

Gardens of algae

What are algae?

Algae are a large and varied group of plants found in most water environments including rivers, lakes, estuaries, hot springs, glaciers, and oceans. Like all plants, algae photosynthesise, producing energy and oxygen from sunlight.

Microalgae or 'phytoplankton' are single-celled species of algae that float freely in the water. Microalgae come in a variety of shapes—some have ornate outer skeletons made of silica, while others have whip-like tails called flagella. Microalgae occur naturally in all waterways, but some types are toxic. Some microalgae belong to the large group called *cyanobacteria*, better known as blue-green algae.

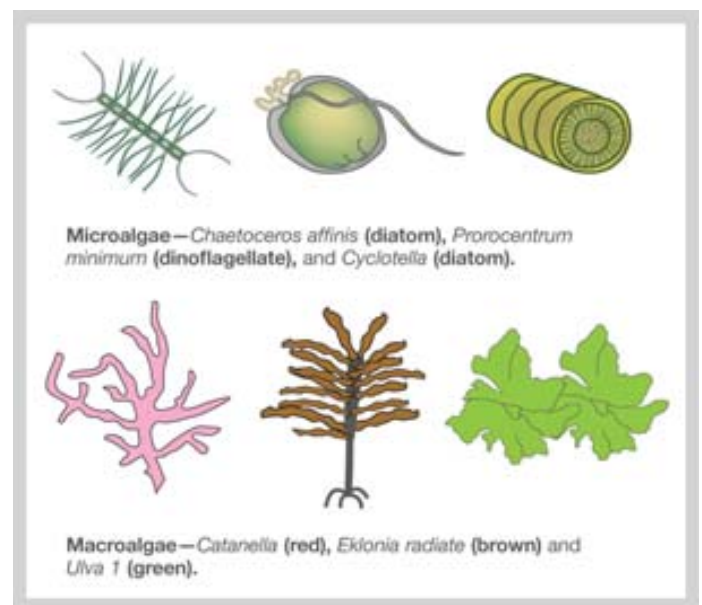
Macroalgae are multi-celled species of algae such as seaweeds. Macroalgae come in a variety of colours such as red (*rhodophytes*), brown (*phaeophytes*), and green (*chlorophytes*). Their colour depends on their photosynthetic pigments—the pigments that capture energy from sunlight. Some macroalgae, such as kelp, can form large underwater forests.

Algae in South East Queensland

The waterways of South East Queensland (SEQ) teem with algae. In streams, microalgae are an important food source for microscopic animals called 'zooplankton' and for invertebrates such as insect larvae and crustaceans. In estuarine and marine areas, microalgae are also the food for filter feeders such as mussels and oysters. These smaller creatures, in turn, are the food sources of larger fish, and birds.

Microalgae called 'microphytobenthos' forms a vast, hidden 'garden' in the shallows of estuaries and can also be found around Moreton Bay. This garden sometimes looks like a fine green layer in the mud.

"A lot of people don't like algae because they can be smelly and slimy. But algae are the most important plants in the aquatic system because they form the base of the food chain!"



Diagrams are often used to show the range of algae shapes and colours.

In South East Queensland, macroalgae are found in rocky areas, mangroves, and in seagrass habitats. For example, a red, sponge-like macroalgae called *Catenella* lives in mangrove habitat, attaching itself to the mangroves' aerial roots (pneumatophores) and soaking up nutrients from the surrounding water.

Algal blooms

Each algal species has particular nutrient, light, salinity, and pH requirements that are necessary for them to survive and grow. However, under certain conditions, some algae can grow rapidly or 'bloom', taking over an aquatic environment. Algal blooms can occur naturally, and may happen regularly in both marine and freshwater systems.

Natural algal blooms depend on the weather and on water conditions. Blooms generally occur when high nutrient levels in the water combine with warm, sunny, calm conditions.



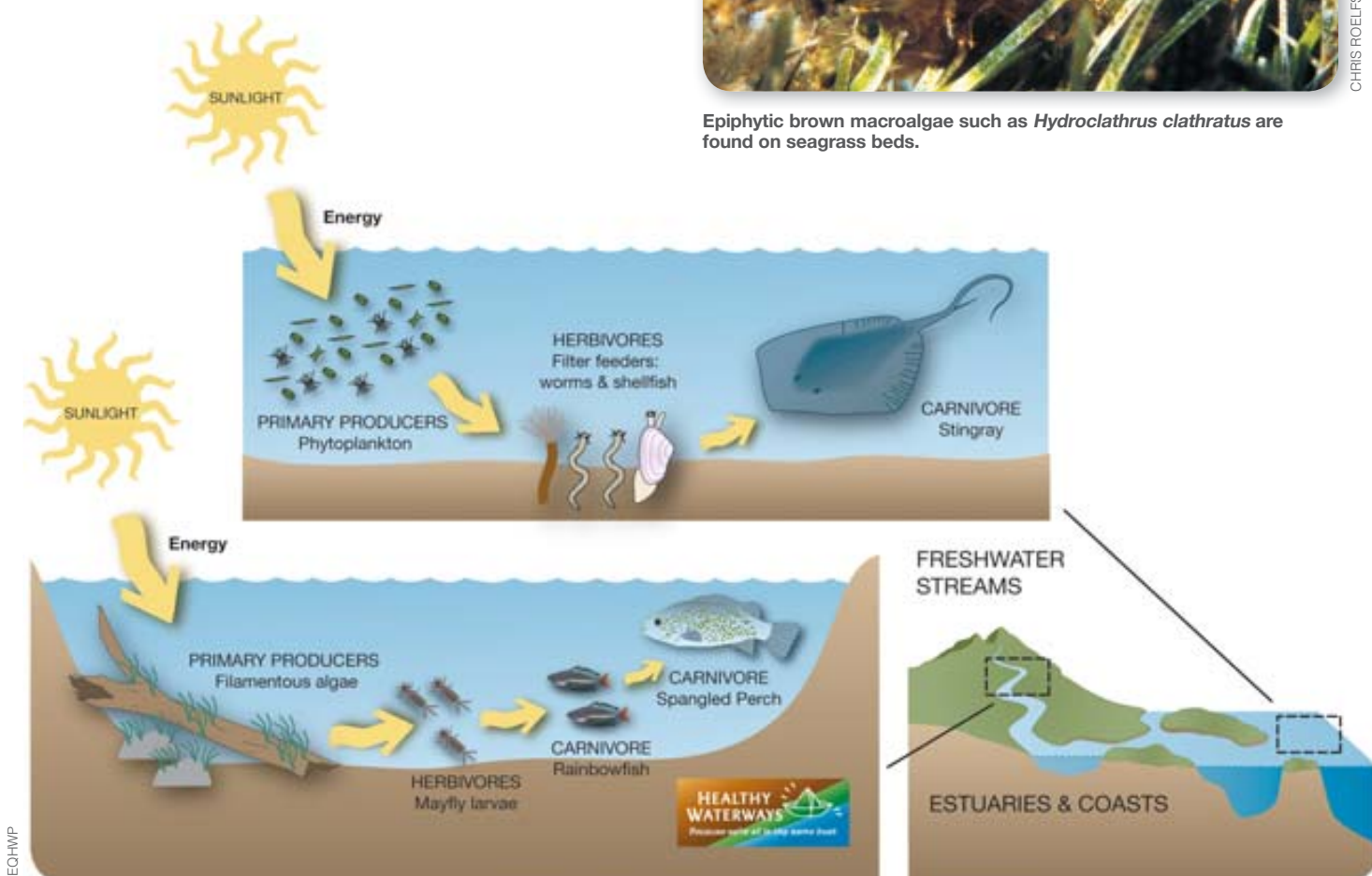
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Mangrove roots and pneumatophores provide habitat for a range of macroalgal species including *Catenella nipae*.



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Epiphytic brown macroalgae such as *Hydroclathrus clathratus* are found on seagrass beds.



Algae are the bottom of the aquatic food chain. They are primary producers capturing the sun's energy and making it available to other organisms.



Increased nutrients in waterways as a result of human activities are increasingly contributing to algal blooms.

Algal blooms can cause aquatic plants to die when dense mats of algae block the sunlight and suffocate the plants and other types of water life. When the algae die after the bloom, they also use up the oxygen in the water. This is called 'eutrophication' and reduces the amount of oxygen available to other marine life. As they decay, some algae release harmful toxins into the water.

Blooms of toxic marine blue-green algae, such as *Lyngbya majuscula*, occur in South East Queensland and can cause eye, skin, and respiratory irritation for both humans and animals. Blooms of blue-green algae in freshwater systems can cause extensive problems, particularly if they are found in reservoirs used for drinking water. Additional water treatment is needed to remove unpleasant smells and tastes from the water as a result of the bloom. Livestock can be poisoned if they drink water contaminated with algal toxins.

Since the mid-1990s, coastal algal blooms have increasingly affected the inshore waters of South East Queensland. The increasing number and severity of blooms is most likely related to changes in water quality due to increasing population, land use changes within catchments, and due to climate change.



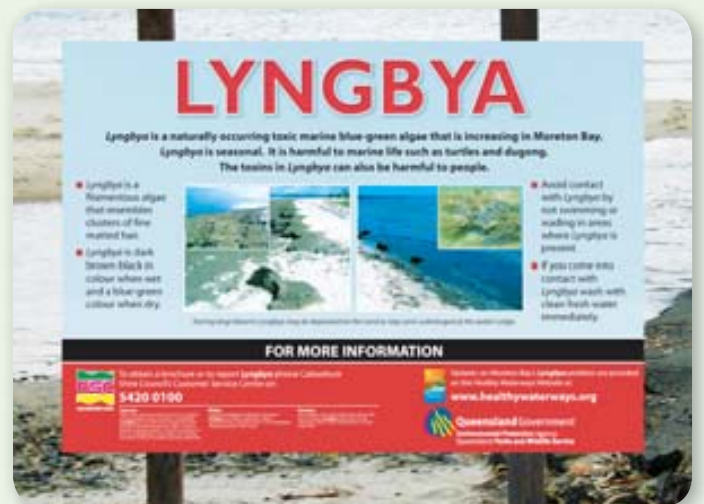
An algal bloom (*Lyngbya*) washed up on a Bribie Island beach.

The SEQ Healthy Waterways Strategy

The SEQ Healthy Waterways Partnership is a collaboration between government, industry, researchers, and the community. *The SEQ Healthy Waterways Strategy 2007–2012* contains over 500 actions, committed to by the Partners, to improve the health and protect the values of our waterways.

Many of these actions within the Strategy are aimed at preventing excessive nutrients entering waterways. *The Coastal Algal Bloom Action Plan* has the following target:

'By 2026, the intensity, frequency, and extent of existing coastal algal blooms have been reduced in all South East Queensland estuarine and marine waterways, with their impacts minimised and no new bloom events occurring.'



A *Lyngbya* information sign warns about the hazards of this marine blue-green algae.

Key Fact

There are approximately 275 species of macroalgae found in Moreton Bay. This is about 40% of all macroalgae found in Queensland.



Key Learning Area

By the end of Year

Essential Learnings

Science	7	<p>Ways of working—Students are able to collect and analyse first- and second-hand data, information, and evidence.</p> <p>Knowledge and understanding—Science as a human endeavour:</p> <ul style="list-style-type: none"> Ethical considerations are involved in decisions made about applications of science. Scientific knowledge can help to make natural, social, and built environments sustainable, ranging from local to global scales. <p>Knowledge and understanding—Life and living:</p> <ul style="list-style-type: none"> Cells are the basic unit of all living things and perform functions that are needed to sustain and reproduce life. Survival of organisms is dependent on their adaptation to their environment. Different feeding relationships exist within an ecosystem.
	9	<p>Ways of working—Students are able to research and analyse data, information, and evidence.</p> <p>Knowledge and understanding—Life and living:</p> <ul style="list-style-type: none"> Changes in ecosystems have causes and consequences that may be predicted. In ecosystems, organisms interact with each other and their surroundings. <p>Knowledge and understanding—Science as a human endeavour:</p> <ul style="list-style-type: none"> Immediate and long-term consequences of human activity can be predicted by considering past and present events.
SOSE	7	<p>Ways of working—Students are able to collect and analyse information and evidence from primary and secondary sources.</p> <p>Knowledge and understanding—Place and space:</p> <ul style="list-style-type: none"> Sustainability requires a balance between using, conserving, and protecting environments, and involves decisions about how resources are used and managed.
	9	<p>Ways of working—Students are able to research and analyse data, information, and evidence from primary and secondary sources.</p> <p>Knowledge and understanding—Place and space:</p> <ul style="list-style-type: none"> Interrelationships between human activity and environments result in particular patterns of land and resource use, and can cause environmental problems.