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This investigation deals with profiles of distribution and community structure of macroinvertebrates in selected streams of Western Ghats especially the southern Western Ghats of peninsular India, which is one of the 25 hotspots of global biodiversity.

First aspect of the investigation deals with latitudinal and altitudinal distribution patterns and diversity profiles of macroinvertebrates inhabiting the streams of southern Western Ghats through kick-net sampling in riffle habitats of 34 stream sites. The study includes geographically from $8^0$N to $14^0$N latitude and 100 m to 889 m altitude covering the 3 states of Karnataka, Kerala and Tamil Nadu.

A total of 19,252 individuals belonging to 12 orders, 47 families and 84 genera were collected in this study. The observed family and the generic richness were higher in all stream sites except at Karuppa nathi (Tampiraparani river basin-east flowing). But the estimated family and the generic richness were lower in Kallar (Tampiraparani river basin-west flowing) than in other stream sites. The estimated order, family and the generic richness were lower than the observed values in sampling locations in $8^0$N. The estimated order, family and the generic richness were slightly higher than the observed values in latitudes $9^0$, $10^0$, $11^0$ and $13^0$N. The estimated order richness was lower than the observed value in altitude between 100 m and 425 m. The estimated family and generic richness values were lower than the observed values in altitude 100 m to 252 m.
Interestingly sampling locations in unprotected areas recorded higher generic richness than those located in protected areas.

The observed alpha diversity index for the families was the highest in $13^0N$ and the lowest in $11^0N$. But the alpha diversity index for genera was the highest in $8^0N$, $13^0N$ and the lowest in $11^0N$. The family turnover showed a strong similarity (0.79) between $8^0N$ and $10^0N$ latitude. The genera turnover showed a strong similarity (0.70) between $8^0N$ and $9^0N$ latitude. The dendogram showed that the macroinvertebrate families across latitudinal zones were similar between $9^0N$ and $10^0N$ and $10^0N$ and $13^0N$. The genera across latitudinal zones were similar between $8^0N$ and $9^0N$ and $11^0N$ and $13^0N$. Simpson and Shannon-Weiner indices for families were the highest in altitude between 752 m and 914 m.

The overall macroinvertebrate family and generic richness were decreasing with increasing altitude in the present investigation, but order wise richness was decreasing in the high altitude and in the middle altitude. However, there was no clear-cut altitudinal zonation of macroinvertebrates within observed range, when all the investigated sampling sites were taken together for analysis. Present investigation shows that there is an altitudinal change in the composition of zoobenthos assemblage and also shows a decline in species richness with increasing elevation.

Second aspect of the investigation deals with the diversity and distribution of functional feeding categories of macroinvertebrate communities and their links in fish food chain. It deals with the diversity and distribution of macroinvertebrate communities in different Landscape Element types (LsE) and it compares the distribution of macroinvertebrate trophic categories against the background of RCC and predictions arising from it as given by Vannote et al., (1980) and
Minshall et al., (1983, 1985). It highlighted the links of benthic macroinvertebrates in fish food chain through fish gut analysis. Total functional feeding groups of macroinvertebrates were significantly different between and within the stream orders and LsE types.

The abundance of functional feeding groups peaks in the second order streams. However, some scraper taxa such as Aulocodes sp. were rare in second order streams. The presence of predators that included families such as Gomphidae (Odonata), Gerridae, Nepidae (Hemiptera), Dystiscidae and Gyrinidae (Coleoptera) were more or less uniform in all stream orders investigated. The proportional abundance of the functional feeding groups changes with stream orders. In the first order streams, collectors contribute about 56%. The predators contributing 24% were the second most abundant group in the fist order streams. In the second, third and fourth order streams collectors were contributing 54.1%, 54.6% and 52.4% of the total functional feeding group density respectively. Likewise predators were the second most abundant group in second order (28.5%), third order (28.9%) and fourth order (30.7%) streams. It is suggested that predictions of the River Continuum Concept (RCC) do not apply to streams from several regions out side Nearctic especially the tropics. The present data on shedder paucity did not follow the predictions of the RCC. The RCC predicts that the proportional abundance of predators remains unchanged across stream orders. It did not find any evidence to support the predictions of the RCC for other functional groups.

Third aspect of the investigation deals with diversity, abundance and seasonality of macroinvertebrates in Gadana river basin for 12 months. The Shannon-Weiner and Simpson’s indices were highest in post-monsoon period,
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March (1.603 and 0.797) and lowest in southwest monsoon, (June, 1.572 and 0.783). Evenness index was highest in March (post-monsoon period, 0.996) and lowest in southwest monsoon (June, 0.976). Analysis of variance showed that water temperature and dissolved oxygen concentration are probably more related to differences between seasons than to differences between sites. A total of 9998 individuals representing 11 orders, 37 families and 58 genera were collected during this study. In terms of both number of individuals and insect, taxa insects are dominant. More individuals were collected annually from sites 5 than in other sites. Gadana river is dominated by bedrock substrate with semi-evergreen type of forest. This may be the reason for the high diversity and abundance of macroinvertebrates especially the aquatic insects in this area.

The fourth aspect of the investigation deals with the rapid assessment in selected streams of Western Ghats using benthic macroinvertebrate communities. It showed two significant correlations with the different assessment approaches.

a. The BMWP and RBP III were significantly associated with the population density (0.3701 and 0.5261 respectively) and
b. ASPT and FBI were significantly associated with the stream velocity and stream order (0.4008 and 0.3856 respectively) at the 34 sites.

The habitat assessment component was very essential in any bio assessment programme. Incorporation of a multimetric approach in future to the monitor peninsular Indian river system should not be overlooked.