



Invertebrate faunal diversity of lentic and lotic ecosystems in Indian desert region

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Abstract

The present study aimed to explore the invertebrate faunal diversity of lentic and lotic ecosystems in Indian desert region. The study was undertaken in Sagar pond (a lentic ecosystem), Bikaner (28.0229°N, 73.3119°E) and Sadul branch of Sirhind feeder canal (a lotic ecosystem), Hanumangarh (29.35°N, 74.19°E). The period of study was July, 2019 to December, 2019. The faunal composition was very rich in pond water represented by 42 species belonging to phylum Protozoa (10 species), Nematoda (1 species), Rotifera (5 species), Annelida (2 species), Arthropoda (20 species), and Mollusca (4 species). The order of diversity of different phyla was : Arthropoda > Protozoa > Rotifera > Mollusca > Annelida > Nematoda. In canal, the invertebrate fauna was represented by 30 species belonging to phylum Protozoa (12 species), Rotifera (7 species), Annelida (2 species), Arthropoda (6 species) and Mollusca (3 species). The order of diversity of different phyla was: Protozoa > Rotifera > Arthropoda > Mollusca > Annelida. It is concluded that lentic habitat differed from lotic habitat. Faunal diversity of lentic ecosystem and lotic ecosystem is distinct and different from each other and is characterized by the climatic, geochemical, geomorphological, biotopic and pollution conditions. The present study reveals significant variations in diversity of invertebrate faunal species in both the waters. Both the waters harbour wide range of species which can withstand stressful conditions.

Keywords : Faunal diversity, Lentic, Lotic, Ecosystem

Introduction

The lentic ecosystem includes all standing water bodies like lakes and ponds. The lotic ecosystem includes all flowing water bodies like rivers and springs. These inland fresh water bodies play vital role in food web and nutrient recycling. Communities of organisms that are dependent on each other and on their environment live in aquatic ecosystem. Both lentic and lotic fresh water ecosystems support high level of biodiversity. Biodiversity is essential to functioning of an ecosystem. Each species plays a unique role within an ecosystem and every species is dependent on other for food, shelter, or other resources. The present study aimed to explore the invertebrate faunal diversity of lentic and lotic ecosystems in Indian desert region.

Study area

The study was undertaken in Sagar pond (a lentic ecosystem), Bikaner (28.0229°N, 73.3119°E) and Sadul branch of Sirhind feeder canal (a lotic ecosystem), Hanumangarh (29.35°N, 74.19°E). Sagar pond is situated about 7 km east of Bikaner city. Sadul branch is situated near Jorkian village district Hanumangarh. It begins from Sirhind feeder at Rajasthan border situated at Punjab.

Materials and Methods

The period of study was July, 2019 to December, 2019. The plankton fauna from water was collected with plankton net. A quadrat was used to collect the mud samples. Benthic fauna was collected by sieving the mud samples.

Identification of invertebrate fauna was made following Edmondson (1966), Needham & Needham (1978), Tonapi (1980), Subba Rao (1989), Borner & DeLong (1957) and McCafferty (1981).

Results and Discussion

The faunal composition was very rich in pond water represented by 42 species belonging to phylum Protozoa (10 species), Nematoda (1 species), Rotifera (5 species), Annelida (2 species), Arthropoda (20 species) and Mollusca (4 species). In the present study the order of diversity of different phyla was noted as : Arthropoda > Protozoa > Rotifera > Mollusca > Annelida > Nematoda. Phylum Protozoa was represented by two classes : Mastigophora (3 species) and Ciliata (7 species). Five species of class Monogonota, phylum Rotifera were present in pond water. Phylum Annelida was represented by two oligochaetes. Arthropods were represented by crustacean and insects. Six crustaceans and 14 insect species were documented. Mollusc fauna was represented by four gastropod species. In canal, the invertebrate fauna was represented by 30 species belonging to phylum Protozoa (12 species), Rotifera (7 species), Annelida (2 species), Arthropoda (6 species) and Mollusca (3 species). The order of diversity of different phyla was : Protozoa > Rotifera > Arthropoda > Mollusca > Annelida. Phylum Protozoa was represented by three classes : Mastigophora (5 species), Ciliata (6 species) and Sarcodina (1 species). Seven species of phylum Rotifera were recorded. Phylum Annelida was represented by three species of crustaceans and three species of insects. Phylum Mollusca was represented by three species of class Gastropoda (Table 1).

A large number of invertebrate species are documented from the water sheets of Rajasthan, belonging to all animal groups excepting Coelenterata and Echinodermata. Saxena (2008) reported 41 species of protozoans from the wet lands of the Indian desert region. Sharma (2013) observed 12 species of rotifers in desert waters. In fresh water, annelids occur mostly as benthic and periphytonic forms. *Aelosoma hemprichi* found in village ponds appears to be first record by Srivastava (2009) from Bikaner region. Tak (1996), Saxena (2008), Srivastava (2009), Tak (2015) and Rukasana (2017) studied aquatic insects of the Indian desert region of Rajasthan. Class Gastropoda was also reported by Rathore (2003), Khatri (2008) and Chandra (2015) in water bodies of desert region.

Conclusion

It is concluded that lentic habitat differed from lotic habitat. Faunal diversity of lentic ecosystem and lotic ecosystem is distinct and different from each other. Both the waters harbour wide range of invertebrate species. Different invertebrate species showed their abundance according to the favourable conditions.

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Table 1 : Invertebrate faunal diversity in lentic (Sagar pond, Bikaner) and lotic (Sirhind feeder canal, Hanumangarh) ecosystem. '+' indicates the presence and '-' indicates the absence of species.

Faunal species	Sagar Pond, Bikaner	Sirhind feeder canal, Hanumangarh
Phylum – Protozoa		
Class – Mastigophora		
<i>Chilomonas Paramecium</i>	+	–
<i>Euglena Sociabilis</i>	+	+
<i>Euglena acus</i>	+	+
<i>Euglena spirogyra</i>	–	+
<i>Euglena mass</i>	–	+
<i>Paranema trichophora</i>	–	+
Class – Ciliata		
<i>Paramecium caudatum</i>	+	+
<i>Hemiohrys procera</i>	+	–
<i>Stentor coeruleus</i>	-	+
<i>Tillina magna</i>	+	–
<i>Nessula omate</i>	+	+
<i>Chilodonella cucullulus</i>	+	+
<i>Stylonychia pustulata</i>	+	–
<i>Paranema bursaria</i>	-	+
<i>Vorticella campanula</i>	+	+
Class – Sarcodina		
<i>Amoeba proteus</i>	–	+
Phylum – Nematoda		
Class – Aphasmidia		
<i>Eudorylaimus carteri</i>	+	–
Phylum – Rotifera		
Class – Monogonota		
<i>Keratella tropica</i>	+	–
<i>Brachionus bidentata</i>	+	+
<i>Brachionus calyciflorus</i>	–	+
<i>Keratella cochlearis</i>	–	+
<i>Lecane bulla</i>	+	–
<i>Philodina roseola</i>	+	–

<i>Filinia longiseta</i>	-	+
<i>Trichocerca longiseta</i>	+	-
<i>Monostyla lunaris</i>	-	+
<i>Monostyla quadridentata</i>	-	+
<i>Keratella vulga</i>	-	+
Phylum – Annelida		
Class – Oligochaeta		
<i>Aeolosoma hemprichi</i>	+	+
<i>Tubifex tubifex</i>	+	+
Phylum – Arthropoda		
Class – Crustacea		
<i>Mesocyclops leukarti</i>	+	+
<i>Diaptomus glacialis</i>	+	-
<i>Daphnia carinata</i>	+	-
<i>Bosmina longicornis</i>	+	-
<i>Stenocypris malcomsoni</i>	+	-
<i>Eocyclus politus</i>	-	+
<i>Cyclops sternus</i>	+	+
Class – Insecta		
Order – Coleoptera		
<i>Hydrophilus olivaceous</i>	+	-
<i>Tropisternus lateralis</i>	+	-
<i>Sternolophus rufipes</i>	+	-
<i>Hydaticus fabricii</i>	+	-
<i>Dytiscus verticalis</i>	+	-
<i>Laccaphilus anticatus</i>	+	-
<i>Uvarus species</i>	+	-
<i>Captotomus interrogatus</i>	+	-
<i>Eubranax species</i>	+	-
<i>Scirtes nigropunctatus</i>	+	-
<i>Hydraena quadricollis</i>	+	-
Order – Hemiptera		
<i>Corixa lima</i>	+	+
<i>Notonecta glauca</i>	+	-

<i>Laccotrepe maculates</i>	+	+
<i>Sigara pectoralis</i>	-	+
Phylum – Mollusca		
Class – Gastropoda		
<i>Lymnaea acuminata</i>	+	+
<i>Indoplanorbis exustus</i>	+	-
<i>Gabbia orcula</i>	+	-
<i>Digoniostomia pulchella</i>	+	-
<i>Thiara tuberculata</i>	-	+
<i>Bellamyia bengalensis</i>	-	+

