

# FRESHWATER FISH DIVERSITY, ABUNDANCE, CONSERVATION AND EFFECT OF AQUATIC BIRDS ON FISH POPULATION IN KAMMALAKKULAMA TANK AT MIHINTALE, SRI LANKA

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## Introduction

Sri Lanka is a tropical island located in the Indian Ocean off the southern tip of Indian peninsular with 65,610 km<sup>2</sup> in extent (IUCN Sri Lanka, 2007). Total number of fish species present in the country is 91 and of that 50 species are endemic to Sri Lanka (The National Red List of Sri Lanka, 2012). Sri Lanka also has highly diversified freshwater bodies in dry zone. There are hundreds of smaller reservoirs scattered throughout the country in the dry zone (Fernando, 1990). The study was carried out at Kammalakkulama tank, near to the Mihintale and close to the Puttalam - Anuradhapura - Trincomalee Highway (A 12) in dry zone. The present study aims to identify the diversity and abundance of freshwater fish, effect of aquatic birds on fish population and conservation of freshwater fishes in Kammalakkulama tank.

## Methodology

The study was conducted from May to August 2013 at two sites, Site 1 (sub sampling sites F-1, F-2, F-3) located near the gravel road which connects the village and Site 2 (sub sampling sites F'-1, F'-2, F'-3) located at the bathing site of villagers (Fig.1). Random sampling technique was used for fish. Sampling was done using a quadrat (size of 2 m x 2 m) and scoop net at a rate of five times within 1 -2 minutes interval in the selected two sites. Point count method was used for aquatic birds. Sampling was done between 06.00 – 08.00 hr. and 14.00 – 16.00 hr., twice per week. Water quality parameters pH, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD) and conductivity were measured. The diversity indices were calculated for fish and the correlation between freshwater fish and aquatic birds was determined by Mann-Whitney test.

## Results and Discussion

### Species composition:

During the study period 21 fish species were recorded belongs to 15 genera, 9 families and 3 (14%) endemic species [Flying Barb (*Esomus thermoicos*), Sri Lanka Blue Laubuca (*Laubuca lankensis*), Sri Lanka Filamented Barb (*Puntius singhala*)]. Twenty eight species of aquatic birds including 26 genera, 15 families were recorded. Most abundant aquatic bird species were Lesser Whistling-duck (*Dendrocygna javanica*), Whiskered Tern (*Chlidonias hybrida*), Asian Openbill (*Anastomus oscitans*), Black-headed Ibis (*Threskiornis melanocephalus*), Indian Pond-heron (*Ardeola grayii*), Cattle Egret (*Bubulcus ibis*), Purple Heron (*Ardea purpurea*), Great Egret (*Casmerodius albus*), Little Cormorant (*Phalacrocorax niger*), Indian Cormorant (*Phalacrocorax fuscicollis*), White-throated Kingfisher (*Halcyon smyrnensis*), Common Kingfisher (*Alcedo atthis*), White breasted Waterhen (*Amaurornis phoenicurus*), Little Egret (*Egretta garzetta*).

### Diversity and abundance of fish species:

Shannon Weiner Diversity index ( $H'$ ) in Site 1 and Site 2 were 1.44 and 1.47 respectively. Simpson Index ( $D$ ) was

higher at Site 2 (0.37) than Site 1 (0.23). Margalef's Diversity Index ( $D_{mg}$ ) in Site 1 was higher (3.45) than Site 2 (2.90). Pielou's  $J$  (Evenness) ( $E_H$ ) were Site 1 (0.47) and Site 2 (0.48) respectively. The results revealed that the Site 2 is comparatively better site for fish species than the Site 1. As Site 2 was with large shading trees and the root of these trees have plenty of hiding places for fish whereas Site 1 lacks large trees with roots. Freshwater fish diversity and abundance at the selected two sites didn't show any difference which revealed that there is no difference in the food availability, habits etc.

### Water quality parameters:

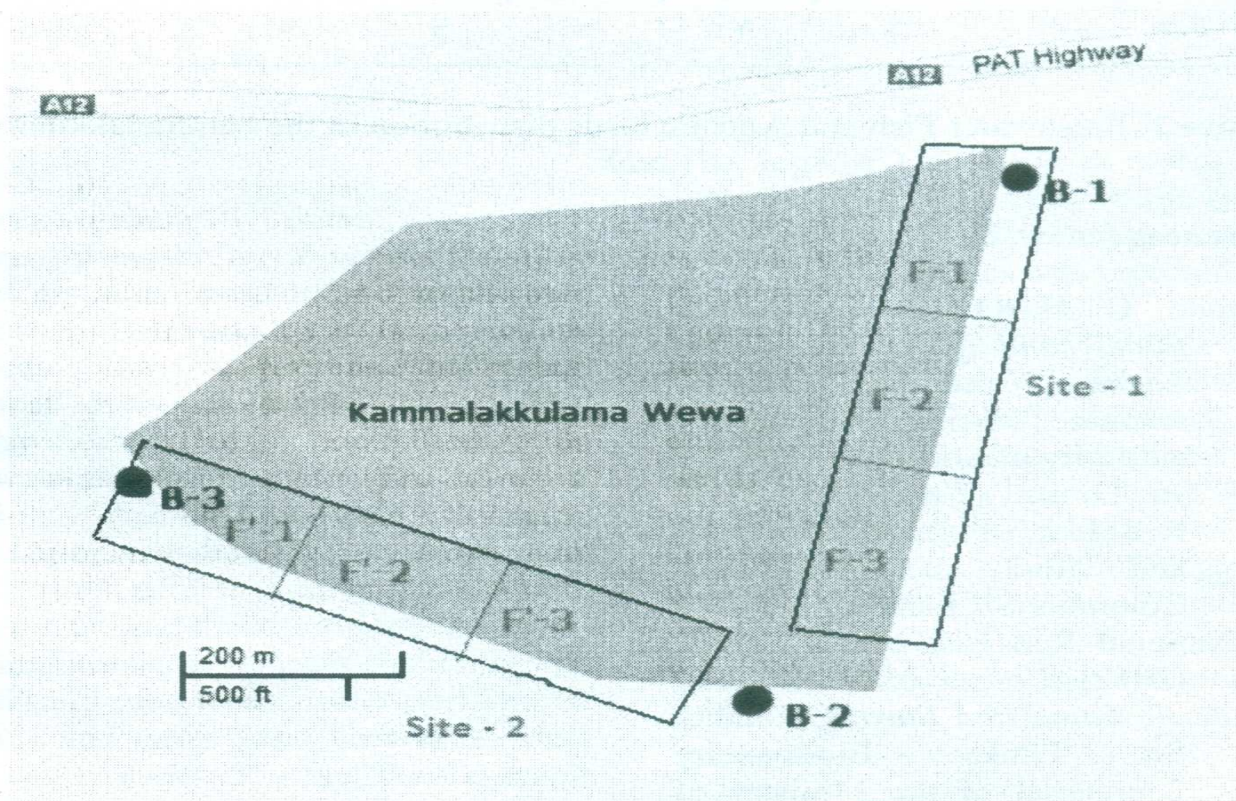
Mean pH was  $6.59 \pm 0.1$  in Site 1 and  $7.12 \pm 0.2$  in Site 2. Mean DO was  $5.12 \pm 0.1$  mg/l and  $4.17 \pm 0.4$  mg/l in Site 1 and Site 2 respectively whereas mean BOD was  $0.76 \pm 0.3$  mg/l and  $0.97 \pm 0.3$  mg/l in Site 1 and Site 2 respectively. Conductivity in Site 1 was  $127.8 \pm 0.2$   $\mu$ s/cm and Site 2 was  $128.9 \pm 0.1$   $\mu$ s/cm. The water quality parameters of the two sites were not significantly different ( $p < 0.05$ ) and those are in favorable range for the aquatic life. Therefore the abundance of fish in Site 1 and Site 2 is not affected by the water quality parameters.

**Effect of Aquatic birds for the freshwater fish diversity:**

There was a positive correlation between aquatic birds and freshwater fishes ( $p = 0.014$ ) ( $p < 0.05$ ) which indicates that the presence of higher number of aquatics birds affects the freshwater fish population in Kammalakkulama tank. The aquatic avifaunal species directly affect the fish population present in Kammalakkulam tank (Fig.2.).

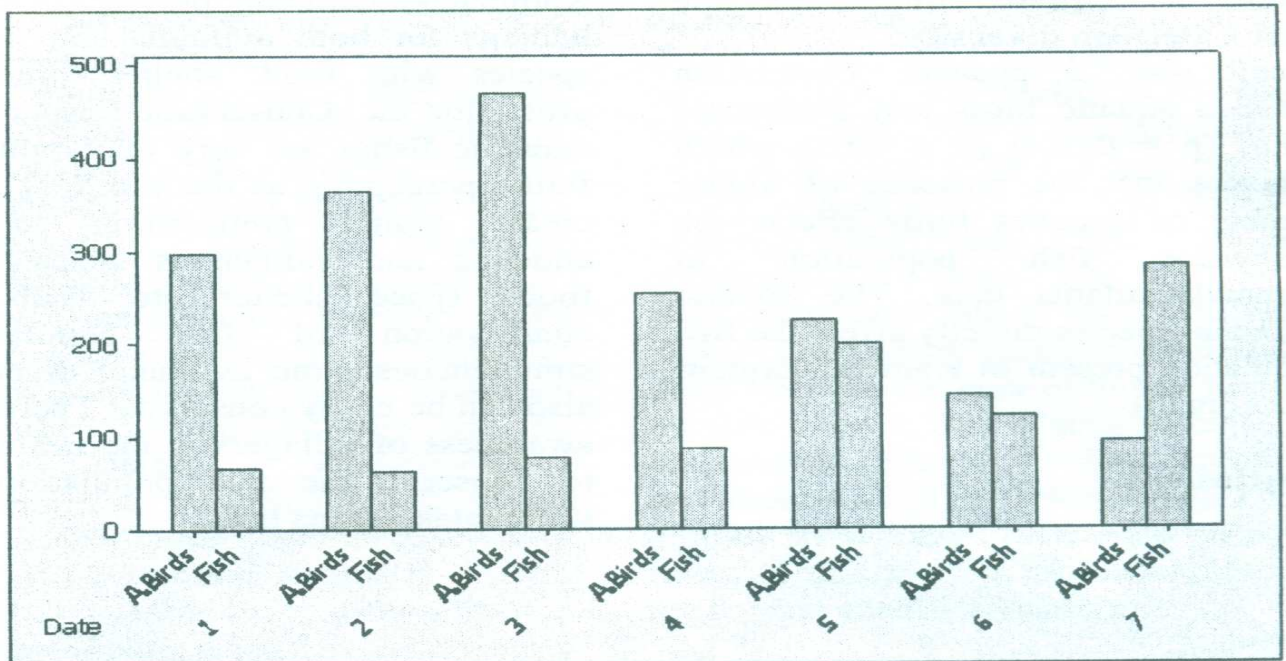
**Conclusions**

Kammalakkulam tank provides suitable habitats for both avifauna and fishes species with food, shelter, predator protection etc. Conservation especially endemic fishes are very important for future perception as the exotic species create higher competition among endemic and indigenous species for foods, space, shelter, etc. With the conservation of fish population, simultaneously the avifaunal diversity also can be easily conserved. Therefore awareness of villagers is the best way to conserve the fish population in Kammalakkulama tank.



**Figure 1 : Selected study sites at Kammalakkulama tank**





**Figure 2:** Freshwater Fish and Aquatic birds distribution in the kammalakkulama tank

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