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SEASONAL ASSESSMENT OF PHYSICO-CHEMICAL CHARACTERISTICS OF WATER IN RIVER JHELUM OF KASHMIR

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ABSTRACT

River Jhelum is the sole drainage system of Kashmir, being connected to all the water bodies of the valley directly or indirectly. As a consequence of numerous anthropogenic activities in its catchment spread over the whole of the valley, the river receives large quantities of pollutants throughout its course. In order to have an insight into the present status of the water body, water samples were collected at different sites along the river from Verinag to Shadipora (Sumbal) from October 2011 to August 2012 on monthly basis for the assessment of different physico-chemical parameters. Most of the parameters studied showed increasing trend with the increase in distance from source indicating the deterioration of water quality in close relation to the anthropogenic activities in the catchment area. The data procured during the study are discussed in detail in the present communication.

Keywords: River Jhelum, anthropogenic activities, deterioration, water chemistry.

INTRODUCTION

River Jhelum is the most important river of the Kashmir valley as it is the lifeline of Kashmir. It orginates from the Verinag spring situated at the foot of the Pirpanjal in the south eastern part of the valley and runs a length of 203 kms upto khandanyar which lies at the downward distance. The abundance of water is the main feature of earth which serves as a resource and a habitat for a number of organisms (Wetzel, 1983). But with the increase in urbanization, deforestation, etc., the water quality is deterioting day by day, which has adversely affected the biotic components (Indira *et al.*,2006; Kumari *et al.*, 2011).River Jhelum is also facing a number of threats from anthropogenic activities in its catchment areas which deteriorates its quality so we must conserve it by formulating policies.A continuous monitoring of water bodies is must so that general public and government knows the status of pollution which will help to develop policies for the conservation of Indian rivers(Ali, 2000; Furhan *et al.*,2004).

Lot of work has been done on the lentic limnology of Kashmir (Qadri and Yousuf,1979 ,1980; Vass,1980; Zutshi *et al*,1980; Pandit, 2002; Hmaira and Yousuf,2004;) but lotic system has not received much attention of limnologists,few reports are available on river Jhelum most of which are midstream or downstream (Vass *et al*, 1977,Kumar and Bhagat,1978; Wanganeo *et al.*,1984; Sunder and Subla,1986; Yousuf and Shah, 1988; Bhat and Yousuf, 2004; Mahdi *et al*, 2006 ; Lingdell *et al.*, 1999; Yousuf *et al.*, 2007).Hence, the present study was undertaken to monitor the water

quality of river Jhelum from the source in order to have an insight into present status of it.

MATERIAL AND METHODS

To analyze physico-chemical characteristics the sampling was done monthly from October, 2011 to September 2012. Water samples were collected and carried to the laboratory in plastic canes and in glass bottles for dissolved oxygen which was fixed on spot. The temperature and hydrogen ion concentration was measured using portable thermometer and pH respectively whereas the dissolved oxygen,free carbon dioxide, alkalinity and chloride were calculated using standard methods of APHA (1995).

RESULT AND DISCUSSION

Temperature plays important role not only in aquatic life but also influences the other parameters (Mamta, 2003). The usual trend was observed in air and water temperature. During winter,the temperature of air and water(7.7°C & 7.5°C respectively) didn'tshow any significant variation which was attributed to the high latent heat content of water whereas in summer difference (24.4°C & 18.6°C) in temperature was observed and related to rapid and continuous flow.(Fig. 1)

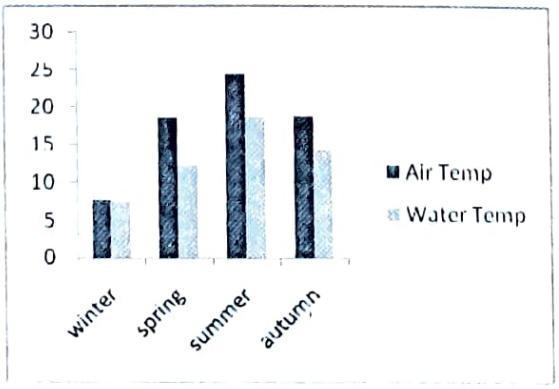

Figure 1. Seasonal variations of air & water temperature (0C) in River Jhelum

The water of Jhelum was observed alkaline in nature throughout the year .The findings tallies with the observations of Mahdi *et al.* (2006) and Pandit *et al.* (2001).The concentration of dissolved oxygen ranged from 7.2 mg/l to 8.5 mg/l. Highest concentration was observed during spring while as lowest in summer.At site -1 the concentration of dissolved oxygen was always high (fluctuated 10.6 mg/L to 8.7 mg/l) which may be due to high altitude,low temperature, high turbulence and low human interference. Then the concentration starts decreasing which shows the effect of anthropogenic activities and again increase at site-4(ranging from 8.2 mg/L to10.1mg/l) which shows the characteristic nature of the river i.e., the river revives itself. Similar observations were carried out by Yousuf *et al*,. 2007; Kumari, 2011. But as we move downstream it shows again low concentration of dissolved oxygen which might be due to the untreated sewage and increase in anthropogenic activities (Fig. 2).

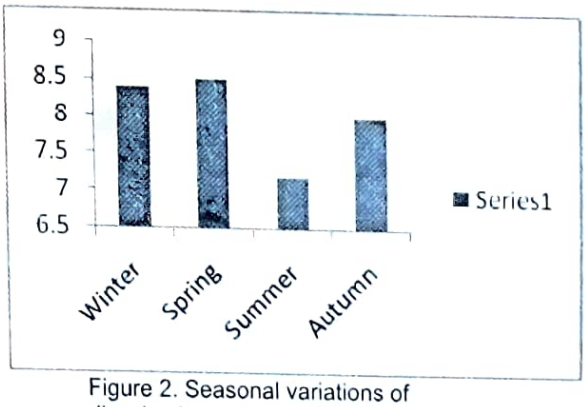

Figure 2. Seasonal variations of dissolved oxygen (mg/l) in River Jhelum.

Free carbon dioxide ranged from 7.1 mg/L to 10.1mg/l (Fig. 3). Highest concentration was recorded during winter.While moving downstream,increase in carbon dioxide was observed which might be due to high partial

pressure of carbon dioxide at low altitudes and also due to organic decomposition.Since in spring andsummer the carbon dioxide concentration is low due to which the alkalinity in the seasons is high showing a negative correlation between the parameters as already reported by Jyoti *et al.* (2007).

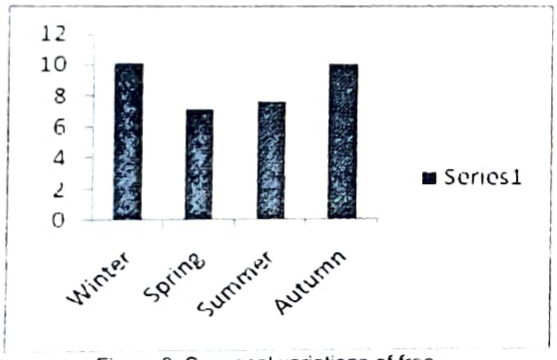

Figure 3: Seasonal variations of free carbon dioxide (mg/l) in River Jhelum

Alkalinity is an index to the nature of the rocks within a drainage basin and to the degree to which they are weathered It results from carbon dioxide and water attacking sedimentary carbonate rocks and dissolving out some of the carbonate to form bicarbonate.It ranged from 134mg/l to 160 mg/l. (Fig. 4). The increase of alkalinity with the onset of spring might be due to the thawning of snow. The alkalinity was always due to bicarbonate .The similar observations were made by Bhat *et al.*(2004). Yousuf *et al.* (2007) and Ahire (2011).

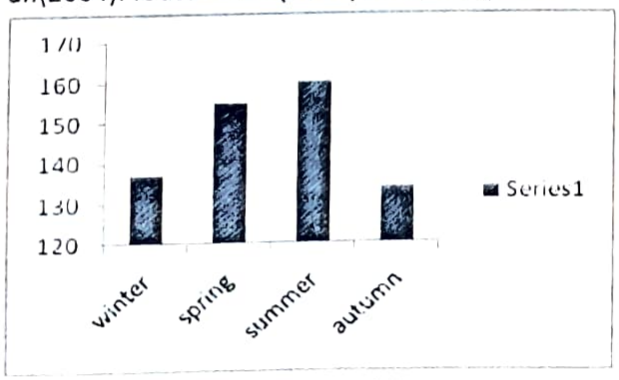

Figure 4. Seasonal variations of Alkalinity (mg/l) in River Jhelum

Chloride concentration shows increasing trend with the distance from source which is related to the anthropogenic activities as human and animal excreta contains 5g/l. It ranged from 0.85mg/l (site-1) to 9.6mg/l (site-9).Low concentration were recorded at site-1 which shows less human interference. Basically, aquatic ecosystem have low chloride concentration but due to the addition of excreta it shows increase. It shows the role of catchment as it is least exposed to human interference than other sites. Similar view point for increase in chloride concentrationwas advocated by Pandit *et al.* (2002) and Jyoti *et al.* (2003). During winter the chloride concentration is high which may be inferred that water level is low so concentration of solutes increases leading to high concentration of chloride (Fig. 5)

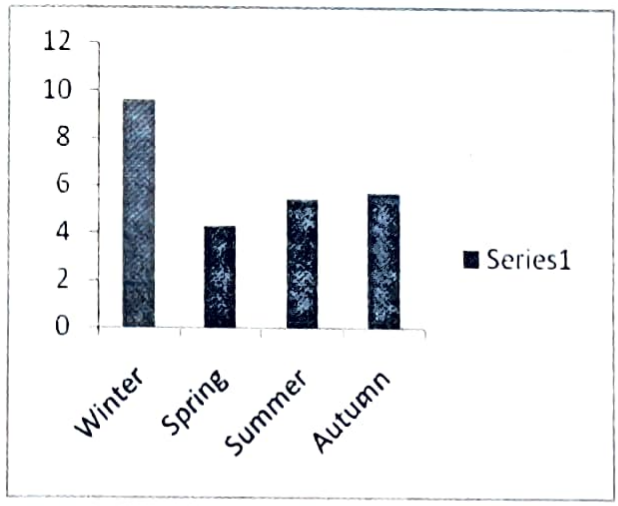

Figure 5. Seasonal variations of chloride concentration (µg/l) in River Jhelum

CONCLUSIONS

The parameters showed increasing trend with the increase in distance from the source indicating the deterioration of water characteristics in close relation to the anthropogenic activities in the

catchment area. On the basis of above mentioned physico-chemical parameters, it may be concluded that the river receives the untreated sewage all along its course which enrich the organic and nutrient load, changing the trophic status of the river.The water quality of the river should be monitored regularly so that it will give us the present status of the water body and for this purpose sewage treatment plants should be installed.

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