

Springwater Quality of Drass, Kargil

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ABSTRACT

In order to determine potability and quality of sub-surface waters of Drass (34.45°N and 75.77°E), Kargil region in respect of parameters like pH, temperature, conductivity, total solids Nitrate, Nitrogen, Dissolved oxygen and chloride in the samples gathered from four sites during May to November, 2007 and the analysis was done on monthly basis. Data obtained for these sites were compared with the various physico-chemical standards of World Health Organization (WHO) 1984 indicating that almost all parameters were within permissible limits given by WHO, 1984 except for alkalinity.

Key words: Water quality, Drass (Kargil), Sub surface water

INTRODUCTION

Ground water is commonly understood to mean water occupying all the voids within a geologic stratum. It is precious and most widely distributed resource of the earth and unlike any other mineral resources it gets its replenishments from meteoric precipitation. It includes all sub surface waters reaching a depth below which all the pore spaces, opening and other cavities of soil and rock are completely filled with water. In arid, semi arid, and dry regions like Ladakh this may be the only source of water supply. Ground water contains salts and the nature and concentration of these salts depend on the environment, movement and source of ground water. Ordinarily higher portion of dissolved constituents are found in ground water than surface water because of greater exposure to soluble material in geologic strata.

As far as Kashmir is concerned information about sub surface water quality is scanty and in case of Ladakh especially Kargil area there has been no study barring for surface waters by Dubey (1999) and Bhat and Yousuf (2002). The present investigation though a preliminary one attempts to highlight main features of sub-surface water of concerned area (Drass).

MATERIAL AND METHODS

The present study was carried out on the spring water quality of Drass (Kargil) of Ladakh region to determine the portability of water. The area under investigation is the Sub Distt. of Distt Kargil situated at a distance of 146Km away from the capital city Srinagar. Drass is flanked on North West by Zojila Pass (3529 mts) AMSL, on the South West by Matayen (Gate Way of Ladakh), on North East by Kargil Distt. and South East by Suru Valley. The main town Drass is located at the bank of river Drass.

The four selected study sites were:

Site I Lamar Chumik:

It is situated in north west of town Drass at a distance of 2 kms

Site II Giringo Chumik:

It is also situated in north west of town Drass at a distance of 1.5 kms

Site III Goshan Chumik:

It is situated in the extreme north of Drass at a distance of 1 kms.

Site IV Himbabs Chumik:

It is situated in crown place of Drass and is also at extreme north of town Drass.

The physico-chemical characteristics of spring water were studied during May to November 2007. Water samples were collected on monthly basis with necessary precaution in plastic bottles of 2 ltrs capacity. The collected samples were brought to laboratory for analysis of various parameters while temperature was recorded at the mouth of spring and dissolved oxygen (DO) was also fixed there on spot. The dissolved oxygen was fixed as per standard methods given by American Public Health Association (APHA, 1995) and Mackereth (1963). Analysis was done within 24 hours after fixation of samples.

RESULTS AND DISCUSSION

The observation and estimations related to various aspects of the study are discussed as under:

Temperature

It is a vital physico-chemical factor as it changes from season to season and also from region to region with altitudes as well. The change in atmospheric temperature brings corresponding change in water temperature (Wetzel, 1975). However, groundwater does not fluctuate much (Brown *et al.*, 1967). During the investigation of water quality the maximum temperature was recorded 11.7°C in the month of August for the samples of site III and minimum temperature of 9°C

during the months of October and November for all sites (Table 1)

pH

It is a measure of hydrogen ion concentration or more precisely hydrogen ion activity. During the investigation highest pH (7.98) was recorded in the month of May-I and lowest value pH 7.18-IV-Sep is indicative of the fact that the water is in agreement with the standard of WHO (1984) as far as potability of water is concerned.

Electrical conductivity

It depends on presence of dissolved mineral matter content (excluding silica and organic matter). Electrical conductivity varies directly with the temperature of the sample during the course of study. Electrical conductivity (micro Simens/cm) of all samples recorded were within the permissible limit of WHO, 1984. The lowest conductance of sample was recorded in the month of Nov. and highest electrical conductivity was recorded in the month of June and July. Chemically pure water does not conduct electricity. Overall this shows that the electrical conductivity of the samples were within the permissible limit given by WHO, 1984.

Total solid

It is a term applied to all matter except the water contained in liquid material. Total solid is residue that includes both dissolved and suspended solids. During present study TS (mg/l) of all samples were within the permissible limits provided by WHO 1984, for drinking purposes. Portable water contains mostly inorganic mineral matters in dissolved conditions and small or none organic matter. According to Rao *et al.* (1991) total solids are the measure factors governing the quality of water

Alkalinity

Alkalinity of treated or natural water is normally due to the presence of carbonates, bicarbonates, hydro-oxide compound of calcium, magnesium, sodium and potassium. The alkalinity of samples ranged from 200mg/L in the month of November from sampling site-1 and the value is in agreement with permissible limit of WHO, 1984. The same value also agrees with the value of and the highest value recorded in the month of August from sampling site 2 much higher than the standard given by WHO (1984). The higher value of Alkalinity/L may be due to carbonaceous or lime rich bed (Koul *et al.*, 1978; Zutshi *et al.*, 1980; Pandit,

Table 1. Physico-chemical characteristics of sub surface water of Drass, Kargil (Ladakh), 2007

PARAMETERS	SITE 1												SITE 2												SITE 3												SITE 4											
	May	Jun	Jul	Aug	Sep	Oct	Nov	May	Jun	Jul	Aug	Sep	Oct	Nov	May	Jun	Jul	Aug	Sep	Oct	Nov	May	Jun	Jul	Aug	Sep	Oct	Nov																				
Temp(°c)	10	10	11	11.5	10	9	10	10	10	10	11	11.5	10	9	9	10	10	10	10	11.7	10	9	10	10	11	11.2	10	9																				
pH	7.98	7.72	7.61	7.69	7.21	7.25	7.24	7.50	7.90	7.23	7.27	7.19	7.27	7.27	7.26	7.81	7.81	7.67	7.29	7.24	7.21	7.89	7.23	7.21	7.19	7.18	7.20	7.20																				
Conductivity μ S/cm	180	190	190	170	150	130	130	160	190	180	170	130	130	130	160	180	170	180	110	110	100	140	170	190	150	140	110	120																				
Total Solids, mg/L	45	49	52	35	39	40	35	72	78	89	49	60	82	52	98	105	120	61	71	110	52	69	72	97	48	59	70	40																				
Alkalinity, mg/L	360	240	240	280	230	230	200	440	640	640	640	720	615	610	500	400	400	400	160	160	105	400	400	400	400	300	350	400																				
Nitrate Nitrogen, μ g/L	69	110	115	270	240	146	66	75	12	100	310	90	81	59	170	174	174	290	181	110	72	175	175	170	260	195	125	81																				
Dissolved Oxygen, mg/L	9.4	9.6	9.6	8.1	8.7	9.2	9.3	8	8	7.8	8.1	8.9	9.0	9.6	9.2	9.1	8.7	9.2	9.1	9.4	8.8	8.8	8.6	8.0	9.7	9.9	10.1																					
Chloride, mg/L	20	20	24	26	18	16	16	24	28	24	24	25	16	14	14	16	24	20	23	14	12	12	16	28	16	22	14	14																				

1980, 1999). The cause of alkalinity is the mineral which dissolve in water from soil carbonate, bi-carbonates, phosphates and organic acids contribute to alkalinity.

Nitrate- Nitrogen

Nitrates are the end products of aerobic stabilization of organic nitrogen and occurs generally in trace amount in surface water supplies but may high attain values in some ground water. During the course of study highest value was recorded for the month of August ($310\mu\text{g/L}$) and lowest value was recorded in the moth of November ($59\mu\text{g/L}$).

Dissolved Oxygen

DO is a vital parameter and is the measure of oxygen present in water and available for respiration for aquatic organisms living there. DO is added and removed from the system by atmospheric exchange and hydrodynamic process. Highest dissolved oxygen (10.1mgL^{-1}) was found from the sampling site I in the month of May and lowest value (7.8mgL^{-1}) from the sampling site II in the month of August. The average dissolved oxygen conc. at all the sites was 8.92mgL^{-1} .

Chloride

During the present study highest value was recorded in the month of June 28mg/L from the sampling site II and site IV in the same month and lowest value in the month of October 12mg/L . The values fall within the permissible limits as per World Health Organization (WHO, 1984)

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