ORL-EB&C-20

Impact of Dam on Fish Diversity and Factors Affecting the Abundance and Richness of Fishes in Madi River, Nepal

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The present study deals with the impact of dam and factors affecting the abundance and richness of fishes in the Madi River, Nepal. The sampling was carried out in four different seasons (winter, spring, summer and autumn) from 11 sites (7 sites were downstream of dam and 4 sites were upstream of dam) with the help of backpack electrofishing device. The altitudinal variation of sampling sites was from 300m to 1300m above sea level. A total of 1271 individuals belonging to 4 orders, 7 families, 17 genera and 26 species were recorded during the study period. The highest number of species was recorded in winter and summer, followed by autumn and spring.

The highest Simpson's diversity (0.436 ± 0.082) was recorded in winter, while the lowest (0.354 ± 0.078) in autumn. Similarly, the Shannon-Wiener's diversity (H') was higher in winter (0.765 ± 0.168) compared to its lowest (0.656 ± 0.179) in spring. The Pielou's evenness (E) was highest (0.946 ± 0.032) in spring and lowest (0.777 ± 0.059) in autumn. The Margalef's richness index (d) was found higher (0.809 ±0.245) in summer and lower (0.447 ± 0.155) in spring. The significance difference between the water quality variables like temperature, pH, free CO_2, total alkalinity and water velocity of upstream and downstream sites was found. But the variables like DO, turbidity and nitrates showed no significant difference.

The fish abundance and species richness of downstream and upstream sites also varies significantly. The results of Generalized Linear Mixed Model (GLMM) showed that among eight water quality variables a significant positive association of fish abundance with water temperature, DO and total hardness was found and species richness also increases with the increase of water temperature and DO. The increase of pH, free CO_2, nitrates and water velocity reduces the fish abundance and species richness.

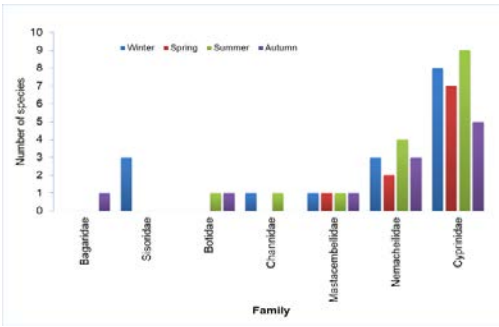

Figure 1. The number of species in each family occurring in four seasons in the Madi River

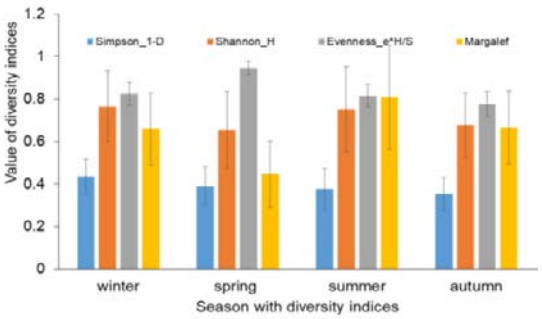

Figure 2. Mean (± SE) of Simpson, Shannon, Evenness and Margalef richness in four different seasons in the Madi River