

Exercise walk-through

20.3

Pollution

IGCSE Biology

Water pollution: eutrophication

Plastic pollution is a major human impact on ecosystems.

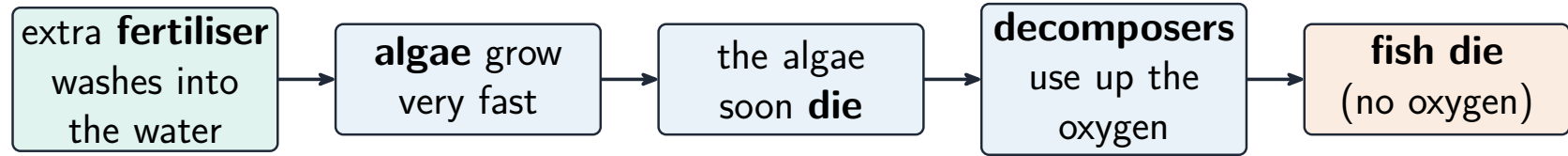
Eutrophication: extra fertiliser makes algae bloom, then the water loses its oxygen and fish die

Eutrophication, step by step

- 1. Fertiliser runs off** The fertiliser adds **nitrate ions** and other ions to the water.
- 2. Algae bloom** They grow fast and cover the surface, blocking light from the plants below.
- 3. Plants die** Without light the water plants die, and **decomposers** multiply on the dead material.
- 4. Oxygen runs out** The decomposers use up the oxygen in **aerobic respiration**, and the fish and insects suffocate.

The nitrate never poisons anything. The damage is done by what grows on it, and then by what decays.

Water pollution: eutrophication, in detail



Eutrophication: extra fertiliser makes algae bloom, the plants below die, and the decomposers use up the oxygen – so the fish suffocate

Plastics and climate change

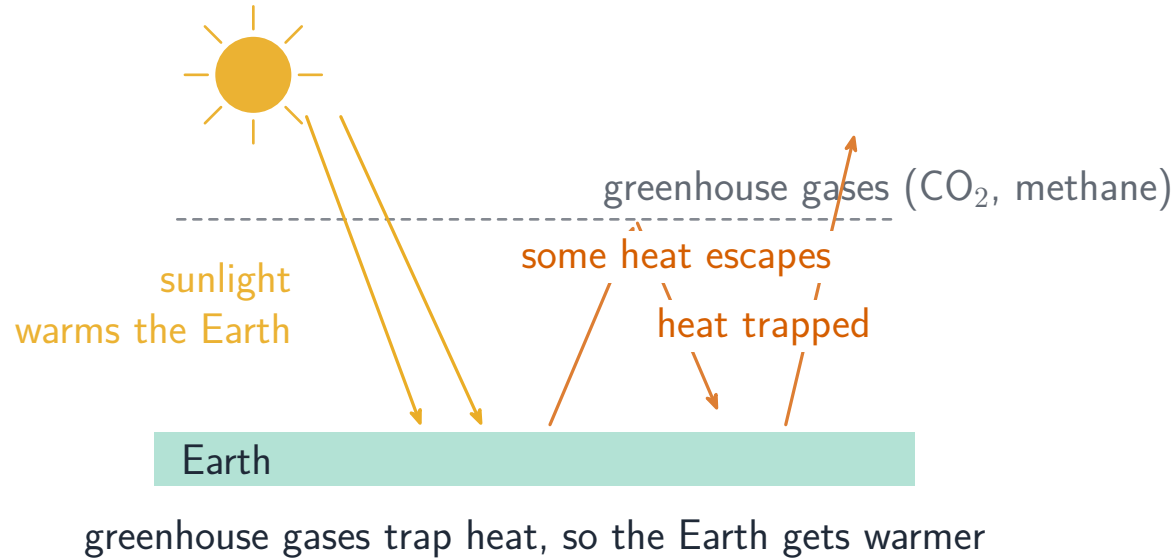
Non-biodegradable

plastics build up & harm wildlife.

**Greenhouse gases
greenhouse effect**

(CO₂, **methane**) trap heat, strengthening the
& driving climate change.

Plastics and climate change, in detail



Greenhouse gases trap heat leaving the Earth, so the Earth gets warmer

Exercises 2.1·2.2

2.1 Name two greenhouse gases.

[2]

2.2 State one problem caused by non-biodegradable plastics.

[1]

Exercises 2.1·2.2

2.1 Name two greenhouse gases.

[2]

2.1

- greenhouse gases: **carbon dioxide** and **methane**

2.2 State one problem caused by non-biodegradable plastics.

[1]

2.2

- non-biodegradable plastics **build up and harm wildlife** (eaten or trapped)

Exercise 3.1

3.1 In eutrophication, the fish die because:

[1]

☐

A the water becomes too cold

B decomposers use up the dissolved oxygen

C the algae eat the fish

D there is too much oxygen

Exercise 3.1

3.1 In eutrophication, the fish die because:

[1]

☐

A the water becomes too cold

B decomposers use up the dissolved oxygen

C the algae eat the fish

D there is too much oxygen

3.1 B

- decomposers **use up the dissolved oxygen**, so the fish die
- A, C and D are not how eutrophication kills fish

Exercise 3.2

3.2 Excess fertiliser runs into a river.

(a) Describe the steps of eutrophication that follow.

[4]

Exercise 3.2

3.2 Excess fertiliser runs into a river.

(a) Describe the steps of eutrophication that follow.

[4]

3.2

(a)

- fertiliser adds **nitrate**
- algae grow very fast then **die**
- decomposers use up **oxygen** in respiration
- dissolved oxygen falls, so **fish die**

Exercise 3.3 (a)

3.3 Fertiliser runs off farmland into a river. Over several weeks the river becomes cloudy, then the fish die.

(a) Name this process and describe, in the correct order, the **four** stages that lead to the fish dying. [5]

Exercise 3.3 (a)

3.3 Fertiliser runs off farmland into a river. Over several weeks the river becomes cloudy, then the fish die.

(a) Name this process and describe, in the correct order, the **four** stages that lead to the fish dying. [5]

(a)

- **eutrophication**
- nitrate/phosphate → **algal bloom**
- bloom **blocks light**, plants underneath die
- decomposers **multiply** on the dead material
- they respire and use up oxygen, so **fish suffocate**

Exercise 3.3 (b)

3.3 Fertiliser runs off farmland into a river. Over several weeks the river becomes cloudy, then the fish die.

(b) Explain why the fish die even though the plants were photosynthesising and making oxygen. [3]

Exercise 3.3 (b)

3.3 Fertiliser runs off farmland into a river. Over several weeks the river becomes cloudy, then the fish die.

(b) Explain why the fish die even though the plants were photosynthesising and making oxygen. [3]

(b)

- most photosynthesis is in the **surface bloom**, not throughout the water
- bacteria use oxygen **faster than it is replaced**
- at night the algae **respire too**, so oxygen falls too low

Exercise 3.3 (c)

3.3 Fertiliser runs off farmland into a river. Over several weeks the river becomes cloudy, then the fish die.

(c) Describe **two** problems caused by plastic waste in the sea.

[2]

Exercise 3.3 (c)

3.3 Fertiliser runs off farmland into a river. Over several weeks the river becomes cloudy, then the fish die.

(c) Describe **two** problems caused by plastic waste in the sea. [2]

(c)

- animals **swallow** plastic or become **entangled**
- plastic does not decompose and breaks into **microplastics** in food chains

Exercise 3.3 (d)

3.3 Fertiliser runs off farmland into a river. Over several weeks the river becomes cloudy, then the fish die.

(d) Explain how the greenhouse effect works, and name **two** greenhouse gases. [4]

Exercise 3.3 (d)

3.3 Fertiliser runs off farmland into a river. Over several weeks the river becomes cloudy, then the fish die.

(d) Explain how the greenhouse effect works, and name **two** greenhouse gases. [4]

(d)

- short-wave radiation warms the Earth's surface
- the surface re-radiates **longer-wave heat**
- greenhouse gases **absorb** it and send some back down
- gases: **carbon dioxide** and **methane**