# Assessment of Physicochemical parameters of River ANS, Rajouri, (J&K), INDIA

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***Abstract*: The present study was conducted to demonstrate the Assessment of physicochemical parameters of water at different stations and in different seasons of River ANS, Rajouri, in order to ascertain its portability for human consumption, recreation and other purposes. Water samples were collected on seasonal basis (Pre-Monsoon & Monsoon) and on winter & summer basis, been analysed for estimation of water temperature, pH, alkalinity, electrical conductivity, total solids, DO, BOD, Calcium, Magnesium etc. in order to access the physical nature and chemical properties of its water and the impact of sites on their concentration. Two sites were selected for the study purpose and the samples thus collected were processed for the detection of chemicals with their relative concentrations following the standard methods. It was observed that there was a significant variations in all parameters under study. Also it was observed that there was a difference in their concentration at different sites when compared among themselves. These parameters were compared with standard water quality parameters to indicate probable pollution in river water. The overall water quality of the study sites remained within the safe limits except a few throughout the study period.**

***Keywords*: Water quality parameters, alkalinity, calcium, magnesium.**

## Introduction:

Water is crucial in the evolution of all living organisms and is one of the basic compounds without which life in any form is not possible in this world. Aquatic life requires water as a support system and in the case of animals such as fish, a medium in which it moves and obtain oxygen in dissolved form. Terrestrial life also requires a regular supply to maintain its biological processes. It is the most essential and abundantly available substance in nature[1]. Water quality deals with the physical, chemical and biological characteristics in relation to all other hydrological properties. Water quality principles furnish the basis for judging the suitability of water for its designated uses and for improving existing conditions[2]. For optimum development and management of water for the beneficial uses, current information is needed which is provided by water quality monitoring programmes. The unequal distribution of water on the surface of earth and the fast declining availability of fresh useable water, are the major concerns in water quality and quantity[3,4]. The quantity of water body can be assessed by determining its physicochemical parameters in order to check the quality status of water, whether it is suitable for drinking, irrigation and fishing purposes. River ANS originates from Pir Panjal range in district Rajouri and passed through Kandi and Budhal areas. More than 40 percent of agricultural wealth is dependent on this river because adjoining areas of this river has rice fields. People use different types of pesticides for controlling the pests. When there is heavy rains, these pesticides like DDT, BHC etc. flow through rain water and pollute the river water. The effect of DDT is more on aquatic life particularly on fishes.

Aquatic animals are sensitive to water quality and a high quality water supply is a key ingredient for successful aquaculture. Possible contamination in water supplies include suspended solids, organic matter, nutrients, metal salts/ores pesticides and industrial chemicals[5]. Anthropogenic activities within river basins, erosion and atmospheric depositions are the main negative aspects on the water quality of most reservoirs[6,7]. The main objective of the present study is to analyse the seasonal variations in water quality of ANS River at Rajouri. These parameters were compared with standard water quality indicators to indicate probable pollution in river water.

Keeping the same in view the present study was taken to aware people that how they are contaminating the source of life and possible use of chemicals and other substances in day to day life.

## Materials and methods

### Study area:

This study was carried out at two stations (Station I, Kotranka and Station II, Phalni) to cover the riverine system of River ANS, in the Rajouri district; J and K. River ANS drains through the vicinity of Kotranka city that lies between latitude 33.3588ºN and 74.5191ºE longitude. This river is also very liable to floods which occur at the time of periodical rains of summer. This river water is used for domestic, irrigation, recreation, sewage disposal, fishing etc.

### Requirements:

All the glasswares and other pipettes were first cleaned with tape water thoroughly and finally with de-ionized distilled water. The pipettes and burettes were rinsed with solution before final use. The chemicals and reagents used for analysis were of AR grade. The procedures for calculating and determining the different parameters were conducted in the laboratory.

**Water sampling and Preservation:**

The samples were taken from the subsurface in plastic bottles of 2.0 litre capacity from station I & II in two different seasons. The sample bottles were stoppered and sealed with parafin wax. Water samples were filtered using Whatman No.41 (0.45 m pore size) filter paper for estimation of dissolved metal content.

**Physico-chemical Study:**

The samples collected were analysed for temperature, pH, Electrical conductivity,Total Alkalinity, total dissolved solids,Total hardness, calcium and magnesium, DO, BOD and COD values. The techniques and methods followed for collection, preservation, analysis and interpretation are those given by Rainwater and Thatcher, Brown et.al. and American Public Health Association (APHA)

**Results:**

The variation in physicochemical parameters in summer & winter (at two different Stations I & II) and in Premonsoon & Monsoon seasons (at three different Stations A, B, C) of river water are given in Table 1 & 2. The values of pH ranged between 7.2 and 7.8 in winter & summer and between 7.3 & 7.9 in Premonsoon & Monsoon seasons. Electrical conductivity values ranged from 190-220 □S/cm. Temperature was found within a range of 9.4-28.2ºC. The concentration of all other chemical parameters with their range as alkalinity from (35.0-61.5) mg/l, chloride (10.0-14.10) mg/l, magnesium (8.5-11.5) mg/l, fluoride (0.11-2.44) mg/l, calcium (30.2-36.50) mg/l, DO (6.4-7.5) mg/l, BOD (0.69-0.81) mg/l etc. were almost within permissible limits in all the studied seasons.

**Table-1. Seasonal variation in physico-chemical properties of River ANS at Stations I & II:**

| S.No. | Parameters | Unit/s | Summer | | Winter | |
|---|---|---|---|---|---|---|
| | | | Station I | Station II | Station I | Station II |
| 1 | Electrical Conductivity | µS/cm | 200 | 220 | 190 | 195 |
| 2. | Temperature | ºC | 26.3 | 28.0 | 9.4 | 9.7 |
| 3. | pH: | | 7.6 | 7.4 | 7.8 | 7.2 |
| 4. | Alkanity | mg/l. | 35 | 37 | 32.1 | 35.2 |
| 5. | Calcium | mg/l | 30.2 | 36.5 | 28.2 | 30.3 |
| 6. | Magnesium | mg/l. | 9.5 | 11.7 | 8.8 | 9.5 |
| 7. | DO | mg/l. | 6.4 | 6.9 | 7.4 | 7.0 |
| 8. | BOD | mg/l. | 0.8 | 1.37 | 0.72 | 0.9 |

**Table 2: Seasonal variation in physico-chemical properties of River ANS at Station I and II in Pre-Monsoon and Monsoon Seasons.**

| S.No. | Parameters | Unit/s | Pre-monsoon | | | Monsoon | | |
|---|---|---|---|---|---|---|---|---|
| | | | A | B | C | A | B | C |
| 1 | Electrical Conductivity | µS/cm | 214 | 216 | 220 | 187 | 195 | 218 |
| 2. | Temperature | ºC | 15.12 | 20.5 | 26.4 | 27.2 | 26.7 | 28.2 |
| 3. | pH | | 7.3 | 7.5 | 7.8 | 7.4 | 7.9 | 7.7 |
| 4. | Alkanity | mg/l. | 38.4 | 42.2 | 41.7 | 42.5 | 45.4 | 49.5 |
| 5. | Chloride | mg/l | 10 | 14.2 | 11.0 | 12.6 | 13.5 | 14.10 |
| 6. | Magnesium | mg/l. | 10.5 | 10.2 | 10.7 | 11.4 | 11.6 | 12.0 |
| 7. | Fluoride | mg/l. | 0.11 | 0.92 | 2.05 | 0.19 | 1.15 | 2.34 |
| 8. | Calcium | mg/l. | 35.4 | 34.3 | 36.44. | 33.9 | 34.6 | 35.2 |
| 9. | DO | mg/l. | 3.7 | 3.5 | 0 | 6.1 | 8.0 | 8.5 |
| 10. | BOD | mg/l. | 0.75 | 0.69 | 0.72 | 0.74 | 0.71 | 0.68 |

**Pre-monsoon**: A)March B)April and C) May
**Monsoon**: A) June B) July and C) August

**Discussion:**

The results obtained during the study shows that the geographical location and seasons have a direct impact on the various physico-chemical properties of river. Air temperature at different sites followed the general climatic regime of the area with minimum in December to January and maximum in June to July. The reason for comparatively low temperature at station I could be due to the presence of more plants at this site which shades the site at their and makes it less visible to direct sunlight and is nearer to Pir Panjal range ( mountains) as compared to Station II. The alkaline nature of water could be attributed to the buffering properties of some inorganic substances[8]. The increase conductivity towards downstream could be due to the increased urban and agricultural land use drainage into the river[9].The various ions added to the water regulate the conductivity of the water[10]. The higher concentration of DO during winter could be due to the fact that cold water contains more oxygen as compared to warm water as the DO is inversely proportional to water temperature[11].The gradual increase in chloride content down the river could be due to the increase in urban land use and due to the addition of some industrial /factory discharge[12,13]. The reason for increasing trend of calcium down the river could be increased concentration of waste material especially the calcium rich substances like bones and milk products of slaughtered and killed animals. The reason for higher concentration of other chemicals than the permissible limits could be due to the excessive use of fertilizers, pesticides and addition of human excretory products and other human activities[14]. The values of different parameters and contaminants observed have been furnished as under. Considerable range of these physico-chemical parameters were observed and are represented in Tables 1 & 2. The values of physical and other chemical parameters with their range observed was almost good to some extent except a few because of their permissible limits.

All forms of life depend on the availability of adequate amounts of essential metals and other chemicals, however, at higher concentration they become toxic to organisms. Many factors are responsible that influence the concentration at which harmful effects can be expected[15-17]. Normally, only the free or inorganically bound form of the element is potentially toxic to adequate biota; complexation with organic ligands significantly reduces this concentration and adverse effects may occur. There are other factors such as pH and hardness that affect concentration of free metal ions and thus regulate toxicity[18,19]. The seriousness and persistence of heavy metals in water are compounded by the fact that generally they are water soluble, non-degradable, vigorous oxidizing agents and strongly bound to many biochemicals especially polypeptides and proteins[20-22]. The heavy metals are bioaccumulated in the body of fish and other aquatic plants and animals[23].

All analytical results indicate that there is a variation in properties of river water at different places and due to involvement of wastage[24,25] and other chemical byproducts.

**Conclusion:**

All the Physico-chemical parameters investigated during present study were in the desirable limits prescribed by BIS except DO, TA, TH and calcium. Some are very near to desirable limits and may cross it in near future as pollution is increasing day by day. On comparision, the concentration of all the physicochemical parameters studied showed high value at station II as compared to station I. Based on observed results, it can be concluded that the river ANS required appropriate water quality management plan for its sustainable usage. It can also be achieved by adopting measurs like limiting the direct discharge of domestic sewage, other chemical and preventing unabated dumping of solid waste near its banks. Also there is needs to check the status of river water regularly by involving various stakeholders.

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