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EFFECT OF PHYSICOCHEMICAL FACTORS ON QUALITY OF RIVER WATER OF OZAT, ORIGIN NEAR PERIPHERAL AREA OF GIR NATIONAL PARK, GUJARAT, INDIA

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ABSTRACT

The water performs important natural capacities like supplement responses, groundwater revives, stream upkeep, improving the assistance of greenery, living space for fauna and give entertainment to individuals. Auxiliary changes in these mind-boggling and dynamic environments have a critical impact on its working. To survey these effects because of the waterway water study, the present investigation was attempted in the Ozat stream bowl. This is done through water quality investigation by systematic strategies. The water quality is impeded due to non-point and point wellspring of contamination. Ozat is one of the significant second-longest waterways and began close to the fringe zone of Gir in the Saurashtra district. Concentrate physicochemical investigation at ten distinct locales and streams like Up-Stream, Mid-Stream and Down Stream along with the Ozat waterway bowl from the year 2017 to 2018. The estimations of parameters were contrasted and natural models and explicitly surface water quality gauges according to WHO and IS 2296-1982. The locales situated in the major country region indicated moderate water quality and in conclusion station situated in a rustic zone close to the Middle Eastern Ocean. It was seen that the primary driver of weakening in water quality was because of the high anthropogenic exercises, the illicit release of sewage and mechanical gushing, and the absence of appropriate sanitation, unprotected waterway destinations and urban overflow. The investigation uncovered that there was a show to some area have exceptionally dirtied in the Ozat waterway and subsequently, preventive measures are required to keep away from further decay of the stream water quality.

Keywords: Physicochemical analysis, Ozat river, Streams, Observed, Peripheral area GIR

1. INTRODUCTION

Water For humans and modern for the development offices and bunches of prerequisites, water is viewed as the primary necessity. Increase of population and industrialization, the interest for the freshwater increments in the most recent decades. This interest satisfied by the waterways which give the water to human life and farming purposes. Because of the waste released from the exercises of anthropogenic and little and huge mechanical exercises, the nature of waterway water has exacerbated which influences humans just as stream oceanic life. As per World Wellbeing Association, Focal Contamination Control Board, Agency of Indian Standard, Indian Gathering of Medicinal Exploration, the water nature of about 70% of waterway water was sullied because of toxins in India and a portion of the stream water was unreasonably poor for human utilization. The Water Quality List for these examples ranges from 89.21 to 660.56.

The high estimation of WQI has been seen as chiefly from the higher estimations of Fe+, NO31-, TDS, all-out hardness, F−, HCO3-and Mn+ in the groundwater [1]. Evaluation of water quality uses different parameters (physicochemical and natural) and the unique [2]. Cauvery waterway was modestly dirtied, while, Kapila stream and at their conjunction site were seriously contaminated. Both Kapila and at their conjunction site go under a similar class (seriously contaminated) however the contamination heap of Kapila waterway was significantly more than the conversion site [3] contemplated that the primary driver of disintegration in water was because of the elevated level of exercises by the anthropogenic, unlawful release of sewage and mechanical emanating, absence of proper sanitation, unprotected stream bank locales, and urban overflow [4]. One methodology for assurance of the nature of stream water will be water quality record, saw as a proficient and helpful technique for evaluating the water quality [5].

Contamination of a waterway first influences its physicochemical qualities at that point deliberately demolishes the network, in this manner upsetting the sensitive nourishment web and is likewise unsafe to general wellbeing. Various employments of streams are genuinely weakened because of expanded contamination. Thusly, it has gotten critical to evaluate the quick water nature of waterways and to foresee future changes in water quality coming about because of the formative exercises in the area. This will help in giving early notice to downstream clients about the unfavorable states of the water. Such kind of work is being finished by limnologists and researchers everywhere throughout the world, so legitimate measures can be taken to improve the water quality for different purposes. Almost no work has been done on the water nature of waterway Sutlej [6-8]. Expanding issue of weakening of stream water quality to assess the creation limit [9]. India, numerous specialists, researchers have worked done on physicochemical and natural qualities of supplies and stream with standard procedure [10-13].

2. EXPERIMENTAL

2.1. Description of Study Area

The physicochemical examination was done in Ozat Stream, Gujarat, India. It is the biggest catchment region among the other whole watersheds inside the Gujarat state. It starts from one of the towns of Gorviyali in Visavadartaluka and releases legitimately into the Bedouin Ocean close to the Pata Town Porbandar region. The investigation zone stretches out between North scopes 21°10' to 22°40' and East longitudes 69°40' to 71°00'. Horticulture is the primary occupation in the territory. Groundwater and waterway water is the principle wellspring of the water system in the examination zone. The Waterway comprises of 4 tributaries: left half of the stream bowl associated through popatdi stream, Ambakhoi Stream. While the left half of the stream bowl associated through the uben waterway and Utavadi waterway. Three tributaries converged close the vanthalitaluka and travel towards the Porbandar area where it releases into the Middle Eastern Ocean.

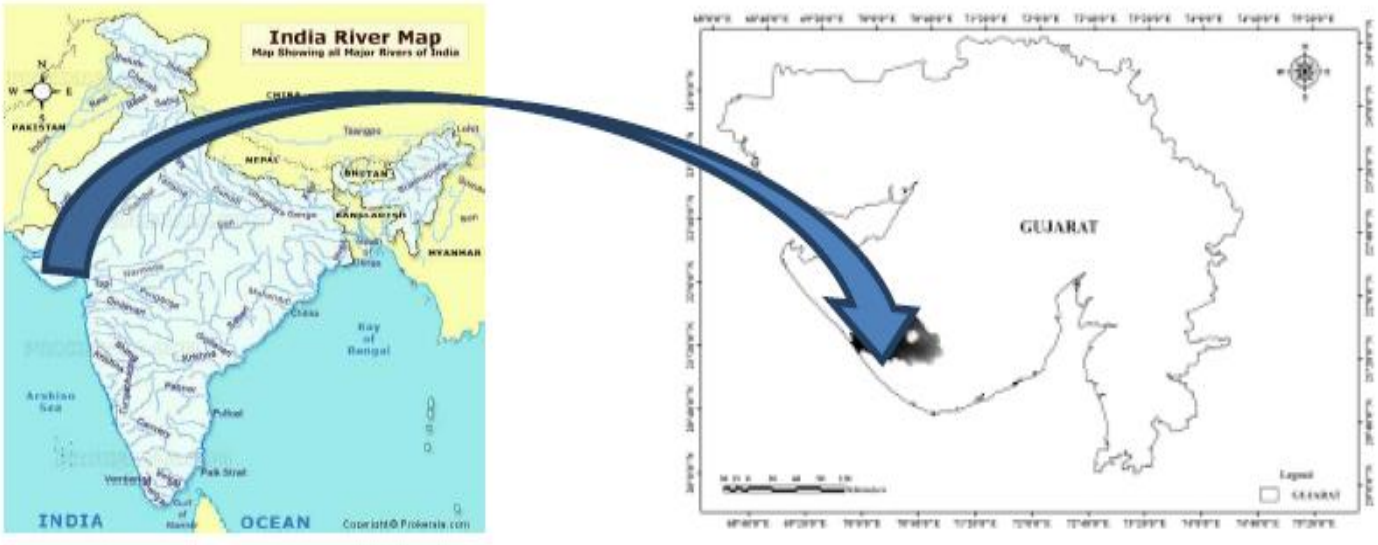

Fig. 1: A Photo of Ozat River and basin area

The examination zone was Junagadh, region of Gujarat state, India. Its topographical directions are latitude 21.52° North and Longitude 70.45° East. Subsequently the investigation was intended to assess the parameters huge for conveyability reason and the focus in the water was contrasted and the benchmarks endorsed by WHO [14]. The 14 examining focuses were chosen from the stream water tests which can state to the waterway. The GPS area of all the testing focuses was noted down.

2.2. Time of fieldwork and laboratory analysis

Fieldwork was conduct at one time, Laboratory analysis was carried out as the samples transported to the 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.

2.3. Physico-chemical Characteristics

Field meter was checked and calibrated according to the 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. The standard method was followed in determining the variables APHA 2014 21st Edition, [15]. 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).

3. RESULT AND DISCUSSION

This study of variations of winter, Pre Monsoon and Post Monsoon for the different physico-chemical parameters at various stations with mean wise and average discussion about various parameters in Ozat River sample location site in Pre-Monsoon, Post Monsoon and winter in 2017 data was recorded in stream wise respectively. The range of all streams like Up-Stream, Mid-Stream and Down Stream in the year of 2017, the result showed different sites was observed of winter 2017.

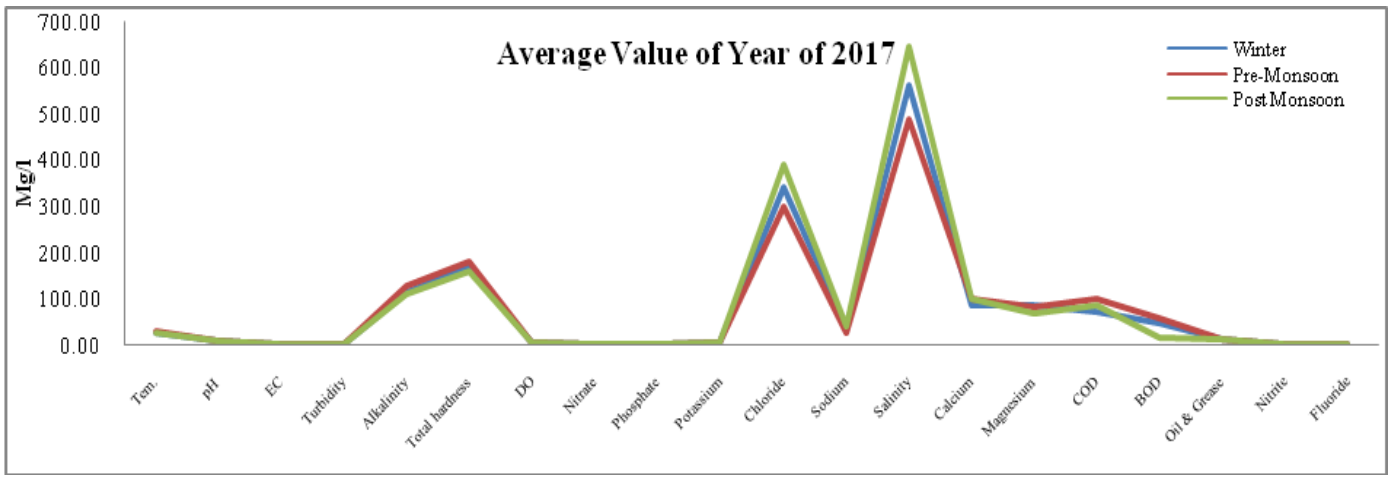

Fig. 2: Seasonal Values for 2017

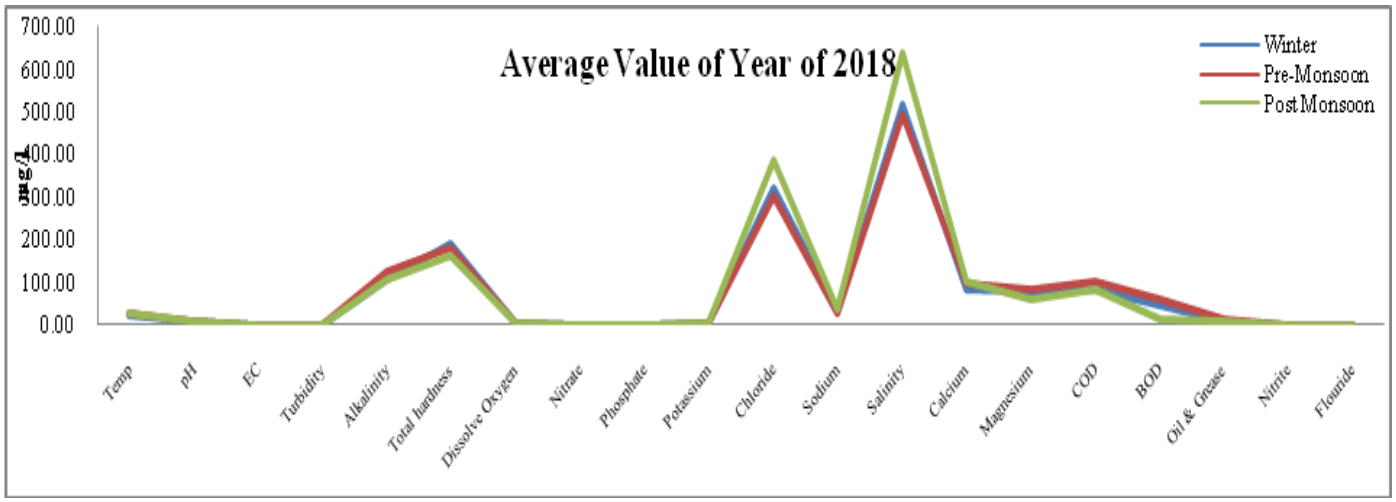

Fig. 3: Seasonal Values for 2018

The range of all streams like Up-Stream, Mid-Stream and Down Stream in the year of 2017, the result showed of winter season. Temperature was highest 29.67, and its range 23.67-27.33, pH was found highest 9.09 and its range 8.17-9.09, Electronic Conductivity highest of 1.50 mho/cm, 0.49-1.50 mho/cm, Turbidity highest 1.01 NTU its range found 0.23-1.01, Alkalinity highest result was 163.33 mg/l and its range

64.67-163.33, Total hardness values found highest 252.00 mg/l, which can be above the permissible limit,(WHO), its range was 106.67-252.00, Dissolved Oxygen result highest 7.34 mg/l and its range was 3.33-7.34 mg/l, Nitrate highest sample 1.62 mg/l and range 0.53-1.62 mg/l, Phosphate result highest was 0.47 mg/l, and range 0.11-0.47 mg/l, Potassium value are 6.52 mg/l, range found was 2.03-6.52 mg/l, Calcium were found highest 111.33 mg/l, its range 56.67-111.33 mg/l, Magnesium's outcome were 140.67 mg/l, range found of 48.00-140.67 mg/l, Chemical oxygen demand were found highest 200.81 mg/l, its range 15.9-200.81 mg/l, Biology oxygen demand result found highest 99.20 mg/l, which is above to permissible limits (WHO), its range were 25.07-99.20 mg/l, Oil and Grease highest values 24.12 mg/l, which can be above to permissible limits according to WHO, its range 6.20-24.12 mg/l, Nitrite highest value 3.94 mg/l which is above to permissible limit according to WHO, its range 0.62-3.94 mg/l, fluoride highest found 0.47 mg/l, its range 0.21-0.47 mg/l. these all parameters location were found Kotda village respectively in Up-Stream of the Ozat River. And other parameter were found Chloride highest result 1157.30 mg/l, which was more above to permissible limit according to WHO, its range 70.53-1157.30 mg/l, Sodium were highest found to be 91.27 mg/l, its range 10.13-91.27 mg/l, Salinity result were 0.47 mg/l, its range 0.21-0.47 mg/l. these all parameter were found in Pata village respectively in Down-Stream of Ozat River [16].

Table 1: Seasonal value of Ozat River 2017-18

	Average Value for Year of 2017			Average Value for Year of 2018		
Parameter	**Winter**	**Pre Monsoon**	**Post Monsoon**	**Winter**	**Pre Monsoon**	**Post Monsoon**
Temperature	24.78	28.33	26.33	25.22	29.11	26.33
pH	8.49	8.62	8.84	8.45	8.74	8.73
EC	0.88	1.05	0.97	0.88	1.08	0.97
Turbidity	0.51	0.41	0.44	0.5	0.44	0.45
Alkalinity	112.81	125.56	110.07	107.85	127.67	109.41
Total hardness	168.3	178.89	159.85	189.33	179.67	162.89
DO	4.66	5.14	5.35	4.58	5.18	5.32
Nitrate	0.95	1.08	1.46	0.99	1.08	1.5
Phosphate	0.26	0.28	0.31	0.25	0.26	0.31
Potassium	3.54	4.15	4	3.5	4.18	3.97
Chloride	339.49	297.49	391.27	323.09	304.23	386.82
Sodium	35.21	25.58	37.56	32.74	26.24	37.42
Salinity	560.15	488.13	645.59	516.85	494.11	638.25
Calcium	84.3	96.89	98.59	85.63	97.67	102.67
Magnesium	84	82	67.63	81.33	82	60.22
COD	70.86	97.76	83.01	81.74	102.15	83.67
BOD	46.93	55.91	13.81	48.89	61.42	14.16
Oil & Grease	10.8	12.47	9.53	10.78	13.35	9.65
Nitrite	1.39	1.72	1.68	1.39	1.81	1.69
Fluoride	0.31	0.33	0.33	0.31	0.34	0.34

The range of all streams like Up-Stream, Mid-Stream and Down Stream in the year of 2017, the result showed of Pre-Monsoon season. Temperature was highest 27.33, and its range27.33-29.67, pH range observed highest 8.98 and its range 8.35-8.98, Electronic Conductivity highest of 1.72 mho/cm, 0.59-1.72 mho/cm, Turbidity highest 0.77 NTU its range found 0.22-0.77, Alkalinity highest result was 177.33 mg/l and its range 74.00-177.33 mg/l, Total hardness values found highest 264.00 mg/l, which can be above the permissible limit,(WHO),its range was 114.67-

264.67 mg/l, Dissolved Oxygen result highest 7.83 mg/l and itsrange was 3.48-7.83 mg/l, Nitrate highest sample 1.97 mg/l and range 0.58-1.97mg/l, Phosphate result highest was 0.54 mg/l, and range 0.16-0.54 mg/l, Potassium value are 6.81 mg/l, range found was 2.54-6.81 mg/l, Calcium were found highest 136.33 mg/l, its range 70.00-136.33 mg/l, Magnesium's outcome were 128.00 mg/l, range found of 21.33-128.00 mg/l, Chemical oxygen demand were found highest 211.25 mg/l, its range 38.77-211.25 mg/l, Biology oxygen demand result found highest 101.87 mg/l, which is above to permissible limits (WHO), its range were 27.73-101.87 mg/l, Oil and Grease highest values 24.68 mg/l, which can be above to permissible limits according to WHO, its range 6.84-24.68mg/l, Nitrite highest value 3.97 mg/l which is above to permissible limit according to WHO, its range 0.66-3.97 mg/l, fluoride highest found 0.49 mg/l, its range 0.21-0.49 mg/l, Chloride highest result 749.29 mg/l, which was more above to permissible limit according to WHO, its range 82.36-749.29 mg/l, Sodium were highest found to be 49.12 mg/l, its range 11.69-49.12 mg/l, Salinity result were 1228.51 mg/l, its range 134.33-1228.51 mg/l. these all parameters location were found Kotda village, Up-Stream of the Ozat River [17].

The range of all streams like Up-Stream, Mid-Stream and Down Stream in the year of 2017, the result showed of Post-Monsoon season.Temperature was highest 35.00, and its range 23.33-35.00, pH range observed highest 9.25 and its range 8.63-9.25,Turbidity highest 0.77 NTU its range found 0.17-0.77, Alkalinity highest result was 142.67 mg/l and its range 86.67-142.67 mg/l, Total hardness values found highest 215.33 mg/l, which can be above the permissible limit,(WHO), its range was 124.67-215.33 mg/l, Dissolved Oxygen result highest 7.49 mg/l and its range was 3.61-7.49 mg/l, Nitrate highest sample 2.94 mg/l and range 0.71-2.94 mg/l, Phosphate result highest was 0.62 mg/l, and range 0.11-0.62 mg/l, Potassium value are 7.15 mg/l, range found was 2.56-7.15 mg/l, Chemical oxygen demand were found highest 261.95 mg/l, which is above to permissible limits (WHO), its range 13.92-261.95 mg/l, Biology oxygen demand result found highest 41.07 mg/l, which is above to permissible limits (WHO), its range were 4.80-41.07 mg/l, Oil and Grease highest values 15.44 mg/l, which can be above to permissible limits according to WHO, its range 5.36-15.44 mg/l, Nitrite highest value 4.14 mg/l which is above to permissible limit according to WHO, its range 0.77-4.14 mg/l, fluoride highest found 0.51 mg/l, its range 0.20-0.51 mg/l, these all parameters location were found Kotda village, Up-Stream of the Ozat River [18]. Electronic Conductivity highest of 1.55 mho/cm, 0.59-1.55 mho/cm, Chloride highest result 1378.16 mg/l, which was more above to permissible limit according to WHO, its range 89.46-1378.16 mg/l, Sodium were highest found to be 98.52 mg/l, its range 10.82-98.52 mg/l, Salinity result were 2273.96 mg/l, its range 147.61-2273.96 mg/l. Calcium were found highest 126.00 mg/l, its range 80.67-126.00 mg/l, Magnesium's outcome were 100.67 mg/l, range found of 41.33-100.67 mg/l, these all parameters location were found Pata village near Arabian sea, Down-Stream of the Ozat River [19].

The range of all streams like Up-Stream, Mid-Stream and Down Stream in the year of 2018, the result showed of winter season. Temperature was highest 27.33, and its range 22.67-27.33, pH was found highest 8.92 and its range 8.02-8.92, Electronic Conductivity highest of 1.51 mho/cm, 0.47-1.51 mho/cm, Turbidity highest 0.99 NTU its range found 0.21-0.99, Alkalinity highest result was 163.33 mg/l and its range 63.33-163.33, Total hardness values found highest 233.00 mg/l, which can be above the permissible limit,(WHO), its range was 110.21-233.00 mg/l, Dissolved Oxygen result highest 7.13mg/l and its range was 3.33-7.13mg/l, Nitrate highest sample 1.87 mg/l and range 0.56-1.87 mg/l, Phosphate result highest was 0.47 mg/l, and range 0.11-0.47 mg/l, Potassium value are 6.60 mg/l, range found was 2.05-6.60 mg/l, Calcium were found highest 116.00 mg/l, its range 50.00-116.00 mg/l, Magnesium's outcome were 126.67 mg/l, range found of 34.00-126.67 mg/l, Chemical oxygen demand were found highest 218.71 mg/l, its range 29.33-218.71 mg/l, Biology oxygen demand result found highest 104.53 mg/l, which is above to permissible limits (WHO), its range were 26.13-104.53 mg/l, Oil and Grease highest values 22.16 mg/l, which can be above to permissible limits according to WHO, its range 6.32-22.16 mg/l, Nitrite highest value 3.48 mg/l which is above to permissible limit according to WHO, its range 0.63-3.48 mg/l, fluoride highest found 0.46 mg/l, its range 0.23-0.46 mg/l. these all parameters location were found Kotda village respectively in Up-Stream of the Ozat River. And other parameter were found Chloride highest

result 1061.83 mg/l, which was more above to permissible limit according to WHO, its range 73.37-1061.83 mg/l, Sodium were highest found to be 88.46 mg/l, its range 10.40-88.46 mg/l, Salinity result were 1697.11 mg/l, its range 98.41-1697.11 mg/l. these all parameter were found in Pata village respectively in Down-Stream of Ozat River [20].

The range of all streams like Up-Stream, Mid-Stream and Down Stream in the year of 2017, the result showed of Pre-Monsoon season. Temperature was highest 31.33, and its range 27.67-31.33, pH range observed highest 8.96 and its range 8.57-8.96, Electronic Conductivity highest of 1.76 mho/cm, 0.61-1.76 mho/cm, Turbidity highest 0.85 NTU its range found 0.23-0.85, Alkalinity highest result was 176.67 mg/l and its range 74.67-176.67 mg/l, Total hardness values found highest 270.67 mg/l, which can be above the permissible limit,(WHO), its range was 110.67-270.67 mg/l, Dissolved Oxygen result highest 7.93mg/l and its range was 3.42-7.93 mg/l, Nitrate highest sample 1.98 mg/l and range 0.58-1.98 mg/l, Phosphate result highest was 0.42 mg/l, and range 0.17-0.42 mg/l, Potassium value are 6.86 mg/l, range found was 3.10-6.86 mg/l, Chloride highest result 773.14 mg/l, which was more above to permissible limit according to WHO, its range 85.67-773.14 mg/l, Sodium were highest found to be 51.44 mg/l, its range 11.72-51.44 mg/l, Salinity result were 1244.13 mg/l, its range 145.27-1244.13 mg/l, Calcium were found highest 136.67 mg/l, its range 73.33-136.67 mg/l, Magnesium's outcome were 134.00 mg/l, range found of 22.00-134.00 mg/l, Chemical oxygen demand were found highest 214.24 mg/l, its range 41.26-214.24 mg/l, Biology oxygen demand result found highest 109.87 mg/l, which is above to permissible limits (WHO), its range were 28.80-109.87 mg/l, Oil and Grease highest values 26.72 mg/l, which can be above to permissible limits according to WHO, its range 7.08-26.72 mg/l, Nitrite highest value 4.12 mg/l which is above to permissible limit according to WHO, its range 0.69-4.12 mg/l, fluoride highest found 0.50 mg/l, its range 0.23-0.50 mg/l, these all parameters location were found Kotda village, Up-Stream of the Ozat River [21].

The range of all streams like Up-Stream, Mid-Stream and Down Stream in the year of 2017, the result showed of Post-Monsoon season. Temperature was highest 35.33, and its range 23.33-35.33, pH range observed highest 9.23 and its range 8.62-9.23, Turbidity highest 0.77 NTU its range found 0.19-0.77, Alkalinity highest result was 145.33 mg/l and its range 87.33-145.33 mg/l, Total hardness values found highest 225.33 mg/l, which can be above the permissible limit,(WHO), its range was 125.33-225.33 mg/l, Dissolved Oxygen result highest 7.51 mg/l and its range was 3.78-7.51 mg/l, Nitrate highest sample 2.95 mg/l and range 0.73-2.95 mg/l, Phosphate result highest was 0.62 mg/l, and range 0.11-0.62 mg/l, Potassium value are 7.06 mg/l, range found was 2.75-7.06 mg/l, Magnesium result found were 114.67 mg/l, range found of 40.00-114.67 mg/l, Chemical oxygen demand were found highest 260.96 mg/l, which is above to permissible limits (WHO), its range 12.43-260.96 mg/l, Biology oxygen demand result found highest 39.47 mg/l, which is above to permissible limits (WHO), its range were 5.33-39.47 mg/l, Oil and Grease highest values 15.48 mg/l, which can be above to permissible limits according to WHO, its range 6.40-15.48 mg/l, Nitrite highest value 4.14 mg/l which is above to permissible limit according to WHO, its range 0.78-4.14 mg/l, fluoride highest found 0.51 mg/l, its range 0.24-0.47 mg/l, these all parameters location were found Kotda village, Up-Stream of the Ozat River [22]. Electronic Conductivity highest of 1.55 mho/cm, 0.62-1.55 mho/cm, Chloride highest result 1342.37 mg/l, which was more above to permissible limit according to WHO, its range 90.88-1342.37 mg/l, Sodium were highest found to be 97.22 mg/l, its range 10.52-97.22mg/l, Salinity result were 2214.92 mg/l, its range 149.95-2214.92 mg/l. Calcium were found highest 130.67 mg/l, its range 84.67-130.67 mg/l, these all parameters location were found Pata village near Arabian sea, Down-Stream of the Ozat River [23].

4. CONCLUSION

'Ozat River in the region of Saurashtra' is considered to be main water resources of this region and second longest river in the Saurashtra Zone. The populations depending on the water of 'Ozat' River utilizes in various aspects of its day to day living 'viz.' Drinking, Irrigation, and other domestics purposes, this water main significance of the river water. Major factor of its changes in its quality may be due to anthropogenic activities prevailing in the nearby region of 'Ozat' River. As stated earlier the major purpose of the study was to highlight the status of the River 'Ozat' which is one of the water sources of the region. We noticed that various parameters were changing with seasonal effects

as well as based on the location viz. Up-stream, Mid-stream, and Downstream. The pH, Alkalinity, Total Hardness, DO, COD, BOD, nitrate, nitrite and other parameters at some of the sites were under the permissible limit in Up-stream and Mid-stream, The River is not much polluted in Mid-Stream and Down-Stream due to the discharge of domestic waste through several drains. The increase in value of total hardness, chloride, magnesium, chemical oxygen demand, biological oxygen demand, oil & grease, and nitrite were also due to domestic and small 'washing ghat' effluent near Kotda village discharges in Up-stream and potassium and phosphate are moderate increasing in Down-stream the last location Sarama and Pata village may be due to runoff or leaching of agricultural waste or pesticides water as well as also anthropogenic activities near this area. At the location named Sarama and Pata, the parameters which were analyzed were observed to be slightly more than the permissible limits, hence the water may be categorized under the "being polluted" category which can be monitored by taking steps for resolving the polluted River water. At this particular location as the parameter showed the values above the permissible limit, therefore it is not appropriate to utilize the River water for domestic, irrigation purposes. Also noticed that at Sarama and pata site concentration of chloride and salinity found to be near desirable limits, and is the verge of getting unsuitable for the drinking and irrigation purposes. The reason may be close to the Arabian Sea.

5. ACKNOWLEDGEMENT

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