

**SPATIO-TEMPORAL DISTRIBUTION OF CHLOROPHYLL-A OF  
PHYTOPLANKTON BIOMASS IN SOUTHWESTERN OCEAN OF SRI LANKA  
CONCERNING DIFFERENT MARITIME ZONES AND MONSOON PATTERNS**

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Marine phytoplankton plays a vital role as a primary producer. However, their spatiotemporal distribution has not been described well within the Sri Lankan waters. This study assessed the anomalies of chlorophyll-a concentrations representing phytoplankton biomass in the southwestern coast of Sri Lanka during different monsoon patterns and maritime zones over six years (2015 – 2020) using remote sensing. To obtain chlorophyll-a concentrations, the moderate Resolution Imaging Spectroradiometer (MODIS) aqua images were daily analyzed by SeaDAS 7.5.3. ArcGIS 10.8 was used to clip reprojected raster layers as per different isobath zones (continental shelf, 1,000 m, and 2,000 m), which were demarcated by Google Earth pro 7.3.3 and legalized zones (Territorial Sea and Exclusive Economic Zone (EEZ)) in the southwestern region. According to two-way ANOVA, mean chlorophyll-a concentrations significantly differed in isobath zones, legalized zones and monsoon patterns. The highest mean chlorophyll-a value, 3.89 mg/m<sup>3</sup> was observed during the southwest monsoon period in the continental shelf, and the lowest (0.14 mg/m<sup>3</sup>) was in the EEZ in the first inter-monsoon period. When concerning the total study area, the highest mean chlorophyll-a values were recorded in the southwest monsoon (2.87 mg/m<sup>3</sup>), followed by the second inter-monsoon (1.31 mg/m<sup>3</sup>), northeast monsoon (0.54 mg/m<sup>3</sup>), and the first inter-monsoon (0.43 mg/m<sup>3</sup>). The mean chlorophyll-a values gradually declined towards the open ocean as the continental shelf, territorial sea, 1,000 m isobath, 2,000 m isobath, and EEZ consecutively. These fluctuations with chlorophyll-a could be due to the uplifting of nutrients drained from terrestrial runoff during the activated monsoon periods and associated upwelling processes. However, further studies are needed to evaluate the nutrient loading with terrestrial runoffs and levels of trace elements that are required for the growth of phytoplankton.

**Keywords:** Chlorophyll-a concentration, Isobath zones, MODIS, Monsoon patterns, Plankton blooms