WATER QUALITY FACTSHEET

Nutrients Q&A

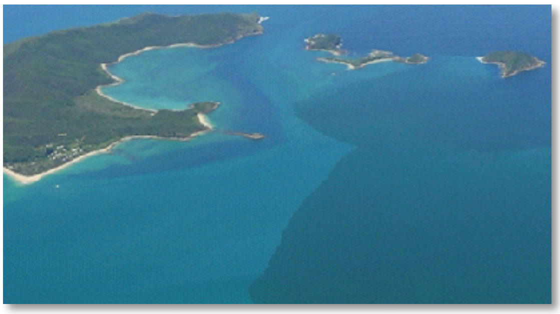
Q. What are nutrients?

A. Nutrients are required by plants and animals to grow and survive. Two nutrients that have an impact on the Great Barrier Reef are nitrogen and phosphorous. Nutrients can come in a variety of forms and can have differing environmental impacts based on the form they are in.

Q. Where do they come from?

A. Historically nitrogen came from natural landscapes come mainly in the form of dissolved organic nitrogen (DON), including runoff from undisturbed forests (Brodie and Mitchell 2005). In recent times, the main source of man-made nitrogen in the water comes from the runoff of nitrogenous fertilisers and enhanced soil erosion. Fertilisers are applied on sugarcane, horticulture and other cropping in the Great Barrier Reef catchment area. Another significant contribution of nutrients originates from the nutrients bound to soil particles in runoff from agricultural and urban soil erosion (Waterhouse et al. 2012). These particulate nutrients can be a potential source of dissolved nutrients.

Up to half of nitrogen applied to crops as fertiliser moves into the rivers and coastal environment during high flow events as dissolved inorganic nitrogen (Brodie and Mitchell, 2005). Urban and industrial land uses can also release high concentrations of both nitrogen and phosphorus into the immediate discharge area. Aquaculture, intensive animal production and the burning of fossil fuels also contribute biologically available nitrogen to the environment.



Aerial shot of the Fitzroy river plume, John Olds, QPWS

Fertilisers are used extensively in the Wet Tropics, Burdekin, Mackay-Whitsundays and Burnett-Mary regions and from cereal grains and cotton in the Fitzroy region. A strong relationship exists between the areas that are nitrogen-fertilised in these catchments and the high nitrate concentration during high-flow conditions.

Q. How do nutrients get to the Great Barrier Reef?

A. The Great Barrier Reef catchment area encompasses more than 30 major catchments that drain into the reef. During floods, river water can carry nutrients and sediments into the Great Barrier Reef lagoon, forming extensive and visible flood plumes. After heavy rainfall, concentrations of both particulate and dissolved nutrients are very high in flood plume waters (in the concentration range 2-30μM nitrogen) (Devlin and Brodie 2005), for days to weeks.

Nutrients attached to suspended sediment in these plumes tend to settle closer to the river mouth, whereas dissolved inorganic nutrients (particularly nitrogen) are carried much further out into open water. However, sediments deposited close to the river mouth can get reworked by strong waves and wind driven currents and are potentially available over much longer time periods.

Q. Why are nutrients a problem?

A. Research has identified higher concentrations of microscopic algae, two to three times higher, in inshore waters from areas rich in agriculture (the central and southern waters off Cairns to Mackay-Whitsunday), compared to areas with lower human impact (like Cape York).Excess nutrients encourage the growth of algae on inshore reefs and seagrass beds changing the composition of animals and plants found on inshore reefs (De'ath and Fabricius, 2010). Crown-of-thorns can have devastating impacts coral reefs and marine snow prevents the growth and recovery of coral and seagrasses. High nitrogen concentrations can also lead to greater susceptibility to coral bleaching when the corals are exposed to high temperatures (Wooldridge 2009).

Microscopic algae can remain bound with sediment to form a 'marine snow', which reduces light and smothers the juvenile corals that renew inshore reefs. In the Great Barrier Reef, 'marine snow' is seen as a major cause of loss of coral cover and seagrass decline (Fabricius et al. 2000, Brodie et al 2012).

These damaging effects make the reefs and seagrasses more vulnerable to other threats, such as high temperatures, because it prevents them from recovering. It is therefore important to control the amount of nutrients, in particular DIN, flowing into the reef so that we can enhance the resilience of inshore corals to the impacts of climate changes.

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