Bangalore and its Lakes

Reclaiming our urban lakes and engaging with our natural ecosystem
This document has been made to be used as a community resource and is meant to evolve with the contributions and experiences of everyone working to protect lakes. Please write to us with your contributions.

Please feel free to use, share and disseminate this document. We would appreciate being informed about how it has been used.

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A City of Tanks

History, Culture and Ecology of Bangalore's Lakes
Bangalore’s Natural Water Resources

Bangalore is located at an altitude of 920 msl due to which the natural flow of water is *away from the city* and *into the valleys surrounding*.

Each valley at the ridge top gives birth to small streams which cascade down to form major stream systems.

Our rainfall: Bangalore receives 920mm of rain over 60 rainy days every year
- Our city sits on two river basins, the Cauvery and the Dakshina Pinakini
- Our Rivers: The Arkavathi, the Vrishabhavathi, the Dakshina Pinakini
- Our Lakes and Tanks: Over 200!
- Our Openwells: *We are losing them, lets preserve them!*
- Our Private Borewells: too many to count (400,000+)
Bangalore’s Tanks (Lakes) – A Historical Perspective

Most of Bangalore’s lakes are actually irrigation tanks, built over the course of many centuries, starting with the Gangas, the Cholas and the Hoysalas who built tanks with high bunds to store water.

In the 16th Century, Kempegowda built tanks and irrigation wells as well. Traditionally interlinked through a chain or cascade system, this ensured water was not wasted.

The Hoysalas, Vijaynagara, Marathas, Tipu Sultan, Haider Ali, Wodeyars have all been patrons of lakes and tanks.
Earlier Uses, Values and Users

What we call ‘lakes’ were mostly man-made irrigation tanks.

Communities were largely agrarian and communities clustered around lakes.

Lakes also had environmental uses, they were critical to flood control management, and stored water. They were not always perennial.

Lakes recharged groundwater.

This was accessed through wells and used for drinking and domestic purposes such as washing (both domestic and cattle)

Of course, more importantly, it had economic uses as well, farmers used the water for irrigation, the silt as manure, shepherds used the grass for grazing, dhobis washed clothes, fishermen fished in the lakes
Who Managed and Owned These Lakes?

- **Rulers**: Patronage ensured tanks were maintained.
- **Community and Village Elders**: Joint decision and management on water use.
- **Neeruganti**: Implementing decisions and distribution of water to village or community tank.
- **Community**: Active participation in maintenance: cleaning, desilting...
- **Farmers, Fishermen, Grazers**: Used lakes for economic use.
'The sugarcane and rice crops looked most flourishing in the low wet land under the great tanks, which have all the appearance of natural lakes. Many of these have been most skilfully constructed, giving proof that the natives knew something of engineering, long before English rule and public works were thought of.' Her observations of what the locals called keres… ‘Lakes, in the right sense of the word[…] have nowhere been observed by me in this country but tanks or water reservoirs with artificial embankments are in great abundance.’

Referring to Bellandur Bund, written in 1868. Excerpt from ‘Deccan Traverses’ by Dilip da Cunha and Anuradha Mathur.
Notes on Bellandur Lake in the 1800s, excerpted from
‘Deccan Traverses’, by Dilip da Cunha and Anuradha Mathur

Belandur Bund is an embankment of earth between two high grounds to which it is linked by sluices that facilitate overflows. These overflows, together with the underflow enabled by a plug in the low ground toward the middle of its length, modulates the wetness and dryness of the extended terrains on either side.

Belandur Bund gathers two terrains: the first extends from the Bangalore Pettah, also called the City, and the second from the Bangalore Cantonment that in 1881 became known as the Civil and Military Station. Observers would describe these settlements as vastly different — ‘a native town almost exclusively Kanarese in origin’ and ‘a heterogeneous assemblage of people of various nationalities and speaking several languages’. Belandur Bund, however, united them in the soil that it gathered from these settlements via two series of tanks.
Major Sankey was the Chief Engineer of Mysore in the late 1800s. He is credited with building a water system to use the traditional Indian water catchment systems for irrigation, a feat completed by a detailed study of the drainage and water flows of the region.

Clockwise: Bellandur lake, 1942 (courtesy HAL Museum and Citizen Matters); Sankey Tank, 1960s (Indian Express), Madiwala Lake (The Hindu) and Dharmambudhi Lake, now Majestic (ToI)
A Culture around Lakes

A centre for religious activity with an ecological perspective: idols were made out of silt and clay; their immersion would help desilt tanks, and move silt from smaller to larger ones.

From l-r: Idol immersion in Yediyur Lake (courtesy Deccan Herald) and Sankey Tank (The Hindu)
Bengaluru, a City of Firsts

The first Indian city to use steam engines to pump water from Hesaraghatta reservoir to Bangalore in 1894.

The first Indian city to use electricity to pump water in 1904.

The first city water utility in India (the BWSSB) was set up in 1964.

A rich tradition of tanks and open wells.
Where does the water come from and where does it go?
This is a cascade of lakes: from Puttenahalli Lake upstream to Allalasandra Lake, Jakkur Lake, Rachenahalli Lake, Hebbal and Nagawara Lakes.
This is Jakkur Lake’s rough catchment area.
Jakkur Lake has multiple inlets.
Here is its tank bund.
Here you can see the Jakkur STP.

It has 10mld capacity.

And here is the lake’s wetland.
This is the overflow and drainage
It has a beautiful open well
And a Kalyani
You can’t see it but this lake provides 200 kg of fish per day in peak season.
Many apartments that offer lake vistas are coming up.
All these lakes are connected, they flow into each other.

The health of one lake affects the health of the entire system.
Our Lakes: Components of the Water System

The **Catchment** is a geographic area where rain falls and flows into the lake.

**Drainage** is the network of kaluves and raja kaluves (storm water drains) through which rainwater flows.

Every lake has **inlets** which bring this water into the lake.

A **lake/tank bund** is a stretch or ridge that holds the water back and creates the reservoir.

The **overflow** from the lake goes through the overflow weirs or culverts. These are traditionally referred to as **Kodis**.

The **Achcut** or command area is what is downstream of the bund and would have originally received irrigation benefits.

All these elements come together as a **cascade** or **cascade network of lakes** that are the rivers of Bengaluru.
The **Catchment** of the lake is the extent of land where all the rainfall and surface water flow into the lake

Catchment of Devarabisinghahalli Lake
Bangalore’s Stormwater Drainage

Drainage is the network of kaluves and raja kaluves (storm water drains) through which rainwater flows.
Stormwater Drains or Raja Kaluves:
A clean Raja Kaluve near Jakkur Lake and a Raja Kaluve filled with sewage in Hennur
Inlets bring water into the lake.

Inlets in Jakkur Lake
Wetlands: Improving Water Quality Naturally

A wetland in an urban lake is a part of the water body that breeds a high density of aquatic life, and typically uses up the nutrients in the lake and enhances the water quality of the lake.

The sewage entry into many tanks tends to naturally foster wetlands if nutrient levels are high.

Some lakes, such as Jakkur, have wetlands incorporated into their design.
The overflow from the lake goes through the overflow weirs or culverts. These are traditionally referred to as Kodis.

Overflows:
Jakkur Lake
The Cascade System

Lakes are linked to each other through drainage networks to a series of lakes or a **cascade**.

These cascades were designed to help water flow from higher to lower elevations.

These are some of Bangalore’s lake series.
Clockwise:
Yellamallappa
Chetty Lake series,
Varthur Lake series,
Hulimavu Lake series,
Lalbagh Lake series
What happens to lakes over time

Community disconnect is what kills the lake
In 1973, you can see that lakes were well connected, with clear areas of vegetation growing along the networks that linked them (highlighted in red)

By 1992, as the city grew, these lake networks began shrinking and became increasingly fragmented

By 2000, the entire catchment has been transformed by the urban spread

*Lakes themselves get encroached and disappear*

What Happens to Drainage: Encroachment, Wastewater and Solid Waste

Flood plain encroachment

Solid waste dumping - Reduced culvert capacity, inlet block

Source: http://wgbis.ces.iisc.ernet.in/energy/water/paper/urbanfloods_bangalore/city_infrastructure.htm
Resulting in Changes to the Cascade System
Sowl Kere

Catchment and cascade disrupted – the lake goes dry.
Untreated Waste Water & Solid Wastes Flow into the Lakes
Dodda Kudlu Lake in 2012 and 2014 – encroachments into the lake
Impact

**Lost livelihoods:** people dependent on these lakes forced out

**Lost resource:** Loss of the source of water for drinking, domestic, economic, environmental uses

**Lost space:** the community’s access to the lake diminishes

**A Disconnect:** the Community disengages from the lake
The Lake Becomes a Liability

The lake is a public resource, it belongs to all of us.

Over time, there has been a lack of accountability and ownership, little or no monitoring, inequitable sharing and uncontrolled growth around our lakes.

The lakes have become a source of public health issues, a hive for safety and security problems, and a sink for all our waste.

The lakes have become a liability.
The lake as a liability
The lake as a liability
Reimagining urban lakes

Understanding and managing tradeoffs, pathways to restoration, institutions and stakeholders
Rejuvenating Our Urban Lakes

This section is on rejuvenating lakes in our modern urban context.

How did people use and value lakes in the past?

And what are more concurrent imaginations of these uses and values?

And how can we reimagine the lake through the values and uses it has?
Earlier Uses, Values and Users (a reminder)

What we call “Lakes” were mostly man-made irrigation tanks.

Communities were largely agrarian and communities clustered around lakes.

Lakes also had environmental uses, they were critical to flood control management, and stored water. They were not always perennial.

Lakes recharged groundwater

This was accessed through wells and then used for drinking and domestic purposes such as washing (both domestic and cattle)

Of course, most importantly, it had economic uses as well, farmers used the water as irrigation, the silt as manure, shepherds used the grass for grazing, dhobis washed clothes, fishermen fished in the lakes.
Who Managed and Owned These Lakes?

- **Rulers**: Patronage - Ensured tanks were maintained
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- **Farmers, Fishermen, Grazers**: Used lakes for economic use
Reimagining Uses, Values and Users

Community uses: as urban communities, we use lakes for recreation (walking, boating...), cultural uses

Environmental uses: lakes lower ambient temperature, are still important for groundwater recharge and biodiversity conservation

Lakes and wetlands treat wastewater

Lakes are still critical for flood control and storage

Livelihood uses: can lakes reclaim their value for dhobis, grazers, fishermen, as sources of silt and manure...?
There will always be trade-offs.

Lakes are used for livelihoods, for waste water management, flood control, groundwater recreation, biodiversity, conservation and recreation.

Strength and sustainability lies in equitable stakeholding.
Livelihoods
Groundwater recharge
Biodiversity and Conservation
Recreation
Recreation
Flood Control
Waste Water Management
A sustainable solution (C) – working together with citizens, government and other groups

- Control management distribution of water to village or community tank
- Joint decision making on water use
- Active participation in maintenance: cleaning, desilting…
- Used lakes for economic use

CSR?
BBMP
Community
Community
Farmers, Fishermen, Grazers
Institutional and non institutional stakeholders

- **FOREST DEPT**
- **KLCDA** - Overarching statewide lake authority
- **KSPCB** - Water Quality Monitoring, Legal Action against Offenders
- **FISHERIES** - Contracting Commercial Fishermen
- **MINOR IRRIGATION**
- **BWSSB** - Construction, Maintenance of Sewage and Stormwater Drains
- **BBMP** - Lake Custodian, monitoring, construction, maintenance, infrastructure, security

**Corporate and Private Entities**

- **VILLAGE COMMUNITY** - Responsible grazing, clothes washing, keeping an eye
- **FISHERMEN** - Maintain the lake, wetland and fish sustainably
- **STAFF, SECURITY, GARDENERS** - Watch and ward of all activities
- **JOGGERS, CYCLISTS, BIRDWATCHERS** - Watch and ward of all activities
- **CORPORATE** - Private entities such as CSR, Companies etc
- **URBAN FAMILIES** - Responsibly enjoying the lake
The Lake Custodian Agency

A custodian agency is the sole agency with whom the bottom line of responsibility lies.

Since many agencies are implicated in one way or another with lakes, the custodian agency needs to work together with other institutions.

In many cases, the BBMP is the lake custodian, but other agencies can also be designated (like BDA).
How can Citizens work with the Government?

The responsibility of the lake lies with the custodian agency, which is supposed to work with other implicated agencies. However, this does not often happen.

Citizen groups can help achieve this convergence between institutions (with the blessing of the lake custodian!), as well as increase citizen stake in the lake.

You can work with your local government either informally through a group or a network or formally engage through an organisation.

Engagement varies from advocacy, awareness building and citizen oversight, to working with lake custodians to improve lakes, for example, groups being authorised by BBMP to maintain lakes themselves.

We see variations these models in Bangalore, and the choice of which to choose really depends on your specific lake context.
Citizen Engagement: Leveraging Existing Networks

There are many avenues for citizen engagement, and the strategy you choose will depend on your specific lake context.

In all cases, you should be in touch with existing citizen lake networks like Friends of Lakes Bangalore or One Bengaluru for Lakes.

These networks can help by:

- bringing experience from other lakes,
- including conversations of upstream and downstream lakes and bring in a cascade level thinking,
- facilitating collective conversations with the government.
You can engage informally with local institutions, individually or through a lake group, who bridge the citizen-institution conversation.

Friends of Lakes Bangalore – a loose network of engaged citizens active in advocated lake rejuvenation across Bangalore.

Friends of Lakes is a pan-Bangalore citizen led advocacy group that talks to local government institutions. Here, citizens act as watchdogs, play an advocacy role, and support government institutions to make them more effective.

If you’re interested in engaging with your lake and are not aware of any existing group active around your lake, you can contact Friends of Lakes, who will help you set up one!
How does the Government see Citizen Participation?

Every agency has their own way “institutionalising citizen participation”.

For example, BBMP has entered into partnerships with lake groups through formal MoUs.

KSPCB has created Watchdog Committees for water quality, comprising of government agencies and citizens.

And the Karnataka Lake Conservation and Development Authority has created the post of the Lake Warden.
Formal Agreements with Local Government

You can work with the local government through a citizen formed Formal Trust or Society.

These trusts typically adopt lakes and sign MoUs with lake custodians for particular responsibilities such as fundraising, working with CSR.

When the custodian agency formally hands over maintenance responsibilities to a group or an organisation (through an MoU), there may be financial implications – the maintenance party is also responsible to ensure securing of finances for maintenance.

Some examples: PNLIT, MAPSAS, Jalaposhan
PNLIT – rejuvenating a neighbourhood around a lake

The Puttenahalli Neighbourhood Lake Improvement Trust was registered in 2010 and works with BBMP to rejuvenate and maintain Puttenahalli lake in JP Nagar, 7th Phase.

It is the first case in the city where a lake was handed over to a trust to manage by the BBMP. PNLIT is funded through public donations.

PNLIT works on issues of environmental protection, local governance and problem solving, boosting economic activities that improve the area, support other non-profit activities and foster educational initiatives that improve the neighbourhood.

The lake is an entry point to rejuvenating the entire neighbourhood around the lake:

- Core lake related activities: lake administration, awareness, nature watch, lake monitoring and regulation, gardening, cleaning, waste management
- Other activities: PNLIT memorabilia to promote local economies, recycling, local governance (traffic, waste etc), engaging with local schools

PNLIT signed an MoU with KSPCB and BBMP to use treated water from a nearby apartment – the first of its kind in B’lore
MAPSAS – working with a series of lakes

Mahadevpura Parisara Samarakshane Mattu Abhivrudhi Samiti is a not for profit registered Trust that was formed in 2011 to revive and rejuvenate lakes in the Bellandur/ORR/Sarjapur Road/Harlur Road area.

Beginning with a single lake, MAPSAS maintains two lakes – Kaikrondahalli Kere (with United Way) and Lower Ambalipura Lake

MAPSAS also engages with a series lakes in the single cascade: Kaikrondahalli Kere, Lower Ambalipura Kere, and Kasavanahalli Lake, and is involved in reviving Soul Kere, Dodda Ambalipura Kere, Haralur Lake and Iblur Lake.

MAPSAS collaboratively produced with BBMP a Lake Development Plan for Kaikrondahalli Lake and also have an MoU for Haralur Lake Park.
Jalaposhan – a mix of formal and informal engagement

Jalaposhan is a community built around Jakkur Lake

Formed by citizens in the vicinity, Jalaposhan tracks the sewage inflow, water quality and also forces institutional intervention. They also help build a vibrant community around the lake.
Some provisions by institutions to recognise citizen engagement

How has the government created a space for engagement with citizens?
Two new roles have been recently created to encourage citizen engagement

‘Lake Wardens’ set up by G.O. FEE 99 ENV 2016
Watchdog Committees under KSPCB
Lake Wardens

Lake Wardens set up by G.O. FEE 99 ENV 2016

Roles and Responsibilities:
- Awareness of roles and responsibilities of citizens towards lake conservation and preservation and carry a message to citizens and enlist public support
- Collect and formulate suggestions for protection, conservation and development of lakes
- Assist the Lake Custodian in regulatory efforts like prevention of encroachment, detection and prosecution of offences, prevention of prohibited acts
- Anything else entrusted by the Lake Custodian

An active role for the Lake Warden, a bridge between citizens and institutions. An active role, with scope for further definition by the Warden and Lake Custodian
Lake Wardens – 2/2

How are Lake Wardens appointed?

- Eligibility: Indian Citizen, between 25-70 years, resident in the lake locality, fit, speak Kannada and English, not active in politics, and not be convicted for any offences
- Interested citizens need to submit details to the Lake Custodian authority using a format issued by KLCDA
- The Lake Custodian will form a committee for the selection, appointments made for 2 years
- The Lake Custodian monitors and reviews the work of the Lake Warden regularly
- This is a non-remunerative post and has no statutory powers
- Issued a Cap and a Tshirt

Unclear legal standing for LWs. How will they enforce decisions if they are not empowered? Are they simply an extension of the Lake Custodian or is there scope for engagement?
Watchdog Committees under KSPCB

Lake Protection Watchdog Committees have been formed for Pollution Control and Response

Formed as a result of the work by Wg Cdr (Retd) Athri on Madiwala Lake.

Committee will consist of members of KSPCB, Lake Custodians (BBMP, BWSSB, BDA etc) and four citizens. Currently citizens already engaged in lake protection have been identified

Copies of meeting and directives will be circulated amongst RWAs

No constitutional mandate – simply an avenue for citizen engagement, and can only watch and report back to KSPCB when a pollution infarction takes place

Questions around the rights and remits of this committee and selection of citizen members remain.

See http://www.deccanherald.com/content/503843/watchdog-committees-stem-further-decay.html
What can I do?
Reclaim your lake!
Don’t Think Too Much, Start Doing

Start engaging with your lake!

Doesn’t have to be a herculean effort to begin - organise events around your lake

Talk to all the stakeholders and ensure you work together

Ensure community ownership of your lake

Keep an eye on your lake!

Get in touch with other lake groups for info and ideas
Make the Lake the Centre of Activity!

See the lake as a public space for bringing the community together!

In earlier times, deweeding festivals took place. Fishermen came together to remove weeds when the lake naturally dried in the summer. Deweeding competitions were organised.

What can you do? Organise a Kere Habba with activities for kids, organic food, NGOs working on environmental issues to talk about water, water quality, nature, bird watching, competitions, lake walks, music and dance!

Organise at least two community activities every month that engages with the lake – cleaning, gardening, repairing pathways, tree planting, herpetology survey.

Each event should not be more than one hour long.
The Lake Belongs To Us All

Do take responsibility for monitoring – Watch and Ward

Be aware of threats

Inform the concerned authorities if anything goes wrong or if anything unusual happens such as fish kills, frothing etc.

See and value the benefits in maintaining a lake!

Work with your institutions to maintain a healthy lake!
How do we go about this?

Step by Step
How do we go about this?

Identify like minded people and volunteers
Identify the agency responsible for maintaining the lake
Identify all the important stakeholders
Bring everyone together and discuss fundamental questions
Draw up a lake rejuvenation plan and work with the lake custodian agency for its implementation
Reach out to other lake groups to learn from and support each other
Fundamental questions to ask

What does the lake mean to us?
What are the things we know and what don’t we know?
Who are the experts we could engage with to get relevant information and help?
How do we formulate the best possible solution for our lake’s rejuvenation?
Work with a Rejuvenation Plan

Map the physical points of the lake: marked-inlet, outlet, sewage issues (if any), threats (if any), water quality, depth, volume, silt build up, biodiversity etc.

Ensure community ownership of the lake

Think about where the funds will come from – LDA, CSR…?

Think about issues of safety and security

Once you have a plan, work with the lake custodian agency to implement it

Network with other lake groups to understand issues, challenges and get help in going further
What does Community Ownership mean?

Do take responsibility for monitoring – Watch and Ward

Be aware of threats

Inform the concerned authorities if anything goes wrong or if anything unusual happens such as fish kills, frothing etc.

See and value the benefits in maintaining a lake!

Work with your institutions to maintain a healthy lake!
Ensuring we Work together

The lake is a public resource, it belongs to all of us.

The lake has both traditional and urban stakeholders as well as many institutions working on lake issues.

Unless we work together and take into accounts all points of view, there will be a lack of accountability, no monitoring, inequitable sharing

And the lake will become a liability.
Experiences from other lakes

What are other groups doing? How can I learn from them?
Jakkur Lake

Location: NE Bangalore
Water spread: 160 acres

Sewage treatment plant- 10 MLD, located upstream of the lake

The treated water from the STP flows over a wetland of 2 ha before entering this 50 ha lake.

- Water flows into the lake through an STP followed by a well sized wetland that enables the sustainability of the lake

- JalaPoshan, a group formed by citizens in the vicinity, tracks the sewage inflow, water quality and also forces institutional intervention.

- The water quality improves as gradual cleaning happens from constructed wetland, and then in the lake

- The Lake is always full, continuously overflows and feeds into the downstream Rachenahalli Lake
Comparison of WQ in Jakkur Lake

Results of a study by Prof TV Ramachandra, IISc
Kaikondrahalli Lake

Location: SE Bangalore
Water spread: 48 acres

Lake Development Plan collaboratively produced with BBMP

Has a Walkway, Gazebo, playspace for children

- Lake managed by MAPSAS through an MoU with BBMP
- Water flows into this lake from upstream Kasavanahalli Kere and overflow goes into Sowl Kere
- The lake supports livelihoods of fishermen
- https://www.youtube.com/watch?v=RAN4lGZi3pl-
Puttenahalli Lake

- Engaging with government institutions through active citizen participation to enable the sustainability of this lake
- BBMP handed over maintenance in May 2011 to Puttenahalli Neighbourhood Lake Improvement Trust (PNLIT)
- First lake in the city to sign an MoU with BBMP
- PNLIT signed an MoU with KSPCB and BBMP to use treated water from a nearby apartment – the first of its kind in B’lore

https://www.youtube.com/watch?v=rT_7F6_lkOI

Location: S Bangalore (JP Nagar 7th Phase)

Water spread: 13 acres 25 guntas, with a perimeter of 1.1km

Managed by PNLIT

Has a Walking Track, Gazebo, Toilets, Rainwater Harvesting, Cycle Stands, Benches
Get in touch with Biome Environmental Trust at water@biome-solutions.com

With thanks to
Shri Ramprasad and Friends of Lakes, PNLIT, MAPSAS, Jalaposhan
And everyone engaged in lake rejuvenation in Bangalore

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