**No more microorganisms**

Some children talk about whether they would get rid of all the microorganisms from Earth.

**Dan**

They’re so small! It would make no difference if they disappeared.

**Harry**

Some microorganisms are very important in ecosystems.

**Amber**

I would get rid of them all. They only cause diseases!

**Tyler**

We depend on microorganisms. We have to keep them!

**Mia**

Without microorganisms we’d all be knee deep in dead bodies!

**Kate**

Nothing eats microorganisms, so nothing would starve if they no longer existed.

**To talk about in your group:**

1. Who do you **agree** with?
2. Who do you **disagree** with, and why?
3. How would you explain the right ideas to these children?

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

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| --- |
| **Response activity** |
| **No more microorganisms** |

**Overview**

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| 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: | Talking heads, discussion |
| Key words: | ecosystem, interdependence, decomposition, decomposers |

This activity can help develop students’ understanding of the important role of microorganisms in decomposition, by enabling them to explore their ideas through small group discussion. It can be used in response to the following diagnostic question:

* Diagnostic question: What happens next?

**What does the research say?**

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).

All living organisms depend upon microorganisms that can decompose 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).

In one study in Isreal, almost one third of teenagers said they would eliminate all microorganisms from Earth if possible (Barenholz and Tamir, 1987).

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 pairs or small groups, and the focus should be on discussion within the group. Students should work together to answer the questions on either the worksheet or the PowerPoint presentation. Giving each group one worksheet to complete between them is helpful for encouraging discussion, but each member should be able to report back to the class. Listening in to the conversations of each group will often give you insights into how your students are thinking.

If there is disagreement when you take feedback, a good way to progress might be 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.

*Differentiation*

You may choose to read the speech bubbles and 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.

The quality of the discussions can be improved with a careful selection of groups; or by allocating specific roles to students in the 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.

**Expected answers**

Students should **agree** with Harry, Mia and Tyler. We depend upon some microorganisms, including some bacteria and fungi, as decomposers – they decompose dead organic matter and make essential elements available for reuse. Students may also suggest some other helpful roles of microorganisms, including for example in the digestive system and industrial uses such as fermentation and synthesis of drugs.

Students should **disagree** with Amber, Dan and Kate. While the elimination of microorganisms would eliminate infectious diseases, the loss of microorganisms would be catastrophic to ecosystems due to the essential role of some bacteria and fungi as decomposers.

**Acknowledgments**

Developed by Alistair Moore (UYSEG).

Images: UYSEG

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