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Physicochemical Parameters of River Jhelum, Jammu and Kashmir

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Abstract

Water samples were collected from river Jhelum at different locations over a stretch of 20 km from Lasjan to Parimpora in the union territory of Jammu and Kashmir, India. These samples were analysed for 14 water quality variables - physical and chemical parameters. The data related physico-chemical parameters of water of river Jehlum obtained during the study have been mentioned below in Table 1. During the course of study, it was also observed that the concentration of some of these parameters was not in accordance to the permissible limits recommended by World Health Organisation. This could have a definite impact on life. The results obtained during the study show that the geographical location and season have a direct impact on the different physico-chemical parameters of river Jehlum. it is believed that this study will be helpful in formulating control strategy in near future.

Key words: *correlation coefficient, river Jhelum, monitoring, physicochemical parameters.*

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INTRODUCTION

Water is undoubtedly one of the precious natural resources existing on planet earth. Even if we recognize this fact, we disregarded it by polluting our water bodies like rivers, lakes and oceans. It is the fundamental duty of mankind to conserve water resources. Rivers are the most important resources of water supply in different countries of the world. At the origin of a river, the water is relatively pure asit flows downstream. In India, rivers are getting polluted day by day. A primary reason for this is that all three major sources of pollution (industry, agriculture and domestic wastes) are concentrated along the river belt and work together to reduce quality of water which is a cause of alarm and needs to be addressed.

Many rivers and other water bodies in Jammu and Kashmir have become targets of pollution due to an inadequate system of waste disposal. The case of river Jhelum in Kashmir, which despite its world famed beauty, has been turned into receiver of direct sewerage drain.

In irrigated areas of Kashmir valley, where main crop grown is paddy, large amount of injudicious fertilizers especially urea is used to supplement plant nutrients for their growth and production. As most of the fertilizers applied to the crops are not fully consumed but part of them remains in the soil

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which through run off enters into the river-The Jhelum, directly from the catchments. Nitrogenous fertilizer (urea) having runoff coefficient (5-30%) tends to deposit more readily in the aquatic bodies in the form of nitrate. Accumulation of nitrogen in this form along with phosphorus causes eutrophication in water bodies, especially growth of algae. Eutrophication becomes harmful for the aquatic life.

The environment, economic growth and development of Jammu and Kashmir especially in Kashmir province are highly influence by water, it regional and seasonal availability, and quality of surface water and microbiological parameters.These parameters are closely interlinked. In the present study, river water quality was determined by measuring the concentration of some physico-chemical parameters and comparing them with drinking water standards laid by World Health Organisation.

MATERIALS AND METHODS

Water quality parameters of River Jhelum were monitored at five different sampling points: Lasjan, Ram MunshiBagh, Lal Chowk, SafaKadal, and Parimpora considering sampling locations (receiving bulk quantity of effluent either by municipal/industrial/agriculture return flow)

CHEMICAL ANALYSIS

The samples were collected from the middle of the flow within 5-12 inches from the surface of water. The samples were saved in glass bottles of equal volume and were analyzed for physicochemical parameters such as alkalinity, calcium, bi-carbonate, pH, conductivity, total dissolved solid, and total suspended solid, chloride, chemical oxygen demand, biological oxygen demand, sodium, sulphate, potassium and magnesium using standard methods (American Public Health Association, 2005).

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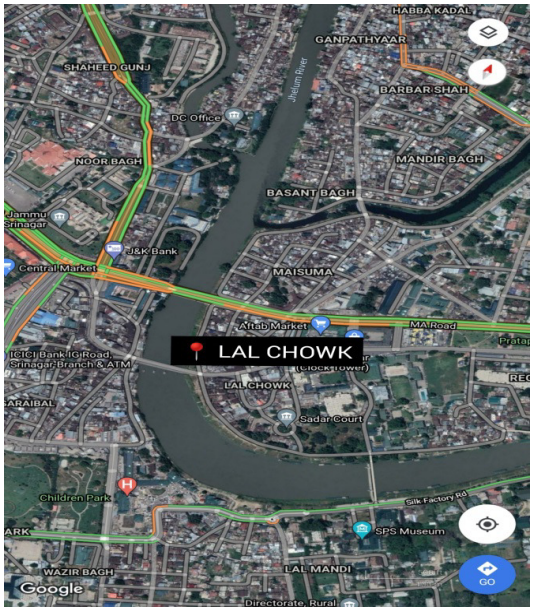

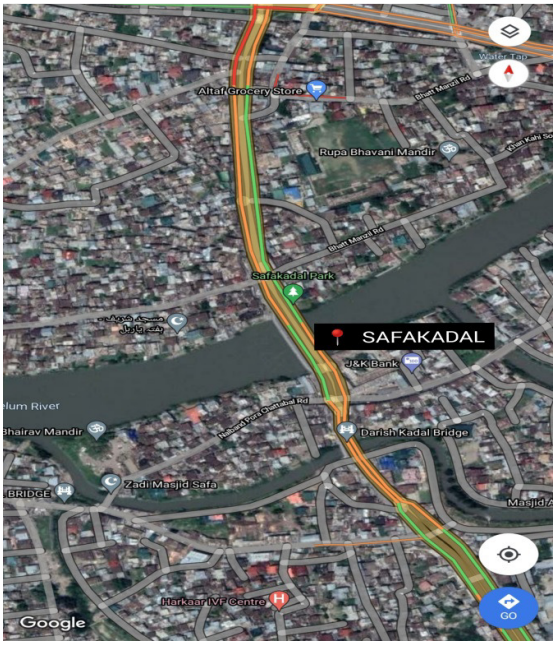

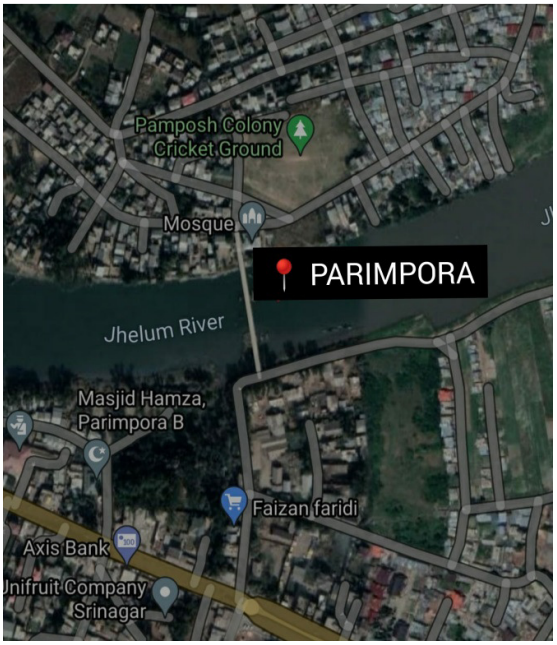

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Table 1 Estimated value of water quality parameters and prescribed limits of WHO

Parameter	Lasjan	Ram Munshibagh	Lal Chowk	SafaKadal	Parimpora	Standard Deviation	WHO Limit
Conductivity	0.38	0.41	0.3	0.41	0.4	0.046	0.3
pH	7.6	7.53	7.5	7.2	7.9	0.264	7-8.5
Alkalinity	71.8	61.12	79	88	90	11.92	100
BOD	27	23	23	32	35	5.385	6
COD	66.5	55	53.32	42.4	38.6	10.71	10
TSS	322	322	185	164	133	93.03	500
TDS	221	200.6	224.4	233.5	243.6	16.04	500
Cl^{-1}	39	38.8	38.2	39.9	39.7	0.690	200
HCO_3^{-1}	87.3	74.6	93.7	93.2	89.3	7.754	-
SO_4	30.6	29	29.8	33.6	33.5	2.130	-
Ca^{+2}	35.1	29.1	37	37.7	39.1	3.908	100
Mg^{+2}	5.8	6.4	6.1	6.1	6.2	0.216	-
Na^{+1}	20.9	22.3	21.4	22.3	22.6	0.717	-
K^{+1}	1.9	1.82	2.1	2.1	2.3	0.188	-

RESULTS AND DISCUSSION

The values of physicochemical parameters, standard deviation and limits prescribed by World Health Organisation are presented in Table 1. The relationship between alkalinity and carbonates is highly correlated and with BOD and magnesium ions are moderately correlated whereas alkalinity is weakly correlated with COD and TDS.

While discussing water quality, the terms alkalinity and hardness are often used interchangeably. These parameters of river water share some similarities but are distinctly different. Alkalinity may be a measure of the acid neutralizing capacity of water. Alkalinity in natural waters is due to the presence of carbonate, bicarbonate , and hydroxyl anions. However, phosphates, borates, silicates and other basic compounds also contribute to alkalinity if present. This property is significant to determine the suitability of water for irrigation and controlling and

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interpreting wastewater treatment processes. In the present study, the alkalinity values were maximum in Parimpora. This may be attributed to increase in the rate of organic decomposition during which carbon dioxide is liberated, which reacts with water to form carbonates , thereby increasing total alkalinity in the river. The increased alkalinity at Parimpora site was due to the concentration of nutrients in water. Alkalinity is important because it buffers water pH within the system. Without such buffering capacity, small additions of bases or acids would result in significant changes in the pH of water, which could be deleterious for aquatic life forms. Alkalinity also affects the distribution of some organisms within water systems. The pH range was 7.2 to 7.9. The pH of most natural waters lies in the range of 6 to 9 because of the bicarbonate buffering. In the present study, the TDS and TSS values were maximum at Lasjan and Ram Munshibagh sites. High values of TSS may be due to siltation, deterioration, heavy precipitation and mixing runoff rain water which carried mud, sand, etc. COD is the amount of chemical oxidant required for the oxidation of the organic matter present in the waste. River Jhelum receives high amount of organic matter which generally originate from domestic and industrial effluents on the bank of Jhelum River. In the present study, the COD value vary from 38.6 to 65.5. For biodegradation, this organic waste requires oxygen, causing significant depletion of dissolved oxygen in river Jhelum. The oxygen exhaustion affects not only biotic community of the river but also its purification capacity. High value of COD indicates that river has received high amount of organic matter. The low value of alkalinity indicates that the compound responsible for decrease in alkalinity is working as chemical oxidant for COD and hence significant increase in the value of COD. The high value of BOD suggest that oxygen present in water is consumed by aerobic bacteria which makes fish, blind and other aquatic species to find it difficult to survive.

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