Exploring the hidden shallows: extensive reef development and resilience within the turbid nearshore Great Barrier Reef

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Mean coral cover on Australia's Great Barrier Reef (GBR) has reportedly declined by over 15% during the last 30 years. Climate change events and outbreaks of coral disease have been major drivers of degradation, often exacerbating the stresses caused by localised human activities (e.g. elevated sediment and nutrient inputs). Here, however, in the first assessment of nearshore reef occurrence and ecology across meaningful spatial scales (15.5 sq km), we show that areas of the GBR shelf have exhibited strong intra-regional variability in coral resilience to declining water quality. Specifically, within the highly-turbid "mesophotic" nearshore (<10 m depth) of the central GBR, where terrigenous seafloor sediments are persistently resuspended by wave processes, coral cover averages 38% (twice that reported on mid- and outer-shelf reefs). Of the mapped area, 11% of the seafloor has distinct reef or coral community cover, a density comparable to that measured across the entire GBR shelf (9%). Identified coral taxa (21 genera) exhibited clear depth-stratification corresponding closely to light attenuation and seafloor topography. Reefs have accreted relatively rapidly during the late-Holocene (1.8-3.0 mm y^{-1}) with rates of vertical reef growth influenced by intrinsic shifts in coral assemblages associated with reef development. Indeed, these shallow-water reefs may have similar potential as refugia from large-scale disturbance as their deep-water (>30 m) "mesophotic" equivalents, and also provide a basis from which to model future trajectories of reef growth within nearshore areas.