



Invertebrates , Vertebrate fauna , Physiochemical Parameter of water & Soil of Mardan Khel Dam district Karak, KP, Pakistan

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ABSTRACT

The present research work was conducted in Mardankhel Dam (Teri), Khyber Pakhtunkhwa, Pakistan, to find out the vertebrate and invertebrate fauna and also physiochemical parameter of that dam in a period from October 2018-January 2019. All type of vertebrates fauna are found Mardankhel dam including Fishes, Amphibians, reptiles, Aves and Mammals. The invertebrate are also present here. Fish fauna of Mardankhel dam includes Carassius auratus, Catla catla, Cirrhinus cirrhosus, Ctenopharynx godonidella, Cyprinus carpio, Labeo rohita and Puntius ticto, Channa punctata and Channa striata. Amphibian fauna of Mardankhel dam includes (D.melanostictus, Rana tigrina, Rana femporaria, Buffo surdus). Reptiles includes X.vigilis, Naja haje, Uromastix egyptian, Anguis fragilis and C. zelyanicus. Bird includes P. domesticus, A. crecca, G. grus, P. Barbatus, C. Splendens, U.epops, C. Moschata, Acridotheristris, Perdixperdix and C.coturnix). Mammal includes F.catus, D.asinus, V.canis, C.lupus, C.hircus, O.aries, O. Cuniculus and D.sibiricus. Invertebrate of Mardankhel dam includes (H. medicinalis, S. invicta, V. velutina, P. Imperator, M.bahiata and Pterostichus melanarius). The physiochemical parameter include temperature, odor, elasticity, pH, total dissolved solid, electrical conductivity of water and soil. The result of the present study revealed that each physiochemical parameter was found in tolerable range.

Keywords: Vertebrates, Invertebrates, Fauna, physiochemical parameter, water, soil, Mardankhel dam, karak, kp.

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INTRODUCTION

Mardankhel dam site is located in Urmar Algad, a left tributary of Teri Toi at a distance of about 20 km from Banda Daud Shah on a road to Gurguri in district Karak. The dam has a crest of 227 ft with height of 100ft. The live storage capacity is 2383 AF having cultivable area (CCA) of 1500 acres. Biodiversity refers to the variety on earth surface and usually measure variation at genetic, specie and ecosystem level. It is the quantity, variety and distribution across the biological scale ranging through genetics and life form of population, species, community and ecosystem [1]. Invertebrates are those animals which do not have vertebral column. Invertebrates are a diverse and prominent group which comprise of more than 90% of the possible 10 million plus animal species, mainly consist of arthropods [2]. Vertebrates are chordates, which consist of vertebral column. Fishes are the most ancient and plentiful vertebrate of about 40,000 species of vertebrates, a total of 21,723 species belong to super class Pisces [3]. Amphibians are the first

animals which contain two life stages such as tadpoles and adults, tadpoles present in water and adults on land [4]. Globally 7,044 species of amphibians have been reported [5]. Reptiles are the supreme significant constituents of worldwide biodiversity. The main group of reptiles in Pakistan is lizards (Suborder Sauria) [6]. Birds are the most voluntarily predictable categories of animals, due to the existence of feather, which is distinctive to them. During seasonal travels birds help in the alteration of nutrients from one area to another [7-8]. Mammals (class Mammalia) are extraordinary group, presenting a remarkable variety of species, forms, compositions, life times past and performances. Their taxonomic variety of 5416 existent or recently absent [9]. Physicochemical parameters of water such as temperature, pH, conductivity, alkalinity, hardness, sodium ion, potassium ion, ammonia, phosphate, and nitrates are very essential for the growth of primary productivity [10]. A lot of studies have been conducted on the physiochemical parameter analysis of water with respect to their effect on fish survival some of them are, Marshall and Elliot observed important relation between fish species and the effect of water, temperature, salinity (salt concentration), dissolved oxygen (DO) to their life survival. The properties of water quality are dependent on the amount of dissolved oxygen (DO), Biochemical Oxygen Demand (BOD), organic content, Chemical Oxygen Demand (COD), pH value temperature, infectious agents, toxic substances and mineral matter [11]. The main objective of the research work was to find out the invertebrates and vertebrates fauna of Mardankhel Dam district Karak, PK, Pakistan and also provide useful information for observing the changes in water and soil quality as a result of the dam's natural dynamics over time.

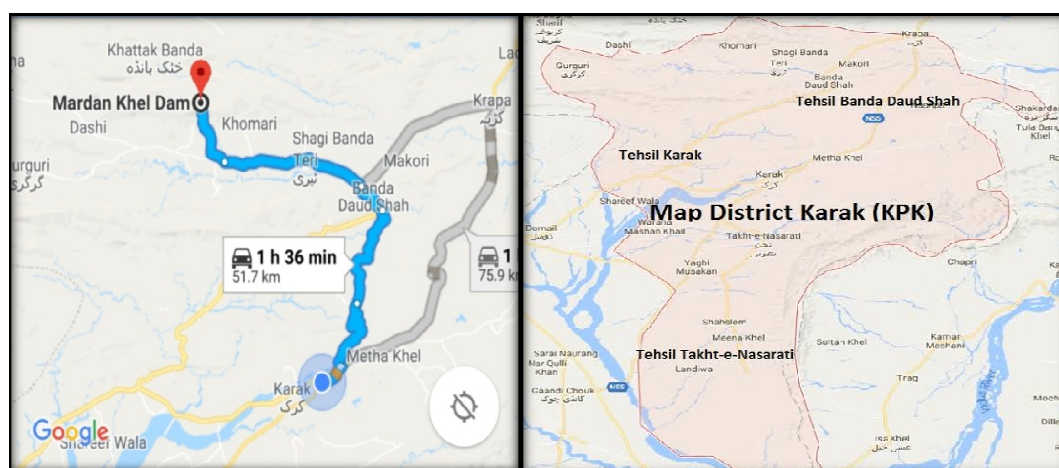


Fig 1: Map of District Karak & Mardankhel dam.

MATERIAL AND METHODS

Sampling sites:

The Mardankhel Dam was selected for the present study. Mardankhel dam provides a enormous and varied macro-habitat in the form of off shoots, sides streams, shallow waters, deep waters, fast flowing water with high oxygen content, side water with low oxygen due to vegetation decomposition, shallow water with submerged vegetation etc.

Fish Sampling:

During the investigation monthly collection of fishes occur from different sites of Mardankhel dam with the help of local the fisherman using different types of nets and hooks etc from October 2018 to January 2019 [3].

Fish preservation and Identification:

After collection fishes were brought to laboratory of zoology department, GPGC, district karak. Just after collection the fishes were secondarily conserved in 70% alcohol and 10% formalin solution After that the collected fishes were carried to the lab for identification [12]. In the laboratory, each fish sample was identified up to species level and identification of the species was done chiefly on the basis of the color design, specific skin condition or scripts on the surface of the body, shape of the body, structure of numerous fins etc. by the help of different systemic and identification keys [13-16].

Amphibians & reptiles:

This method comprises fast surveys and careful visual estimation of amphibians in all the possible habitats of the Mardankhel dam [17]. The various species of amphibians were observed and these species were identified by using [18]. In Mardankhel dam both the amphibians and reptiles were perceived, during daytime and both were identified by using the identification keys of Khan, 2004 and 2006 [20-21].

Birds:

Observations were made in the morning and afternoon time at daily basis. The bird's species were identified through slander literature of community [16-22].At each finding birds were totalled using a binocular and recognized. In circumstance of suspicious citations, photographs were taken and the species is identified far along by Referring specialists. The identification of birds was agreed out using ordinary literature of [22].

Mammals:

Direct sum survey method was used for population valuation of mammalian fauna of the study area. Opera glasses (32x50) were used to detect the animals and trailed guides were accessed to correctly identify the species [23].

Invertebrates:

During the present study the invertebrates of Mardankhel dam were also observed. For their identification numerous identification keys were used [24-25].

Physiochemical parameter:

Sample:Three samples of water and soil were collected from a different location that is starting up point, middle point and the end up point at MardanKhel dam. All the three water Samples were collected in properly washed plastic bottles, while soil sample was collected near the bottom of the dam and then placed in airtight polyethylene bags for further analyses by using methodology followed Rehman *etal*[26].

Physiochemical feature: All the Physiochemical features such as total dissolved solids (TDS), Electrical conductivity (EC), Temperature, Total Solid (TS), PH, color, odor and elasticity of water and soil samples were collected from the different locations of the MardanKhel dam were analysed and observed. Features like electrical conductivity, color, odor and Temperature were detected and determine at sampling sites, while for further analysis the sample was carried to the laboratory.

Temperature: The temperature of surface water of the dam was determined directly on the spot by means of a simple mercury thermometer. The reading was taken by rightly keeping the bulb depth inside the sample water.

Total Dissolved Solid andTotal Suspended Solid: Total Suspended Solid was measured by filtering and evaporating a sample of water and then calculating the values by weighting the remains by a physical balance.

pH:The PH of the water was determined at the spot by pH paper (Toyo test paper) having a pH detection rang 0 to 14. The pH paper was read by dipping it in a beaker filled with freshwater sample six readings at the different interval were taken in the same manner.

Hydrogen ion concentration:

Electrical Jenway pH meter Model no 3020 was used for the measurement of hydrogen ion concentration (PH) of water and soil samples. The study was carried out according to the method which was previously used by [27].

Electrical conductivity:

The Electrical conductivity of soil and water were analyzed by Conductivity meter JENWAY model no.4520. Conductivity meter was, calibrated by 0.1 KCl (potassium chloride) solution and washed with distilled water and dried before dipped into each sample of water and soil to avoid the inaccuracy.





Fig 2: Site view of Mardankhel dam.

RESULT

In our present research work we found varieties of vertebrates along with their scientific & local names including Fishes, Amphibians, Reptiles, Birds, Mammals & invertebrates of Mardankheldam karak, KP Pakistan. Mardankhel dam contain different vertebrate and invertebrates fauna and that were randomly collected from this dam. And identified up to the species level and were presented in the following tables 1-6. We also checked all the physiochemical parameters such as, Temperature, Electrical conductivity, Total dissolved solid (TDS), Colour, Oder and Elasticity of water and soil of MardanKhel Dam of District Karak, KPK, Pakistan is showing in the table 7.

Table 1: Showing the fishes found in Mardankhel dam.

S.No	Local name	Class	Order	Family	Genus	Species
1	Gold fish	Actinopterygii	Cypriniforms	Cyprinidea	Carassius	<i>C.auratus</i>
2	Asian carp	Actinopterygii	Cypriniforms	Cyprinidea	Labeo	<i>Catlacatla</i>
3	Moree fish	Actinopterygii	Cypriniforms	Cyprinidea	Cirrhinus	<i>C.cirrhosus</i>
4	Grass carp	Actinopterygii	Cypriniforms	Cyprinidea	Ctenophayngodon	<i>C.idella</i>
5	Gulfam	Actinopterygii	Cypriniforms	Cyprinidea	Cyprinus	<i>C.carpio</i>
6	Rohu	Actinopterygii	Cypriniforms	Cyprinidea	Labeo	<i>L.rohita</i>
7	Ticto barb	Actinopterygii	Cypriniforms	Cyprinidea	Puntius	<i>P.ticto</i>
8	Katasary	Actinopterygii	Anabantiforms	Channidea	Channa	<i>C.punctata</i>
9	Soli	Actinopterygii	Anabantiforms	Channidea	Channa	<i>C.striata</i>

Table 2: showing the Amphibians species found in Mardankhel dam.

S.NO.	Local Name	Class	Order	Family	Genus	Species
1	Common toad	Amphibia	Anura	Bufoidea	Duttaphrynus	<i>D. melanostictus</i>
2	Frog	Amphibia	Anura	Dicroglossidae	Rana	<i>Ranatigrina</i>
3	Common Frog	Amphibia	Anura	Ranidea	Rana	<i>Ranafemporaria</i>
4	Pakistani Frog	Amphibia	Anura	Bufoidea	Buffo	<i>Buffo surdus</i>

Table 3: Showing the Reptiles species found in MardanKhel Dam.

S.No	Local name	Class	Order	Family	Genus	Species
1	Desert lizard	Reptilia	Squamata	Xantusiidae	Xantusia	<i>X.vigilis</i>
2	Forest Cobra	Reptilia	Squamata	Serpentes	Naja	<i>Najahajee</i>
3	Egyptian spiny-tailed lizard	Reptilia	Squamata	Agamidae	Uromastix	<i>U.egyptian</i>
4	Slow worm	Reptilia	Squamata	Agamidae	Anguis	<i>A.fragilis</i>
5	Chameleon	Reptilia	Squamata	Chamaeleonidae	Chameleo	<i>C. zeylanicus</i>

Table 4: Showing the species of birds of Mardankhel dam.

S.NO	Local name	Class	Order	Family	Genus	Species
1	House Crow	Aves	Passeriformes	Corvidae	Corvus	<i>C. splendens</i>
2	Hudhud	Aves	Bucerotiformes	Upupidea	Upupa	<i>U. epops</i>
3	Karkara	Aves	Galliformes	Gruidae	Grus	<i>G. grus</i>
4	Common teal	Aves	Anseriformes	Anatidae	Anas	<i>A. crecca</i>
5	Bulbul	Aves	Passeriformes	Pycnonotidae	Pycnonotus	<i>P. barbatus</i>
6	Duck (pataha)	Aves	Anseriformes	Anatidae	Cairina	<i>C. moschata</i>
7	Sparrow	Aves	Passeriformes	Passeridae	Passer	<i>P. domesticus</i>
8	Mynah	Aves	Passeriformes	Sturnidae	Acridotheres	<i>Acridotheristris</i>
9	Sanzara	Aves	Galliformes	Phasianidae	Perdix	<i>Perdixperdix</i>
10	Batair(quail)	Aves	Galliformes	Phasianidae	Coturnix	<i>C. coturnix</i>

Table 5: Showing the species of Mammals of Mardankhel dam.

S.No	Local name	Class	Order	Family	Genus	Species
1	Cat (Balikaye)	Mammalia	Carnivora	Felidae	Felis	<i>F. catus</i>
2	Donkey(Khar)	Mammalia	Perissodactyla	Equidae	Equus	<i>D. asinus</i>
3	Fox (Lomri)	Mammalia	Carnivora	Canidae	Vulpes	<i>V. cana</i>
4	Dog (Spaye)	Mammalia	Carnivora	Canidae	Canis	<i>C. lupus</i>
5	Goat (Oza)	Mammalia	Artiodactyla	Bovidae	Capra	<i>C. hircus</i>
6	Sheep (Gadda)	Mammalia	Artiodactyla	Bovidae	Ovis	<i>O. aries</i>
7	Hargosh (Soya)	Mammalia	Lagomorpha	Leporidae	Oryctolagus	<i>O. cuniculus</i>
8	Palipash	Mammalia	Rodentia	Sciuridae	Eutamias	<i>D. sibiricus</i>

Table 6: showing the invertebrates of Mardankhel dam.

S.NO	Local name	Class	Order	Family	Genus	Species
1	Scorpion	Arachnida	Scorpiones	Scorpionidae	Pandinus	<i>P. imperator</i>
2	Butterfly	Insecta	Lepidoptera	Hedlidae	Macrosoma	<i>M. bahiata</i>
3	Leech	Clitellata	Arynchobdellida	Hirudidae	Hirudo	<i>H. medicinalis</i>
4	Wasp	Insecta	Hymenoptera	Vespidae	Vespa	<i>V. velutina</i>
5	Beetle	Insecta	Coleoptera	Carabidae	Pterostichus	<i>P. melanarius</i>
6	Ants	Insecta	Hymenoptera	Formicidae	Solonopsis	<i>S. invicta</i>
7	Snail	Gastropoda	Caenogastropoda	Bithyniidae	Bithynia	<i>B. tentaculata</i>

Table 7 Showing the Physiochemical Parameter of MardanKhel Dam.

Samples	Temperature (C°)	PH	Conductance (µs/ml)	TDS (mg/100ml)	Color	Odor	Elasticity
Water	29.3	8	0.24	0.4	Greenish	Spongy	Nonelastic
Soil	26.5	8.4	0.19	5.2	Brown red	odorless	Elastic

Fig 3: The pH of water and soil collected from MardanKhel dam is(shown in Fig 8).

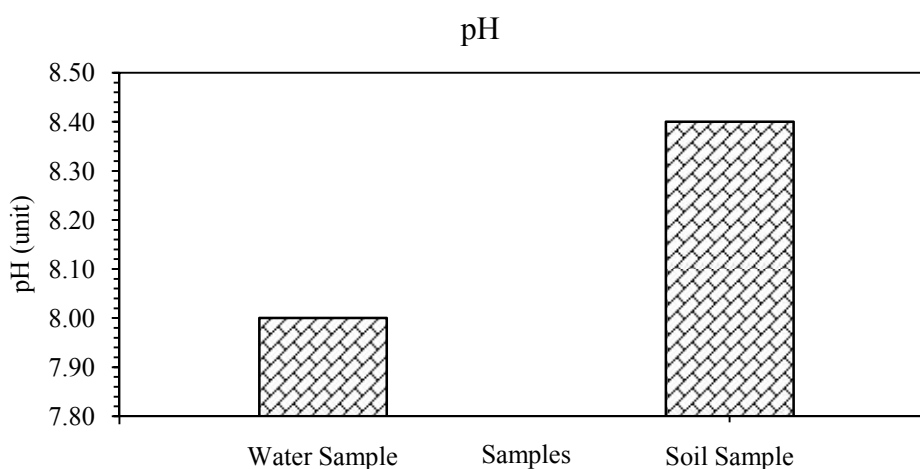


Fig 4: The temperature of water taken from Mardankhel is shown in the figure 9.

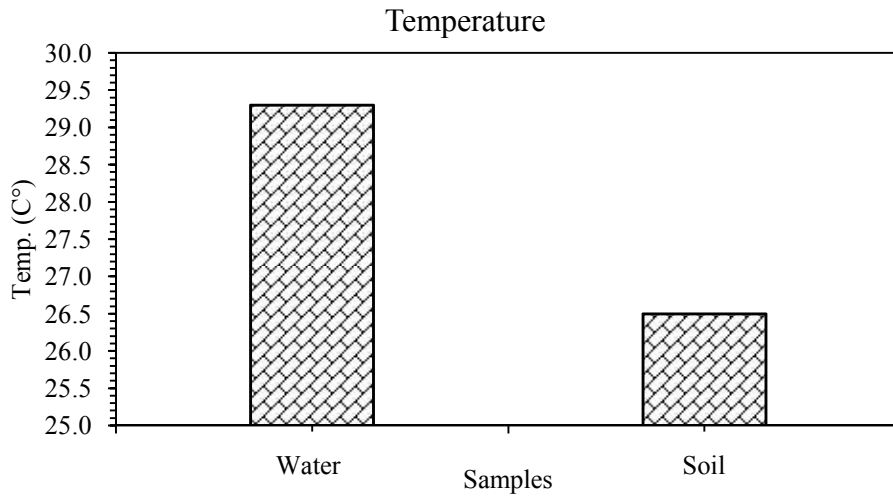


Fig 5: The TDS of water obtained from Mardankhel dam is shown in the figure 10.

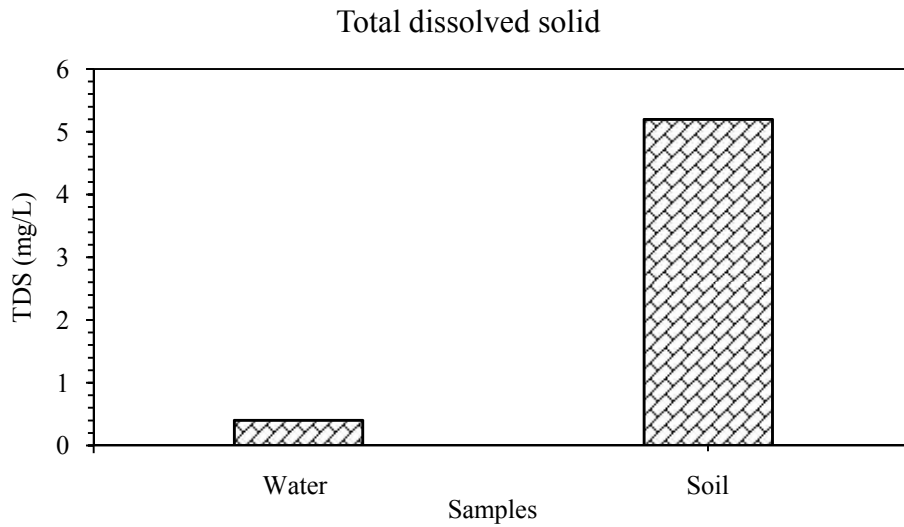


Fig 6: The electrical conductivity of water and soil of Mardankhel dam is shown in Figure 11.

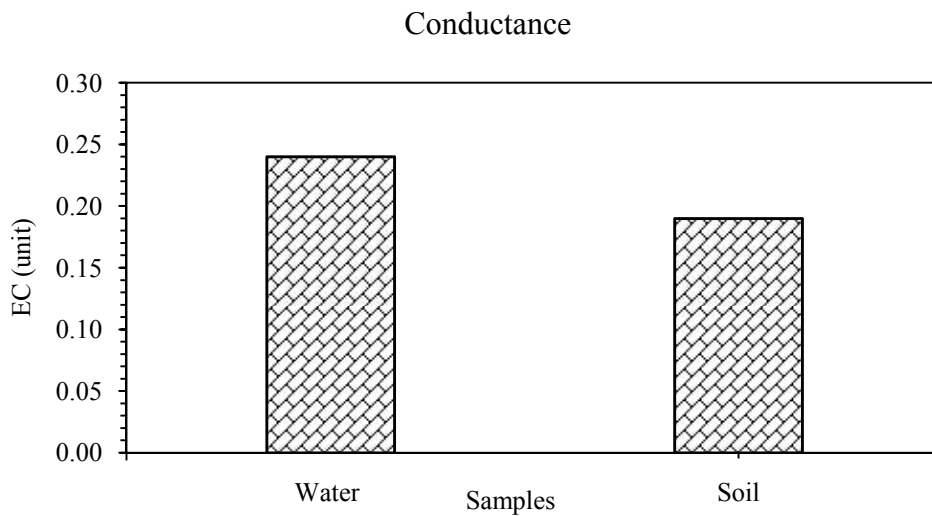
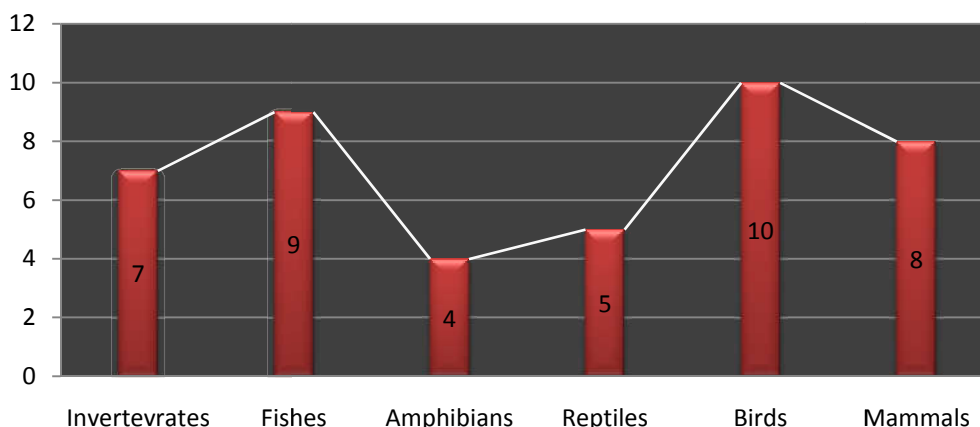


Fig 7: Chart showing the vertebrate and invertebrate fauna of Mardankhel dam karak.



DISCUSSION

The present research work was conducted in Mardankhel Dam district Karak, KP, Pakistan, to find out the vertebrate and invertebrate fauna of that dam, in a period from from October 2018 to January 2019. During this survey we find 09 species of fishes which are then preserved in 70% alcohol and after that they are identified up to their specie level. Out of these 09 species of fishes, 07 species such as *Carassius auratus*, *Catla catla*, *Cirrhinus cirrhosus*, *Ctenopharynx gononidella*, *Cyprinus carpio*, *Labeo rohita* and *Puntius ticto* belong to one order Cypriniformes and one family Caprinidea, and the remaining two species of fishes such as *Channa punctata* and *Channa stiata* belong to one order Anabantiformes and family Channidea. But all these 09 species of fishes belongs to one class Actinopterygii. During present study we also four species of Amphibians' such as (*D. melanostictus*, *Rana tigrina*, *Rana femporaria*, *Bufo surdus*) all these belonging to one class (Amphibia) and one order (Anura). The two species such as *D. Melanostictus* and *Bufo surdus* belonging to one family (Bufonidea), *Rana tigrina* belong to family (Dicroglossidea) and *Ranafemporaria* belong to family (Ranidea). Five species of reptiles observed in Mardankhel dam belong to one class (Reptilia). One order (Squamata), Four families (Chamaeleonidae, Xantusiidae, Serpentes and Agamidea), five genus (Chameleo, Xantusia, Naja, Uromastix and Anguis) and five species (*C. zeylanicus*, *X. Vigilis*, *Naja hajee*, *Anguis fragilis* and *Uromastix egyptian*). In Mardankhel dam we find 10 species of birds belonging to one class (Aves), four orders (Passeriformes, Anseriformes, Bucerotiformes and Galliformes), Eight families (Passeridae, Sturnidae, Anatidae, Gruidae, Phasianidae, Pycnonotidae, Corvidae, and Upupidea) Ten genus (Passer, Acridotheres, Anas, Grus, Pycnonotus, Numida, Cairina, Perdix, Corvus and Upupa) and Ten species (*P. domesticus*, *A. crecca*, *G. grus*, *P. Barbatus*, *C. Splendens*, *U.epops*, *C. Moschata*, *Acridotheristris*, *Perdixperdix* and *C.coturnix*). Eight mammal species such as *F.catus*, *D.asinus*, *V.canis*, *C.lupus*, *C.hircus*, *O.aries*, *O. Cuniculus* and *D.sibiricus* belongs to one class Mammalia were also observed in surrounding areas of Mardankhel dam, mainly in hills. Out of these 08 species of mammal, 03 species belong from Order (Carnivora), 02 from Artiodactyla, and the remaining 03 belongs from different order namely, Rodentia, Lagomorpha and perissodactyla as shown in detail in Table-5. In Mardankhel dam, we find six species of invertebrates. The identified species belonged to three class (Clitellata, Insecta and Arachnida), five orders (Arynhobdellida, Hymenoptera, Lepidoptera, Coleoptera and Scorpiones), six families (Hiruidae, Carabidae, Vespidae, Scorpionidae, Hedlidea and Formicidae,) six genus (Hirudo, Vespa, Pterostichus, Pandinus, Macrosoma and Solonopsis) and six species (*H. medicinalis*, *S. invicta*, *V. velutina*, *P. Imperator*, *M.bahiata* and *Pterostichusmel anarius*). Water sample collected from Mardankhel dam was Greenish, Spongy & Non elastic while the soil sample was brown red, Odorless & Elastic. The optimum range of pH of water for fishes was lies between 6.5 to 9.5 [28]. It was observed that the temperature of water taken from Mardankhel is (29.3°C) and the soil are (26.5°C). Total Dissolved Solid (TDS) is quantity of inorganic salts, organic matter and other dissolved ingredients in water. Normally, TDS ranged from 5 to 1000mg/L is considering as suitable range for fish growth [29]. Electrical conductivity is the ability of an aqueous solution to convey electric current from it. The sensible range of conductivity lies between 15-500 µs/ml, values afar this range indicates that the water is not suitable for the survival of aquatic organisms [30].

CONCLUSION

From the current study it can be concluded that Mardankhel dam provides suitable environmental conditions for the diversity of both vertebrates and invertebrates. The result obtained from Mardankhel

dam of KPK was concluded that all the physiochemical parameter like color, odor, elasticity, TDS, electrical conductivity and temperature are suitable and favourable for fish growth and have no adverse effect on survival, reproduction and growth of aquatic flora and fauna.

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