

# Land Runoff affecting Seagrass Populations in Cockburn Sound

Written by Sophie Vo

Cockburn Sound is a small section of the Indian Ocean on the coast of Western Australia, just south of its capital city Perth. It is the most used marine embayment in Western Australia and supports many recreational activities such as fishing and aquaculture operations. The Sound is also valued for its ecological attributes such as being a spawning and nursing ground for Pink Snapper and the area's local Bottlenose Dolphins. Though this area's marine environment is well managed to prevent excess pollutants from entering the water, the Sound's water quality is not the best. This has resulted in a large amount of seagrass loss.

The seagrass coverage of Cockburn Sound has decreased by 77% since 1967, with 1600 hectares being lost from 1967-1972. By 1981 another 600 hectares had been lost, with at least three hectares being lost each year for the next few decades. This resulted in a total loss of over 3000 hectares, leaving the Sound with less than a quarter of the original seagrass population. The cause of this devastating loss was caused by nutrient pollution. This process is called eutrophication, which is when too many nutrients, mainly nitrogen and phosphorus, are deposited into water bodies. The nutrients then act like fertilisers and increase the growth of algae.

Though too much algae does not seem like a problem that could affect seagrass, it is. Excessive amounts of nutrients can lead to severe problems, such as low levels of oxygen. When there is too much algae covering the surface of the water, the growth blocks sunlight from entering the water and reaching the plants, preventing them from photosynthesising.

Not only does the algae prevent the seagrass from photosynthesising, but when the algae and seagrass dies, it decays. This means that the oxygen in the water is used up, causing low levels of oxygen, which will kill other marine life.

The nutrients that cause these problems can come from many different sources. Natural occurrences of this include weathering of rocks and soil, but this would not have a large effect on bodies of water, as weathering is a slow process, meaning that there would be no surge in the algae levels. The cause of excessive nutrients is not natural, but the way that the nutrients are deposited into the waterways is natural, it is land runoff.

Land runoff also known as surface runoff is excess water that the land is unable to absorb. The water runs off into nearby bodies of water, such as creeks, rivers or ponds. Runoff carries sediments, which may contain toxic chemicals or other pollutants. Surface runoff can cause many problems with marine ecosystems such as killing marine life and destroying habitats.

The main source of these chemicals are fertilisers and animal waste. The three main chemicals that fertilisers contain are Nitrogen, Phosphorus and Potassium. Nitrogen is the element most absorbed by plants and is essential to making sure that plants are healthy. When nitrogen is used on algae however, it overstimulates the growth clogging the water. Phosphorus strengthens a plant's ability to use and store energy, and is needed to help plants grow and develop normally. Phosphorus also speeds algae growth, causing out of control algae blooms. When used on land plants, Potassium helps to strengthen the ability to resist disease and strengthens overall quality, but Potassium has no known effects on algae growth, meaning that only Nitrogen and Phosphorus cause the problem.

Around Cockburn Sound, there are five fertiliser plants which are all close to rivers leading to the Sound, or next to the Sound. When surface runoff occurs, there generally is a substantial amount of rain in the area around Cockburn Sound, meaning that the water running towards a body of water would

collect the excess fertilisers from people's home gardens, public parks, other recreational gardens and from the fertiliser plants. These chemicals will then be deposited into the Sound creating algae blooms which then causes the loss of seagrass populations leading to the death of the other marine life in the water.

The true effect of excess nutrients is far worse than people believe. When there are large algae blooms, all the marine plants are killed either from lack of oxygen or not being able to photosynthesise. What most people do not realise, is that when the marine flora dies, so does the marine fauna. This is because the oxygen is used up when the algae and seagrasses die, meaning that all the fauna also suffers from the lack of dissolved oxygen. The first species to die are smaller animals such as crabs, clams and young fish. When these animals leave the area, this means that some of the larger animals that generally feed on the smaller species of animals would be unable to feed. This would result in them either dying as well or leaving the area, and this chain reaction would continue until there was nothing left in the body of water.

Because the extra nutrients come from human sources, only we can prevent it. Though the Western Australian Government has released a revised policy of the State Environmental Policy in December of 2015, there is more that can be done.

For people keeping home gardens, using no-phosphorus fertilisers can make a huge difference, or just using smaller amounts of fertiliser so that the plants only absorb the amount that they need leaving no excess chemicals. When planting decorative flora, using wildflowers, shrubs and trees can help absorb and filter runoff containing nutrients preventing it from being deposited into the water.

The immense loss of seagrass meadows affects Pink Snapper as it is also a nursery habitat for baby snapper, calamari, whiting, blue swimmer crabs and many other fish species, as well as dolphins. A trial project (Seeds for Snapper) was first implemented in 2018 in partnership with OzFish, the University of Western Australia Oceans Institute and community members from the Cockburn Power Boat Club. The purpose of this trial was to be able to accelerate the growth of seagrasses to help restore the ecosystem to how it was before the nutrient pollution. Community volunteers including drivers and fishers collected floating seagrass fruit for processing on-shore which were placed in tanks with circulating seawater to separate the seed before they were dispersed in a predetermined location.

Ways that you could help this cause would be to go to the OzFish website and register to be a volunteer where you will be trained to collect fruit, process seeds, keep digital records and operate safely. These events will occur at the Cockburn Power House Boat Club.

This project can and has been making a huge difference in the restoration of Cockburn Sound's seagrass population by going through many lengths to provide the best situation for the seeds to grow. This is being achieved by the volunteers making sure that all seeds planted are fertilised to increase the chance of them growing as well as the seed being planted in the best environment (depth, seafloor quality, environmental quality, etc.) to give the seeds the best chance of survival.

The results of this experiment have so far increased seedling emergence by ten times, which will soon be a higher number. More information can be found below.

Information on the 'Seeds for Snapper' Cause:

<https://recfishwest.org.au/news/snapper-fishers-needed-to-help-seagrass-reseeding-trial/>

Registration Form:

<https://ozfish.org.au/projects/seeds-for-snapper/volunteer-application/>