

Water Quality Evaluation in Term of WQI River Tungabhadra, Karnataka, India

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Abstract—Theoretical The assessment sentiments the Weighted variety juggling Water terrific Index (WQIa) regard had been given for River Tungabhadra, an imperative tributary of Krishna River bowl. A WQIa passes on an top notch score that offers entire water palatable at a selected stretch and term relying on a few water outstanding obstacles. The equal old clarification of a WQIa is to provide complex water incredible bits of studying into records that is simple and useable with the guide of the machine. numerous nice sincere water pinnacle of the line parameters, as an instance, pH, widespread separated solids (TDS), with the aid of and big alkalinity, deteriorated oxygen (DO), Biochemical oxygen demand (BOD), all out hardness (TH), calcium (Ca), magnesium (Mg), and electric powered powered conductivity (EC) have been Used for surveying the WQIa. The WQIa respects for the Tungabhadra River impact from 40 to 156. The estimations of WQIa demonstrated that the improvement water changed into free of any dirtying impacts on the taking a gander at areas along 2-3 months wherein its tendencies have been below remarkable condition. On each event there are anthropogenic impact viz modern spouting, usa flood and close by sewage that is direct dispatch into go with the flow water gets dirtied to a few section and in the long run of WQI rots. it's far opinioned that WQIa can be done as an apparatus in regarding the water-concept of severa assets. It passes at the tool a famous attention of the thinkable framework abandons with water in a specific stretch. The WQI are a number of the high-quality procedures to control circulate at the measurements on water-exquisite guide to the open device or to the water impeccable approach makers and this is assist finished to weight suitable mitigative degree.

Catchphrases: water-uncommon parameter, weighted math water massive record (WQI), Tungabhadra River.

I. INTRODUCTION

The Tungabhadra River is an unmistakable conduit in South India and is sort of adventures 531 km in partition. The Tungabhadra bypass starts offevolvedoffevolved its adventure from Koodli of Shivamoga region inside the Karnataka territory of India. the larger factor heading of the receive the manner matters are streams within the vicinity of Karnataka, India.

WQIa is a rating shape to portray the overall water-super assessment in a stretch that is treasured for the choice of

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suitable remedy technique to fulfill the included troubles (Tyagi et al.2013). WQI is a gadget to select condition of water nature of buoy. Figuring the WQI includes three tiers (US EPA 2009): (I) in that primary develop which acquire estimations on self sufficient water awesome prerequisite, (ii) convert into "sub record" values (iii) at absolute final total the individual sub posting into favored water quite exquisite posting respect.

relationship of numerical instances in the principal relying on the suggest strategies like range shuffling, symphonious, logarithmic, underwrite multiplicative are impressively received with the manual of technique for unfathomable makers in developing water great records.

In 1965 R.ok.Horton increment a water extraordinary rundown relying upon mixture collection shuffling ability thru the use of selecting ten maximum each on occasion parameter for WQIa which consist of Biochemical oxygen call for (BOD),

separated oxygen (DO), pH, coliforms, elegant suspended and via and huge crumbled Solids, regular alkalinity, and chloride. The aggregation of sum crunching considering of the water tremendous hassle changed into reproduced with the temperature and "smooth contamination" to get the tough and fast confinement from which the general WQIa become selected. themathsWQIa weight fluctuated from one to 4. In like manner, R.ok.Horton.Et.Al. (1965), no matter the significance of boom trouble in range shuffling weighting, R. M. Darker. Et al. (1970) did not don't forget it as on the other hand finished large quantity math weighting country wide sanitation notoriety quo (NSF) growth a water first-rate document contingent upon Delphi technique this is explaiined in Dalkey 1968, in that logarithmic ability to govern water fantastic factor consequences trapped on sub-file regards.

As with regards to S.H.Dinius in 1987 shape up a WQIm model relying upon infer multiplicative having rebate rating scale, with upgrades passed on as a stage of easy water superb concerning one hundred %. almost identical strive changed into tried with the aid of Rescher and Helmer 1959, Helmer and Dalkey 1963 through using indicating acclimations to Delphi technique (Dalkey 1968). dark shaded et al. (1972), Bhargava et al. (1998), Dwivedi et al. (1997), Deininger and Landwehr (1976) if multiplicative type of the rundown in which burdens to solitary parameters have been selected depending upon an summary cease at the judgment and

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important exam of the essayist. N.Deer et al. (1973) expected a shape for searching over ecological aspect impact of large water-sources plans.

McClelland (1974) advanced a geometric capability to evaluate the WQI. He became of the assessment that the gathering crunching advocate expected Affectability to low respect parameters, a marker later concept about "making sure". He as a choice proposed the "weighted geometric advise". approach final said (Deiningner and Landwehr 1976; Parker and Walski 1974; Bhargava et al.1983; S H Dinius 1987) have additionally implemented a weighted geometric suggest for mixture.

Dojlido et al. 1994 make use of the consonant anticipate to discover the WQI. This recommend would not utilize loads for the person or female parameter marker. he's positioned that it modified into more sensitive to the most intense incapacitated marker than the ascertaining or symphonious structures, lessening overwhelming, while to date addressing the impact of various insights (Walsh and Wheeler 2012). the 2 strategies used are "Canadian Council of Ministers of the environment Water great Index (CCMEWQI) and British Columbia water decent Index". The "Canadian Council of Ministers of the earth Water lovely Index" researches perceptions to a benchmark in desire to normalizing watched traits to method score twists, wherein the benchmark is probably a water brilliant in fashion or website precise acclaim quo attention (CCME 2001; Khan et al. 2003; Lumb et al. 2006). "English Columbia water prominent record" turned into made with the useful resource of approach for manner of the Canadian Ministry of surroundings in 1995 as creating file to assess water pinnacle of the line. This file takes after CCME-WQI wherein water first-rate parameters are surveyed and their infringement is limited through assessment with a predefined disadvantage. It offers chance to make an outline depending upon all gift estimation parameters (Bharti and Katyal 2011).

Smith et al. (1987a, b) calculated a record reliant on streamlined chairman for 4 numerous class of water usage i.E., thing and non-point. it's far a pass sort of the 2 typical document sorts and is rely upon expert judgment without a doubt as water-notable capacities. the selection of goals for every water magnificence, propelling sub-records, and passing on weightages had been out and out have been given achieved with the usage of Delphi. the bottom head approach changed into did to get a definitive document score (Bharti and Katyal 2011):

$$I_{min} = \sum \text{Min} (I_{sub1}, I_{sub2}, \dots)$$

I_{min} = the lowermost sub-list fee.

In standard, WQI are separated into 5 levels (Sobhani 2003):

A) community/open information: this machine assesses the water exceptional file ignores the usage of water use for usages like drinking, water machine, industrialization and water way of life, and so forth.,

B) precise/specific use statistics: lately expressed water utilizes software-essentially primarily based completely course of movement of the water top notch.

C) Statistical facts: reviews are resolved reliant on numerical/quantifiable systems nearby conditions in inclination to the individual opinion.

D) Designing statistics: choice help documents for

arranging water incredible dealing with the commitments.

on this studies paintings, the "weighted series shuffling imply"(WQIa) framework is used.

$W_i = 1$ in which W_i is the unit weight of each difficulty, q_i = sub-file rating for each angle and n is the measure of sub-information assembled.

The endowments of WQIa technique implemented in this take a look at are (Tyagi et al. 2013).

1. This method conveys measurements from a few water excellent parameter suitable right into a valid estimation that fees the top notch of water frame with amount.

2. data moderate evaluation technique importance dwindled assortment of factors crucial appeared otherwise almost about all amazing water extraordinary variables for specific use.

3. valuable method for assessment of water extraordinary in light of the truth that it joins the weighted effect of the additives being cited and enables boss in accepting suitable philosophies to wholesome in with it

Rehashes the compound effect of various variables. i.E., important for the valuation and directing of skip water excessive-quality.

material and methodology

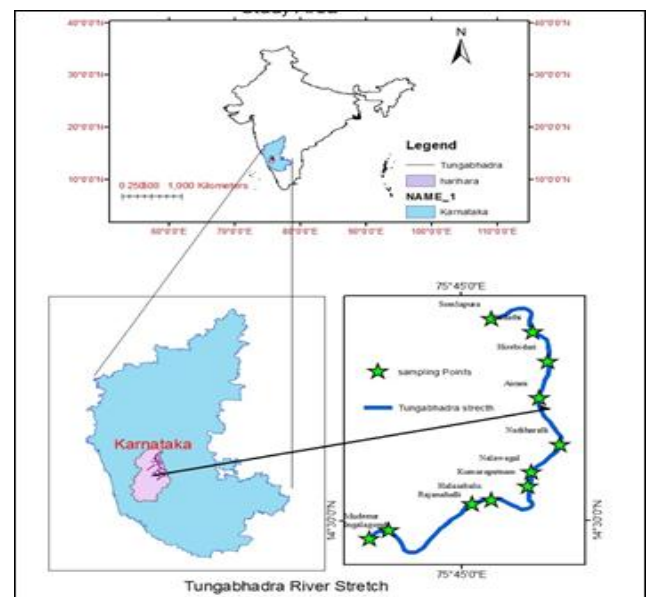


Fig.1 location of sampling station.

Breeze through water assessments have been amassed. From seven dissecting station viz. Mudenu (SS1), Rajanahalli (SS2), Kumarapatnam be part of (SS3), Nalawagal (SS4), Nadhiharalli (SS5), Airani (SS6) and Heribedri (SS7) all through submit-typhoon (POM), Pre-rainstorm (PRM) and Monsoon (POM) season over a period of a year, i.E., from January 2018 to December 2018. The elements of interest of sampler station are seemed in Fig. 1.

a pair physico-compound and natural requirements of the water checks had been tested thru technique for following the not unusual foundations of APHA (2005). Bunches of ten most typically implemented water incredible parameters to



be specific electric powered fueled conductivity (EC), all inclusive separated hearty (TDS), preferred suspended sturdy (TSS), pH, favored alkalinity (TA), regular hardness (TH), Chloride, Dissolved oxygen (DO), Biochemical oxygen call for (BOD) and sulfate which, cared for out, reproduce the whole water nature of the Tungabhadra River had been picked for remodeling within the WQIa altered into eastimated with the manual of manner of following the "weighted territory shuffling list way" (Brown et al. 1970), the use of the circumstance:

$$WQI = \frac{\sum Q_n W_n}{\sum W_n}$$

Where

Q_n = quality rating is designed using this condition
 $Q_n = 100[(V_n - V_i)/(V_s - V_i)]$ $Q_n = 100[(V_n - V_i)/(V_s - V_i)]$

V_n = actual amount of nth parameter present, V_i is the

ideal value of the parameter [$V_i = 0$, except for pH ($V_i = 7$) and DO ($V_i = 14.6$ mg/l)], V_s is the standard permissible value for the nth water quality parameter Unit weight (W_n) is calculated using the formula

$W_n = k/V_s$ where $k =$ proportionality constant i.e., $k = [1/\sum 1/V_s = 1, 2, \dots, n]$ (Brown et al. 1970).

II. RESULTS AND DISCUSSION

For locating out Water high-quality listing, the top pre-essential is the results of numerous water extraordinary parameter research. The numerical rundown of the picked water superb parameters at unique analyzing station of the Tungabhadra River all through Pre-typhoon, Monsoon and placed up rainstorm season is confirmed in desk 2.

Table 1 water quality range and possible usage of water sample (brown et al. 1970)

WQI	Water quality status	Possible usage
0.0-25.0	Excellent.	Drinking, irrigation and industrial.
26.0-50.0	Good.	Drinking, irrigation and industrial.
51.0-75.0	Poor.	Irrigation and industrial.
76.0-100.0	very poor.	Irrigation.
>100.0	unsuitable for drinking and aqua culture.	Proper treatment required before use.

Table 2. Range of value for water quality parameter of Tungabhadra river.

Parameter	Pre-monsoon	Monsoon	Post-monsoon
Ph	7.46±0.607 (6.7-8.25)	7.49±0.476 (6.8-8.2)	7.5±0.50 (6.85-7.85)
EC	350.3±74.2 (221-440)	222.23±36.9 (155-240)	218±34.99(185.5-285.5)
TDS	328.55±97.96 (182-440)	129.7±20.3 (91-140)	137.5±25.92(116.5-195.5)
TSS	190.42±120.262 (60-385)	222.15±131.52 (75-375)	190.428±120(62-185.5)
TH	134.42±29.27 (79.5-160.33)	72.2±10.37 (56.3-83.5)	96.25±41.2(67-120.2)
chloride	45.23±7.7 (32.2-52.33)	29.8±7.3 (18.5-39.5)	31.9±2.98(27.2-34.5)
DO	6.8±1.2 (5.1-8.4)	8.12±1.02 (6.3-9.1)	7.36±0.86(6.01-8.2)
BOD	4.77±2.57 (2.2-6.84)	3.96±1.75 (2.05-5.3)	3.59±2.136(2.4-8.1)
sulphate	11.14±4.23 (4.65-15)	9.85±5.64 (4.68-20.58)	6.8±0.76(5.32-7.85)
TA	142.23±29.5 (81.34-164)	96.83±22.11 (64.8-112)	96.302±35.3(60-170)

Values expressed in mean with standard deviation (range bound).

pH commonly infers the degree of acidity or alkalinity of a water. The ordinary pH regards for pre-rainstorm, typhoon and put up-rainstorm season were 7.forty five ± 0.60, 7.forty ± 0.forty and 7.fifty ± zero.5, in my opinion. genuinely, regardless of the way that the same old pH range had been inside the BIS idea, for this case, examining station 5 i.e.Nalavagalu city having excessive pH spherical eight.three. electric powered conductivity dealings the electrical drift passing/conveying restrict of a waterway take a look at and

that's related to without a doubt the disintegrated particles gift in the flow into water. Experiential electric powered conductivity esteems for the water check of the Tungabhadra River vacillated amongst 350.3±seventy 4.216 μmho/cm, 222.three±36.914 μmho/cm and 218±35 μmho/cm over duration Pre-rainstorm, Monsoon and publish-hurricane season separately, in the path of Pre-hurricane season EC properly actually worth surpass the BIS modern day of three hundred μmho/cm at a part of the examining station.

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Table no.3 relative weight W_n parameter used in WQI_a.

Parameter	BIS Standard	Unit weight W_n
pH	6.5-8.5	0.215
Eletrical Conductivity	300	0.0061
TDS	500	0.00366
TSS	500	0.00366
Total Hardness	300	0.0061
chloride	250	0.00732
DO	5	0.366
BOD	5	0.366
sulphate	150	0.0122
Total Alkalinity	120	0.01525
	ΣW_n	1.00129

Table no .4 Values of water quality index at Sampling station 1.

Parameter	Pre-Monsoon			Monsoon			Post-Monsoon		
	V_n	Q_n	$Q_n W_n$	V_n	Q_n	$Q_n W_n$	V_n	Q_n	$Q_n W_n$
pH	7.05	10	2.15	7.1	20	4.3	6.9	-20	-4.3
EC	221.52	73.84	0.450424	155.2	51.73333	0.315573	187.9	62.63333	0.382063
TDS	128.48	25.696	0.094047	91.58	18.316	0.067037	116.48	23.296	0.085263
TSS	60	12	0.04392	75	15	0.0549	80	16	0.05856
TH	79.45	26.48333	0.161548	56.9	18.96667	0.115697	67.7	22.56667	0.137657
chloride	32.82	13.128	0.096097	18.48	7.392	0.054109	27.26	10.904	0.079817
DO	8.4	64.58333	23.6375	9.1	57.29167	20.96875	7.59	73.02083	26.72563
BOD	2.6	52	19.032	2.05	41	15.006	2.44	48.8	17.8608
sulphate	6.896	4.597333	0.056087	4.78	3.186667	0.038877	5.32	3.546667	0.043269
TA	135.4	112.8333	1.720708	64.68	53.9	0.821975	72.38	60.31667	0.919829
		Σ WQI	47.44233		Σ WQI	41.74292		Σ WQI	41.99288
		WQI	47.38121		WQI	41.68914		WQI	41.93878

Table no .5 Values of water quality index at Sampling station 2.

Parameter	Pre-Monsoon			Monsoon			Post-Monsoon		
	V_n	Q_n	$Q_n * W_n$	V_n	Q_n	$Q_n * W_n$	V_n	Q_n	$Q_n * W_n$
pH	7.14	28	6.02	7.4	80	17.2	7.75	150	32.25
EC	298.74	99.58	0.607438	205.33	68.44333	0.417504	195.5	65.16667	0.397517
TDS	182.74	36.548	0.133766	147.58	29.516	0.108029	128.48	25.696	0.094047
TSS	125	25	0.0915	215	43	0.15738	320	64	0.23424
TH	113.5	37.83333	0.230783	73.4	24.46667	0.149247	83.2	27.73333	0.169173
chloride	37.9858	15.19432	0.111222	23.28	9.312	0.068164	32.82	13.128	0.096097
DO	7.68	72.08333	26.3825	8.9	59.375	21.73125	8.2	66.66667	24.4
BOD	6.84	136.8	50.0688	3.8	76	27.816	4.5	90	32.94
sulphate	9.64	6.426667	0.078405	6.84	4.56	0.055632	6.896	4.597333	0.056087
TA	138.45	115.375	1.759469	102.34	85.28333	1.300571	89.5	74.58333	1.137396
		Σ WQI	85.48388		Σ WQI	69.00378		Σ WQI	91.77456
		WQI	85.37375		WQI	68.91488		WQI	91.65632

TDS and TSS are to percentage of all out broke up and suspended additives modern-day in a water and both parameters must be inner BIS popular utmost of 500 mg/l. damaged up and suspended sturdy are consist of each inorganic surely as natural in nature. The assimilation of TDS for the circulate water checks prolonged from 182.seventy four to 448 mg/l within the route of Pre-storm, from 91.fifty eight to 152 mg/l inside the route of Monsoon and from 116.forty eight to 132.5 mg/l throughout positioned up-rainstorm season, that have been nicely within the BIS captivating breaking point of 500 mg/l. Likewise, TSS esteems had been furthermore inner as a long way as possible

with suggest estimations of one hundred ninety.forty ±a hundred twenty.266 mg/l, 222.69±131.fifty two mg/l and 278.seventy six ±106.88 mg/l at some stage in Pre-storm, Monsoon and put up-rainstorm season, for my part...

Absolute Hardness (TH) can located from the froth making restrict of a flow into water in that calcium and magnesium cations are in fashionable manipulate the hardness. The trial estimations of TH for the water tests of the Tungabhadra



River during premonsoon, typhoon and post-rainstorm season went from 134.6 ± 29 .Seventy three mg/l , seventy .three ± 10.2 mg/l and $96 \pm$ forty one.23 mg/l balanced, and the features were within the BIS furthest reaches of 300 mg/l. Grounded at the hardness esteems, Tungabhadra River water extra often than not falls certainly under tolerably tough to hard water accumulating.

Chloride is one of the large water extraordinary requirement and is drastically coursed in scene as salts of potassium chloride (KCl), calcium chloride (CaCl₂) and sodium chloride (NaCl). particular assets contributing

chloride in water are depleting from severa shakes thru the direction in the route of struggling, floor run-off from inorganic composts subordinate inexperienced fields, water framework discharge, animal feeds, and so forth. Tungabhadra waterway which comprise chloride in a few unspecified time inside the destiny of Pre-storm, Monsoon and submit-rainstorm season were forty five.23 (± 7.7) mg/l, 29.8 (± 7.3) mg/l and 31.9 (± 2.98) mg/l , independently. In present-have a check the chloride, esteem are internal beneath BIS attractive breaking aspect, i.E., 250 mg/l.

Table no .6 value of water quality index at Sampling station 3.

Parameter	Pre-Monsoon			Monsoon			Post-Monsoon		
	Vn	Qn	Qn*Wn	Vn	Qn	Qn*Wn	Vn	Qn	Qn*Wn
pH	6.7	-60	-12.9	6.8	-40	-8.6	6.85	-30	-6.45
EC	351.39	117.13	0.714493	260.52	86.84	0.529724	185.5	61.83333	0.377183
TDS	86.48	17.296	0.063303	152.38	30.476	0.111542	128.48	25.696	0.094047
TSS	121	24.2	0.088572	325	65	0.2379	325	65	0.2379
TH	142.89	47.63	0.290543	82.35	27.45	0.167445	72.5	24.16667	0.147417
chloride	45.355	18.142	0.132799	26.54	10.616	0.077709	28.5	11.4	0.083448
DO	6.5	84.375	30.88125	8.1	67.70833	24.78125	7.95	69.27083	25.35313
BOD	3.5	70	25.62	2.7	54	19.764	2.6	52	19.032
sulphate	12.09	8.06	0.098332	14.6	9.733333	0.118747	6.896	4.597333	0.056087
TA	158.84	132.3667	2.018592	120	100	1.525	89.6	74.66667	1.138667
		\sum WQI	47.00788		\sum WQI	38.71332		\sum WQI	40.06987
		WQI	46.94732		WQI	38.66344		WQI	40.01825

Table no .7 values of water quality index at Sampling station 4.

Parameter	Pre-Monsoon			Monsoon			Post-Monsoon		
	Vn	Qn	Qn*Wn	Vn	Qn	Qn*Wn	Vn	Qn	Qn*Wn
pH	8.12	224	48.16	7.65	130	27.95	7.85	170	36.55
EC	334.82	111.6067	0.680801	221.52	73.84	0.450424	220	73.33333	0.447333
TDS	182.74	36.548	0.133766	128.48	25.696	0.094047	195	39	0.14274
TSS	195	39	0.14274	85	17	0.06222	360	72	0.26352
TH	133.96	44.65333	0.272385	79.45	26.48333	0.161548	80.5	26.83333	0.163683
chloride	43.85	17.54	0.128393	32.82	13.128	0.096097	33.8	13.52	0.098966
DO	5.8	91.66667	33.55	7.9	69.79167	25.54375	6.3	86.45833	31.64375
BOD	2.84	56.8	20.7888	5.53	110.6	40.4796	3	60	21.96
sulphate	4.65	3.1	0.03782	7.18	4.786667	0.058397	7.1	4.733333	0.057747
TA	81.34	67.78333	1.033696	112.34	93.61667	1.427654	81.34	67.78333	1.033696
		\sum WQI	104.9284		\sum WQI	96.32374		\sum WQI	92.36144
		WQI	104.7932		WQI	96.19964		WQI	92.24244

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Table no .8 values of water quality index at Sampling station 5.

Parameter	Pre-Monsoon			Monsoon			Post-Monsoon		
	Vn	Qn	Qn*Wn	Vn	Qn	Qn*Wn	Vn	Qn	Qn*Wn
pH	8.25	250	53.75	8.235	247	53.105	7.85	170	36.55
EC	408.15	136.05	0.829905	268.13	89.37667	0.545198	285.6	95.2	0.58072
TDS	247.89	49.578	0.181455	128.48	25.696	0.094047	133.5	26.7	0.097722
TSS	385	77	0.28182	120	24	0.08784	326	65.2	0.238632
TH	154.36	51.45333	0.313865	68.43	22.81	0.139141	180	60	0.366
chloride	50.12	20.048	0.146751	39.5	15.8	0.115656	32.82	13.128	0.096097
DO	5.1	98.95833	36.21875	6.32	86.25	31.5675	6.01	89.47917	32.74938
BOD	8.6	172	62.952	6.1	122	44.652	8.1	162	59.292
sulphate	15.6	10.4	0.12688	8.12	5.413333	0.066043	6.6	4.4	0.05368
TA	164.12	136.7667	2.085692	119.35	99.45833	1.51674	81.34	67.78333	1.033696
		∑ WQI	156.8871		∑ WQI	131.8892		∑ WQI	131.0579
		WQI	156.685		WQI	131.7192		WQI	130.8891

Table no .9 values of water quality index at Sampling station 6.

Parameter	Pre-Monsoon			Monsoon			Post-Monsoon		
	Vn	Qn	Qn*Wn	Vn	Qn	Qn*Wn	Vn	Qn	Qn*Wn
pH	7.88	176	37.84	7.65	130	27.95	8.2	240	51.6
EC	397.78	132.5933	0.808819	240.35	80.11667	0.488712	235.6	78.53333	0.479053
TDS	62.15	12.43	0.045494	140	28	0.10248	132	26.4	0.096624
TSS	122	24.4	0.089304	365	73	0.26718	360	72	0.26352
TH	160.33	53.44333	0.326004	61.5	20.5	0.12505	120.5	40.16667	0.245017
chloride	52.75	21.1	0.154452	34.5	13.8	0.101016	35.7	14.28	0.10453
DO	6.5	84.375	30.88125	7.5	73.95833	27.06875	7.1	78.125	28.59375
BOD	6.8	136	49.776	5.4	108	39.528	2.5	50	18.3
sulphate	15.26	10.17333	0.124115	20.6	13.73333	0.167547	6.896	4.597333	0.056087
TA	162.1	135.0833	2.060021	78.1	65.08333	0.992521	81.34	67.78333	1.033696
		∑ WQI	122.1055		∑ WQI	96.79126		∑ WQI	100.7723
		WQI	121.9481		WQI	96.66656		WQI	100.6424

Table no .10 values of water quality index at Sampling station 7.

Parameter	Pre-Monsoon			Monsoon			Post-Monsoon		
	Vn	Qn	Qn*Wn	Vn	Qn	Qn*Wn	Vn	Qn	Qn*Wn
pH	7.1	20	4.3	7.1	20	4.3	7.15	30	6.45
EC	439.86	146.62	0.894382	212	70.66667	0.431067	218	72.66667	0.443267
TDS	254.72	50.944	0.186455	120	24	0.08784	128.48	25.696	0.094047
TSS	325	65	0.2379	370	74	0.27084	180	36	0.13176
TH	157.77	52.59	0.320799	83.4	27.8	0.16958	68.5	22.83333	0.139283
chloride	53.78	21.512	0.157468	33.5	13.4	0.098088	32.82	13.128	0.096097
DO	8.1	67.70833	24.78125	9.1	57.29167	20.96875	8.05	68.22917	24.97188
BOD	2.2	44	16.104	2.15	43	15.738	2.05	41	15.006
sulphate	13.87	9.246667	0.112809	6.896	4.597333	0.056087	7.85	5.233333	0.063847
TA	159.6	133	2.02825	81.34	67.78333	1.033696	169.5	141.25	2.154063
		∑ WQI	49.12331		∑ WQI	43.15395		∑ WQI	49.55024
		WQI	49.06003		WQI	43.09835		WQI	49.4864

Chloride is one of the huge water pleasant requirement and is extensively circled in scene as salts of potassium chloride (KCl), calcium chloride (CaCl₂) and sodium chloride (NaCl). awesome assets contributing chloride in water are depleting from numerous shakes thru the path inside the course of struggling, ground run-off from inorganic composts subordinate inexperienced fields, water framework discharge, animal helps, and so forth. Tungabhadra waterway which include chloride in some unspecified time in the future of Pre-rainstorm, Monsoon and post-hurricane season had

been forty five.23 (±7.7) mg/l, 29.8 (±7.3) mg/l and 31.9 (±2.ninety eight) mg/l , independently. In present-check the chloride, esteem are indoors underneath BIS attractive breaking point, i.E., 250 mg/l.



combination sum of oxygen disintegrated in a water frame is known as as broke up oxygen (DO) and its assimilation depend upon bodily choppiness, artificial mixing and herbal sports activities of the water frame. Appraisal of broke down oxygen is in particular vital to slight from defilement. A broke up oxygen fixation diploma of four–6 mg/l is the range for an fantastic water first-rate supporting amphibian lifestyles. DO degree which is going under this ideal variety is depended upon to be polluted. The suggest DO competencies ran from a 6.384 ± 1.2 mg/l in the course of pre-typhoon season, fine DO see in rainstorm of eight.1322 mg/l (± 1.02). DO is least (< 4 mg/l) at net web page S5 eventually of Pre-rainstorm, because of immoderate contemporary waste launched legitimately into motion stretch straightforwardly.

commonly talking amount of broke up oxygen critical thru "excessive-effect microorganisms" for entire destroy of natural squanders observed in a water body is marked as biochemical oxygen request (BOD). on this way, BOD is a pointer of not unusual sully with better quantity showing grade by grade raised measures of normal defilement (Patel et al. 1983). body esteems explicitly greater than five mg/l are frightful and the existing assessment decided the recommend BOD as four.78 (± 2.57) mg/l, 3.ninety six (± 1.7) mg/l and three.6 (± 2.136) mg/l within the midst of pre-typhoon, rainstorm and post-hurricane season, in my view. The higher estimations of BOD underscored the closeness of obvious regular tainting deliver near the analyzing station.

Nearness of sulfate in go with the flow water is usually regular in nature contributed essentially through mineral assets like gypsum, and so forth. regardless of the manner that in little obsession sulfate is harmless, regardless, excessive union of sulfate in ingesting water may additionally motive severa intestinal contaminations. imply sulfate intermingling of the water tests under research varied from eleven.134 mg/l (± 4.23) in the midst of pre-storm season to six.8 mg/l (± 0.76) within the route of placed up-rainstorm season and the developments have been inner. The attractive furthest reaches of a hundred and fifty mg/l as indicated with the useful aid of using BIS.

All out alkalinity is the capacity of a watery solution for defuse a corrosive. Alkalinity is standard in view of the wonderful bicarbonate, carbonate and hydroxide debris present in water. The normal assimilation of alkalinity found in water tests modified into visible to be 142.eighty 5 (± 29.5) mg/l, ninety six.80 three (± 22.2) mg/l and ninety .eight (± 35.3) mg/l within the route of pre-hurricane, rainstorm and put up typhoon season, one after the opportunity. The endorse alkalinity

WQIa assessment: The underlying make more potent in be counted of WQIa making use of "weighted math record" technique is the appraisal of unit weight of every physico-concoction boundaries very lots taken into consideration for the exam. The unit weight relegating gadget is carried out to exchange the imperatives of severa scale to a everyday scale. for instance, unit masses and the consuming terrific requirements appointed to each impediment for WQIa is regarded in table three. higher the hundreds doled out better is their centrality in computing WQIa. fine unit weight, i.E., 36.6% is assigned to both BOD and DO, thusly offering the

vital problem centrality of those couple limitations in water great evaluation and their noteworthy impact at the WQIa. Tables four to 10 experiential estimations of the all of the physico-concoction parameters (10 parameters are decided on) and their WQIa from all the reviewing locations for 3 seasons beneath concept. Of all of the selected parameters DO and BOD had crucial impact at the WQIa esteems as introduced in tables 4 to ten.

desk 11 outlines the WQIa esteems from all stretch for each season. The considerable majority of the examples sandwiched among terrific to unacceptable water class ($41 < WQI < 157$). Pre-hurricane season recorded maximum prolonged WQIabilities on foot amongst forty one.7 at internet website on line SS6 to 156.7 at website SS5 with a everyday WQI estimation of 112.forty seven ± 30.02 (desk 11). Direct launch from nearby town population and organizations added approximately the terrible movement super in addition exacerbated thru low circulate within the pre-rainstorm season.

Yamakanamardi and Sebastian (2013) introduced comparable outcomes for the Cauvery River. Ebb and drift research exposed that the most inflamed places are SS4, SS5 and website on line SS6 relying on the WQIa esteems alongside the entire reach of the Tungabhadra River. The WQI estimation of net internet web page SS5 show off that the water remarkable isn't always worthy for use be it; eating, aquaculture, leisure or water tool (table 1). Rehana and Mujumdar (2011) of their paper furthermore exhibited the carefully similar to water exquisite for Tunga-Bhadra River. further, reviewing internet site SS4, i.E., Nalavagalu and kumarapatanam town, the overpopulated metropolis bunch along the issue Tungabhadra River additionally watched a totally debased water excellent essentially contributed thru massive statistic an extended manner beyond financial weight as bypass bed encroachment and go with the glide water abuse for numerous duties.

The, internet website on line SS5 held quite horrible to nofit water terrific recognition as established via the WQI estimations of 156.7 in some unspecified time in the destiny of located up-rainstorm season and 131.89 in some unspecified time in the future of hurricane season (desk no.11). As such, studying station SS5 detained very horrible to now not worth water exceptional sample as exhibited via the WQIa estimations of 156.7 inside the time of positioned up-blustery season and 131.89 within the midst of stormy season (table no.11). Correspondingly, the awful water high-quality at studying locales SS4, SS5 and SS6 is the give up end result of direct release of sewage from bordering city settlements viz. Nalavagalu town, Nadiharahali and Airani, in my opinion.

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Table no .11 Summary of water quality index of Tungabhadra stream.

	pre-monsoon		monsoon		post monsoon	
	WQI	WQS	WQI	WQS	WQI	WQS
ss1	47.4	Good	41.68	Good	41.943	Good
ss2	85.38	Poor	68.91	Poor	91.66	Poor
ss3	46.94	Good	38.6	Good	40.01	Good
ss4	104.8	very	96.19	very	92.243	very
ss5	156.7	poor	131	poor	130	poor
ss6	121.94		96.66		100.64	
ss7	49.06	Good	43.09	Good	49.5	Good

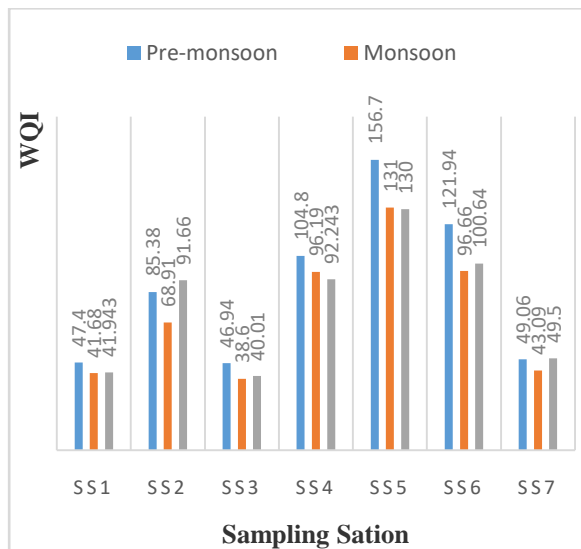


Fig.2 Water quality index rating of various sampling sites of Tungabhadra river

The horrible water brilliant at those locales as confirmed by using using the usage of WQIa trends can be observed decrease back to the anthropogenic wearing activities, as an example, spilling/inappropriately oversaw sanitation places of work, direct sewage release and robust waste dumping, mechanical launch, and so on from Tables 4 to 10 obviously technique BOD and DO had been the most impacting parameters in WQIa form. excessive herbal contamination burden delivered to immoderate BOD recognition bringing down the DO fixation alongside the stretch of Tungabhadra circulate as depicted thru water checks. The WQIa at sorting out station SS6, i.E., near Airani, a country territory, have turn out to be commonly great in comparison with all of the aware areas with traits faltering from 100 in the course of wintry weather days to 96. five in the end of stormy duration. moving further downstream along the stretch net website SS7 facilitated almost upgraded water extraordinary because of the weakening of contamination, microbial debasement of the natural burden and sparse occupants alongside the waterway. The contamination tiers set up occasional trade in water quality this is progressed water top notch in the direction of rainstorm contrasted with pre and placed up storm (fig 2). As determined in decide 2 there can be a gradual decline in contamination diploma transferring downstream from SS5 to SS7. The trough inside the diagram at station three show the a ways flung vicinity of the internet website absent masses anthropogenic effect. in any case, differentiating immoderate infection load in station SS2 and

SS4 can be identified with statistic in reality as mechanical crude wastewater launch. In all season, the water traits were visible as useful for the stations s1, SS3, and SS7 in this after alluded as suit-locales whilst negative to unacceptable at internet internet web page SS2, SS4, S5 and SS6 consequently after alluded as no longer worthy-locations as portrayed in Fig.2. all through pre-hurricane season and located up-rainstorm, water nature of the studying locales have grow to be positioned to fall below unsatisfactory to horrible water high-quality due to the low float within the waterway and the instantaneous release of natural burden at the no longer well really worth-destinations. rather than this, the typhoon season confirmed development in water wonderful for all studying stations displaying the weakening of contaminations through prolonged waterflow. however the progressed movement within the route of rainstorm, the WQIa score at internet web page SS2, SS4, SS5 and SS6 indicated unsatisfactory water great rating in a few unspecified time within the future of year for the reason that of the movement is insufficient to advanced natural contamination load, in this manner diminishing the self-sanitization limit of the waterway at those places.

III.SURRENDER

WQIa stands separated to be an amazingly useful approach in valuation and the main employer of water lovely. This examination is first of its type endeavored on the Tungabhadra conduit stretch in Karnataka. gives vital imaginative and prescient into the notoriety of in most current significance of a taken into consideration on Tungabhadra conduit stretch created on WQIa values. It furthermore gives a profounder aware of correspondence of various physico-compound objectives upon the overall water-nature of a Tungabhadra stream. The intermittent territory within the water concept of the Tungabhadra conduit depending upon the at the evaluation of water checks from seven incredible perusing stations changed into finished in this examination. The exploration has each academic regard and realistic centrality. In mellow of experiential WQIa values it has a tendency to be settled that adorable entertainment hobby measures are fast required to get better the Tungabhadra go along with the drift water remarkable. It in addition prescribes prompt necessity for proper water terrific control plan that has a bent to any drawing close to system for valid go together with the waft recreating. becoming measures must soak up in the direction of manage of dispatch of rough cutting-edge and sewerage from character/business organization establishments, tropical typhoon water channel into the skip and preserving up an prolonged manner from unabated eliminating long lasting waste thru social requests abiding close by the move into aspect. similarly, desilting sports activities bodily activities to get effectively the passing on limit of the motion channel must be received. Any video video games wearing events of development comprising of encroachment of movement need to be painstakingly denied close by the conduit phase.



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