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A Comparative Study of the Physiochemical Parameter Levels of Water Quality in Man Sagar Lake, Jaipur

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Abstract
The contamination of water sources like Man Sagar Lake is a major global health problem. The accumulation of heavy metals and a change in the water's physicochemical properties due to eutrophication and slits breakdown result from releasing untreated waste, industrial discharges, home trash disposals, and agricultural waste. Untreated sewage and other pollutants are contributing to the degradation of Man Sarovar in Jaipur, Rajasthan. These pollutants promote eutrophication and slit disintegration by altering the water's physicochemical qualities.

1. Introduction:

Air, water, or land injuries are all direct results of pollution. Lakes and rivers are the primary sources of fresh water. We are running out of water fast. It can dissolve almost anything in the water. Water, an inorganic molecule with no discernible smell, taste, color, or transparency, is the most important substance on our planet. It's impossible to stay alive without water. A population's health and economic stability are directly related to the quality of its water supply. Millions of people every year become sick and die because of water pollution. It meets a wide range of requirements in several settings.. Water becomes polluted whenever its purity or composition is altered due to human activities. Around 2025, humans are expected to use up to 70 per cent of the world's freshwater resources [1].

It dissolves a broad range of inorganic and organic compounds effectively. An increasing percentage of India's groundwater has also been contaminated by the same biological, poisonous, chemical, and inorganic pollutants that have spread over the country's surface water. It's common for these water supplies to be unfit for human consumption, agriculture, or manufacturing. Water shortage is exacerbated by issues related to poor water quality, which restricts its usage in human and environmental contexts. Detrimental to aquatic life and human health, water pollution occurs when foreign substances enter water sources. The importance of water for human survival and development cannot be overstated [2]. Both single-use polythene bags and discarded plastic do environmental harm. Plastic bags are used for trash disposal. An estimated third of urban dwellers urinate or defecate in open spaces [3]. Around 8% of the population still uses pit latrines, whereas 77% choose flush toilets. Infectious illnesses tend to expand as cities grow. Some of the dangers of city life include overcrowding, substandard housing, and water contamination. Around a quarter of city dwellers are susceptible to illness.

Microbiological, toxic, pharmaceutical and inorganic contaminants have depleted groundwater supplies and about 70% of India's surface water availability. There is growing concern that these sources are becoming unsafe for commercial and other contexts, like irrigation. This exemplifies how bad water quality leads to a water crisis by reducing the water's usefulness across both human and ecological systems [4]. Water contamination is a problem for the environment and human health when unwanted contaminants enter the water supply. Notwithstanding its obvious uses in maintaining life, water is also crucial in various industrial processes. The availability of potable water is critical to the well-being of people worldwide. A major source of disease-causing microorganisms is water itself. According to the World Health Organization, water contamination is a major cause of 80 % of all ailments. Three-point-one percent of fatalities are attributed to dirty water. Nevertheless, population increase not only has many unfavourable repercussions, but it also causes water pollution.

A rise in population directly correlates to a rise in garbage production. Pollutants in both liquid and solid forms clog rivers and streams. In addition, water is contaminated by human waste. As science has demonstrated, unclean water may harbor many bacteria, some of which can be very dangerous to humans. The government will need to expand its capabilities to meet the growing demand for essential services. In cities, residents have easier access to public restrooms than in countryside ones. The widespread distribution and use of polythene bags and the careless disposal of plastic trash are major contributors to pollution. In order to properly dispose of garbage, plastic bags are often utilized. It is estimated that in metropolitan areas, a shocking 30% of the population urinates in the open [5]. Most individuals (77%), compared to the minority (8%) who still use pit latrines, prefer to use flush toilets. Urbanization may aid in the spread of certain infectious illnesses. Overcrowding, squalor, and contaminated water supplies are all major contributors to the poor health of city dwellers. One-fourth of the world's population lives in cities, making them more vulnerable to disease.

2. Literature Review:

Recent research published in [6] looked at the water quality parameter characteristics of Man Sagar Lake. Man Sagar Lake in Jaipur is a popular place and destination in Rajasthan. India's central government acknowledged the lake's significance in December of 2002 when it added it to their State Lake Conservation Plan. Some lawmakers have decided to examine governmental initiatives to reduce water waste more closely. The pH level of Man Sagar Lake is C, below the NPCA's minimum requirements for grades A, B, and D. Dissolved oxygen levels range from 3.6 to 4.8 mg/L in the different classes or groups of groups of samples. In no NPCA category is a BOD of 15.4 to 27.9 mg/L acceptable. The National Parks Conservation Association (NPCA) discourages anybody from consuming water near Man Sagar Lake. The control of BOD and the reduction of lake pollution require the implementation of measures such as the identification and elimination of pollution sources, the treatment of sewage, the discharge of industrial pollutants, the removal and dredging of sediment, de-weeding and control of weeds, the restoration of feeder drainages, the application of treatment regimens in the drainage basin, efficient waste management, increased public knowledge and participation in preservation efforts, revised preservation policies, and monitoring of lake water quality. Waterfalls or aerators of varied heights might be added to the lake to improve its beautiful picturesque value and help keep its total dissolved and biochemical oxygen requirement at healthy levels (BOD).

The physicochemical properties of the water in Man Sagar Lake are discussed in the study above [7]. The physicochemical parameters of water are estimated, and their dispersion by sample site and season is investigated further. The author elaborates on regional and seasonal variations in the physicochemical properties of the lake's surface water in Man Sagar. The lake is contaminated by both point and non-point sources. Test results showed that this lake was at risk for sewage intake and trash disposal due to unchecked urban expansion and a rising population. The present water analysis study discusses WQI values and the correlations between physicochemical factors. Improve lake management using the Water Quality Index and Pearson's correlation coefficients. With the help of these variables, a network for monitoring water quality may be set up. According to this study [8], which examines a "Fuzzy River Index," there has to be less opportunity for judgment and more clarification on the condition of India's Chambal River (FRHI). The criteria for determining water quality are vague and open to interpretation. Fuzzification uses triangle membership functions, whereas defuzzification relies on the centroid approach.

There are several proposed approaches to improving lake water quality among published authors [9]. This page describes the physiochemical analysis performed on Man Sagar Lake. When in Jaipur, stop at the serene Man Sagar Lake. The lake's deteriorating condition prompted the Indian government to add it to their National Lake Conservation Plan the same year, in December. Researching the water quality and water conservation efforts of the present was deemed necessary. According to the National Parks and Conservation Association's guidelines, Man Sagar Lake has an acidity of 7.16-8.85, placing it in the C group yet separate from other classifications based on the data. Dissolved oxygen levels in classes B, C, and D range from 3.6 to 5.8 mg/L. The NPCA has determined that a BOD range of 15.5-27.0 mg/L is unsafe. The National Parks and Conservation Association (NPCA) does not recommend utilizing the water from Man Sagar Lake for anything. Identifying the causes of pollutants, treating sewage, discharging industrial pollutants, extracting and eliminating sediment, deseeding and controlling weeds, rehabilitating feed drainages, attempting to execute care plans in river catchments, successfully managing waste, creating awareness, supporting in preservation efforts, and assessing the water. Installing flowing aerators or cascades would be beneficial to preserve the beauty of the lake, as well as the levels of dissolved oxygen and the biological oxygen demand (BOD).

Groundwater quality in the Satlasana area of the Mehsana district in northern Gujarat was studied using the Water Evaluation and Quality Index (WAQQI) and the Combined States of Mehsana Water Quality Index (CCMEWQI). Over six months, researchers evaluated 50 samples of groundwater from 9 different sites for pH, turbidity, total dissolved solids, total hardness, total alkalinity, Dissolved oxygen, and chloride [10]. These are the very minimum expectations for drinking water quality. International Standards (IS), World Health Organization (WHO), and the California State Board of Pharmacy (CPCB) criteria were used to draw comparisons. For this study, we used physicochemical indicators and indices of water quality. The groundwater in Satlasana is potable after the usual treatment. Groundwater quality may be improved by using standard water treatment methods, which can reduce the hardness, acidity and alkalinity of water. Several different processes, such as filtering out salts, adsorption of contaminants, and electrochemical treatments, might go into the making of potable water. One kind of in-situ treatment is to mix clean water with the polluted water on site. As no causes of groundwater contamination originate in rural areas, urban and industrial areas cannot be blamed for polluting the groundwater supply. The water in Satlasana is so pristine because it comes from an unspoiled source that the community must do all it can to preserve it. Collecting rainwater might help maintain water quality and replenish groundwater [11].

3. Material and Methods:

SPSS software will be used for determining the F-test values with ANOVA and Tukey-Kramer test for the different variables used for detecting the quality of water due to pollution. Further bar-graphs will be calculated using the excel sheet values calculated for the different variables used for detecting the water pollution levels in water.

4. Results:

All of the metrics in the examination of Man Sagar Lake's water quality fell within the acceptable and optimum levels, as shown below (pH, total alkalinity, of water hardness, presence of calcium, presence of magnesium, presence of chloride, presence of sulphate, sodium, potassium content , nitrate, total phosphate content, total suspended particles, dissolved oxygen, biochemical oxygen demand, chemical oxygen demand). To complete this investigation, we will examine the availability of these features in the lake and the function they serve.

On the IS-3025 test, the PH value is 8.17. (P-11). IS-3025 produces a total dissolved solids value of 700 mg/l (P-16). Total alkalinity (as CaCO3) is 314.6 mg/l, according to test method IS-3025 (P-23). Total hardness (in CaCO3) is measured at 374.49 mg/l using test method IS-3025 (P-21). The amount of calcium (as Cl) found with the IS-3025 test is 362.8 mg/l (P-40). ISO 3025 uses the magnesium concentration in milligrams per liter as its standard (P-46). While measuring chloride with IS-3025(P-32, the concentration is 362.8 mg/l. Sulfate

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concentration (P- 24) is 18.6 mg/l using test method IS-3025. The result of the 0.98 Mho/cm EC tests with IS-3025 is: (P-14). There is a sodium concentration of 28.2 mg/l when using the IS-3025 test technique (P-45). A result of 2.8 mM/L for potassium using the IS-3025 test (P-45). Nitrate concentrations of 3.91 mg/l were found using the IS-3025 test technique (P-34). The results of the phosphate test using procedure RTHTS-07 are 0.58 mg/l. An analysis of IS-3025 found total suspended solids to be 80.6 mg/l (P-17). Dissolved oxygen (DO) in the IS-3025 test is 1.98 mg/l (P-38). The Biological Oxygen Demand was 117.2 Mg/l, as measured by the IS-3025 technique (P-44). Chemical Oxygen Demand is 386.6 Mg/l according to test method IS-3025 (P-58).

According to test procedure IS-3025, the EC value is 1040 Mho/cm (P-14).According to test method IS-3025, the sodium concentration is 42.6 millimoles per liter (P-45). In the potassium test using IS-3025, the outcome is 3.2 with a Mg/ (P-45). Results for nitrate using test method IS-3025 are 4.6 (in Mg/l) (P-34). Phosphate concentration in RTHTS-07 test was 0.62 mg/l (Mg/l). Total Suspended Solids was measured using IS-3025 and came out to be 82.8 milligrams per milliliter (P-17). The Biological Oxygen Demand was calculated to be 114.6 (in Mg/l) (P-44) by using the IS-3025 method of quality control analysis. In the IS-3025 test, the Chemical Oxygen Demand was measured in milligrams per liter, and the result was 412.2(P-58). IS 10500:2012 specifies a maximum value of 45.0 for nitrates as an acceptable range, but makes no recommendations for the other parameters. Not all parameters have an allowed range according to IS-10500:2012. The test results using method IS-3025 were as follows: 8.39 PH, 11.50 mg/l total dissolved solid, 279,6 Mg/l total alkalinity, 393 mg/l overall hardness, 34.08 mg/l calcium (as Cl), 70.67 mg/l magnesium, and 64.6 mg/l sulphate. IS 10500:2012 suggests a pH range of 0.0-0.5, 500 grams of total dissolved solids, 200.0 grams of total alkalinity, 100 grams of calcium, 100 grams of magnesium, 1000 grams of chloride, and 400 grams of sulfate. The tests conducted to determine the water quality parameters and index were carried out once again using the IS-3025 water quality measuring technique.

In the second round of tests, we found out that the IS-3025 test gives a PH value of 8.17, for example. Calcium content was 539.2 mg/l, total alkalinity was 254.3 Mg/l (CaCO3), total hardness was 413.9 mg/l (reported as CaCO3), and total dissolved solids was 1934 mg/l. The sodium test produces 49.2mg/l, while the EC test produces 830 Mho/cm. Using the RTHTS-07 phosphorus test, nitrate values of 4.3 mg/l may be determined. Both the Biological and Chemical Oxygen Demands are high; they are at a value of 104.3 and 491.2 ppm, respectively.

Additionally, the IS-3025 test reported total alkalinity to be 284.3 Mg/l (CaCO3), total hardness to be 382.4 mg/l, calcium concentration to be 54.5 mg/l (as Cl), and magnesium production to be 79.4 Mg. The output of sulphate was 58.3 mg/l, whereas the chloride content was 304.67 mg/l. Maximum values for pH, TDS, TAA, TDH, Ca, Mg, and Cl are specified as 2.0, 500.0, 600, 200, 200, 100, and 1000 respectively in IS 10500:2012. In February, the PH of the lakeside water supply is 8.17 and growing. In February, the total dissolved solids value is at 700, rising with time. The water's biological oxygen demand varies throughout the year, with the lowest being in February at 177.2 and gradually decreasing from there. The chemical oxygen demand value dropped to its yearly low of 386.6 in February and has been slowly climbing. With a February water quality of 0.984, it is apparent that pollution levels are minimal. This increase of 1.1 per cent took effect in April of 2019. It shows that water pollution is becoming worse over time.

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The tabular results for the third round of experiments are depicted in the different tables given below:

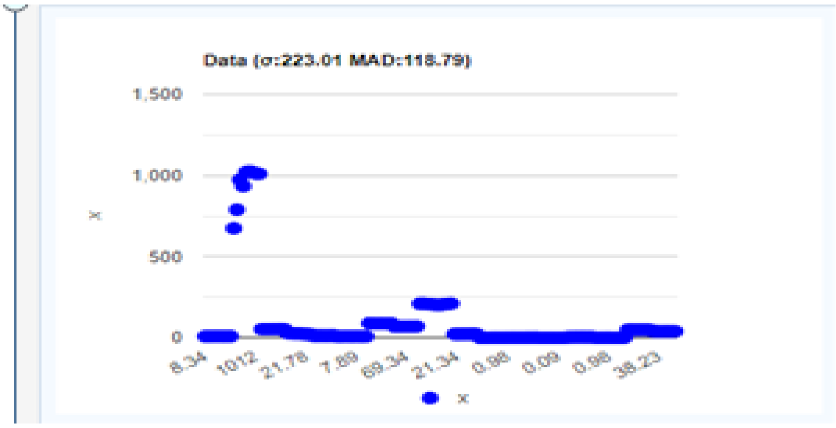

Figure 1 shows the distribution of the different parameters for quality control

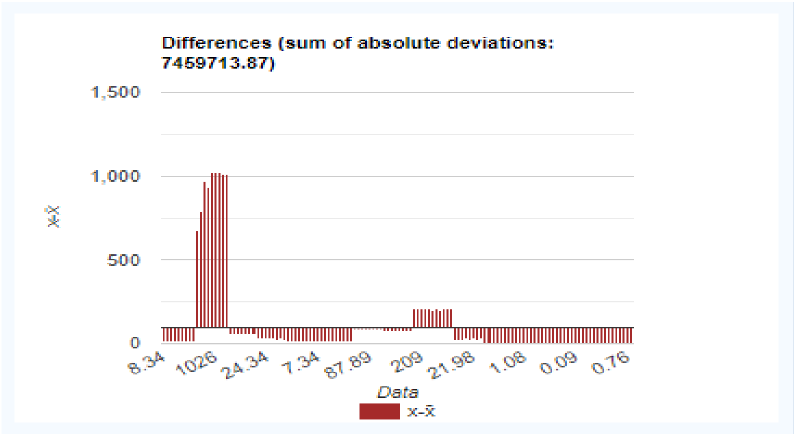

Figure 2 Shows the distribution of different water control variables with sum of absolute deviation values

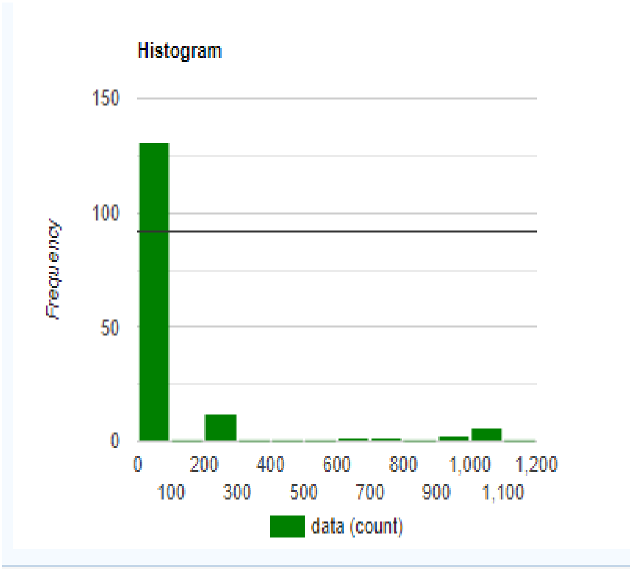

Figure 3 Shows the frequency distribution of the different variables used for water quality testing.

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Source	DF	Sum of Square	Mean Square	F Statistic	P-value
Groups (between groups)	15	7309881.245	487325.4163	488.2964	-4.441e-16
Error (within groups)	126	125749.4436	998.0115		
Total	141	7435630.689	52734.9694		

Figure 4 Shows the ANOVA test for the different water quality variables.

According to the result the initial hypothesis that there is a no significant difference between the means of the different group variables used for water quality testing. As the p-value is less for the original hypothesis H_0 can be rejected. Further the, hypothesis H_1 is accepted that there is a significant difference between the means of the different variables used for water quality testing.

Pair	**Difference**	**SE**	**Q**	**Lower CI**	**Upper CI**	**Critical Mean**	**p-value**
x1-x2	932.2389	10.5304	88.528	880.1677	984.3101	52.0712	7.356e-11
x1-x3	43.9224	10.8545	4.0465	-9.7514	97.5961	53.6737	0.2497
x1-x4	15.4511	10.8545	1.4235	-38.2226	69.1248	53.6737	0.9997
x1-x5	3.9436	10.8545	0.3633	-49.7301	57.6173	53.6737	1
x1-x6	1.0369	10.2638	0.101	-49.7158	51.7896	50.7527	1
x1-x7	79.0049	10.8545	7.2785	25.3311	132.6786	53.6737	0.0001106
x1-x8	60.9161	10.8545	5.612	7.2424	114.5898	53.6737	0.01108
x1-x9	198.8247	10.0404	19.8025	149.1768	248.4727	49.6479	7.356e-11
x1-x10	13.1274	10.8545	1.2094	-40.5464	66.8011	53.6737	1
x1-x11	7.7789	10.2638	0.7579	-42.9738	58.5316	50.7527	1
x1-x12	7.3644	10.5304	0.6993	-44.7067	59.4356	52.0712	1
x1-x13	8.4744	10.5304	0.8048	-43.5967	60.5456	52.0712	1
x1-x14	5.12	10.5304	0.4862	-46.9512	57.1912	52.0712	1
x1-x15	7.9549	10.2638	0.775	-42.7978	58.7076	50.7527	1
x1-x16	39.9036	10.8545	3.6762	-13.7701	93.5773	53.6737	0.4086

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x2-x3	888.3165	10.8545	81.8383	834.6428	941.9903	53.6737	7.356e-11
x2-x4	916.7878	10.8545	84.4613	863.114	970.4615	53.6737	7.356e-11
x2-x5	928.2953	10.8545	85.5215	874.6215	981.969	53.6737	7.356e-11
x2-x6	933.2758	10.2638	90.9288	882.5231	984.0285	50.7527	7.356e-11
x2-x7	853.234	10.8545	78.6063	799.5603	906.9078	53.6737	7.356e-11
x2-x8	871.3228	10.8545	80.2727	817.649	924.9965	53.6737	7.356e-11
x2-x9	733.4141	10.0404	73.0464	683.7662	783.0621	49.6479	7.356e-11
x2-x10	919.1115	10.8545	84.6754	865.4378	972.7853	53.6737	7.356e-11
x2-x11	940.0178	10.2638	91.5857	889.2651	990.7705	50.7527	7.356e-11
x2-x12	939.6033	10.5304	89.2274	887.5322	991.6745	52.0712	7.356e-11
x2-x13	940.7133	10.5304	89.3328	888.6422	992.7845	52.0712	7.356e-11
x2-x14	937.3589	10.5304	89.0142	885.2877	989.4301	52.0712	7.356e-11
x2-x15	940.1938	10.2638	91.6029	889.4411	990.9465	50.7527	7.356e-11
x2-x16	892.3353	10.8545	82.2086	838.6615	946.009	53.6737	7.356e-11
x3-x4	28.4713	11.1692	2.5491	-26.7586	83.7011	55.2298	0.911
x3-x5	39.9787	11.1692	3.5794	-15.2511	95.2086	55.2298	0.4563
x3-x6	44.9592	10.5961	4.243	-7.4363	97.3548	52.3956	0.1842
x3-x7	35.0825	11.1692	3.141	-20.1473	90.3123	55.2298	0.6808
x3-x8	16.9937	11.1692	1.5215	-38.2361	72.2236	55.2298	0.9994
x3-x9	154.9024	10.3798	14.9235	103.5762	206.2286	51.3262	7.368e-11
x3-x10	30.795	11.1692	2.7571	-24.4348	86.0248	55.2298	0.8472
x3-x11	51.7013	10.5961	4.8793	-0.6943	104.0968	52.3956	0.05722
x3-x12	51.2868	10.8545	4.7249	-2.3869	104.9605	53.6737	0.07783
x3-x13	52.3968	10.8545	4.8272	-1.2769	106.0705	53.6737	0.06358
x3-x14	49.0424	10.8545	4.5181	-4.6314	102.7161	53.6737	0.1148
x3-x15	51.8772	10.5961	4.8959	-0.5183	104.2728	52.3956	0.05531

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x3-x16	4.0187	11.1692	0.3598	-51.2111	59.2486	55.2298	1
x4-x5	11.5075	11.1692	1.0303	-43.7223	66.7373	55.2298	1
x4-x6	16.488	10.5961	1.5561	-35.9076	68.8836	52.3956	0.9992
x4-x7	63.5538	11.1692	5.6901	8.3239	118.7836	55.2298	0.009155
x4-x8	45.465	11.1692	4.0706	-9.7648	100.6948	55.2298	0.241
x4-x9	183.3736	10.3798	17.6664	132.0474	234.6998	51.3262	7.357e-11
x4-x10	2.3237	11.1692	0.208	-52.9061	57.5536	55.2298	1
x4-x11	23.23	10.5961	2.1923	-29.1656	75.6256	52.3956	0.9739
x4-x12	22.8156	10.8545	2.1019	-30.8582	76.4893	53.6737	0.9822
x4-x13	23.9256	10.8545	2.2042	-29.7482	77.5993	53.6737	0.9726
x4-x14	20.5711	10.8545	1.8952	-33.1026	74.2448	53.6737	0.9935
x4-x15	23.406	10.5961	2.2089	-28.9896	75.8016	52.3956	0.9721
x4-x16	24.4525	11.1692	2.1893	-30.7773	79.6823	55.2298	0.9742
x5-x6	4.9805	10.5961	0.47	-47.4151	57.3761	52.3956	1
x5-x7	75.0613	11.1692	6.7204	19.8314	130.2911	55.2298	0.0005793
x5-x8	56.9725	11.1692	5.1008	1.7427	112.2023	55.2298	0.03591
x5-x9	194.8811	10.3798	18.7751	143.5549	246.2073	51.3262	7.356e-11
x5-x10	9.1838	11.1692	0.8222	-46.0461	64.4136	55.2298	1
x5-x11	11.7225	10.5961	1.1063	-40.6731	64.1181	52.3956	1
x5-x12	11.3081	10.8545	1.0418	-42.3657	64.9818	53.6737	1
x5-x13	12.4181	10.8545	1.144	-41.2557	66.0918	53.6737	1
x5-x14	9.0636	10.8545	0.835	-44.6101	62.7373	53.6737	1
x5-x15	11.8985	10.5961	1.1229	-40.4971	64.2941	52.3956	1
x5-x16	35.96	11.1692	3.2196	-19.2698	91.1898	55.2298	0.6413
x6-x7	80.0418	10.5961	7.5539	27.6462	132.4373	52.3956	0.00004718
x6-x8	61.953	10.5961	5.8468	9.5574	114.3486	52.3956	0.006188

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x6-x9	199.8616	9.7604	20.4769	151.5984	248.1249	48.2633	7.356e-11
x6-x10	14.1643	10.5961	1.3367	-38.2313	66.5598	52.3956	0.9999
x6-x11	6.742	9.9901	0.6749	-42.657	56.141	49.399	1
x6-x12	6.3276	10.2638	0.6165	-44.4251	57.0803	50.7527	1
x6-x13	7.4376	10.2638	0.7246	-43.3151	58.1903	50.7527	1
x6-x14	4.0831	10.2638	0.3978	-46.6696	54.8358	50.7527	1
x6-x15	6.918	9.9901	0.6925	-42.481	56.317	49.399	1
x6-x16	40.9405	10.5961	3.8638	-11.4551	93.3361	52.3956	0.3228
x7-x8	18.0888	11.1692	1.6195	-37.1411	73.3186	55.2298	0.9988
x7-x9	119.8199	10.3798	11.5436	68.4937	171.1461	51.3262	1.083e-10
x7-x10	65.8775	11.1692	5.8981	10.6477	121.1073	55.2298	0.00543
x7-x11	86.7837	10.5961	8.1902	34.3882	139.1793	52.3956	0.000006092
x7-x12	86.3693	10.8545	7.957	32.6956	140.043	53.6737	0.00001306
x7-x13	87.4793	10.8545	8.0592	33.8056	141.153	53.6737	0.000009362
x7-x14	84.1249	10.8545	7.7502	30.4511	137.7986	53.6737	0.00002537
x7-x15	86.9597	10.5961	8.2068	34.5642	139.3553	52.3956	0.000005768
x7-x16	39.1013	11.1692	3.5008	-16.1286	94.3311	55.2298	0.4961
x8-x9	137.9086	10.3798	13.2863	86.5824	189.2348	51.3262	7.375e-11
x8-x10	47.7887	11.1692	4.2786	-7.4411	103.0186	55.2298	0.1738
x8-x11	68.695	10.5961	6.4831	16.2994	121.0906	52.3956	0.001135
x8-x12	68.2806	10.8545	6.2905	14.6068	121.9543	53.6737	0.001928
x8-x13	69.3906	10.8545	6.3928	15.7168	123.0643	53.6737	0.001457
x8-x14	66.0361	10.8545	6.0837	12.3624	119.7098	53.6737	0.003354
x8-x15	68.871	10.5961	6.4997	16.4754	121.2666	52.3956	0.001083
x8-x16	21.0125	11.1692	1.8813	-34.2173	76.2423	55.2298	0.994
x9-x10	185.6974	10.3798	17.8903	134.3712	237.0236	51.3262	7.356e-11

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x9-x11	206.6036	9.7604	21.1676	158.3404	254.8669	48.2633	7.356e-11
x9-x12	206.1892	10.0404	20.536	156.5413	255.8371	49.6479	7.356e-11
x9-x13	207.2992	10.0404	20.6465	157.6513	256.9471	49.6479	7.356e-11
x9-x14	203.9447	10.0404	20.3125	154.2968	253.5927	49.6479	7.356e-11
x9-x15	206.7796	9.7604	21.1856	158.5164	255.0429	48.2633	7.356e-11
x9-x16	158.9211	10.3798	15.3106	107.5949	210.2473	51.3262	7.366e-11
x10-x11	20.9063	10.5961	1.973	-31.4893	73.3018	52.3956	0.9903
x10-x12	20.4918	10.8545	1.8879	-33.1819	74.1655	53.6737	0.9938
x10-x13	21.6018	10.8545	1.9901	-32.0719	75.2755	53.6737	0.9894
x10-x14	18.2474	10.8545	1.6811	-35.4264	71.9211	53.6737	0.9982
x10-x15	21.0823	10.5961	1.9896	-31.3133	73.4778	52.3956	0.9895
x10-x16	26.7763	11.1692	2.3973	-28.4536	82.0061	55.2298	0.9444
x11-x12	0.4144	10.2638	0.04038	-50.3383	51.1671	50.7527	1
x11-x13	0.6956	10.2638	0.06777	-50.0571	51.4483	50.7527	1
x11-x14	2.6589	10.2638	0.2591	-48.0938	53.4116	50.7527	1
x11-x15	0.176	9.9901	0.01762	-49.223	49.575	49.399	1
x11-x16	47.6825	10.5961	4.5	-4.7131	100.0781	52.3956	0.1186
x12-x13	1.11	10.5304	0.1054	-50.9612	53.1812	52.0712	1
x12-x14	2.2444	10.5304	0.2131	-49.8267	54.3156	52.0712	1
x12-x15	0.5904	10.2638	0.05753	-50.1623	51.3431	50.7527	1
x12-x16	47.2681	10.8545	4.3547	-6.4057	100.9418	53.6737	0.153
x13-x14	3.3544	10.5304	0.3185	-48.7167	55.4256	52.0712	1
x13-x15	0.5196	10.2638	0.05062	-50.2331	51.2723	50.7527	1
x13-x16	48.3781	10.8545	4.4569	-5.2957	102.0518	53.6737	0.1281
x14-x15	2.8349	10.2638	0.2762	-47.9178	53.5876	50.7527	1
x14-x16	45.0236	10.8545	4.1479	-8.6501	98.6973	53.6737	0.2142

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x15-x16	47.8585	10.5961	4.5166	-4.5371	100.2541	52.3956	0.1151

Figure 5 Shows the testing values of the different variables used for water quality testing in by Tukey Kramer test analysis.

The different variables used for water quality testing are x1=pH value, x2=quality of the total solid content dissolved in the water lakes system being investigated, x3= alkaline water quality analysis, x4= shows the hardness content in water, x5= total concentration of calcium ions, x6= total concentration of magnesium ions, x7=total concentration of chloride ions in the water being tested, x7= total concentration of the sulfate ions being tested in the water, x8= the electrical conductivity analysis of the water being tested, x9= total sodium ion analysis, x10=total potassium ion analysis, x11= total nitrate ion analysis, x12= total phosphate ion analysis, x13= total concentration of the suspended particulate matter, x14= analysis of the total oxygen content dissolved in water, x15= total analysis of the biological demand of oxygen, x16=total analysis of the chemical demand for oxygen in water. The Tukey-test confirms that there is a significant difference between the means of the different variables used for water quality testing.

5. Conclusion:

In regions where pollution plays a significant role in the spread of illness, the lack of access to clean drinking water presents a severe danger to people's health and economic stability. Man Sagar Lake in the Indian state of Rajasthan is a major contributor to pollution due to its long-term and increasing contact with wastewater, toxic waste, and sewage that has been only partly cleaned. The worth of the water was calculated using physiochemical studies, which took into account the water's contents of various elements and compounds, such as total dissolved solids, water hardness, acidity, calcium content, magnesium, chloride, sulphate, and nitrate content. As a consequence of these inquiries, the Board felt compelled to act. The goal of this project is to clean up the polluted Man Sagar Lakes and the surrounding area. Help the environment by using less plastic, finding creative uses for things that can't be recycled and switching to organic produce and products wherever possible. Because more and more individuals are moving to organic foods, there are lesser contaminants found in municipal water supplies. Heavy rains wash away topsoil, so any contaminants that make their way into the soil also will spread along with the water. Yet, soil may be seriously harmed if exposed to a large amount of phosphorus or other harmful substances. The dumping of solid waste should be avoided wherever possible in favor of the trash. Water contamination needs careful consideration of all the potential problems that might arise.

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