

DEATH OF LAKES AND THE FUTURE OF BANGALORE

V.Balasubramanian, IAS (Retd)
Former Additional Chief Secretary, Govt of Karnataka
July 2013

A BRIEF BACKGROUND:

Most cities in the world—London, Paris, Moscow, New York, Beijing, Bangkok, Buenos Aires, Cairo, Ulan Bator, Tokyo, Varanasi, even Delhi are situated on river banks or on estuaries where the river meets the sea. But not Bangalore. Bangalore, near the older town Yelahanka, was established in 1537 by Kempe Gowda who was a feudal Lord under the Vijayanagar kings. But since there was no perennial river – Arakavathi, Vrishabavathi and Suvarnamukhi being seasonal – Kempe Gowda constructed a large number of lakes (tanks) on the slopy land of Bangalore. Known as *Gandu Boomi*, it was a commercial town with two main streets, the Chikka Pete road on East-West and Doddapete Road on North South. Kempe Gowda's successor, Kempe Gowda the Second constructed four towers around the town of Bangalore and legend has it that he had said that if the town extends beyond these towers it cannot be protected and will be ruined ! It was prophetic !

After the fall of the Vijayanagara Empire, Bangalore's rule changed hands several times. In 1638, a large Adil Shahi's Bijapur army led by Ranadulla Khan and accompanied by Shahajirao Bhonsle, father of Shivaji, defeated Kempe Gowda III and Bangalore was given to Shahaji as a jagir. In 1687, the Mughal general Kasim Khan sent by Aurangzeb defeated Ekoji I / Venkoji, son of Shahaji, and then sold Bangalore to Chikkadevaraja Wodeyar (1673–1704) of Mysore for 300,000 rupees. After the death of Krishnaraja Wodeyar II in 1759, Hyder Ali, Commander-in-Chief of the Mysore Army, proclaimed himself the de facto ruler of Mysore. The kingdom later passed to Hyder Ali's son Tippu Sultan, known as the Tiger of Mysore.

Bangalore fort was captured by the British army under Lord Cornwallis on 21 March 1791 during the Third Anglo-Mysore War and formed a centre for British resistance against Tippu Sultan. It was then incorporated into the British Indian Empire after Tippu Sultan was defeated and killed in the Fourth Anglo-Mysore War (1799). The British returned administrative control of the Bangalore "pētē" to the Maharaja of Mysore, choosing only to retain the Cantonment under their jurisdiction. The 'Residency' of Mysore State was first established in Mysore in 1799 and later shifted to Bangalore in the year 1804. It was abolished in the year 1843 only to be revived in 1881 at Bangalore and to be closed down permanently in 1947, with Indian independence. The British found it easier to recruit employees in the Madras Presidency and relocate them to cantonment area during this period. The Kingdom of Mysore relocated its capital from Mysore city to Bangalore in 1831. Two important developments then contributed to the rapid growth of the city: the introduction of telegraph connections and a rail connection to Madras in 1864.

THE SYSTEM OF *CASCADING OF LAKES* FOR WATER SUPPLY TO BANGALORE:

Bangalore being on top of a rock of 3000 feet above sea level and there being no perennial river, lakes became the mainstay for Bangalore's survival. Both, Kempe Gowda and later General Hiram Sankey (after whom Sankey Tank is named), developed a system of Cascading of Lakes. Bangalore has been getting an average rainfall of 800mm to 900mm per annum regularly. As a natural way of rainwater harvesting, the run-off (which is ~20% of the rainfall, ~70% being evapo-transpiration, the balance being percolation to ground-water), was collected first in the lakes at the higher level, its surplus then flowing to the next level of lakes through *Rajakaluwes* (which were not less than 30 feet in width) which became inlets to the lakes and when the second level lakes filled up, the surplus flowed to the third level of lakes and so on till the excess water from the last level of lakes flowed into the four natural drainage valleys of Challaghatta, Koramangala, Hebbal and Vrishabhavati.

Bangalore was described as the *LAND OF A THOUSAND LAKES* by the Captain of the British East India Company sent by Governor General Cornwallis to find an alternative route to Seringapatam (Srirangapatna), as the Southern route via Satyamangalam and Dimbum was controlled by Tippu Sultan, came to Bangalore via Chittoor, Palmaner and Kolar and ascribed its salubrious climate to the lakes and described Bangalore as the *LAND OF A THOUSAND LAKES*. Even today in the Revenue Survey maps of Bangalore, there are 937 lakes in the Bangalore Urban district consisting of five taluks.

BUT, DUE TO THE "DEVELOPMENT" OF BANGALORE, ESPECIALLY THE INFORMATION TECHNOLOGY BOOM CAUSING LAND VALUE GOING UP BY 350 TIMES SINCE 1980 RESULTING IN LAND GRABBING BY LAND MAFIA, POLITICIANS, BUREAUCRATS AND CITIZENS, THERE ARE ONLY 189 TANKS WHICH ARE "LIVE" ACCORDING TO BBMP. BUT THESE "LIVE" TANKS ARE ONLY STORING SEWAGE WASTE WATER CAUSING GROUNDWATER CONTAMINATION AS DISCUSSED BELOW IN THIS PAPER.

THE GAP BETWEEN DEMAND AND SUPPLY OF WATER IN BANGALORE WILL ONLY INCREASE:

At the historical 4% population growth rate of Bangalore over the past fifty years, the population of Bangalore living in the 772 km² area of the present BBMP will increase from 85 lakhs in 2011 to one crore by 2016. With Hessarghatta gone and Tippegondahanally drying up, the only reliable water supply to Bangalore is from Cauvery with a gross pumping of 1,410 MLD. There is no way of increasing the drawal from Cauvery any more because the allocation by the Cauvery Water Disputes Tribunal for the *entire* urban and rural population in Cauvery Basin in Karnataka for drinking water is only 8.75 TMC. As one TMC (thousand million cubic feet) equals 78 MLD, Bangalore city is already drawing more water, 1,400 MLD equals 19 TMC, than the allocation for the entire rural and urban population in Cauvery basin. Besides, Bangalore city falls under two basins, Cauvery and Pennaiyar basins. Only Cauvery basin area can receive Cauvery Water and more than half of Bangalore is outside it. The schemes which the Government is proposing namely, diversion of water from West flowing rivers such as Kanganahole, Kakkatuhole and Ethinahole through Western Ghats, bringing water from Almatti dam etc. are flights of fantasy, Contractors' and their patrons' Dream Projects and Environmentalists' nightmare. They will not see the light of the day.

About 43% of the water supplied by BWSSB is Non-Revenue Water or Unaccounted For Water (UfW). Of this, an estimated 35% (500 MLD) is simply leakage from supply pipes. It costs Rs.450 crores annually in electricity charges to BWSSB currently to pump water from Cauvery from 97 kms distance. Therefore it spends Rs.150 crores annually to let water underground leading to the unintended consequence of increasing the dwindling water table ! Plugging this leakage alone by such schemes as the "24/7 Supply" in Hubli-Dharwad, Gulbarga and Belgaum will save about two-thirds (25%) of the leakage, equivalent to 300 MLD. At present, with nearly 500 MLD of leakage and another 150 MLD going to industries, the balance of 750 MLD for a population of 1 crore works out to 75 litres per capita per day (LPCD) while the Government of India norm for metropolitan cities is 150 LPCD. With Bangalore's population going up every year, the gap between supply and demand will widen with supply from Cauvery having reached the ceiling.

BOREWELLS SUPPLYING CONTAMINATED WATER:

There are about 312,000 borewells in Bangalore which draw about 300 MLD. According to the Department of Mines and Geology, the drawal of underground water is 3.7 times more than the recharge from Bangalore's annual rainfall of 900mm. This is the reason why the borewells have gone deeper upto 1,000 feet and many are becoming totally dry. Moreover, the 600 lakes of Bangalore Urban district have all become Sewage Tanks as shown in Volume 2 of *Excreta Matters* by the Centre for Science & Environment, Delhi, 2011, which is a study of 71 cities in India including Bangalore. The sewage water from the lakes percolates down and contaminates the ground water and fills into the borewells. According to the laboratory results of the Public Health Institute of Govt of Karnataka and the Department of Mines & Geology, GoK, 52% of the borewell water and 59% of tap-water in Bangalore is not potable. Besides, the borewell and pipe supply contain 8.4% and 19% *Escherichia coli* bacteria respectively. When it gets infected, *E.coli* becomes a dire health hazard. **The problem of diseases from public and borewell drinking water in Bangalore is seldom highlighted.**

A CITY DIES WHEN ITS LAKES DIE: Of the original 937 lakes in Bangalore Urban District according to the Revenue Records, less than 200 are said to be "live" lakes. Many of them have been breached and converted as layouts, bus-stations, Golf Clubs, stadiums, Colleges, government offices, etc. (An illustrative list of 43 such lakes is attached in Annexure). Moreover, the so-called "live" lakes are only storing city's sewage. The 850 kms of old Raja Kaluves meant as Storm Water Drains to carry surplus water from higher elevation lakes to lower levels in a cascading system of natural rain water harvesting, instead carry city's sewage to these lakes now. The existing 14 Secondary Treatment Plants (STPs), 4 Tertiary Treatment Plants (TTPs) and 10 more STPs under construction will together have a capacity to treat 1,133 MLD. However, the existing STPs hardly treat 30% of the sewage because of sewage not flowing into the STPs (but into the lakes instead) and the poor maintenance by the contractors to save on electricity and neglected supervision. If the STPs with huge investments already made are effectively used to treat the sewage and more STPs are converted to TTPs, the recovered water can be re-used at least for non-potable purposes to start with and later, with proper education of the public, for drinking water purpose also as done in Singapore. Unless the sewage is diverted and the Raja Kaluves are cleared of

encroachments to carry surplus rainwater to the succession of lakes, all the water bodies in Bangalore will become sewage cess-pools causing immense health hazard. Restoration of lakes done by BBMP with "soup-bowl" technology, decorative bird-islands, paved jogging paths and Chain Link Fences without attending to the primary task of diversion of sewage away from the lakes, helps only the Contractors and their patrons.

RAINWATER HARVESTING IS A JOKE IN BANGALORE: Rainwater harvesting done now for name's sake covering 44,000 houses out of some 18 lakh properties has no meaning. As only 40% of the area of Bangalore is covered by roofs, for rain water harvesting to be effective, it should be done on a geographical basis covering the entire four basins area of Bangalore as done in Singapore, a city that works. What is done in Bangalore now is only sloganeering.

SOLUTIONS:

Obviously these problems are gigantic but must be solved in an integrated and comprehensive manner if Bangalore has to survive. What the BWSSB is doing is tokenism, piece-meal, ad-hoc and on "pilot" basis. A comprehensive plan including all the above components with genuine restoration of lakes and Rajakaluwes, leakage plugging, effective STPs and TTPs, Rainwater Harvesting and involving civil society organizations will alone solve the crisis facing Bangalore. It also requires a sizeable investment. An outline for such a comprehensive plan has also been prepared by reputed consultants as shown below:

<u>ITEM OF WORK</u>	<u>AMOUNT IN Cr.</u>
1. Reducing Leakages in 650,000 connections from 30% to 15% in core area from Source to House connections under Maintenance Contract system as in Hubli-Dharwad, Gulbarga and Belgaum	1,250
2. Removal of encroachments & maintenance of 850 kms of SWDS & Rajakaluwes with proper servicing tracks	10,000
3. Rejuvenation of Lakes and maintenance	5,000
4. Segregating sewage from SWDs, Optimum Treatment in STPs and TTPs, New STPs and Upgrading existing STPs including the major 300 MLD Vrishabavathy Valley STP and laying Dual Pipelines	2,750
5. Rainwater Harvesting and other Miscellaneous Works	5,000
6. Price and Physical Contingencies	2,000
<u>TOTAL</u>	<u>26,000</u>

Such a Comprehensive Project will take about 10 years and can be funded only with external assistance from international funding bodies such as the World Bank and Asian Development Bank which impose strict financial discipline in awarding contracts and certifying quality of work.

Unfortunately, the BWSSB is not keen on preparing such an integrated project which requires strict financial supervision by the funding body. Even though the Chief Secretary had directed the Additional Chief Secretary, Urban Development and other officers of BWSSB, LDA, etc. in October 2010 and the then Minister for Urban Development had also directed the BWSSB to prepare such a Feasibility Report in June 2012, the BWSSB has neglected to carry out these instructions. This is because, in such big projects with World Bank or ADB funding, the unholy alliance of politicians, officers and contractors cannot siphon funds. The WB or ADB first insists upon the preparation of a Detailed Project Report (DPR) by international bidding, then calls for pre-qualification of bidders for contracts, the contracts are then approved by a committee headed by the Chief Secretary, no "negotiations" can take place once the bids are opened and when work is done stage by stage, the certification of work done is by one or more independent agencies selected by global bidding and not by the BWSSB. Before bills are paid the approval of the WB or ADB has to be obtained. It is due to such tight procedure that the WB or ADB funded projects such as the National Highways or the State High Ways Improvement Projects in Karnataka are of good quality. Above all, no practice of "DSR + 70%" (that is, Divisional Schedule of Rates plus upto 70%) payable to contractors is possible under the WB and ADB funded projects.

Without preparing and implementing such an integrated and comprehensive programme, any attempt to solve one component here and another there on a piecemeal and much popular "pilot basis" enabling corruption is only a futile exercise in tokenism and will not be of any use and a waste of public funds.

The people of Bangalore must take responsibility for the survival of Bangalore. Otherwise, we will be overtaken by a Black Swan event (totally unexpected event suddenly taking place) of evacuating half of the city in ten years due to water scarcity, contaminated water and disease. It has happened in history before, such as the abandoning of Fatehpur Sikhri, fading out of Adil Shahi's Bijapur, etc. History repeats itself as Tragedy unless people wake up.

V.Balasubramanian
4/1 Hall Road, Richards Town,
Bangalore 560005
Ph.080 2546 5034
M-98459 70092
Email vbalu41@gmail.com

ANNEXURE

An Illustrative List of Lakes which have been breached and have lost their entire characteristics

1. Marenahalli Lake – Marenahalli Layout
2. Sarakki Agrahara Lake/Doresanipalya - JP Nagar 4th Phase
3. Chinnagara Lake - Ejipura
4. Challaghatta Lake – Karnataka Golf Association
5. Domulur Lake - Domlur Second Stage
6. Siddapura Lake - Siddapura/Jayanagar 1st Block,
7. Geddalahalli Lake - RMV 2nd Stage, 1st Block
8. Nagashettihalli Lake - RMV 2nd Stage, 2nd Block
9. Kadirenahalli Lake - Banashankari 2nd Stage,
10. Tyagarajanagar Lake - Tyagarajanagar
11. Tumkur Lake - Mysore Lamps
12. Ramshetty Palya kere - Milk Colony (Playground)
13. Agasana Lake - Gayathri Devi Park
14. Ketamaranahalli Lake - Rajajinagar (Mahalakshmpuram)
15. Gangashetty Lake - Minerva Mills & Open ground
16. Jakraya Lake - Krishna Floor Mills
17. Dharmambudhi Lake - Kempegowda Bus Terminal
18. Agarahar hosakere - Cheluvadipalya
19. Kalasipalya Lake - Kalasipalya
20. Sampangi Lake - Kanteerava Stadium
21. Shule Tank - Ashok nagar, Football Stadium
22. Akkitimmanahalli Tank - Sai Hockey Stadium
23. Sunkal Tank - KSRTC Regional workshop
24. Koramangala Lake - National Dairy Research Institute
25. Kodihalli Lake - New Tippasandra/Government Buildings
26. Hoskere - Residential Railway Stockyard
27. Sonnenehalli Lake - Austin Town (RES Colony)
28. Gokula Tank - Mattikere
29. Vidyaranya pura lake - Vidyananaya pura/(Jalhalli East)
30. Kadugondanahalli Lake - Kadugondanahalli
31. Hennur Lake - Nagavara (HBR Layout)
32. Banaswadi Lake - Subbayapalya Extention
33. Chennasandra Lake - Pulla Reddy Layout
34. Vijinapura Lake (Kotturu) - Rajarajeshwai Layout
35. Murugeshpalya Lake - Murugeshpalya
36. Parangipalya Lake - HSR Layout
37. Mestriplaya Lake - Mestriplaya (Open Ground)
38. Timeryard Lake - Timeryard Layout
39. Gangodanhalli Lake - Gangodanhalli
40. Vijayanagar Chord Road Lake - Vijayanagar
41. Oddarapalaya Lake - Rajajinagar (Industrial Area)
42. Saneguruvanahalli Lake - Shivanahalli (Play Ground)/
KSPCB Buildings
43. Kurubarahalli Lake – Basaveshwaranagar Layout