

## **Status of Wetlands in the Coimbatore District, Tamilnadu, India**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Author KV designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors MJ, RLP and LS survey, literature searches and managed the analyses of the study. Author ML gave valuable guidance of the research work. All authors read and approved the final manuscript.*

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### **ABSTRACT**

The present investigation was carried out to study the status of wetlands in the Coimbatore district in the 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. Compared with previous records, 51% wetlands are being used, 32% of wetlands vanished before six years and 17% of wetlands gone within 5 years. During every summer season, 53% of wetlands get 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

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wetlands, 20 wetlands used for irrigation, 13 wetlands used for fishing, 7% of wetlands were used for washing clothes and cleaning cattle and 2.2% of wetland used as drinking source. The results represented that decline of wetlands in Coimbatore district was due to waste dumping, construction nearby wetlands, lack of desilting and dredging, blocking water channel and lack of strict law. Apart from government regulation, better monitoring mechanism are needed to increase the knowledge of the physical, chemical and biological characteristics of wetlands resources. Awareness implemented through government and NGO for popularization of the importance of the lakes, wetlands and their role in aquatic biodiversity and sustenance of human civilization.

**Keywords:** Wetlands; status; wetland; pollution; anthropogenic activities; conservation; Coimbatore.

## 1. INTRODUCTION

Wetlands are areas of land that are either temporarily or permanently covered by water which means that a wetland is neither truly aquatic nor terrestrial; it is possible that wetlands can be both and at the same time depending on seasonal variability. India, with its annual rainfall of over 130 cm, varying topography and climatic regimes, supports diverse and unique wetland habitats [1]. These wetlands are distributed in different geographical regions ranging from Himalayas to Deccan plateau. Indian wetlands are mostly associated with river systems distributed from the cold, arid zone of Ladakh, and the warm, arid zone of Gujarat-Rajasthan to the tropical monsoon of central India and the wet, humid zone of the southern peninsula [2].

Based on the Country report of Directory of Asian Wetlands [3] and the Directory of Indian Wetlands 1993 [4], 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 [5]. 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 [6] as per the National Wetland Atlas (2011), 61% of TamilNadu'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 %) [7]. In India, wetlands were 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 [8]. 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, [9] noted that as many as 700 potential wetlands do not have any data to prioritize. Many of these wetlands are threatened [1]. 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 aim of the present study was to record the present status of wetlands in Coimbatore district and influenced based on the anthropogenic activities on wetlands.

## 2. MATERIALS AND METHODS

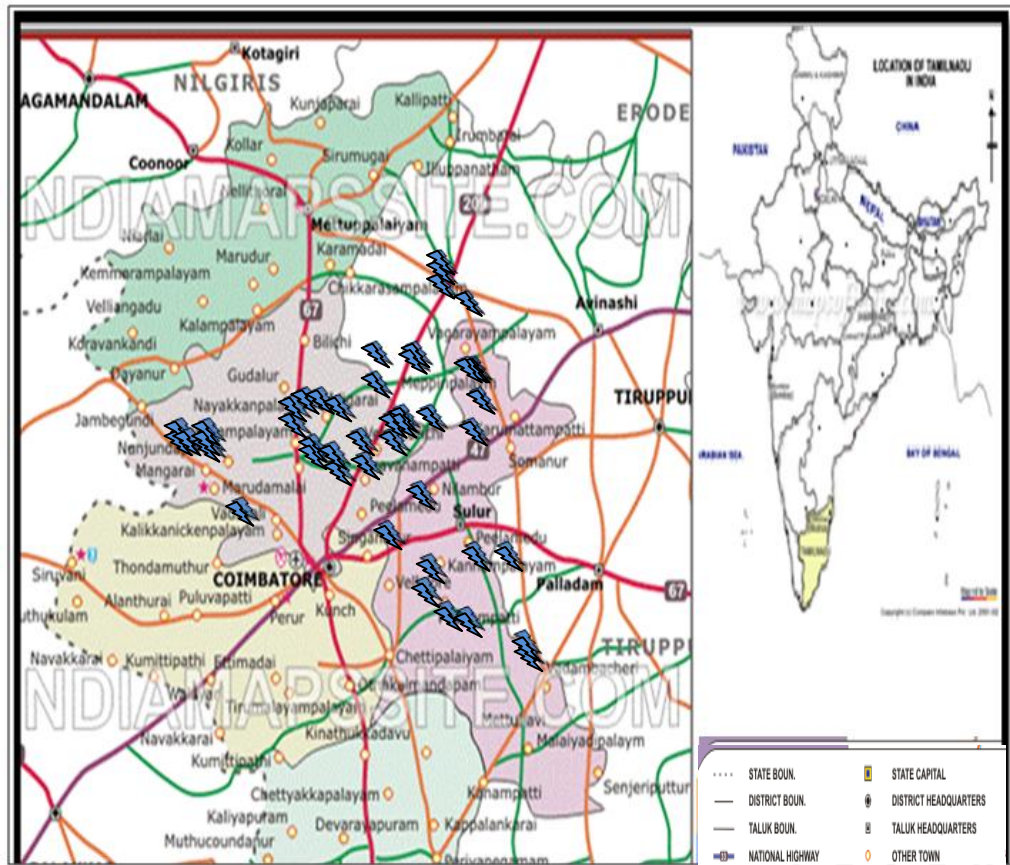
### 2.1 Study Area

Coimbatore is the second largest city in the Indian state of Tamil Nadu, 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 tehsil and twelve blocks Fig. 1 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 potentials.

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, considered as 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 subdivisions, namely Bolampatty, Coimbatore, Perianaichenpalayam, Karamadai, Mettupalayam and Sirumugai.



**Fig. 1. Map of wetlands in Coimbatore district, TamilNadu**  
Scale 1:25000 map info

## 2.2 Methods

The present study was conducted by means of a questionnaire survey. The study assessed the status of the wetlands 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 collect data on the situation of wetlands towards the conservation challenges in Coimbatore district. Data on wetland status in Coimbatore in previous years from 2000 to 2016 were collected from local NGO's and Government record which were used to make comparative studies on wetland status in Coimbatore district. The data were analyzed using SPSS (Statistical Package for Social Sciences) 17 version computer software program.

## 3. RESULTS

Based on this study, 47 wetlands recorded in Coimbatore district. According to the area of the wetlands they were 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 data's, the wetland were recorded 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 and 49% non usable wetlands. 4% of wetlands vanished before fifteen years, 22% of wetlands left within 10 years period, 17% of wetlands disappeared within 5 years time and 6% of wetlands dried before 16 years ago. 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.

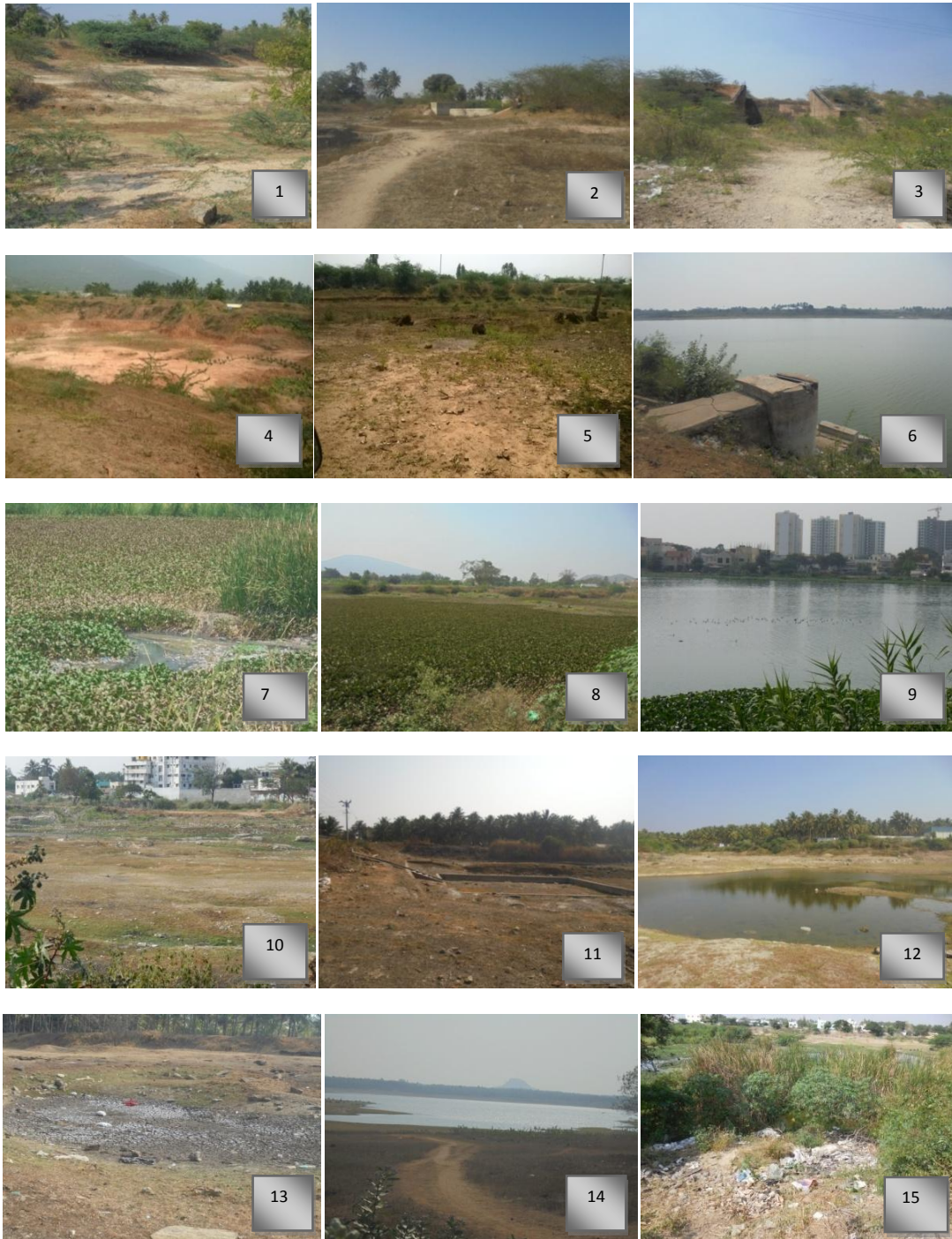
**Table 1. Wetlands status in Coimbatore district**

Wetland name	Dryness	Usage of water	Waste dumping	Anthropogenic impacts
Agrahara Samakulam, ★★★	6- 10 years	Irrigation	Protected	Farmland
Avalappampatti pond, ★	>5 years	Irrigation	Mixed waste	Farmland
Belladhi lake, ★★	Never dried	Irrigation, Fishing	Protected	Farmland
Chinnakulam, ★★	Never dried	-	Mixed waste	Farmland
Chinnakulam, ★★	>5 years	Fishing	Mixed waste	Companies/ Factories
Chinnavedampatti lake, ★★★	11-15 years	Irrigation	Degradable	Farmland
Devarayapuram pond, ★★	6- 10 years	Irrigation	Protected	Farmland
Ganga Narayana Samudram,★★	>5 years	-	Non Degradable	Companies/ Factories, Farmland
Gramakulam, ★	6- 10 years	Other purpose	Mixed waste	Farmland
Irugur lake, ★★	Never dried	-	Mixed waste	Farmland
Jakkarpalayam lake, ★★	Never dried	Irrigation, Other purpose	Degradable	Farmland
Kadathur lake,★★★	Above 15 years	Irrigation	Mixed waste	Companies/ Factories, Farmland
Kalapatti lake, ★★	Never dried	-	Non Degradable	Companies/ Factories
Karamadai pond 1, ★	Never dried	-	Mixed waste	Residential area
Karamadai pond 2, ★	Never dried	-	Mixed waste	Farmland
Karatupadi kuttai, ★	Never dried	Irrigation	Mixed waste	Farmland

Wetland name	Dryness	Usage of water	Waste dumping	Anthropogenic impacts
Katakaran kuttai, ★	6- 10 years	Irrigation	Degradable	Farmland
Kodayampalayam lake, ★★	6- 10 years	Other purpose	Mixed waste	Farmland
Kothavadi kulam★★★★	11-15 Years	Irrigation	Protected	Farmland
Kottaipalayam lake, ★★	6- 10 years	Other purpose	Mixed waste	Farmland
Krishna pond, ★★	Never dried	-	Mixed waste	Farmland
Krishnampathy lake, ★★	Never dried	Fishing	Mixed waste	Farmland
Kurichi lake, ★★★	Never dried	Fishing	Mixed waste	Residential area
Muthannan lake, ★★	Never dried	Fishing	Mixed waste	Companies/ Factories, Residential area
Narasampathy lake, ★★	Never dried	-	Mixed waste	Farmland
Perur big lake, ★★★	Never dried	Irrigation, Fishing	Degradable	Farmland
Pudukulam, ★★	Never dried	Other purpose	Non Degradable	Farmland
Samathur pond, ★★★	>5 years	Fishing	Protected	Farmland
Selambanur kuttai, ★	Above 15 years	Irrigation	Degradable	Farmland
Sellapampalayam lake 2, ★★	6- 10 years	Irrigation	Mixed waste	Farmland
Sellappampalayam lake, ★★	6- 10 years	Irrigation	Mixed waste	Farmland
Selvampathy lake, ★★	Never dried	Fishing	Mixed waste	Farmland
Selvasinthamani lake, ★★	Never dried	-	Mixed waste	Residential area
Sengulam, ★★	Never dried	Irrigation, Fishing	Degradable	Farmland
Senguttampalayam pond, ★	>5 years	Irrigation	Mixed waste	Farmland
Singanallur lake,★★★★	Never dried	Fishing, Other purpose	Mixed waste	Companies/ Factories
Sottayandi kuttai, ★★	Never dried	Other purpose	Non Degradable	Companies/ Factories, Farmland
Sundakamuthur lake, ★	>5 years	Other purpose	Mixed waste	Farmland
Theppakulam, ★	Never dried	-	Mixed waste	Residential area
Ukkadam big lake, ★★★	Never dried	Fishing	Mixed waste	Residential area
Valankulam lake, ★★	>5 years	-	Non Degradable	Companies/ Factories
Valasu kulam, ★★	>5 years	Irrigation	No Waste	Farmland
Vellalore lake, ★★	6- 10 years	-	Mixed waste	Farmland
Vellerukampalayam lake, ★	6- 10 years	Irrigation	Protected	Farmland
Vettaikarankulam, ★★★	Never dried	Fishing, Drinking, Other purpose	Protected	Farmland
Viraliyur kuttai, ★	11-15 years	Irrigation	Degradable	Farmland
Walayar reservoir, ★★★★	Never dried	Irrigation, Fishing	Good	Farmland

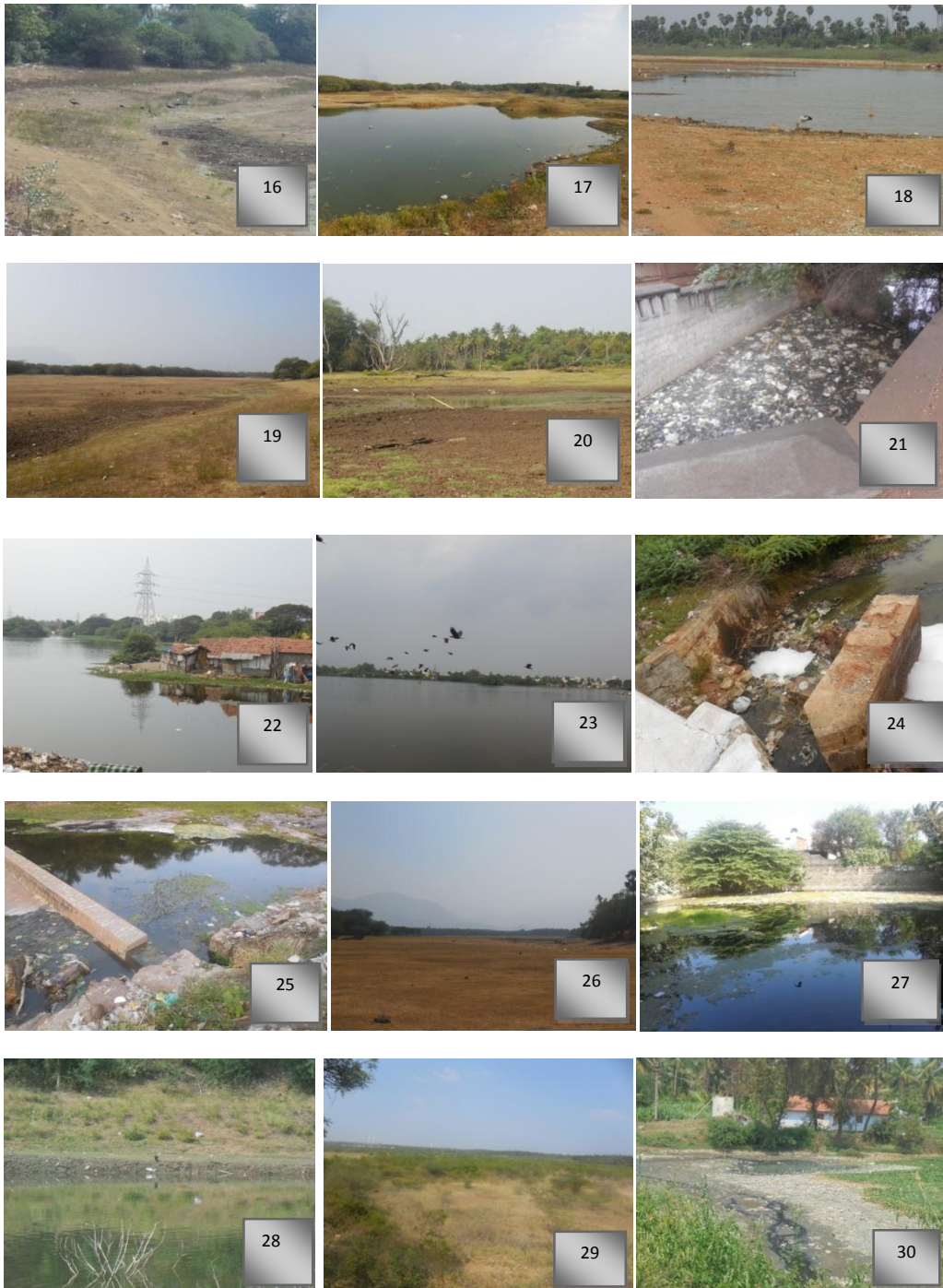
★ 0-10 Acres, ★★ 11-100 Acres, ★★★ 101-250 Acres,  
★★★★ more than 250 Acres





**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**

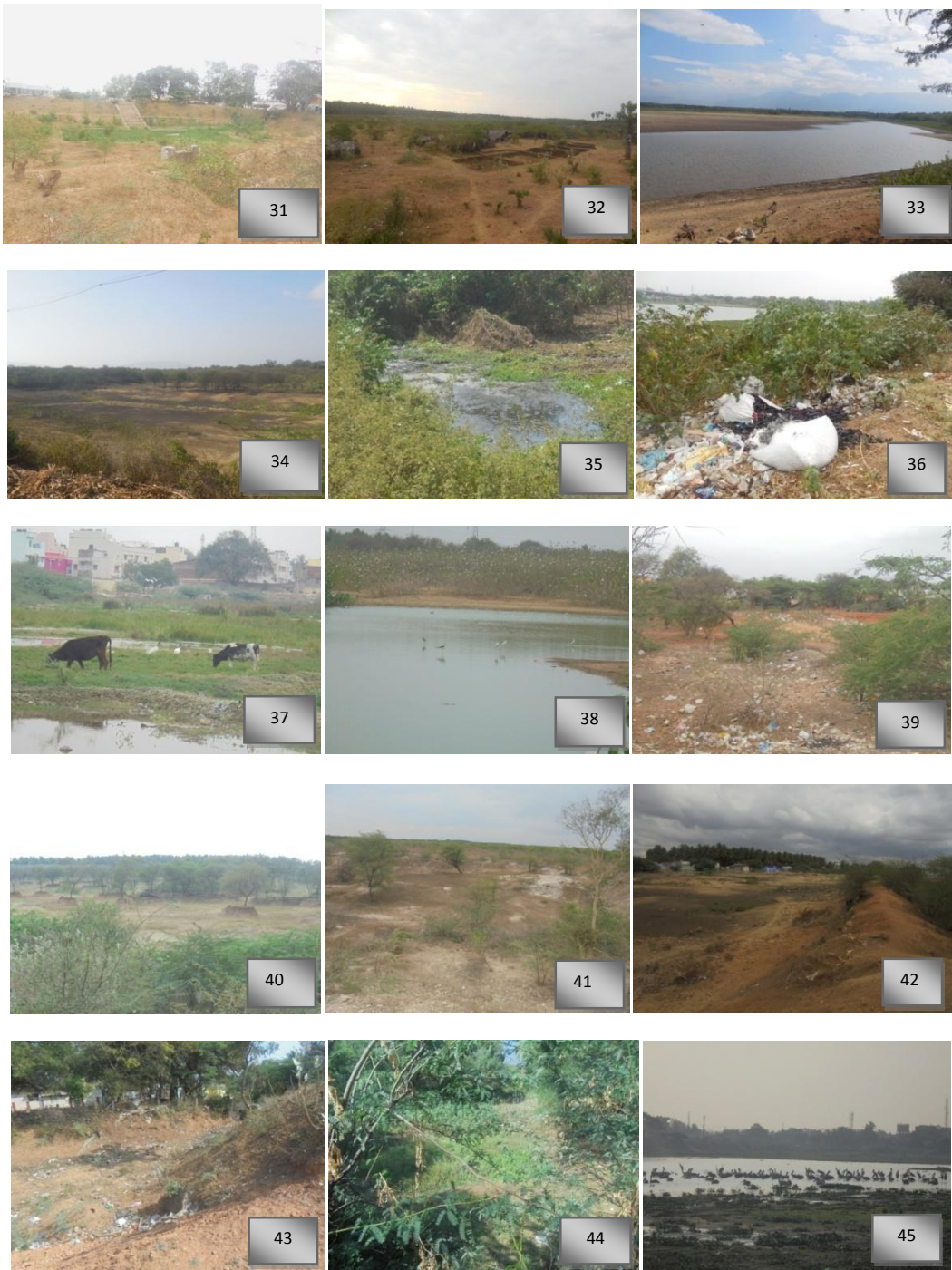
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16. Ganga Narayana Samudram, 17. Narasampathy lake, 18. Perur Big lake, 19. Sottayandi kuttai, 20. Vedapatti lake, 21. Krishnampathy lake, 22. Muthannan lake, 23, 24. Selvampathy lake, 25. Krishna pond, 26. Samathur pond, 27. Theppakulam, 28. Jakkarpalayam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



Continued



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



Continued



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

Fig. 2. Photos of different Wetlands in Coimbatore district, Tamil Nadu

**WETLAND SURVEY DATA SHEET**

Dates Surveys Performed:  
Team Members: 1. 2.

Team Name:  
Wetland name:

Colour	Size (hectares)	Depth	Condition	Usage	Dumping waste	Anthropogenic impacts	Wetland type/Plant species
Comments							

Different types of wastes were dumped in and around the Wetlands of the Coimbatore district. The waste materials were classified as I. Degradable (Food waste, Wooden waste, Clothes, Glass bottles), II. Non degradable (Plastic, Polythene products), III. Dumping prohibited, IV. Mixed wastes (MW) observed. Out of ( forty seven) 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. The depths of various wetlands were recorded 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 which were recorded during the study period.

The following anthropogenic were observed 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). The 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, 8 Wetland were recorded (Singanallur pond, Valankulam, Kalapatti lake, Ganga narayana samudram, Sottayandi kuttai, Muthannan kulam, Kadathur lake, Chinnakulam) during the present study. The recent changes in wetlands were within the last 5 years to identify the various anthropogenic activities. Based on the changes the wetlands were 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 farmlands which were observed during the present study period.

#### 4. DISCUSSION

Entire regions of India's land surface were altered through long term human use and manipulation (e.g. intensive cropping, deforestation, intensive grazing and alteration of water flows) [10]. The study also revealed that fifty percentage (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 [11]. Throughout India the landscape development pattern shows that wetland adjacent areas provide excellent dry season foraging opportunities for grazers and irrigation. The study observed that twenty five of wetlands were dried up during summer time due to poor water holding capacity and without desilting process. The dried out wetlands are use 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 [12,1]. 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 [13]. The study supported that 81% of wetlands in Coimbatore district were polluted by degradable and non degradable waste material. According to [14] listing, 45% of all Indian wetlands are considered moderately to highly threaten. No single effort is going to protect these wetlands [10]. The present study showed that twenty wetlands were used for irrigation purposes, thirteen wetlands used for fishing, (7%) of wetlands were used for washing clothes and cleaning cattle's and two percentage (2%) of wetland used as drinking source in Coimbatore district. Overall in Coimbatore district twenty eight wetlands were usable and the rest of nineteen wetlands were non usable. Silt deposit had reduced the water storage capacity in major wetlands by 30 -40 %. The study observed 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 [15]. The study also supports that wetlands colour in Coimbatore contain Green, Black, Greenish Black and Colourless. Many wetlands are 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 [16]. 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 [17]. The study showed that seventy two percentage (72%) wetlands were surrounded by farmlands, 16% are covered by companies or factories, twelve percentage (12%) wetlands are occupied by residential areas.

The river and the river-fed wetlands support a large number of plants 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 [18]. Most of these wetlands get dried in summer and serves as a dumping yard for garbage and industrial wastes. [19]. From the study it is observed that the wetlands support the presence of eleven (11) bird's species in and around wetlands in Coimbatore district.

## 5. CONCLUSION

In Coimbatore district forty nine percent (49%) of wetlands vanished within 20 years of time due to anthropogenic activities. Apart from government regulation, better monitoring mechanism are needed to increase the knowledge of the physical, chemical and biological characteristic of wetlands resources. Awareness implemented through government and NGO for popularization of the importance of the lakes, wetlands and their role in aquatic biodiversity and sustenance of human civilization.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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