International Journal of Food Safety and Public Health
Vol. 12 (2), pp. 01-11, July-December, 2025
ISSN: 2756-3693

Full Length Research Paper

Assessment Of Water Quality Of Mir Alam Tank Hyderabad

Hina Alam[1], Dr. Masroor Fatima[2], Dr. Shakeel Ahmed[3]
[1] Research scholar, Maulana Azad National Urdu University, Gachibowli, Hyderabad, Telangana-500032, India.
[2] Assistant Professor, Department of Zoology, Maulana Azad National Urdu University, Gachibowli, Hyderabad, Telangana-500032, India.
[3] Professor, Maulana Azad National Urdu University, Gachibowli, Hyderabad, Telangana-500032, India.

Accepted 21st May 2025

ABSTRACT:
The city of Hyderabad is known as the Lake City of India owing to the numerous lakes surrounding the twin cities. However, over the years, the city has undergone unplanned urbanization along with the increased establishment of industries. Water quality of the lakes of Hyderabad has declined significantly due to the indiscriminate disposal of sewage and industrial effluents. The present study focused on an assessment of water quality of Mir Alam Tank. The impact of water quality of the lake was assessed by collecting data over a period of six years (2016 -2022) and analysing some of the significant parameters concerning water quality. The parameters utilize included DO, pH, Conductivity, BOD, Nitrates, Total coliforms, Fecal coliforms COD, Chlorides, sulfates, TDS, Sodium, Calcium, Magnesium, Alkalinity, and hardness. The water quality of the Lake was considered unsatisfactory for drinking consumption, according to the Bureau of Indian Standards (BIS) criteria for potable water (IS -10500: 2012). The studies have concluded that the lake has sufficient pollution to preclude aquatic life. The conclusion of this study can useful for the government to assist and strategically develop several different strategies to avert further pollution. The studies can also make contributions with regards to information excellence and research findings in Hyderabad Lakes.

Introduction And History Of Mir Alam Tank

"In the name of God, it flows and thank God it flows and thank God it glides along, 1221 A.H." is written on the tank. Mir Alam Tank is a symbol that truly showcases the city's brilliance in terms of its remarkable architecture and engineering prowess. Nawab Mir Alam Khan, who served as Hyderabad's minister from 1804 to 1808, initiated the construction of this impressive reservoir, also known as Mir Alam Talab. The project began in 1804. It was completed by 1806 and cleverly designed to address the city's water needs during dry seasons; French engineers working for Nizam constructed it (Briglani, 1984). Its building was finished in 1806. By redirecting waters from the Musi River, which is often referred to as Hyderabad's lifeline, through an intricate network of canals and aqueducts, Mir Alam Tank covers an expansive area of approximately 600 acres with a water capacity reaching around 21 million cubic meters.

The primary objective behind the creation of Mir Alam Tank was to establish a source of water for Hyderabad. This visionary endeavour ensured a water supply for essential purposes such as irrigation and domestic consumption throughout all seasons. Additionally, it provided residents with a recreational space encompassed by picturesque gardens and splendid pavilions. The construction of Mir Alam Tank has had an impact on Hyderabad's progress. It has spurred growth in the region, leading to increased productivity and economic prosperity. Furthermore, it has actively contributed to the expansion of the city by attracting settlements and fostering development in its surrounding vicinity The official website of the Telangana Tourism Department provides information about the history and purpose of Mir Alam Tanks. The Mir Alam Tank had a perimeter of roughly 8 kilometres. The 21 semicircular retaining walls that made up the dam had their convex side towards the river. The Mir Alam tank was reportedly used by Hyderabad's citizens to supply drinking water prior to the construction of contemporary storage facilities. For two centuries, Hyderabad citizens have been receiving water from it. Before the establishment of Osman Sagar and Himayat Sagar, it served as Hyderabad's main supply of drinking water. However, resulting from the direct blending of sewage from neighbouring regions and hazardous chemicals from small-scale enterprises, the pollution levels of lakes have increased, and the water is no longer suitable for drinking.

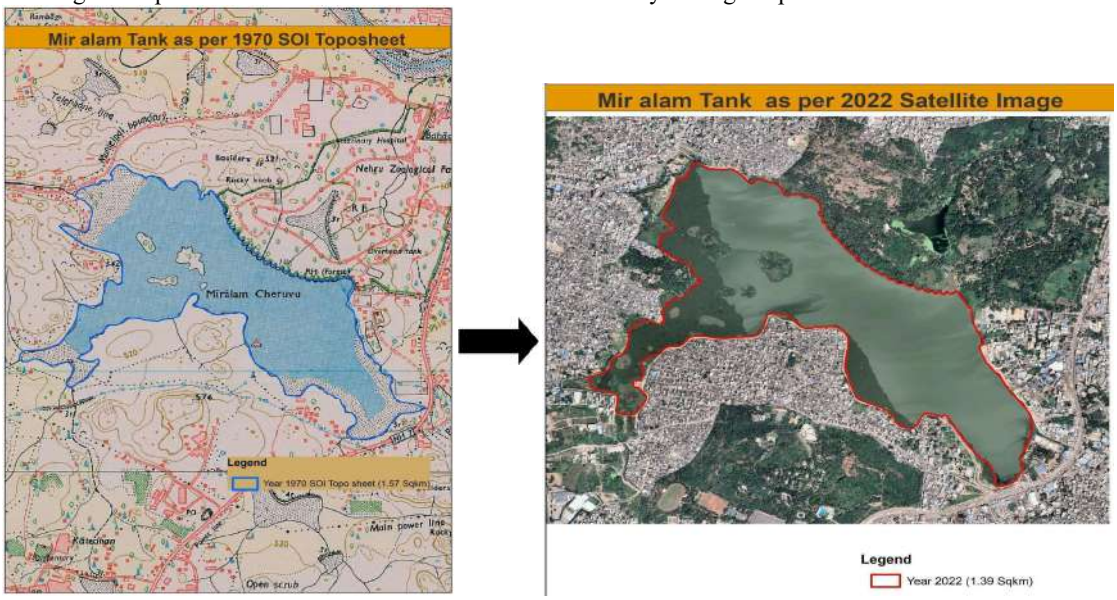
International Journal of Food Safety and Public Health
Vol. 12 (2), pp. 01-11, July-December, 2025
ISSN: 2756-3693

Figure 1: Mir Alam Tank (*Source: Google Maps)*

Mir Alam Tank Location and Morphological Features

The Mir Alam Dam, one of the first dams constructed on the Musi River System, is the only multi-arch (21-arch) dam of its sort worldwide. It was built in 1806. Approximately 7 km to the southwest of the city. Mir Alam Tank, The Rajendranagar neighbourhood relied heavily on the water body as a supply of drinking water. Most of the water for the Nehru Zoological Park and its surroundings came from the lake called Mir Alam till 1960. Its catchment area is 16.5 square kilometers, its surface area is 1.7 square kilometers, and its highest depth is 13.41 meters. The catchment has rocky, rough terrain. The Mir Alam tank, which is located in the city at the geographical coordinates 17°21' N, 78°26' E., had its foundation laid on July 20, 1804, and it was finished on June 8, 1806, about two years later (Google).

Water supply for Hyderabad and the nearby industrial areas was the primary goal of this impoundment. At the moment, it serves as a backup reservoir for watering the downstream-located Nehru Zoological Park. Mir Alam Tank has always supported a sizable biomass and a variety of interests. Along with serving household necessities like fishing and farming, it has also helped the nearby zoological park.



Year 1970 SOI TOPOSheet (1.57 sq. km), Year 2022 SOI TOPO Sheet (1.39 Sq.km)

Figure 2: Study Area of Mir Alam Tank

International Journal of Food Safety and Public Health
Vol. 12 (2), pp. 01-11, July-December, 2025
ISSN: 2756-3693

Evolution of Tank in Terms of Water Quality

The Mir Alam tank was one of Hyderabad's original water sources and was crucial in addressing the city's water shortage. Built in 1806, during the reign of the third Nizam, Mir Akbar Ali Khan Sikandar is still considered a marvel of engineering and the world's first multiple-arch dam. The completion of this tank resulted in a drop in the city's cholera prevalence, according to a 1909 Imperial Gazetteer report. The tank is 13–14 meters deep and is thought to have an area of 1.7 square kilometres. It was Hyderabad's main source of drinking water for 125 years before the construction of the Osman Sagar and Himayat Sagar reservoirs were built in the end. With about twenty-one bodies of water, the Mir Alam basin played a part in the development of agriculture, replenishing and managing the groundwater level, and managing floods.

The loss of the supply routes is also to blame for this. The majority of the connecting waterways that were essential to the survival of this system were mercilessly encroached upon, either in the guise of development projects like the building of highways or other structures or in the name of unauthorized habitation. Industries situated near the Mir Alam Tank often release effluents that contain harmful chemicals and heavy metals without proper treatment or inadequate treatment. The improper management of sewage systems and the presence of illegal connections result in the discharge of untreated sewage, which introduces dangerous pathogens and organic matter into the tank. Additionally, the improper disposal of solid waste, including non-biodegradable materials, close to the tank contributes to water pollution through rainwater runoff. To address these issues. It is crucial to strictly enforce waste management regulations (Hossaini et al., 2013). Industries should be required to treat their effluents before discharging them, and regular monitoring should be conducted to ensure compliance. Furthermore. Investments should be made in upgrading sewage treatment infrastructure and expanding the sewage network to prevent untreated sewage from entering the tank. To raise awareness among local communities about the importance of preserving the Mir Alam Tank and its consequences in terms of water pollution, public awareness and education campaigns are essential. These campaigns can promote responsible waste disposal practices and encourage community participation in pollution control efforts. (Ramachandraiah and Prasad, 2004; Khan et al., 2016).

Methodology :

Various physico-chemical parameters were analyzed in Mir Alam Tank, from the year 2016 to the year 2022. For analysis Monthly data of Mir Alam Tank for seven years, from the year 2016 to is collected from Telangana state pollution control board (TSPCB). The yearly mean of the parameters is taken to know the average values of the selected parameters to prepare the graphs in order to show the variations over a period of seven years. The quality of water is generally analyzed by knowing the pH, temperature, dissolved oxygen, total suspended solids, total dissolved solids, electrical conductivity, total alkalinity, total hardness, and chlorides. The water quality parameters are checked according to the limits provided by(BIS, Indian Standard DRINKING WATER — SPECIFICATION (Second Revision) IS 10500 :2012 DRINKING WATER -SPECIFICATION)

Water Quality Index of Mir Alam Tank

WQI of Mir Alam Tank has shown maximum quality deterioration in the year 2018, post 2018 till 2022 Also, the water quality of the lake is neither drinkable nor suitable for aquatic animals. The main reason of contamination of Mir Alam Tank is effluents and hazardous waste from small industries that are being irresponsibly disposed into the lake water.

Year	WQI	Rating of Water Quality for Saroornagar Lake
2016	510.31	Unsuitable for Drinking
2017	453.06	Unsuitable for Drinking
2018	1440.52	Unsuitable for Drinking
2019	472.64	Unsuitable for Drinking
2020	572.84	Unsuitable for Drinking
2021	461.02	Unsuitable for Drinking
2022	464.27	Unsuitable for Drinking

Table 1: WQI for Mir Alam Tank

International Journal of Food Safety and Public Health
Vol. 12 (2), pp. 01-11, July-December, 2025
ISSN: 2756-3693

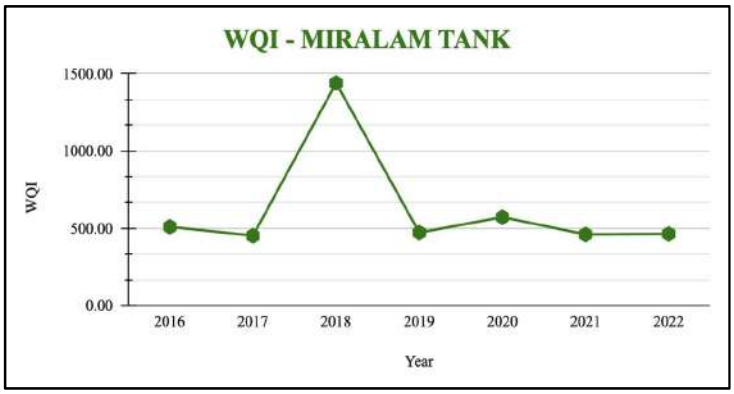


Figure 3: WQI - Mir Alam Tank

RESULTS

The current study evaluated selected physico-chemical characteristics and how they have affected Mir Alam Tank in terms of pollution and water quality during the last seven years. (From 2016 to 2022). The TSPCB provided data on water quality for seven years, from 2016 to 2022, in order to evaluate the lakes' water quality.

MIR ALAM TANK LAKE WATER QUALITY											
Sl.No	**Parameters**	**Unit**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Permissible Limit**	**Remarks**
1	**Temperature**	°C	26.0	26.5	28.7	27.7	27.6	28.1	26.8	10 - 20 °C	Exceeds the limit
2	**DO**	mg/l	1.0	1.6	1.8	1.5	2.6	2.0	2.0	18.0	Less than the limit
3	**pH**	mg/l	7.8	7.8	7.6	7.4	7.5	7.5	7.4	7.5	Exceeds the limit
4	**Conductivity**	µs/cm	1472.4	1533.8	1559.7	1641.3	1312.8	1319.8	1323.4	400.0	Exceeds the limit
5	**BOD**	mg/l	20.9	15.1	10.3	15.8	11.4	5.6	5.1	2.2	Less than the limit
6	**Nitrates**	mg/l	5.4	7.4	7.4	5.9	5.9	3.0	4.3	10.0	Less than the limit
7	**Total Coliforms**	mpn/ml	393.1	339.9	1445.5	354.2	494.2	384.2	391.0	0.0	Exceeds the limits
8	**Faecal Coliforms**	mpn/ml	66.3	39.9	68.6	27.0	17.7	37.1	34.0	0.0	Exceeds the limits
9	**COD**	mg/l	101.4	86.9	90.8	104.4	92.7	55.3	54.9	500.0	Less than the limit
10	**Chlorides**	mg/l	196.0	213.0	214.2	220.1	178.4	168.3	174.0	250.0	Less than the limit
11	**Sulphates**	mg/l	103.5	93.4	107.9	95.3	74.9	92.7	96.2	400.0	Less than the limit
12	**TDS**	mg/l	938.7	937.9	1000.4	1024.8	804.1	797.3	803.4	500.0	Less than the limit
13	**Sodium**	mg/l	138.0	129.9	154.9	163.7	150.4	134.3	170.0	400.0	Less than the limit
14	**Calcium**	mg/l	118.5	128.3	125.6	94.6	73.0	91.9	86.3	75.0	Less than the limit
15	**Alkalinity**	mg/l	315.8	324.0	344.8	403.6	297.8	337.8	316.1	200.0	Less than the limit
16	**Magnesium**	mg/l	52.8	60.6	48.1	53.0	34.6	35.6	32.5	30.0	Less than the limit
17	**Hardness**	mg/l	443.2	486.8	428.8	454.6	324.8	376.1	349.2	200.0	Less than the limit

Table 2: Mir Alam Tank Water Quality

International Journal of Food Safety and Public Health
Vol. 12 (2), pp. 01-11, July-December, 2025
ISSN: 2756-3693

Temperature: Mir Alam Tank, a historically significant water body in Hyderabad, displays moderate temperature changes due to its relatively larger size and depth. The temperature stratification in this tank is less pronounced compared to smaller lakes. However, the urban runoff and pollutants entering the tank can exacerbate thermal stress on fish by introducing additional temperature fluctuations and degrading water quality.

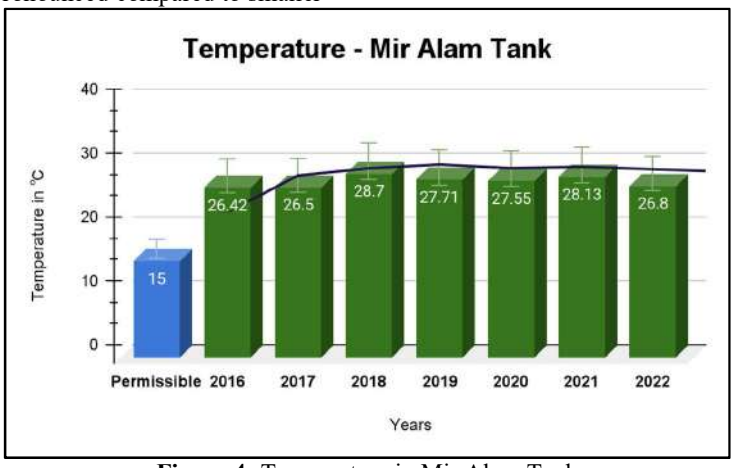


Figure 4: Temperature in Mir Alam Tank

DO: The present study reveals that dissolved oxygen in Mir Alam Tank is much less than the expected limits. Dissolved oxygen in water is a very important parameter for supporting aquatic life. The results of this study show that even though dissolved oxygen has improved over time, it is still considered poor.

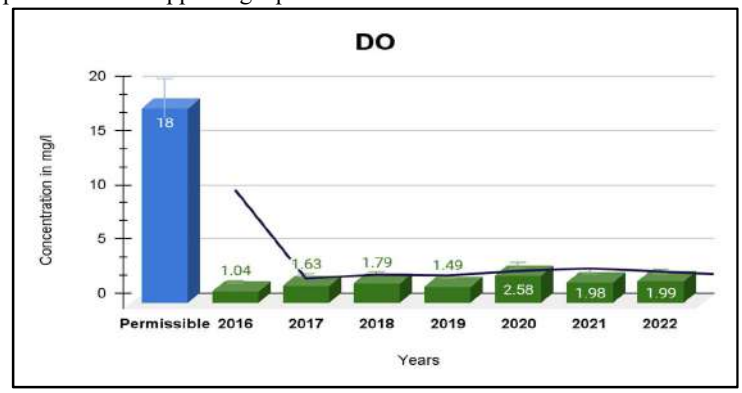


Figure 5: DO in Mir Alam Tank

pH: The pH of any aquatic ecosystem has a very significant role in the survival of aquatic life. pH values of Mir alam Tank for seven years did not vary much.

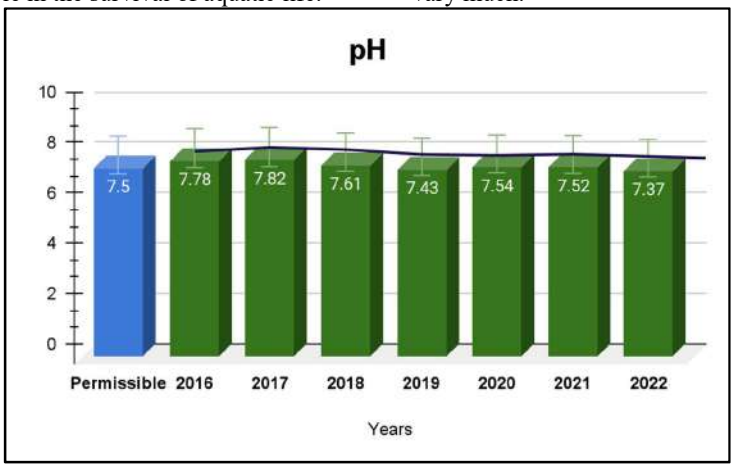


Figure 6: pH in Mir Alam Tank

International Journal of Food Safety and Public Health
Vol. 12 (2), pp. 01-11, July-December, 2025
ISSN: 2756-3693

Conductivity: Significant changes in water conductivity are indicative of the discharge or another potential source of pollution that has entered the aquatic environment. The values of conductivity in Mir Alam Tank over a period of seven years are indicative of contaminants.

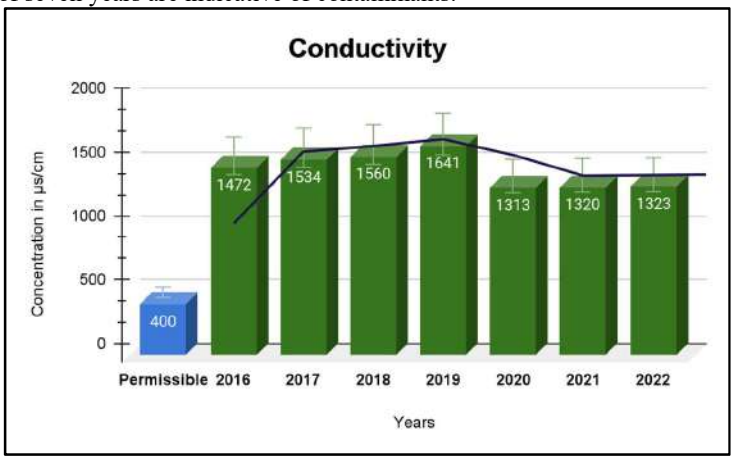


Figure 7: Conductivity in Mir Alam Tank

BOD: Biological oxygen demand, or BOD, is one of the most significant water quality indicators for pollution. An increased BOD indicates a higher level of organic oxidizable matter in the lake. Domestic sewage, agricultural runoff, and industrial discharges are the primary sources of organic enrichment in aquatic ecosystems. The year 2016 saw the highest BOD found in the Mir Alam tank.

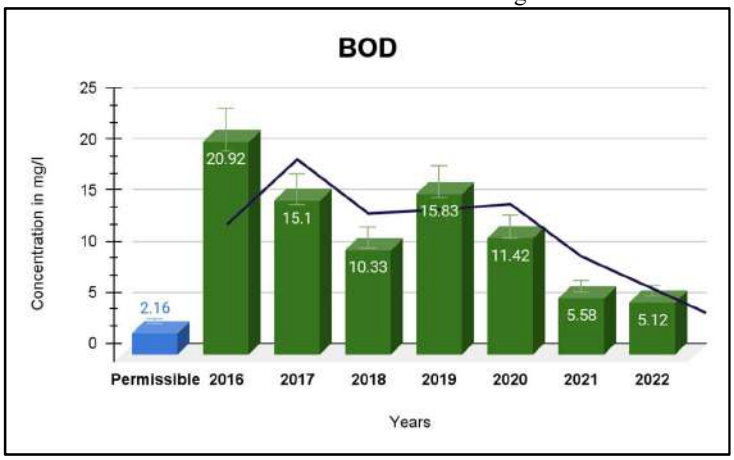


Figure 8: BOD in Mir Alam Tank

Nitrates: Nitrates are crucial nutrients for aquatic ecosystems, playing a vital role in the proliferation of plants and animals in aquatic systems. The heavily oxidised form of nitrogen compounds, nitrate, is created when organic nitrogenous materials break down aerobically. It is frequently found in natural water sources. However, the nitrate concentrations in Mir Alam Tank are found to be relatively low.

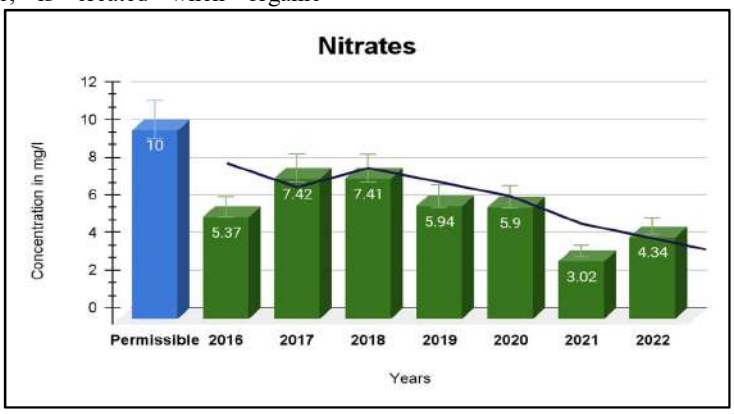


Figure 9: Nitrates in Mir alam Tank Lake

International Journal of Food Safety and Public Health
Vol. 12 (2), pp. 01-11, July-December, 2025
ISSN: 2756-3693

Total Coliforms: Total coliform bacteria are an indicator of contamination of the water system through animal waste and failed septic tanks. The contamination of freshwater bodies by E. coli is a serious problem. The number of coliform bacteria in 2018 was maximum in the Mir Alam tank.

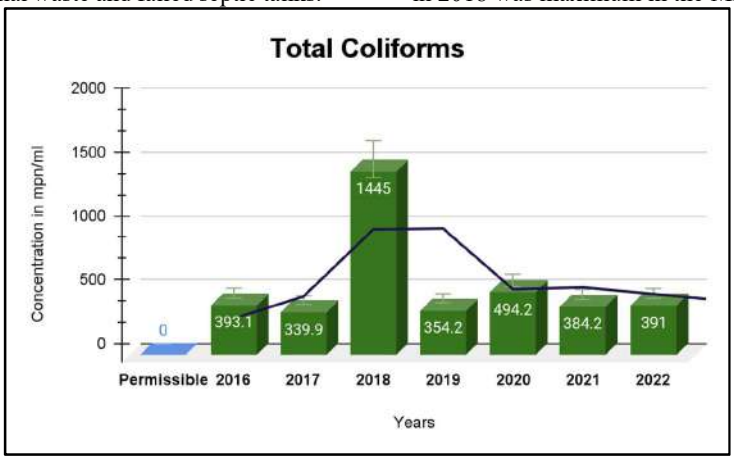


Figure 10: Total Coliforms in Mir Alam Tank

Faecal Coliforms The presence of faecal coliform bacteria in aquatic environments indicates that the water source has been contaminated by human or animal waste. The presence of faecal contamination of water indicates the potential risks involved with the exposure of such water. In 2016 and 2018, the maximum number of coliform bacteria were observed in the Mir Alam Tank

.

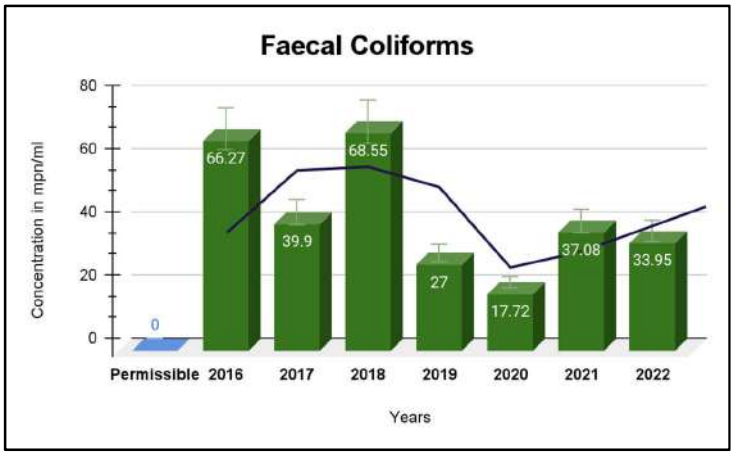


Figure 11: Faecal Coliforms in Mir Alam Tank

COD: The requirement for oxygen may also increase in the presence of non-biological waste. Chemical oxygen demand, or COD, includes all substances other than organic matter that increase oxygen need. As a result, the COD value always exceeds the BOD value. The COD value has decreased over a period in the Mir Alam Tank .

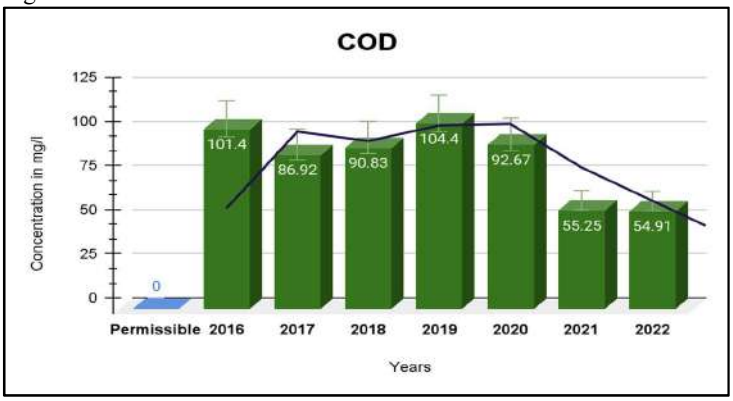


Figure 12: COD in Mir Alam Tank

International Journal of Food Safety and Public Health
Vol. 12 (2), pp. 01-11, July-December, 2025
ISSN: 2756-3693

Chlorides: Fish and amphibians, among other aquatic organisms, may be poisoned by excessively high chloride levels**.** In Mir Alam Tank, the chloride concentrations varied from 54.91 mg/l to 104.4 mg/l.

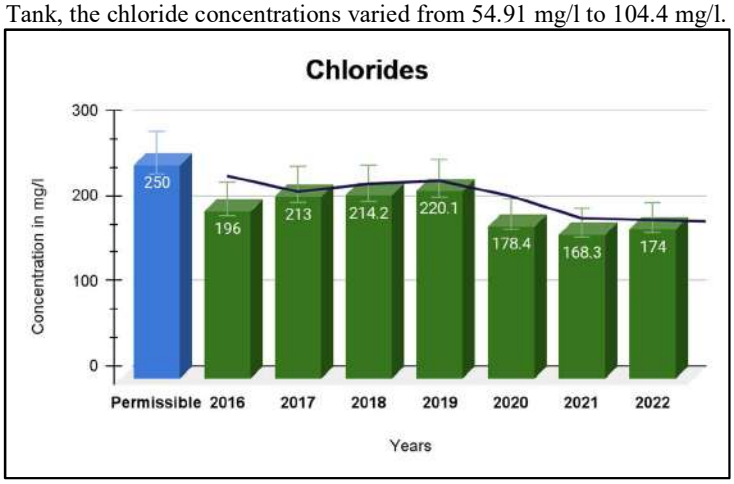


Figure 13: Chlorides in Mir Alam Tank

Sulphates: Sulphates are a natural or synthetic byproduct of sewage or industrial pollutants. Anthropogenic sources of sulphate are sewage seepage, fertilisers, artificial cleansers, industrial effluents, and mining runoff. In Mir Alam Tank, the sulphate maximum value is in 2019.

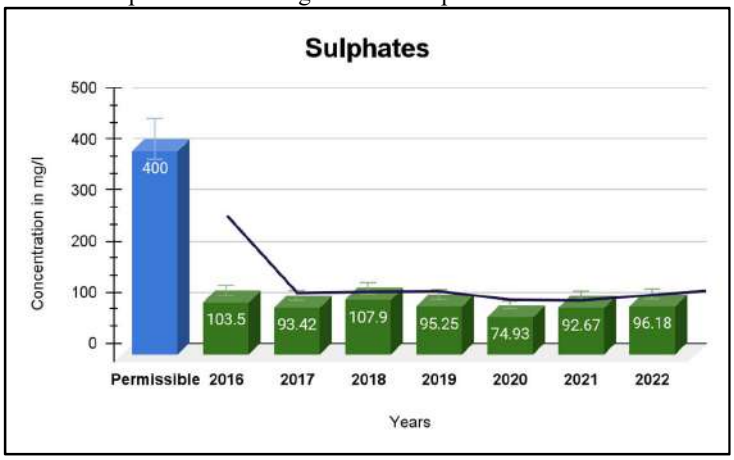


Figure 14: Sulphates in Mir Alam Tank

TDS: Total Dissolved Solids (mg/l) are important parameters for analysing the quality of water. The nature, size, shape, colour, density, and dispersion of suspended particles affect the underwater environment as well as the translucent and coloured aspects of the water body. The Total Dissolved Solids (TDS) values ranged from 209.5 to 451.67. The year 2019 saw the highest TDS values in the Mir Alam Tank.

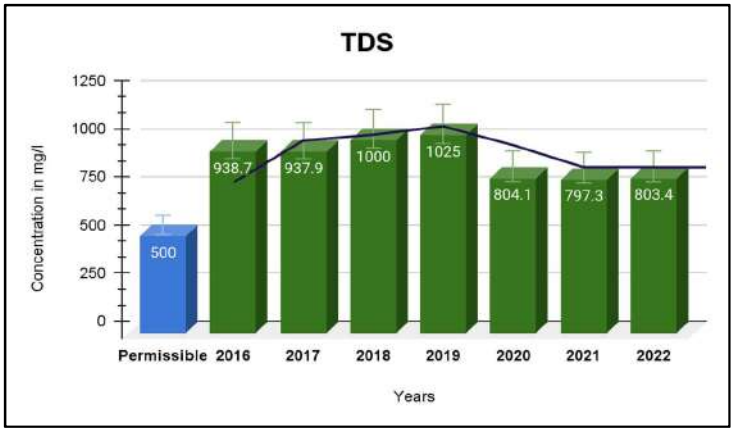


Figure 15: TDS in Mir Alam Tank

International Journal of Food Safety and Public Health
Vol. 12 (2), pp. 01-11, July-December, 2025
ISSN: 2756-3693

Sodium: Many rivers and lakes contain significant amounts of salt contamination. Most of the sodium contamination of freshwater bodies happens because of the industrial effluents discharged in lakes irresponsibly. Mir alam Tank showed a low level of sodium over the years.

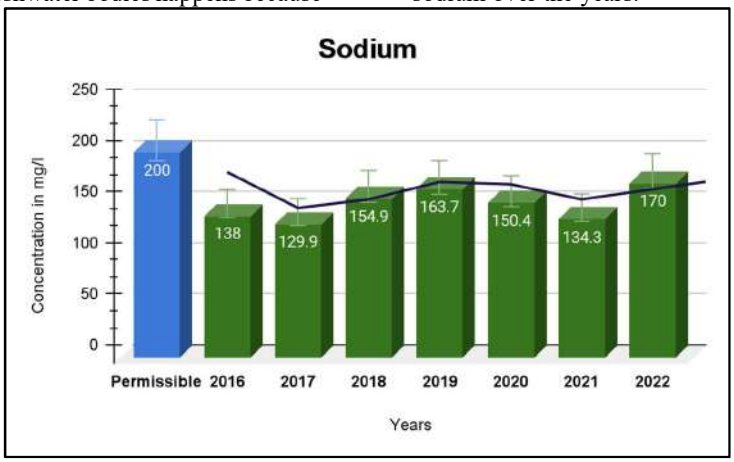


Figure 16: Sodium in Mir Alam Tank

Calcium: The allowable limits for the calcium content of Mir Alam Tank have been exceeded, with fluctuations occurring between 86.25 mg/l and 128.3 mg/l**.** Water hardness is significantly influenced by the calcium content of the lake

.

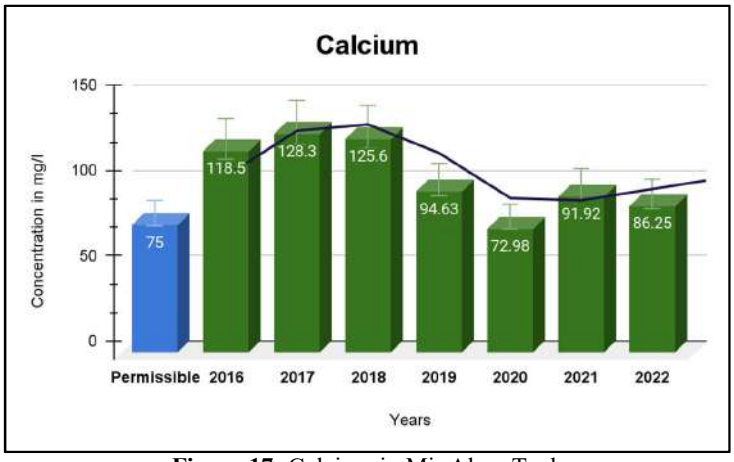


Figure 17: Calcium in Mir Alam Tank

Alkalinity : is also known as the water's quantitative ability to neutralise acids. Higher amounts of alkalinity help to maintain the pH level; hence, alkalinity and pH are connected. In the past 7 years, the alkalinity value has ranged from 297.8 mg/l to 403.6 mg/l.

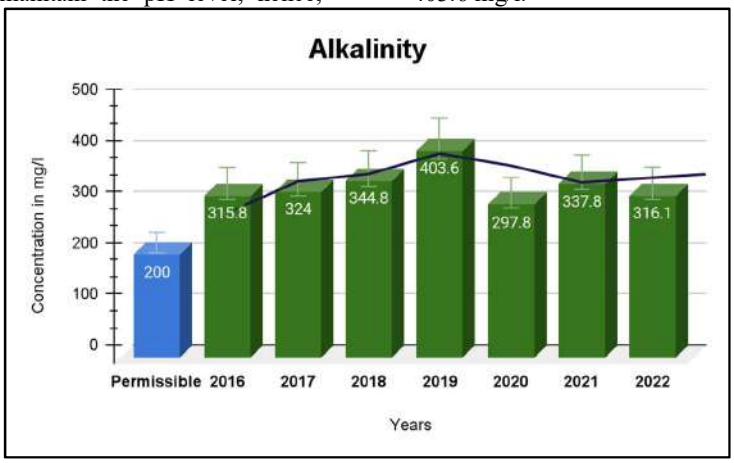


Figure 18: Alkalinity in Mir Alam Tank

International Journal of Food Safety and Public Health
Vol. 12 (2), pp. 01-11, July-December, 2025
ISSN: 2756-3693

Magnesium: Magnesium reaches lakes through the leaching of rocks. It is a vital component of chlorophyll. In Mir Alam Tank, magnesium is present in a relatively high quantity, surpassing the permissible limit of 30 mg/l.

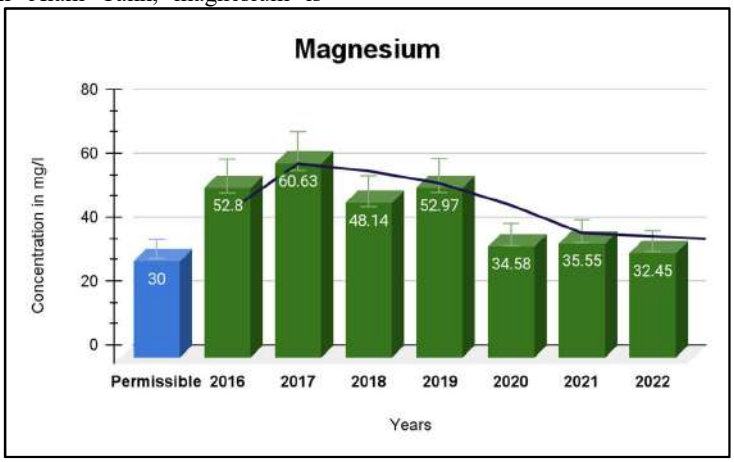


Figure 1.19: Magnesium in Mir Alam Tank

Hardness. The acceptable limit for hardness is 200 mg/l. Generally, hard water is considered less toxic for aquatic life as some of the toxins can form insoluble precipitants and settle down. In Mir Alam Tank, the hardness of water was the least during the year 2020.

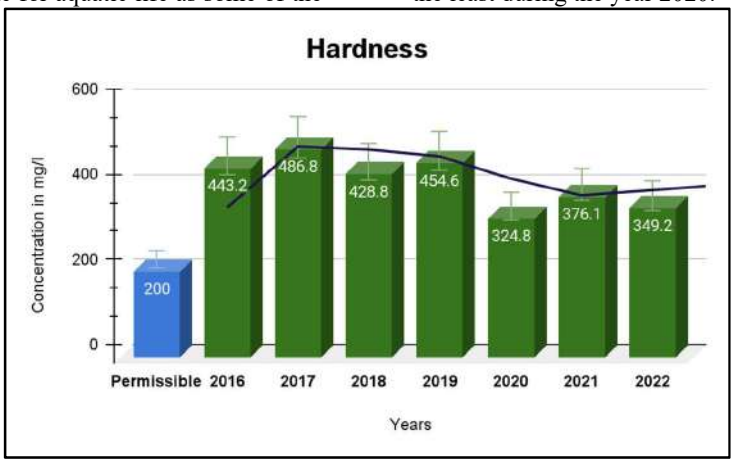


Figure 1.20: Hardness in Mir Alam Tank

Conclusion

The water quality of Mir Alam Tank, located in Hyderabad, India, also presents a concerning situation similar to that of Shamirpet Lake. Data spanning from 2016 to 2022 indicates a continuous decline in water quality, making it unsafe for human consumption and endangering the aquatic ecosystem. Low dissolved oxygen levels and high biological oxygen demand, which are issues similar to those seen in Shamirpet Lake, indicate a severe threat to aquatic life. The presence of coliform bacteria in Mir Alam Tank water points towards untreated sewage contamination, raising concerns about public health and the overall well-being of the lake's ecosystem. Despite the passage of time, there is a lack of substantial improvement in the lake's health, suggesting that the current conditions may persist or worsen without intervention. Regular monitoring is essential to prevent further contamination and track fluctuations in water quality over time. Additionally, it is strongly recommended to implement bioremediation techniques to address the specific issues affecting Mir Alam Tank. By using organisms or natural processes to remove pollutants and restore ecosystem balance, bioremediation techniques can significantly improve the quality of water. In conclusion, the situation in Mir Alam Tank is alarming, and urgent steps, including continuous monitoring and the application of bioremediation techniques, are necessary to safeguard the lake's water quality and support a healthier aquatic environment.

References

[1]. Briglani, S. A. A. (1984) Landmarks of the Deccan. Delhi: Manas

[2]. Hossaini Motlagh, A., Navatha, K. and Reddy, P. (2013). Ecological studies of Mir

Alam lake with reference to water quality. *Nature Environment and Pollution Technology*, 12(2), 355–358.

[3]. Khan, M. A., Rao, D. V. S. N., Khan, M. M., & Ranjeet, P. (2016). Water quality standards and its effects on Mir Alam Tank and surrounding environment.

[4]. Ramachandraiah, C. and Prasad, S. (2004). *Impact of Urban Growth on Water Bodies: The Case of Hyderabad*. Working Paper No. 60, Centre for Economic and Social Studies, Hyderabad. Cambridge University Press & Assessment.

[5]. HAGIWARA, K. (1979). Water Pollution and BOD. Japan journal of water pollution research,\ 2 (3), pp. 123 – 131. doi:https://doi.org/10.2965/jswe1978.2.123.

[6]. Rafi, P.M., Kusum, A.J., 2018. Review of Hussain Sagar Lake pollution, Hyderabad, India. Int.J. Environ. Agric. Biotechnol. 3, 543–549. https://doi.org/10.22161/ijeab/3.2.31.

[7]. Dr.A.V.Rajashekhar, J.Mahender,(2016) Analysis Of Water Quality Parameters On Shamirpet Lake, Rangareddy District, Telangana State, India.

[8]. Buttner, J.K., R.W. Soderberg, and D.E. Terlizzi. (1993). An introduction to water chemistry in freshwater aquaculture [Publication No. 170-1993]. Dartmouth: University of Massachusetts, Northeastern Regional Aquaculture Center.

[9]. Parikh Ankita N. and Mankodi P.C., (2012). Limnology of Sama Pond, Vadodara City, Gujarat Research Journal of Recent Sciences, 1(1), 16-21.

[10]. J.Mahender, K.Ramesh and A.V.Rajshekhar. (2016). Assessment of water quality with reference to fish production in Chenugonipally pedda cheruvu, mahabubnagar dist, telangana. International Journal of applied biology and Pharmaceutical Technology, Vol(7), Issue(2).

[11]. D.D.Mishra, S.S.DARA, (2011). A Text book of Environmental Chemistry and Pollution Control, 9 th edn., WHO Guidelines for Drinking Water Quality, (1993). Second Edition VoLl p 52- 82, Geneva.

[12]. Ganai H.A parveen S and Khan A. (2010). Study of some physico-chemical parameters in a medical pond, Aligarh, The Ekol,10(1-2).

[13]. Kiran B.R. (2010). Physico–chemical characteristics of fish ponds of Bhadra project at Karnataka, Rasayan, J.Chem., 3(4) 671-676.

[14]. Wetzel, R.G. (2001). Limnology: Lake and river ecosystems, 3rd ed. San Diego, CA: Academic Press.

[15]. G.Srinivas(2022) ,Study Of Water Quality Parameters Of Lakes In And Around Hyderabad

[16]. Prahalad A.K.,(1987) Ph.D. thesis at Osmania University in Hyderabad, India, titled "Impact of Human Activity of the Heavy Metal Pollution in Water Profile, Sediment and Biota of an Industrially Polluted Saroornagar Lake."