

# ANTHROPOGENIC IMPACT OF SURFACE AND GROUND WATER QUALITY OF VARIOUS LOCAL RESERVOIR OF NIMACH MADHYA PRADESH

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**ABSTRACT:** The present work has been done at Nimach district surface and ground water quality. Nimach district is part of Ujjain division borders the Rajasthan state on the west and north. There are 98 hand pump and more than 47 tube well 59 well present for the report of nagar palika parishad Nimach. Sitaram Jaju sagar dam Thikariya reservoir Chambal River, Morwan dam is to provide water for the irrigation and drinking purpose for district. Present study was carried out from June 2015-2016 and 2016-17 sample were collected on seasonal basis from three sample site of Nimach ic Morwan dam, Jaju sagar dam Sangivani nala. The physico-chemical parameter like Temperature pH, Depth of visibility, total hardness, conductivity, T.D.S, Nitrate Phosphate, dissolved Oxygen etc. the result reveled that there were significant seasonal variation in some physico-chemical parameter and most of the parameter were in normal range and indicate good water quality of fresh water reservoir.

**KEYWORDS:-** Contamination, ground water, reservoir, eutrophication physico-chemical parameter.

## INTRODUCTION:-

Water has two dimensions that are closely linked quantity and quality water quality means the physico-chemical and biological characteristics of water .a healthy aquatic environment is one in which the water quality supports a rich and varied community of organism and protects public health. Reservoir, dam, pond have been impounded to store the water for multipurpose beneficial uses like irrigation fisheries power generation and drinking water supply. The main purpose of analyzing physico-chemical characteristics of water is to determine its nutrient status.

Nimach district is part of Ujjain division and had approximately 700.000 inhabitants as of Gambhiri 2001 Nimach district is bordered by Rajasthan Morwan dam is 24 km from Nimach and constructed on river Gambhiri and mainly used for irrigation and water supply to nearby Sitaram jajusagar dam is commonly known as Harkiyakhal reservoir as many stream or khalss canal flow in to Nimach dam was constructed in year 1985

dam is to provide water for the irrigation and drinking purpose for 26 village of Nimach district.

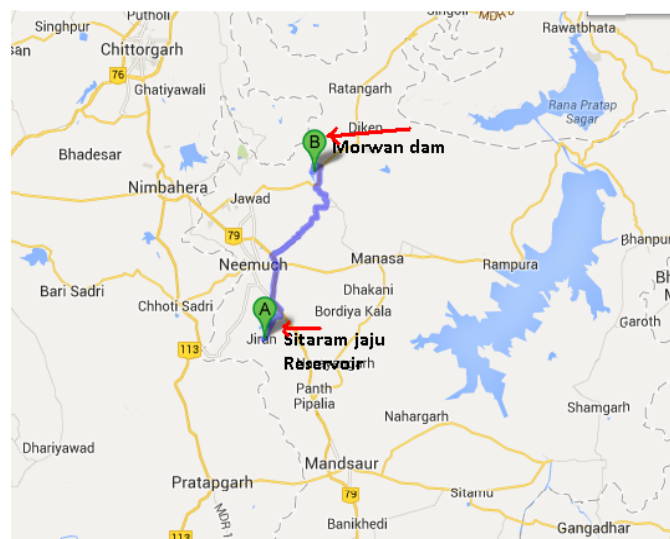
## MATERIALS AND METHODS –

For study both anthropogenic impact of surface and ground water quality of study of physico–chemical parameters have been taken into consideration the main object of this paper was to study the surface and ground water quality and impact of human. The samples were collected seasonally monsoon winter and summer from three sampling station of Nimach district.

**Station 1:** Morwan dam is 24 km from Nimach situated in the Jawad tehsil and a beautiful place to visit.dam is constructed on river Gambhiri tributary of Chambal.

**Station 2.** Sitaram jaju sagar dam is 17 km from Nimach commonly known as Harkiyakhal dam constructed on the gambhiri tributary of the Chambal River.

**Station 3:**Sanjivani nala it reaches CRPF to Rawan Rundi Nimach city scheme no 36, 24, 14/4 ,14/1, 14/3. Rajasw colony Gandhi nagar colony Gwaltoli Indiranagar Rajiv nagar bagicha no 13, Bagicha no 10. Nimach city etc.



**Satellite Map of Study Site**

**Water quality analysis:** Sampling of water was carried out at the three study stations three times in the year from June 2015 to May 2017, covering monsoon, winter and summer seasons. Water was collected in sterilized phosphate free pre-cleaned polythene bottles and processed within 6 hrs. The samples were analyzed by standard methods (APHA 1985, AOAC 2002) for major physical and chemical water quality parameters like air and water temperature, depth of temperature pH, depth of visibility, total hardness, conductivity, T.D.S Nitrate Phosphates, dissolved oxygen etc.

**RESULTS AND DISCUSSION:-**

The data water quality analysis of Jajusagar dam Nimach has been given in table no. 1

**Table :1. Physico-chemical Parameter of Jaju Sagar Dam Nimach District During 2015 to 2017**

S. No.	Parameter	Jaju Sagar Dam						Average	Min	Max
		2015-16			2016-17					
		W	S	M	W	S	M			
1	Air Temperature (°C)	22.2	35.2	26.7	21.7	34.4	26.9	27.85	21.7	35.2
2	Water Temperature (°C)	18.2	34.8	24.8	18.4	35	24.2	25.90	18.2	35
3	Depth of Visibility (cm)	150.87	168.2	122.8	146.2	152.6	126.5	144.53	122.8	168.2
4	Conductivity (µms/cm)	0.288	0.341	0.149	0.288	0.342	0.149	0.26	0.149	0.342
5	pH	6.6	7.9	7.2	7.7	8.1	7.44	7.49	6.6	8.1
6	Total Dissolved solid (ppm)	145	158	90.6	137	157	96.2	130.63	90.6	158
7	Dissolved oxygen (mg/L)	7.6	6.3	6.4	7.7	6.6	6.9	6.92	6.3	7.7
8	Total alkalinity (ppm)	86	100	96	86	100	96	94.00	86	100
9	Hardness (ppm)	156	180	170	157	179	160	167	156	180
10	Calcium hardness (ppm)	71.2	75.4	65.4	75.2	77	70	72.37	65.4	77
11	Magnesium (ppm)	24.56	25.27	21.22	23.44	24.21	21.87	23.43	21.22	25.27
12	Chloride (mg/L)	61.5	61.8	61	55.5	56.6	62.5	59.82	55.5	62.5
13	Fluoride (mg/L)	0.400	484	0.413	0.404	0.491	0.432	81.02	0.400	0.491
14	Phosphate (mg/L)	0.11	0.232	0.1351	0.121	0.2132	0.1359	0.157	0.11	0.232
15	Sulphat (mg/L)	36.62	36.44	24.88	36.72	37.72	25.38	32.96	24.88	37.72
16	Iron (mg/L)	3.52	3.64	3.66	3.22	3.82	3.46	3.57	3.22	3.82
17	Megenes (mg/L)	0.18	0.1	0.03	0.21	0.02	0	0.09	0	0.21
18	Nitrate (mg/L)	0.232	0.386	0.1	0.23	0.38	0.1	0.24	0.1	0.386

**pH:-**

Hydrogen ion concentration pH is most important factor for determining the corrosive nature of water (patil et al. 2012) during the study period water of city removed alkaline and the values of pH were fluctuated between 6.6 to 8.2 at all the stations. The minimum value of pH 6.6 was observed at station 2<sup>nd</sup> during winter 2015-2016 at station 3<sup>rd</sup> mainly attributed to addition of rain water however, maximum value of pH was observed at station

**Water Temperature:-**

Temperature is major factor, which governs chemical reaction and biological process in any water bodies (Gour et al. 2014) average value of air temperature of 3 attention varied between 21.7 °C to 35.2 °C at all the stations highest temperature 35.2 °C was recorded during the summer 2016 Jajusagar dam whereas the lowest Temperature 21.7 °C during the winter 2016-2017.

Temperature of water in the Nimach ranged between 18.2 °C to 35.0 °C minimum temperature 18.2 °C was found station 2<sup>nd</sup> during winter and maximum 35.0 °C at station 2<sup>nd</sup> during summer 2015-2016.

1<sup>st</sup> during summer 2016-2017. pH had positive correlation with electrical conductance and total alkalinity (Gupta 2009) during the study pH showed more significant positive correlation with depth of visibility alkalinity total hardness nitrate and phosphate while it had negative relation with dissolved oxygen Sharma et al.

#### **Dissolve Oxygen:-**

Dissolved oxygen is essential for direct need of many organisms, affects the solubility of many nutrients and the periodicity of aquatic ecosystem (Wetzel 1983). The result of present study showed that highest peak value of dissolved oxygen was recorded 9.3mg/l during the winter 2015-2016 at station 1<sup>st</sup> and the least in the summer of 2015-2016 and 2016-2017 5.6mg/l at station 1<sup>st</sup> and 2<sup>nd</sup>. Sharma et al. (2009) also findings in the Mahi dam in the summer, dissolved oxygen decreased microbial activity (Katuria 1996). Through the study dissolved oxygen. Showed a positive correlation with Temperature, chlorides hardness nitrate, phosphate and pH (Sharma et al. 2012).

The depth of visibility gives information regarding water quality (Sharma *et al.*, 2000). Suspended materials in water produce turbidity and reduce light penetration (Mathur *et al.*, 2010). In the present study, depth of visibility varied between of 126 cm to 168 cm at Nimach. Depth of visibility showed more significant positive correlation with alkalinity ( $r=0.8790$ ), Hardness( $r=0.9737$ ), TDS ( $r=0.9518$ ), Electrical conductance( $r=0.9518$ ), nitrate ( $r=0.8255$ ), phosphate ( $r=0.8171$ ). Sharma *et al.*, (2009) also reported similar findings in Mahi dam.

#### **Alkalinity:-**

Alkalinity is an estimate of the ability of water to resist change in pH upon addition of acid. It is composed primarily of carbonate ( $\text{CO}_3^{2-}$ ) and bicarbonate ( $\text{HCO}_3^-$ ), acting as a stabilizer for pH. Total alkalinity in Nimach ground and surface water ranged between 86mg/L to 100 mg/L at all the stations. During present study total alkalinity was found within permissible limits at all stations (Table-1). Saxsena *et al.*, (2008) found total alkalinity variation between 70 to 290 mg/L at the Chambal river.

#### **Total Hardness:-**

Total hardness is an important parameter indicating level of water quality and organic production in the lake (Wetzel, 1983). Total hardness ranged between 156 mg/L to 203 mg/l at Jaju Sagar dam. In this study hardness values were found within permissible limits at all stations (Table1). Gaur *et al.*, (2014) observed total hardness between 122 mg/L and 203 mg/L in Chambal river.

#### **Total Dissolve Solids:-**

During this study, total hardness showed significant positive correlation with total dissolved solids. In Nimach TDS ranged between 90.0 mg/Land 158 mg/L. Indian Standards (2001) prescribed the desirable limit of TDS as 500 mg/L in drinking water. However,

TDS values were found under the desirable limits (Table-1). The minimum value (99.0 mg/l) was recorded in monsoon 2015-2016 and maximum 158mg/l during the summer 2015-2016 at Jaju sagar dam. Total dissolved solid (Na, Cl, K,  $\text{SO}_4$ ) regularly increased due to human interference in nature from stream order one to river mouth (Meybeck, 1998). A high content of dissolved solid salivates the density of water and influences osmoregulation of fresh water organisms (Mishra and Saksena, 1993). The statistical computation indicated significant positive correlation of TDS with electrical conductance ( $r=0.9999$ ). Conductivity is a better index to measure trophic status of a water body, oligotrophic waters are characterized by poor Electrical conductance, showing lesser number of free ions, responsible for limiting effect on productivity (Gaur *et al.*, 2014).

#### **Conductivity:-**

During the present study conductivity values ranged between 164 $\mu\text{S/cm}$  to 213  $\mu\text{moh/cm}$ . Saksena *et al.*, (2008) reported highest value of conductance a 884  $\mu\text{moh/cm}$  at the Chambal River. In Nimach Electrical conductance demonstrated significant positive relation with nitrate ( $r=0.8433$ ) and phosphate ( $r=0.7836$ ). Gaur *et al.*, (2014) showed positive correlation of conductivity with TDS, dissolved oxygen at Chambal river. Whereas relation was negative with showed with pH, hardness and nitrate. the value of nitrate SS in Nimach varied between 0.1104 mg/l to 0.386 mg/lat all station in present study Showed significant positive correlation with phosphate pH, alkalinity totals hardness chloride phosphate and negative relation with dissolved oxygen TDS and conductivity(Sharma et al.,2011).

#### **Phosphate:-**

In the water of Nimach phosphate varied between 1228mg/l to 0.4221mg/l .during present study maximum phosphate was found during summer 2016-2017 Morwan at the station 1<sup>st</sup> while minimum value was recorded in monsoon 2015-2016 at station 1<sup>st</sup> the lowest value of phosphate was observed in monsoon due to the dilution of rain water which sub squinty decreases phosphate concentration. In the present study phosphate showed positive correlation with chloride total alkalinity harness and nitrate but negative with conductivity and dept of visibility in Rana pratap sagar dam in Nimach district an average value of WQI suggested good water quality .

#### **Water Quality Index:-**

The WQI was used to incorporate various Physico-chemical parameters of water and their dimension into a single score showing a clear picture of water quality of Nimach. In present study an average value of WQI of

Morvan dam was computed as 33.458 which suggested good water quality. The station-wise variations of WQI was reported as 32.8647 at station I, 35.7193 at station II, 31.7901 at station III that indicated better water quality as III station. Yadav *et al.*, (2010) calculated high ranges of WQI which varied between 154.6 to 226.6 may be attributed to high value of total hardness in Todarai Singh area of Tonk district, Rajasthan. Bamaniya *et al.*, (2011) computed highest WQI (223.85) in river Ahad, Udaipur which was, due to the disposal of domestic wastes, sewage effluents, industrial waste and agriculture waste. Pandey and Ali (2013) observed WQI range between 8741.1 to 30246.51 which indicated that water is unsafe for human consumption in River Wainganga, Bhandara, Maharashtra. Desai and Desai (2012) assessed water quality of ground water Surat city, Gujarat. They found high WQI ranged between 418.65-2281.15 in winter season and 936.89-2411.65 in summer season from 25 stations mainly due to the higher values of iron, total dissolved solids (TDS), hardness, fluoride, silica, chloride, COD and salinity in the groundwater further water was not safe for domestic use or drinking. The variations of water quality at all stations were almost same. The lowest value of WQI reported during study period was due to the water quality parameters within permissible limits. Therefore, it can be concluded that the water quality of the Nimach district dam is acceptable for drinking and domestic purpose.

#### CONCLUSION:-

Water quality parameters of the Nimach district were found within the permissible limits as decided by various agencies. During present study results clearly revealed that water of Jajusagar dam may be used for drinking, irrigation, domestic as well as fish culture without any scientific treatment. However, regular assessments of water quality parameters are required to further management and conservation of Nimach district.

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