

Invertebrates and Vertebrates Fauna of Zameer Gul Dam, Kohat, Khyber Pakhtunkhwa, Pakistan

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Abstract: The basic aim of the present study was to find out the vertebrates and invertebrates' fauna of Zameer gul dam to provide useful information for future studies. During our research work, different samples of fishes were collected from the different sites of the Zameer Gull Dam Kohat with the help of local fishermen using different types of catch nets and were preserved in 10% formalin. The birds were counted by using a binocular (8x to 32x) and were identified. Observations of mammals were made using field binoculars (32x50) and all species were arranged according to their taxonomic classification. The collected samples of invertebrates were identified by using various identification keys. In our research, we discovered six fish species belonging to one class, two orders, and two families during our research. Three amphibian species were discovered, belonging to one class, one order, and three families. There were four reptile species found, with one class, four orders, and eight families. During our research, we found seven mammalian species belonging to one class, three orders, and four families. Six species of invertebrates, comprising eight wasps and five spiders, were found to belong to three classes, five orders, and six different families. From the current study it can be concluded that Zameer gull dam provide suitable environmental conditions to support the diversity of both vertebrates and invertebrates. The water of this dam is of good quality. Government should pay attention to this dam for making this dam excellent for life and irrigation.

Key Words : Invertebrates, vertebrates, diversity, Zameer Gul, Dam, Kohat

1| Introduction

Biodiversity refers to the basic vast quantities of biological beings in ocean that have strong links to individuals, such as fish. Fish fauna biodiversity depends on the ratio enormous amount of sea creatures in the targeted area. (Scholz et al., 2016).

Fish belong to the side wise group of living beings including all water creatures of gills. (Smales et al., 2018). Sea creatures can be involved in virtually all water bodies, from high altitude river systems to the underwater zone of the deepest oceans, with 33,600 discovered species. Fish are the most diverse group of vertebrates.(Paxton et al., 2019). Fish biodiversity reflects differences in morphology, habitat, and mode of life. Fishes, in contrast to certain other related crashes vertebrates, are a diverse group. (Sonet et al., 2019). Amphibians develop from aquatic larvae to land based matures by a series of events known as metamorphosis. (Stancher, Sovrano, & Vallortigara, 2018). Amphibians survive in both terrestrial and aquatic natural environments; any transition either or both habitats affects amphibian diversity. (Di Lorenzo et al., 2020). Adult amphibians consume meat, whereas larval amphibians consume plants. The teeth of the amphibian are spread and supplemented on a constant schedule. The tongue is commonly used in food preparation. (Shi & Camus, 2006). Contaminants, sex hormones, and anti - microbial stimulants are all naturally produced by the amphibian's granular glands. The poisonous substance shields the amphibians from predatory animals, while the bioactive components keep bacteria and fungi at bay. (Shi & Camus,

2006). There are currently 7,044 amphibian species in the world, classified into three orders (Lychakov, 2016). The climate in Pakistan is not particularly hospitable to amphibian fauna. Pakistan has a scattered amphibian fauna due to the removal of water ponds in both towns and cities in order to eradicate mosquito larvae for Biological control, which does have a detrimental effect on amphibian populations (Lychakov, 2016).

Reptiles are poikilothermic vertebrates that, apart from a few, must finalise their life cycle on land. They exhale chiefly through their air sacs, though some (such as turtles) use permeable skin and those that use altered alimentary canal, that either causes swelling for gaseous exchange (Shine, 2013). Arid regions, such as the deserts of North America, have the most multifaceted reptilian fauna on the planet. Pakistan reptiles have been considered to be the first vertebrates to live on land. (Masroor, Khisroon, Khan, & Jablonski, 2020). Pakistan is home to 179 reptile species, including snakes, lizards, gavials, tortoises, crocodiles, and turtles (Masroor et al., 2020). Lizards (Suborder Sauria) are the most common type of reptile (Altaf et al., 2020). More than 7,700 reptile species have been discovered, including turtles, tortoises, snakes, lizards, crocodiles, alligators, and tuataras (Khan et al., 2020). In Pakistan, lizards are fairly common (Rais et al., 2021). Crocodiles, snakes, lizards, turtles, and tortoises are among the reptiles that provide important protein sources for humans (Smith Fleming, 2019). Even though live snakes are highly sought after for medicinal purposes, their numbers have dropped in most parts of the world (Mendoza-Roldan, Modry, & Otranto, 2020).

Of 28 orders, 166 family members, and 8800 species, birds are the most prolific terrestrial vertebrate group. Modern birds lack teeth. Many similarities exist between birds and reptiles, such as the reality that they both produce eggs with amniocentesis cellular membrane and have rating scale on their lower legs (Brusatte, O'Connor, & Jarvis, 2015). Aves are the most instantly recognizable animals. Birds are characterised by the presence of quills; their forelimbs are transformed into wings that are predominantly used for flying; and they have a fluffy tail that assist in balancing and lifting (Ottinger, 2018).

Pakistan's mammalian fauna is comprised of 195 species from ten orders. 5 are widespread in Pakistan, 12 are close to extinction (1 endemic), 12 have been endangered (3 species are native), 20 are highly susceptible, 32 are near victimised (1 endemic), 71 seem to be least major worry, 38 are data defective, 8 are territorially endangered, and 2 are not analysed (IUCN, 2003). Mammals, like birds, play a key function in development by transporting seedlings from flower to flower and controlling various diseases (Ahmed, Hashmi, & Khan, 2019).

Invertebrates seem to be animals that do not have a spine or a spinal column. Invertebrates have diversified and efficient group that contribute for high than 90% of the estimated total 10 million species, with arthropods accounting for the majority of them (Kellert SR, 1993). Humans consume invertebrates such as bee colonies, grasshoppers, and shrimps in a variety of ways (Mather and Carere 2019). Hornets are most often carnivores that eat pests, but there are some species that eat nectar as well. (O'Neill and O'Neill 2019).

2| Materials and Methods

2.1 Collection of fishes

The fish samples were collected from the different sites of the Zameer Gul dam in Kohat with cast nets and different sizes of hooks at regular intervals with the help of local fishermen using different types of catch nets, which were followed by hand nets. Following the collection, photographs were taken, and the same species were preserved in bottles with 10% formalin and 10% alcohol, depending on the size of the species. Each species was identified up to the species level in the laboratory, and the species were reorganized primarily on the basis of the colour pattern, specific spots or marks on the surface of the body, shape of the body, structure of various fins, and so on, using various methods.

2.2 Amphibians and Reptiles Observation

A variety of survey methods were used to survey amphibians during the day and at night. Amphibian species encountered in various habitats, as well as the number of individuals encountered, were recorded on data sheets. The following literature was used to identify amphibian specimens (Wake & Koo, 2018). During the summer, reptiles appear to be very active after dusk. Snakes and lizards are diurnal creatures that are most

active in the morning. Certain geckos and snakes are mostly active at night. Reptiles conceal themselves beneath stones or rocks. During the daytime surveys, stones or rotten fallen trees were turned over to look for reptiles. Information was also gathered from local wildlife staff and the communities surrounding the study areas. The classification and names of the species in the present work are based on (Sabater Gonzalez, 2019). Voucher specimens were injected and preserved in 10% formalin solution or 50-70% alcohol and then transported to the laboratory for their identification by using keys (Marschang, 2011).

2.3 Birds and Mammals Observation

Between the months of December 2020 and July 2021, bird observations were made in the morning and afternoon. Daily surveys were carried out at various locations around the dam. Birds were counted and identified at each sighting using a binocular (8x to 32x). Photographs were taken in cases of doubtful identification, and the species was later identified by consulting experts. The identification of birds was accomplished through the use of standard literature (Zhou, 2004). The expected number of birds at each study site was calculated by averaging each species and then calculating the percentage abundance. Medium and large mammals were identified using signs such as footprints, scats, and dens, as well as information gathered from locals and hunters and game watchers of the Department of Wildlife, Karak. In certain cases, direct observations of the mammals were made using field binoculars (32x50). All species were arranged according to taxonomic classification and their IUCN conservation status was determined (Fea, Linklater, & Hartley, 2021). Invertebrates were also observed during the present study of Zameer gul dam Kohat. For the proper identification of invertebrates, various identification keys were also used, such as (Pellett, O'Brien, & Kennedy, 2020).

2.4 Invertebrate collection

Shells of snails were also collected from all sides of the Zameer Gull dam. Other Invertebrates were also found around the dam, which are now on the list.

2.4.1 Techniques Employed

From the study area, we collected invertebrate fauna by adopting standard sampling techniques such as sweep netting, beating sheets, active searching, hand picking, and umbrella collection.

2.4.2 Preservation of Invertebrates

After collection, all the species of invertebrates were preserved in 70% alcohol in plastic bottles and identified up to their species level by using taxonomic keys.

3 | Results

In our present research work we found varieties of vertebrates including Fishes, Amphibians, Reptiles, birds, mammals and invertebrates of different types in Zameer gull dam district Kohat which are given below in tabulated form from **Table 1-6**. We also searched invertebrates particularly Wasps and Spiders in Zameer Gull dam Kohat which are also given below in the table.

3.1 Fishes

Table 1: Taxonomic position of Zameer gull dam fishes.

S.N.	Class	Order	Family	Genus	Species
1	Actinopterygii	Cypriniformes	Cyprinidae	Ctenopharygodon	<i>C. idella</i>
2	Actinopterygii	Cypriniformes	Cyprinidae	Crossocheilus	<i>C. diplocheilus</i>
3	Actinopterygii	Cypriniformes	Cyprinidae	Cyprinus	<i>C. carpio</i>
4	Actinopterygii	Cypriniformes	Cyprinidae	Aspidoparia	<i>A. morar</i>
5	Actinopterygii	Cypriniformes	Cyprinidae	Salmophasia	<i>S. bacaila</i>
6	Actinopterygii	Siluriformes	Siluridea	Ompok	<i>O. pabda</i>

3.2. Amphibians

Table 2: Species of amphibians found in Zameer gull dam.

S No.	Name of species	Class	Order	Family	Genus	Species
1	Frog	Amphibia	Anura	Dicroglossidae	Rana	<i>Rana tigrina</i>
2	True frog	Amphibia	Anura	Ranidea	Euphlyctis	<i>Euphlyctis cyanophlyctis</i>
3	Common Toad	Amphibia	Anura	Bufoidea	Duttaphrynus	<i>Duttaphrynus melanostictus</i>

3.3. Reptiles

Table 3: Species of Reptiles found in Zameer gull dam.

S No.	Name of the species	Class	Order	Family	Genus	Species
1	Chameleon	Reptilia	Squamata	Chamaeleonidae	Chameleo	<i>Chamaeleo zeylanicus</i>

2	Spiny tailed lizard	Reptilia	Squamata	Agamidae	Saara	<i>Saara hardwickii</i>
3	Desert lizards	Reptilia	Squamata	Xantusiidae	Xantusia	<i>Xantusia vigilis</i>
4	Desert king snake	Reptilia	Squamata	Colubridae	Lamprope ltis	<i>Lampropeltis getula</i>

3.4. Birds

Table 4: Species of Birds found in Zameer gull dam

S. No.	Name species of	Class	Order	Family	Genus	Species
1	Sparrow	Aves	Passeriformes	Passeridae	<i>Passer</i>	<i>Passer domesticus</i>
2	Mynah	Aves	Passeriformes	Sturnidae	<i>Acridotheres</i>	<i>Acridotheris tristis</i>
3	Common teal	Aves	Anseriformes	Anatidae	<i>Anas</i>	<i>Anas crecca</i>
4	Seenzara	Aves	Galliformes	Phasianidae	<i>Perdix</i>	<i>Perdix perdix</i>
5	Peacock	Aves	Galliformes	Phasianidae	<i>Pavo</i>	<i>P. cristatus</i>
6.	Partridge	Aves	Galliformes	Numididae	<i>Numida</i>	<i>Numida meleagris</i>
7.	Dove	Aves	Galliformes	Gruidae	<i>Grus</i>	<i>Grus grus</i>
8.	Nightangle	Aves	Passeriformes	Pycnonotidae	<i>Pycnonotus</i>	<i>Pycnonotus barbatus</i>
9.	Woodpecker	Aves	Bucerotiformes	Upupidea	<i>Upupa</i>	<i>Upupa epops</i>

3.5. Mammals

Table 05: Species of Mammals found in Zameer gull dam.

S. No	Name of species	Class	Order	Family	Genus	Species
1.	Goat	Mammalia	Artiodactyla	Bovidae	<i>Capra</i>	<i>Capra hircus</i>
2.	Sheep	Mammalia	Artiodactyla	Bovidae	<i>Ovis</i>	<i>Ovis aries</i>
3.	Cattle	Mammalia	Artiodactyla	Bovidae	<i>Bos</i>	<i>Bos taurus</i>
4.	Donkey	Mammalia	Perissodactyla	Equidae	<i>Equus</i>	<i>Equus asinus</i>
5.	Dog	Mammalia	Carnivora	Canidae	<i>Canis</i>	<i>Canis lupus</i>
6.	Cat	Mammalia	Carnivora	Felidae	<i>Felis</i>	<i>Felis catus</i>
7.	Jackal	Mammalia	Carnivora	Canidae	<i>Canis</i>	<i>Canis adustus</i>

3.6. Invertebrates

Table 06: Species of Invertebrates found in Zameer gull Dam.

S. No	Name of species	Class	Order	Family	Genus	Species
1.	Dragonfly	Insecta	Odonata	Petaluridae	<i>Sympetrum</i>	<i>Sympetrum flaveolum</i>
2.	Scorpion	Arachnida	Scorpiones	Scorpionidae	<i>Pandinus</i>	<i>Pandinus imperator</i>
3.	Beetle	Insecta	Coleoptera	Carabidae	<i>Pterostichus</i>	<i>Pterostichus melanarius</i>
4.	Common green darner	Insecta	Odonata	Aeshnidae	<i>Anax</i>	<i>Anax junius</i>
5.	Ants	Insecta	Hymenoptera	Formicidae	<i>Solonopsis</i>	<i>Solonopsis invicta</i>
6.	Leech	Clitellata	Arynchobdellida	Hirudidae	<i>Hirudo</i>	<i>Hirudo medicinalis</i>

3.7 Wasps

Table 07; Wasps fauna in Zameer Gull dam kohat

S.No	Class	Order	Family	Genus	Species
01	Insecta	Hymenoptera	Vespidae	<i>Polistes</i>	<i>P.indicus</i>
02	Insecta	Hymenoptera	Vespidae	<i>Polistes</i>	<i>P.gallicus</i>
03	Insecta	Hymenoptera	Vespidae	<i>Vespa</i>	<i>V.orientalis</i>
04	Insecta	Hymenoptera	Vespidae	<i>Vespa</i>	<i>V.velutina</i>
05	Insecta	Hymenoptera	Pompilidae	<i>Hemipepsis</i>	<i>H.acer</i>
06	Insecta	Hymenoptera	Pompilidae	<i>Hemipepsis</i>	<i>H.elizabethae</i>
07	Insecta	Hymenoptera	Pompilidae	<i>Hemipepsis</i>	<i>H.indica</i>
08	Insecta	Hymenoptera	Pompilidae	<i>Hemipepsis</i>	<i>H.lusca</i>

3.8 Spiders

Table 08. Spider Fauna of Zameer Gull dam kohat.

S.No	Class	Order	Family	Genus	Species
01	Arachnida	Arena	Scytodidae	<i>Scytodes</i>	<i>s.horacica</i>
02	Arachnida	Arena	Clubionidae	<i>Clubiona</i>	<i>C.drassodes</i>
03	Arachnida	Arena	Araneidae	<i>Araneus</i>	<i>A.diadematus</i>
04	Arachnida	Arena	Gnaphosidae	<i>Gnaphosa</i>	<i>G.eucalyptus</i>
05	Arachnida	Arena	Gnaphosidae	<i>scopophaeus</i>	<i>S.aisalabadiensis</i>

4| Discussion

The current study was carried out in order to learn more about the diversity of vertebrates and invertebrates found in the Zameer gul dam in Kohat. Tables 1-6 provide a complete taxonomic systematic representation of both vertebrates and invertebrates up to the species level. A survey of the fish fauna in the Zameer gull dam confirms the presence of six species from the two orders Cypriniformes and Siluriformes, as well as two families, Cyprinidae and Siluridae. *Cyprinus carpio*, *Crossocheilus diplochielus*, *Ctenopharyngodon idella*, *Salmophasia bacaila*, *Aspidopariamorar*, and *Ompok pabda* are members of the Cyprinidae family, while *Ompok pabda* is a member of the Siluridea family. Ilyas was grateful for his work on the Zebi dam in District Karak, where he identified cyprinid species such as *Cyprinus carpio*, *Bariliusvagra*, *Labeo rohita*, *Carassius auratus*, *Catla catla*, *Cirrhinus mrigala*, *Ctenopharyngodon idella*, *Puntius sophore*, and

Hypophthalmichthys molitrix. (Hussain, Muhammad, Malik, Khan, and Farooq, 2014) identified 94 fish species. Ctenopharyngodon idella and Salmophasia bacaila from the entire province of K.P.K. (Usman, 2016) worked on Khurum dam and described six fish species. The five species are from the Cyprinidae family (Cyprinus carpio, Crossocheilus diplocheilus, Aspidoparia morar) and one from the Siluridae family (Ompok pabda).

The amphibians found in Zameer gull dam belong to one order (Anura) and three families (Dicroglossidae, Ranidae, Bufonidae). Ranatigrina, Euphlyctis cyanophlyctis, and Duttaphrynus melanostictus were identified in the Zameer gull dam. In 2018, two amphibian species, Ranatigrina and Duttaphrynus melanostictus, were also observed in the Barghanati Dam. They are both members of the order Anura and of two distinct families, the Dicroglossidae and the Bufonidae (Arsalan, Abbas et al. 2018).

During our research, we observed six species of mammals grazing and drinking water in the Zameer gull dam: Caprahircus, Ovis aries, Bos Taurus, Equus asinus, Canis lupus, Canis adustus, and Felis catus. They are classified into orders (Artiodactyla, Perissodactyla, and Carnivora) and families (Bovidae, Equidae, Canidae, Felidae). (Altaf et al., 2014) discovered 23 mammalian species (15 small and 8 large) in the Chenab River, divided into three classes (Insecta, Clitellata, and Arachnida) and five orders (Hymenoptera, Scorpiones, Arynchobdellida, Odonata, Coleoptera). Sympetrum flaveolum, Pandinus nging to 20 genera, 11 families, and 6 orders are among the six species. The study area yielded a total of 15 mammalian species (11 small and 4 large), belonging to 14 genera, 10 families, and 6 orders. Out of these, 11 were found in all three subareas, while two were found only in head Marala, one in head Qadirabad and head Khanki, and one in head Khanki and head Marala. (Perveen, Khan, and Shah, 2013) discovered 23 mammalian species (15 small and 8 large) in the Chenab River, belonging to 20 genera, 11 families, and 6 orders. (Singh, 2012) studied the mammalian diversity of the Ravi River's riparian wetland and identified 16 species from 14 genera, 12 families, and 6 orders.

In Zameer gull dam, ten different species of small invertebrates, including arthropods, insects, and other arachnids, have been identified. In the Zameer gull dam, the class Insecta outnumbered all other classes of invertebrates. In the Zameer gull dam, six species of invertebrates were discovered: imperator, Pterostichus junius, melanarius, Anex Solenopsis invicta, and Hirudo medicinalis. Zaryab et al. conducted a study on the Tanga dam in the district Karak of Pakistan's Khyber Pakhtunkhwa province from August to October 2016. Tanga dam is home to all vertebrates, including fish, amphibians, reptiles, birds, and mammals. Catla catla is a fish. Rana tigrina is an amphibian. Xanthus vigilis and Lampropeltis getula are reptiles. Passer domesticus, Acridotheres tritis, and Anas crecca are examples of birds. Capra hircus, Ovis aries, Canis adustus, Bos taurus, Equus asinus, Canis lupus, and Felis catus are examples of mammals. Pandinus imperator, Pterostichus melanarius, Solenopsis invicta, and Hirudo medicinalis were among the abundant invertebrates in Tanga dam (Siraj, Khisroon, & Khan, 2016).

5. Conclusion

From the current study it can be concluded that Zameer gull dam provide suitable environmental conditions to support the diversity of both vertebrates and invertebrates. The water of this dam is of good quality. Government should pay attention to this dam for making this dam excellent for life and irrigation.

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