

Human Impacts

Reefs of Tomorrow: Nutrients Drive Coral Biodiversity in an Urbanized Seascape

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Marine ecosystems have experienced dramatic changes since the 1850s in response to human activities. This epoch, often referred to as the Anthropocene, has witnessed the punctuated loss of reef-building corals worldwide. Coral reef degradation may induce subtle changes which remain un-witnessed; this is particularly true when the water quality is altered. Deteriorated water quality hampers coral larvae recruitment, amplifies bio-erosion, favors coral diseases and reduces the threshold of thermal bleaching, leading to local or regional coral species extinctions.

Hong Kong SAR waters host more than 80 hard coral species which thrive at the edge of strong gradients of water quality. Thus, HK's coral communities provide an interesting scenario to document the impact of water quality on hard coral biodiversity. This GIS-based study investigates the coral species richness patterns and their link with water quality parameters (dissolved inorganic nitrogen & phosphate, particulate suspended matter, salinity and dissolved oxygen). Two biodiversity "hotspots" including more than 70% of the total species were identified. One was located on the very northeastern part of Hong Kong waters (Mirs Bay), and the other one was located on the entrance of Port Shelter. The spatial analysis revealed that the gradients of hard coral species richness were following the water quality gradients. The nutrient concentrations (nitrogen and phosphorus) appeared to be the main drivers of coral species richness.

The biodiversity patterns and the water quality thresholds calculated in the present study provide invaluable information about the future of coral reefs under high anthropogenic stress. It also provides a useful baseline for coral reefs conservation and management.