Algal bloom crisis

What are algae?
Algae range in size from microscopic bacteria or plants to large plants such as kelp. Algae are important in water as they use carbon dioxide, nutrients and sunlight to make their own food (by a process called photosynthesis) and to produce oxygen. Water must contain oxygen so that many aquatic animals can survive. Algae are also an important source of food for animals.

Cyanobacteria are microscopic bacteria also called ‘blue-green’ algae. They are quite common in waterways in Australia. Check out some images of cyanobacteria at the Cyanobacteria web links listed in the References below.

How does an algal bloom occur?
An algal bloom means that algae have increased so much that they can take over the water community. If too many nutrients enter a waterway, algae numbers can quickly increase. Nutrients can come from farms as fertilisers and animal wastes transported in agricultural drains or overland flow, from grey water in urban areas, or from sewage discharge.

With increased nutrients, slow-flowing or still water and warm, sunny conditions, algal blooms grow very quickly and can form a greenish scum on the water surface. Eventually, there are so many algae that all the nutrients are used up and the algae begin to die. A lot of oxygen is used up when algae die and decompose (break down), which means other aquatic animals can’t get enough oxygen and may die too.

What are the consequences of an algal bloom?
Algal blooms block light that enters the water. Aquatic plants will not be able to produce their own food and die. If drinking water becomes contaminated it cannot be used and water would need to be brought in from another source.

Toxins (poisons) from the break down of blue-green algae can cause skin rashes and eye irritation. Recreational activities such as swimming, boating and fishing can no longer take place in water with algal blooms. If swallowed, the water can cause vomiting, nausea and diarrhoea. The water can also smell unpleasant. Wildlife and farm animals can become sick and even die if they drink it.

How can algal blooms be managed?
Algal bloom events can be reduced if:

- nutrients (chemicals and fertilisers) are not allowed to enter rivers and streams. This is the best means of controlling algal blooms.
- oxygen is added to the water and sediments are treated so that algae are less likely to bloom
- water is added to rivers from storage dams to flush the system so that more nutrients are lost from the water body.

Barwon-Darling River algal bloom
The world’s longest stretch of poisoned river occurred in the summer 1991–92 in the Barwon–Darling rivers. The New South Wales Government declared a state of emergency because of the extent of this bloom. The bright green water spread for 1000 kilometres and the cyanobacteria produced toxins that caused some people to become sick, and some animals to become sick and die. Drinking water had to be brought in to the area. Freshwater plants and animals, agriculture and tourism were severely affected. Check out the Barwon–Darling algal bloom web link listed below in the References for more information on this event, and to view some photographs.
Use information in this worksheet and in the sources listed in the References to complete the following activities.

1. What are the main causes of algal blooms?

2. Algal blooms can occur in a river system that is out of balance. What does this mean? Refer to ‘inputs’ and ‘outputs’ in your answer.

3. Explain why algal blooms are a problem for waterways.

4. Design an eye-catching poster for distribution near waterways in your state or territory that alerts people to strategies they can adopt to prevent nutrients entering the waterways.

5. Use an atlas to locate the Barwon–Darling rivers. Locate Bourke, where the 1991–92 algal bloom outbreak occurred. Use the scale on the map to track 1000 kilometres of this river system. Use your own words to describe the extent of this environmental disaster.
6. Complete the algal bloom cycle below by writing the appropriate text to match the numbers in the diagram.

- Drinking water from areas affected by algal blooms becomes contaminated.
- Algal blooms prevent aquatic plants from getting enough light and may kill them.
- When the nutrients are all used up, the blue-green algae begin to die and decompose.
- These conditions are usually set when increased amounts of nutrients enter a river from farms or urban areas.
- This means that wildlife and farm animals that drink water affected by algal blooms can become sick.
- As the algae progressively decay, they use up a lot of oxygen in the water.
- Given the right conditions, algal blooms can grow very quickly.
- Recreation activities in and around water affected by algal blooms will be limited, in case people, too, swallow the water or get it on their skin or in their eyes.
- Algal blooms kill aquatic animals by depriving them of sufficient oxygen. The water becomes very smelly.