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Science Writing

Year 7 - 8

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Government of South Australia
Department for Education

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When Water Turns Green: The Hidden Danger of Algal Blooms

Every year, waterways around the world turn bright green, choking life beneath the surface—this is the impact of algal blooms. Algae are little organisms that live in oceans and bodies of water. These organisms use photosynthesis to produce energy from the sun – they don't even need to eat to survive! Let's explore how these tiny organisms are changing oceans around the world.

What Are Algal Blooms?

Algae are small creatures living in our oceans. They have a normal lifespan of 6-10 years and usually perish due to sudden temperature changes or when they are deprived of the sunlight they need to live (Vidyasagar, 2016). "The term algae covers many different organisms capable of producing oxygen through photosynthesis" (Live Science, 2016). Some of these organisms produce toxins. An algal bloom occurs when those toxin-producing algae multiply rapidly in a body of water (NOAA, 2016). As shown in figure 1, algal blooms are not visible at a microscopic scale but are completely visible to the naked human eye, highlighting how dangerous they are in size and intensity.

Figure 1: Harmful algal bloom and its impacts in South Australia, Aussie Animals, 2025

Why Do Algal Blooms Happen?

Algal blooms are caused by algae, the tiny, microscopic organisms that thrive and live in marine ecosystems; but how and why do these creatures create such a massive problem. When toxin-producing algae grow extremely fast in a body of water, it creates an algal bloom (NIH, 2026). These blooms occur naturally, but studies show that human-driven actions increase the size and intensity of the blooms (NOAA, 2016). As well as increased nutrient loadings and pollution, food web changes, introduced species, water flow variations, and climate change all contribute to the growth of algal blooms (NOAA, 2016).

How Do Excess Nutrients Fuel Algal Blooms?

Nutrient pollution occurs in the situation of an oversupply of the essential plant nutrients nitrogen and phosphorus. These elements enter waterways from many places, some including industrial and wastewater treatment plant discharges, fertilizers, septic tanks, and stormwater runoff from civil areas, farms, and urban areas. When the combinations of nitrogen and phosphorus increase rapidly in a water body, the right combination of temperature, sunlight, and low water flow can trigger an algal bloom; even though nitrogen and phosphorus appear naturally and are essential plant nutrients, too much and excessive quantities of these nutrients can cause significant imbalances and trigger an algal bloom (St. Johns River, 2026).

The Dangers of Algal Blooms

Algal blooms can damage the environment by decreasing oxygen levels in the water, which can kill fish and other living creatures. A bloom that develops near the water surface can also block sunlight from reaching organisms deeper in the water. This does not allow other plants and animals in the water to get the sunlight that they need to survive. Heavy, dense blooms can also clog the gills of fish, amphibians, and other animals, restricting them from breathing (Government of South Australia, 2026). Producing toxins is the primary way harmful algal blooms make people and animals ill. Toxins can be in the cells of the algae or discharged into the water. Humans and animals only become ill once they come into contact with these toxins via water (swimming, drinking, etc.) or food (seafood) (CDC, 2024).

Harmful vs Nuisance bloom

A handful of blooms can be harmful, as shown in Figure 2; however, not all algal blooms are dangerous. These blooms are known as nuisance blooms (Figure 3); they can discolour the water, smell horrid, and cause water and/or fish/seafood to taste off. Nuisance blooms are not harmful to people and animals as they do not produce toxins. Nevertheless, they can intimidate or scare people, discouraging them from visiting beaches, drinking tap water, or eating fish from water with an ongoing algal bloom.

Figure 2: Harmful Aglae Bloom, NOAA, 2016

Figure 3: Nuisance Aglae Bloom, Friends of Casco Bay, 2026

It is practically impossible to tell if a bloom is a harmful or nuisance bloom from simply inspecting it with no equipment. Testing the water for toxins is the only way to be completely sure if an algal bloom is harmful or not. Overall, it is safer not to come into contact with water if unsure whether the bloom is harmful or not (CDC, 2024).

How do Algal Blooms impact us?

Algal blooms have many impacts on humans and the environment. One major impact is how they are damaging the environment, as stated, before blooms can decrease the oxygen levels in the water; therefore, killing the marine life day by day (NIH, 2026). They can also be costly in economic terms as well. Harmful algal blooms cause about $82 million in economic losses in South Australia to the seafood, restaurant, and tourism industries each year. Blooms reduce tourism, close beaches, and restrict fishermen from fishing in waters with algal bloom (NOAA,2024).

That $82 million can take a long time to recover after algae blooms have completely gone away, and with ongoing blooms it can take up to decades to recover the loss.

Alongside environmental and economic impacts algal blooms can have serious health risks and impacts. For example, consuming fish or seafood containing or contaminated by toxins can lead to paralytic shellfish poisoning, which can lead to paralysis or even cause a person to pass away. “The algae Pseudo-nitzschia produces a toxin called domoic acid that can cause vomiting, diarrhea, confusion, seizures, permanent short term memory loss, or death, when consumed at high levels” (NIH,2026).

Algal Blooms in South Australia

Algal blooms are not rare events limited to only a few waterways on Earth; in 2025, a major bloom reached its peak in South Australia. The dangerous bloom taking over South Australia's coastline is Karenia Mikimoto (Figure 4). The microscopic algae dominating beaches all over South Australia are not visible to the naked human eye. However, their dangerously high populations along South Australian beaches have made them visible.

Figure 4: Karenia Mikimoto viewed under a microscope, ABC News, 2025

So, what caused this algal bloom in South Australia? There are a couple of reasons and factors that contributed to South Australia’s algal blooms. One of the biggest factors was the change in climate. South Australia averaged two and a half degrees warmer than usual, algae can grow and multiply rapidly in warmer climates and temperatures. Another factor is nutrient overdose; a few years ago, the Murray floods occurred, introducing a lot more nutrient rich water to South Australia’s coastlines, serving as an energy source for the algae. Another source of nutrition for algae is when deep ocean water (richer in nutrients) mixes with surface water. While all this was happening, the third factor was aiding the whole process, the still waters. When oceans and water are calm, it allows algae to grow quickly. This happens because in still waters, a warmer layer forms on top, allowing algae to access heat and sunlight, giving effortless access to sunlight, therefore making it very easy to photosynthesize, grow, and multiply.

How can we reduce algal blooms?

While it cannot be guaranteed that changing one habit or starting a new one can completely stop algal blooms, it can definitely make an impact on the size and danger of the algal bloom. Some examples of things that we can do to reduce algal blooms include:

Better waste management: Factories and workplaces can dump excess chemicals into streams, rivers, and lakes, eventually leading into the ocean, where the extra nutrients and toxins are what the algae are waiting to thrive in (Better Planet Education, n.d). This chemical waste can be better managed through industrial recycling or hazardous Wasteland fills instead of being disposed of into our waterways.

Timing of farming: As South Australia is a highly agricultural state, a major cause of algal blooms is the runoff of fertilisers from farmland. Fertilisers contain nutrients such as nitrogen and phosphorus, which promote rapid algae growth when they enter waterways. During rainfall or irrigation, these nutrients can be washed into rivers and eventually the ocean, leading to nutrient overload and algal blooms.

In addition, waste from animal farming can also contribute excess nutrients to the water. While pesticides are used to protect crops by killing pests, they are not the main cause of algal blooms. However, they can still harm marine ecosystems if they enter waterways through wind or runoff

Not only can these chemicals harm marine life, but excess nutrients from fertilisers act as a food source for algae, leading to nutrient overload and rapid algal growth. To reduce these impacts, measures can be put in place such as using fertilisers efficiently, minimising water runoff from farms, and avoiding chemical application during times of strong winds and/or heavy rainfall.

Conclusion

Algal blooms are a serious environmental issue that affects our ecosystems, human health, and the economy. While algae are a natural and important part of aquatic life, human activities such as pollution and climate change have increased the frequency and intensity of harmful blooms. These blooms can damage marine life, contaminate water, and impact industries like tourism and fishing. Although algal blooms cannot be completely prevented, actions such as reducing nutrient pollution and improving environmental practices can help minimise their effects and occurrences. Understanding algal blooms is essential in order to protect our waterways and ensure a healthier future for both people and the environment.

WORD COUNT: 1,431

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