

SOME ECOLOGICAL ASPECTS OF FISH ASSEMBLAGES IN A WET ZONE
STREAM SYSTEM; BREEDING AND REARING OF THREE ENDEMIC FISH
SPECIES

By

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ABSTRACT

The endemic fish fauna of Sri Lanka is undergoing a severe threatening process through habitat degradation, pollution, over exploitation and introduction of exotic species and it is vital to conserve them from extinction. Present study was planned to investigate the fish assemblages, some aspects of biology of selected fish species, ecological niches in the Blackwater stream and its two main tributaries (T₁ and T₂) located at Blackwater Tea Estate, Ginigathena and develop captive breeding and rearing methods for endemic fish *Puntius tilteya*, *Belontia signata* and *Garra ceylonensis*.

Blackwater stream and its tributaries contained 16 fish species, of which 9 were endemic, 6 indigenous and 1 exotic. Species diversity and abundance were comparatively low in the tributary T₂ as it was located completely within the tea plantation.

P. tilteya, *B. signata*, *L. thermalis* and *S. notostigma* are multiple spawners while *G. ceylonensis* is a single spawner. *B. signata* and *G. ceylonensis* are seasonal breeders and *P. tilteya* is a perennial breeder. *L. thermalis* and *S. notostigma* spawn twice in a breeding season. Condition Factor indicated that *S. notostigma* could be reared successfully under laboratory conditions whereas the feed and the other environmental requirements should be improved rearing *L. thermalis* under laboratory conditions.

Physico-chemical parameters of the stream eco-system were within the favourable range for aquatic life and eutrophication was not observed during the three year investigation period. Since the stream and tributaries were fast flowing, different pollutants such as fertilizers, chemicals and sediments from the tea plantation did not accumulate in these fast flowing systems.

Canonical Correspondence Analysis performed for distribution of fish according to physico-chemical parameters revealed that most of the fish species show high affinity to substratum condition and water column depth. Fish assemblages have been segregated on the basis of microhabitat, macrohabitat and feeding behaviour and they did not experience considerable habitat alterations. Regression analysis revealed a significant decline in population of *Rashora vaterifloris*, *P. titteya*, *P. nigrofasciatus*, *P. bimaculatus* and *P. cuningii* whereas *G. ceylonensis* and *S. notostigma* maintained a stable population over the three year study period.

The decline in fish population could be mainly due to overexploitation by the ornamental fish collectors and habitat deterioration. Therefore *in situ* conservation by co-management and *ex situ* conservation by conducting captive breeding programmes and stocking of captive bred fish without causing adverse effects on the ecological balance are recommended as conservation strategies.

Captive breeding of *B. signata* and *G. ceylonensis* was possible under indoor conditions without hormonal stimulation while it was only successful in flowing

water systems (without hormones) for *P. titteya* may be due to the availability of high Total Dissolved Solids, Specific Conductivity and water flow.

P. titteya fry were tested with 4 diets; formulated feed, *Artemia* and microworm produced significantly higher growth than the plankton diet ($P < 0.05$). Plankton fed juveniles exhibited significantly higher growth, when compared to those fed with dried swine liver and formulated feeds. Source of illumination (natural and aquarium) did not have any significant effect ($P > 0.05$) while plankton diet showed a significant effect on the colour development of *P. titteya* under captivity ($P < 0.05$).

B. signata fry were tested with three test diets, *Artemia*, microworm and the formulated feed, and the highest growth was observed with *Artemia* ($P < 0.05$). Juveniles were tested with four feeding regimes, formulated feed, dried swine liver, raw swine liver and live guppy fry and the highest growth was observed with guppy feed ($P < 0.05$).

Artemia, microworm and formulated feed were tested with *G. ceylonensis* fry and the fish fed with formulated feed exhibited the highest growth whereas microworm exhibited the lowest growth ($P < 0.05$). Juveniles were tested with formulated feed, dried swine liver and a mixture of detritus and plankton, and the highest growth performance was observed with swine liver and lowest with a mixture of detritus and plankton ($P < 0.05$).