

1 STATUS OF WETLANDS IN COIMBATORE DISTRICT, TAMILNADU, INDIA

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3

4 ABSTRACT

The present investigation was carried out to study the status of wetlands in Coimbatore district in TamilNadu, for the period of November 2016 to March 2017. Out of 49 wetlands, less than 10 acres occupies 26%, between 11-100 acres represent 51%, 101-250 acres occupies 17% and above 250 acres contain 6% of wetlands. Compare with previous records, 51% wetlands are being used, 32% of wetlands vanished before six years and 17% of wetlands gone within 5 years. During summer season, 53% wetlands totally dried out, 19% were partially dried up and 28% of wetlands remain as such water holding throughout the year. In Coimbatore district, 55% of wetlands were polluted by degradable and non degradable waste, 15% degradable waste, 11% non degradable waste and 19% of wetlands were out of waste dumping. According to the usage of wetlands, 20 wetlands used for irrigation, 13 wetlands used for fishing, 7% of wetlands were used for washing clothes and cleaning cattle's and 2% of wetland used as drinking source. Presently 28 wetlands were usable and the rest of 19 wetlands were non usable. Our results represented that decline of wetlands in Coimbatore district due to waste dumping, construction nearby wetlands, lack of desilting and dredging, blocking water channel and lack of strict law.

5 *Keywords: {Wetlands, Status, Wetland, Pollution, Anthropogenic activities, Conservation, Coimbatore}*

6 1. INTRODUCTION (ARIAL, BOLD, 11 FONT, LEFT ALIGNED, CAPS)

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8 Wetlands are areas of land that are either temporarily or permanently covered by water. This means that a
9 wetland is neither truly aquatic nor terrestrial; it is possible that wetlands can be both at the same time
10 depending on seasonal variability. India, with its annual rainfall of over 130 cm, varying topography and climatic
11 regimes, supports diverse and unique wetland habitats (Prasad et al., 2002). These wetlands are distributed in
12 different geographical regions ranging from Himalayas to Deccan plateau. Indian wetlands are mostly
13 associated with river systems distributed from the cold, arid zone of Ladakh, and the warm, arid zone of
14 Gujarat-Rajasthan to the tropical monsoon of central India and the wet, humid zone of the southern
15 peninsula.(Bharath H Aithal et al., 2012)

As per the Country report of Directory of Asian Wetlands (Woistencroft et al., 1989); and the Directory of Indian Wetlands 1993 (WWF and AWB, 1993), the areal spread of wetlands in India was around 58.3 m ha. The first scientific mapping of wetlands of the country was carried out using satellite data of 1992–1993 by Space Applications Centre (SAC), Ahmedabad. The exercise classified wetlands based on the Ramsar Convention definition. This inventory estimated the areal extent of wetlands to be about 7.6 m ha (Garg et al., 1998) As per the National Wetland Atlas (2011), 61% of Tamil Nadu's wetlands are classified under lakes, ponds and tanks. As noted above 24684 wetlands have been mapped in the state. In addition, 18294 small wetlands (< 2.25 ha) have also been identified. Total wetland area estimated is 902534 ha, which is around 6.92% of the total geographic area. Of this, the major wetland types are lake (316091 ha), tank (237613 ha), river / stream (136878 ha), and reservoir / barrage (56419 ha). Area under mangrove is around 7315 ha. Coral Reef (3899 ha) exists mainly in Ramanathapuram district. Proportionately, among the 30 districts in the state, the Ramanathapuram district has as high as 18.05% of geographic area under wetlands while it is as low as 1.08% in Coimbatore. In terms of total wetland area, Kancheepuram is the leading district (80445 ha, 8.91%) and Chennai is trailing (917 ha, 0.10 %)(Goldin Quadros et al., 2014). In India, as elsewhere are increasingly facing several anthropogenic pressures. Thus, the rapidly expanding human populations, large scale changes in land use/land cover, burgeoning development projects and improper use of watersheds have all caused a substantial decline of wetland resources of the country.

Lack of good governance and management are also major reasons (Kumar et al., 2013a). Introduction of exotic species like water hyacinth (*Eichornia crassipes*) and salvinia (*Salvinia molesta*) have threatened the wetlands and clogged the waterways competing with the native vegetation. In a recent attempt at prioritization of wetlands for conservation, (Samant 1999) noted that as many as 700 potential wetlands do not have any data to prioritize. Many of these wetlands are threatened (Prasad et al., 2002). Hence, the demand for wetland products (e.g., water, fish, wood, fiber, medicinal plants etc.) will increase with increase in population. The wetlands of Coimbatore are known to have served the society for over 800 years and continue to do so despite serious setbacks and pressures. The lakes that were aimed at flood control, ground water recharge and irrigation were indiscriminately exploited for industrial and agricultural purposes in due course of time. The main objective of the present study is to record the present status of wetlands in Coimbatore district based on the issues like pollution and anthropogenic activities.

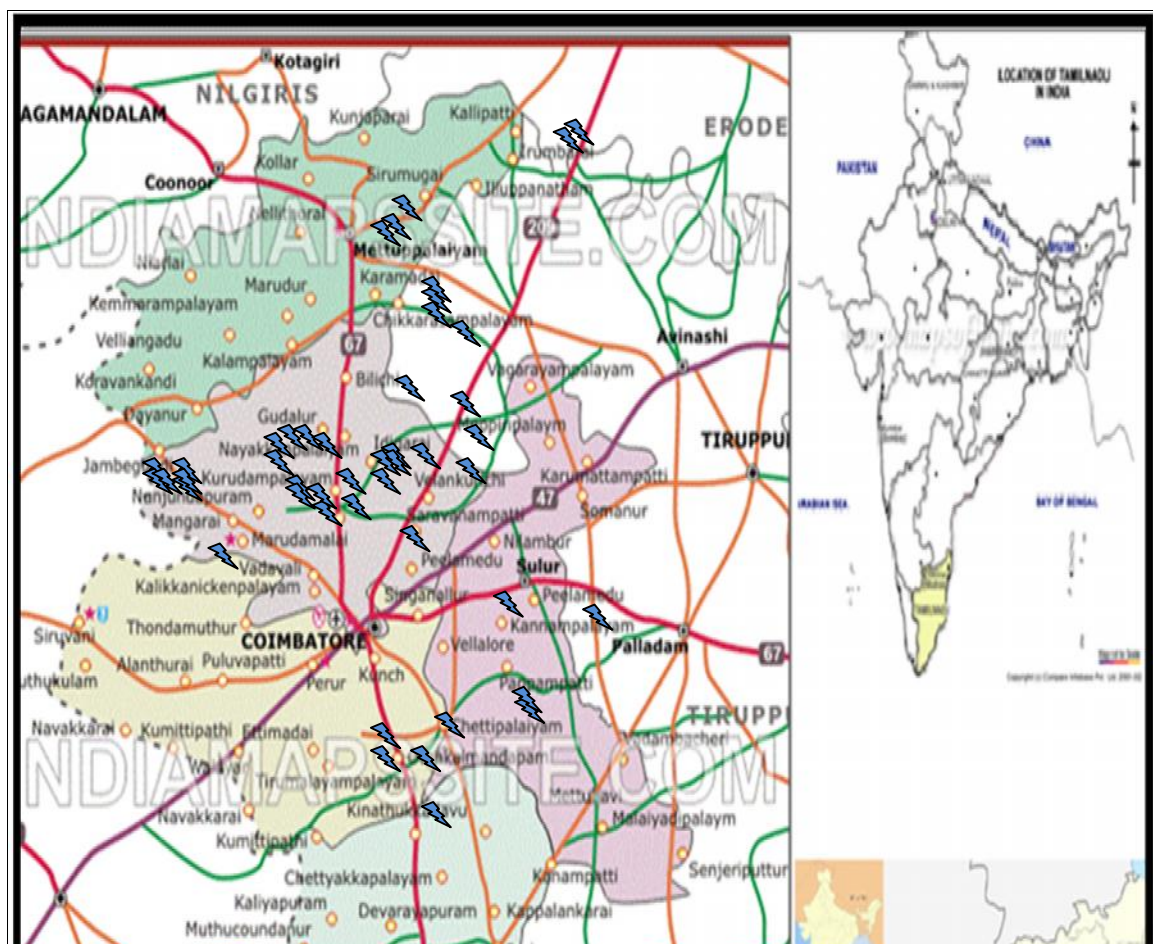
2. MATERIAL AND METHODS

STUDY AREA

Coimbatore is the second largest city in the Indian state of TamilNadu, it is located at 11°00'58"N 76°58'16"E 11.0161°N 76.971°E, surrounded by the Western Ghats of mountains range to the west and north. Administratively district is divided into six taluks and twelve blocks fig1 .the district head quarters is located in the north central part of the region. The temperature ranges between 18.32 °C in the month of January and 36.42°C in the month of April. The area is bounded by the Western Ghats on the west, Nilgiri hills in the North West and anaimalai and palani hill in the south. Coimbatore emerged as one of the state's business hubs in post-colonial India. The city's economy is now dominated by the manufacturing, information technology, and textile industries. Two Special Economic Zones (SEZs) attract domestic and international investment into the city, and Coimbatore continues to rank highly in surveys of business atmosphere and potential.

The city is part of a wealthy and highly industrialized belt on the western part of Tamil Nadu state. Coimbatore is an important producer of textiles, leather, automotive components, and other manufactured goods. The area under the jurisdiction of the Corporation increased from 105 square kilometers to 257 square kilometers. The city is now administratively governed by being separated into five zones - North, South, East, West, and Central - and has 100 wards that are split between the zones. Coimbatore, the South Indian Manchester is gifted with a unique spread of a number of wetland water bodies that store rain water, recharge groundwater and provide shelter for a vast array of biodiversity. The river gets flooded only during monsoons. Rest of the days it is almost dry. The Coimbatore forest range is spread over an area of 700 sq. km. (or nearly 10 per cent of the total district area) and flanked by Sathyamangalam, Erode, and Nilgiris Forest Division in the north and Palghat Forest Division of Kerala in the south. Located within the core zone of the Nilgiri Biosphere Reserve (NBR), Coimbatore forest division is divided into six administrative sub-divisions, namely Bolampatty, Coimbatore, Perianaichenpalayam, Karamadai, Mettupalayam and Sirumugai(WWF-INDIA, 2011).

Fig1. The study area of wetland in Coimbatore district



METHODS

The present study was conducted by means of a questionnaire survey. The study assessed the status of the wetland in Coimbatore, from November 2016 to March 2017. Before the start of the actual data collection, preliminary survey was conducted during mid-October 2016. A total of 47 wetlands were surveyed in 40 villages. The questionnaire was designed to understand the situation of wetlands towards the conservation challenges in Coimbatore district.

Official collection of information

Data on wetland status in Coimbatore in previous years from 2000 to 2016 were collected from local NGO's and Government records and to make comparative studies on wetland status in Coimbatore district

Data analysis

The data were analyzed using SPSS .17 version computer software program.

3. RESULTS

Table 1. Wetlands status in Coimbatore district.

| Wetland name | Dryness | Condition | Usage | Waste | Anthropogenic Impacts |
|-----------------------------|---------|------------|---------------------------|-------|-------------------------------|
| Agrahara Samakulam, ★★★ | GII | Usable | Irrigation | IV | Farmland |
| Avalappampatti pond, ★ | GI | Usable | Irrigation | III | Farmland |
| Belladhi lake, ★★ | GV | Usable | Irrigation, Fishing | IV | Farmland |
| Chinnakulam, ★★ | GV | Non Usable | - | III | Farmland |
| Chinnakulam, ★★ | GI | Non Usable | Fishing | III | Companies/Factories |
| Chinnavedampatti lake, ★★★ | GIII | Usable | Irrigation | I | Farmland |
| Devarayapuram pond, ★★ | GII | Usable | Irrigation | IV | Farmland |
| Ganga Narayana Samudram, ★★ | GI | Usable | - | II | Companies/Factories, Farmland |
| Gramakulam, ★ | GII | Non Usable | Other purpose | III | Farmland |
| Irugur lake, ★★ | GV | Non Usable | - | III | Farmland |
| Jakkarpalayam lake, ★★ | GV | Usable | Irrigation, Other purpose | I | Farmland |
| Kadathur lake, ★★★ | GIV | Usable | Irrigation | III | Companies/Factories, Farmland |
| Kalapatti lake, ★★ | GV | Non Usable | - | II | Companies/Factories |
| Karamadai pond 1, ★ | GV | Non Usable | - | III | Residential area |
| Karamadai pond 2, ★ | GV | Non Usable | - | III | Farmland |
| Karatupadi kuttai, ★ | GV | Usable | Irrigation | III | Farmland |
| Katakaran kuttai, ★ | GII | Usable | Irrigation | I | Farmland |
| Kondayampalaym lake, ★★ | GII | Usable | Other purpose | III | Farmland |

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|----------------------------|------|------------|------------------------|-----|---------------------------------------|
| Kothavadi kulam★★★★ | GIII | Usable | Irrigation | IV | Farmland |
| Kottaipalayam lake, ★★ | GII | Usable | Other purpose | III | Farmland |
| Krishna pond, ★★ | GV | Non Usable | - | III | Farmland |
| Krishnampathy lake, ★★ | GV | Non Usable | Fishing | III | Farmland |
| Kurichi lake, ★★★ | GV | Non Usable | Fishing | III | Residential area |
| Muthannan lake, ★★ | GV | Non Usable | Fishing | III | Companies/Factories, Residential area |
| Narasampathy lake, ★★ | GV | Non Usable | - | III | Farmland |
| Perur big lake, ★★★ | GV | Usable | Irrigation, Fishing | I | Farmland |
| Pudukulam, ★★ | GV | Usable | Other purpose | II | Farmland |
| Samathur pond, ★★★ | GI | Usable | Fishing | IV | Farmland |
| Selambanur kuttai, ★ | GIV | Usable | Irrigation | I | Farmland |
| Sellapampalayam lake 2, ★★ | GII | Usable | Irrigation | III | Farmland |
| Sellappampalayam lake, ★★ | GII | Usable | Irrigation | III | Farmland |
| Selvampathy lake, ★★ | GV | Non Usable | Fishing | III | Farmland |
| Selvasinthamani lake, ★★ | GV | Non Usable | - | III | Residential area |
| Sengulam, ★★ | GV | Usable | Irrigation, Fishing | I | Farmland |
| Senguttampalayam pond, ★ | GI | Usable | Irrigation | III | Farmland |
| Singanallur lake,★★★★ | GV | Non Usable | Fishing, Other purpose | III | Companies/Factories |
| Sottayandi kuttai, ★★ | GV | Usable | Other purpose | II | Companies/Factories, Farmland |
| Sundakamuthur lake, ★ | GI | Usable | Other purpose | III | Farmland |
| Theppakulam, ★ | GV | Non Usable | - | III | Residential area |
| Ukkadam big lake, ★★★ | GV | Non Usable | Fishing | III | Residential area |
| Valankulam lake, ★★ | GI | Non Usable | - | II | Companies/Factories |

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|---------------------------|------|------------|-------------------------------------|-----|----------|
| Valasu kulam, ★★ | GI | Usable | Irrigation | IV | Farmland |
| Vellalore lake, ★★ | GII | Non Usable | - | III | Farmland |
| Vellerukampalayam lake, ★ | GII | Usable | Irrigation | IV | Farmland |
| Vettaikarankulam, ★★★ | GV | Usable | Fishing, Drinking, Other purpose | IV | Farmland |
| Viraliyur kuttai, ★ | GIII | Usable | Irrigation | I | Farmland |
| Walayar reservoir, ★★★★★ | GV | Usable | Irrigation, Fishing | IV | Farmland |
| | | | | | |

★ 0-10 Acres, ★★ 11-100 Acres, ★★★ 101-250 Acres, ★★★★★ more than 250 Acres.

GI: >5years, GII: 6-10 years, GIII: 11-15 Years, GIV: above 15years, GV: Never dried

I: Degradable, II: Non Degradable, III: Both waste, IV: No Waste

We recorded 47 wetlands in Coimbatore district. According to the area of the wetlands we have classified them under four groups. The Group I (n=12), which is less than 10 acres in size and occupies about 26% of total wetlands, whereas wetlands under Group II (n=24), is between 11-100 acres represent 51% of wetlands, Group III (n=8), wetlands are large in size (101-250 acres) occupies 17% and Group IV (n=3), are largest in size (more than 250 acres) which occupies 6% were recorded. Compare with past datas, we have recorded the wetland into five categories (n=8) less than 5 years, (n=10) between 6 to 10 years, (n=3) 11 to 15 years, (n=2) above 16 years and (n=24) wetlands never dried. From the total of 47 wetlands, 51% wetlands are being used, 4% of wetlands vanished before fifteen years, 22% of wetlands left before 10 years, 17% of wetlands disappeared within 5 years and 6% of wetlands dried more than 16 years. Among the wetland status in Coimbatore district represent that 53% of wetlands (n=25) were dried up, 4% of the wetlands were partially dried, 15% wetlands (n=13) in stagnant water and 28% of wetlands remain as such water holding throughout the year were observed.

We have recorded different types of waste dumped in and around the Wetlands of Coimbatore district. The waste materials were classified as I. Degradable (Food waste, Wooden waste, Clothes, Glass bottles), II. Non degradable (Plastic, Polythene products), III. Absence of waste, IV. Degradable/ Non degradable wastes observed. Out of 47 wetlands, 55% of wetlands in Coimbatore district were polluted by degradable and non degradable waste including food waste, wood waste, clothes, glass products, plastic and polythene products.

15% of wetlands containing degradable waste, Non degradable waste dumped in 5 wetlands which represent 11% and 19% of wetlands were out of pollution were observed.

We have recorded based on the usage of Wetlands in Coimbatore district including villages and urban areas. The usages were subdivided into I. Irrigation, II. Fishing, III. Drinking, IV. Other uses, V. Not used. According to the usage of wetlands in Coimbatore district which represent, 20 wetlands (36%) were used for irrigation purposes, 13 wetlands (24%) were used for fishing, and 7% of wetlands were used for other purpose like washing clothes and cleaning cattles and 2% of wetland used as drinking source in Coimbatore district. Based on the present condition of wetland in Coimbatore district we categorized into two subdivisions. I. Usable condition, II. Non usable condition. Among 47 Wetlands (n=28) represent 60% which were usable and the rest of (n=19) represent 40% were non usable. The usable wetlands accounted 28 wetlands and mentioned in Table 1. We have recorded the depth of various wetlands in Coimbatore district. According to the category wise were divided into four types. Six wetlands had a depth of (0-10 feet) which has 13%, (n=20) wetlands which contain 11-20 feet in depth, which represent 17(43%) wetlands depth about 21-30 feet represent 36% and 4 wetlands above 30 feet depth were observed. Based on the colour of wetlands we differentiate (n=11) Green in color, (n=2) Black in color, (n=3) Colourless, (n=6) Greenish black in color. From the total wetlands, 50% of the Wetlands are green in colour, 9% of the Wetlands are black in colour, 27% of the Wetlands are greenish black in colour, 14% of the wetlands are colourless were recorded during the study period.

We observed the anthropogenic practices in and around the wetlands in Coimbatore district. I. Companies/ factories (coir mills, automobile workshop, industrial manufacturing companies), II. Farm land, III. Building construction (residential home, slums, government office, private companies). Our study showed that 72% wetlands were surrounded by farmland, 16% are covered by companies or factories, 12% wetlands are occupied by residential area. Under subdivision I we have recorded 8 Wetland (Singanallur pond, Valankulam, Kalapatti lake, Ganga narayana samudram, Sottayandi kuttai, Muthannan kulam, Kadathur lake, Chinnakulam) during the present study. We also recorded the recent changes in wetlands within the last 5 years to identify the various anthropogenic activities. Based on the changes we classified the wetlands into I. changes occurred in the area of the Wetland, II. Changes occurred in water quality, III. No changes etc. Under these categories (n=28), 57% of Wetlands have never changed its characteristics in recent times, the water quality have been changed in (n=18) 37% of wetlands and the area have been occupied in (n=3) 6% of the total wetland. The area have been occupied in 3 Wetlands (Valankulam, Muthannan kulam, Kothavadi kulam) in the form of slums, constructions and farm lands were observed during the present study period.

DISCUSSION

Entire regions of india's land surface where altered through long term human use and manipulation (e.g intensive cropping, deforestation, intensive grazing and alteration of water flows).(Lee Foote et al., 1996). In our study also revealed that 50% of wetlands vanished in Coimbatore district due to decline water holding capacity, lack of desilting, building construction, dredging, blocking water channels and spreading of *Vachelia nilotica* species influence the decline of wetlands status in Coimbatore district. Earlier investigations have revealed that nearly 30% of lakes are used for irrigation. Fishing is being carried out in 25% of lakes surveyed. About 36% of the lakes were used for washing purpose and only 3% are used for drinking. Agriculture along drying margins is practiced in 21% of lakes. Approximately 35% of lakes are used for grazing by cattle. Mud lifting was recorded in 30% and brick making in 38% of the lakes (Krishna et al., 1996). Throughout India the landscape development pattern shows that wetland adjacent areas provide excellent dry season foraging opportunities for grazers and irrigation. Our study reports that 25 of wetlands were dried up during summer time due to poor water holding capacity and without desilting process. the driedout wetlands used for cattle grazing and dumping of waste materials all over Coimbatore district.

Water in most Asian rivers, lakes, streams and wetlands has been heavily degraded, mainly due to agricultural runoff of pesticides and fertilizers, and industrial and municipal wastewater discharges, all of which cause widespread eutrophication (Liu and Diamond, 2005; Prasad et al., 2002). More than 50,000 small and large Indian lakes are polluted to the point of being considered as dead wetlands. The primary sources of pollution are human sewage, industrial pollution and agricultural runoff which contain pesticides, fertilizers and herbicide (Gopal, 1995). Our study supported that 81% of wetlands in Coimbatore district were polluted by degradable and non degradable waste material. According to Scott and Pole's (1989) listing, 45% of all Indian wetlands are considered moderately to highly threatened. No single effort is going to protect these wetlands(Lee Foote et al., 1996). From the present study showed that 20 wetlands were used for irrigation purposes, 13 wetlands used for fishing, 7% of wetlands were used for washing clothes and cleaning cattles and 2% of wetland used as drinking source in Coimbatore district. Overall in Coimbatore district 28 wetlands were usable and the rest of 19 wetlands were non usable. Silt deposit had reduced the water storage capacity in major wetlands by 30 -40 %. The study reported that wetlands in Coimbatore district reduced due to silting and dredging.

The colour of the polluted water bodies were mostly greenish indicating eutrophication mainly due to algal blooms followed by the contribution of effluents from domestic and industrial sources. Nearly 23% of lakes show eutrophication due to inflow of sewage (Chakrapani et al., 1996). From our study supported that wetlands colour in Coimbatore contain Green, Black, Greenish Black and Colourless. Many wetlands used as dumping yards for either municipal solid waste or building debris. The surrounding of these lakes have illegal constructions of

buildings and most of the times, slum dwellers occupy the adjoining areas (Ramachandra et al., 2012). Lack of conformity among government policies in the areas of economics, environment, nature conservation, development planning is one reason for the deterioration of these water bodies (Turner et al., 2000). Our study showed that 72% wetlands were surrounded by farmland, 16% are covered by companies or factories, 12% wetlands are occupied by residential area.

The river and the river-fed wetlands support a large number of plants (Chandrabose and Nair, 1988) and animals including migratory species of birds. Wetlands in India support around 2400 species and subspecies of birds. But losses in habitat have threatened the diversity of these ecosystems (Mitchell & Gopal 1990). Most of these wetlands get dried in summer and serves as a dumping yard for garbage and industrial wastes. (Mohan raj et al., 2000). From our study wetlands supports presence of 11 birds species in and around wetlands in Coimbatore district.

4. CONCLUSION

In Coimbatore district 49% of wetlands vanished within 20 years of time due to anthropogenic activities.

CONSENT

Authors may use the following wordings for this section: "All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.'"

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FIG 2 -WETLAND PHOTO

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1. Sellapampalayam big lake, 2.Sellapampalayam Lake, 3.Chinnavedampatty Lake, 4.Devarayapuram pond,
5. Vellerukampalyam lake, 6. Belladhi lake, 7. Karamadai pond, 8.Karamadai pond, 9.Singanallur lake,
- 10.Valankulam, 11. Aavalappampatti lake, 12. Karattupadi lake, 13. Senguttampalayam pond, 14. Walayar,
15. Kalapatti pond

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16. Ganga Narayana Samudram, 17. Narasampathy lake, 18. Perur Big lake, 19. Sottayandi kuttai
20. Vedapatti lake, 21. Krishnampathy lake, 22. Muthannan lake, 23,24. Selvampathy lake,
25.Krishna pond, 26.Samathur pond, 27. Theppakulam, 28. Jakkarpalayam pond, 29. Kothavadi lake,
30. Irugur lake

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31.Malumichampatty pond, 32.Valasukulam, 33.Vettaikaranpudur lake, 34.Agraharasamakulam,
35.Kadathur lake, 36.Chinnakulam, 37.Selvasinthamanilake, 38.Sengulam, 39.Sundakamuthurlake,
40.Vellalorelake, 41. Kodayampalayam lake, 42. Kottaipalayam pond, 43. Chinnakulam,
44. Kattakaran kuttai, 45. Kurichi lake

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46. Selambanur kuttai, 47. Viraliyur kuttai, 48. Ukkadam lake