

HUMAN AND ENVIRONMENTAL STRESS ON SOUTHERN CORAL REEFS OF SRI LANKA

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Southern coral reefs have been facing severe degradation problems due to human and environmental stressors. This study describes the reef related impacts by assessing substrate composition and spatial physico-chemical parameters between selected coral reef areas in Southern coast namely Hikkaduwa, Rumassala, Weligama, Mirissa, Polhena and Dondra during September to November 2014. Line Intercept Transect method (LIT) was used to estimate the coral and sessile benthic cover categories. Physico-chemical parameters were Concentration of Nitrate, Phosphate, Temperature, pH, Salinity, Conductivity, Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Dissolved oxygen (DO) and Biological Oxygen Demand (BOD).

The highest mean coral cover was observed at Weligama (32.66%±20.62) followed by Mirissa (23.97%±9.14), Polhena (21.57%±9.04), Hikkaduwa (19.68%±4.42), Dondra (17.31%±9.06) and Rumassala (12.5%±6.45). Significant differences between sampling sites were observed for percentages of sessile benthic categories and for all measured physico-chemical parameters. Dendrogram of physico-chemical parameters between selected sites illustrates that Dondra is completely separate from all the other sites when Polhena, Hikkaduwa, Rumassala and Weligama, and Mirissa grouped together. Weligama showed the lowest BOD level (2.41 mg/L±0.33) and comparatively lower nutrient levels. Live coral coverage at Weligama is the highest among surveyed sites. Destructive fishing practices such as use of moxy nets, iron rods and high ornamental fishing pressure, anchoring of fishing boats cause severe damage to the reef. Excessive overgrowth of calcareous *Halimeda* sp. and *Caulerpa* sp. would also be a threat. The reef was dominated by branching *Acropora* sp. and *Montipora* sp. The lowest TSS amount (0.07g/L) and lower nutrient levels were observed at Mirissa which is characterized with newly recruiting coral species. Polhena reef area is highly vulnerable for recreational visitor pressure due to coral trampling and the collection of corals as souvenirs and high turbidity level due to Nilwala river plume. The bottom substrate of Hikkaduwa National Park was dominated by dead coral reef and sand/silt coverage.

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It experiences the highest BOD level ($3.98 \text{ mg/L} \pm 0.09$) among surveyed sites. Coral trampling, boating activities and high siltation were observed as threats to the reef area. The highest siltation was observed at Rumassla with the highest TDS concentration ($0.57 \text{ g/L} \pm 0.08$). *Acropora* sp. *Montipora* sp. and *Galaxea* sp. were dominant coral species. Dondra showed the highest Nitrate level ($0.62 \text{ mg/L} \pm 0.06$) and Phosphate level (0.03 mg/L). Dense bed of seagrass, *Thalassia hemprichii* and highly colonized sea urchins *Diadema* sp. also indicated high nutrient loading confirmed by higher number of sewage and domestic waste disposal directly to the coastal waters. By considering all surveyed sites southern coastal water was characterized significantly by high level of nitrate levels ($0.27\text{-}0.71 \text{ mg/L}$), Phosphate levels ($0.0115\text{-}0.0283 \text{ mg/L}$), high amount of TDS ($32.7\text{-}49.29 \text{ g/L}$), TSS ($0.062\text{-}0.63 \text{ g/L}$) and high BOD ($2\text{-}4.06 \text{ mg/L}$) which were greater than the critical levels highlighting the excess stress levels exists impacting the healthiness of reefs in Southern coast of Sri Lanka.

Keywords: *Coral reefs, Human and environmental stress, Sri Lanka*