

1. INTRODUCTION

The Great Barrier Reef, the world's longest coral reef, covers about 350 000 km² off the north-east coast of Australia. It extends for over 2000 kilometres from latitude 10°S, north of Cape York, to latitude 25°S, east of Bundaberg. The reef follows the submerged coastline in the shallow tropical seas of the continental shelf, at distances varying from 30 kilometres from the coast in the northern section to over 200 kilometres at the Swain Reefs off Mackay.

There are over 2600 reefs, varying in size from less than one hectare to more than 100 km², 300 coral cays and 60 continental islands. The reef has an abundance of marine species, including over 4000 molluscs, 1500 fish, 400 hard and soft corals, thousands of species of sponges, crustaceans, echinoderms, worms and other invertebrates. Six of the world's seven species of sea turtle breed on the reef, humpback whales calve in reef waters and dugongs graze seagrass beds along the coast. Two hundred and forty-two seabirds frequent the reef area.

The growth of the reef-building corals is affected by the freshness or turbidity of the water, water depth, temperature (> 20°C) and nutrients. The temperature of the water is mediated by the East Australian Current, a surface drift of warmer, less saline, more dilute, less dense tropical water from the equatorial regions of the Pacific, down the east coast of Australia.

The east coast of Queensland spans 2200 kilometres, east of the Great Dividing Range, from latitude 10°30'S at Cape York to 28°15'S at the New South Wales border. The total catchment excluding the islands is 447 655 km²; of this about 423 725 km² are adjacent to the Great Barrier Reef, from the Jacky Jacky basin in the north to the Mary basin in the south. The land area is thus 21% larger than the reef area.

The 42 million hectares of the North East Coast Drainage Division which abuts the Great Barrier Reef are largely used for forestry and extensive pastoral, with 1.3 million hectares of agricultural crops and 3.4 million hectares of improved pastures containing introduced sown species.

Thirty-seven percent of the crop area and 3.3% of the sown pastures are fertilized - overall, fertilizer is applied to 1.4% of the North East Coast Division (595 000 hectares).

The Division's river basins vary considerably in rainfall and topography. These are major factors affecting land use, crops grown and fertilizer applications. There are also large differences in the proportion of the rainfall which runs off the catchment, varying from 7% in the Burnett and Fitzroy basins to 74% in the Tully River system. In each of the basins from the Daintree to the Murray, excluding the Barron, 57% or more of the rainfall runs off, on average.

The actual proportion of the rainfall which runs off in any rainfall event or in any year is very variable and depends on the quantity and intensity of rainfall, the topography and the density and type of ground cover. The average annual volume of run-off is affected by the basin area. The Burdekin basin has the third lowest run-off percentage (12%) but because of its large area, it has the largest annual average run-off volume, over 10 million megalitres.

A combination of high run-off potential and high rates of fertilizer use provides an opportunity for leaching, erosion of topsoil and hence nutrient losses from agricultural areas to streams and rivers and eventually to the reef lagoon. This may impact on the growth of seagrass, algae, coral and other marine organisms, especially if the nutrient balance is disturbed or the concentrations increased.

The possible downstream effects of agricultural practices on Great Barrier Reef ecosystems are of particular concern to primary producers and marine scientists.

No attempt has been made to review the extensive literature relating to fertilizer use efficiency, the mechanisms of nutrient transfer from terrestrial to marine ecosystems or to the impacts of nutrients on reef ecosystems.

This report details historical inputs of nitrogen (N) and phosphorus (P) in fertilizer products into the main basins adjacent to the Great Barrier Reef.