SUMMARY

The purpose of this research was to determine the density and diversity of the planktonic Cladocerans. For this research Changa Manga Lake, Lahore was chosen as no work has been done on the biodiversity of this lake so far. The study area was partitioned into four different parts. The duration of this study was from September 2015 to August 2016. The samples for the research were taken on monthly basis in order to study the population dynamics of the Cladocerans. The physico-chemical parameters i.e., air temperature, pH, dissolved oxygen, water temperature, total dissolved solids, transparency, turbidity, salinity and electrical conductivity.

The samples of the study were preserved with caution. The counting of the Cladocerans was carried out by the help of the Sedgewick-Rafter chamber or cell by using an inverted OLYMPUS microscope at magnification of 60–100x. The photographs of the Cladoceran species were captured by using LEICA HC 50/50 microscope along with 5.0 megapixel Cannon camera that was fixed on it. The Cladoceran species were identified up to species level.

In the present study, total 20 species were identified belonging to 11 genera. Cladoceran population was highest in May (9.00 ± 1.468) and lowest in October (0.75 ± 0.649) and August (0.75 ± 0.414). The relative (%) representation of family indicated that dominant family were in the order of Chydoridae (45%) > Daphniidae (40%) > Bosminidae (15%). The relative (%) representation of genera indicated that dominant genera were in the following order i.e., *Alona* (20%), *Ceriodaphnia* (20%) > *Chydorus* (15%) > *Scapholeberis* (10%). The relative (%) representation of Cladoceran species indicated that dominant species were in the following order *B. longirostris* (27.7%), *E. coregoni* (12.03%) and *C. reticulata* (10.81%).

Analysis of variance (ANOVA) showed that parameters including air temperature, water temperature, dissolved oxygen, electrical conductivity, transparency, pH, salinity, turbidity and total dissolved solids (TDS) were statistically highly significant as the values of p were less than 5% ($\alpha = 0.05$).

Pearson correlation indicated that air temperature, water temperature, dissolved oxygen, transparency and pH were positively correlated with Cladoceran density and diversity. The

parameters including electrical conductivity, salinity, turbidity and total dissolved solids (TDS) were negatively correlated with the Cladoceran density and diversity.

Shannon-Weaver index (H) of Changa Manga Lake was calculated on monthly basis. The Shannon diversity index showed the maximum diversity in February (1.32) and minimum in August (0). Simpson's index of dominance ranged 0.28 to 1. It was lowest in February and highest in August. Simpson's index of diversity was highest (0.71) in February and lowest (0) in August. Simpson's reciprocal index was highest (3.56) in February and lowest (1) in August. These results showed low diversity of Cladocerans during the study period. These results have been supported by Simpson index of dominance, Simpson Index of diversity and Simpson reciprocal index. Species evenness was lowest in August (0) and highest in February (0.44). It showed uneven distribution of Cladocerans species in all the months. Species richness ranged from 2.10 to 2.87. It was lowest in May and highest in August and October. It showed the presence of a smaller food chain.

Rank abundance curve was plotted between Cladocerna species and relative abundance of their individuals. The rank abundance curve showed that *B. longirostris* was present at rank 1 with abundance of 30%, the highest peak value in the plot. *E. coregoni* and *C. reticulata* were present at rank 2 and 3 with abundance of 13% and 11% respectively. *C. sphaericus, M. macleayi* and *S. aurita* were present at the end of the curve with least abundance of 1%. The remaining species lie between these extremes.

Principal Component Analysis (PCA) plotted was used to explain the distribution of Cladocera within the months. *A. quadrangularis* and *C. reticulate* and *E. coregoni* showed strong positive relation with the months. *B. longirostris* showed weak positive relation. *C. dubia, A. guttata, C. megalops, S. exspinosus, S. mucronata* and *P. denticulatus* had strong negative relation with the months.

The lake showed low diversity of Cladoceran species during study period. Physicochemical parameters i.e., DO, temperature, pH etc are limiting factors. Cladocerans showed their abundance in favorable conditions and disappeard in unfavorable conditions and reappeared when conditions become favorable. Abundance of *B. longirostris, E. coregoni and C. reticulata* showed eutrophic condition of lake water. Nitrogenous wastes in the faeces of birds were responsible for the alkaline pH of lake water. Fluctuations in different physico-chemical

parameters, competition for food between Cladocerans and other groups might have contributed to low diversity of Cladocerans in the lake. Further studies are needed to study the effect of recreational values on water bodies and their effects on zooplankton species.