Effects of shrimp farming practices on water quality of northern part of the Dutch canal

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Most of the shrimp farms in Sri Lanka are concentrated over a distance of about 120 km around Chilaw Lagoon, Dutch Canal, Mundal Lake and Puttalam Lagoon, with 70% of farms depending on the Dutch Canal for water. Farms take water in from the canal and discharge their effluent Into the same water sources without proper treatments. Discharge of pond effluent has led to deterioration of water quality in the main water sources. Present study was carried out to investigate the changes of water quality parameters in Northern part of Dutch canal (7°63'N 79 °80'E to 7 °85'N 79 °80'E) in relation to different shrimp farming practices in selected five sampling sites at Karukkupane, Nalladarankattuwa, Muthupanthiya, Udappuwa and Madurankuliya. Water samples were collected biweekly from September 2008 to January 2010 from both surface and bottom layers at the pre-selected sampling points. Temperature, turbidity, conductivity, salinity, BOD, DO, TDS, flow rate, pH, NH_3, PO_4^{-3} and chlorophyll- a in the collected water samples were analyzed. In addition, shrimp farming activities adjacent to five sampling points were recorded.

Surface water samples did not show significant inter-site differences for the parameters determined except for temperature, DO and pH which are subjected to diurnal variations too. Bottom water samples of Udappuwa and Madurankuliya had significantly higher levels ($P< 0.05$) of turbidity (24.25 ± 8.4 NTU and 32.4 ± 9.3 NTU), pH (9.1 ± 2.3 and 10.2 ± 1.6), NH_3 (0.22 ± 0.006 mg/l and 0.32 ± 0.012 mg/l), PO_4^{-3} (0.046 ±0.007 mg/l and 0.079 ± 0.011 mg/l) , chlorophyll-a (27.2 ± 8.3 mg m^{-3} and 32.8 ± 6.1 mg m^{-3}) and BOD (2.42 ± 0.60 mg/l and 3.40 ± 0.8mg/l) compared to other sampling sites. Flow rates of water at five sampling points didn't show significant differences ($P>0.05$) and had an average value of 1.3 ± 0.36 m^3/s. Sub optimal levels for DO, BOD, pH, NH_3, PO_4^{-3} and chlorophyll-a were recorded at Udappuwa, Madurankuliya and Muthupanthiya areas of the Dutch canal, where shrimp farm density is moderately higher.

Results of the study exemplify that higher levels of shrimp farming activities can alter quality of water in the Dutch Canal, making it less suitable for shrimp culture. Therefore it is suggested to have treatment facilities especially at the areas like Udappuwa, Madurankuliya and Muthupanthiya, to improve the quality of receiving water from shrimp farms In order to minimize the environmental impacts of shrimp culture industry and to assure the sustainability of future shrimp cultivation.