

Physico-Chemical Study of Sonrakh River in Junagadh City Gujarat

S. J. Vyas^{1*}, S. P. Tank¹, R.P Bhatt², M. M. Jani³,

¹Department of Life sciences, Bhakta Kavi Narsinh Mehta University, Junagadh
¹Department of Earth and Environmental Science KSKV Kachchh University, Bhuj
^{2,3}Department of Botany, Bahauddin Science College, Junagadh

Corresponding author: vsuhas_13@yahoo.co.in Tel. 9925016914

Available online at: www.isroset.org

Received: 07/Oct/2018, Accepted: 22/Oct/2018, Online: 31/Dec/2018

Abstract- The present work was undertaken to observe the impact of human activity and sewage disposal in Sonrakh river by analyzing different nutrient parameters. The sampling sites were selected based on their distance from urban (developing) areas and rural (under develop) areas along the Sonrakh River. The physico-chemical parameters like colour, pH, Electrical Conductivity (EC), acidity, alkalinity, turbidity, calcium, total hardness, total dissolved solids, chloride, magnesium, potassium, fluoride and sodium were analyzed during winter season. During the study It was observed that the main cause of deterioration in water quality was due to the high anthropogenic activities, illegal discharge of sewage and industrial effluent, lack of proper sanitation, unprotected river sites and urban runoff. The results of the present study have been discussed and from the data it can be concluded that the water is moderately polluted, it is clear that the water is not highly polluted, the range of physico-chemical parameters were within the permissible limit.

Keyword - Sonrakh River, physical water analysis, chemical water analysis, nutrient, potassium

I. INTRODUCTION

The River Sonrakh is a river in western India, originating in the Giranar Hills of Junagadh Gujarat, India. The River Sonrakh plays a significant role in the human life of the City and Villages. It has become polluted at some places of City Area due to industrial activities and the confluence of sewage, domestic wastes and industrial effluents of many enterprises with various types of organic compounds deteriorated to human health and aquatic organisms. Urban areas, farms, factories and individual households – all contribute to the contamination of this river. The water quality in the stretch of the River Sonrakh water is one of the most important compounds of the ecosystem, but due to increased human population, industrialization, use of fertilizers in the agriculture and man-made activity. The natural aquatic resources are causing heavy and varied pollution in aquatic environment leading to pollute water quality and depletion of aquatic biota. It is therefore necessary that the quality of drinking water should be checked at regular time of interval, because due to use of contaminated drinking water, human population suffers from varied of water borne diseases. It is difficult to understand the biological phenomena fully because the chemistry of water reveals much about the metabolism of the ecosystem and explain the general hydro - biological relationship. The river occupy vital role in the irrigation as well as local ecosystem in the semi-arid and regions of South India. The river water provides multiple uses like source of drinking

water for uncountable rural and urban communities and livestock, fish culture, recharge of ground water, control of floods etc.[1]. showed a one third of the drinking water requirement of the world is obtained from surface sources like rivers, dams, lakes and canals [2]. studied the physicochemical characteristics of water bodies have been studies by many researchers from time to time [3] in India, many researchers have worked on physicochemical and biological characteristics of reservoirs and river with standard procedure [4-10]. in noticed Limnological studies of Narsinh Mehta Lake, it was carried out for ascertaining the quality of water for the purpose of the conservation of Narsinh Mehta Lake of Junagadh. Several physicochemical parameters such as pH, total alkalinity, total hardness, total dissolved solids, chloride content, dissolved oxygen (DO), biochemical oxygen demand (BOD) were meticulously observed in different seasons for the year 2012[11]. found that the pH, turbidity, chloride, total hardness, total solid and DO of Wardha river water samples in pre-monsoon season was found in the monsoon-Pre monsoon[12]. showed soil and water collected from different wetland area of Kachchh region during February to march 2016 and analysis of physico-chemical characteristics. the various physico-chemical parameters such as pH, electrical conductivity, calcium, magnesium, total hardness, potassium, sodium, chloride, texture, COD, BOD, DO, total organic carbon total dissolved solid, total suspended solid, total solid were analyzed [13]. carried out the study at temperature varying from 20°C month of January and 33°C month of May. The

concentration of DO in Narmada water samples varied from 6.3 mg/l in month of May and 9.0 mg/l maximum month of January. pH values ranging from 7.4 to 9.1 show that the present water samples are slightly alkaline, the values of chloride varied between 17 mg/l minimum in December and 54 mg/l in June. seasonally, the values were highest in summer and lower in winter and intermediate values were recorded in rainy season. The observation of total hardness reveals that the monthly variation in the water samples of Narmada River ranged between 73 mg/l to 210 mg/l with minimum in the month of October and Maximum in the month of June. The lower values of hardness in the post monsoon might be due to settlement of anions and cations[14]. studied Physico-chemical parameters of Narmada River at Indrasagar Dam and Omkareshwar Dam period of January to December 2012, Water samples were taken from sampling stations every month and were analyzed as per standard methods. chloride and sulphate maximum in Punasa Dam, observed during June, BOD and TDS in August, total hardness in November, temperature in May and pH was highest in March and April. at Omkareshwar Dam maxima of total hardness were recorded in October, chloride in November, sulphate in August, TDS and temperature in July, maximum of pH was recorded in February[15]. the Result observed that the water quality of river is deteriorated due to domestic, industrial effluents direct discharge in to river and various human activities along the banks of the river. Instead of analyzing the single parameter and predicting the quality of river does not define the actual quality of the river for serving required purpose. So, the seasonal river quality monitoring by analyzing various physico-chemical parameters and by integrating them is very much necessary in order to determine and maintain the water quality of the rivers[16]. studied Physico-chemical and biological parameters and their variability in relation to the

pollution of river water. The analyzed polluted site contained high values of chloride, total hardness, total alkalinity, COD, heavy metals like as iron, zinc, copper, manganese and low value of Dissolved oxygen, which indicates a high pollution load. It was carried out greater impact of urban activity on the ground and river water quality in Hoshangabad. it may be attributed to the fact that most of the river water Hoshangabad site are polluted through discharge of wastes at various land sites.[17] studied physico-chemical and biological characteristics of water sample around Jabalpur city, M.P. to evaluated the suitability of water for irrigation and domestic uses. Samples of water were collected from various localities such as Narmada and Pariyat water supply system, various ghats of Narmada River, various tools and tanks, main drains of the city such as Omti nala and Moti nala and were analyzed for pH, electrical conductivity, temperature, dissolved oxygen, five days Biological oxygen demand, fecal coliform, turbidity, total solids, nitrates and phosphates.[18]

II. MATERIAL AND METHOD STUDY AREA

Junagadh a historical town in Saurashtra region Gujarat, in Junagadh pass two small river Sonrakh and Kalva both are originated from Girnar and around hills. A Sonrakh river situated near Junagadh City and its originated from Giranar hills and meet Uben river near Taliyadhar village. A sampling point to this river Laldhori[S1] ($21^{\circ}53'78''$ - $70^{\circ}50'32''$), Narayan dharo[2] ($21^{\circ}52'71''$ - $70^{\circ}49'09''$), Damodar kund[3] ($21^{\circ}52'57''$ - $70^{\circ}48'70''$), Near husheinichowk[4] ($21^{\circ}53'00''$ - $70^{\circ}47'04''$), Near Khamdhrol village[5] ($21^{\circ}32'55''$ - $70^{\circ}27'13''$), and Near Junagadh veraval bypass road side[6] ($21^{\circ}32'54''$ - $70^{\circ}26'43''$).

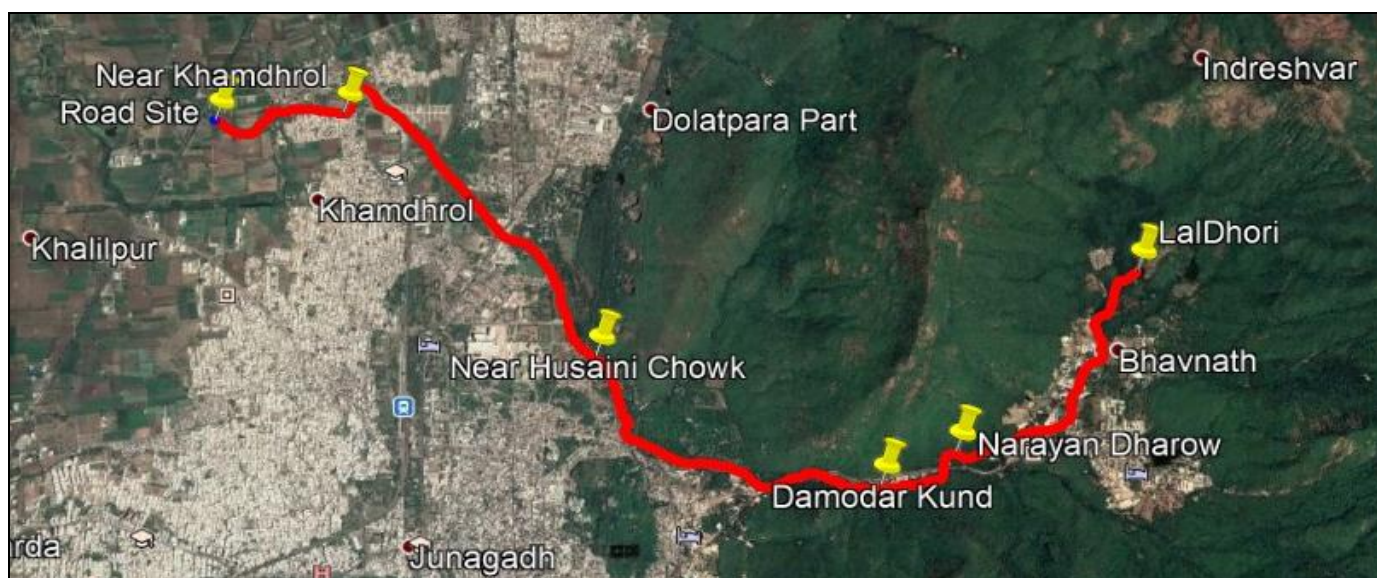


Fig.1 Satellite view of Sonrakh river and its Location

Sample Collection and Sampling Points:

The study area was Junagadh City, Junagadh, district of Gujarat state, India. Its geographical coordinates are Latitude 21.5222° North and Longitude 70.4579° East. Hence the study was designed to evaluate the parameters significant for portability purpose and the concentration in the water was compared with the standards prescribed by WHO (World Health Organization).[9] The six sampling points were selected from the river water samples which can represent the river. The GPS location of all the sampling points was noted down.

Time of field work and laboratory analysis:

Field work was conduct on one time, Laboratory analysis was carried out as the samples transported to laboratory. Two samples were collected from each point. Method of water sample collection: Point sampling Sample no: Two sampling points from one site and at each sampling

point sample was collect from Surface. Sample Volume: 1 to 2 lit sample for physicochemical parameter estimation collect at each sampling point. Container: Water sample was collected in the plastic Container or Glass bottle from the selected sampling point. explains the different experimental methods, how to determine the various parameters

Physico-chemical Characteristics:-

Field meter were checked and calibrated according to manufacturer’s specification. The variables analyzed were pH, temperature, Electrical Conductivity, total dissolved solids and turbidity acidity, alkalinity, calcium hardness, total hardness, chloride, potassium, fluoride, sodium. Standard method were followed in determining the variables (APHA 2014)[10], In situ measurement of some of the physicochemical parameters, pH, temperature, total dissolved solids and electrical conductivity were measured using Hanna Multiparametric meter (model 191300)

III. RESULTS

PHYSICAL PARAMETERS

pH

The result of pH values in different sampling location of Sonrakh river. The highest pH value recorded in Near Husaini Chowk[S4] is 9.2. The minimum value of pH is recorded in Narayan Dharow [S2]and Road side is 8.2. The rang of pH value are 8.2, 8.5, 8.6, 8.8 and 9.2

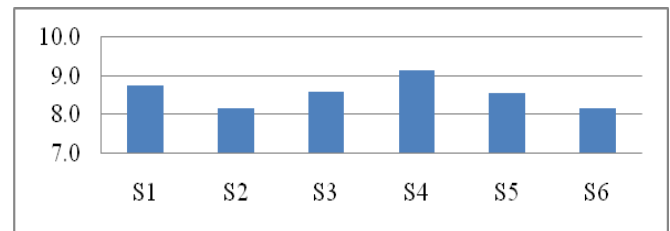


Fig. 2 Result showing of pH at six sites of Sonrakh River

Electronic Conductivity

The result of EC values in different sampling location of Sonrakh river. The highest Electronic Conductivity value recorded in Near Khamdhrol[S5] is 1.75 miliSimons/cm. The minimum value of Electronic Conductivity is recorded in Near Laldhori[S1] area is 1.00 miliSimons/cm. The rang of the EC value are 1.00, 1.51, 1.54, 1.63 and 1.75 miliSimons/cm.

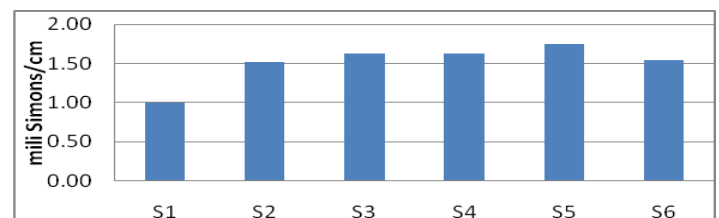


Fig. 3 Result showing of Electronic Conductivity at six sites of Sonrakh River

Acidity

The result of Acidity values in different sampling location of Sonrakh river is 77.3 mg/l. The highest Acidity value recorded in Road side[S6] is 96.0 mg/l. The minimum value of Acidity is recorded in Near HusainiChowk[S4] is 55.0 mg/l. The rang of the Acidity value are 83.3, 70.0, 78.0, 55.3, 81.3 and 96.0

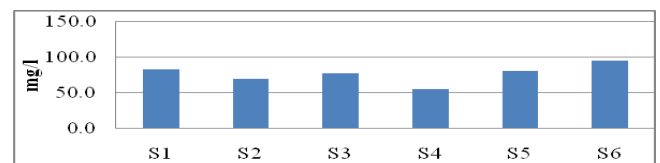


Fig. 4 Result showing of Acidity at six sites of Sonrakh River

Alkalinity

The result of Alkalinity values in different sampling location of Sonrakh River is 138.2 mg/l. The highest Alkalinity value recorded in Near HusainiChowk[S4] is 218.7 mg/l. The minimum value of Alkalinity is recorded in Near Narayan Dharow[S2] and Road side is 109.3 mg/l. The rang of Alkalinity value are 107.33, 109.33, 133.33, 218.67, 151.33 and 109.33

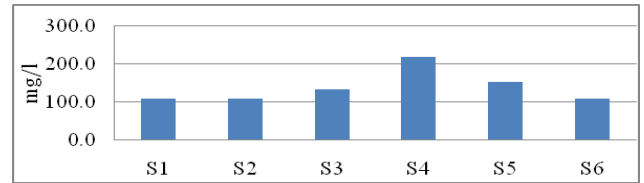


Fig. 5 Result showing of Alkalinity at six sites of Sonrakh River

Turbidity (NTU)

The Average result of Turbidity values in different sampling location of Sonrakh River is 0.068 NTU. The highest Turbidity value recorded in Near HusainiChowk[S4] is 0.075 NTU. The minimum value of Turbidity is recorded in Road side[S6] is 0.060 NTU. The rang of the Turbidity value 0.066, 0.061, 0.074, 0.075, 0.072 and 0.060

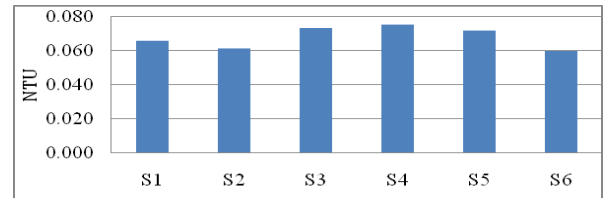


Fig. 6 Result showing of Turbidity at six sites of Sonrakh River

Total Hardness

The Average result of Total Hardness values in different sampling location of Sonrakh River is 222.4 mg/l. The highest Total Hardness value recorded in Near Khamdhrol[S5] is 295.5 mg/l. The minimum value of Total Hardness is recorded in Laldhori[S1] is 148.5 mg/l. The Rang of the Total Hardness value are 148.5, 153.0, 177.3, 272.1, 295.5 and 288.0.

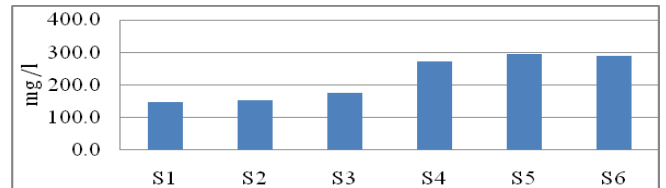


Fig. 7 Result showing of Total Hardness at six sites of Sonrakh River

Total Dissolve Solid

The Average result of Total Dissolve Solid values in different sampling location of Sonrakh River is 848.7 mg/l. The highest Total Dissolve Solid value recorded in Road side[S6] is 1076.0 mg/l. The minimum value of Total Dissolve Solid is recorded in Laldhori[S1] is 594.0 mg/l. The Rang of the Total Dissolve Solid value are 594.0, 690.0, 1004.0, 914.0, 814.0 and 1076.0

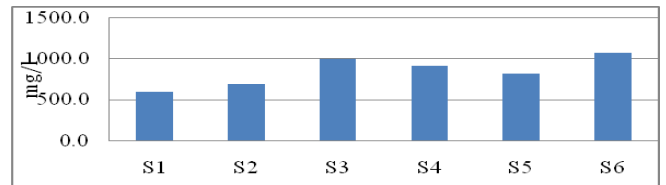


Fig. 8 Result showing of Total Dissolve Solid at six sites of Sonrakh River

IV. RESULT OF NUTRIENT PARAMETERS

Calcium

The Average result of Calcium Hardness values in different sampling location of Sonrakh River is 149.0 mg/l. The highest Calcium Hardness value recorded in Near HusainiChowk[S4] is 212.7 mg/l. The minimum value of Calcium Hardness is recorded in Narayan Dharow is[S2] 89.3 mg/l. The Rang of the Calcium Hardness value are 126.7, 89.3, 144.7, 212.7, 153.3 and 167.3

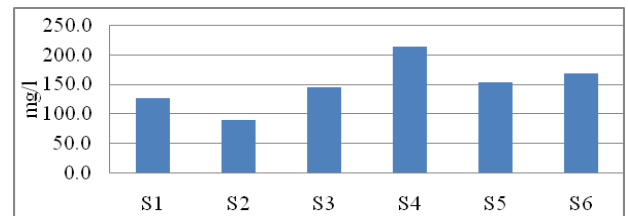


Fig. 8 Result showing of Calcium at six sites of Sonrakh River

Magnesium

The Average result of Magnesium values in different sampling location of Sonrakh River is 73.4 mg/l. The highest Magnesium value recorded in Near Khamdhrol[S5] is 142.1 mg/l. The minimum value of Magnesium is recorded in Laldhori[S1] is 21.8 mg/l. The rang of the Magnesium value are 21.8, 63.7, 32.6, 59.4, 142.1 and 120.7

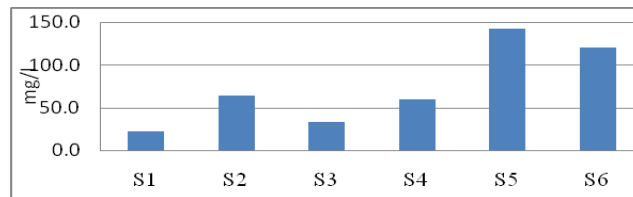


Fig. 9 Result showing of Magnesium at six sites of Sonrakh River

Chloride

The Average result of Chloride values in different sampling location of Sonrakh River is 100.8 mg/l. The highest Chloride value recorded in HusainiChowk[S4] is 138.5 mg/l. The minimum value of Chloride is recorded in Laldhori[S1] is 65.5 mg/l. The rang of the Chloride value are 65.5, 80.3, 114.4, 138.5, 106.2 and 100.1

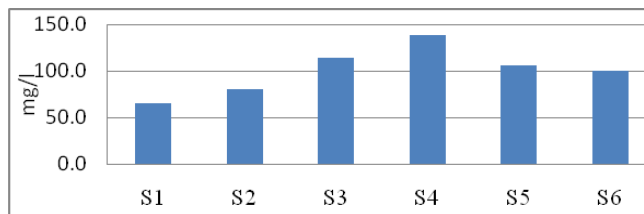


Fig. 10 Result showing of Chloride at six sites of Sonrakh River

Potassium

The Average result of Potassium values in different sampling location of Sonrakh River is 0.283 mg/l. The highest Potassium value recorded in HusainiChowk[S4] is 0.391 mg/l. The minimum value of Potassium is recorded in Narayan Dharow[S2] is 0.155mg/l. The rang of the Potassium value are 0.203, 0.155, 0.187, 0.391, 0.385 and 0.374

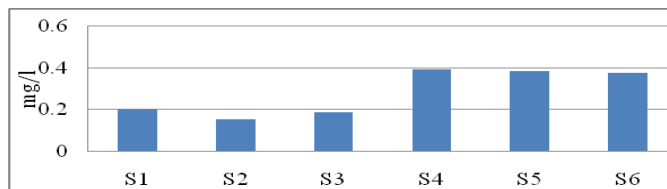


Fig. 11 Result showing of Potassium at six sites of Sonrakh River

Fluoride

The Average result of Fluoride values in different sampling location of Sonrakh River is 0.412 mg/l. The highest Fluoride value recorded in HusainiChowk[S4] is 0.520. The minimum value of Fluoride is recorded in Laldhori[S1] is 0.247 mg/l. The rang of the Fluoride value are 0.247, 0.260, 0.440, 0.520, 0.500 and 0.507

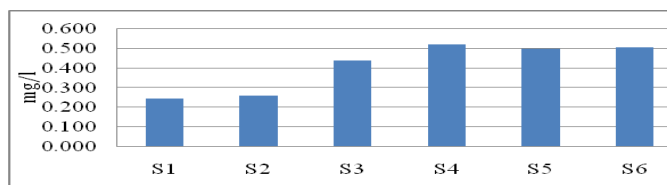


Fig.12 Result showing of Fluoride at six sites of Sonrakh River

Sodium

The Average result of Sodium values in different sampling location of Sonrakh River is 10.753 mg/l. The highest Sodium value recorded in Near Khamdhrol [S5] is 13.36 mg/l. The minimum value of Sodium is recorded in Laldhori[S1] is 3.53 mg/l. The rang of the Sodium value are 3.53, 8.82, 12.22, 13.25, 13.36 and 13.34

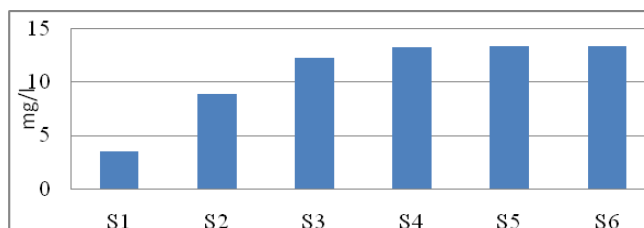


Fig. 13 Result showing of Sodium at six sites of Sonrakh River

V. DISCUSSION

Amounts of physical parameters and Nutrient values were present below than WHO recommended level Physical Parameter of various location of Sonrakh river and its location are Laldhori's parameter comparison pH 8.8, EC 1.00 mS/cm, Acidity 83.3 mg/l, Alkalinity 107.3 mg/l, Turbidity 0.066 NTU, Total Dissolve Solid, 594.0 mg/l, Total Hardness, 148.5 mg/l which are highest in the all location., In Nutrient parameter Calcium 126.7 mg/l, chloride 65.5, Magnesium 21.8 mg/l, which is the lowest in the all locations., potassium 0.203 mg/l, fluoride 0.247 mg/l, sodium 3.53 mg/l which are the lowest in the all location. Study the water samples were collected from pre-selected sampling stations during January to June 2011 and important physico-chemical parameters such as temperature, turbidity, conductivity, pH, total alkalinity, DO, BOD, COD, chloride, total hardness, phosphate, Nitrate-N, Nitrite-N, ammonia, sodium and potassium were analyzed.[19] Narayan Dharow location's parameter comparison pH 8.2, EC 8.2 mS/cm, calcium 89.3 mg/l, Potassium 0.155 mg/l in lowest values in this location, Acidity 70.0 mg/l, Alkalinity 109.33 mg/l, Turbidity 0.061 NTU, Total Dissolve Solid, 690.0 mg/l, Total Hardness, 153.0 mg/l In Nutrient parameter Chloride 80.3 mg/l, Magnesium 63.7 mg/l, Fluoride 0.260 mg/l, Sodium 8.82 mg/l [20] Damodar Kund location's Physico-Chemical and Nutrient parameter are pH, 8.6, EC 1.63 mS/cm, Acidity 78.0 mg/l, Alkalinity 133.3 mg/l, Turbidity 0.074 NTU, Total Dissolve Solid, 1004.0 mg/l, Total Hardness, 177.3 mg/l In Nutrient parameter Calcium 144.7 mg/l, Chloride 114.4 mg/l, Magnesium 32.6 mg/l, Potassium 0.187 mg/l, Fluoride 0.440 mg/l, Sodium 12.22 mg/l.[21]. studied that the variation in physico-chemical parameters such as temperatures, pH, transparency, total alkalinity, total hardness, chloride content and dissolved oxygen. Husainichowk location's physicochemical and nutrient parameters are pH, 9.2 highest in all location, EC 1.63 mS/cm, Acidity 55.3 lowest in all location mg/l, Alkalinity 218.7 mg/l highest in all location, Turbidity 0.075 NTU Highest in all locations, Total Dissolve Solid, 914.0 mg/l, Total Hardness, 272.1 mg/l In Nutrient parameter Calcium 212.7 mg/l Highest in all locations, Chloride 138.5 mg/l, Highest in all locations Magnesium 59.4 mg/l, Potassium 0.391 mg/l Highest in all locations, Fluoride 0.520 mg/l, Sodium 13.25 mg/l. Comparison of the measured parameters and the metal concentration with the water quality index shows that the water quality of Isykli Lake can be accepted as first grade irrigated water. The minimum and maximum values of the analytical results are all physic-chemical parameters. While the values of pH, total dissolved solids, hardness, calcium, magnesium, chloride, sulfate, sodium, potassium and nitrate agreed with the standards, those of organic matter, phosphate, ammonia nitrogen and nitrite were observed to exceed the standards [22] Near Khamdhrol location's Physicochemical and Nutrient parameters are pH

8.5 , EC 1.75 mS/cm, Acidity 81.3 mg/l, Alkalinity 151.3 mg/l, Turbidity 0.072 NTU, Total Dissolve Solid, 814.0 mg/l, Total Hardness, 295.5 mg/l Highest in all locations In Nutrient parameter Calcium 153.3 mg/l, Chloride 106.2 mg/l, Magnesium 142.1 mg/l Highest in all locations, Potassium 0.385 mg/l, Fluoride 0.500 mg/l, Sodium 13.36 mg/l (WHO) The water quality and levels of some trace metals in water and sediments of the Kpeshie Lagoon located in Accra, Ghana were studied in March, 2009. Water and sediment samples of the lagoon were analyzed for various parameters. The water quality parameters included all types of Physicochemical and Heavy metals also [23]. Near Road Side location's physicochemical parameters are pH 8.2 Lowest in all location, EC 1.54 mS/cm Lowest in all location, Acidity 96.0 mg/l Highest in all location, Alkalinity 109.3 mg/l, Turbidity 0.060 NTU, Total Dissolve Solid, 1076.0 mg/l, Total Hardness 288.0 mg/l, In Nutrient parameter Calcium 167.3 mg/l, Chloride 100.1 mg/l, Magnesium 120.7 mg/l, Potassium 0.374 mg/l, Fluoride 0.507 mg/l, Sodium 13.34 mg/l. The quality parameters determined for sources are conclude that the Narmada river water at Rajghat, Barwani (S-I) and Khalghat quite within the acceptable range and shows that the overall quality of water is suitable and safe for domestic and irrigation purposes.[24] In these study investigation of the all parameters of water samples varied.[25] which is quite normal and within the range of prescribed by Bureau of Indian Standards.[26]

VI. CONCLUSION

At six different locations of Sonrakh River originating from Girnar hills of Junagadh in Gujarat, which is a major source of water used in drinking and irrigation by approximately eight to nine villages. By analyzing different nutrient parameters present in water showed that the hardness due to calcium and magnesium were more compare to that of other mineral ions. This may be due to the domestic utility by the local residential population. Overall conclusions of all the mineral ions studied during the present work were within the permissible limits.

VII. ACKNOWLEDGMENT

Authors are thank full to the Principal of Bahauddin Science College and Bhakta Kavi Narsinh Mehta University Junagadh, for using of Laboratory and Instrumentation facilities.

REFERENCES

- [1]. Gurunathan, A. Shanmugam, C.R, (2006): Customary Rights and their Relevance in Modern Tank Management: Select Cases in Tamil Nadu, Paper prepared for the workshop entitled 'Water, Law and the Commons' organized in Delhi from 8 to 10

- December 2006 by the International Environmental Law Research Centre (ILERC).
- [2]. S.B. Jannalagada and G. Mhere (2001). *Water Res*, 35, Page 2371-2376.
- [3]. Mathew Kashy and T. Vasudwan Nayer (1999), *Water quality aspects of rivers Pambo*, Pollution Research 18 (4), Page 501-510.
- [4]. D.N. Saksena, R.K. Garge and RJ Rao (2008), *Journal of Environmental Biology*, 29 (5), Page 710.
- [5]. R.K. Trivedy; and P K Goel, (1986) Environmental Publication, Karad, Maharashtra.
- [6]. S. Rao, (1993) *Fresh Water Molluscs of Indian Recent Advances in Fresh Water*, Anmol Publications Pvt. Ltd. New Delhi, Page. 4752.
- [7]. S. Patil; and J.M. Patwari (2003), *J. Aquatic Biology*, Vol. 18(2), Page 85-86.
- [8]. A. Shayestehfar; M. Soleimani; S.N. Mousavi; and F. Shirazi, (2008) *Iran Journal of Environmental Biology*, 29(5), Page 715-720.
- [9]. World Health Organization, *International Standard for drinking water*. Geneva, 1992.
- [10]. American Public Health Association, *Standard methods for examination of water and waste water 21st ED* Washington DC. 2014.
- [11]. Khwaja Salahuddin, Soni Virendra, Visavadia Manish, Gosai Chirag and Syed Mohammad Zofair. *Limnological studies of Narsinh Mehta Lake of Junagadh District in Gujarat, India.*, International Research journal of Environmental Sciences. Vol. 2(5), 9-16, May (2013)
- [12]. Tambekar pratiksha, Pravin p morey, Batra rj, Weginwar rg. *Physico-chemical parameter evaluation of water quality around chandrapur district Maharashtra, India*, *Journal of Chemical and Pharmaceutical Research* 2013; 5(5):27-36
- [13]. Suhas Vyas, Hetal Jadeja, Savan Tank, Vijay Ram. *Physico-Chemical Analysis of Soil and Water Wetland in Bhuj Taluka of Kachchh Region*, *Advances in Bioresearch* Vol 9 (2) March 2018: 73-80
- [14]. Sharma shailendra, solanki Cm, dhanvi sharma, zahoor pir. *Distribution and diversity of zooplanktons in Madhya Pradesh, India 2013*, *International Journal of Advanced Research* 2013; 1(1):16-21.
- [15]. Kumari minu, mudgal Lk, singh Ak. *Comparative Studies of Physico-Chemical Parameters of Two Reservoirs of Narmada River, MP, India* *Current World Environment* 2013; 8(3):473-478.
- [16]. Gadekar Mr, Gonte Rn, Paithankar Vk, Sangale Yb, Yeola Np. *Review on River Water Quality Designation*, *International Journal of Emerging Technology and Advanced Engineering*. 2012, 2(9)
- [17]. Malviya ashutosh, Diwakar S K, Sunanda, Choubey O N. *Chemical assessment of narmada river water at Hoshangabad city and Nemawar as navel of river in Central India*, *Oriental Journal of Chemistry* 2010; 26(1):319-323
- [18]. Jhaa Medha and Sanjay Tignathb, *Assessment and impacts of surface water environment in and around Jabalpur city, Madhya Pradesh, India*, *e-Journal Earth Science India* 2009; 2(II):111-116.
- [19]. Monika Dubey and N.C Ujjania *Water quality and pollution status of Tapi River, Gujarat, India*, *International Journal of Pure and Applied Zoology*, Vol. 1, Issue 3, pp: 261-266, 2013
- [20]. Chapman and hall, *Water Quality Assessment: A Guide of the use of Biota, Sediments and Water in Environmental Monitoring*. University Press, Cambridge, pp: 585.
- [21]. Salahuddin khwaja, Manish visavadia, Suresh gor, Chirag gosai, Virendra kumar Soni, Mohammad dilshad hussain. *Diel variations in limnological characteristics of Omkareshwar reservoir of Narmada river*, *Journal of Ecology and the Natural Environment, India* 2014; 6(1):12-24.
- [22]. Kara, Y., Kara, I. and Basaran, D. (2004) *Investigation of some physical and chemical parameters of water in the Lake Isykli in Denizli, Turkey*. *Int. J. Agri. and Biol.* 6(2), 275-277.
- [23]. Addo, M.A., Okley, G.M., Affum, H.A., Acquah, S., Gbadago, J. K., Senu, J.K. and Botwe, B.O. (2011) *Water Quality and Level of Some Heavy Metals in Water and Sediments of Kpeshie Lagoon, La-Accra, Ghana*. *Research J. Environ.and Earth Sci.* 3(5), 487-497.
- [24]. Barde v. s., piplode s., thakur v. and agrawal r. *physico-chemical evaluation of water quality of narmada river at barwani and khalghat, mp, india*. *international research journal of environment sciences* vol. 4(3), 12-16, march (2015)
- [25]. Poonam bhadja Ashokkumar Vaghela., *status of river water quality of Saurashtra, Gujarat, India*, *International journal of advanced biological research* Vol 3(2)2013 276-280.
- [26]. *Specification for drinking water*, Indian Standard Institution (Indian Bureau of standard) New Delhi.

AUTHORS PROFILE

I have completed my Doctorate in the field of Plant Sciences (Botany). Ph. D. Research work is emphasized on biodiversity, coastal flora, Physico-chemical and mineral composition of soil, water and plants, ground water analysis, effluent analysis.
