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Importance of *Puntius titteya* as a Biomarker to Determine the Water Quality of Aquatic Habitats in the Low and Mid-Country Wet Zone of Sri Lanka

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Abstract

Puntius titteya Deraniyagala (1929) is an endemic fish to Sri Lanka called as Sri Lanka Cherry Barb (Sinhala name: Lé thiththaya). It distributes throughout natural freshwater habitats located all over the low and mid-country wet zone of Sri Lanka. This study aimed to establish *P. titteya* as a biomarker in natural freshwater habitats to predict water quality in aquatic systems. Current study was carried out based on three water parameters pH, Total dissolved solids (TDS), Electrical conductivity (EC) of six natural freshwater habitats (Hewainna sampling unit 1 and 2, Karadana, Meethirigala, Waga and Aradhanakanda) of *P. titteya* scattered though Kelani river basin. Presence of *P. titteya* was observed, identified and investigated from each sampling unit (SU) while measuring pH, TDS, and EC of six replicates of randomly collected water samples. Each SU were mapped using Global Positioning System (GPS) for further studies. Out of the six SUs, offspring were present from three units including Hewainna SU 2, Meethirigala, and Aradhanakanda, those were consisted shallow water bodies with medium flow rate and submerged leaf debris layer. The optimum pH range for *P. titteya* was found to be 4.95-7.11 from current results. The lowest pH was recorded from Aradhanakanda SU and it was found to be 4.95±0.10. Also it was responsible for the lowest TDS (10.50±1.00 ppm) and EC (21.00±2.00 µS/cm) as well as Waga SU (TDS: 12.50±1.00 ppm, EC: 24.00±0.00 µS/cm): Distilled water (TDS: 0.00 ppm, EC: 0.00 µS/cm). Highest pH was recorded from Karadana SU (pH: 7.11±0.01) and it was responsible for the highest TDS (20.00±3.00 ppm) and EC (40.00±6.00 µS/cm) as well as Hewainna SU 1 (TDS: 19.00±1.00 ppm, EC: 42.00±8.72 µS/cm). Both Karadana and Hewainna SU 1 were highly affected by anthropogenic activities and only two adult individuals were observed from Karadana SU. It may be due to the adverse effect of pesticide usage in closer paddy fields and mining activities in nearby areas. The current study revealed that *P. titteya* requires a higher purity of water to reproduction and make successful population while they can live in a range of pH in water, shallow water bodies with medium flow rate and submerged debris layer to establish a good breeding population. Rather than that by the presence of a good breeding population of *P. titteya* will give a clue regarding the better water quality of relevant natural aquatic source.

Keywords: *Puntius titteya*, Biomarker, Water quality, Behavioral ecology, Offspring