

**ASSESSMENT OF WATER QUALITY IN RIVER KHAN FOR DOMESTIC USE IN  
SANWER TOWNSHIP, MADHYA PRADESH, INDIA**

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**ABSTRACT**

Human exercises along water courses have affected contrarily on water quality finishing in water quality issues. The expansion in contamination load along numerous waterways in the creating nations has diminished the possibilities of these significant water hotspots for an assortment of purposes. The examination evaluated the appropriateness of water in Khan River for homegrown use in Sanwer Township. The stream streams across Sanwer Township giving it the possibilities to an assortment of employments, for example, diversion, homegrown and water system. Despite the fact that the water is broadly utilized for different purposes notwithstanding, little work has been done to decide its reasonableness. Ten water tests were brought the waterway during a solitary summer period of Corona year 2020. Utilizing standard lab methods given by APHA (1979) the water tests were investigated. Properties dissected included, pH, absolute broke up solids, explicit particle harmfulness and E-coli focuses. Discoveries from this examination uncovered the outcomes as pH between 8.2 to 8.90 and add up to broke up solids 1700 to 3200 mg/l were inside the level considered safe for homegrown water use. While calcium carbonate with a mean of 138.75mg/l and alkalinity 173.25mg/l were extremely high as per WHO, (2012) edge limits for homegrown water use, The location of e-coli at significant level in the water of the waterway shows that the water presents medical issues thus alert must be seen in the utilization of the water for homegrown purposes. The investigation suggests that checking of the water quality particularly at the purpose of human exercises into the waterway ought to be paid attention to, elective water sources ought to be given to the occupants of the town to decrease their reliance on the stream and danger they are probably going to look in the utilization of water in the stream and different uses, for example, water system, watering of yards and nurseries that require less rigid quality should be possible with water from the waterway.

**KEYWORDS:** Reasonableness, homegrown, Sanwer Township, Khan River.

**PRESENTATION**

Water is an all inclusive dissolvable and a significant constituent of each living life form and basic for the supportability of life on earth. It has no substitute as such humanity utilizes it for an assortment of purposes including modern, water system, amusement and homegrown. The utilization of water may influence the intrinsic physical, synthetic and organic attributes of water finishing in water quality issue. As seen by Dalal (2015) Water quality involves various factors the vast majority of which influence the utilization of water for explicit or general purposes. The decision of the factors to be assessed rely upon the wellspring of water, nature of squanders, climatic condition, topography and above all the proposed utilization of the water. As seen by Dalal, (2016) distinctive water utilizes have diverse water quality necessities as such water considered not useable for a given reason can be used for different

employments. To help this Hansen and Stringham, (1979) saw that no water ought to be articulated as fit or unsuitable for a specific use without cautiously considering all the variables concerned. The nature of water whether from surface or underground sources relies upon various interrelated elements. Water as it travels through the biological system can respond with the minerals it interacts with present either in rocks or soils and in the process retain a wide scope of minerals consequently influencing its regular state. It is as consequence of this, water contains an assortment of natural and inorganic solutes and a lot of insoluble minerals held in suspension.

Under common condition as seen by Cunningham, et.al (2007) barely does substances considered as toxins in water overpower water quality. This is on the grounds that under characteristic condition amounts of toxins are

little to the point that they can be overlooked as the common mending state of surface water reestablishes it to a useable state. Human exercises anyway have raised the degree of contamination of most surface getting sources over the levels at which normal recuperating cycle can be accomplished. As seen by Dalal (2019) this has in this way brought about the contamination of most water beneficiary surfaces coming full circle in water quality issues. The water quality has drained to such levels at which they can't meet most prerequisites for an assortment of employments. Before any water is utilized for any reason its reasonableness must be learned and contrasted and water quality and additionally norms. Water when utilized for any reason without taking into contemplations its quality may prompt the developed of ionic substances at levels to debilitate the formative cycles of living creatures. As called attention to by Wright, (2007) modest quantities of substances seen as toxins in water are innocuous as well as animate great wellbeing and development. The high centralization of these substances in water as seen by Dalal, (2016) anyway is probably going to bring about unfavorable impacts on people and natural frameworks.

Dalal (2011) saw that water quality ought to fulfill the prerequisite and norms set for explicit or general use. Where this condition isn't met it is joined by genuine delayed consequences on the earth and imperils the clients of such water. The nature of water for homegrown use should fall inside the suggested admissible cutoff thought about safe. The support of the physical, concoction and organic properties of water at decent cutoff points is vital for homegrown water gracefully which requires most tough water quality. The physical properties of water, for example, shading, taste, temperature, scent, turbidity and suspended materials influence the stylish worth and attractiveness of water. Water subsequently should be without altogether from shading, turbidity, taste, suspended materials and warmth.

Dalal (2016) saw that Anthropogenic cycles may acquaint with water surface natural contaminants included ailment causing life forms, for example, infections, microorganisms and other ailment causing living beings which will influence the sound profitable existence of most living creatures. Broken up ionic substances in water at high power may hinder human wellbeing and cause genuine amphibian corruption. Water most is healthy and free structure sickness causing living beings, noxious substances, unnecessary measures of mineral salts and natural issue. Notwithstanding this water to be sheltered and consumable it must concur with water quality attributes, for example,

- a. It ought to be liberated from pathogenic creatures.
- b. Should be low in harmful components with genuine long haul impacts.
- c. Clear for example away from turbidity and shading and scent.

- d. Free from saltiness, harmfulness, broken up and suspended partials.
- e. Free structure aggravates that cause hostile scent and causes responses and unfavorable impacts.
- f. Non-destructive to stay away from encrustation of lines or stains.

## MATERIALS AND METHOD

Stream Khan likewise alluded to the Khan River takes its source from the Kakri-Bardi slopes north-west of Madhya Pradesh. The waterway enroute its stream into a little region through Sanwer and Indore town as the significant seepage framework. Since the town is described via occasional deficiency in water dissemination the waterway gives plentiful possibilities to an assortment of employments particularly in the dry season when water lack is endemic.

Human exercises have anyway brought contaminants into the waterway at powers liable to influence the nature of water. The utilization of the water particularly for homegrown purposes which is the most well-known practice in the territory jeopardizes the soundness of the occupants and results in a portion of the medical issues are watched. Water borne infections, for example, loose bowels, cholera and typhoid fever have been recorded throughout the long terms which have brought about death toll at times. On the off chance that the water in the waterway is to be utilized without delayed consequences then the recognition and upkeep of water quality gets basic. This examination consequently surveyed water quality in River Khan for homegrown use in Sanwer Township, Madhya Pradesh State, India.

Information for this examination was gotten from both essential and optional sources. Water tests were brought the stream in the long stretch of May, 2020 a period when water shortage was at a top in the examination zone likewise the lockdown was additionally lifted for heading out to Sanwer. Archived information on water quality principles were acquired for the investigation from our past existing writing. A sum of ten water tests was brought the stream at 30 meters span. The water tests were taken at various areas of the waterway for example upstream, midstream and downstream. This was done to watch if there was spatial variety in the appropriation of water quality along the stream and at purposes of examining.

Standard lab methods were utilized in the investigations of the boundaries secured by this examination. Temperature, pH, electrical conductivity, absolute broke down solids and turbidity were controlled by compact meter, Laboratory medicines of alkalinity by sodium hydroxide technique, gravimetric strategy for suspended solids, all out hardness by ammonium chloride, sodium, nitrate, iron, manganese and lead by spectrophotometric screening, chloride by argentometric strategy while all out coli and e-coli were resolved utilizing Mac Conkey

technique. The outcomes were summed up in even structures predisposition in graphic insights. The outcomes were contrasted and the WHO, (2012) passable norms for homegrown water use.

## RESULTS AND DISCUSSION

The outcomes in different tables indicated the convergence of the properties of water of the waterway. Electrical conductivity went between 283 $\mu$ S/cm to 525 $\mu$ S/cm with the least recorded upstream and the most noteworthy at midstream where most human exercises in the waterway appeared to happen. Turbidity was between 4.68 NTU and 16.38 NTU and was high for a large portion of the examples particularly at mid and upstream focuses at which washing and washing was seen to be normal practices along the stream banks. The temperature was between 41°C to 44.3°C with the most

noteworthy recorded downstream while the least was watched for water midstream.

All out coli fixation recorded was between 0mg/l to 1000mg/l both at midstream. The homegrown effluents which depleted into the stream now and the conceivable poop by kids swimming in the waterway could represent the high grouping of all out coli watched for the water now. In a comparable report Dalal (2016) additionally watched high centralization of absolute coli type of water in Shipra River in Ujjain area of Madhya Pradesh. Chloride was between 0.28mg/l to 167.7mg/l with the most noteworthy chloride focus recorded midstream. The focus was commonly low for the stream and was inside the level considered safe for homegrown water use (WHO, 2012). An examination by Dalal (2016) likewise watched less chloride in water of River Shipra Ujjain.

**Table 1: Concentration of Physical and Biological Properties of Water in River Khan.**

Sampling Points	Concentrations				
	Conductivity ( $\mu$ S/cm)	Turbidity (NTU)	Temperature (°C)	TCC (Cfu/ml)	E. coli (Cfu/ml)
1 Upstream	283.4	9.75	43.16	45.07	386
2 Upstream	289.9	8.19	43.81	157.73	1000
3 Midstream	525.2	4.68	43.68	3.47	650
4 Midstream	427.7	7.28	42.38	26.87	420
5 Midstream	500.5	15.34	42.9	77.57	50
6 Midstream	451.1	16.38	42.51	0.28	0
7 Midstream	445.9	13.26	41.99	2.17	560
8 Midstream	469.3	13.13	42.9	167.70	780
9 Downstream	380.9	15.34	44.33	48.10	20
10 Downstream	513.5	12.48	42.64	61.75	250
<b>WHO Standards</b>	380	5	33	10.00	0
<b>Mean</b>	428.74	11.583	43.03	59.05	410
<b>Std. Deviation</b>	86.138	3.926	0.728	60.61	340
<b>Variance</b>	5706.649	11.817	0.403	2825.20	9020

The pH recorded of water in the waterway was between 8.2 to 8.9 and a mean of 8.9. The outcome demonstrated the water to be somewhat antacid. The pH recorded for this investigation was not a long way from that watched for River Shipra Dalal (2016). Complete disintegrated solids of 1792 to 3292mg/l and a mean of 2702mg/l was recorded. All out broke down solids was high mid stream where human exercises along the waterway is normal. Complete suspended solids demonstrated little variety in conveyance along the waterway. The qualities are low as the water conveys minimal suspended materials during the dry season and the absence of boundless removal of homegrown effluents. Calcium went between 11.45 to 17.75mg/l with a mean convergence of 13.91mg/l, the focus somewhat changed at the various parts of the waterway secured by this examination. Sodium focus was between 0.35 to 4.4mg/l. Sodium was commonly low for the water along all the examining focuses. Fluoride was most noteworthy (1.4mg/l) upstream and least (1.1 mg/l) midstream. The fixation anyway fluctuated along the stream. Magnesium was between

3.57 to 5.99mg/l and was high in the water. High magnesium watched could be credited to weather able minerals from rocks, compost application and fertilizer which discover their way into the waste framework.

**Table 2: Concentrations of Chemical Properties of Water in River Khan.**

Sampling Point	pH	Cu (mg/l)	Fe (mg/l)	F (mg/l)	Zn (mg/l)	Mn (mg/l)	Pb(mg/l)	Cr (mg/l)	TDS (mg/l)	TSS (mg/l)
1 Upstream	8.27	0.0026	0.274	1.3	0.2192	0.0013	0.6713	0	1792.86	423.77
2 Upstream	8.22	0	0.1233	1.131	0.0822	0	0.6302	0	1792.86	399.32
3 Midstream	8.61	0.0026	0.0548	1.196	0.0274	0	0.6576	0	3292.34	391.17
4 Midstream	8.67	0	0.0274	1.118	0.0411	0	0.6713	0	2640.39	383.02
5 Midstream	8.91	0	0.0548	1.326	0.0137	0	0.7672	0	3129.35	391.17
6 Midstream	8.42	0	0.0411	1.456	0.0685	0	0.8494	0.026	2803.38	407.47
7 Midstream	8.42	0	0.0274	1.43	0.0548	0	0.8768	0	2787.08	407.47
8 Midstream	8.37	0	0.0411	1.404	0.0959	0	0.9179	0	2950.07	423.77
9 Downstream	8.91	0	0.0959	1.248	0.2055	0	0.9042	0.052	2575.20	374.87
10 Downstream	8.54	0	0.0411	1.495	0.0411	0	0.8631	0	3259.74	374.87
WHO Standards	7.5 - 8.5	2	0.3	2	0.05	0.1	0.01	0.05	500.00	100.00
Mean	8.54	0.00052	0.0685	1.313	0.0822	0.00013	0.7809	0.0078	2702.32	397.69
Std. Deviation	0.24	0.00104	0.0685	0.1352	0.0685	0.00039	0.1096	0.0182	536.88	17.93
Variance	0.06	0	0.00411	0.0143	0.00411	0	0.00959	0	17685.23	19.72

Nitrate was between 0.16 to 1.43mg/l and with a mean of 0.73mg/l. The low nitrate watched for the water of the waterway could have been because of low homegrown effluents depleted into the stream. Nitrate is poisonous to newborn children under 3 months and has brought about the blue infant condition. Phosphate ran between 0.31 to 0.74mg/l and a mean of 0.43. Phosphate was commonly high for the water and can cause outrageous multiplication of algal development which may bring about eutrophication of new water in the waterway. High phosphate watched for water of the stream can be credited in parts to rot of natural issue, discharge by living beings and enduring of phosphate rich rocks. Calcium carbonate was between 54mg/l to 217mg/l and with a mean of 138.75mg/l. Calcium carbonate in water

shows hardness, at high fixation water turns out to be hard and can't create froths effectively from cleansers during washing likewise because of different industry effluents dumping in khan legitimately.

Alkalinity ran from 97mg/l to 310mg/l and a mean of 173.25mg/l. The circulation of alkalinity along the stream shifted with the most noteworthy recorded downstream and the least upstream. The level centralization of alkalinity demonstrates the capacity of the water to kill acids. Consequences of the minor components secured by this examination were commonly low for the water suggesting that poisonousness related to these metals won't result to influence the wellbeing of the individuals in the region.

**Table 3: Concentrations of Chemical Properties of Water in River Khan.**

Sampling Points	Concentrations									
	Cl (mg/l)	Na (mg/l)	Ca (mg/l)	CaCO <sub>3</sub> (mg/l)	NO <sub>3</sub> (mg/l)	Mg (mg/l)	Cd (mg/l)	Al (mg/l)	Alk (mg/l)	P (mg/l)
1 Upstream	1.06	1.43	11.46	217.29	0.98	3.57	0.01	0.39	310.59	0.74
2 Upstream	0.44	0.36	14.42	62.59	0.80	5.24	0.00	0.40	100.20	0.32
3 Midstream	0.83	3.57	13.67	54.03	0.82	5.31	0.00	0.39	112.46	0.33
4 Midstream	1.00	4.40	15.09	137.77	1.46	6.00	0.00	1.19	253.47	0.62
5 Midstream	3.46	2.62	13.03	147.56	0.25	5.26	0.00	0.60	239.19	0.61
6 Midstream	205.04	3.21	14.22	107.10	0.17	5.22	0.00	0.39	139.23	0.32
7 Midstream	0.79	3.33	17.75	147.56	0.80	5.68	0.00	0.99	216.58	0.55
8 Midstream	0.39	2.62	14.47	171.36	0.33	6.07	0.01	0.80	119.00	0.30
9 Downstream	2.87	3.33	12.70	202.30	0.83	5.36	0.00	1.79	97.58	0.31
10 Downstream	1.06	1.43	11.46	217.29	0.98	3.57	0.01	0.39	310.59	0.74
WHO Standards	250.00	200.00	75.00	500.00	10.00	50.00	0.00	0.20	250.00	0.10
Mean	21.64	2.64	13.91	138.75	0.73	5.22	0.02	0.80	173.25	0.43
Std. Deviation	64.50	1.21	1.76	53.18	0.38	0.74	0.05	0.45	75.57	0.19
Variance	1.06	1.43	11.46	217.29	0.98	3.57	0.01	0.39	310.59	0.74

#### Reasonableness of water in Khan River for homegrown use

The examination assessed the appropriateness of water for homegrown use by contrasting the outcomes from

this investigation and homegrown water standard by World Health Organization (WHO, 2012) and National Standard for Drinking Water Quality, (NSDWQ, 2007). Samaila (2006) saw that the evaluation of water quality

is trivial except if it is identified with a given use as such water quality ought to fulfill the necessities set for a particular use. Results from this examination indicated most factors secured by this investigation were low for the water of the stream. Saltiness as demonstrated by absolute disintegrated solids was commonly low and was inside the levels thought about safe for homegrown use. Different factors, for example, calcium, calcium carbonate (hardness), nitrate, alkalinity, pH, manganese, absolute suspended solids, chloride, chromium, iron and copper all fall inside the reasonable levels for homegrown water use. The utilization of water from the waterway subsequently won't be influenced by the degree of the centralizations of these factors to affect contrarily on homegrown exercises and wellbeing of the individuals in the region.

The investigation watched the high convergences of turbidity, complete coliform check, e-coli tally, aluminum, phosphorus, magnesium, lead, temperature and cadmium at level surpassing the cutoff considered for homegrown water use.

The high absolute coliform and e-coliform tally recorded by this examination infers that the water was polluted by microbes. The presence of these microbes in the water may present wellbeing dangers to the clients of the water. The utilization of the water particularly for drinking is probably going to be joined by maladies, for example, typhoid, looseness of the bowels, spasms, migraine and other related water borne illnesses. High temperature saw of the water may influence the recreational use and increment digestion and diminish dissolvability of oxygen in the water hence influencing amphibian creatures.

High cadmium may cause pallor, impedes development and combined harming. So also, abundance grouping of lead in water can cause torpidity, loss of craving, obstruction, sickness, stomach torment, slow loss of motion in the muscles, and passing. Phosphorus in focus in surface water can prompt algal sprout and lower broke down oxygen which is basic for oceanic life and may make water taste issue. The investigation has indicated the presence of a portion of the substances is at high fixations surpassing the passable levels considered for homegrown water use particularly for drinking. In this manner the utilization of water from the stream is probably going to be joined by genuine eventual outcomes on human wellbeing particularly when safeguard in the utilization of the water isn't watched.

#### **End (conclusion)**

Water in River Khan is generally utilized in Sanwer Township for an assortment of purposes particularly during the dry season when flexibly from different sources couldn't fulfill need. Human exercises have expanded the substances in the waterway at levels at which the water isn't ok for use in the zone. This examination has demonstrated that however a few substances are low in the water notwithstanding, others

are high or more the level thought about safe for homegrown use. The utilization of water particularly for drinking is probably going to be joined by medical issues as the water is high in microorganisms. The utilization of the water from stream accordingly requires alert and legitimate administration to lessen the conceivable delayed consequences attendant to the utilization of the water.

#### **Suggestions**

Since the water in Khan River contain a few substances above allowable levels considered for homegrown water use, the examination in this way proffer the accompanying suggestions. There is the requirement for constant observing of water nature of the waterway in order to direct and illuminate the occupants regarding the threat prone to experience in the utilization of the water in the territory. The water ought not to be utilized straightforwardly in the waterway rather ought to be bubbled before utilized for any reason as doing this will decimate a portion of the substances saw of the water. The water can be utilized for other homegrown purposes, for example, scouring, washing watering of nurseries and water system. The administration ought to give satisfactory water to network to decrease their reliance on the waterway for flexibly particularly during the dry season. Elective water sources ought to be ought to be used such wells and boreholes. The people group should start to think on the best way to store downpour for use during the dry season. Investigates on water quality for the stream ought to be accepted genuine by choices producers as such explores will fill in as significant instruments for overseeing water in the zone.

#### **REFERENCES**

1. Dalal P. Hydro Distillation Method Extraction of Eucalyptus Oil & Lemongrass Oil *Socialsci Journal*, 2019; 4: 36-44.
2. Dalal Parag "Liquid Biomedical waste management strategy". *Environmental Conservation Journal*, 2011 12(1&2): 87-93.
3. Dalal Parag "Impact of Water Quality on Crop Production in Ujjain District" *African Journal of Agricultural Science and Technology*, 2015; 3(9): 392-397.
4. Dalal Parag: "Pollution Prevention Management of Holy Saphth Sagars in Ujjain City" *Journal of Environmental Science, Computer Science and Engineering & Technology*, 2016; 5(3): 470-481.
5. Dalal Parag "Seasonal Variations in Water Quality of Shipra River in Ujjain, India" *IRA-International Journal of Technology & Engineering*, 2016; 3(3): 236-246.
6. Cunningham, W. P, Cunningham, M.A and Saigo B.W *Environmental Science: A Global Concern*. Boston, USA; McGraw Hill, 2007; 53-87.
7. Hansen, E. V and Stringham, G. E *Irrigation Principles and Practices*. London: John Wiley and Sons, 1979.

8. WHO, International standard for drinking water, Geneva: are the international reference point for standard setting and drinking-water safety, 2012.
9. Wright, R.T Environmental Science. India Prentice Hall, 2007; 89.
10. APHA Americana Public Health Association. Standard Method Examination of Water and West water, 20th edition Washington, DC., 1979.
11. NSDWQ WHO, and EU Standards from publication: Assessment of the Impact of Solid Waste Dumps on Ground Water Quality, 2007.