



## Water quality parameters of River Jindi at District Charsadda, KPK, Pakistan

Waheed Ur Rehman<sup>1</sup>, Arab Hussain<sup>1</sup>, Ahmad Yar<sup>1</sup>, Kaleem Khan<sup>2</sup>, Hameed Ur Rehman<sup>3</sup>, Nadia Khanam<sup>4</sup>, Kamran Akhter<sup>5</sup>, Shahid Raza<sup>6</sup>, Haleema Sadia<sup>7</sup>, Muhammad Younas<sup>8</sup>, Nighat Saeed<sup>9</sup>, Syeda Fareesa Hassan<sup>9</sup>, Fazle Akbar<sup>10</sup>

<sup>1</sup>Department of Zoology, Government Post Graduate College Charsadda, KPK, Pakistan

<sup>2</sup>Department of Environmental Sciences, International Islamic University Islamabad, Pakistan

<sup>3</sup>Department of Zoology, Kohat University of Science & Technology, KUST-26000, Kohat, KP, Pakistan

<sup>4</sup>Department of Zoology, Islamia College University, KP, Peshawar, Pakistan

<sup>5</sup>Deputy Director Rerural Poultry livestock Department, Balochistan Quetta, Pakistan

<sup>6</sup>Department of Food Science & Technology, UCP (University of Central Punjab, Lahore)

<sup>7</sup>Department of Biotechnology, University of Information Technology, Engineering and Management Sciences Quetta, Pakistan

<sup>8</sup>Department of Zoology, Abdul Wali Khan University Mardan, KP, Pakistan

<sup>9</sup>Department of Chemistry, Kohat University of Science & Technology, KUST-26000, Kohat, KP, Pakistan

<sup>10</sup>Department of Agriculture Chemistry, University of Agriculture Peshawar, Pakistan

**Key words:** River Jindi, Water, Values, Parameters.

<http://dx.doi.org/10.12692/ijb/15.2.363-369>

Article published on August 24, 2019

### Abstract

A study on the fish fauna and water quality parameters of River Jindi at Charsadda, Khyber Pakhtunkhwa, Pakistan was conducted, with an aim to determine fresh records of water quality variables from March to July, 2017. During this study the mean values recorded for physico-chemical parameters were water temperature 24.8°C, pH 7.4, Water flow 0.50 m/s, Air temperature 32.4°C, Depth 1 m, TDS 109 mg/l, TSS 92 mg/l alkalinity 126.8 mg/l. All these values were within the limits prescribed by the standard methods for the examination of water, sewage and industrial wastes.

\* **Corresponding Author:** Waheed Ur Rehman ✉ [waheedurrahman18@gmail.com](mailto:waheedurrahman18@gmail.com)

## Introduction

Water quality deals with the physical, chemical and biological characteristics in relation to other hydrological properties. Water quality parameters which affect the survival, reproduction, growth and production of aquatic species are called water quality variables (Chhatawa 1998). Physicochemical parameters of water such as temperature, pH, conductivity, alkalinity, hardness, sodium ion, potassium ion, ammonia, phosphate and nitrates are very important for the growth of primary productivity (Lashari 2011).

Safe drinking water is very important to avoid different infectious diseases and chemical adverse effects. Most of developing countries depend on surface water bodies as a source of drinking water. Also ground water is the major source of drinking water in both urban and rural areas. Ground and surface sources of water are exposed to various pollutants either naturally or due to human and animal activities as a consequence of urbanization and industrialization. Water quality is determined by the physical and chemical limnology of a reservoir and includes all physical, chemical and biological factors of water that influence the beneficial use of the water. Rivers usually subjected to municipal and industrial wastewater and runoff from agricultural land, the former constitutes the constant polluting source whereas the latter is a seasonal phenomenon. Important physical and chemical parameters influencing the aquatic environment are temperature, rainfall, pH, salinity, dissolved oxygen and carbon dioxide. Others are total suspended and dissolved solids, total alkalinity and acidity and heavy metal contaminants. These parameters can cause adverse health effects if exceeding the standards values. World Health Organization sets water quality guidelines which include standards threshold values for a lot of parameters. However, most countries set national criteria to ensure the quality of drinking water.

Water is the precious gift of God without which life cannot exist. Water is basic requirement for all living

things (Told *et al.*, 1987). It is very important for human and all other living beings as food. So, it is one of the most abundant and widely distributed substances in nature. Water has unusual physical properties. It is essential that supply of water for human consumption should be free from unpleasant or harmful impurities (Latif, 1999). The ground water is generally considered a good source of drinking water due to its hidden storage in the aquifers and inherent purification properties of soil. However, it is proved to be polluted through leaching from dumping sites, improper sewage disposal and industrial activities (Todd *et al.*, 2005).

The water bodies that carry polluted water pose great threat to stream, river and sand qualities. The continuous availability of such waters into unlined drains is permanent sources of chemical leaching to ground water. Quality of ground water varies from place to place (Sharma, 2000). One of the major worldwide problems is the availability of safe drinking water which people are going to face in future.

In Pakistan, people get drinking water from various sources. In cities it comes in the form of piped water and in the villages hand pumps, wells, open tanks filled canal and river water directly are the major sources of drinking water. The pipes carrying drinking water mostly go side by side with sewage system. Therefore, back pressure, pipes leakage and improper cleaning of the overhead water tanks are the major source of the drinking water contamination (Eisena *et al.*, 1979).

Municipal sewage discharge is one of the problems and sewage water treatment is the most challenging environmental problem in all over the world (Okoh *et al.*, 2007). Because WHO survey showing that 80% of all illnesses in developing countries are water related. A quarter of children born in developing countries die before the age of 5, the majority of them from water related diseases each day. Overall, about 30,000 people die from water related diseases each day. At any one time there are likely to be 400 million people

suffering from gastroenteritis. 200 million with schistosomiasis, 160 million with malaria and 30 million with onchocerciasis. All of these diseases can be water related although other environmental factors may also be important (Tebbutt, 1983).

These problems are due to sewage water commonly contains both solids wastes and liquid wastes generated by various human activities along with various trace metals and metal compounds. Now a day, both surface and ground water resources are contaminated by various sources like industrial effluents, agricultural discharge and municipal waste water associated with large amount of inorganic and organic toxic pollutants along with harmful pathogens. Various efforts and research are being vigorously pursued for complete treatment and healthy discharge or reuse sewage water and industrial effluents (Okoh *et al.*, 2007). The aim of the current study was to find out the water quality parameters of River Jindi at District Charsadda, KPK, Pakistan.

### Materials and methods

#### Water sample collection

The water sample were collected in clean plastic bottles. First of all the bottle were washed with the sampling site water. Then sample of water were taken from the depth of about 1.5 to 2 cm below the surface of water from different sites of the river and then bring to laboratory for further analysis of water quality parameters. Samples were collected twice in a month and then founded the mean of two samples and were presented the result month wise.

#### Parameters

**Water color:** Water color were noticed through vision of at least three person at five different times between 12:00 p.m. to 4:00 p.m.

**Rate of flow of water:** Rate of flow of water is the distance covered water in a unit time. Rate of flow of water was measured as follows:-

Two point "A" and "B" were marked on the bank of

river meters apart. Then a wooden piece having density equal to that of water having its upper surface parallel to water, was thrown in water at point "A" and the time was noted. When the wooden piece reached the point "B" the time was noted again. The total time taken to reach the wooden piece from point "A" to "B" was determined. The wooden piece of different sizes were used for six readings. Rate of flow of water was calculated by using the formula given below.

$$S=d/t$$

Where, S=Rate of flow

d=distance covered by wooden piece

t=time taken

**Depth of river:** The depth of river were checked by mean of Graduated stick Deeping vertically at various points.

**Water temperature:** Water temperature were checked by Ordinary centigrade Thermometer. The temperature of surface water of the river was determined directly on the spot by means of simple mercury thermometer. The reading was taken by rightly keeping the bulb depth inside the sample water. Before the temperature of the atmosphere was taken.

**pH:** Ph is defined as the hydrogen ion concentration. Ph of the water was determined at the spot by Ph paper (toyo test paper) having a ph detection rang 0-14. The ph paper was read by dipping it in a beaker filled with fresh water sample .six readings at different interval were taken in the same manner.

**TDS:** Total Dissolved Solid.

**TSS:** Total Suspended Solid were measured by filtering and evaporating a sample of water and then calculating the values by weighting the remains by a physical balance.

**Alkalinity:** Alkalinity of water was determined by titrimetric method. A conical flask was taken and washed with distilled and sample water. Then 25 ml

of water sample was taken and added three to four drops of methyl orange. Titrate it against 0.02 N H<sub>2</sub>SO<sub>4</sub> until the color of sample water was changed from orange to blue. Note the reading directly from burette and used the formula below:

$$\frac{\text{Std. sol. vol} \times \text{exstdol. conc} \times M. w \text{ of } \text{CaCO}_3 \times 100}{\text{used sample water volume}}$$

**Results**

During the study the mean values recorded for physico-chemical parameters were water temperature 24.8°C, pH 7.4, Air temperature 32.4°C, Depth 1 m, TDS 109 mg/l, TSS 92 mg/l alkalinity 126.8 mg/l. All these values were within the limits prescribed by the standard methods for the examination of water, sewage and industrial wastes.

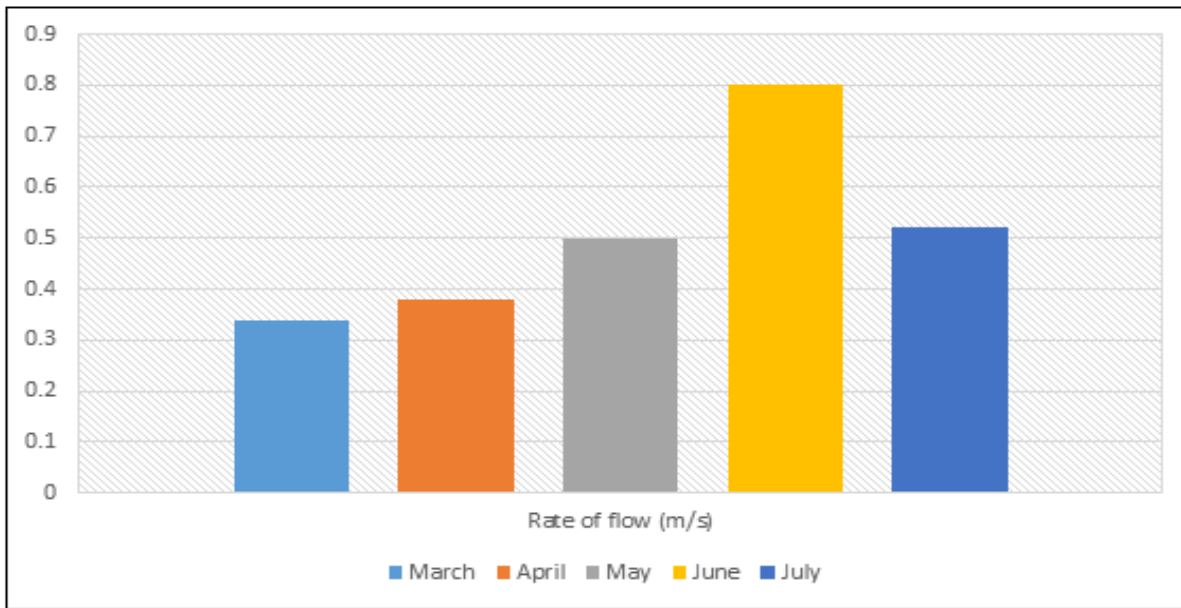


Fig. 1. Rate water flow of River Jindi.

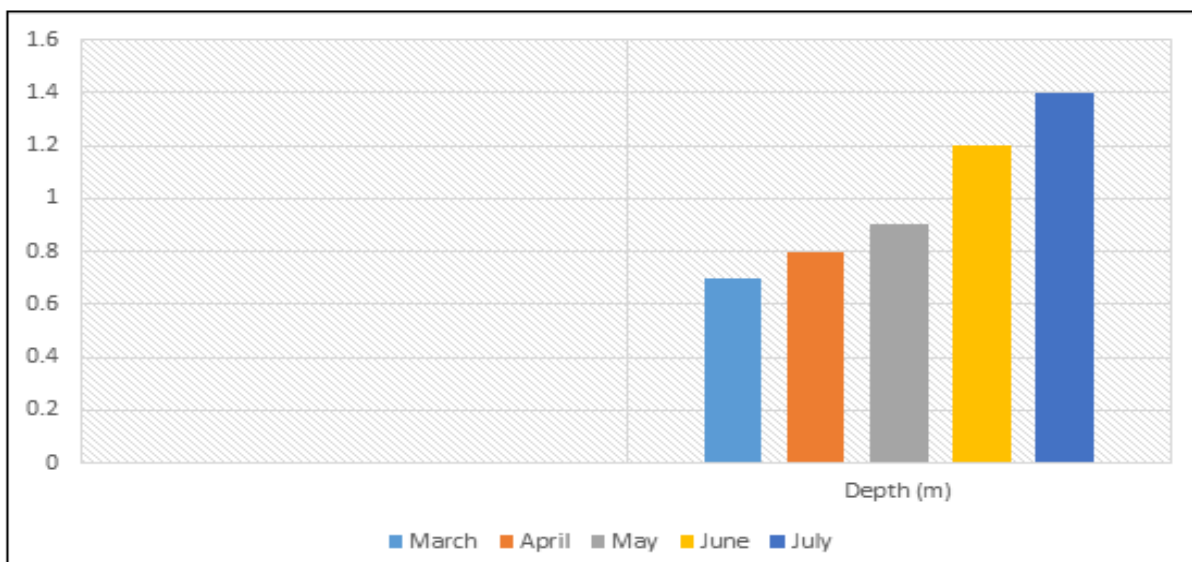


Fig. 2. Depth of River Jindi.

**Discussion**

The present study showed various physical and chemical water quality parameters found within

permissible limits of Pakistan National Environmental Quality Standards (Government of Pakistan, 1997).

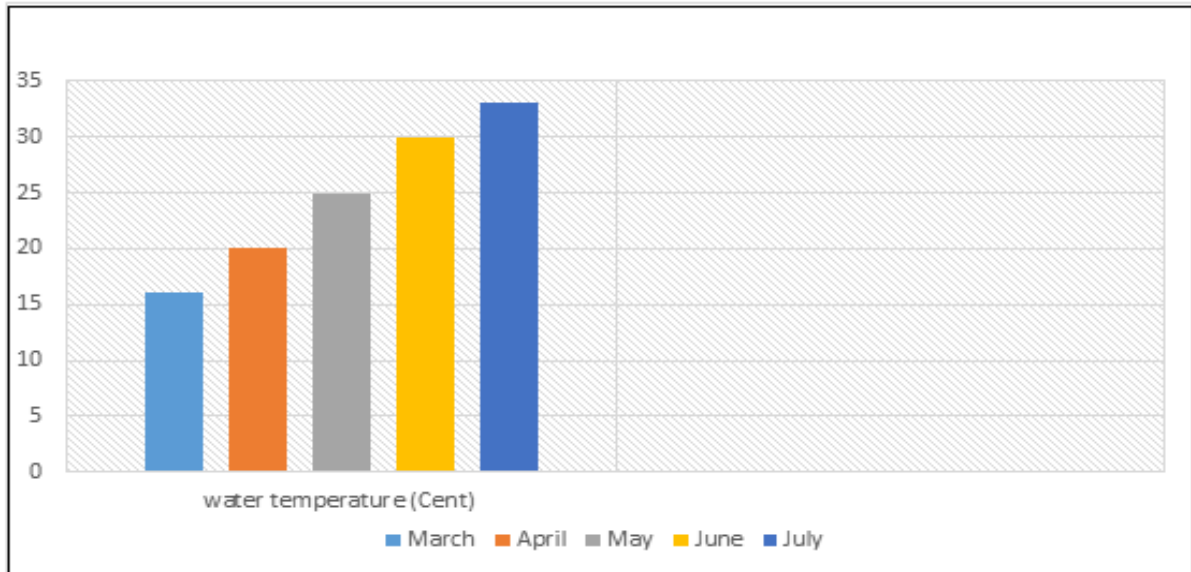


Fig. 3. Water temperature of River Jindi.

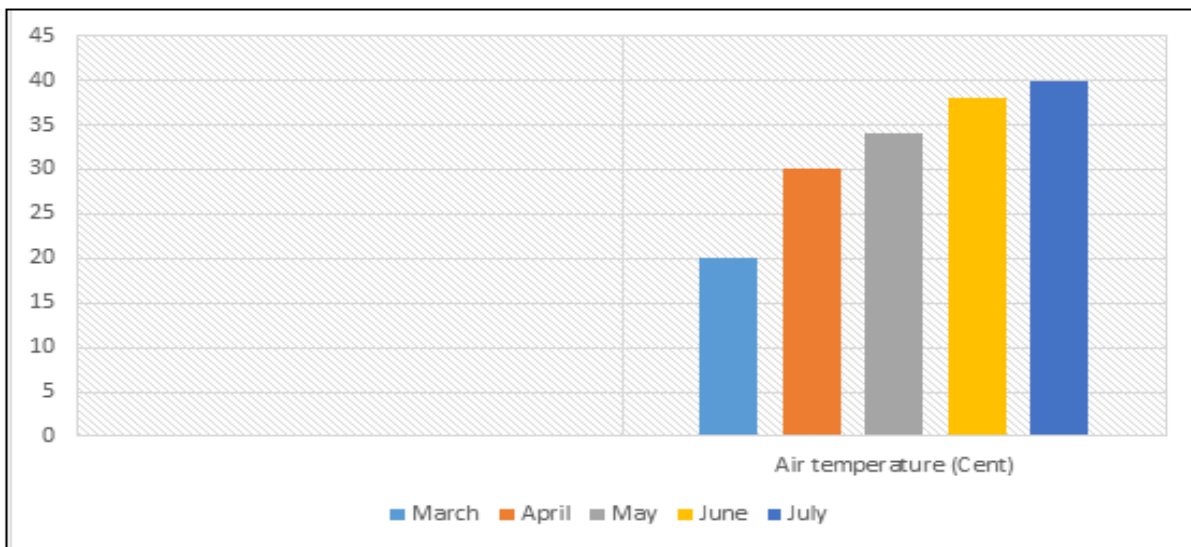


Fig. 4. Air temperature of River Jindi.

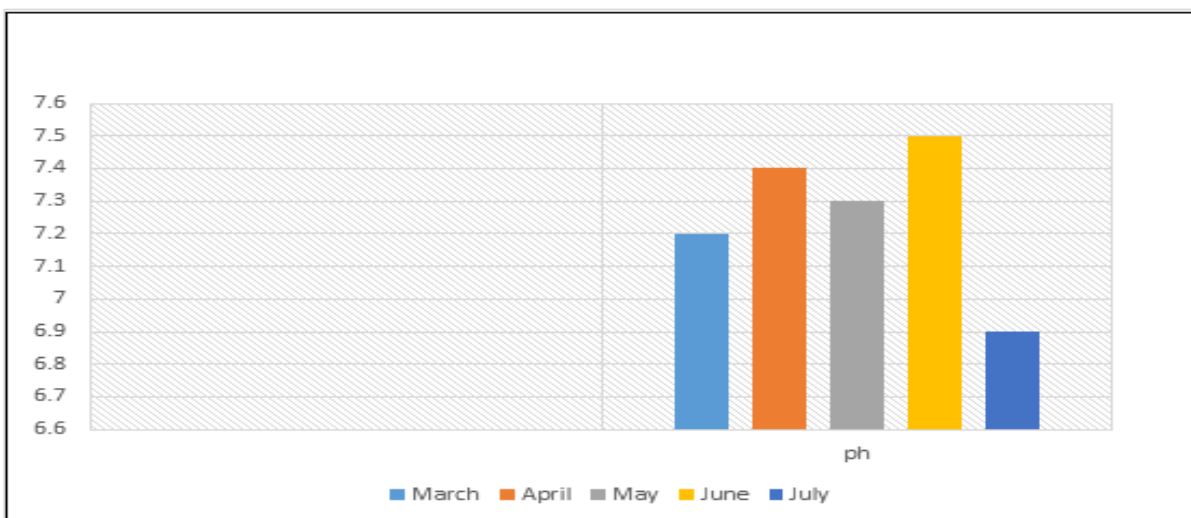


Fig. 5. pH of River Jindi.

During this study the mean values recorded for physico- chemical parameters were water temperature 24.8°C, pH 7.4, Water flow 0.50 m/s, Air temperature 32.4°C, Depth 1 m, TDS 109 mg/l, TSS

92 mg/l alkalinity 126.8 mg/l,. All these values were within the limits prescribed by the standard methods for the examination of water, sewage and industrial wastes.

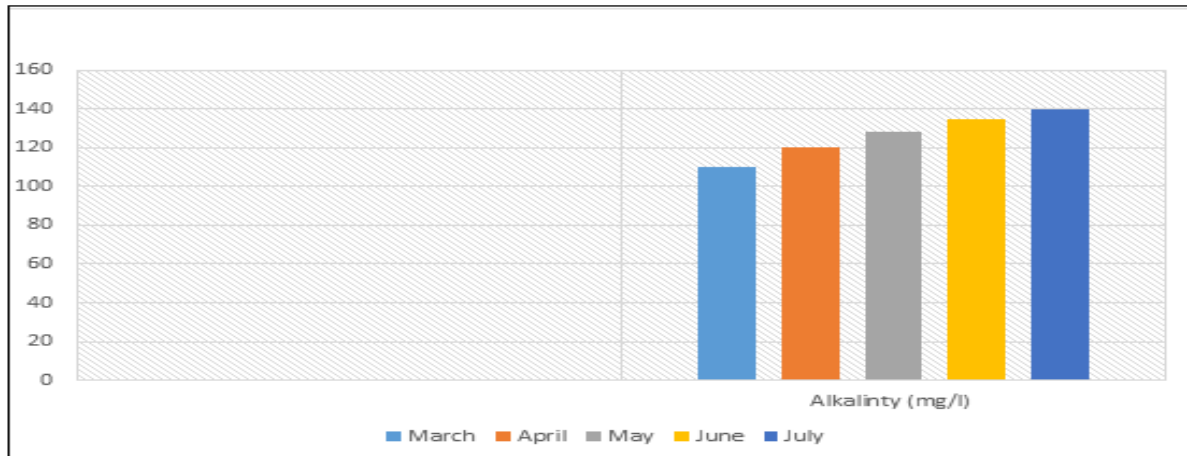


Fig. 6. Alkalinity of River Jindi.

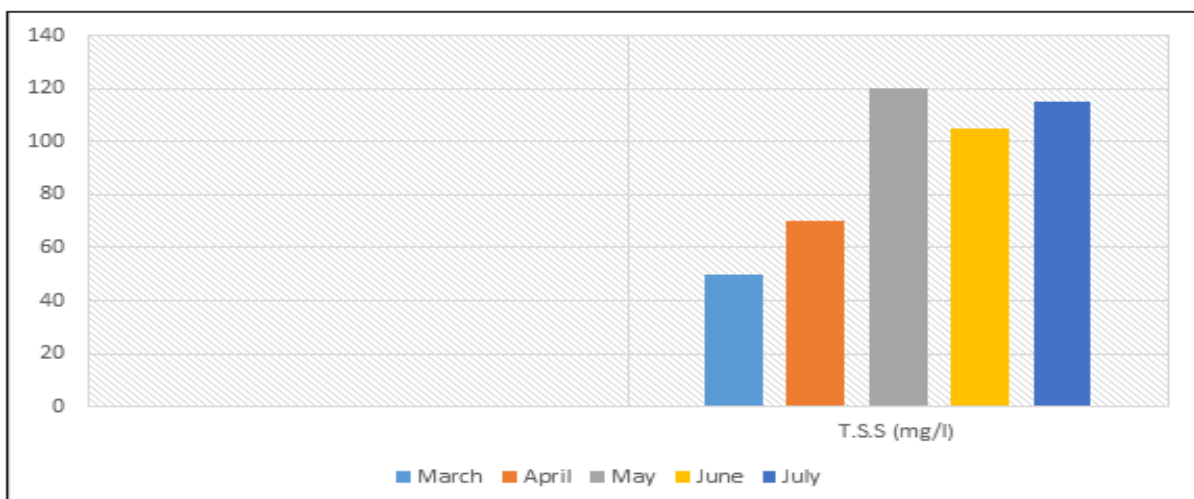


Fig. 7. T.S.S of River Jindi.

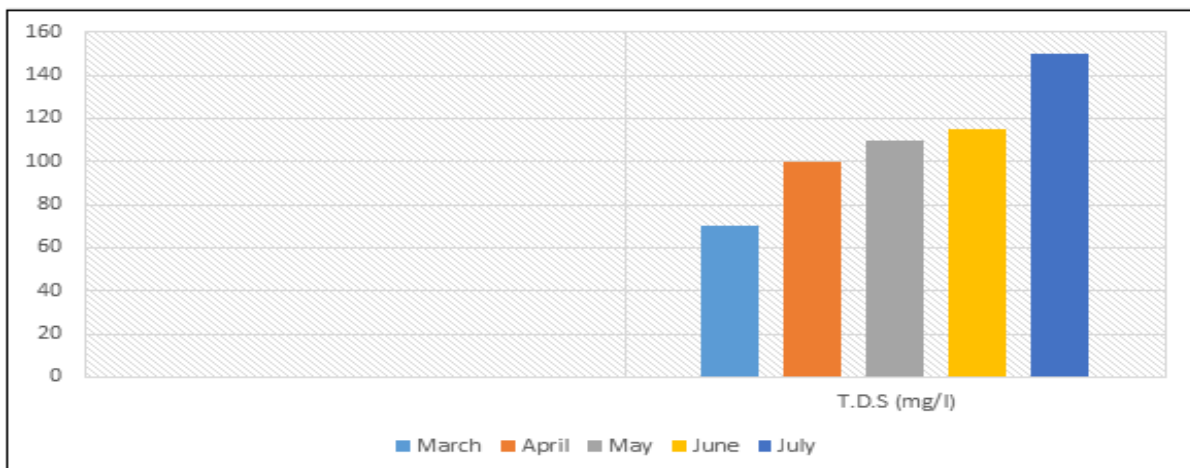


Fig. 8. T.D.S of River Jindi.

### Conclusion

It was concluded from the current study that river Jindi is facing the illegal human activities like domestic and anthropogenic activities, agricultural runoff, introduction of vehicle oils, riverine flood etc. The harmful and novel introduction of fishing gears by fisherman such as electrical shocks, chemicals also affects the fish population of river Jindi. In addition, all the physicochemical parameters showed the safe range according to water quality standards of APHA. Water quality shows suitability for varieties of fish survival and breeding season such as *Mastacembelus armatus* (Marmahi), etc.

### References

- Eisena C, Anderson MP.** 1979. The Effects of Urbanization on Ground-Water Quality A CaseStudy. *Groundwater* **17(5)**, 456-462.
- Government of Pakistan.** 1997. "Pakistan environmental legislation and the National Environmental Quality Standard", (NEQS): 1-7.
- Helfrich LA, Neves RJ.** 2005. Sustaining America's Aquatic Biodiversity. *Freshwater Fish Biodiversity and Conservation*.
- Lashari KH, Korai AL, Sahato GA, Kazi TG.** 2011. Limnological studies of keenjhar lake, district, Thatta, Sindh, Pakistan. *Pakistan Journal of Analytical and Environmental Chemistry* **10(1-2)**, 39-47.
- Latif R.** 1999. Chemical analysis and treatment of drinking water using indigenously prepared column. Dept of Chemistry. University of Agriculture. Faisalabad. 1-2.
- Okoh AI, Odjadjare EE, Igbinosa EO, Osode AN.** 2007. Wastewater treatment plants as a source of microbial pathogens in receiving watersheds. *African Journal of Biotechnology* **6(25)**.
- Sharma BK, Kaur H.** 2000. *Environmental Chemistry*; Krishna Prakashan Media (P) Ltd. Meerut UPp.
- Todd DK, Mays LW.** 2005. *Ground water hydrology*, 3rd edition, wiley and son, **79**, 1184 U-e-Habiba, L. Taj, M. Farid, M.A. Haq, N. Sharif, H. Farheen& N. Sharif.
- Told K.** 1987. Microbiological indicator for water pollution control. *Journal of Water Pollution* **13**, 370-380.