

Water Quality and Fish Species Diversity of Kabul River at Darounta Dam, Nangarhar Afghanistan

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Abstract:

Water is most abundant fluid covering about 70% of earth surface. Water quality at the origin of source is usually better due to heavy rainfall, Physical characteristics of water (temperature, color, taste, odor etc.) are determined by senses of touch, sight, smell and taste. The chemical characteristics of natural water are reflection of the soils and rocks with which the water has been in contact. Afghanistan is located in central Asia. The area is 652,000 square originates from Paghman Mountains in Afghanistan and flows for about 480 km before joining River Indus at Attack in Pakistan. Kabul river basin draining to the Indus River with 44 fish species. In these fish species family Cyprinidae was found the richest one overall

Keywords: water quality, Diversity, Kabul River, fishes

1. Introduction

The aquatic ecosystem is extremely depended on water quality and biological diversity, physiochemical parameters of water play an important role in the biology and physiology of fishes (A. Dhawan, *et. al*, 2002). Fish diversity is referring to variety of fish species depending on context and scale (Jayabhaye, *et. al*, 2013). Fishes the largest group of vertebrates consist of cold blooded aquatic animals having fins, gills, scales, and streamed- linked body (Esmaeili, *et, al*, 2018). Some are herbivorous while other are omnivorous (Paighambari, *et. al*, 2020). Diversity patterns of fishes in fresh water is dependent on interaction ecological characteristics of the water such as size of water body, amount of input and output of water, temperature, depth, speed of water, shape of channel, substrate and climatic conditions (welcome, 1985).

The Afghan ichthyic fauna has not been well studied and it is probably more diverse than indicated here (Kattegat & Whitten 1996). There are three principle drainage basins the endothermic Amu Darya (Oxus river) draining to the Aral Sea with 29 species, the endorthic Helmand river basin draining to the Sistan terminal lakes on the Iranian borders with 22 species, and the Kabul river basin draining to the Indus river with 44 species (Coad and Brain, 2015). Humans have exploited water of lakes and rivers for more of years (Manjare, *et. al*, 2010). Fresh water has small bodies and its various parameter values can be changed with human and natural activities (Rebilled, *et., al*, 2011). The most important parameter is temperature which can affect life of aquatic organisms directly or indirectly. Concentration of dissolved oxygen, free carbon dioxide, amount of alkalinity, conductivity, salinity, PH, are also affected by pollution and environmental changes (Ezekiel, *et., al*, 2011). Due to

A part from physic-chemical parameters and Climate changes play a key role in the physiology of water and intense water cycle (Crashaw, *et., al*, 1979). This review study will determine the values of different physical and chemical factors of water, relationship of ichthyofauna with water quality and ichthyofaunal diversity of local Darunta reservoir of Nangarhar to aware the people with importance of fish and conservation of water quality.

Physical characteristics of water (temperature, color, taste, odor etc.) are determined by senses of touch, sight, smell and taste. For example temperature by touch, color, floating debris, turbidity and suspended solids by sight, and taste and odor by smell (Mirza *et al*, 2007). Chemical and biological reaction rates increase with increasing temperature. Reaction rates usually assumed to double for an increase in temperature of 10 °C. The temperature of water in streams and rivers throughout the world varies from 0 to 35 °C (Sabra *et al*, 2017). Colored water give the appearance of being unfit to drink, even though the water may be perfectly safe for public use. On the other hand, color can indicate the presence of organic substances, such as algae or humic compounds. More recently, color has been used as a quantitative assessment of the presence of potentially hazardous or toxic organic materials in water (Thayer 1985).

Taste and odor are human perceptions of water quality. Human perception of taste includes sour (hydrochloric acid), salty (sodium chloride), sweet (sucrose) and bitter (Jayabhaye *et al*, 2013). Human detect many more tips of odor than tastes. Organic materials discharged directly to water, such as falling leaves, runoff, etc., are sources of tastes and odor-producing compounds released during biodegradation (Rebilled. *et al* 2017). The total solids content of water is defined as the residue remaining after evaporation of the water and drying the residue to a constant weight at 103 °C to 105 °C. The organic fraction is considered to be related to the loss of weight of the residue remaining after evaporation of the water (Rackham *et al* 2017). The chemical characteristics of natural water are a reflection of the soils and rocks with which the water has been in contact. In addition, agricultural and urban runoff and municipal and industrial treated wastewater impact the water quality. (Polzin *et al*, 2006), Runoff causes erosion and weathering of geological formation, rocks and soils as the runoff travels to the surface-water bodies (Ismailia *et al*, 2018). During this period of contact with rocks and soils the water dissolves inorganic minerals, which enter the natural waters. Inorganic compounds may dissociate to varying degrees, to cations and anions (Partech *et al* 2016). Major cations found in natural water include calcium (Ca²⁺), magnesium (Mg²⁺), sodium (Na⁺) and potassium (K⁺). Calcium (Ca²⁺), is the most prevalent cation in water and second inorganic ion to bicarbonate in most surface water (Paighambari *et al* 2020). The principal concern about calcium is related to the fact that calcium is the primary constituent of water hardness. Calcium precipitates as CaCO₃ in iron and steel pipes (Manjra *et al*, 2015). Major anions include chloride, sulfate, carbonate, bicarbonate, fluoride and nitrate. Bicarbonate (HCO₃⁻) is the principal anion found in natural water (Charo-Karisa *et al* 2016). One source of bicarbonate ions (HCO₃⁻) in natural water is the dissociation of carbonic acid (H₂CO₃) that is formed when carbon dioxide (CO₂) from the atmosphere, (Dawn. *et al* 2002) sulfates (SO₄²⁻), and nitrates (NO₃⁻) are commonly found in natural water. Principal source of the chlorides anions (Ismailia *et al*, 2018) in natural water are magmatic rock formations that include chlorine-content minerals. The second source of this anions is Ward Ocean from where a considerably amount of chlorides anions (Jayabhaye *et al*, 2013) enter in the atmosphere. From atmosphere chlorides anions enter in the natural water in result of interaction between precipitation and soil (Manjra *et al*, 2015).

2. Methods and Materials

This review study has been performed by utilizing various concern research articles, National Environmental Protection Agency-related reports, and magazines. Brief tables are presented to show the number of fish species and water quality of Kabul River near to daroonta dam Nangarhar province Afghanistan.

3. Significance of the Study

This review study will determine the values of different physical and chemical factors of water, relationship of ichthyofauna with water quality and ichthyofaunal diversity of local Darunta reservoir of Nangarhar to aware the people with importance of fish and conservation of water quality.

4. Review of Related Studies

This study was carried out to explore the water quality and fish species diversity of Kabul River at daroonta, Nangarhar Afghanistan. Afghanistan is located in central Asia. The area is 652,000 square originates from Panhuman Mountains in Afghanistan and flows for about 480 km before joining River Indus at Attack in Pakistan. Kabul river basin draining to the Indus River with 44 fish species resting mosquitoes, cattle sheds and houses suitable for indoor resting collection.

5. Objectives of the Study

- To study the biochemistry parameters of water of Kabul river at darounta nangarhar afghanistan.
- To determine the ichtyofuna of fishes in Kabul river near to daronta dam.

6. Hypotheses of the Study

- The spring rainfall in the months of March and April fish species highest this Manson.
- Fish species highest in water storage sites and adjacent agricultural fields.

7. Result

Table 1. The major contaminants parameters of Kabul River with their percentages are given in the following (APHA Standard Protocols).

Sr. No.	Parameters	Unsafe samples	
		No.	%age
1.	TDS	27	7
2.	Hardness	34	9
3.	Turbidity	10	3
4.	pH	5	1
5.	NO ₃	4	1
6.	Chloride	22	6
7.	Total Coliforms	132	34
8.	<i>E. coli</i>	64	16

Table 1: Water chemical and biological parameters have different numbers and percentage water hardness have 34 unsafe samples and highest 9%. *E.Coli* Bacteria have 16 percent.

Figure 1. . The major contaminants parameters of Kabul River with their percentages are given in the following (APHA Standard Protocols).

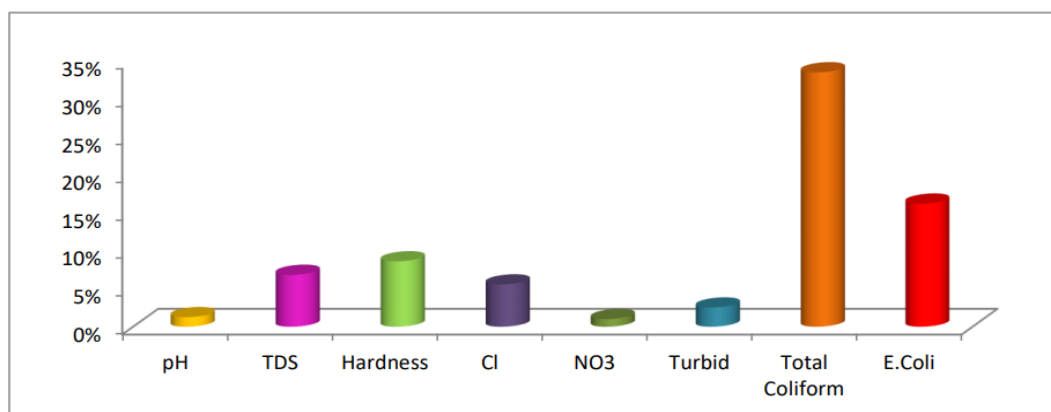


Figure 1: Water chemical and biological parameters have different numbers and percentage water hardness have 34 unsafe samples and highest 9%. *E.Coli* Bacteria have 16 percent.

8. Discussion

Ali *et al* explained that the River of Kabul have 22 fish species respectively. Out of them belonged to 1 Class, 4 Orders, 8 Families, 18 Genera and 22 Species. In these 22 fish species family Cyprinidae was found the richest one overall. Mirza *et al* expressed that the River Kabul water habitat is quite suitable for Cyprinidae fish species. These fishes belong to order Salmoniformes, Cypriniformes, Nemacheilidae, Perciformes, Chaniformes, and Siluriformes respectively. Ismailia *et al* explained that Temperature plays an important role in the aquatic environment. Certain organisms, including fish, are sensitive to water temperature and the pH is one of the most important limiting factors in an aquatic environment; adult fish can tolerate a high water pH, while young ones have low tolerance ranges for pH, from over all scientific review studies concluded that the seasonal variation have strength relation to physic-chemical parameters we will awar the communities about importance of water,

9. Conclusion and Recommendation

Kabul river basin draining to the Indus River with 44 fish species the fish fauna in the river of Kabul Downstream darunta Dam Afghanistan is rich and Cyprinidae species and will be provide useful information to an aqua culturists and increase food resources as well as attraction and income of local people of darunta dam for refreshment. Global practice indicates that regular water quality monitoring of water sources amid landscape mechanism and fish density, some environmental, sociological and economic factors related to water irrigation facilities, dry weather, heavy snowfall. Poor knowledge, food safety, health problem, economics crisis on high value market. If the study area and parameters are extended than the data could be more useful for designing fish farms and reproduction strategies. This will help build trust between the service provider and community resulting in improved services.

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11. References

1. Ashok, B. T., & Ali, R. (1999). The aging paradox: free radical theory of aging. *Experimental gerontology*, 34(3), 293-303.
2. Balkhande, J. V., & Kulkarni, A. N. (2013). Seasonal impact on potable quality of water of Purna river, near Purna city, Dist Parbhani, Maharashtra. *Indian J. Applied & Pure Bio*, 28(2), 177-180.
3. Charo-Karisa, H., Rezk, M. A., Bovenhuis, H., & Komen, H. (2005). Heritability of cold tolerance in Nile tilapia, *Oreochromis niloticus*, juveniles. *Aquaculture*, 249(1-4), 115-123.
4. Coad, B. W., & Reist, J. D. (2004). *Annotated list of the Arctic marine fishes of Canada* Winnipeg, Canada: Fisheries and Oceans Canada. (p. 2674).
5. Dhawan, A., & Kaur, S. (2002). Pig dung as pond manure: Effect on water quality, pond productivity and growth of carps in polyculture system. *NAGA, the ICLARM quarterly*, 25(1), 11-14.
6. Esmaeili, H. R., Asrar, T., & Gholamifard, A. (2018). Cyprinodontid fishes of the world: an updated list of taxonomy, distribution and conservation status (Teleostei: Cyprinodontoidea). *Iranian Journal of Ichthyology*, 5(1), 1-29.
7. Estekani, S., Attaran Fariman, G., & Ghasemzadeh, J. (2020). Study on Blennies fishes (Blenniidae Rafinesque 1810) from Makoran coastal waters (Southeast of Iran 19(2), 1006-1014.
8. Ezekiel, E. N., Hart, A. I., & Abowei, J. F. N. (2011). The physical and chemical condition of Sombreiro river, Niger Delta, Nigeria. *Research Journal of Environmental and Earth Sciences*, 3(4), 327-340.
9. Jayabhaye, U. M., & Lahane, L. D. (2013). Studies on Ichthyofaunal Diversity of Pimpaldari tank, Hingoli, Maharashtra, India. *forestry chronicle*, 68(2), 225-237.

10. Kottelat, M., & Whitten, T. (1996). *Freshwater fishes of Western Indonesia and Sulawesi: additions and corrections* (p. 8). Hong Kong: Periplus editions.
11. Manjare, S. A. (2015). Qualitative and Quantitative study of zooplankton from freshwater tanks of Kolhapur district, (Maharashtra). *Research Journal of Life Sciences, Bio informatics, Pharmaceutical and Chemical Sciences*, 1(1), 54-61.
12. Mirza, M. R., & Sandhu, A. A. (2007). Fishes of the Punjab Pakistan. *Polymer Publication, Urdu Bazar, Lahore*.
13. Paighambari, S. Y., Ghaed Mohammadi, M., Raeisi, H., & Pouladi, M. (2020). Seasonal comparison of catch composition, biodiversity and length-weight relationships of fish fauna in Doroudzan Dam, Fars Province, Iran. *Journal of Wildlife and Biodiversity*, 4(1), 18-28.
14. Partusch, A., Coad, B., Cummins, A., Nelson, K., & McCulloch, R. S. (2016). Effect of Isolated Hamstring Strengthening On Unanticipated Drop-Landing Knee Kinematics in females. In *International Journal of Exercise Science: Conference Proceedings* (Vol. 8, No. 4, P. 19).
15. Polzin, K. A., Markusic, T. E., Stanojev, B. J., Dehoyos, A., & Spaun, B. (2006). Thrust stand for electric propulsion performance evaluation. *Review of Scientific Instruments*, 77(10), 105108.
16. Radkhah, A. R., Poorbagher, H., & Eagderi, S. (2017). Habitat effects on morphological plasticity of Saw-belly (*Hemiculter leucisculus*) in the Zarrineh River (Urmia Lake basin, Iran). *Journal of BioScience and Biotechnology*, 6(1), 37-41.
17. Robillard, J. F., Muralidharan, K., Bucay, J., Deymier, P. A., Beck, W., & Barker, D. (2011). Phononic metamaterials for thermal management: an atomistic computational study. *Chinese Journal of Physics*, 49(1), 448-461.
18. Sabri, A., Abdulrahimzai, S., Witteveen, L. M., Lie, R., & Meulen, S. (2017). Enhancing women's participation in agricultural education in Afghanistan through distance education by the national agricultural education college (NAEC) Afghanistan. *International Women Online Journal of Distance Education*, 6(2), 67-78.
19. Thayer, S. A., Welcome, M., Chhabra, A., & Fairhurst, A. S. (1985). Effects of dihydropyridine calcium channel blocking drugs on rat brain muscarinic and α -adrenergic receptors. *Biochemical pharmacology*, 34(2), 175-180.