Application of multi-criterion GIS model for the zonation of Puttalam Lagoon for oyster culturing

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Oyster beds located in intertidal waters serve as an important economic resource to the coastal communities and provide many essential functions to the coastal environment. Anthropogenic factors such as coastal development and associated waterway usage significantly alter the size and health of oysters. The study was conducted with the aim of identifying the most suitable areas for oyster culturing, brood stock growing and depuration for effective conservation and management of oyster beds in Puttalam lagoon. A multi-criterion site suitability model was developed using the Geographic Information System (GIS) including environmental and physical parameters such as water quality including microbiological (Total coliforms, Faecal coliforms, *E.coli* (Faecal streptococci), *Salmonella, V. cholerae, V. parahaemolyticus),* physio chemical parameters (pH, salinity, temperature) and heavy metals (Mercury (Hg), Cadmium (Cd), Lead (Pb)). Sediment, depth, existing oyster beds, access to the road and canal outlets (from urban and aquaculture ponds was also considered for the study. Eight sampling locations were selected for the microbiological and heavy metal analysis and twenty locations for physio chemical parameters. Monthly samples were taken for microbiological and physicochemical parameters and quarterly for heavy metal analysis for two years i.e., 2017 and 2018. Weighted Overlay Analysis (WOA) was performed by overlaying classified layers of all considered parameters stated above. During WOA, a weight was assigned for each individual parameter as obtained by Analytical Hierarchy Process (AHP) technique. Suitability classes were categorized as most suitable, moderately suitable and not suitable. The analysis showed that 81 hectares in the Northern part of Puttalam Lagoon are covered by oyster beds. Out of which 9.7 sq.km is the most suitable area for brood stock growing while 17.4 sq.km and 12.5 sq. km are for oyster farming/culturing and depuration respectively.

Keywords: GIS, oyster culturing, Puttalam lagoon, site suitability, multi-criterion

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