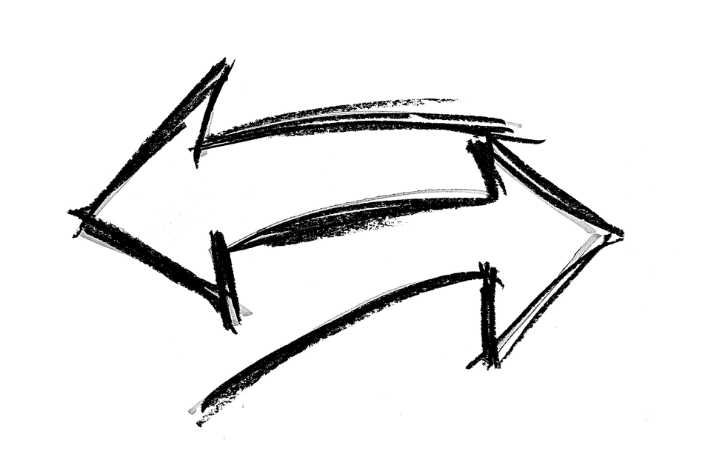
**Out and in**



Animals affect the environment they live in. They remove some substances from the environment and return substances to the environment. The substances they return may be returned in a different form to those they removed.

**To do in your pair**

1. The table lists some substances that animals may remove or add to their environment.

Place ticks in the boxes to show which substances you think animals remove from the environment and which substances you think they return to the environment.

|  |  |  |
| --- | --- | --- |
|  | **Substance removed** | **Substance returned** |
| Carbon dioxide |  |  |
| Oxygen |  |  |
| Water |  |  |
| Organic matter |  |  |

**To talk about in your group**

1. Organic matter is recycled in an ecosystem. Which organisms are responsible for this and why is it important that this happens?

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

|  |
| --- |
| **Response activity** |
| **Out and in** |

**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: | Describe ways in which animals change the environment they live in. |
| Activity type: | Discussion |
| Key words: | cycling, carbon dioxide, oxygen, water, organic matter |

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

* Diagnostic question: Animals and their environment

**What does the research say?**

All living organisms depend upon decomposers that can break down dead organic matter and make essential elements available for reuse. Research has found that school children generally do not appreciate the important roles of microorganisms in decomposition and the recycling of carbon, nitrogen and other elements, with many associating microorganisms only with disease and associating decay only with rotting food (Brinkman and Boschhuizen, 1989; Leach et al., 1992).

Research in the UK, USA, Portugal and Sweden has suggested that students’ ideas about what happens to dead organic matter generally follow a progression from age 5-6, as follows (Sequeira and Freitas, 1986; Smith and Anderson, 1986; Helden, 1992; Leach et al., 1992):

|  |  |  |  |
| --- | --- | --- | --- |
| **Age (years)** | **Thinking on what happens to dead organic matter** | **Thinking on the products of decomposition** | **Category of thinking about conservation** |
| 5 | No ideas. | There are no products, or products not considered. | Non-conservation |
|  | It simply disappears. |
| It breaks down over time by undefined ‘natural processes’. |
| It breaks down (or ‘rots’) of its own accord, and birds/rodents/insects/’bugs’ eat it. | Enriches/fertilises the soil/ground. | Partial conservation |
| Unspecified ‘microorganisms’ cause it to break down. | ‘Forms soil’ (and thus the Earth is continually getting bigger). |
| It is decomposed by bacteria and fungi. | Produces soil minerals. | Conservation |
| 16 | Decomposers use it as food. | Produces soil minerals, carbon dioxide and water. |

Research suggests that students are not aware of the role of decomposers in a cycling capacity within an ecosystem. It is important for students to appreciate that the interdependence of organisms within an ecosystem arises from more than just feeding relationships (Driver et al., 1994; Allen, 2014).

Sander et al. (2006) observed the misunderstanding that the dependence of organisms on climate and other abiotic factors was one-directional; they noted how students felt that organisms, except for humans, had no influence on the change of climate.

**Ways to use this activity**

Students should complete this activity in small groups. The focus of the activity should be on group discussion to complete the table. Students should decide if the substances listed are removed and/or returned to the environment.

It is through the discussions that students can check their understanding and develop their explanations. Listening in to the conversations of each group will often give you insights into how your students are thinking. The quality of the discussions can be improved with a careful selection of groups, or by allocating specific roles to students in each group. 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 group should be prepared to report the key points of their discussion to another group, or to the class.

**Expected answers**

|  |  |  |
| --- | --- | --- |
|  | **Substance removed** | **Substance added** |
| Carbon dioxide |  | X |
| Oxygen | X |  |
| Water | X | X |
| Organic matter | X | X |

**Questions**

1. Organic matter is recycled in an ecosystem. The organisms responsible for this are decomposers (bacteria and fungi). Cycling of organic matter is important as it returns nutrients to the soil which can be utilised by plants.

If students are not aware that animals remove oxygen from the environment and release the carbon dioxide produced during respiration back into the environment it may be helpful for students to revisit the Response activity BCL\_2\_2\_ Response \_ Flames.

If students struggle to answer the question about the role of decomposers it may be helpful to revisit a set of activities tackled earlier in the BOE unit. Diagnostic activity: What happens next and Response activity: No more microorganisms.

**Acknowledgments**

Developed by Elizabeth Lupton(UYSEG).

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