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Effect of Dredging on Water Quality, Plankton and Macro-Benthos in Negombo Estuary

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Abstract

The high demand for goods and services together with the pollution problem due to development activities has led to a rapid degradation of estuaries and lagoons in Sri Lanka. Interventions to rehabilitate the degraded estuaries and lagoons in the country have been implemented by the authorities. One of the main interventions is dredging of the water body to improve the water quality which will subsequently improve the quality of fauna and flora. Dredging operations were carried out at selected locations of Negombo estuary as a pilot project during 2000-2002 in order to improve its water quality. Since the completion of dredging, its effect on the water quality improvement has not been adequately investigated, which becomes essential if dredging is to be used in other water bodies as a rehabilitation measure.

The present study was thus carried out to investigate the effect of dredging on the water quality, plankton and macro-benthos of Negombo estuary. Selected physic-chemical parameters of water samples, sediment samples together with phytoplankton, zooplankton and macro-benthos were taken from four selected dredged locations (A,B,C,D) and were compared and contrasted with a non-dredged location (E).

Of the physic-chemical parameters, temperature, pH, conductivity, hardness, DO, BOD, alkalinity, nitrate, phosphate, did not show any significant difference among locations ($p>0.05$) while salinity differed significantly ($p<0.05$) which can be attributed to the proximity of different locations to the sea mouth. All locations indicated eutrophic conditions with high levels of phosphate (0.96-1.39 mg/L.) and nitrate (4.09-5.12 mg/L).Of the planktons recorded, there were pollution indicator plankton species namely *Nitzschia* sp., *Navicula* sp., and *Melosira* sp. which were observed in all locations. Among the zooplankton species, rotifers were the most abundant species recorded in all locations which is also a pollution indicator species. Among the macro-benthos, pollution indicator species *Cerithidea* sp., *Gafrarium tumidum*, *Neritapolita* and *Meretrix casta* were the most abundant at all locations. Shannon Diversity Indices (SWDI) calculated for phytoplankton, zooplankton and benthos were in the range of 1-3 indicating moderately polluted water in all locations. These observations indicate that the water quality of dredged locations did not show any improvement when compared with the un-dredged location and the water quality of all sites was poor. This was further confirmed by calculating the Canadian Water Quality Indices.

The present study reveals that there is no long-term positive effect of dredging on water quality which can be attributed to the lack of control over point and non-point pollutant sources which strongly points out the need of their control.

Keyword: Negombo Estuary, Dredging, Pollution, Water quality, Plankton