

Agricultural Contaminants in Sediments of Hinchinbrook Channel and Missionary Bay, North Queensland

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Over 500 surface sediment samples from within the Herbert River estuary to the continental shelf slope have been analysed for major and trace elements. These data indicates that many trace elements are found in high concentrations in the riverine mud trapped in the mangroves and shallow mudbanks of Hinchinbrook Channel and Missionary Bay, compared to middle and outer Great Barrier Reef lagoon sediments. For some elements (lead, nickel, copper), this appears to be a natural consequence of elemental enrichment in weathering products of granite and basalts in the catchment, whereas these elements are present in very low concentrations in the skeletal carbonate sands of the middle and outer Lagoon. Sediment cores from mangrove mudbanks in Hinchinbrook Channel and Missionary Bay, dated by radiochemical methods, indicate that there has been little or no change in rates of supply of these elements over the last 150 years. In proportion to aluminium (a non-contaminant and abundant granite weathering product), these elements are delivered from the catchment to the Great Barrier Reef lagoon coastal embayments at natural supply rates.

Some other elements (cadmium, uranium, mercury, arsenic) are enhanced above pre-1900 background concentrations in surface sediments of the mangroves and mudbanks of Hinchinbrook Channel and Missionary Bay. Concentrations of cadmium and mercury are enhanced above natural background by factors of 2–5, and the dated sediment core profiles show that this increase in supply rate happened after 1900, mostly after 1950. This history of increased supply of cadmium and mercury to coastal Great Barrier Reef sediments was compared to the known usage history of phosphatic fertilisers (enriched in cadmium, uranium and arsenic), and to the usage of organomercurial fungicides (Shirtan) on sugar cane land in the Herbert River lowlands. Less than 0.1% of the accumulated reservoir of these contaminant elements in the caneland soils could account for the observed coastal sediment enhancement of cadmium and mercury, via river transport of caneland soils to Hinchinbrook Channel and Missionary Bay over the last 50 years.

Wetlands, freshwater swamps, riparian vegetation, mangrove deltas, tidal creeks, and shallow mudbanks are natural traps for riverine sediments and their associated agricultural contaminants. Disturbance to these natural sediment traps is likely to result in increased delivery of sediment, nutrients, and contaminants to the Great Barrier Reef lagoon.

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