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Research Article

Species diversity of order Trichoptera (Insecta) in district Abbottabad

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ABSTRACT

Caddis flies are important bio indicators of water quality. Present study was planned to explore the species diversity of insect order Trichoptera in section of River Dorr between Harno and Dhamtor of district Abbottabad, Pakistan in 2018. Four sites were selected viz. site A, B, C and D, where site A was upstream while site B, C and D was downstream and a distance of 300 meters in between all four sites. Kicking and hand picking techniques were used. Samples were collected using D-frame kick net. Samples were washed, sorted and preserved in 70% alcohol in plastic bottles. A total of 243 individuals of Trichoptera larvae were sampled belonging to five families (Hydropsychidae, Hydroptilidae, Leptoceridae, Phryganeidae, and Polycentropodidae. Hydropsychidae (37.03%), Hydroptilidae (30.86%) and Leptoceridae (29.21%) were found to be the most abundant families whereas Phryganeidae (2.46%) and Polycentropodidae (0.41%) were least encountered families. Greater species diversity of Trichoptera was observed in early-late March.

Keywords: Trichoptera, larvae, bio indicators, water quality, D-frame kick net.

INTRODUCTION

Biodiversity plays a vital role in reflection whether an organism is threatened or not and it also focuses on the measures that how to conserve an endangered species (Abdul Ahad, Raja, Khatun, & Hossain, 2012).

Species richness is the most important criteria to access diversity. The most significant and appreciable part of a mother community is total number of individuals in that community (Abdelsalam & Tanida, 2013). Aquatic insects play an important role in conservation of biodiversity mainly in streams. Macro benthic invertebrates act as bio indicators and are important in considering the loss of biodiversity. These insects help in the conservation of biomass and prevent it from being carried out downstream. They also play a role in the assimilation and mineralization of nutrients by microbes which perform the redox reactions (Suter & Cormier, 2014).

Among the insect's order, Trichoptera (Caddis flies) comprises of more than 14,500 reported species. They hinder the diversification of habitats starting from springs to large rivers to all types of standing water bodies. They are well known for bio indication varying from organic pollution to hydro-morphological degradation, acidification and climate change (Kloiber, et al., 2017). Trichopterans are very sensitive to fluctuations in physical and chemical structure of aquatic environments, anthropogenic alteration and variation in canopy cover (Pereira, Cabette, & Juen, 2012).

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MATERIALS AND METHODS

Study Area

Field experiments were carried out in section of River Dorr, District Abbottabad (altitude 4,120 feet). The study was conducted from January 2018 to June 2018 to determine the diversity of the order Trichoptera. For evaluation, four sites were selected. Site A and site B were selected upstream far from the place of entry of wastewater from Abbottabad, whereas site C and site D were chosen downstream to the point source pollution.

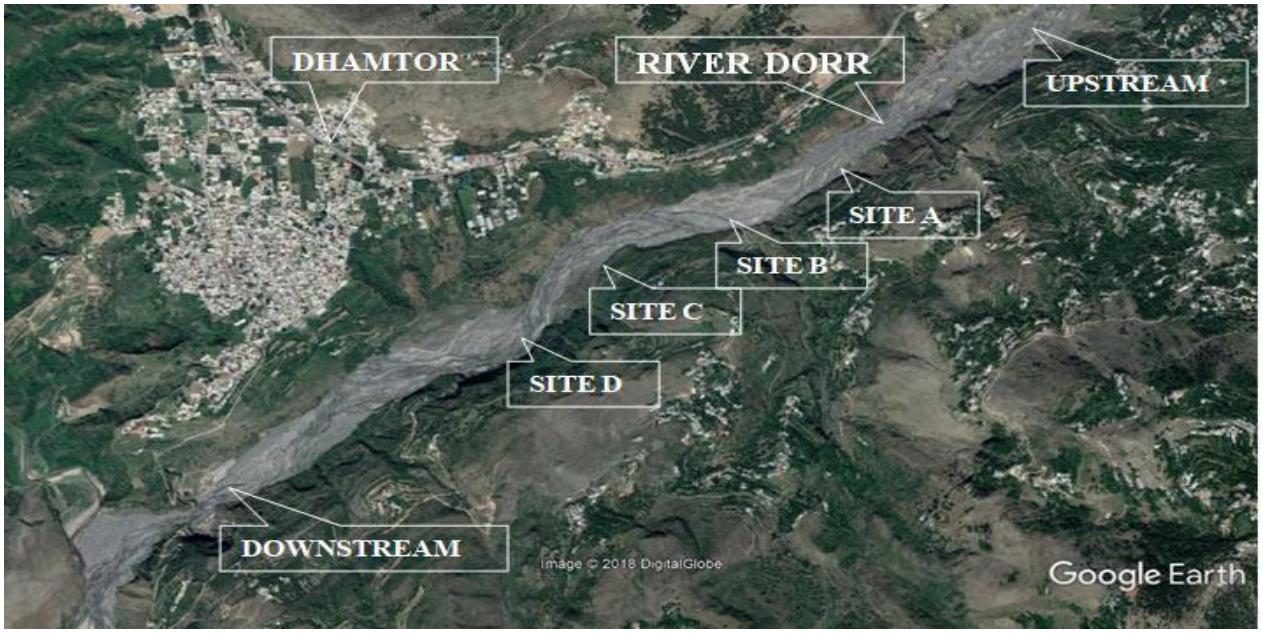

Figure 1. Map of Study Area.

Experimental Design and Treatments

Kicking along the permanent channels was done from downstream to upstream. D-frame kick net with 200 mesh per square inch was dragged behind the researcher to capture the dislodged insects. Kicking was performed for 5 to 10 minutes. The net was inverted in a plastic bucket filled with water to separate the pebbles, leaves and other unwanted material from the sampled material. The material was sieved and shifted on a white tray for the invertebrate sorting using forceps. The sampling was done 2 to 3 times using the same method for each site.

Individuals of Trichoptera was collected and preserved in 25 ml plastic bottles containing 70% of ethyl alcohol for further lab analysis. Identification was performed using a magnifier and Olympus SZX7stereo-microscope with magnifying power of 40X. Standard identification keys were used to identify the Trichoptera up to family level. Identified individuals of each family were counted. The result was noted to indicate the overall diversity of families of Trichoptera at the selected sites.

Data analysis

The obtained data was analyzed using Simpson's Diversity Index (D) and Shannon-
Weiner Index (H) biological indices. Excel software was used to draw figures and tables.

Simpson's Diversity Index (D): $D = 1-\{ \frac{n(n-1)}{N(N-1)} \}$

Shannon- Weiner Index (H): $H = -\sum P_i(\ln P_i)$

RESULTS AND DISCUSSION

During the study period, a total of 243 individuals of Trichoptera were collected. The sampled individuals represented 5 families Hydropsychidae, Hydroptilidae, Leptoceridae, Polycentropodidae and Phryganeidae (Table: I). Family Hydropsychidae was found to be most abundant followed by Hydroptilidae, Leptoceridae and Phryganeidae. Family Polycentropodidae showed least diversity with only 1 individual.

Table 1. Showing Total Number of Trichoptera.

Families	Number of Individuals
Hydropsychidae	90
Hydroptilidae	75
Leptoceridae	71
Phryganeidae	6
Polycentropodidae	1

High number of individuals were found during the month of January and March. Whereas during the month of April, the faunal composition was minimal due to heavy rainfall resulting in increased flow of water and disturbed substratum **(**Figure 2**).** 93 individuals were sampled from site A, 48 from B, 46 from C and 56 from site D respectively. Site A represented a higher diversity of 93 individuals upstream. While site C showed less diversity of 46 individuals downstream.

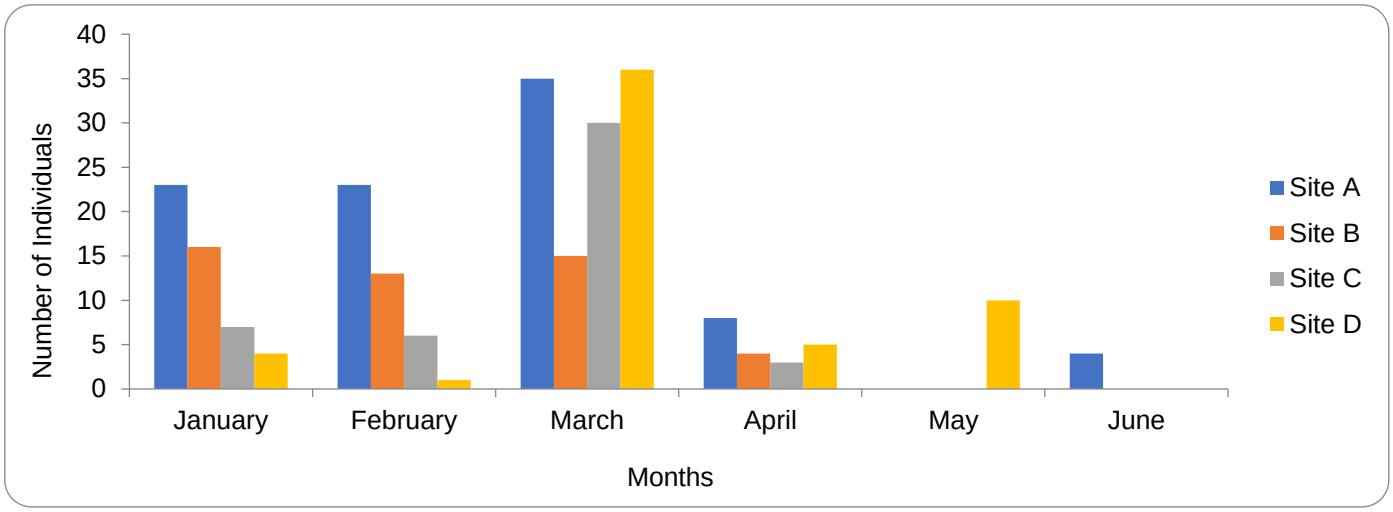

Figure 2. Showing Overall Diversity of Trichoptera.

In the present study, family Hydropsychidae showed abundance among the identified families. The observation correlates with the (Maneechan & Prommi, 2015), who related the diversity of family Hydropsychidae and family Heptageniidae (Ephemeroptera) with their abilities to inhabit waters with low oxygen concentration. This also correlates with the studies of (Henriques-Oliveira, Nessimian, & Bapista, 2015), in which family Hydropsychidae was found to be abundant.

The results showed that the number of Trichoptera larvae gradually increased from January and become higher in the month of March. The number decreases in the first week of April due to heavy rainfall. The larvae showed a decline in number during the months of May and June as the larvae started maturing into adults.

According to recent investigation, the water of Harnoi stream is highly polluted due to recreational activities and human involvement. Besides this, sewage disposal, organic and inorganic solid waste dumping and vehicle washing in the Harnoi stream results in the destruction of flora and fauna of this stream. It still provides suitable breeding ground for Caddis flies.

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