IMPACTS OF NUTRIENT LOADING FOLLOWED BY MACROALGAL INVASION ON CORAL REEFS AT PIGEON ISLAND MARINE NATIONAL PARK, SRI LANKA.

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Pigeon Island (PI) is designated as a Marine Protected Area (MPA) in order to protect its fringing reef and terrestrial habitats under the Fauna and Flora ordinance. It harbors over 100 species of corals and 300 coral reef fishes and some of them are endemic and protected under IUCN red list. The island is a tourism destination enabling snorkeling, diving, bathing activities. According to the annual reports of Department of Wildlife Conservation 2012, the revenue earned by the visitors is about 2.1% as a percentage compared with the total income of other National Parks and placed 07th based on the income generated. At present the reef is degrading due to combined effects emanated from natural and anthropogenic influences. Invasion of macro-algae, Crown of thorn star fish (COTs) and corallimorpharians, thermal stress, coral diseases, impacts from tourism activities such as coral trampling, boat maneuvering, non-sustainable fishing methods, haphazard waste disposal, and agricultural run-off hamper the reef health. Therefore, from a conservation point of view, understanding the dynamics of the environment is indispensable to make informed decisions. The main objective of the present study is to elucidate the temporal changes and trends of nutrient loading in the park environment and to propose relevant remedial measures to ensure the reef health. Field works were conducted from September 2014 to March 2016. Nitrate and Phosphate concentrations were assessed at 6 locations (S1-S6) around the main Pigeon Island. Percentage cover of macro-algae was estimated with 15m Line Intercept Transect (LIT) at 14 sampling sites (T_1-T_{14}) along two depth contours; 1-2m and 3-5m.

Highest nutrient level is recorded in the bathing area and the values are above the optimum standards according to GBRMPA 2010; 2μgL-1 and 4μgL-1 for Nitrate and Phosphate respectively. A shift in algae growth was observed from West (highest algae growth) to East direction in the Southern flank of the island. It may be due to the current pattern around the island. Impact of human activities, effluent discharges of nearby hotels and industries, discharge of Irakkandi lagoon are possible causes for this situation. Intermittent outbreaks of COTS (*Acanthater planci*) also gave evidences for the potential nutrient enrichment.

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The survival of the reef is in danger due to the ongoing nutrient loading followed by uncontrolled macro-algae blooming. Illegal fishing practices enhance the severity of the condition by removing the natural predators. Hence, prompt attention and management intervention of the park authority is necessary to safeguard the reef. Understanding the root causes of the situation is paramount to make sound decisions. Further research on modeling the hydrodynamics specifically with the current pattern during various seasons are proposed to obtain a clear overview of the PI marine environment.

Key words: *Coral, macro algal invasion, nutrient loading, LIT, COT, Pigeon Island, Sri Lanka*