AP ENVIRONMENTAL SCIENCE • EXERCISE SHEET

8.5 Eutrophication

Name: _____ Class: _____ Date: _____ **Total: 10 marks**

Objective

Build the skills to answer exam questions on **eutrophication**.

You must be able to:

- explain the **eutrophication** 富营养化 sequence
- link nutrients to algal blooms and oxygen loss
- describe **hypoxia** 缺氧 / dead zones

1 Worked examples

Study these first. Each one shows the method for a question type used later —follow the steps and you can do the Practice and Exam-style questions yourself.

The eutrophication sequence

1. **Excess nutrients** (nitrogen, phosphorus) enter water —usually from fertilizer runoff or sewage.
2. **Algal bloom** —algae grow explosively, covering the surface.
3. Algae **die** and **decompose**.
4. **Decomposers use up oxygen**, causing **hypoxia** (low oxygen).
5. Fish and other organisms **suffocate** —a **dead zone**.

The key cause

The nutrients that normally **limit** algal growth (especially phosphorus) become abundant, so algae grow out of control.

A worked link

Fertilizer runs off a farm into a lake → algal bloom → algae die → decomposers deplete oxygen → fish die.

Dead zones

Large **dead zones** (e.g. the Gulf of Mexico) form where big rivers deliver farm nutrients to the sea.

2 Practice

Now apply the methods above.

2.1 What nutrients cause eutrophication? [1]

2.2 What happens to oxygen levels during eutrophication? [1]

2.3 What is a dead zone? [1]

3 Exam-style questions

3.1 Fish die during eutrophication because decomposition of algae [1]

- **A** adds oxygen
- **B** uses up the oxygen (causing hypoxia)
- **C** removes nutrients
- **D** cools the water

3.2 Fertilizer runs off farmland into a lake.

(a) Describe the sequence that leads to fish deaths. [3]

(b) State one way to prevent this. [1]

3.3 Explain why adding phosphorus in particular can trigger a bloom. [2]

4 Go further

You are now ready for the real exam questions on this subtopic:

- work through the **8.5 Eutrophication** lesson on the **Learn** page;
- read the **Eutrophication** section of the AP Environmental Science handout on the **Know** page.

Solutions

2.1 Nitrogen and phosphorus.

2.2 Oxygen is depleted (hypoxia).

2.3 An area of water with too little oxygen to support most life.

3.1 B —uses up the oxygen (causing hypoxia).

3.2 (a) Excess nutrients cause an algal bloom; the algae die and decompose; decomposers use up the oxygen, so fish suffocate. (b) Any one: buffer strips, reduced fertilizer, better sewage treatment.

3.3 Phosphorus is usually the limiting nutrient, so adding it removes the limit and lets algae grow explosively.