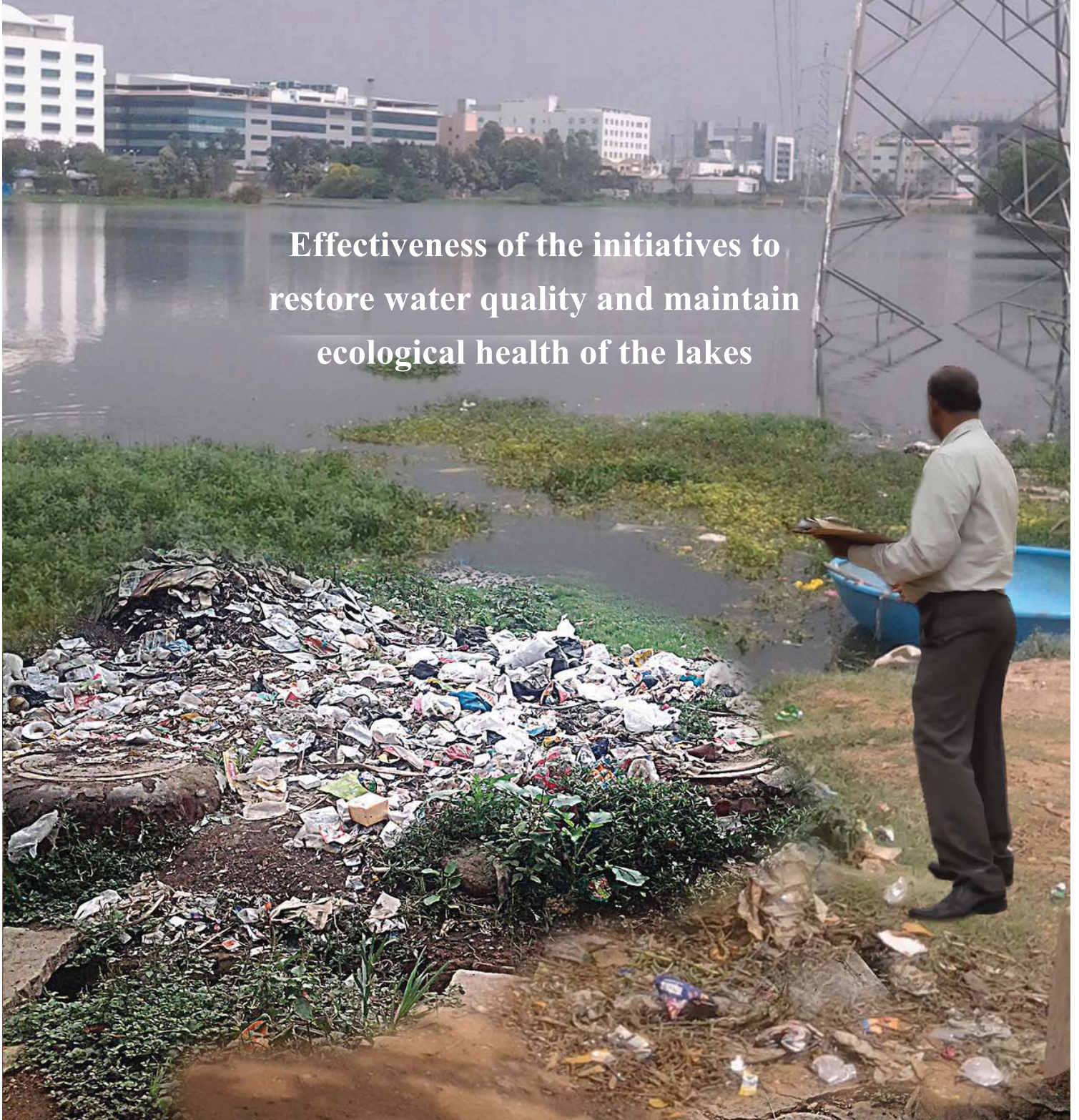


# S E C T I O N - I I I

Effectiveness of the initiatives to  
restore water quality and maintain  
ecological health of the lakes





## Chapter V

### Efforts and initiatives to restore water quality in lakes

#### 5 Background

The Water (Prevention and Control of Pollution) Act<sup>17</sup>, 1974 defines pollution to mean such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluents or of any other liquid, gaseous or solid substance into water (whether directly or indirectly). Pollution in lakes leads to eutrophication<sup>18</sup> and ground water contamination causing loss of habitat and healthy environment.

#### 5.1 Inadequate assessment of levels of pollution in lakes

The responsibility of assessing the pollution levels in lakes and determining the quality of water vests with KSPCB.

The levels of quality of water as per NLCP and KSPCB are given in **Table 2** below:

**Table 2: Classifications for quality of water**

Designated best-use	Class of water
Drinking water source without conventional treatment but after disinfection	A
Outdoor bathing (organised)	B
Drinking water source after conventional treatment and after disinfection	C
Propagation of wild life and fisheries	D
Irrigation, industrial cooling, controlled waste disposal	E

Source: KSPCB and NLCP guidelines

The quality of water in lakes was required to be of 'B' Class *i.e.* suitable for outdoor bathing. Out of 56 test-checked lakes, KSPCB conducted the water quality testing in only six<sup>19</sup> lakes (Bengaluru) and in nine<sup>20</sup> lakes (other ULBs). The water quality in all these lakes was categorised as either 'D' or 'E'. The implementing agencies had also not undertaken any exercise to assess the pollution levels in those lakes which were rejuvenated by them. Thus, the objective of ensuring the standard of 'B' class outdoor bathing was not achieved.

The State Government (UDD) stated (March 2015) that in addition to KSPCB, private agencies would be identified and entrusted the job of testing water

<sup>17</sup> Section 2 (e) of the Act

<sup>18</sup> A process where water bodies receive excess nutrients that stimulate excessive plant growth.

<sup>19</sup> D Category - Jakkur-Sampigehalli, Yelahanka; E Category-Chinnappanahalli, Doddanekundi, Kaigondanahalli and Kasavanahalli

<sup>20</sup> Dalvoy, Kelageri, Kolikeri, Kotekere, Navalur, Nuggikeri, Sadankeri, Someshwara and Unkal (Main) lakes

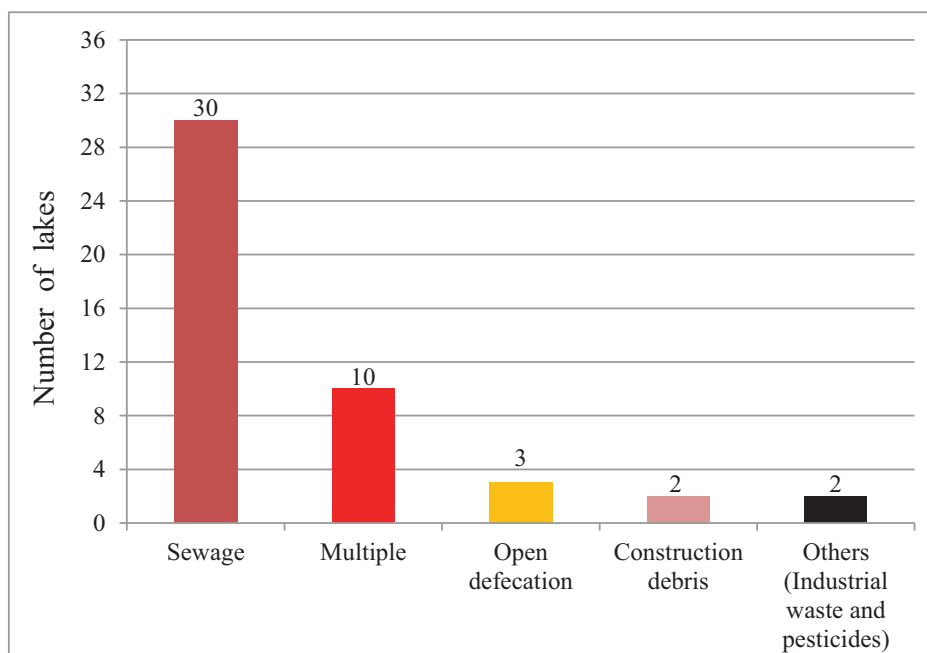
quality and monitoring of pollution levels in lakes. The reply, however, did not specify the penal provisions to be imposed on polluters.

## 5.2 Sources of pollution

It was observed during JPV that out of 56 test-checked lakes, 47 lakes were severely polluted. Sewage was the major cause of pollution in 30 lakes. Apart from the inflow of sewage, it was observed during Audit that the lakes were being polluted by dumping of municipal solid waste and construction debris, open defecation, industrial effluents, *etc.* Details of pollution in test-checked lakes are given in **Appendix 8**.

The kinds of pollution noticed in test-checked lakes are given in the **Chart 4** below:

**Chart 4: Kinds of pollution in test-checked lakes**



The lakes were not free from sewage primarily because the Storm Water Drains (SWDs) which were to bring in rain water run-off were carrying sewage. This was attributed to the fact that UGD lines were laid by BWSSB inside the SWDs at many stretches in Bengaluru. The UGD pipes laid almost 40 years back in core areas of Bengaluru were also corroded, encroached upon, choked and blocked.

## 5.3 Status of restoration works

The implementing agencies undertake various works for restoration and improvement of lakes. During 2009-14, no fresh works were sanctioned under NLCP, but 16 works sanctioned prior to 2009 were under progress. Two works under NWCP and four works under State Sector Programme were sanctioned during 2009-14. As per the progress reports of BBMP and BDA,

out of the 55 and 123 lakes in their respective custodies, 34<sup>21</sup> and 45<sup>22</sup> lakes were taken up for restoration during 2009-14.

The position of works executed in the test-checked lakes is given in **Table 3** below:

**Table 3: Position of works executed in test-checked lakes**

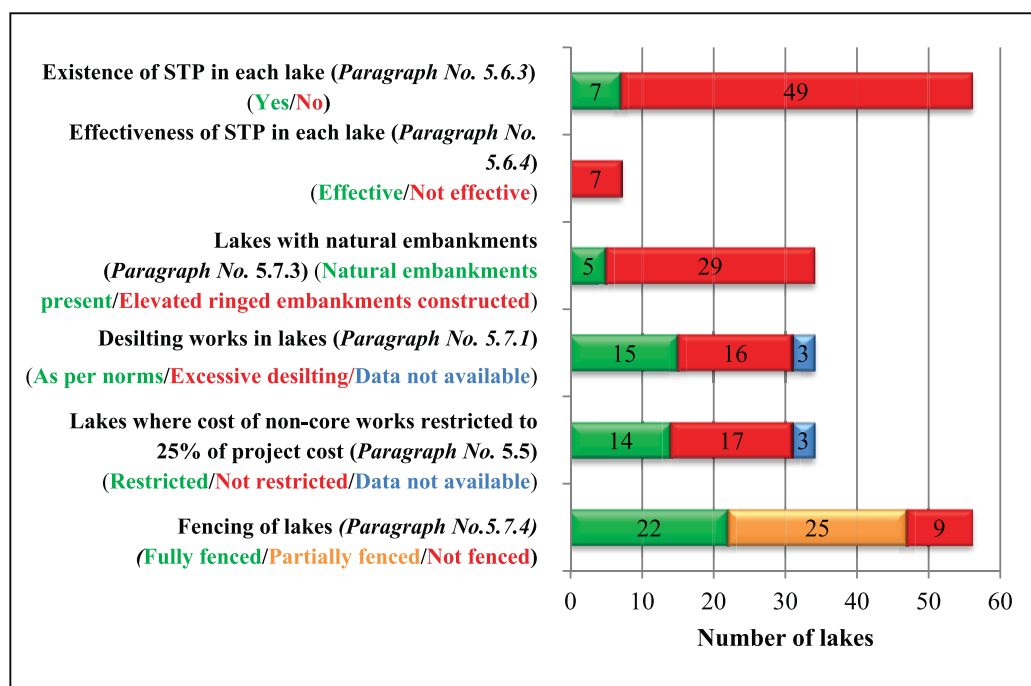
Implementing agency	Number of test-checked lakes	Number of lakes where works were executed	Expenditure (₹ in crore)
BBMP	13	12	54.16
BDA	19	08	40.81
LDA	NLCP	06	25.03
	NWCP	02	1.00
	State Grants	03	1.45
CCs	Hubballi-Dharwad	0	0
	Belagavi	03	0.63
<b>Total</b>	<b>56</b>	<b>34</b>	<b>123.08</b>

Source: As furnished by implementing agencies

Details of execution of works in test-checked lakes are given in **Appendix 5**.

The main findings of Audit on lakes where restoration works were taken up are depicted in **Chart 5** below:

**Chart 5: Restoration works in test-checked lakes**



The audit findings are discussed in the succeeding paragraphs.

<sup>21</sup> 32 lakes – work in progress and in two lakes – preparation of DPRs is underway

<sup>22</sup> 12 lakes – already developed, 25 lakes – work in progress and eight lakes – works to be taken up

#### 5.4 Approval of DPRs by LDA

The State Government directed (April 2010) that the DPRs for the works be approved by LDA. In respect of NLCP works, the DPR required the approval of GoI. Deficiencies in approval of DPRs, monitoring of lake restoration works, pollution and creation of biodiversity are dealt in subsequent chapters.

In the test-checked lakes, out of 34 lakes where works were taken up, LDA had given approval for 21 works and in the remaining 13<sup>23</sup> cases, works were taken up without approval of LDA.

Audit observed the following deficiencies in the approved DPRs and monitoring by LDA of execution of works as per DPRs.

- Delays in approval of DPRs up to nine months were noticed;
- LDA had approved DPRs in 11<sup>24</sup> cases where the cost provided for non-core works (such as boat jetty, guard rooms, play stations, *etc.*) was much more than the stipulated 25 *per cent* of the total project cost proposed in the DPRs (detailed in the succeeding paragraph).
- DPRs did not conclusively state the pollution classification level as followed by KSPCB though NLCP guidelines required prioritisation of lakes for rejuvenation with reference to the severity of pollution levels.
- The works proposed in the DPRs varied with the works actually taken up in eight<sup>25</sup> test-checked lakes.

The LDA accepted the audit observations and attributed (April 2015) the delays to improper preparation of DPRs by BBMP and BDA. It was stated that care would be taken to provide less than 25 *per cent* of the project cost for non-core items and DPRs would be approved in future only on submission of pollution classification level. It was further stated that variations in works were mainly due to local site condition.

#### 5.5 Categorisation of works *i.e.* core and non-core works

As per the NLCP guidelines, the development works in lakes were categorised as core and non-core works. The core works associated with ecological restoration included the works such as strengthening of bund, desilting, foreshore planting, inlet and waste weir restoration works, *etc.* These works were significant for maintaining a healthy ecology of lakes. The non-core activities included construction of walkways, boat jetties, idol immersion

<sup>23</sup> Alarwad, Allalassandra, Attur, Chinnappanahalli, Dasarahalli, Jakkur-Sampigehalli, Kaigondanahalli, Kowdenhalli, Kuduchi, Kuduchi (small), Rachenahalli, Venkateshpura and Yelahanka

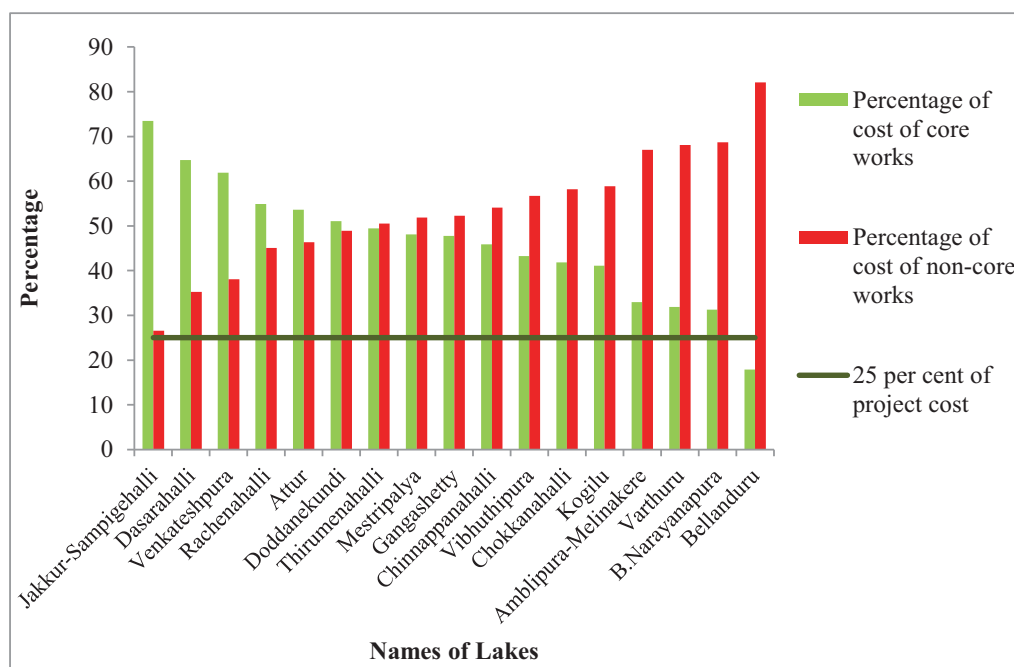
<sup>24</sup> Amblipura Melinakere, B.Narayanapura, Bellanduru, Chokkanahalli, Doddanekundi, Gangashetty, Kogilu, Mestripalya, Thirumenahalli, Varthuru and Vibhuthipura

<sup>25</sup> B.Narayanapura, Chokkanahalli, Doddanekundi, Gangashetty, Kogilu, Mestripalya, Thirumenahalli and Vibhuthipura

tanks, children play area, gazebo, toilets, food courts, etc. Over emphasis on these works would adversely impact the bio-diversity of the lakes.

Further, according to the NLCP guidelines, the expenditure on non-core activities was permitted up to 25 per cent of the project cost. However, Audit observed that in 17 out of 56 test-checked lakes, the cost provided for non-core works was much more than the stipulated 25 per cent of the project cost amounting to ₹185.18 crore as per DPRs/estimates. In respect of 11 out of these 17 test-checked lakes, cost provided for non-core works was even higher than that of core works. This has been depicted graphically in **Chart 6** below:

**Chart 6: Provision for core and non-core works as per DPRs/estimates**



Audit observed that the implementing agencies had not segregated the expenditure based on core and non-core works. In the absence of a stringent system of monitoring by LDA of the expenditure on lake related activities, there would be difficulty in maintaining the ratio of expenditure between core and non-core activities. This would impact the expenditure on essential core works necessary for the ecological health of the lakes.

The State Government (UDD) stated (March 2015) that in urban lakes, requirement of executing non-core components were very essential and works were carried out based on site specific requirements. The DPRs for these lakes were also technically approved. The reply cannot be accepted as execution of non-core works in excess of norms is detrimental to the ecological health of the lake.

**Recommendation 8: The provisioning of funds for both core and non-core works needs to be maintained as per norms in the interest of the ecological health of the lakes.**

## 5.6 Works impacting pollution

According to a Government Order (April 2010), works were to be taken up only after removal of sewage. The Apex Committee, headed by Principal Secretary, Revenue Department, had also directed (May 2013) that regular inflow of fresh water into the lakes should be ensured and sewage inflow should be stopped before taking up any restoration work by the agencies responsible for development of lakes.

However, these conditions were not adhered to as elaborated in the succeeding paragraphs.

### 5.6.1 Overhaul of sewage network by BWSSB

Audit observed that the implementing agencies in Bengaluru were taking up restoration works in lakes in which sewage continued to enter. This was happening due to the fact that BWSSB had not completed the work of overhauling the entire existing sewage network in the core area and newly added areas of Bengaluru by its scheduled completion date of December 2014.

BWSSB stated (October 2014) that as at the end of August 2014, the re-laying of UGD lines in the core area was complete. This was, however, not the position as seen during JPV of test-checked lakes in core areas.

BWSSB informed during Exit Conference (February 2015) that it would ensure zero sewage flow into the water bodies.

Thus, it is evident that the problem of sewage entering lakes will continue to persist until the UGD works are completed and therefore works taken up in such lakes will be rendered largely unfruitful.

### 5.6.2 Improper construction of sewage diversion channels

Implementing agencies had proposed the construction of sewage diversion channels in the DPRs/estimates of 13<sup>26</sup> lakes. It was observed during audit that in 12 of these lakes (except Doddanekundi), the implementing agencies were diverting the sewage entering the lake through box drain or Reinforced Cement Concrete (RCC) diversion channels, even though none of the other inlets were bringing in rain water into the lake. Consequently, the rejuvenated lakes remained dry and the sewage diverted was polluting the downstream lakes.

During JPV of seven<sup>27</sup> of these lakes, it was observed that BWSSB had also laid UGD pipelines in parallel. Thus, the expenditure incurred for the sewage

<sup>26</sup> B.Narayanapura, Chinnappanahalli, Chokkanahalli, Dasarahalli, Doddanekundi, Gangashetty, Jakkur-Sampigehalli, Kaigondanahalli, Kasavanahalli, Kowdenhalli, Rachenahalli, Vibhuthipura and Yelahanka

<sup>27</sup> Doddanekundi (₹1.26 crore), Jakkur-Sampigehalli (₹0.24 crore), Kaigondanahalli (₹1.15 crore), Kowdenhalli (₹0.21 crore), Rachenahalli (₹0.95 crore), Vibhuthipura (₹0.04 crore) and Yelahanka (₹2.26 crore)

diversion channel for which the estimated cost was ₹6.11 crore was unwarranted as these works were taken up without coordinating with BWSSB.

BDA replied (February 2015) that diversion drains were laid in a few lakes as the BWSSB work of UGD was not complete as anticipated and that diversion drains were still required to prevent entry of sewage mixed rain water into the lake during the first few showers of the monsoon. The State Government (UDD) also stated (March 2015) that BWSSB is laying UGD lines in common places such as roads, common utility areas and lakes which are situated quite below the levels of the trunk lines.

The replies are not acceptable as diversion drains led to drying up of lake beds, loss of characteristics and eventual death of the water bodies and expenditure was rendered unfruitful where UGD lines had been laid by BWSSB in parallel.

### **5.6.3 Inadequacy in establishment of Sewage Treatment Plants**

In the State of Karnataka, out of 219 local bodies, only 55 local bodies had been provided with STPs. KSPCB stated (May 2014) that directions had been issued to the local bodies to ensure that STPs are provided to prevent entry of sewage into water bodies. The DPRs had suggested establishment of STPs to treat sewage based on the inflow through all the inlets of the lake. This would ensure that the entire sewage flowing into the lake be treated and thereafter the treated water alone would enter into the lake, thereby improving the ecological health of the lake.

In Bengaluru, approximately 900 Million Litre per Day (MLD) of water was being consumed. Out of this, 80 *per cent* was generated as waste water. KSPCB norms require BWSSB to treat the entire waste water to secondary level before letting it into water bodies. Although BWSSB had the capacity to treat 721 MLD in the existing STPs, only 521 MLD of waste water was being treated and the remaining untreated sewage (200 MLD) was let into the lakes. BWSSB (November 2014) stated that construction of STPs of additional capacity of 339 MLD was under progress. Regarding apartment complexes which had their own STPs, BWSSB during Exit Conference (February 2015) stated that treated water from such apartments which had their own STPs<sup>28</sup> should be let into the lakes rather than into the sewer lines. However, KSPCB and BWSSB need to ensure that only treated water is let into the lakes from all such apartments.

There were two cases where STPs had not been established which are as under:

- i. In Nagavara Lake in Bengaluru, the lease holder of the lake did not provide for a five MLD STP (on the north-western side of the inlet) even though it was a pre-requisite for leasing of the lake as per the contractual obligation.

<sup>28</sup> apartments which have 50 dwelling units or generating 50 cum of sewage daily were required to operate an STP within their premises



- ii. In Kotekere tank of Belagavi, the rejuvenation works, which included the component of establishment of an STP, were completed (May 2009) incurring an expenditure of ₹5.73 crore. However, the item of STP was deleted and during JPV (March 2014) it was seen that the sewage continued to pollute the lake.

The State Government (UDD) stated (March 2015) that establishing STPs for other lakes will be extended on priority basis, while keeping in view budgetary allocations.

#### **5.6.4 Inefficient functioning of STPs**

Audit examined the functioning of STPs in the test-checked lakes in Bengaluru. The following deficiencies were noticed:

- The STP established in Dasarahalli Lake by BBMP was for a lesser capacity of one MLD although the sewage entering the lake was 2.3 MLD. The State Government (UDD) accepted (March 2015) the deficiency and explained that the lesser capacity was for dry weather flow. The reply cannot be accepted because sewage flow for dry weather alone cannot justify establishment of a capacity lesser than the requirement.
- In Vengaihanakere, an STP of 20 MLD was provided for letting treated water into the lake. During JPV, it was observed that the STP was not working to its full capacity and the treated water was let into the SWD filled with raw sewage flowing into the lake through the same inlet. The BWSSB replied (November 2014) that the raw sewage was being diluted due to mixing with treated water. The reply is not tenable as the purpose of treating the sewage was defeated once the sewage is mixed with the treated water.
- BWSSB had constructed an STP of 60 MLD capacity in Nagavara Lake and it was not functioning due to frequent power failures. BWSSB admitted (November 2014) that this was due to not providing captive power to the STP and the same would be provided.
- The treatment of sewage was not to the installed capacity of 10 MLD in Jakkur-Sampigehalli Lake also. This affected aquatic species in the lake and mass death of fish was reported during January 2015.

All these instances indicate that the functioning of STPs was not effective and due to under-utilisation and lesser capacity of these STPs, sewage entering the lakes could not be contained. The Additional Chief Secretary, Forest, Ecology and Environment also stressed during the Exit Conference (February 2015) the need for direct supervision of STPs to ensure that the sewage is being treated to the desired level before being let into lakes.

Photograph below taken during JPV also illustrates the level of pollution in a test-checked lake.



Dasarahalli Lake main drain (inlet 1 of the lake) receives all the effluents from Peenya Industrial area as evident from the thick viscous black water flowing in the drain

***Recommendation 9: BWSSB should, in coordination with implementing agencies/custodians of the lake, construct STPs and use them optimally to ensure that untreated sewage is not let into the lakes.***

## 5.7 Other works carried out in lakes

### 5.7.1 Excessive desilting works

As per the NLCP guidelines, increase in the lake depth through de-siltation has an adverse impact on its flora and fauna. Execution of de-siltation component should be carried out scientifically under expert guidance. The DPRs pointed out that excessive desilting would affect the lake ecology due to hydrological retention time<sup>29</sup>. The Principal Chief Conservator of Forests (PCCF) highlighted (2008) the need for preserving natural foreshore region without substantial desilting and without formation of steep embankment. The Technical Advisory Committee of LDA suggested that desilting of the lake should be restricted to the quantity required for formation of embankment. The State Government also instructed (April 2010) LDA to supervise and monitor the works executed by BBMP and BDA.

Scrutiny of records revealed that desilting was undertaken for increasing the impounding capacity of water, replenishment of ground water, etc. It was noticed that the quantity of desilting carried out was much higher when compared to the estimate and the DPR. There was no justification on record for the excess excavation and the expenditure incurred on the excess desilting was ₹4.02 crore in 13<sup>30</sup> test-checked lakes. Further, it was observed that

<sup>29</sup> Hydrological retention time is the mean time that water is retained in a lake. If the retention time is longer, pollutants stay longer in the lake and the lake is less often flushed, thereby increasing the pollution of the lake.

<sup>30</sup> Allalasanra, Attur, B.Narayanapura, Chinnappanahalli, Dasarahalli, Doddanekundi, Gangashetty, Jakkur-Sampigehalli, Kaigondanahalli, Kowdenhalli, Mestripalya, Rachenahalli and Yelahanka

though desilting activities were not proposed in the DPRs of three<sup>31</sup> lakes, desilting work was carried out incurring an expenditure of ₹99.78 lakh. Excessive desilting had, therefore, increased the hydrological retention time and consequently increased pollution level in the lakes.

LDA also failed to supervise and monitor the excessive desilting works executed by BBMP and BDA. The LDA accepted the audit observation and stated (April 2015) that it did not have sufficient technical staff to carry out regular inspection and monitoring of lakes.

The BDA stated (January 2015) that the deepening of the lake bed was carried out to bring saucer shape to the lake bed. The reply is not acceptable as this was contrary to the expert guidance given (July 2008) by the PCCF. The State Government (UDD) admitted (March 2015) that there was excessive desilting due to accumulation of debris and other wastes in the lakes which was due to delay in the process of preparation of DPRs and execution of the work. Also, slushy soil cannot be used for formation of embankment. The reply is not acceptable as accumulation of debris and other wastes should be avoided once the lake has been handed over to the implementing agencies. For categorising the soil as 'slushy soil', there should be proper soil test reports which were not there. Also, bills showed that that even dry soil was transported out of the lake area. As such, the issue calls for investigation and fixing of responsibility for doing excess excavation as compared with DPRs.



### 5.7.2 Irregular payment of lead charges

Lead charges are payable to the contractor for carrying material from the quarry to the work site and also for disposing of unused/unwanted material to the identified dumping place.

Audit noticed that the excess desilting also increased the expenditure incurred on the lead charges paid to contractors for the work of dumping the excavated soil. The payments were made to contractors even though there were no lead charts/maps enclosed with the approved technical estimates as required under

<sup>31</sup> Kogilu, Thirumenahalli and Venkateshpura

codal provisions. There were no details of transportation for lead charges claimed by the contractors. It was also seen that instead of utilising the available soil, the soil was brought from burrow areas without justification such as soil suitability test reports. In 13<sup>32</sup> test-checked cases, ₹4.91 crore was paid as lead charges.

The State Government (UDD) admitted (March 2015) that there was variation in lead calculation due to non-availability of dumping area near the lakes. The reply is not tenable, as it does not address the issue of non-availability of the lead charts/maps for calculation of the lead charges which are to be enclosed with the approved technical estimates, for which responsibility may be fixed.

### 5.7.3 Embankment work

According to the NLCP guidelines, engineering works on bund should be minimised with naturalisation of bunds as a preferred option. Further, the cost of these works was to be restricted to 10 to 15 *per cent* of the total project cost. However, excessive desilting was carried out in the lakes directed with the purpose of formation of elevated ring bunds. Action Plan for restoration of lakes stipulated formation of a packed-mud/cobble stone ground level walkway with a width not exceeding three metres, instead of ringed elevated jogging tracks. It was envisaged that ground level walkways should not obstruct the inflow of run-off water from the surrounding catchment area. This work was required to be carried out all around the lake perimeter beyond the high-water mark or close to the perimeter fence. This was also reiterated by the Conservator of Forest, LDA, during his inspection (February 2008) of Kunnirkatte Minor Irrigation tank that bund all around the lake and mound in the middle of lake would reduce the water spread area and block the entry of water into lake.

It was, however, observed that ringed elevated jogging tracks at an average height of above three metres and width up to 29 metres had been provided in 17<sup>33</sup> test-checked lakes. This work was also not objected to by LDA. The ring bunds were formed utilising the soil desilted and in some cases, soil was brought from burrow areas without utilising the entire available desilted soil. This prevented free inflow of run-off water from the surrounding catchment areas of the lakes. Due to execution of these works, the avoidable expenditure in respect of these lakes amounted to ₹11.32 crore.

LDA admitted (December 2014) that it had not carried out any supervision and monitoring of rejuvenation works in BBMP and BDA lakes. Failure on the part of LDA to monitor and supervise lake rejuvenation activities in BBMP/BDA lakes resulted in works adversely affecting the ecology of the lakes.

<sup>32</sup> Amblipura Melinakere, Attur, Chinnappanahalli, Dasarahalli, Gangashetty, Jakkur-Sampigehalli, Kaigondanahalli, Kogilu, Mestripalya, Rachenahalli, Thirumenahalli, Vibhuthipura and Yelahanka

<sup>33</sup> Allalassandra, Amblipura Melinakere, Attur, B.Narayanapura, Chinnappanahalli, Dasarahalli, Doddanekundi, Jakkur-Sampigehalli, Kaigondanahalli, Kasavanahalli, Kogilu, Kowdenhalli, Mestripalya, Rachenahalli, Venkateshpura, Vibhuthipura and Yelahanka



The State Government (UDD) replied (March 2015) that the ring bunds were provided after ensuring inlets for flow of water into the lake and the expenditure incurred on ring bunds was actually necessitated. The reply is not acceptable, as the ring bunds obstruct the inflow of run-off water from the surrounding catchment area.

#### **5.7.4 Fencing of lake**

Fencing of the lake area was one of the works to be taken up on priority. Out of 56 test-checked lakes, 22 lakes were fully fenced, 25 lakes were partially fenced and there was no fence for nine lakes. During 2009-14, fencing works were taken up in 17<sup>34</sup> lakes and ₹11.13 crore expenditure was incurred on these works.

In Bellanduru Lake, BBMP had incurred an expenditure of ₹3.31 crore during 2009-12 and BDA had also proposed (2012-13) to undertake fencing at an estimated cost of ₹3.03 crore. The tender had been finalised and work was yet to commence (November 2014).

The expenditure on fencing and its effectiveness needs to be seen in the light of the fact that survey had not been completed and lake area was not decisively demarcated.

The State Government (UDD) admitted (March 2015) that some miscreants in order to dump debris had damaged fencing for easy access and this would be rectified. The reply is not acceptable, as the primary duty of implementing agencies was to safeguard the lake area by deploying sufficient security soon after the lake was taken over.

### **5.8 Absence of efforts to preserve the natural wetlands**

The DPRs of the test-checked lakes invariably highlighted the significance of preserving the wetlands. However, they also suggested construction of artificial wetlands instead of providing the road map to preserve the natural wetlands. As per the instructions (July 2008) of PCCF, the formation of wetland should not be less than 25 *per cent* of the lake area.

Audit observed that constructed wetlands were provided in 14<sup>35</sup> lakes and the area of wetlands in all of these lakes was much less than the desired minimum 25 *per cent* of the lake area. It was also seen that the wetlands were provided inside the ringed elevated bunds whereas the diversion drains in these lakes (except Allalassandra and Attur) were provided outside the ringed elevated bunds. This resulted in the wetland region (and water spread area of the lake) remaining dry through most part of the year. During JPV of the lakes, it was

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<sup>34</sup> Allalassandra, Attur, B.Narayanapura, Bellanduru, Dasarahalli, Doddanekundi, Gangashetty, Jakkur-Sampigehalli, Kaigondanahalli, Kowdenhalli, Mestripalya, Rachenahalli, Thirumenahalli, Varthuru, Venkateshpura, Vibhuthipura and Yelahanka

<sup>35</sup> Allalassandra, Attur, B.Narayanapura, Chinnappanahalli, Chokkanahalli, Dasarahalli, Doddanekundi, Gangashetty, Jakkur-Sampigehalli, Kaigondanahalli, Mestripalya, Rachenahalli, Vibhuthipura and Yelahanka

observed that the wetland region remained dry even during monsoon season and was devoid of even aquatic weeds.

The constructed wetlands were also felt to be insufficient to absorb the pollutants due to absence of aquatic weeds. Due to lack of multilayered slope design in wetland construction, the backlash of sewage to the drain was entering the settlements near the foreshore region, as observed in the case of Allalassandra Lake.



The State Government (UDD) accepted (March 2015) the observation and stated that action would be taken to rectify the breached bunds as well as inlet levels would be ensured in the lakes.

Of the test-checked lakes, the Nagavara Lake in Bengaluru was the only lake in which a natural wetland formation was noticed. However, even this wetland was full of water hyacinth and floating debris due to lack of maintenance.

***Recommendation 10: LDA should insist on creation and preservation of natural wetlands instead of constructed wetlands while approving the DPRs for rejuvenation of lakes.***

## 5.9 Lacunae in execution of afforestation works

Afforestation around the lake is an important measure to retain the natural features of the lake. Audit observed the following deficiencies:

- The State Government instructed (April 2010) that disused tanks should also be restored to their original status. However, contrary to the instructions, the planting of trees was carried out on the lake bed itself in seven<sup>36</sup> test-checked cases.

<sup>36</sup> Amblipura Melinakere, Attur, B.Channasandra, Chikka Bellanduru, Chokkanahalli, Kogilu and Thirumenahalli

- In two test-checked lakes, Chokkanahalli and Thirumenahalli, the afforestation works were carried out during 2010-11 in the lake bed and thereafter lake rejuvenation works including desilting were done during 2013-14. Audit observed during JPV, that no plantations had survived after the rejuvenation works were carried out. The efforts towards afforestation, therefore, did not yield the intended result.



**Absence of plantation in Thirumenahalli Lake and Chokkanahalli Lake**

The State Government (UDD) agreed (March 2015) that the works of afforestation were carried out while fencing works were in progress. This was necessary to bring the evicted area of encroachment under plantation. The reply is not acceptable as these plantation works were destroyed due to desilting and formation of elevated ring bunds in the lake. This resulted in the expenditure incurred on these afforestation works as wasteful.

Conversely, during JPV of Kaigondanahalli Lake, Audit observed that trees had been cut indiscriminately to pave way for laying sewage diversion pipe line.



**Cutting of trees in Kaigondanahalli Lake**

### 5.10 Impact assessment

Assessment of the programmes implemented over a period of time would provide insight into the deficiencies observed in planning and operation of the programmes. It would also provide necessary corrective and remedial measures to be adopted for the lacunae noticed.

Audit observed that impact assessments were not done by any of the implementing agencies on lakes after restoration works were carried out. There was also no assessment on the impact of ground water levels; water quality; damage caused to the wetlands, keystone species, flora, fauna and aquatic birds due to pollution; and the health of human beings in the vicinity of lakes before and after restoration works.

The State Government (UDD) stated (March 2015) that the KSPCB was responsible for assessing the impact of pollution of lakes on human health. Reply is not tenable as there was no effort on the part of the implementing agencies to assess the impact of pollution on lakes before or after restoration works were carried out. Also, BBMP, being the civic agency, was responsible to assess any outbreak of diseases due to deterioration of environmental conditions.