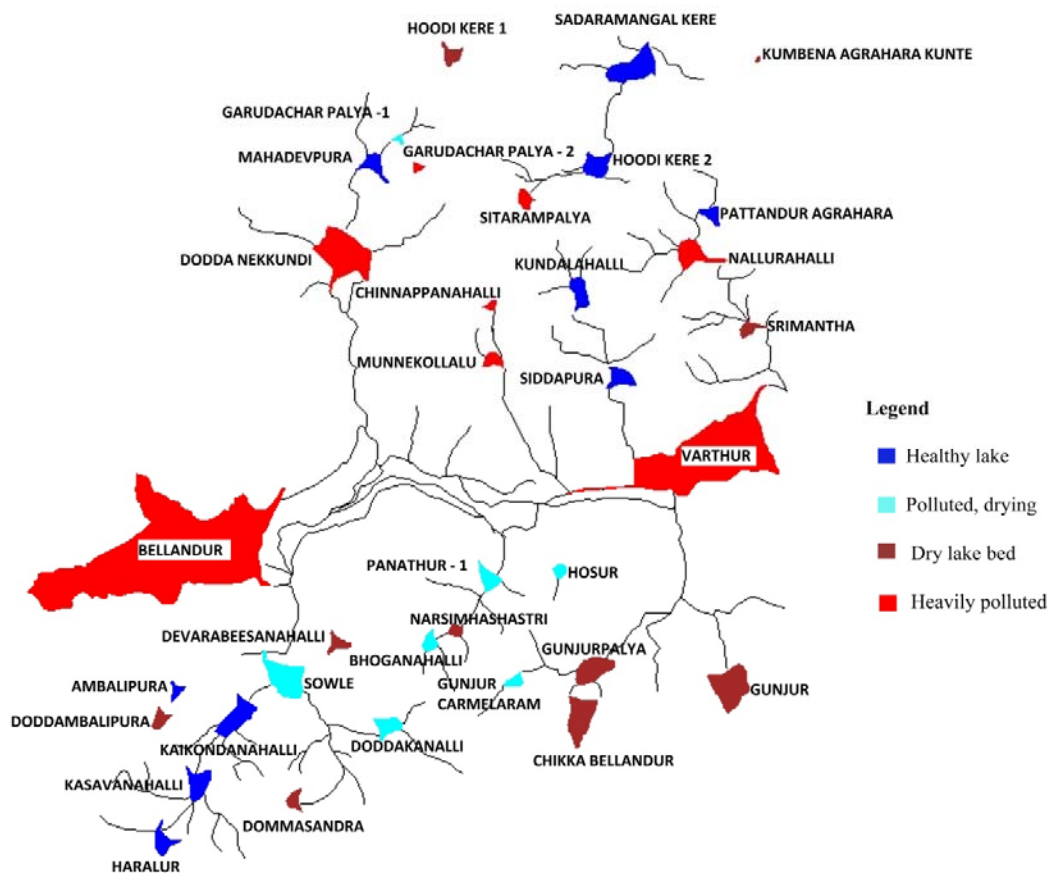


LAKES OF MAHADEVPURA CONSTITUENCY, BENGALURU – CURRENT STATUS, CHANGES IN DISTRIBUTION, AND RECOMMENDATIONS FOR RESTORATION



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Executive Summary

Old inscriptions indicate that lakes in Mahadevpura were maintained as far back as the 9th century AD, but now face the impacts of rapid urbanization. With the BBMP consolidating management of the majority of the city's lakes under their control, we have surveyed the lakes in the Mahadevpura constituency. This report describes current status, studies changes in extent, and suggests steps for reclamation and conservation.

There are 35 lakes in 10 sub chains in Mahadevpura (see pages 11 and 12 for details on individual lakes). Ten lakes are completely dry, and fifteen are heavily polluted, requiring urgent attention to sewage diversion, desiltation and clearing of kaluves. Eight are in healthy condition, but require protection from sewage. Two have recently been restored. We suggest individual strategies for each lake based on size, drainage pattern, connectivity, land use and vegetation, biodiversity, and patterns of human use. These strategies consider lake benefits for ground water recharging, acting as green spaces, lung spaces, areas for microclimate, supporting biodiversity, providing areas for exercise and recreational use, educational opportunities to expose urban residents and youth to nature and ecological principles, and important cultural, sacred and livelihood uses for local communities. Specifically,

- a. Encroachments should be removed and kaluves cleared of blockages. Sewage should be treated by biological control, diversion, and treatment through STPs at each sub-chain.
- b. Severely polluted lakes and dry lakes should be dredged with a sloping basin, reasonably healthy lakes can be treated through clearing of kaluves, and diversion of sewage.
- c. Appropriate greening should be done with heterogeneity of edges and diversity of water habitats to encourage biodiversity, and careful restoration of aquatic flora and fauna.
- d. To prevent disturbance to biodiversity, motorized boats should not be permitted and walking and bicycling paths should avoid the marshy diversity-rich areas of the lake.
- e. Lakes constitute public commons and should be accessible to all. Several of the lakes do not have public access at present and are completely surrounded by private land owners.
- f. Opportunities should be provided for traditional use and use by urban poor, including for washing of clothes and cattle, and controlled harvesting of grass.
- g. Ward Task Forces need to be formed with powers to monitor, maintain and regulate lake condition. These should involve local communities, corporators, MLAs, BBMP, Forest Department, BWSSB, schools and colleges, researchers and NGOs.

Introduction

The inhabitants of the settlements in and around present day Bengaluru were well aware of the importance of fresh water in their daily lives. Both Agara lake and Kudlu lake in the surrounding region have inscriptions from the 9th century AD indicating that they were being maintained by local chieftans during the Ganga dynasty. This leads us to infer that many of the lakes the region around these lakes in Mahadevpura were maintained at least as far back as 9th century AD, and may have been in existence earlier. Sadly, through the centuries, we have lost our appreciation for these critical resources. With the BBMP consolidating management of the majority of the city's lakes under their control, there is now great scope for restoration of these lakes. With this in mind, we have taken up a survey of the lakes in the Mahadevpura constituency, and detailed the historical changes in the condition of the lake, current status, and suggest steps that can be taken for reclamation and conservation of each lake in the constituency, so that integrated planning at a constituency and ward level can be done.

Traditional uses of keres, ecology, structure and maintenance

The original network of keres in Bengaluru was linked through a web of canals or kaluves, connected to the surrounding agricultural-wetland landscape. There were numerous small tanks less than a hectare; several medium sized tanks of tens of hectares, and a few large tanks of hundreds of hectares in area. All were rain fed. The small and medium tanks were seasonal; only large tanks were perennial. During the monsoon, the water levels were at their highest. Wetlands, orchards and agricultural fields surrounded the lake, and these were irrigated by water from open wells that were dependent on the ground water table recharged by nearby lakes. Water was used for domestic purposes such as washing, for drinking water, and to

replenish the ground water table. Some fishing was also conducted. Idols were immersed in the tanks during festivals. Since most lakes were seasonal, and pollution levels were low, siltation was easy to control. The silt was extracted every few years. The wetland-agricultural-grazing-orchard landscape surrounding the lake acted as a natural watershed basin to recharge the lake with fresh precipitation.

With urbanization, much of the landscape around lakes is now covered by impervious surfaces. A large number of the smaller lakes and several of the medium sized lakes have been converted to other land uses, and only some of the larger lakes remain. The kaluves are encroached. Instead of rainwater precipitation, sewage and effluents fill the lakes, converting them from seasonal to perennial ecosystems and drastically altering their biodiversity. In low rainfall years, the lakes dry up and become choked with sewage; in high rainfall years they overflow into blocked kaluves, and result in flooding in the city.

Problems with previous restoration efforts

Although lake restoration programs have been conducted in the past, they have been expensive and lake condition has deteriorated soon after in many lakes. Restoration has been piecemeal – one lake is treated, but the upstream and downstream lakes remain polluted, and kaluves continue to be blocked, so that in a few years the lake returns to its original polluted condition. All DPRs look largely the same, with the lakes dredged in a U-shaped bowl, which is completely different from the deep water vs shallow water areas in many of the original lakes as can be seen in the Survey of India toposheets. Waterspread areas of the lake are encroached upon for gardens and play areas, and extensive plantations of water hungry species such as *Acacia auriculiformis*, *Casuarina*, *Eucalyptus* and silver oak have been planted around several lakes,

along with plantations of coconut and palms around the lake, drying up the water table. There is a clear need to treat each lake as a unique individual entity, with its own appropriate method of restoration based on the size of the lake, its drainage pattern with reference to the sub-watershed in which it is located, the land use and vegetation in the periphery, the biodiversity, and current patterns of human use.

Importance of lakes

- 1) **Ground water recharging** – In water-starved Bengaluru, lakes are critical for recharging the rapidly depleting water table. Thus, the waterspread area of lakes should be kept as large as possible.
- 2) **Green spaces, lung spaces and areas for microclimate control** - lakes can act as important lung spaces, and act to control microclimate variations. Greening should be done using shade providing, biodiversity friendly trees and plants, with minimized evapotranspiration levels. Greening should however be only at the periphery and in islands, and should NOT result in reduction of the waterspread area (as has been done in lakes like Agara).
- 3) **Support for biodiversity** – lakes act as important refuges for birds, insects, amphibians, reptiles, fish, planktons, and other water and wild life. Over 140 species of birds, 66 forms of phytoplankton, 62 forms of zooplankton, 16 species of amphibians and 41 species of fish have been identified in Bangalore's wetlands. Birds fall into five major groups – open water birds, waders and shoreline birds, meadow and grassland birds, birds of reed grass and other vegetation, and birds of open airspace above wetlands. For proper biodiversity support, it is important that lakes provide as many of these microhabitats as possible.

4) Preventing disturbance to biodiversity – Biodiversity can be disturbed by algal blooms and sewage contamination, human disturbance from walkways and play areas, and boating. This can be avoided by keeping the marshy and shallow water section of each lake, where biodiversity levels are maximum, away from human disturbance and preventing sewage pollution.

5) Areas for exercise and recreation – there is a serious dearth of large open spaces for exercise and recreation for adults and children in the city. Most of our parks are small, and cannot fill this need completely. Thus, lakes should provide areas for walking, jogging and exercise as well as small play areas for children. These recreation areas and walkways should not reduce the waterspread area, or disturb biodiversity.

6) Traditional uses including idol immersion, irrigation, domestic use, grazing, washing of clothes, of cattle, and silt extraction – Unfortunately, most lake restoration programs have paid little or no attention to the traditional and current sacred and livelihood uses of lakes by local residents and the urban poor, and these need to be factored in while preserving lake conditions.

7) Lakes constitute public commons and should be accessible to all. Several of the lakes including Ambalipura, Gunjur Carmelaram kere, Devarabisanahalli and Narasimha Shastri kere do not have public access at present as they are completely surrounded by private land owners.

Points to be followed during lake restoration

Based on the discussions above, we have followed certain general principles while developing plans for lake restoration and conservation. These are as follows

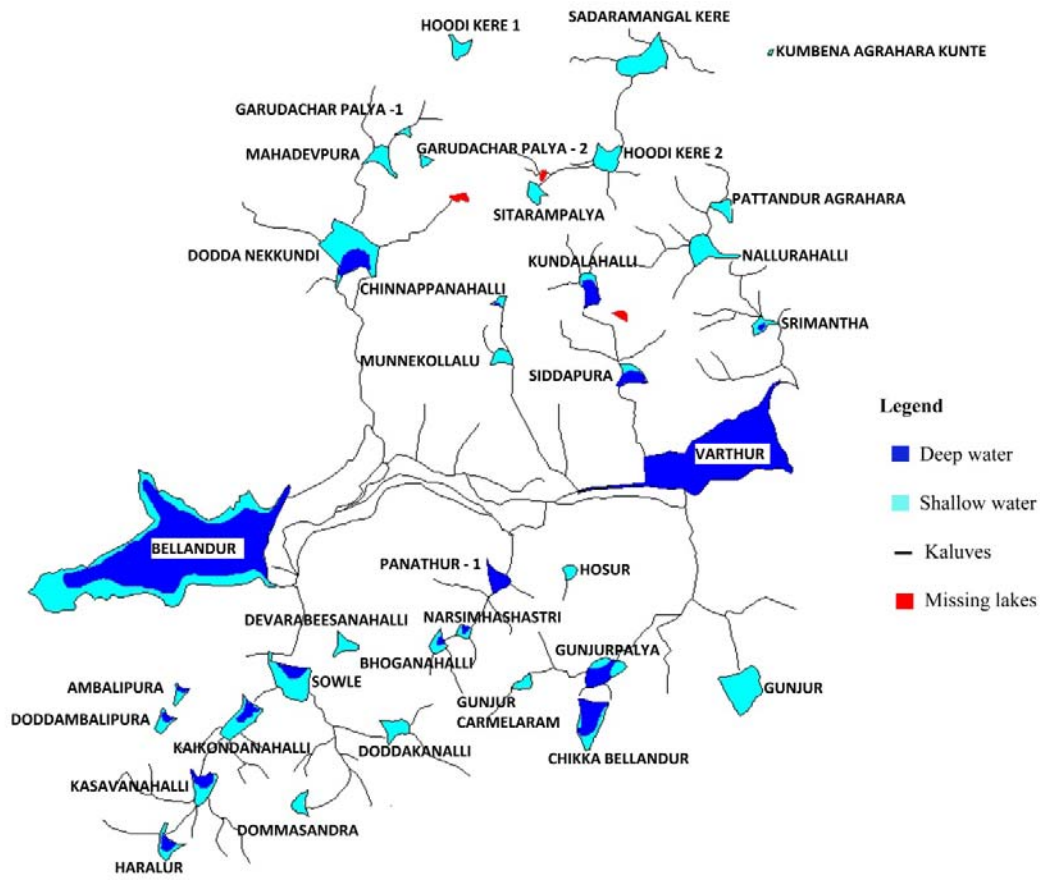
- 1) Encroachments should be removed and kaluves cleared of blockages. Existing sewage should be treated by biological control; inlet of further sewage should be prevented by diversion, and treatment through an STP at the level of sub-chains. Particularly in the

BBMP peripheral areas where sewage lines have not been laid, BWSSP should be involved to ensure that sewage is confined to sewage pipes and treated through STPs.

- 2) Severely polluted lakes should be dredged with a sloping basin, following the original deep water-shallow water allocation pattern if indicated in previous maps, with the shallow end and marshy areas upstream, and deep water areas downstream. Reasonably healthy lakes should not be dredged, but treated through clearing of kaluves, cutter suction in polluted areas, and diversion and treatment of sewage.
- 3) Motorized boats should not be permitted, as this is harmful for biodiversity and bird life.
- 4) The shallow end, marshy areas and islands should be planted with water tolerant species of trees and plants. Heterogeneity of edges and diversity of habitats should be provided to encourage biodiversity, through cost-friendly simple landscaping approaches such as the use of naturally available rocks and boulders, and plantation of appropriate water tolerant emergent trees. At the periphery of the lake, shade providing, fruiting and flowering, biodiversity supporting trees should be planted.
- 5) Careful restoration of aquatic flora and fauna is essential, and should be conducted in consultation with ecologists with expertise on lakes. Previously, aquatic restoration happened in a more natural manner due to connectivity of lake water channels, and through dispersion from birds. Both these modes of dispersal are now significantly reduced, and active restoration of aquatic diversity including of plankton, aquatic plants and fish, is essential for proper restoration of the lake as an ecosystem.
- 6) Lakes should have narrow tree lined walking and jogging paths, which do not encroach into the waterspread area, and which avoid the shallow end of the lake, leaving it as an undisturbed refuge for biodiversity.

- 7) A small kalyani should be provided near the downstream exit for domestic uses such as washing of clothes and cattle. Controlled harvesting of grass can be permitted in the monsoon to prevent encroachment of the grass into the lake. Traditional land uses that preserve open space in areas surrounding the lake should be encouraged as these provide opportunities for ground water recharge.
- 8) The follow up maintenance of lakes is as important a process as the rejuvenation. Else, expensive rejuvenation programs will be of no use, and lake condition will slowly degenerate over time, for instance as in Madivala lake. The original local community surrounding the lakes have detailed knowledge of the lake and its traditional maintenance processes that can provide useful inputs. For instance, our interviews with older residents indicate that silt was removed from shallow regions of the lake annually, and from deeper regions when the water levels went down during cyclical droughts. Some periodic desiltation of the lake beds will be required, and the approach can be decided with inputs from local communities.
- 9) Governance processes for lake maintenance need to be clearly formulated. Ward Task Forces need to be formed and their capacities built for maintaining the lakes. These should involve local communities, RWAs, corporators, MLAs, BBMP, Forest Department, BWSSB, schools and colleges, researchers and NGOs, and have powers to monitor, maintain and regulate lake condition. Regular monitoring of water condition needs to be conducted across all lakes, to generate scientific information that will be of great use for future lake management and restoration. Nearby schools and colleges can be involved in simple monitoring activities, building local capacity for such studies.

Lake networks in Mahadevpura constituency



Identification of Lakes

1. Five lakes mentioned in the BBMP lakes website could not be traced –
 - a. Kadugodi plantation/Dinner kunte
 - b. S. Pinakini river
 - c. Gunjur kunte (Carmelaram kunte)
 - d. Venkatappa kunte
 - e. Jimkenahalli (this is located in KR Puram, and is incorrectly written as Mahadevpura)
2. Doddambalipura lake is missing from the BBMP lakes list
3. Devarabisanahalli kunte has been recently located inside Devarabisanahalli, and needs to be added to the BBMP list.
4. Three small lakes are visible in the Survey of India toposheet of 1970s, but missing in the BBMP list (see red patches in map) – these need to be traced in the village survey records, and reclaimed if possible.
5. Name changes –
 - a. Dommasandra lake is also called Junnasandra
 - b. Hoodi kere -2 is also called Giddanakere
 - c. Chikkabellandur kere is also called Gowrammana kere

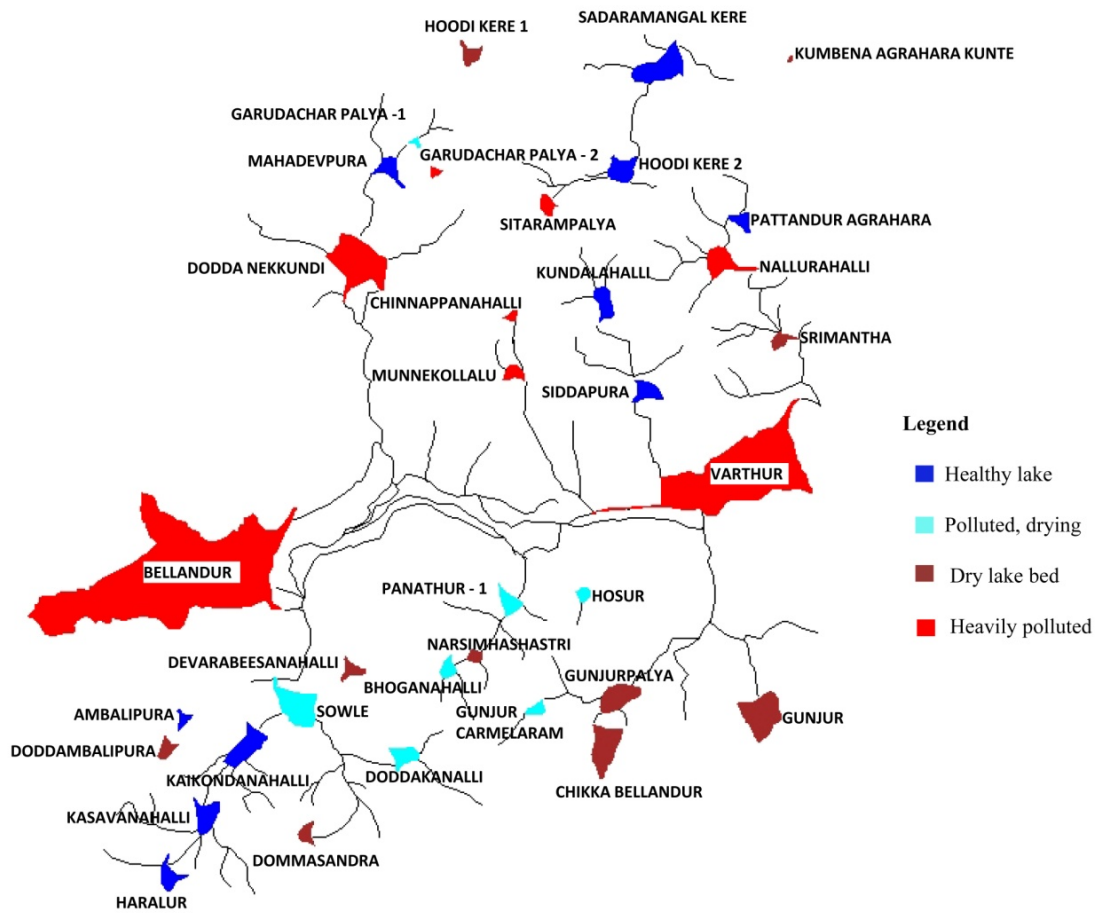
There are a total of 35 lakes in Mahadevpura. The distribution of lakes within wards is highly unequal. Bellandur has 12 lakes, Varthur has 7 lakes, Garudachar Palya has 6 lakes, Dodda Nekkundi has 4, lakes, and Hagadur and Hudi have 3 lakes each. Two wards – Marathahalli and Kadugodi – do not have any lakes.

Status of lakes

Based on examination of satellite imagery and field visits to each lake, lakes were classified into four groups – reasonably healthy water bodies; polluted water bodies with water; polluted water bodies that are drying up; and dry lakes.

Lake name	Ward	Area in ha	Deep water (ha)	Status
Doddambalipura	Bellandur	5.47	1.59	Dry
Ambalipura	Bellandur	2.99	1.02	Under restoration
Bellandur	Bellandur	307.35	221.11	Heavily polluted
Haralur	Bellandur	9.58	3.46	Healthy water body
Kasavanahalli	Bellandur	15.83	4.95	Healthy water body
Kaikondanahalli	Bellandur	18.06	5.07	Under restoration
Sowlekere	Bellandur	18.33	5.25	Heavily polluted, drying
Doddakanenahalli	Bellandur	8.93	-	Heavily polluted, drying
Junnasandra	Bellandur	4.67	-	Dry
Devarabeesanahalli	Bellandur	4.64	-	Dry
Bhoganahalli	Bellandur	4.14	0.04	Heavily polluted, drying
Narasimha Shastri kere	Bellandur	2.02	0.04	Dry, encroached, allotted to private owner
Panathur kere – 1	Varthur	8.45	7.80	Heavily polluted, drying
Hosur kere/Panathur kere - 2	Varthur	1.68	-	Heavily polluted, drying
Gunjur kere (Carmelaram kere)	Varthur	2.6	-	Heavily polluted, drying
Chikkabellandur/Gowrammana kere	Varthur	22.11	14.23	Dry
Gunjur palya kere	Varthur	13.75	9.99	Dry
Gunjur kere	Varthur	22.39	-	Dry
Garudachar palya kere – 1	Garudachar palya	1.39		Heavily polluted, drying
Mahadevpura	Garudachar palya	8.29		Healthy water body
Garudachar palya kere – 2	Garudachar palya	2.09		Heavily polluted
Dodda Nekkundi	Dodda Nekkundi	45.29		Heavily polluted
Chinnappanahalli	Dodda Nekkundi	2.63		Heavily polluted
Munnekollalu kere	Dodda Nekkundi	4.1		Heavily polluted
Kundalahalli	Dodda Nekkundi	9.52		Healthy water body
Siddapur kere	Hagadur	7.58		Healthy water body
Pattandur agrahara	Garudachar palya	3.72		Healthy water body
Nallura halli	Hagadur	11.61		Heavily polluted
Srimanta kere/R Narayanapura	Hagadur	5.13		Dry
Sitaram palya/Sonnenahalli	Garudachar palya	4.53		Heavily polluted
Hoodi – 2/Giddana kere	Garudachar palya	11.31		Healthy water body
Sadaramangal kere	Hudi	21.37		Healthy water body
Hoodi – 1	Hudi	6.28		Dry
Konena Agrahara kunte	Hudi	0.5		Dry
Varthur	Varthur	166.87		Heavily polluted
Total lakes – 35				

Current lake status in Mahadevpura



Recommendations for sub-chains

Lakes in sub-chain	Overall status	Recommendation
Doddambalipura; Ambalipura	Mixed, with healthy and dry lakes	Ambalipura restoration is almost complete; desilt and restore Doddambalipura. Provide public access to Ambalipura
Haralur; Kasavanahalli; Kaikondanahalli; Sowlekere; Dommasandra; Doddakanahalli; Devarabeesanahalli	Mixed, with healthy, polluted and dry lakes	Dredge, desilt and restore Dommasandra, Doddakanalli, Sowlekere and Devarabeesanahalli; protect Haralur, Kasavanahalli and Kaikondanahalli from further sewage contamination; divert combined sewage to an STP prior to entry into Bellandur canal
Bhoganahalli; Narasimha Shastri kere; Panathur kere 1	Mixed, with polluted and dry lakes	Dredge, desilt and restore all three lakes; Narasimha Shastri lake is in private control and needs to be reclaimed; all lakes require protection from further sewage contamination by diverting combined sewage to an STP prior to entry into Bellandur canal
Hosur kere		Stand alone lake – dredge and restore
Gunjur kere Carmelaram; Chikkabellandur; Gunjur palya kere; Gunjur kere	Almost dry	All four lakes need comprehensive desiltation and dredging, along with opening of kaluves which are completely blocked.
Garudachar palya kere 1; Garudachar palya kere 2; Mahadevpura; Dodda Nekkundi	Mixed, with polluted, partially dry and healthy lakes	The two lakes in Garudachar palya are small and can be quickly dredged and restored. Mahadevpura needs to be protected from further sewage contamination. Dodda Nekkundi is a large lake, and requires comprehensive dredging as well as sewage treatment through an STP located upstream of the lake, so that good water can be discharged out of the lake.
Chinnapanahalli; Munnekollalu	Polluted	Both lakes require treatment of sewage through biological control (as the lakes are too small for an STP), along with dredging and restoration
Kundalahalli; Siddapura	Largely healthy	Reasonably healthy but has some contamination of sewage, requires treatment through biological control
Pattandur Agrahara; Nallurahalli; Srimantha kere	Mixed, with healthy, polluted, and dry lakes	Pattandur Agrahara only requires protection from further contamination by sewage, and is in reasonable condition. Nallurahalli is a polluted medium sized lake, and requires comprehensive desilting and restoration, with diversion of sewage. Once this is done, the downstream Srimantha kere which is dry, can be taken up for restoration. Sewage from this chain should be diverted to an STP before entering Varthur.
Sitaram palya; Hoodi kere 1; Hoodi kere 2; Sadaramangal kere	Largely healthy	The two largest lakes in this sub-chain, Hoodi kere 2 and Sadaramangal kere, are in reasonably healthy condition and only require some protection from further contamination. Sitaram palya kere and Hoodi kere 1 are partially and completely dry, and require desilting and restoration programs, which can be concurrently carried out fairly quickly as these are small lakes.

The remainder of the report provides a detailed description of each lake, historical changes, current status and summarized recommendations.

Acknowledgements

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Doddambalipura – 2002 (Google Earth)



Doddambalipura – 2009 (Google Earth)



Doddambalipura – 1973 (Survey of India toposheet) Doddambalipura – field visit



Lake/Tank Name	Doddambalipura Kere
Status Of Water body	Completely dry
Detailed Description	Partially fenced, awaiting encroachment clearance and resurvey in military area
Size	5.47 ha
Deep water	1.59 ha
Encroachment	High
Connectivity	Outlet to Ambalipura kere
Flora (Visual Observation)	Bamboo plantation on one side, military area to west has dense tree cover
Fauna (Visual Observation)	Lot of snakes and mongooses
Recommendation	Located in military area. Requires urgent comprehensive desilting, restoration of main bund, and preservation of deep water area to northeast. All inlet and outlet kaluves are completely blocked and encroached, and need to be reclaimed and restored. Partially fenced but needs complete fencing to prevent encroachments. Tree plantation required in north and west. Walking path can be made on north, east and west.

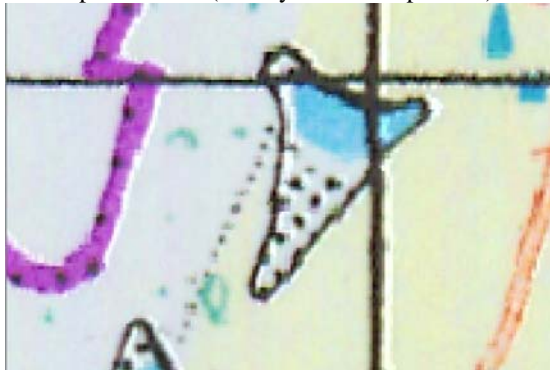
Ambalipura – 2002 (Google Earth)



Ambalipura – 2009 (Google Earth)



Ambalipura – 1973 (Survey of India toposheet)



Ambalipura – field visit (during restoration)



Lake/Tank Name	Ambalipura Kere (Ambalipura kelagina kere)
Status Of Water body	Restored recently, phase I of restoration completed. Before that, was a polluted, drying up water body, but very rich in biodiversity
Detailed Description	No public access , access only through residential colonies and apartments. Fencing and plans for restoration in progress. High in bird diversity after restoration, but has extensive growth of grass, and some sewage is still entering from nearby layouts. Exit kaluve is encroached.
Size	2.99 ha
Deep water	1.02 ha
Encroachment	Exit kaluve is encroached
Connectivity	Inlet from Doddambalipura; outlet to Ibbalur
Flora (Visual Observation)	Plantation of predominantly Acacia and wild jamun. Several trees dead due to water logging, and have been removed.
Fauna (Visual Observation)	More than thirty species of birds, and very rare observation of Lesser Whistling Ducks, previously not known to breed in Bangalore areas.
Recommendation	Urgently requires prevention of further pollution from sewage. Exit kaluve has been cleared of encroachment, but surrounding areas are still encroached by construction. Phase 1 of restoration is completed, and the lake is very rich in biodiversity. The lake has no public access currently, and this needs to be provided.

Bellandur – 2002 (Google Earth)



Bellandur – 2009 (Google Earth)



Bellandur – 1973 (Survey of India toposheet)



Bellandur – field visit



Lake/Tank Name	Bellandur Kere
Status Of Water body	Highly polluted water body
Detailed Description	Extremely polluted with heavy metals, industrial effluents, sewage from residential areas and hospital waste. Heavily encroached and reduced in size, with severe encroachment of rajakaluves including Bellandur canal.
Size	307.35 ha
Deep water	221.11 ha
Encroachment	Lake and kaluves heavily encroached
Connectivity	Inlet from several lakes; outlet to Bellandur canal and to Varthur
Flora (Visual Observation)	Some tree plantations, and significant overgrowth with water hyacinth
Fauna (Visual Observation)	Rich in diversity
Recommendation	The lake urgently requires prevention of further pollution by diverting sewage, industrial waste and hospital waste; biological treatment; creation of multiple STPS as the current STP is under capacity; dredging and restoration of the lake; bund restoration, and removal of encroachments from lake and kaluves in order to provide a healthy supply of rainwater. The toposheet indicates that most of this lake formerly had deep water areas, and this should be kept in mind while restoring the lake. The waterspread area should not be encroached upon for tree plantation as is currently being done. This is one of Bangalore’s largest lakes – maintaining the entire waterspread area is critical for the ground water table in this area. Bicycle and walking trails should be created around the lake.

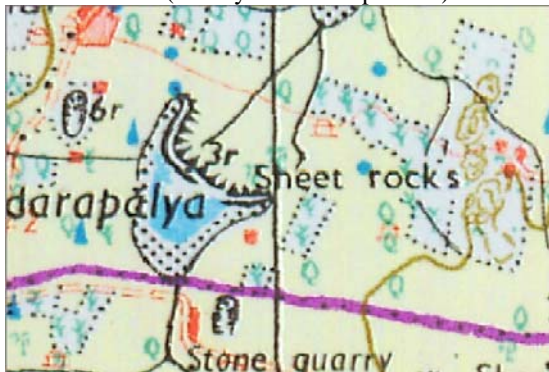
Haralur – 2002 (Google Earth)



Haralur – 2009 (Google Earth)



Haralur – 1973 (Survey of India toposheet)



Haralur – field visit



Lake/Tank Name	Haralur Kere
Status Of Water body	Healthy water body with some pollution
Detailed Description	Fencing is dilapidated in certain areas around the lake. Dumping at one side of the lake. Used for fishing. Entry to the lake is through a walled residential area (Lakedew Residency).
Size	9.58 ha
Deep water	3.46 ha
Encroachment	Low
Connectivity	Inlet from Kudlu kere; outlet to Kasavanahalli kere
Flora (Visual Observation)	Tree lined tank bund
Fauna (Visual Observation)	Grey heron, Lapwing, Moor hen
Recommendation	Largely healthy water body, does not require extensive dredging and desilting. Urgently requires protection from further encroachment; removal of solid waste and cleaning; prevention of further pollution from sewage by diversion or biological treatment; and restoration of upstream and downstream kaluves to provide a healthy supply of rainwater. Waterspread area should be protected and not encroached for walking path or tree plantation. More trees should be planted around the lake, largely to the north, with a few water tolerant species planted in the southern side. Walking path can be made around the north, east and west sides but the shallow south side with wetlands which is richest in biodiversity, and most sensitive to disturbance, should be protected from human influence. Since this tank is surrounded by villages and urban areas, options should be provided for traditional use such as cattle washing. A small kalyani just before the outlet can be provided for immersion of Ganesha idols, and made available for clothes washing and domestic use at other times of the year.

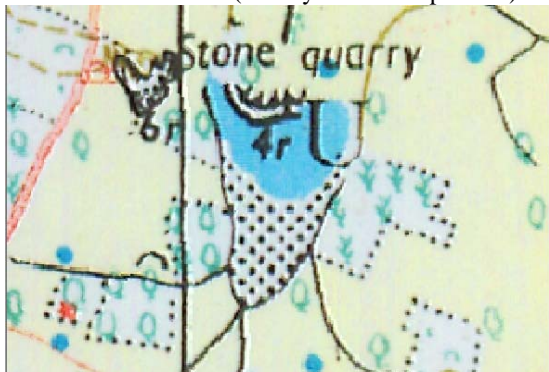
Kasavanahalli – 2002 (Google Earth)



Kasavanahalli – 2009 (Google Earth)



Kasavanahalli – 1973 (Survey of India toposheet)



Kasavanahalli – field visit



Lake/Tank Name	Kasavanahalli Kere
Status Of Water body	Healthy water body with some pollution
Detailed Description	Part of the tank separated by a bund where sewage is impounded, larger part of the other side of the bund is healthy water body. Lake used for fishing.
Size	15.83 ha
Deep water	4.95 ha
Encroachment	Low
Connectivity	Inlet from Haralur kere; outlet to Kaikondanahalli kere
Flora (Visual Observation)	Acacia Plantation, Arjuna. Several trees in the plantation appear to be dead
Fauna (Visual Observation)	Moor hen, Dabchick, Heron, Egret
Recommendation	Largely healthy water body, but polluted by sewage. Water spread area has shrunk in the north due to encroachment of kaluves and sewage pollution. Large scale desilting and dredging is not required. There should be carefully conducted wet dredging (cutter suction) in selected areas in the north , where it is presently shallow and marshy but should be deep water as per the toposheet . Urgently requires protection from further encroachment; removal of solid waste; biological cleaning and diversion of sewage; and restoration of kaluves. Waterspread area should be protected and not encroached for walking path or tree plantation. Tree cover is adequate on north and west, but needs plantation along the east. No plantation should be done on the shallow south side with wetlands. Walking path can be made around the north, east and west but not on the shallow south side with wetlands which is richest in biodiversity, and most sensitive to disturbance, and should be protected from human disturbance. This tank is surrounded by villages, and traditional use options should be provided for cattle washing. A small kalyani for immersion of Ganesha idols can also be used for clothes washing and domestic use.

Kaikondanahalli – 2002 (Google Earth)



Kaikondanahalli – 2009 (Google Earth)



Kaikondanahalli – 1973 (Survey of India toposheet)



Kaikondanahalli – field visit



Lake/Tank Name	Kaikondanahalli Kere
Status Of Water body	Polluted water body
Detailed Description	Fenced, phase 1 of restoration completed. Sewage access has temporarily been blocked. Water is clean, and over 35 bird species have been sighted in recent visits.
Size	18.06 ha
Deep water	5.07 ha
Encroachment	Low
Connectivity	Inlet from Kasavanahalli kere; outlet to Sowle kere
Flora (Visual Observation)	Plantation of predominantly Acacia and Eucalyptus, marsh grass, lantana, Syzygium sp (nerale). New plantation of over 1000 local fruiting and biodiversity friendly trees has just been completed.
Fauna (Visual Observation)	More than thirty species of birds recorded. Also rich in amphibian, insect and snake populations. The central island serves as a resting area for many bird species and other urban wildlife.
Recommendation	Desilting and rejuvenation process completed. No encroachment or acquisition of the northern and western bund for road widening or road construction should be allowed, as is being proposed. Requires prevention of further pollution from sewage; and restoration of upstream and downstream kaluves to provide a healthy supply of rainwater. The lake shows substantial return of bird diversity, as the walking path avoids the shallow south side with wetlands which is richest in biodiversity, and most sensitive to disturbance.

Sowlekere – 2002 (Google Earth)



Sowlekere – 2009 (Google Earth)



Sowlekere – 1973 (Survey of India toposheet)



Sowlekere – field visit



Lake/Tank Name	Sowle Kere
Status Of Water body	Polluted water body, almost dry due to sewage, encroachment of kaluves, and dumping of construction debris and solid waste
Detailed Description	Completely polluted by sewage flowing into the lake from surrounding colonies. The periphery of the tank has a garbage dump with construction rubble. Lot of construction activity around the lake.
Size	18.33 ha
Deep water	5.25 ha
Encroachment	Seems to be encroached from east and south
Connectivity	Inlet from Kaikondanahalli; outlet to Bellandur canal leading to Varthur
Flora (Visual Observation)	Lantana, grass, Manila tamarind
Fauna (Visual Observation)	Small birds like flower peckers, Robin, sunbirds
Recommendation	Requires urgent prioritisation. This lake needs to be completely fenced, dredged, and restored. Comprehensive desilting should follow the original shape as per SoI toposheet, with deep water to north, and shallow water-marshlands in the south. Encroachments to the east and south should be removed. An STP is required to treat combined sewage from Haralur, Kasavanahalli, Kaikondanahalli and Sowlekere. Inlet and outlet kaluves are completely blocked and encroached, and need to be recovered and restored to provide a healthy supply of rainwater. A row of trees was planted on the northern side, but was cut in 2004. Trees need to be planted around the lake, without encroaching into the waterspread area. Walking path can be made around the north, east and west sides but the shallow south side with wetlands which is richest in biodiversity, and most sensitive to disturbance, should be protected from human influence.

Doddakanalli – 2002 (Google Earth)



Doddakanalli – 2009 (Google Earth)



Dodakanalli – 1973 (Survey of India toposheet)



Doddakanalli – field visit



Lake/Tank Name	Doddakanalli Kere
Status Of Water body	Almost totally dry, heavily polluted by sewage.
Detailed Description	This lake has been neglected for the past 10 to 15 years. Badly maintained tank bund and encroachment at several points. The lake has no fencing or boundary fixed and there is no approach route to the water body. Almost completely dry.
Size	8.93 ha
Deep water	None
Encroachment	Low
Connectivity	Outlet to Sowlekere
Flora (Visual Observation)	Lantana, Nilgiri plantation, Marsh grass
Fauna (Visual Observation)	Spot billed duck, Egrets, Herons
Recommendation	Requires urgent prioritisation. This lake needs to be completely fenced, dredged, and restored. Inlet and outlet kaluves are completely blocked and encroached, and need to be recovered and restored to provide a healthy supply of rainwater to rejuvenate both Doddakanalli kere and the downstream Sowlekere. Trees need to be planted around the lake, without encroaching into the waterspread area.

Dommasandra/Junnasandra – 2002 (Google Earth)



Dommasandra/Junnasandra– 2009 (Google Earth)



Dommasandra/Junnasandra – 1973 (toposheet)



Dommasandra/Junnasandra– field visit



Lake/Tank Name	Dommasandra/Junnasandra
Status Of Water body	Almost completely dry
Detailed Description	Marshy, drying, possibly due to encroachment of kaluves. Has a board from tahsildar’s office stating that the lake is government property prominently displayed. Construction debris dumped inside. Has eucalyptus tree growth. Inlet kaluves come from surrounding landscape, which is mostly built up. There is no upstream lake to provide water, but it is a small lake which can be easily well filled by rainwater precipitation. Thus this lake can be maintained as a marshy wetland with water tolerant tree plantations (such as <i>Acacia nilotica</i>) in the periphery, to act as a biodiversity lake. The lake is surrounded by construction activity, and requires urgent fencing and protection to prevent encroachment.
Size	4.67 ha
Deep water	None
Encroachment	Apparently under dispute on title deed, requires urgent attention
Connectivity	Outlet to Sowlekere
Flora (Visual Observation)	Dominated by eucalyptus plantation
Fauna (Visual Observation)	Common egrets in monsoon
Recommendation	This lake needs to be completely surveyed and fenced urgently . The kaluves connecting the lake need to be dredged, and restored. The trees in this area can be supplemented with additional tree planting, and a continuous walk way can be made around the periphery. This area has substantial potential for plantation of indigenous trees.

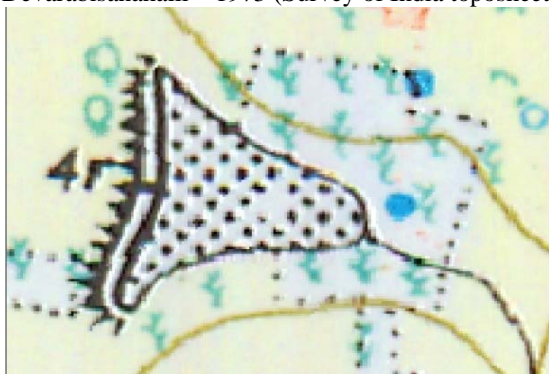
Devarabisanahalli – 2002 (Google Earth)



Devarabisanahalli – 2009 (Google Earth)



Devarabisanahalli – 1973 (Survey of India toposheet) Devarabisanahalli – field visit



Lake/Tank Name	Devarabisanahalli Kere
Status Of Water body	Shrinking water body
Detailed Description	Drying lake, due to blocked kaluves; water appears to be fairly clear though with some pollution from sewage. No private access exists, as this lake is surrounded by private property on all sides.
Size	4.64 ha
Deep water	None
Encroachment	Encroached on north and south ends
Connectivity	Inlet from surrounding landscape; outlet to Bellandur canal and Varthur
Recommendation	Requires urgent comprehensive desilting, reclaiming of encroached land, and reclaiming and restoration of inlet and outlet kaluves. Currently completely dry lake, but this is a small lake and can be easily recharged with rain water precipitation if proper dredging is undertaken. Since the lake area is already very small, tree plantation work should be confined to the periphery to avoid further encroachment into water spread area. Plantation must be conducted in the foreshore area to control soil erosion and siltation, along with siltation traps using trenches. A walkway can be constructed around the lake but this should be narrow in width to avoid further shrinkage of waterspread area. Public access must be provided to this lake, in accordance with the status of lakes as public common spaces.

Bhoganahalli – 2002 (Google Earth)



Bhoganahalli – 2009 (Google Earth)



Bhoganahalli – 1973 (Survey of India toposheet)



Bhoganahalli – field visit



Lake/Tank Name	Bhoganahalli Kere
Status Of Water body	Drying water body, very muddy
Detailed Description	Drying lake,
Size	4.14 ha
Deep water	0.04 ha
Encroachment	Kaluves appear encroached
Connectivity	Inlet from surrounding landscape; outlet to Narasimha Shastri kere
Recommendation	Urgently requires prevention of further pollution from sewage; and restoration of kaluves which have been encroached on by adjoining apartments, in order to provide a healthy supply of rainwater. Requires comprehensive desilting and rejuvenation, keeping the original structure of the lake intact with deep water to the east. The lake is already small and the waterspread area should not be used to make a wide walking path or for extensive tree plantation – instead a single row of large indigenous trees can be planted around, with a narrow walkway. The foreshore area should be planted with trees to control soil erosion and siltation, along with silt traps in the form of trenches. As this is a small lake there is potential for complete filling due to rainwater precipitation, but the kaluves need to be reclaimed and restored.

Narasimha Shastri kere – 2002 (Google Earth)



Narasimha Shastri kere – 2009 (Google Earth)



Narasimha Shastri kere – 1973 (SoI toposheet)



Narasimha Shastri kere – field visit



Lake/Tank Name	Narasimha Shastri Kere
Status Of Water body	Completely dry, totally encroached and fenced as private property
Detailed Description	Formerly connected to Bhoganahalli, now completely dry. The lake has been allotted to a private owner who has fenced the lake - private allotment needs to be revoked and the lake reclaimed . Inlet kaluves are blocked, and the lake bed is completely dry.
Size	2.02 ha
Deep water	0.04 ha
Encroachment	Kaluves appear encroached; entire lake is encroached
Connectivity	Inlet from Bhoganahalli; outlet to Panathur – I
Recommendation	Requires comprehensive desilting and rejuvenation, keeping the original structure of the lake intact with deep water in the north. The lake needs to be retrieved from private property developers. Connection to the adjacent Bhoganahalli lake should be restored on priority basis. The lake is already small and the waterspread area should not be used to make a wide walking path or for extensive tree plantation – instead a single row of large indigenous trees can be planted around, with a narrow walkway. As this is a small lake there is potential for complete filling due to rainwater precipitation, but the kaluves need to be reclaimed and restored.

Panathur 1 – 2002 (Google Earth)



Panathur 1– 2009 (Google Earth)



Panathur 1 – 1973 (Survey of India toposheet)



Panathur 1 – field visit



Lake/Tank Name	Panathur Kere - 1
Status Of Water body	Polluted, drying up water body, but rich in biodiversity
Detailed Description	Covered with marshy grass and encroached by weeds, very polluted with sewage.
Size	8.45 ha
Deep water	7.8 ha
Encroachment	Kaluves encroached
Connectivity	Inlet from Bhoganahalli and Narasimha Shastri kere; outlet to Bellandur canal and then to Varthur
Flora (Visual Observation)	Marshy grass, lantana, Eucalyptus
Fauna (Visual Observation)	Good bird and insect diversity
Recommendation	As per Survey of India toposheet details, this lake is a deep water lake, with two other lakes draining into it – although not very large in size, it therefore has good potential for water storage. Comprehensive desiltation and dredging is required to create a deep water spread area . The lake requires urgent prevention of sewage pollution through bioremediation and diversion of sewage . Restoration of encroached kaluves is also essential for this deep water lake in order to provide a healthy supply of rainwater. There is good potential for plantation of local trees around the lake . A tree lined walking path can also be created, but the area adjacent to the tree plantation on the southwest should be left undisturbed, without access, so that bird life is not disturbed. Care should be taken not to create very wide walking paths which will encroach on and restrict the waterspread area.

Panathur 2/Hosur kere – 2002 (Google Earth)



Panathur 2/Hosur kere – 2009 (Google Earth)



Panathur 2/Hosur kere – 1973 (SoI toposheet)



Panathur 2/Hosur kere – field visit



Lake/Tank Name	Panathur Kere 2/Hosur kere
Status Of Water body	Almost completely dry
Detailed Description	Very dry lake, with blocked kaluves.
Size	1.68 ha
Deep water	None
Encroachment	Kaluves appear encroached
Connectivity	Inlet from surrounding landscape; outlet to Varthur lake
Flora (Visual Observation)	Surrounded by extensive tree plantations
Fauna (Visual Observation)	Rich in bird and insect life
Recommendation	Urgently requires comprehensive desilting and restoration program; prevention of further pollution from sewage through bioremediation and diversion; and reclamation and restoration of kaluves, in order to provide a healthy supply of rainwater. This is a small lake and can easily be filled by precipitation if the kaluves are opened. As this lake is very rich in biodiversity, and small in size, a small walking path can be provided but this should not be very wide and restrict the already limited waterspread area. The walking path should not be circular, and should avoid the eastern edge near the plantations as an undisturbed area for bird and insect life.

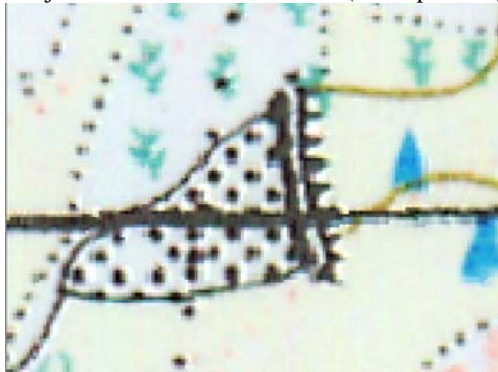
Gunjur kere Carmelaram – 2002 (Google Earth)



Gunjur kere Carmelaram – 2009 (Google Earth)



Gunjur kere Carmelaram – 1973 (SoI toposheet)



Gunjur kere Carmelaram – field visit



Lake/Tank Name	Gunjur kere Carmelaram
Status Of Water body	Almost completely dry
Detailed Description	Fencing in progress. Complete encroachment of kaluves, and lake is located within private boundary.
Size	2.6 ha
Deep water	None
Encroachment	Kaluves encroached
Connectivity	Inlet from surrounding landscape; outlet to Gunjur palya kere
Flora (Visual Observation)	Surrounded by tree plantations
Fauna (Visual Observation)	Rich in bird and insect life, very high diversity of butterflies
Recommendation	Urgently requires comprehensive desilting and restoration program; and reclamation and restoration of kaluves, in order to provide a healthy supply of rainwater. This is a small lake and can easily be filled by precipitation if the kaluves are opened. Appropriate water tolerant trees can be planted on the east, north and south. As this lake is very rich in biodiversity, and small in size, a small walking path can be provided but this should not be very wide and restrict the already limited waterspread area. The walking path should not be circular, and should avoid the western swampy edge leaving it as an undisturbed area for bird and insect life.

Chikkabellandur/Gowrammana kere 2002 (Google E) Chikkabellandur/Gowrammana kere – 2009 (Google E)



Chikkabellandur/Gowrammana kere – 1973 (SoI) Chikkabellandur/Gowrammana kere – field visit



Lake/Tank Name	Chikkabellandur kere/Gowrammana kere
Status Of Water body	Dry lake
Detailed Description	Almost completely dry lake bed, with blocked kaluves.
Size	22.11 ha
Deep water	14.23
Encroachment	Kaluves completely encroached
Connectivity	Inlet from surrounding landscape; outlet to Gunjur palya kere
Flora (Visual Observation)	Very few trees, some short grass, largely open soil
Fauna (Visual Observation)	Snakes, mongoose, other rodents
Recommendation	Urgently requires comprehensive desilting and restoration program; and reclamation and restoration of kaluves, in order to provide a healthy supply of rainwater. This is a small lake and can easily be filled by precipitation if the kaluves are opened. The lake has significant potential for rain water harvesting as about 60% of the lake is deep water area . This should be retained during the rejuvenation program. Appropriate shade giving trees should be planted on all sides, with foreshore planting of trees to reduce siltation. A narrow walking path is required around part of the lake, taking care to avoid the shallow area and leave it as a refuge for biodiversity.

Gunjur palya kere – 2002 (Google Earth)



Gunjur palya kere – 2009 (Google Earth)



Gunjur palya kere – 1973 (SoI toposheet)



Gunjur palya kere – field visit



Lake/Tank Name	Gunjur palya kere
Status Of Water body	Completely dry
Detailed Description	Dry lake bed, all kaluves blocked, overgrown with weeds, encroached to the north-west.
Size	13.75 ha
Deep water	9.99
Encroachment	Kaluves encroached, encroachment on north-west of lake
Connectivity	Inlet from Gunjur kere Carmelaram, and Chikkabellandur kere; outlet to Varthur lake
Flora (Visual Observation)	Weeds and shrubs on dry lake bed
Fauna (Visual Observation)	Snakes, mongoose, small mammals, some birds and insects
Recommendation	Urgently requires comprehensive desilting and restoration program; prevention of pollution from sewage through bioremediation and diversion; and reclamation and restoration of kaluves, in order to provide a healthy supply of rainwater. This lake will hold a substantial amount of water as most of the lake is deep water, and this should be kept in mind during restoration. Since the lake has inlets from two other lakes, it can easily be filled by precipitation if the kaluves are cleared and opened. There is abundant scope for plantation of a large number of shade providing trees all around the edge, and trees should be planted in the foreshore area to control soil erosion and siltation. A walking path should be provided as this lake has good public access through the Gunjur palya road, and has substantial scope for use for recreation. The walking path should be narrow and should not restrict the waterspread area. The walking path should avoid the south-western edge that is away from the roads, to create an undisturbed area for bird and insect life.

Gunjur kere – 2002 (Google Earth) Gunjur kere – 2009 (Google Earth)



Gunjur kere – 1973 (SoI toposheet)



Gunjur kere – field visit



Lake/Tank Name	Gunjur kere
Status Of Water body	Almost completely dry
Detailed Description	Dry lake, kaluves are completely blocked.
Size	22.39 ha
Deep water	None
Encroachment	Kaluves appear encroached
Connectivity	Inlet from surrounding landscape; outlet to Varthur lake
Flora (Visual Observation)	Grass, shrubs and weeds, with few trees around periphery
Fauna (Visual Observation)	Rich in bird and insect life
Recommendation	Urgently requires comprehensive desilting and restoration program; prevention of further pollution from sewage through bioremediation and diversion; and reclamation and restoration of kaluves, in order to provide a healthy supply of rainwater. This is a large lake and it is important to prioritize its restoration to recharge ground water levels in the region. The natural water slope should be maintained, with deeper water near the northern bund area and shallow water in the south. Tree planting is required in the foreshore to control soil erosion and siltation. The lake is rich in biodiversity, and a tree lined walking path can be provided around the lake for recreation. But should be narrow so as to restrict the waterspread area. The walking path should not be circular, and should avoid the south-western shallow water edge away from the road, leaving this as an undisturbed area for bird and insect life.

Garudachar palya kere 1 – 2002 (Google Earth)



Garudachar palya kere 1 – 2009 (Google Earth)



Garudachar palya kere 1 – 1973 (SoI toposheet)



Garudachar palya kere 1 – field visit



Lake/Tank Name	Garudachar palya kere 1
Status Of Water body	Almost completely dry
Detailed Description	Encroachment of kaluves, heavily polluted by sewage, dumping of construction debris and solid waste
Size	1.39
Deep water	None
Encroachment	Kaluves encroached, lake appears to have been encroached before 2002 on the southeastern edge (based on the Survey of India toposheet)
Connectivity	Inlet from surrounding landscape; outlet to Mahadevpura kere
Flora (Visual Observation)	Marshy grass and weeds
Fauna (Visual Observation)	Birds and insects
Recommendation	Urgently requires comprehensive desilting and restoration program; and reclamation and restoration of kaluves, in order to provide a healthy supply of rainwater. The shape should be checked against the village survey maps to confirm if there is encroachment on the southeastern corner. This is a small lake and can easily be filled by precipitation if the kaluves are opened. There is no tree cover, and appropriate shade giving and biodiversity friendly trees should be planted around the lake. As this lake is small in size, a walking path can be provided but this should not be very wide and restrict the already limited waterspread area. The walking path should not be circular, and should avoid the northern edge which is away from the road, leaving it as an undisturbed area for bird and insect life.

Mahadevpura kere – 2002 (Google Earth)



Mahadevpura kere – 2009 (Google Earth)



Mahadevpura kere – 1973 (SoI toposheet)



Mahadevpura – field visit



Lake/Tank Name	Mahadevpura kere
Status Of Water body	Reasonably healthy water body with some pollution from sewage
Detailed Description	Southwest and northern boundaries polluted with sewage and encroached by water hyacinth. The rest of the lake appears to be in reasonably good condition. The lake has been fenced. Coracle fishing was observed.
Size	8.29 ha
Deep water	None
Encroachment	Kaluves encroached
Connectivity	Inlet from Garudachar palya kere 1; outlet to Dodda Nekkundi kere
Flora (visual observation)	Bamboo, mango, other large trees along western boundary
Fauna (visual observation)	Good bird and insect diversity, observed fishing in the lake
Recommendation	Requires diversion of sewage entry, and biological treatment of water. Cutter suction can be conducted to treat the areas of siltation to the north and west. Reclamation and restoration of kaluve connecting Garudachar palya kere 1 is required, in order to maintain a healthy supply of water. The lake has good tree cover, which can be supplemented by providing some trees around the the lake. Appropriate water tolerant trees should be planted in the swampy areas to the north, with a walking path that goes around the boundary, but which avoids the northern swampy areas leaving this as an undisturbed refuge for biodiversity.

Dodda Nekkundi – 2002 (Google Earth)



Dodda Nekkundi – 2009 (Google Earth)



Dodda Nekkundi – 1973 (SoI toposheet)



Lake/Tank Name	Dodda Nekkundi kere
Status Of Water body	Heavily polluted water body
Detailed Description	Heavily polluted by sewage, with the western 2/3rds almost completely encroached by water hyacinth. Complete encroachment of kaluves.
Size	45.29 ha
Deep water	11.53
Encroachment	Kaluves encroached; lake appears encroached compared to the Survey of India toposheet
Connectivity	Inlet from multiple lakes including Mahadevpura kere; outlet to Vartur kere
Flora (visual observation)	Few trees along southern boundary, some bamboo at the western end.
Fauna (visual observation)	Some birds, but low diversity because of extreme coverage by water hyacinth
Recommendation	Urgently requires comprehensive desilting and restoration program; and reclamation and restoration of kaluves, in order to provide a healthy supply of rainwater. Care should be taken to follow the original pattern of sorage, with deep water areas to the south. This lake can hold a great deal of water as it is large, has about 25% area for deep water storage, and has multiple lakes feeding into it. Kaluves need to be cleared, and incoming water treated through bioremediation or an STP; further inflow of sewage should be diverted as well. There is substantial scope for plantation of a large number of shade providing, biodiversity friendly trees. Appropriate water tolerant trees can be planted on the east, north and south. A walking and bicycle path should be provided around part of the lake, avoiding the marshy areas and leaving them undisturbed as a refuge for wildlife and birds.

Garudachar palya kere 2 – 2002 (Google Earth)



Garudachar palya kere 2 – 2009 (Google Earth)



Garudachar palya kere 2 – 1973 (SoI toposheet)



Garudachar palya kere 2 – field visit



Lake/Tank Name	Garudachar palya kere 2
Status Of Water body	Highly polluted, shrinking water body
Detailed Description	Fencing and plans for restoration in progress. Kaluves encroached. Highly polluted, with dumping of solid debris.
Size	2.09 ha
Deep water	None
Encroachment	Kaluves encroached
Connectivity	Stand alone lake
Flora (Visual Observation)	Marshy grass, weeds
Fauna (Visual Observation)	Birds and insects
Recommendation	Urgently requires comprehensive desilting and restoration program; and reclamation and restoration of kaluves, in order to provide a healthy supply of rainwater. This is a small lake and can easily be filled by precipitation if the kaluves are opened. Pollution should be treated by diversion, and treatment through biological control as the amounts of inflow are too small for an STP. As this lake is small in size, a small walking path can be provided surrounded by trees, which does not restrict the limited waterspread area. The walking path should not be circular, and should avoid the eastern swampy edge away from the road, leaving it as an undisturbed refuge for bird and insect life.

Chinnappanahalli kere – 2002 (Google Earth)



Chinnappanahalli kere – 2009 (Google Earth)



Chinnappanahalli kere – 1973 (SoI toposheet)



Chinnappanahalli kere – field visit



Lake/Tank Name	Chinnappanahalli kere
Status Of Water body	Polluted, drying water body
Detailed Description	A large part of the lake appears to have been filled and diverted for a park.
Size	2.63 ha
Deep water	0.43 ha
Encroachment	Lake appears encroached to north and northwest in comparison to Survey of India toposheet.
Connectivity	Inlet from surrounding landscape; outlet to Munnekollalu kere
Flora (Visual Observation)	Marshy grass, weeds
Fauna (Visual Observation)	Some birds and insects
Recommendation	This is a small lake and can easily be filled by precipitation, but only if all the kaluves are cleared from encroachments and opened. Pollution should be treated by diversion, and treatment through biological control as the amounts of inflow are too small for an STP. Some of the waterspread area appears to have been diverted for creation of a park at the northern end. There is significant space for the plantation of trees, and the additional land area should be used for creation of a tree park, instead of planting grasses and decorative shrubs, so that this area can serve as a lung space.

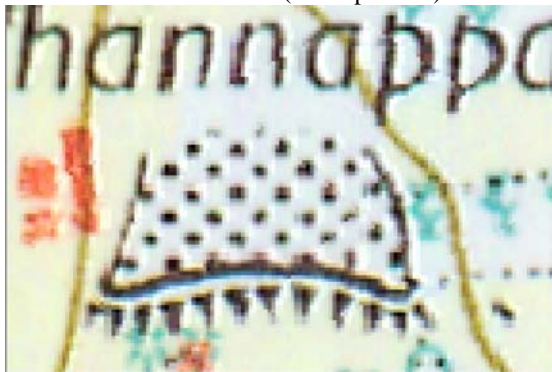
Munnekollalu kere – 2002 (Google Earth)



Munnekollalu kere – 2009 (Google Earth)



Munnekollalu kere – 1973 (SoI toposheet)



Munnekollalu kere – field visit



Lake/Tank Name	Munnekollalu kere
Status Of Water body	Polluted, shrinking water body
Detailed Description	Sewage observed flowing in to the lake; dumping of solid waste on the lake banks; lake bund is nonexistent in many areas; kaluves encroached; highly polluted, with overgrowth of weeds and water hyacinth
Size	4.1 ha
Deep water	None
Encroachment	Kaluves encroached
Connectivity	Inlet from Chinnappanahalli kere; outlet to Varthur kere
Flora (Visual Observation)	Banyan tree; water hyacinth; weeds
Fauna (Visual Observation)	Good bird and insect diversity
Recommendation	Urgently requires comprehensive desilting and restoration program; cleaning of solid waste; treatment and diversion of sewage; restoration of lake bund; and reclamation and restoration of kaluves, in order to provide a healthy supply of rainwater. This is a small lake and can easily be filled by precipitation if the kaluves are opened and the upstream Chinnappanahalli lake is restored. Pollution should be treated by diversion, and treatment through biological control as the amounts of inflow are too small for an STP. As this lake is small in size, a small walking path can be provided surrounded by trees, which does not restrict the limited waterspread area. There is scope for tree plantation along the north, west and east boundaries. The walking path should not be circular, and should avoid the northern swampy edge away from the road, leaving it as an undisturbed refuge for bird and insect life. There is a very old banyan tree with a small temple at the lake edge, and this should be protected as a sacred space and biodiversity refuge.

Kundalahalli kere – 2002 (Google Earth)



Kundalahalli kere – 2009 (Google Earth)



Kundalahalli kere – 1973 (SoI toposheet)



Kundalahalli kere – field visit



Lake/Tank Name	Kundalahalli kere
Status Of Water body	Reasonably healthy water body with some pollution
Detailed Description	Reasonably healthy water body, with some pollution due to sewage, and water hyacinth growth at the edges. There is a garbage dumping site next to the kaluve, as can be seen in the photograph, and this area is heavily used by cattle and stray dogs, with the garbage also blocking the kaluve.
Size	9.52 ha
Deep water	7.13 ha
Encroachment	Appears encroached on northwest edge compared to Survey of India toposheet; kaluves encroached
Connectivity	Inlet from surrounding landscape; outlet to Siddapura kere
Flora (Visual Observation)	Marshy grass, reeds
Fauna (Visual Observation)	Good diversity of bird and insect life; cattle and stray dogs and rodents at the garbage dump at one corner
Recommendation	This lake has good potential for storage of water, being largely a deep water lake. The village survey map should be checked to verify if encroachment has taken place at the northwest, as appears from the toposheet. The garbage area needs to be cleaned, and the lake should be fenced. The kaluves should be cleaned and cleared of encroachments. Sewage should be treated by biological control, and incoming sewage diverted to a downstream STP. There is significant potential for tree planting around the lake periphery. A narrow walking path can be maintained, but this should not be very wide as the lake itself is quite narrow, and cannot sustain further decrease in width. The walking path should not be circular and should avoid the northern boundary, where shallow water is present, leaving it as an undisturbed refuge for bird and insect life.

Siddapura kere – 2002 (Google Earth)



Siddapura kere – 2009 (Google Earth)



Siddapura kere – 1973 (SoI toposheet)



Siddapura kere – field visit



Lake/Tank Name	Siddapura kere
Status Of Water body	Reasonably healthy water body with some pollution
Detailed Description	Reasonably healthy, with some pollution leading to encroachment of water hyacinth.
Size	7.58 ha
Deep water	6.22 ha
Encroachment	Kaluves encroached
Connectivity	Inlet from Kundalahalli kere; outlet to Varthur kere
Flora (Visual Observation)	Marshy grass, water hyacinth, surrounded by trees and bamboo
Fauna (Visual Observation)	Good diversity of birds and insects
Recommendation	This lake has good potential for storage of water, as a large part of the lake is covered by deep water area. The kaluves should be cleaned and cleared of encroachments. Existing sewage should be treated by biological control, and incoming sewage diverted to a downstream STP. A walking path can be maintained, but should be narrow, so as to prevent reduction in the lake waterspread area. There is scope for further tree and bamboo plantation on the western boundary. The foreshore area should also be planted with trees to control siltation and soil erosion. The walking path should not be circular and should avoid the northern swampy area, leaving it as an undisturbed refuge for bird and insect life.

Pattandur Agrahara kere – 2002 (Google Earth)



Pattandur Agrahara kere – 2009 (Google Earth)



Pattandur Agrahara kere – 1973 (SoI toposheet)



Pattandur Agrahara kere – field visit



Lake/Tank Name	Pattandur Agrahara kere
Status Of Water body	Reasonably healthy water body
Detailed Description	Reasonably healthy status, with some pollution by sewage and encroachment of kaluves leading to shrinkage of waterbody and growth of water hyacinth.
Size	3.72 ha
Deep water	None
Encroachment	Kaluves encroached, lane appears encroached at the northwestern corner compared to Survey of India toposheet.
Connectivity	Inlet from surrounding landscape; outlet to Nallurahalli kere
Flora (Visual Observation)	Shrubs, marshy area, water hyacinth
Fauna (Visual Observation)	Good bird and insect diversity
Recommendation	Requires treatment of sewage through biological means, as well as diversion of sewage for treatment upstream after Srimantha kere, just before entry into Varthur kere, as the amounts of inflow in this lake are too small for an STP located here. Reclamation and restoration of kaluves is needed in order to provide a healthy supply of rainwater. This is a small lake and can easily be maintained in a healthy condition by precipitation if the kaluves are maintained free of blockage. There is scope for creation of a narrow walking path along with plantation of trees, being careful however not to restrict the limited waterspread area. The walking path should not be circular, and should avoid the northern swampy edge away from the road, leaving it as an undisturbed refuge for bird and insect life.

Nallurahalli kere – 2002 (Google Earth)



Nallurahalli kere – 2009 (Google Earth)



Nallurahalli kere – 1973 (SoI toposheet)



Nallurahalli kere – field visit



Lake/Tank Name	Nallurahalli kere
Status Of Water body	Polluted, shrinking water body
Detailed Description	Fencing completed. Kaluves encroached. Highly polluted, with dumping of solid waste and construction debris blocking some of the kaluves.
Size	11.61 ha
Deep water	None
Encroachment	Appears to be significantly encroached to the north based on comparisons with Survey of India toposheet. Kaluves encroached and blocked.
Connectivity	Inlet from Pattandur Agrahara kere; outlet to Srimantha kere
Flora (Visual Observation)	Marshy grass, reeds, thorny bushes, some trees
Fauna (Visual Observation)	Kingfishers, other birds and insects, rich biodiversity
Recommendation	Urgently requires comprehensive desilting and restoration program; cleaning of solid waste and removal of debris; reclamation, restoration and opening of kaluves, in order to provide a healthy supply of rainwater. The village survey maps should be checked to confirm if there are encroachments to the north, and if so these should be reclaimed. This lake can easily be filled by precipitation and by the water inflow from upstream Pattandur Agrahara kere, if the kaluves are opened – they are currently blocked by solid waste and construction encroachments. Pollution should be treated by treatment through biological control, and diversion followed by treatment in an STP upstream from Srimantha kere just before entering Vathur, as the amounts of inflow are too small for an STP. There is substantial scope for tree plantation. A walking path can be provided surrounded by trees, but the waterspread area should not be restricted further. The walking path should not be circular, and should leave the northern and eastern swampy areas as undisturbed refuge for biodiversity.

Srimantha kere – 2002 (Google Earth)



Srimantha kere – 2009 (Google Earth)



Srimantha kere – 1973 (SoI toposheet)



Srimantha kere– field visit



Lake/Tank Name	Srimantha kere/Sheelavanthara kere/R Narayanapura
Status Of Water body	Highly polluted water body, almost dry
Detailed Description	Kaluves encroached and blocked by dumping of solid debris.
Size	5.13 ha
Deep water	0.89 ha
Encroachment	Kaluves encroached; lake appears encroached on northeast and northwest boundaries compared to Survey of India toposheet.
Connectivity	Inlet from Nallurahalli kere; outlet to Varthur kere
Flora (Visual Observation)	Overgrown with marshy grass, thorny shrubs and weeds.
Fauna (Visual Observation)	Birds and insects
Recommendation	The village survey maps should be checked to confirm if there is encroachment. This lake urgently requires comprehensive desilting and restoration program; and reclamation and restoration of kaluves, in order to provide a healthy supply of rainwater. Care should be taken to maintain the original contours, with deep water areas in the south as per the toposheet. Pollution should be treated by diversion, and treatment through biological control in an STP just prior to inflow into Varthur lake. As this lake is small in size, a small walking path can be provided surrounded by trees, which does not restrict the limited waterspread area. There are very few trees, and there is substantial scope for plantation of appropriate shade providing and biodiversity friendly trees and plants around the boundary. The walking path should not be circular, and should avoid the northern boundary, leaving it as an undisturbed refuge for bird and insect life.

Sonnenahalli kere – 2002 (Google Earth)



Sonnenahalli kere – 2009 (Google Earth)



Sonnenahalli kere – 1973 (SoI toposheet)



Sonnenahalli kere – field visit



Lake/Tank Name	Sonnenahalli kere/Sitaram Palya
Status Of Water body	Highly polluted, shrinking water body
Detailed Description	Kaluves encroached. Highly polluted, drying lake.
Size	4.53 ha
Deep water	None
Encroachment	Kaluves encroached
Connectivity	Inlet from surrounding landscape; outlet to Hoodi kere 2
Recommendation	Urgently requires comprehensive desilting and restoration program; and reclamation and restoration of kaluves, in order to provide a healthy supply of rainwater. This is a small lake and can easily be filled by precipitation if the kaluves are opened. Pollution should be treated by diversion, and treatment through biological control, as the amounts of inflow are too small for an STP here. There is substantial scope for the plantation of appropriate shade giving and biodiversity friendly trees around the lake, particularly in the foreshore area. As this lake is small in size, a small walking path can be provided surrounded by trees, which does not restrict the limited waterspread area. The walking path should not be circular, and should avoid the southern swampy edge, leaving it as an undisturbed refuge for bird and insect life.

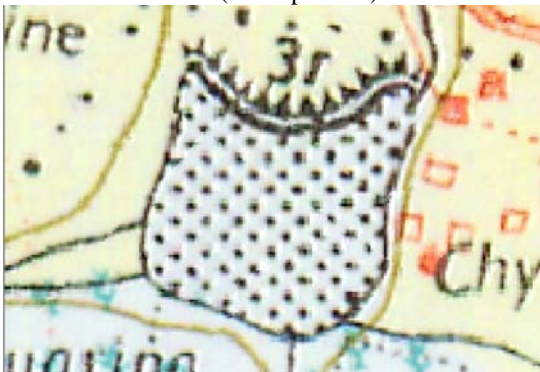
Hoodi kere 2 – 2002 (Google Earth)



Hoodi kere 2 – 2009 (Google Earth)



Hoodi kere 2 – 1973 (SoI toposheet)



Hoodi kere 2 – field visit



Lake/Tank Name	Hoodi kere 2
Status Of Water body	Healthy water body
Detailed Description	Water body in reasonably good condition, with some pollution
Size	11.31 ha
Deep water	None
Encroachment	Kaluves encroached
Connectivity	Inlet from Sonnenahalli kere; outlet to Sadaramangal kere
Flora (Visual Observation)	Marshy grass and trees at periphery
Fauna (Visual Observation)	Good bird and insect diversity
Recommendation	In reasonably good condition, but requires to be maintained by clearing upstream and downstream kaluves, and diversion of sewage for treatment upstream after Sadaramangal kere. There are quite a few trees at the periphery, but this should be supplemented by planting additional trees especially at the western and southern boundary, along the walking path.

Hoodi kere 1 – 2002 (Google Earth)



Hoodi kere 1– 2009 (Google Earth)



Hoodi kere 1– 1973 (SoI toposheet)



Hoodi kere 1– field visit



Lake/Tank Name	Hoodi kere 1
Status Of Water body	Highly polluted, shrinking water body, almost dry
Detailed Description	Lake is fenced. Kaluves are encroached. Highly polluted, and almost dry.
Size	6.28 ha
Deep water	None
Encroachment	Kaluves encroached
Connectivity	Inlet from surrounding landscape; outlet to Sadaramangal kere
Flora (Visual Observation)	Marshy grass, weeds
Fauna (Visual Observation)	Some bird and insect diversity, snakes, mongoose and small rodents.
Recommendation	Urgently requires comprehensive desilting and restoration program; and reclamation and restoration of kaluves, in order to provide a healthy supply of rainwater. This is a small lake and can easily be filled by precipitation if the kaluves are opened. Pollution should be treated by diversion, and treatment through biological control as the amounts of inflow are too small for an STP. As this lake is small in size, a small walking path can be provided surrounded by trees, which does not restrict the limited waterspread area. The walking path should not be circular, and should avoid the eastern swampy edge, leaving it as an undisturbed refuge for biodiversity.

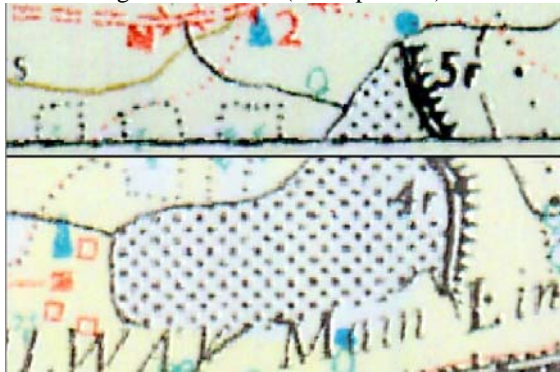
Sadaramangal kere – 2002 (Google Earth)



Sadaramangal kere – 2009 (Google Earth)



Sadaramangal kere – 1973 (SoI toposheet)



Sadaramangal kere 2 – field visit



Lake/Tank Name	Sadaramangal kere
Status Of Water body	Reasonably healthy water body with some pollution.
Detailed Description	Plans for restoration in progress. Kaluves encroached. Polluted by entry of sewage.
Size	21.37 ha
Deep water	None
Encroachment	Kaluves encroached
Connectivity	Inlet from Hoodi kere 1 and Hoodi kere 2; outlet to Yellamallappa Chetty kere
Flora (Visual Observation)	Marshy grass, weeds, trees
Fauna (Visual Observation)	Good bird and insect diversity
Recommendation	Requires reclamation and restoration of kaluves, bund treatment, some dredging near the banks, and treatment of sewage by diversion (followed by treatment at an STP near Yellamallappa Chetty kere) , and treatment through biological control. A small walking path can be provided surrounded by trees, which does not restrict the limited waterspread area. There is substantial scope for tree plantation around the lake, and in the foreshore area to control siltation and soil erosion. The walking path should not be circular, and should avoid the western swampy edge, leaving it as an undisturbed refuge for bird and insect life.

Varthur kere – 2003 (Google Earth)



Varthur kere – 2009 (Google Earth)



Varthur kere – 1973 (SoI toposheet)



Varthur – field visit



Lake/Tank Name	Varthur kere
Status Of Water body	Highly polluted, encroached water body
Detailed Description	Highly polluted with sewage, industrial effluents and medical waste flowing in from multiple lakes. Kaluves including the Bellandur canal are badly encroached.
Size	166.87 ha
Deep water	152.08 ha
Encroachment	Lake and kaluves encroached
Connectivity	Inlet from multiple lakes
Flora (Visual Observation)	Marshy grass, weeds
Fauna (Visual Observation)	Good birds and insect diversity
Recommendation	This is one of Bangalore’s largest lakes – maintaining the entire waterspread area is critical for the ground water table in this area. The lake urgently requires prevention of further pollution by diverting sewage, industrial waste and hospital waste; biological treatment; creation of multiple STPS as the current STP is under capacity; dredging and and restoration of the lake; bund restoration, and removal of encroachments from lake and kaluves in order to provide a healthy supply of rainwater. The restoration should be done keeping in mind this lake’s original status as a deep water lake . Trees should be planted around the periphery, and in the foreshore area to control soil erosion and check pollution. Bicycle and walking trails should be created around the lake.