

Chapter VI

Biodiversity of water bodies

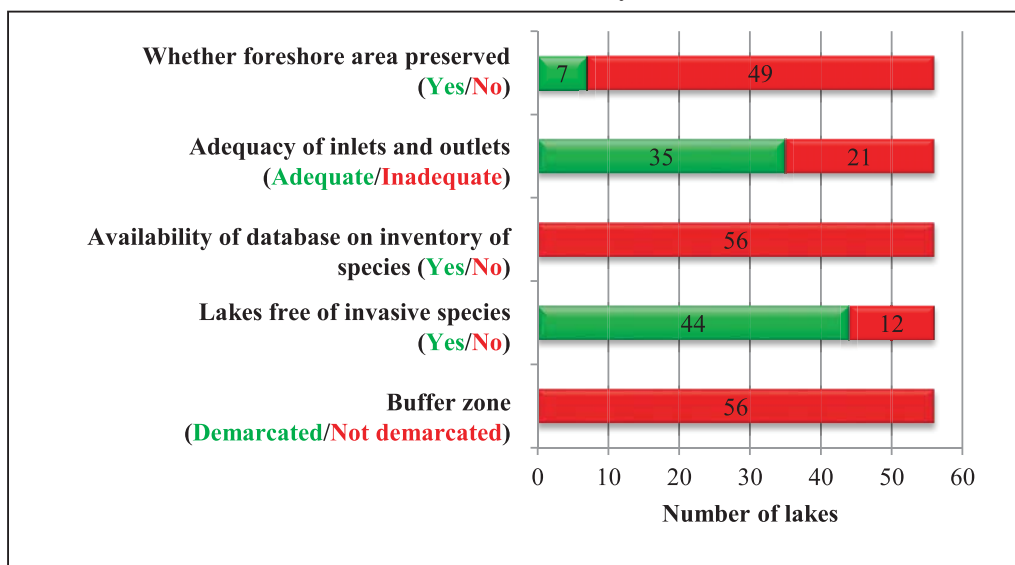
6 Efforts to preserve biodiversity

Lakes constitute habitats for a wide variety of flora, fauna and other aquatic life. They also act as important life support systems by recharging aquifers³⁷ and hydrological regime. Wetlands are lands transitional between terrestrial and aquatic ecosystems where the water at or near the surface of the land is covered by shallow water. It is highly important to preserve the wetlands for sustenance of a wide variety of species of flora and fauna.

This chapter examines the efforts of the implementing agencies to restore and preserve the biodiversity in a lake. These efforts include providing a lake rejuvenation plan by preserving natural wetlands and formation of wetland along with preserving the shorelines with gentle slopes, buffer zones on the outer periphery with indigenous trees to act as a protective cover to the lakes from anthropogenic disturbances, *etc.*

Main issues on biodiversity are depicted in **Chart 7** below:

Chart 7: Biodiversity issues



The audit findings are given below:

6.1 Non-preservation of foreshore area of the lake

According to the NLCP guidelines, the rejuvenation of lakes has to be carried out by preserving the gentle slopes of the shorelines. As far as possible, naturalisation of slopes was to be provided by suitable vegetation with proper

³⁷ an aquifer is an underground layer of water-bearing permeable rock or unconsolidated materials (gravel and sand) from which groundwater can be extracted using a water well.

selection of species (macrophytes). The Forest Department instructed (March 2008) LDA and other implementing agencies on the need for preserving the natural slopes in the foreshore region.

However, instead of preserving the natural slopes in the foreshore area, Audit found that even the estimates and DPRs provided for deep cutting and formation of elevated ring bunds with stone pitching in the 20³⁸ test-checked lakes. This was also seen during JPV. Deep cutting of lake area was carried out to utilise the soil excavated for formation of elevated ring bunds within the periphery of the lake. The execution of these works in the test-checked lakes thus disturbed the gentle foreshore slopes and shallowness at the mouth of the lake which would, therefore, not support flora and fauna.

Photographs of such embankment works at Chokkanahalli Lake and B.Narayanapura Lake are given below:



The State Government (UDD) replied (March 2015) that due to urbanisation, vast area was not available for maintaining the foreshore area. The reply is not acceptable as the available foreshore area has been destroyed to create elevated ring bund contrary to the directions issued and could therefore not support the flora and fauna and aquatic life.

6.2 Inadequate inlets and outlets of lakes

SWD (*Raja Kaluves*) are the inlets and outlets for the lakes. They are the lifelines for the survival of lakes and harbour immense potential for biodiversity conservation. During JPV of lakes, it was noticed that five³⁹ lakes did not have inlets, the inlets of two⁴⁰ lakes were encroached upon and there

³⁸ Allalasanra, Amblipura Melinakere, Attur, B.Narayanapura, Chinnappanahalli, Chokkanahalli, Dasarahalli, Doddanekundi, Gangashetty, Jakkur-Sampigehalli, Kaigondanahalli, Kasavanahalli, Kogilu, Kowdenhalli, Mestripalya, Rachenahalli, Thirumenahalli, Venkateshpura, Vibhuthipura and Yelahanka

³⁹ B.Channasandra, Chikka Bellanduru, Heggeri, Mahadevapura and Venkateshpura

⁴⁰ Amblipura Melinakere and Thirumenahalli

were no outlets in eight⁴¹ lakes. Audit also observed from the records that the SWDs leading to the lakes were encroached upon/diverted in 14⁴² test-checked lakes of Bengaluru. As such, there was no free inflow from *Raja Kaluves* and there was no outflow through the SWD.

Of the 56 test checked lakes, 16⁴³ lakes had shrunk considerably or dried up as the inlets were either encroached upon or diverted.

The State Government (UDD) stated (March 2015) that inlets and outlets were technically designed and constructed and that there were no incidents of inundation surrounding the lakes developed by BBMP. The reply was contrary to the fact that after Revenue Department survey, it was found that the *Raja Kaluves* for 14 test-checked lakes were either encroached upon or diverted.

Recommendation 11: The implementing agencies should ensure adequate inlets and outlets in all lakes in coordination with concerned agencies to restore water in lakes and make way for excess outflow.

6.3 Absence of database on inventory of species

None of the agencies which were entrusted with the development of lakes was in possession of the details of flora and fauna including keystone species⁴⁴ available in the lake after restoration works.

The State Government (UDD) admitted (March 2015) that there was no database of lakes and species therein. The Government, however, agreed to take action to maintain a database.

6.3.1 Invasive species in lakes

An invasive species is a plant or animal that is not native to a specific location (an introduced species) and has a tendency to spread, which is believed to cause damage to the environment and human health.

Audit examined the impact of one of the most common invasive plants *i.e.* *Eichhornia crassipes*, commonly known as water hyacinth. This kind of plant doubles itself within two weeks time. When not controlled, it blocks the sunlight reaching native aquatic plants and starves the water of oxygen, killing the fish/turtles. The rapid growth of water hyacinth was due to entry of

⁴¹ Amblipura Melinakere, B.Narayanapura, Chokkanahalli, Horamavu-Agara, Mahadevapura, Mestripalya, Rachenahalli and Vibhuthipura

⁴² Attur, B.Narayanapura, Bellanduru, Chokkanahalli, Gangashetty, Horamavu-Agara, Jakkur-Sampigehalli, Kaigondanahalli, Kalkere-Rampura, Kasavanahalli, Kogilu, Kowdenhalli, Varthuru and Yelahanka

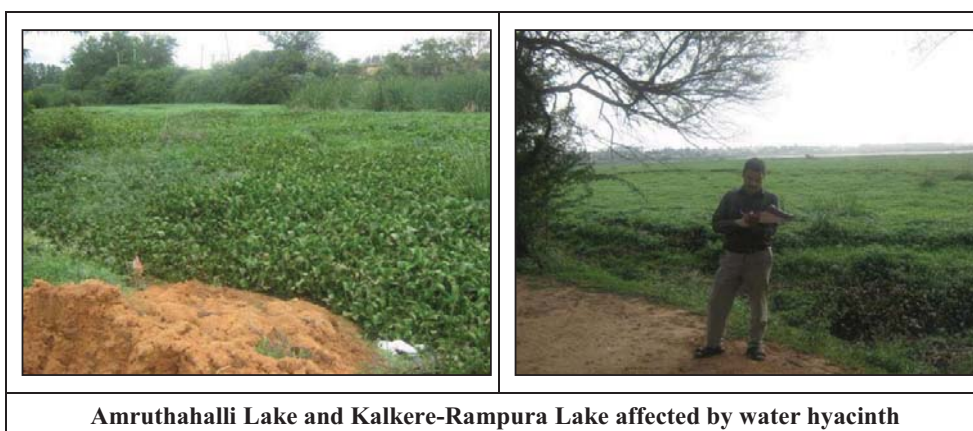
⁴³ Amblipura Melinakere, B.Narayanapura, B.Channasandra, Chikka Bellanduru, Chokkanahalli, Doddanekundi, Gangashetty, Heggeri, Horamavu-Agara, Kogilu, Mahadevapura, Mestripalya, Shivanahalli, Thirumenahalli, Venkateshpura and Vibhuthipura

⁴⁴ species whose presence and role within an ecosystem has a disproportionate effect on other organisms within the system

sewage into the lakes. Unless this menace of pollution is tackled, the growth of water hyacinth cannot be controlled.

In the test-checked lakes, Audit observed in three⁴⁵ lakes that the entire water spread area was covered with water hyacinth. In nine⁴⁶ lakes, this invasive species was found near the inlets/outlets. In 10⁴⁷ lakes under BBMP, ₹9.83 lakh had been spent on works to de-weed the invasive species.

The State Government (UDD) stated (March 2015) that due to diversion of sewage entering the water body, growth of water hyacinth was noticed and the agency maintaining the lakes would remove such invasive species. The reply was contrary to the concept that growth of water hyacinth was mainly due to entry of sewage in to the lakes leading to eutrophication. The solution lies not just in removal of the species but in ensuring entry of only treated water into the lakes.



6.3.2 Harmful invasive species of fish

The Fisheries Department is responsible for regulating fishing activities in the lakes. It had to ensure that native fish are reared and invasive species are avoided to enhance fish fauna in the lakes. The implementing agencies were not aware about rearing of invasive species of fish which were harmful for the survival of native fish. Scrutiny of records revealed that the Assistant Director of Fisheries, Mysuru had issued instructions (July 2014) to fishing leaseholders not to rear African catfish in Dalvoy Lake, Mysuru. However, due to lack of monitoring and strict enforcement of penal provisions by Fisheries Department, the rearing of catfish was continued. In Kaigondanahalli Lake, the agency⁴⁸ maintaining the lake informed Audit that this invasive species of fish had entered the lake from catchment area and are devouring the native fish.

⁴⁵ Amruthahalli, Garudacharpalya and Kalkere-Rampura

⁴⁶ Amruthahalli, Bellanduru, Garudacharpalya, Kalkere-Rampura, Kempkere, Kolikeri, Unkal, Varthuru and Yelahanka

⁴⁷ Amblipura Melinakere, Attur, Chinnappanahalli, Dasarahalli, Kaigondanahalli, Kasavanahalli, Kogilu, Kowdenhalli, Thirumenahalli and Yelahanka

⁴⁸ Mahadevapura Parisara Samrakshane Matthu Abhivruddhi Samithi (MPSMAS)

6.4 Creation and preservation of buffer zone of lakes

The State Government issued⁴⁹ instructions to create a buffer zone to an extent of not less than 30 metres along the periphery of the lake. A buffer zone which consists of diverse vegetation along the perimeter of water body, preferably one of natural habitat, stable species serves the functions such as sediment and nutrient transformation; metals and other pollutant reduction; storm water run-off reduction through infiltration; reduction of water temperature; reduction of human impacts by limiting easy access and by minimising edge effects from noise, light, temperature and other changes; and protection for interior wetland species and a barrier to invasion of exotic species (such as water hyacinth). In addition, buffer zones facilitate space for recreational activities and prohibit encroachments.

Buffer zones had not been created by acquiring land or regulating construction activities on the periphery in any of the test-checked lakes. Instead, the lake periphery was breached upon by slums, formation of roads and residential layouts, construction of buildings/apartments, functioning of schools, construction of quarters by Forest Department, *etc.* Possible breach of buffer zone was noticed in all the 34 test-checked lakes in Bengaluru. Illustrative cases are indicated in **Appendix 9**.

In the case of Chinnappanahalli and Kaigondanahalli Lakes, the Town Planning Wing of BBMP did not take into account the concept of buffer zone while sanctioning building plans which led to violation of buffer zone. In both the above test-checked lakes, breach of buffer zone was observed during JPV. The NGOs involved in maintenance works of these lakes had also stated that buffer zones were breached by land developers and they advocated for creation of buffer area for lakes. Member, Town Planning (BDA) stated (November 2014) that residential layout plans were approved excluding buffer zone of 30 metres. During JPV, it was, however, observed that private/BDA layouts had come up within the buffer zone in four⁵⁰ test-checked lakes.

The State Government (UDD) replied (March 2015) that the buffer area of lakes are owned by private people and development activities are going on at a rapid pace due to escalation of land prices. They also stated that the enforcement of buffer zone vests with the planning authorities. The reply is not acceptable as it indicates that the State Government has not taken any effective measures over the years for ensuring protection of the buffer zones.

Recommendation 12: The State Government should consider acquiring land or prescribing norms for regulating activities in buffer area and the buffer limits need to be reviewed to increase the norm progressively to facilitate development of buffer in the form of tree parks, walking paths, etc.

⁴⁹ during March 2008 and corrigendum during October 2008

⁵⁰ B.Channasandra, Horamavu-Agara, Jakkur-Sampigehalli and Kalkere-Rampura