

The Effect of Pollution on Biodiversity

Answer the following questions:

1. Define the term deforestation.
The permanent removal of trees in forests to use land for a different purpose
2. State three human activities that reduce biodiversity.
Deforestation, waste disposal (landfill), peat bog destruction, quarrying, pollution (air and water)
3. State three actions that can increase biodiversity.
Habitat protection, reducing deforestation, recycling to reduce landfill, growing hedgerows on farms, (non-selective) breeding programmes
4. Name the piece of equipment used in both random and systematic sampling.
Quadrat
5. Identify a biotic factor that can affect a community
Availability of food, a new predator, disease



The Effect of Pollution on Biodiversity

B3.2.5

Science
Mastery



B3.2.1 Prior Knowledge Review

B3.2.2 Biodiversity

B3.2.3 How Humans Affect Biodiversity

B3.2.4 How Humans can Preserve Biodiversity

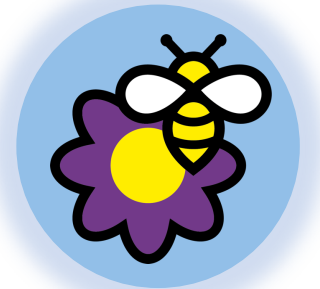
➤ **B3.2.5 The Effect of Pollution on Biodiversity**

B3.2.6 Global Warming

B3.2.7 Taking It Further: Pyramids of Biomass

B3.2.8 Taking It Further: Farming and Biotechnology

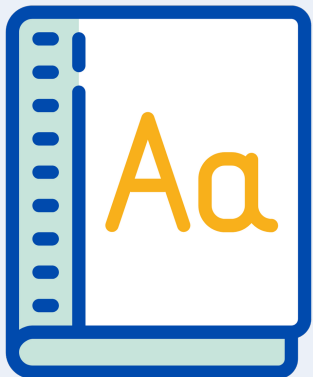
B3.2.9 Taking It Further: Food Security



Following this lesson, students will be able to:

- Describe the effect of the increasing human population on the amount of waste produced
- Describe the different types of pollution
- Describe some consequences of pollution

Key Words:



sewage

fertilisers

indicator species

contamination

leaching

This is the fix-it portion of the lesson

The **fix-it** is an opportunity to respond to gaps in knowledge, especially those identified by the previous lesson's exit ticket.

- The teacher should customise this slide as needed, to facilitate
 - **reteach, explanation, demonstration** or **modelling** of ideas and concepts that students have not yet grasped or have misunderstood.
 - **practise** answering specific questions or of key skills.
 - **redrafting** or **improving** previous work.

Answer the questions below.

1. Which of the following is not a way to maintain biodiversity?

- ☐ A. Protecting rare habitats
- ☒ B. Selective breeding programmes
- ☐ C. Reducing deforestation

2. Why would a farmer grow hedgerows on their farm?

- ☐ A. To use hedgerows as crops to sell
- ☐ B. To increase crop yield by making more space
- ☒ C. To increase biodiversity

3. Which of these actions would increase biodiversity?

- ☒ A. Maintaining nature reserves
- ☐ B. Introducing a new species into an ecosystem
- ☐ C. Using a selective breeding programme to produce more individuals with a desired characteristic

Exit ticket

Human Waste

The human population is approximately **7.7 billion**

The increase in population over the last century means there is a greater **demand** for **resources** and **more waste** is produced

Waste must be **treated** carefully to prevent pollution

Sources of **air** pollution include **smoke** and **acidic gases**

Sources of **land** pollution include **landfill**

Sources of **water** pollution include **sewage**, **fertilisers** and **toxic chemicals**



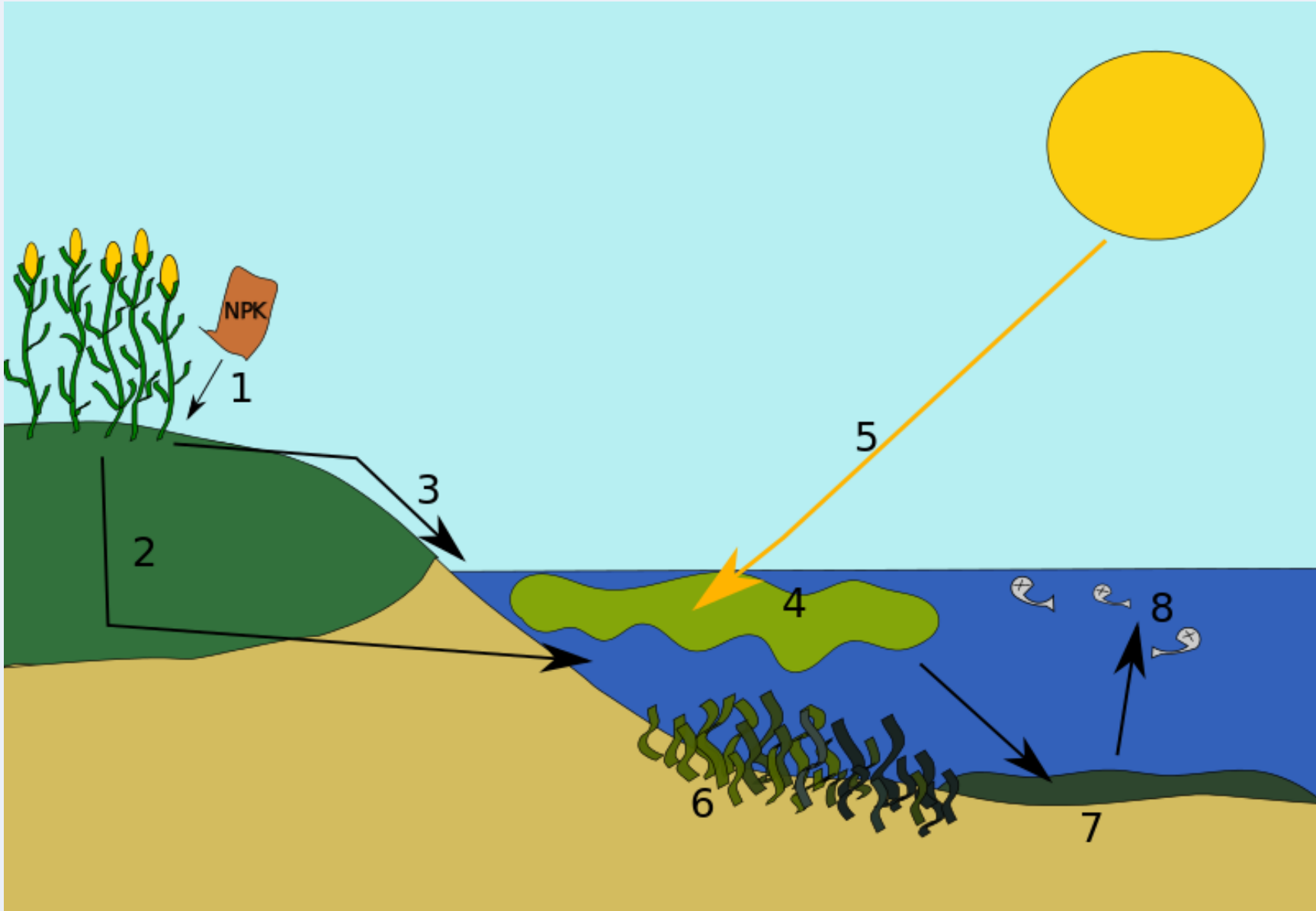
Waste water

The processing and treatment of waste water includes the following steps:

1. **Screening** and **grit** removal to take out large pieces
2. **Sedimentation** to separate sludge and effluent (the liquid that remains on top)
3. **Sludge** is digested by specific bacteria
4. **Effluent** is treated with specific bacteria and chemicals



Eutrophication



Quick Quiz

If these are the answers, what were the questions?

a. Greater demand for resources and more waste produced

What is the effect of the increasing human population?

b. Sewage, fertilisers and toxic chemicals

What are the sources of water pollution?

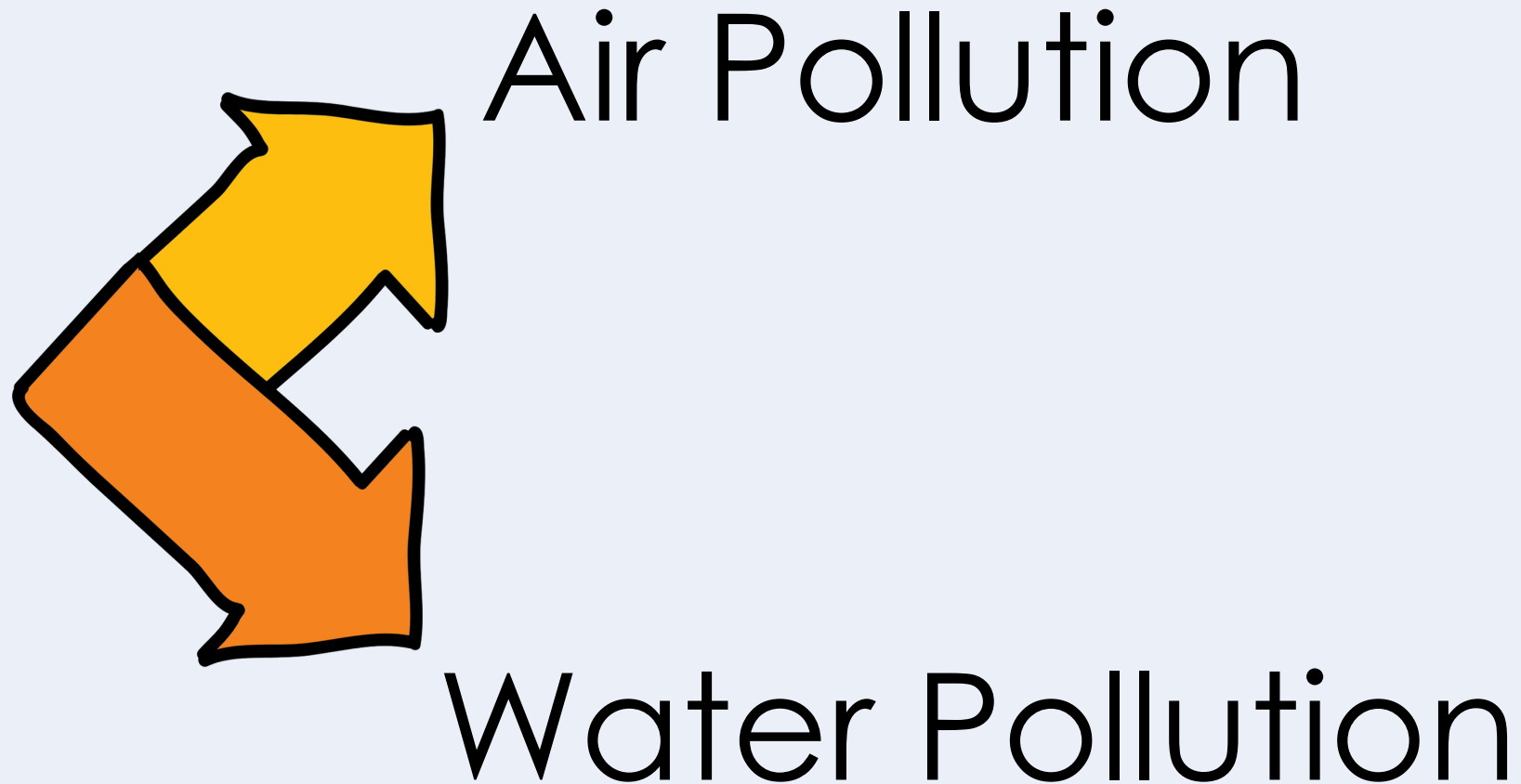
c. Production of any substances that are harmful to plants or animals

What is pollution?

d. Fertilisers run into bodies of water causing explosive plant/algae growth that ultimately result in 'dead zones' of water.

What is eutrophication?

Can you explain the difference between these types of pollution?



What are the causes?

What are the effects?

Stretch: which is more harmful?

Indicator species - lichen and air pollution

Indicator species are organisms that can tell us about the levels of pollution in an area by their presence or absence.



Bushy lichen
Clean air



Leafy lichen
Small amounts
of air pollution



Crusty lichen
Higher amounts
of air pollution

Indicator species - water pollution

Level of water pollution	Indicator species
Clean	Stonefly nymph
Some	Freshwater shrimp
Moderate	Bloodworm
High	Sludge worm
Very High	Absence of all living insects



Drill

1. State the sources of air pollution.
2. State a source of land pollution.
3. State three sources of water pollution.
4. In the process of treating wastewater, name the process to:
 - a) Remove large pieces
 - b) Separate sludge
 - c) What the sludge is treated with?
 - d) What the effluent is treated with?
5. Define eutrophication.
6. Define indicator species.

Drill answers

1. Smoke and acidic gases
2. Landfill
3. Sewage, fertilisers and toxic chemicals
4.
 - a) Screening and grit removal
 - b) Sedimentation
 - c) Bacteria
 - d) Bacteria and chemicals
5. Excessive growth of plant life in a river/lake due to the run-off of fertilisers from crops
6. Indicator species are organisms that can tell us about the levels of pollution in an area by their presence or absence.

I: Explain using *scientific understanding* to make something clear or *state the reason* for something happening

Example question:

Farmers put fertiliser on their fields. When there is a lot of rain, some of the fertiliser is washed into the river.

Explain the effect of the fertiliser on the growth of plants/algae in the river

Model answer:

- Fertiliser provides nutrients for plants/algae
- Plants/algae grow excessively

To 'explain' your answer should:

- Begin with a **scientific statement**.
- Use 'this means that', 'because' or 'so' **to link your statement to the question**.



We: Explain using scientific understanding to make something clear or state the reason for something happening

Example question:

Two groups of students were monitoring the oxygen concentration in a river.

The results of Group 1 show the lowest concentration of oxygen was at sampling position X, **directly below a field of farmers crops.**

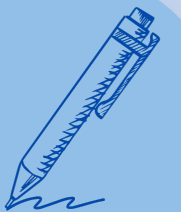
Explain why the concentration of oxygen was lowest at this point in the river.

Model answer:

- Fertiliser runs off into river
- Fertiliser causes growth of algae/plants
- Algae/plants block light
- Plants/algae die
- Microorganisms decay plants/algae
- Microorganisms respire so use O₂

To 'explain' your answer should:

- Begin with a **scientific statement.**
- Use 'this means that', 'because' or 'so' **to link your statement to the question.**



You: Explain using scientific understanding to make something clear or state the reason for something happening

Example question:

Farmers put fertiliser on their fields. When there is a lot of rain, some of the fertiliser is washed into the river.

This can cause the concentration of oxygen in the water to decrease

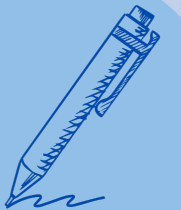
Explain why the concentration of oxygen decreases.

Model answer:

- Fertiliser causes growth of algae/plants
- Algae/plants block light
- Plants/algae die
- Microorganisms decay plants/algae
- Microorganisms respire so use O₂

To 'explain' your answer should:

- Begin with a **scientific statement**.
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Answer the questions below.

1. Which correctly explains why humans are now producing more waste?
 - ☐ A. Humans now have a worse quality of life, fewer resources are used
 - ☒ B. The human population has increased hugely over the last century
 - ☐ C. Many resources can now be recycled so we can throw away non-recyclable items

2. Which is a consequence of not treating waste water?
 - ☒ A. Contamination of water sources, leading to severe illnesses
 - ☐ B. Factories illegally leaking toxic chemicals into streams and rivers
 - ☐ C. Run off of fertilisers from farms after heavy rain

3. Why is pollution bad for many plants and animals?
 - ☐ A. Pollution kills all plants and animals
 - ☒ B. Pollution is harmful for many habitats and can spread toxic substances through food chains
 - ☐ C. Pollution increases biodiversity

Lesson B3.2.5

What was good about this lesson?

What can we do to improve this lesson?

[Send us your feedback by clicking this link](#)
or by emailing sciencemastery@arkonline.org
Thank you!