discussions, which encourage social construction of new ideas (meaning making) through dialogue.

If students have misunderstandings about the difference between abiotic and biotic components of ecosystems or struggle to name examples of these components the following BEST ‘response activity’ could be used in follow-up to this diagnostic question:

* Response activity: Biotic or abiotic?

**Acknowledgments**

Developed by Elizabeth Lupton (UYSEG).

Images: horse riders – pixabay.com/mtkockar (3472330); seals –pixabay.com/Pexels (1283478); badger and deer in garden – pixabay.com/monithebest (688884)

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