

Primary Productivity and related aspects of three coastal lagoons in Sri Lanka

Abstract

Coastal Lagoons are productive in shellfish and finfish due to its high phytoplankton productivity. Phytoplankton are the dominant primary producers of the pelagic waters converting inorganic materials into new organic compounds by the process of photosynthesis. Primary producers which stand on baseline of aquatic food web determine the fish production and pollution level of the system.

Primary productivity which is estimated by light and dark bottle technique was used to determine its relationship to some water quality parameters such as chlorophyll *a*, dissolved oxygen and salinity. Assimilation index was used to express the growth rate of phytoplankton. The study was conducted in three coastal lagoons, namely Chilaw, Negombo and Rekawa Lagoons during the year 2001.

Average monthly gross primary productivity varied from 67.80-150.25 mg C m⁻³h⁻¹ in Chilaw Lagoon, 139.50-213.75 mg C m⁻³h⁻¹ in Negombo Lagoon and 58.00 – 87.90 mg C m⁻³h⁻¹ in Rekawa Lagoon showing that highest and lowest productivities are from Negombo and Rekawa Lagoons respectively. Primary productivity and chlorophyll *a*

concentration increased towards the head of the lagoon while salinity decreased toward the head of the lagoon except in Rekawa Lagoon. Because Rekawa Lagoon receives fresh water only from the mouth of the lagoon and it is slightly hypersaline (37 psu) during the month of September. Assimilation index for tropical coastal lagoons is between 9-28 $\text{mg}^{-1} \text{Chl } a \text{ h}^{-1}$ showing that Negombo Lagoon is the most productive lagoon in terms of phytoplankton growth with an assimilation index ranging from 18.3—27.76 $\text{mg C mg}^{-1} \text{Chl } a \text{ h}^{-1}$. According to the trophic status classification, these three lagoons can be categorized under the mesotrophic condition with some algal turbidity with a range of chlorophyll *a* concentration of 5.4 -10.9 mg m^{-3} .

The gross primary productivity and related parameters of studied coastal ecosystems showed that these coastal lagoons remain in good health and suitable for most aquatic plants and organisms. But the productivity of the Rekawa Lagoon remains low and intermittent closing of the mouth of the lagoon by a sand bar affects the larval recruitment of fish and prawn larvae. So intern it affects the biological productivity of Rekawa Lagoon.

Key words: primary productivity, coastal lagoons, chlorophyll, water quality