**Ecosystems**



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

How do you feel about the statements in the table below?

Tick **one** box for each statement.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Statements** | | I am **sure** this is right | I **think** this is right | I **think** this is wrong | I am **sure** this is wrong |
| **1** | All ecosystems are large. |  |  |  |  |
| **2** | An area that has been made by man, such as an area of buildings, is an ecosystem. |  |  |  |  |
| **3** | The abiotic factors in an ecosystem determine which species can live there. |  |  |  |  |
| **4** | The abiotic factors in all ecosystems are the same. |  |  |  |  |

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

|  |
| --- |
| **Diagnostic question** |
| **Ecosystems** |

**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: | Recognise that there are different environmental conditions in different ecosystems, and this affects what lives there. |
| Question type: | Confidence grid |
| Key words: | ecosystem, abiotic, species |

**What does the research say?**

Students considered ecosystems as a larger region, and size was used as a decisive factor in discriminating between areas (Sander, Jelemenska and Kattmann, 2006).

A number of authors have noted the importance of learning about the interdependence (or “connectedness”) of organisms within ecosystems. As Allen (2014) has pointed out, “Anyone who is not able to fully appreciate the far-reaching impacts of changes to a single population may trivialize a media report about an endangered species, only believing that species alone is under threat, when the likelihood is that many members of an ecosystem will be adversely affected”. Many researchers have recognised the difficulties that school children have in reaching this kind of understanding, which seems to be due to misunderstandings of key ideas including how the biotic and abiotic components of ecosystems are organised, that they interact, and that they are interdependent/connected (e.g. Grotzer and Bell Basca, 2003; Sander et al., 2006).

**Ways to use this question**

Students should complete the confidence grids 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 questions 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**

1. All ecosystems are large – **wrong**
2. An area that has been made by man, such as an area of buildings, is an ecosystem – **right**
3. The abiotic factors in an ecosystem determine which species can live in there – **right**
4. The abiotic factors in all ecosystems are the same – **wrong**

There is no defined size that determines the classification of an area as an ecosystem. Many students think that ecosystems must cover large areas, perhaps this is because these are ecosystems that they are most familiar with. A student that states **A** is right is demonstrating that they have this misconception. It may be helpful to show students pictures of small ecosystems and ask that they use the definition of the term ecosystem to explain why it is indeed an ecosystem despite its small size.

A common misconception is for students to think that ecosystems can only be found in ‘natural’ areas. They therefore believe that a built-up area is not an ecosystem. Students identifying **B** as incorrect hold this misconception.

Many students have not considered that certain abiotic factors play a greater role in some ecosystems than in others, and that certain abiotic factors will only be present in certain ecosystems- students selecting **D** as right show 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 size or nature of ecosystems, it would be helpful to study and discuss ecosystems that are less familiar to them in terms of size and type. This could include the use of the school site. Students can identity the species that they are likely to find there and the physical (abiotic) conditions that allow the species to inhabit the site. The following BEST ‘response activities’ could be used in follow-up to this diagnostic question:

* Response activity: Where do you live?
* Response activity: The X factors
* Response activity: Urban fox

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Images: pixabay.com/ilyessuti (3123271)

**References**

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Grotzer, T. and Bell Basca, B. (2003). How does grasping the underlying causual structures of ecosystems impact students' understanding? *Journal of Biological Education,* 38(1)**,** 16-29.

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