

PAST, PRESENT AND FUTURE OF POWAI LAKE, [MUMBAI] AND REVIVAL THROUGH - HOLISTIC ANALYSIS

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Abstract

The original potable water supply to Bombay [Mumbai] metropolitan city and its suburban area, by large depend upon Five lakes namely: Tulsi, Tansa, Vaitarana, Vihar and Powai. These lakes had been constructed during British India period during middle to last phase of eighteen century and beginning phase of nineteen century. All lakes are still functioning well, except Powai lake. The Powai lake has been under severe environmental degradation, garbage cum waste disposal, causing deterioration in lake water quality and enhancing lake sedimentation by local residents.

Several attempts have been made for revival and survival of Powai lake by eminent environmental engineers, chemists, zoologists and limnologists but seem to be futile in the want of desired success. An attempt has been made for revival of Powai lake through holistic analysis with considering its past, present and future. The remedy for existence of Powai lake precisely occupies by ethical, moral and humanitarian values of bonafide gentle residents of the surrounding of lake within its 5-8 km radius distance range and whole heart's good wishes through concerned persons.

Introduction

Powai lake of artificial category had constructed during emergency in order to sustain forthcoming "Water Famine" in the month of June 1889. The construction work had proceeded through damming local Mithi river in between two adjacent hillocks of elevation 31 feet [10 meter] from the ground surface, belonging to Borovili-Powai ridge by British Water-Work Engineer Mr. Tomlinson in the Premji Kavasli Powai estate and named after estate as 'Powai lake'. **The construction work had completed in 1891, involving the cost of Rs Six Lakh and Fifty thousand for the provision of 2 Million Gallon water per day [9 Million Liter per day] domestic water supply of potable nature**, since it was belonging to Mithi river- sweet and potable flowing water body.

Powai lake has been 130 years old and still with proud of Mumbai lakes, within the main part of city today. The holistic analysis of Powai lake has been carried out as past [during 1891 to 1919], present [during 1920 to 2019] and future since 2020 onward till local residents's wish. Powai lake had already lost its potable nature since long during past and facing environmental degradation presently with the danger of extinction in future. In- deed, it requires restoration/ revival for sake of humanity and environmental conservation.

Area of study

Powai lake is at 27 km distance in north-east direction from the original main Mumbai city. It is approachable by nearest Railway Station 'Kanjur Marg' [west] on Central Railway. Presently, it is under extensive use for non-domestic activities, like: Larsen Tourbro, Aarey colony, Commercial vehicle cum Cattle washing, Dispersion of Lord Ganesh idols during festival and recreational purpose. It is surrounded by Hiranandani residential complex, Renaissance Mumbai Convention Centre, Adani Electricity Management Institute, Directorate General of Shipping, Restaurants-hotel & club, IIT Campus, NITIE Campus and Powai garden, which exhibit typical character of entrophicated ecosystem [6].

The geographic coordinates of Powai lake are: Longitude E 72° 54' to 72° 55' and Latitude N 19° 17' to N 19° 18'. The location map of Powai lake is illustrated as Fig.1.

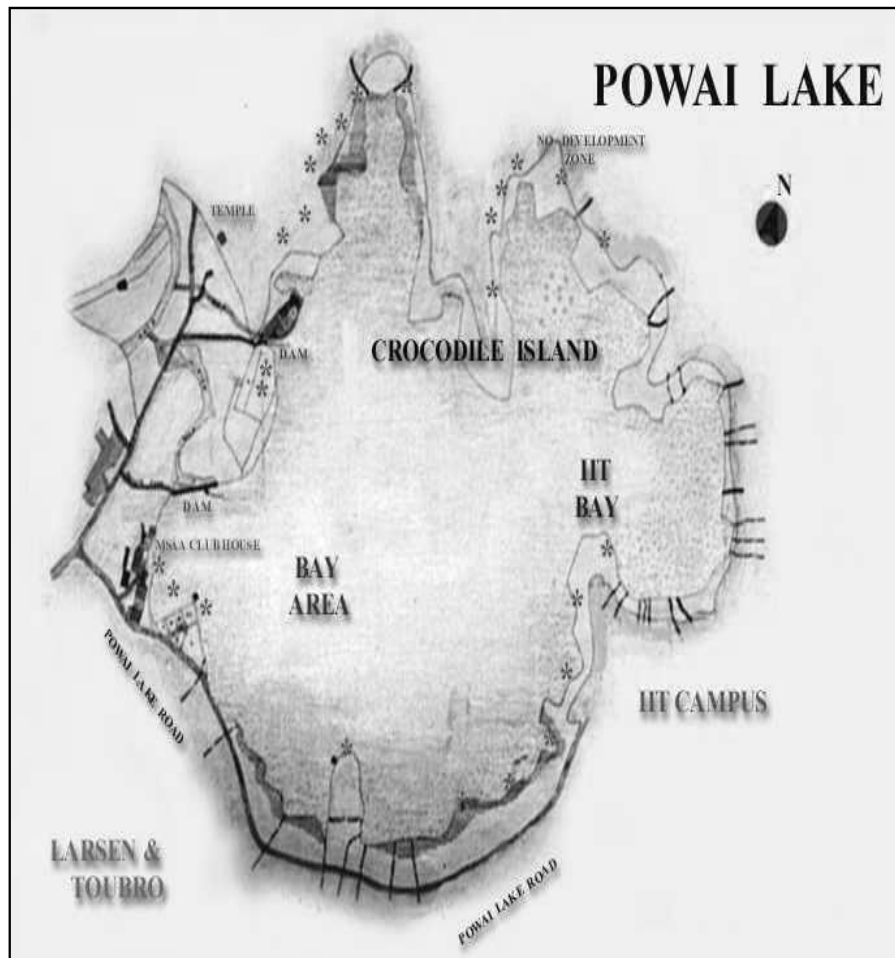


Fig. 1 Location Map of Powai Lake, Mumbai

Methodology & Objectives

The evolved methodology is holistic analysis, based upon conventional approach as relevant literature review cum personal discussion with colleagues of I I T Bombay campus in and off, with the following objectives:

- Past Scenario of Powai lake
- Present status of Powai lake
- Future [Positive & Negative] aspect of Powai lake

Literature Review

Powai lake has been studied under three sub-heads namely: Hydrology, Lake Sedimentation and Lake water Quality and summarized as follows:

Hydrology:

Powai lake had constructed over local sweet water flowing body named 'Mithi River'. The origin of Mithi river had been in dense forest area of Borovili [1889] and still it is part of Sanjay Gandhi National Park, today. Nowadays, the local residents and surrounding Industries treat Mithi river as **Open Nallah**. There was

serious flood in Mithi river during July 2006 on account of illegal encroachment and environmental degradation. Mithi river passes through Andheri [east], Vile Parle [east] Santacruz [east], Bandra [east] localities and finally meets to Mahim bay as part of Arabian sea, covering with length of 15 Km [7]. The river has been narrow but widen gradually and widest at Bandra-Kurla complex. The river has been under tidal influence of Arabian Sea and extends up to 5 Km inside towards Vakola and Santacruz airport. The entire stretch of Mithi river in relation to Powai & Vihar lake has been illustrated as Fig.2.

The silent hydrological aspects of Powai lake are as follows: [4]

- Catchment area of Powai lake = 6.61 Sq. Km.
- Average annual rainfall in catchment area of Powai lake = 2540 mm [1000 inches]
- Altitude of ground surface ,surrounding of Powai lake...= 585 m
- Maximum depth of Powai lake = 12 m
- Minimum depth of Powai lake = 03 m
- Water spread area of Powai lake = 2.70 Sq. Km. [520 acre]

The Powai lake overflows after sixty days of moderate rainfall through Powai dam since long and still continued also, at present.



Fig.2 Entire stretch of Mithi river with reference to Powai lake

Lake Sedimentation-

Lake sedimentation has been tremendous in Powai lake since long. It is due to the construction waste disposal from residential complex, Industrial development. The study conducted in 1995, has revealed that, 45, 00 Lakh Cubic meter of silt type material has been deposited in Lake since its inception.

The water spread area of lake has shrinkage trend. It is due to the disposal of untreated domestic waste, garbage from local slum area and dispersion of Lord Ganesh idols during Ganpati festival. The temporal satellite data of Landsat-1 [1973] and Landsat-8 [2014], with the gap of 31 years, using Arc 10.1 GIS tool exhibit the status, as illustrated in Fig.3, with decrease by 26% water spread area [5].

Two PIL have been filed in Bombay High court during 2000 and 2001 for saving the Powai lake [7]. National Lake Conservation Plan of MOEF & CC has initiated a scheme in April 2002. The Detailed Feasibility Report [DFR] has been prepared by Consultant M/s Wochardt Limited with the grant of Rs 6.62 Crores [3].

Lake Water Quality-

The Dissolved Oxygen [DO] level in Powai lake has decline trend at alarming rate, which is essential for survival of aquatic organism. It has been monitored during three different periods, with the following observation [4]:

- During 1961-1963, DO level = 2.80 to 7.80 mg/Liter.
- During 1972-1977, DO level = 4.00 to 12.40 mg/Liter.
- During 1979-1980, DO level = 1.70 to 07.90 mg/Liter.

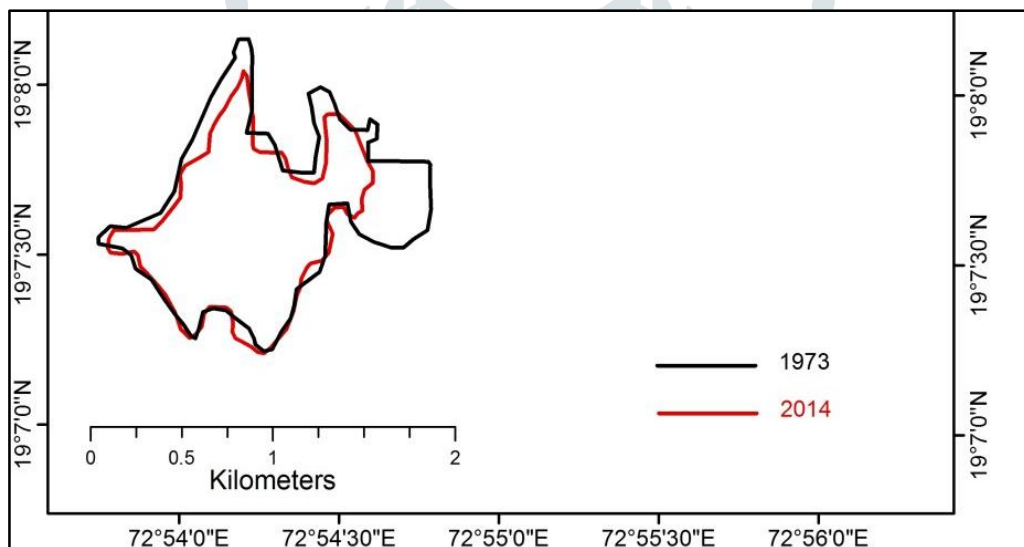


Fig. 3 Change Detection in Powai lake through Temporal satellite data in between 1973-2014 [31 years]

IIT Bombay has launched a scheme in 1980, entitled, 'Revitalization of Powai lake' with objective to store lake into its primitive original and sustain by adopting eco-friendly design [3].

Powai lake has been associated with luxurious growth of aquatic weeds and water hyacinth due to serious water pollution. It has adverse role on fisheries. Powai lake is the house of several aquatic wild water borne animals like: Crocodile, Hawk, King fisher, Corn rich, Wild Fowl, Crane, Egad and Turtles [6].

Maharashtra Pollution Control Board has conducted comprehensive study /profiling of Mithi river including Powai lake in 2014 for environmental conservation, with several useful suggestions [4].

Thirteen physio- chemical parameters of water quality of Powai lake on monthly basis during October 2016 to May 2017, has stressed the emphasis on monitoring water quality in order to save Powai lake [1&2].

Result & Discussion

Powai lake once upon in sub-urban area of Mumbai city, now becomes the main part of city on account of intensive population increment and allied livelihood activities. The lush green cultivated area in front of IIT campus in 1975 has vanished totally with the replacement of concrete jungle in 2010. It has developed noisy environment with serious variety of environmental degradation. The holistic analysis for the desired objectives has been summarized as follows:

✓ Past Scenario of Powai lake

It covers the period in between 1891 to 1919 and probably the best golden days for Powai lake in terms of fulfilling the objective of domestic water supply of potable nature [though under British India period]. The lake portion had been without any protective or safety measures, since beginning and still going on in similar way. The Powai lake, with its surrounding was the natural spot for sight- seeing, getting fresh breathing, fishing cum boating and picnic holiday enjoyment by British officers as 'Anglers Paradise'.

The little bit nuisance cum encroachment was initiated by local/native people in 1915. The British Government had attempted to check over undesired activity for safety and conservation of Powai lake by spending Rs five Lakh in 1919, but was not successful for losing the potable nature of lake water. Meanwhile, the other three lakes of Bombay had been under construction to completion for potable domestic water supply. Vihar lake had been constructed in 1859, earlier than Powai lake

✓ Present status of Powai lake

It covers the period in between 1920 to 2019 with four twenty years of slab and last of fifteen years slab - as [a] 1920-1940, [b] 1941 -1961, [c] 1962-1982, [d] 1983-2003 and [e] 2004-2019. The silent features of each slab have been summarized as follows:

[a] 1920-1940 period: - The nuisance in terms of encroachment and safety arrangement to Territory of Powai Lake became more by local people/natives with blending of national movement for freedom of India. The impact of World War I and danger of World War II had influenced all public development activities with more stresses to defense sector by British Government. The domestic water supply from Powai lake had been disrupted on account of un-potable water quality, as well as functioning of other four lakes namely: Tulsi, Tansa, Vaitarana, Vihar successfully.

[b] 1941-1961 period: - The agitation cum political movement by native Indians became more active against British Government. India achieved freedom in 1947 and British Government was taken by Indian government with partition of country. It had influenced the population pressure from Punjab and Bengal with more stress on domestic water supply and other water utilization aspects in Bombay. IIT Campus around Powai lake had established in 1958, with utilization of lake water for construction activity as well as local labors for mass open defecation and other daily uses. Bombay film industry had good start with film shooting at various natural spots including Powai lake. The reputed class people had stated more frequent visits for fishing, boating and kite flying and recreational purpose.

[c] 1962-1982 period: - It had witnessed the overall activities around Powai lake - as market development, residential house including cultivation, NITIE campus, Bank etc. The Film Industry had been active with Hindi film shooting 'Javai-Diwani' [1974-75], casted by Randheer Kapoor and Jaya Bhaduri in IIT campus. The adjoining area of IIT campus had still lush green scenario with cultivable land. The encroachment to lake from all directions was active with no objection by any statutory authority.

[d] 1983-2003 period: - It had witnessed the growth of real estate business. The large scale construction activity, multi -flat building, shopping complex had emerged at full swing along with growth of slum area. It had become the part of main Mumbai city. It had intensified the environmental degradation of Powai lake in multiple dimensions. The cultivated land had been converted into residential land. The local hillocks & hills have been vanished for utilization of coarse aggregate in construction activity.

[e] 2004-2019 period: - The real estate lobby with more power and political support had intensified activity around land portion of Powai lake by all possible means with concept of lake reclaimed land on account of excessive population pressure. The construction of more hostels and residential buildings in IIT Campus, Hotel & Restaurants and Directorate General of Shipping, Adani Electricity Management Institute, Renaissance Mumbai Convention Centre, Express –Way with heavy road traffic had clustered the area around Powai lake with more noisy situation.

✓ Future [Positive & Negative] aspect of Powai lake

It has been since 2020 and still going on till bona-fide local resident's desire towards their intention to face impact either positive or negative of Powai lake. The environmental degradation of Powai lake seems to reach beyond its sustainable capacity. The concerned people of real estate business, politicians, and technocrats with strictly enforcement of statutory norms have to play their crucial role. Virtually, all efforts so- far for check over environmental degradation of Powai lake have proved as eye wash /customary fashion.

The role of positive impact of Powai lake has been associated with its industrial use, recreational and gardening as well as picnic.

The role of negative impact of Powai lake has been associated with untreated waste disposal from Hotel & Restaurant, garbage disposal of residential complex, slum area, cattle and commercial vehicle washing, domestic waste from Posh colony and medical waste from clinic/hospital.

If the trend of negative impact is excessively more than positive impact, Powai lake may become soon as small dirty pond [as designated Powai Talav in Google image of 2020], with lake reclaimed land surrounding it- at par with John Milton's famous poem "Paradise Lost & Paradise Regained" for anglers.

Conclusion

The re-construction of potable water scheme for domestic water supply in mega-metropolitan city like Mumbai is not an easy going task. It is very costly affair and with full of technical challenges. The continuous environmental degradation of Powai lake has 'NO COST' in comparison to the efforts, dedication in construction of it, that too 130 years ago. It is the requirement and need of humanity and mankind of every bona-fide of local resident to consider the following for the safe existence of Powai lake:

- It serves still as natural rainwater buffer zone for the people of surrounding, with recharging local aquifer.
- The ethical & moral values of local people with their self interest have vital role in execution of any scheme for revival and survival of lake.
- The co-existence of flora, fauna and human being requires safe and healthy situation of lake under sustainable development of ecosystem.
- If there is wish, there will always be way to solve the issues.
- It should be remembered, always the basic principle of nature- 'Past is the key of Present and Present is key for Future.'

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