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A study of fish fauna of ornamental value with special reference to *Danio malabaricus* in two main tributaries (Wak Oya and Pusweli Oya) of the Kelani River.

By

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Memorandum

The work described in this thesis was carried out by me at the Department of Zoology, University of Sri Jayewardenepura, Nugegoda, Sri Lanka, under the supervision of Dr. (Mrs) Ajantha De Alwis and Professor. J.Jinadasa, and the report on this has not been submitted to any university for another degree.

Date: 98.10.20

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We certify that the above statement made by the candidate is true and that this thesis is suitable for submission to the university for the purpose of evaluation.

Date 10/20/98

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ABSTRACT

Fish assembalge in two tributaries of Kelani river, namely, Wak Oya stream and Pusweli Oya stream situated in the southwestern ichthyological province of Sri Lanka was studied for a period of twenty five months from 01st March 1992- 31st March 1994.

These two streams are inhabited by thirty species of fish, out of which five are endemic and ninteen are indigenous. Twenyty five of the thirty species (including the five endemic species) recorded are of ornamental value, either exported to be used in aquaria or used locally in aquaria. The ornamental fish assemblage stuided is highly structured as reflected in their morphological differences and habitat segregation which enhance the co-existence of such a variety of species. However, they show a considerable qualitative food overlap but their quantitative food selection help them to coexist. This type of high degree of specialization reveals the fact that, the fish assemblage under study is maintaining an equilibrium and their co-existence is a cumulative result of morphological, habitat and trophic specializations. Therefore, a slight change caused by any adverse effect in this community can bring detrimental results to the whole system.

Differences can be seen in the distribution and occurrence of ornamentally important fish in these two streams which could be attributed to some of the environmental factors studied. They are chemical and physical factors such as dissolved oxygen, conductivity, total hardness, total alkalinity and flow velocity of water in the streams, gem/sand mining, deforestation and construction of weirs in the streams. Direct factory discharges and pesticides and insecticides which are added to the streams directly (*ie.* cleaning of gear used for spraying) also seems affecting the fish. These observations emphasizes the fact that there are many factors operating in these two streams that affect the delicate balance of the fish assemblage and timely attention has to be paid in implementing a rational management of these two systems.

Some biological aspects of the most abundant ornamental fish species, *Danio malabaricus* were studied. The Length frequency data obtained from the commercial fish collectors in the study area were analysed using compleat ELEFAN software. The asymptotic total length (L_∞) is 70.5mm, von Bertalanfy growth coefficient (K) is 1.2 $year^{-1}$ and theoritical age at length zero (t_0) is -0.2 years. The Growth performance index (Ø') of this species is 3.78. The total mortality (Z), natural mortality (M) and fishing mortality (F) are estimated to be 5.81 $year^{-1}$, 3.01 $year^{-1}$ and 2,80 $year^{-1}$ respectively. The exploitation rate (E) is 0.48 indicating that the stock is not over-exploited but it

also indicates that the natural mortality (M) of this species is higher than the fishing mortality (F). This emphasizes the point that, an increase in the fishing mortality on this species, in which the natural mortality is already high can be very harmful. The annual recruitment of this species occurs as two recruitment pulses separated by a 4-5 months interval. The mean size at first capture of this species is 39.36 mm.

Both sexes of the fish show a typical length-weight relationship, weight increasing with length, rapidly at the beginning and then slowing down. There is no significant difference between the length-weight relationship of males and females. The exponent b is 2.7 for male and 2.8 for female, indicating that this species shows an allometric growth.

Studies of feeding of D.malabaricus show that this species is an omnivore, feeding primarily on insects (Both terrestrial and aquatic) and crustaceans. There is a high positive selection of insect larvae, insects, cladocerance such as *Ceriodaphnia,Bosmina* and *Daphnia*. A qualitative difference in food items between the males and females is also shown, which may be due to some ecological segregation of sexes in the habitat they occupy. There is a high qualitative food overlap among the size classes with a quantitative difference in prey size, where smaller size classes consume smaller prey items while large classes consume large prey items. This may be attributed to the morphological differences (*ie.* size of the

mouth) in the size classes.

The sex ratio of this species is 1 :1.4 (male :female) showing that the females predominate the population. Such difference could be due to a partial segregation of mature forms through habitat preference or due to migration or behavioural differences between sexes or a cumulative result of one or more of the above. The minimum size at first maturity is 48 mm for females and 52 mm for males indicating that the females attain maturity earlier than the males. The reason for this could be the size differences between males and females where females of this species were generally larger than the males. Females reach full maturity (100%) at 65.1 mm and males at 70 mm.

D. malabaricus, is a multiple spawner, spawning from April to September with a peak spawning in April and September. Mature eggs of the species show a minimum diameter of 0.1 mm and the range can vary from 0.1 - 0.14 mm. The fecundity of female is 458 (SD ± 165) and fecundity is best related with weight of ovaries and tha total weight of fish.