Why is excess nutrient pollution in the River Cleddau a problem?

The River Cleddau is classified as **hyper-nutrified**, meaning it contains much higher levels of nutrients than a healthy river should. It also fails the **Trophic Diatom Index (TDI)**, a biological test that uses microscopic algae called diatoms to indicate river health. The results show that species which thrive in nutrient-rich conditions are disproportionately abundant, indicating that the river is under significant nutrient pressure.

What are diatoms and algae?

Diatoms, algae and cyanobacteria ("blue-green algae") are tiny aquatic organisms that form an important part of river ecosystems. Like plants, they use sunlight to convert carbon dioxide and water into energy through photosynthesis, producing oxygen as a by-product.

These organisms form the base of the aquatic food web. Small aquatic animals (zooplankton and invertebrates) feed on them, fish feed on those animals, and larger wildlife depends on this chain. In a healthy river, algae and diatoms are naturally present and are kept in balance by grazing animals and the availability of nutrients.

Not all algal growth is harmful. Seasonal increases are normal, particularly in spring when warmer temperatures and longer daylight hours encourage growth.

What causes the imbalance?

Problems occur when excessive amounts of nutrients, particularly **phosphorus and nitrogen**, enter rivers from sources such as:

- Agricultural runoff and livestock waste
- Wastewater treatment works
- Septic tanks
- Urban runoff from roads and developed areas

These nutrients act like fertiliser, stimulating excessive growth of algae and other microscopic organisms. This process is known as **eutrophication**.

Warmer temperatures can make the problem worse by increasing growth rates and extending the period when blooms can develop.

How does this affect aquatic life?

Excessive algal growth can have a range of impacts on the river ecosystem.

Reduced light and habitat loss

Dense growth of algae can make the water cloudy and reduce the amount of sunlight reaching the riverbed. As a result, submerged plants may struggle to grow or disappear altogether.

Aquatic plants provide food, shelter and spawning habitat for fish, insects and other wildlife. Their loss can therefore affect many other species throughout the ecosystem.

Reduced oxygen levels

Although algae produce oxygen during daylight, they also respire continuously and consume oxygen, particularly at night.

When algal populations become very large, oxygen levels can fall significantly overnight. In extreme cases, this can stress fish and invertebrates or even lead to fish deaths.

A second problem occurs when blooms die off. Bacteria decompose the dead material and use large amounts of dissolved oxygen (DO) in the process. These sudden drops in oxygen ("DO sags") can be particularly damaging to aquatic life.

Changes to the food web

An overabundance of nutrient-loving species can alter the balance of the river ecosystem.

Some species become dominant while more sensitive plants, algae and invertebrates decline. This can reduce biodiversity and create a less healthy and less resilient river environment.

Physical impacts on fish

In severe blooms, large quantities of algae can irritate or clog fish gills, making it harder for fish to breathe and increasing stress on already vulnerable populations.

What about blue-green algae?

Some cyanobacteria (blue-green algae) can produce toxins that are harmful to people, pets, livestock and wildlife.

These harmful blooms are most common in nutrient-rich ponds, lakes and reservoirs, but they can also occur in slow-moving or nutrient-enriched rivers. Exposure can cause skin irritation, illness and, in extreme cases, serious harm to animals that drink affected water.

However, it is important to note that **not all algal blooms are toxic**, and not every nutrient-enriched river will develop harmful blue-green algal blooms.

Why does the TDI failure matter?

The Trophic Diatom Index does not simply measure how much algae is present. It looks at the types of diatoms living in the river. Certain species are strongly associated with elevated nutrient levels, while others are found in cleaner waters.

When nutrient-tolerant species dominate, it provides evidence that the ecological balance of the river has shifted away from natural conditions.

In the Cleddau, the TDI results indicate that nutrient enrichment is influencing the biological community. This matters because it can lead to poorer water quality, reduced biodiversity, degraded habitats and greater vulnerability to environmental pressures such as warmer temperatures and low river flows.

In summary

The Cleddau's TDI failure shows that nutrient-loving diatom species are dominating the river, reflecting excessive nutrient inputs. While algae and diatoms are essential components of healthy river ecosystems, too many can reduce water quality, block light, lower oxygen levels and alter the balance of aquatic life. Over time, these changes can harm fish, invertebrates, aquatic plants and the overall health and resilience of the river ecosystem.