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Etroplus suratensis commonly called as pearl-spot, is one of the indigenous cichlid and is perhaps one of the most delicious estuarine fish of the locals. The present study was envisaged to provide information on some of the eco-biological aspects of the fish from Karwar waters.

Specimens were collected from four different study stations of the Kali estuary for systematic and taxonomic studies. Some new information is added to the morphological characters such as increased number of caudal fin rays, two on each side that is upper and lower, which are fused and smaller in size. The attachment of the inner margin of the ventral fin to main body with thin membrane, four additional vertical bands in the head regions, number of vertebrae and the pharyngeal teeth are the additional information reported in chapter one.

The various ecological parameters of the Kali estuary with reference to natural habitat of Etroplus suratensis has been extensively studied and discussed in chapter two.

HYDROLOGY

During the study period, all the stations recorded mean seasonal higher temperature during the pre-monsoon season and the minimum temperature was recorded during the monsoon season.

The salinity at the sampling sites showed a unimodel pattern being minimum during monsoon and thereafter gradually increased to its maximum until pre-monsoon period.

Dissolved oxygen content was recorded higher during post-monsoon season. However, higher dissolved oxygen were also observed during monsoon and can be attributed towards lower salinity and higher solubility of gases.
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The pH variation was relatively less and ranged between 7.2 and 8.9 in the Kali estuary.

Suspended load was found to be more during the monsoon period. River run off and land drainage were the main reason attributed to it. The pre-monsoonal months recorded the lower VEC and monsoonal months the highest.

Nutrient profile of Kali estuary showed marked variation during the period of observation. Nitrate nitrogen and phosphate phosphorus were high during post monsoon and low during pre- monsoon. Large amount of silicates were recorded during monsoon months.

Primary productivity in the estuarine waters increased in the post-monsoon period and reached its peak in December following that of nutrients.

Higher values of particulate organic matter were found in monsoon months and lower values during post-monsoon. This trend may be due to accumulation of organic material in to the estuary by tidal influx.

Particulate humic acids were found to be low in the pre-monsoon months and higher during the post- monsoon months.

SEDIMENTOLOGY

Sediment temperature had more or less the same trend of variation as that of water temperature.

Higher values of organic carbon during pre-monsoon could be due to autochthonous origin since the intertidal areas are rich in periphyton, whereas higher values during monsoon could be attributed to terrestrial runoff.

Higher sediment pH ranges were observed during monsoon and lower during pre-monsoon.
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Sediment structure was found to be of sandy type at station 1, silty clayey type at station 2 and clayey silt type at station 3 & 4, respectively.

BIOTIC PARAMETERS

Highest and lowest mean values of macrobenthos were recorded at station 3 & 4, respectively. Of the 14 representatives of macrobenthic taxa, 10 groups viz. Foraminifera, Coelentata, Polychaeta, Gastropoda, Bivalvia, Shrimps, Decapoda, Isopoda, Harpacticoida, and Cumacea constituted the maximum at station 1, respectively.

During the present study, it was observed that at station 1, the density of macrofauna was less and meiofauna very high. Station 1 had higher density of meiofauna during premonsoon and their density reduced to a very lower level during monsoon. Of the 16 representatives of meiobenthic taxa Foraminifera, Diatoms, Nematodes, Harpacticoida constituted the major group.

However, the meiobenthic and macrobenthic population were not homogenous in the present study and exhibited spatial and temporal variation at the study stations.

Higher densities of phytoplankton were observed during the premonsoon and lower densities were recorded at station 1 during post-monsoon.

Maximum occurrence of zooplankton was centered in post-monsoon at station 2 and pre-monsoon at station 4.

Studies made on the food and feeding habits revealed that Etroplus suratensis is an omnivorous fish feeding on algae, macrophytes and benthic organisms such as polychaete worms, crustaceans, molluscs etc. Filamentous algae, Nitella species and Hydrilla species comprised the maximum part of its food.
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through out the year.

Season wise, size wise and sex-wise qualitative and quantitative analysis of stomach contents were carried out to study the similarity and disparities of food and feeding regimes of the fish and results are discussed.

Juveniles were found to graze mainly on diatoms, filamentous algae, small amount of detritus and fraction of zooplankton. In higher size group, filamentous algae comprised the maximum percentage of food followed by macrophytes, diatoms etc. Fish scales, sand, wooden fragments were observed in smaller quantities among these groups, which might have been ingested while grazing upon detritus.

Feeding activities was found to be high in juveniles followed by other length groups. Thus differential feeding intensity in the smaller and larger sizes and in different maturity stages was observed.

Studies on the length-weight relationship showed that these groups differ significantly from one other. The significance of deviation of the regression coefficient from the cube law ($b=3$) was tested by the test of significance or student’s $t$ test. Significant deviations were observed in case of males and females with males showing greater deviations. The differences in regression coefficient within groups were tested by $t$ test and it was estimated that length-weight relationship between males and females was not found to differ significantly whereas the length-weight relationship between juveniles and males and juveniles and females differed significantly.

In the study of reproductive biology, ten oocyte stages of developing oocyte could be distinguished based on size and morphological characters. The monthly distribution of maturity stages and Gonado-Somatic-Index indicated that spawning
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in these species was a prolonged one with peaks in January-February and November.

The maturation process of ova and distribution pattern of ova diameter in the ovaries of this fish indicated multiple spawning behaviour during the breeding season. Generally, the fecundity showed a linear relationship with length and weight of fish and ovary weight. The fecundity ranged from 700-3586 with an average of 2278 eggs.

The sex ratio showed preponderance of females up to 136 mm group (1:2.66), until it attained sexual maturity but in the higher length group i.e. above 136 mm males were dominating. The size at first maturity of this species along the Kali estuary was found to be 111-115 mm size group.

The acute toxic effects of the heavy meals Hg, Cu, Zn and Cd were studied on the juveniles of *Etroplus suratensis* by static renewal tests. The bioassay tests were conducted for a period of 96 hours on juveniles and the percentage mortality was recorded at different time intervals. The median lethal concentrations (LC$_{50}$) of Hg, Cu, Zn and Cd were determined by probit analysis.

Acute toxicity tests revealed that Hg was the most toxic among the four metals tested, and the order of toxicity of the metal was: Hg>Cu>Zn>Cd to the juveniles of the *Etroplus suratensis*.

Effects of sublethal concentrations of heavy metals on the respiratory rate of juveniles were studied for a period of 24 hours. Respiration was significantly affected with increase in metal concentration and time. Thus, it is evident from the present study that the heavy metals Hg, Cu, Zn and Cd were all found to be oxygen depressants of the juveniles of *Etroplus suratensis*. 
Epizootic ulcerative syndrome and fin rot are the two important diseases analyzed and discussed. The different parasites recorded during the present study were *Lernea species*, *Tricodina species*, *Ancyrocephalus Caligus species* and *Cymothoa Krishnai*.

For biochemical studies, *Etroplus suratensis* were analysed for a period of 16 months and the samples representing different sizes, maturity stages of fish and ovary were analysed to study the dynamics of biochemical constituents in these tissues.

The protein and moisture content of the muscle tissue gradually decreased as the gonadal maturity in female approached the ripe and mature stage in male. This corresponds to the cessation of feeding in the ripe and mature stage, respectively.

Proteins and lipids were found to have inverse relationship wherein the former decreased in both the sexes and the later was found to be high in late maturing and ripe fish in both the sexes.

There was a marginal decrease in ash content with a simultaneous increase in organic carbon in the ripe stage.

The moisture content was lowest in the highest class group (180mm). There was no variation in protein level as the fish grew in size or age.

The lipid level increased in higher class (120-160mm) and then decreased in the largest class.

There appears to be no distinct change in the ash, organic carbon and calorific content with respect to fish size.
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There was monthly variation observed in the biochemical constituents of the fish. So also, variations were evident in the ovary and different size groups, of which the results are analyzed and discussed.

Thus the proximate composition of *Etroplus suratensis*, revealed that it is rich in protein content and low in lipid, which is very much important from the nutritional point of view.