1 **STATUS OF WETLANDS IN THE COIMBATORE DISTRICT, TAMILNADU, INDIA**

2 **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 than10 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 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 increases 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

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

4 **1. INTRODUCTION**
5
6 Wetlands are areas of land that are either temporarily or permanently covered by water which means that a
7 wetland is neither truly aquatic nor terrestrial; it is possible that wetlands can be both and at the same time
8 depending on seasonal variability. India, with its annual rainfall of over 130 cm, varying topography and climatic
9 regimes, supports diverse and unique wetland habitats (Prasad et al., 2002). These wetlands are distributed in
10 different geographical regions ranging from Himalayas to Deccan plateau. Indian wetlands are mostly
11 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.(Bharath H Aithal et al., 2012).

Based on 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, 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 (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 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. 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″E11.0161°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 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 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 sub-divisions, namely Bolampatty, Coimbatore, Perianaichenpalayam, Karamadai, Mettupalayam and Sirumugai(WWF–INDIA, 2011).

Fig1. Map of wetlands in Coimbatore district, TamilNadu.
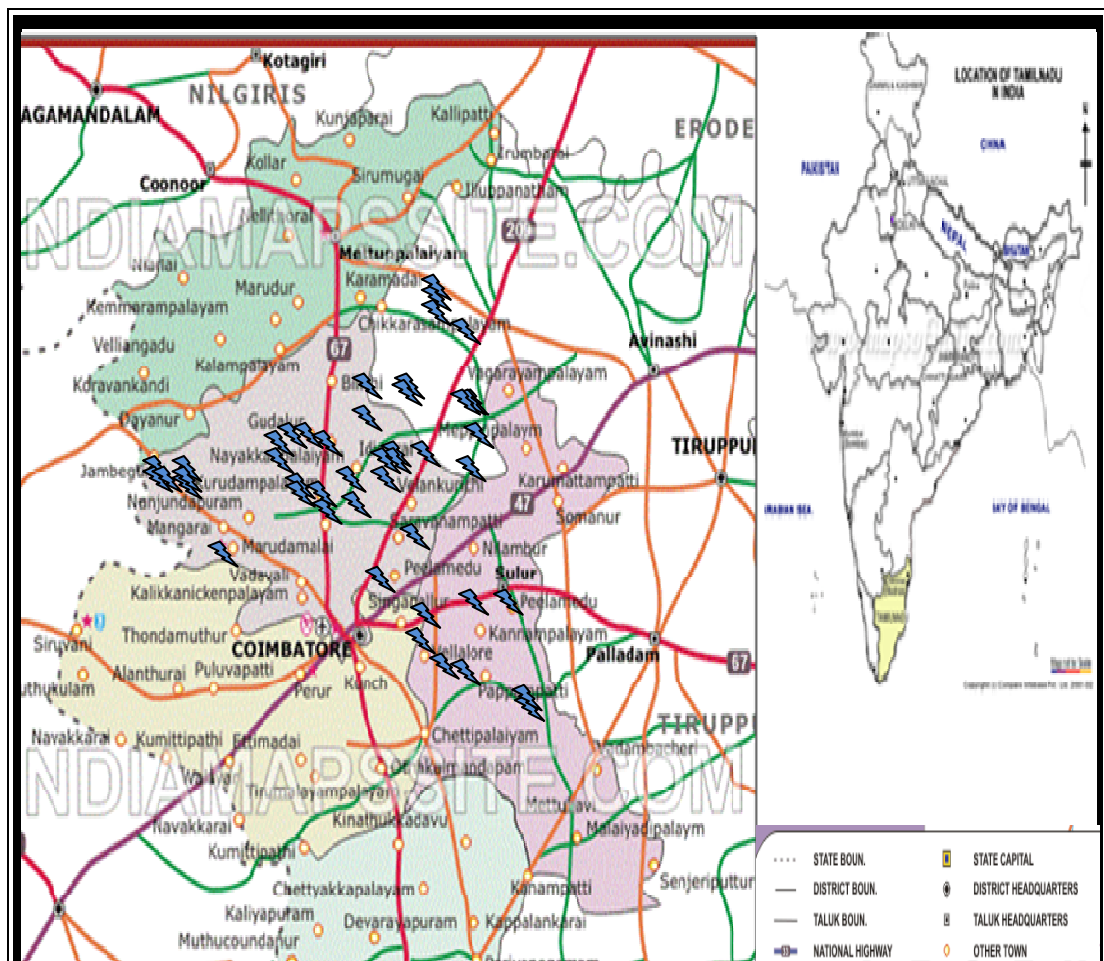
Scale 1:25000 map info.

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

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, ★	>5years	Irrigation	Mixed waste	Farmland
Belladhi lake, ★★	Never dried	Irrigation, Fishing	Protected	Farmland
Chinnakulam, ★★	Never dried	-	Mixed waste	Farmland
Chinnakulam, ★★	>5years	Fishing	Mixed waste	Companies/Factories
Chinnavedampatti lake, ★★★	11-15 Years	Irrigation	Degradable	Farmland
Devarayapuram pond, ★★	6- 10 years	Irrigation	Protected	Farmland
Ganga Narayana Samudram,★★	>5years	-	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 15years	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
Katakaran kuttai, ★	6- 10 years	Irrigation	Degradable	Farmland
Kondayampalaym 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, ★★★	>5years	Fishing	Protected	Farmland
Selambanur kuttai, ★	above 15years	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, ★	>5years	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, ★	>5years	Other purpose	Mixed waste	Farmland
Theppakulam, ★	Never dried	-	Mixed waste	Residential area
Ukkadam big lake, ★★★	Never dried	Fishing	Mixed waste	Residential area
Valankulam lake, ★★	>5years	-	Non Degradable	Companies/Factories
Valasu kulam, ★★	>5years	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

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82   ★ 0-10 Acres, ★★ 11-100 Acres, ★★★ 101-250 Acres, ★★★★ more than 250 Acres.

83   Based on this study, 47 wetlands recorded in Coimbatore district. According to the area of the wetlands they

84   were classified them under four groups. The Group I (n=12), which is less than 10 acres in size and occupies

85   about 26% of total wetlands, whereas wetlands under Group II (n=24), is between 11-100 acres represent 51%

86   of wetlands, Group III (n=8), wetlands are large in size (101-250 acres) occupies 17% and Group IV (n=3), are

87   largest in size (more than 250 acres) which occupies 6% were recorded. Compare with past data's, the wetland

88   were recorded into five categories (n=8) less than 5 years, (n=10) between 6 to 10 years, (n=3) 11 to 15 years,

89   (n=2) above16 years and   (n=24) wetlands never dried. From the total of 47 wetlands, 51% wetlands are being

90   used and 49% non usable wetlands. 4% of wetlands vanished before fifteen years, 22% of wetlands left within

91   10 years period, 17% of wetlands disappeared within 5 years time and 6% of wetlands dried before   16 years

92   ago. Among the wetland status in Coimbatore district represent that 53% of wetlands (n=25) were dried up, 4%

93   of the wetlands were partially dried, 15% wetlands (n=13) in stagnant water and 28% of wetlands remain as

94   such water holding throughout the year were observed.

95   Different types of wastes were dumped in and around the Wetlands of the Coimbatore district. The waste

96   materials were classified as I. Degradable (Food waste, Wooden waste, Clothes, Glass bottles), II. Non

97   degradable (Plastic, Polythene products), III. Dumping prohibited, IV. Mixed wastes(MW) observed. Out of (

98   forty seven) wetlands, 55% of wetlands in Coimbatore district were polluted by degradable and non degradable

99   waste including food waste, wood waste, clothes, glass products, plastic and polythene products. 15% of

100   wetlands containing degradable waste, Non degradable waste dumped in 5 wetlands which represent 11% and

101   19% of wetlands were out of pollution were observed.

102   We have recorded based on the usage of Wetlands in Coimbatore district including villages and urban areas.

103   The usages were subdivided into I. Irrigation, II. Fishing, III. Drinking, IV. Other uses, V. Not used. According to

104   the usage of wetlands in Coimbatore district which represent, 20 wetlands (36%) were used for irrigation

105   purposes, 13 wetlands (24%) were used for fishing, and 7% of wetlands were used for other purpoese like

106   washing clothes and cleaning cattles and 2% of wetland used as drinking source in Coimbatore district. The

107   depths of various wetlands were recorded in Coimbatore district. According to the category wise were divided

108 into four types. Six wetlands had a depth of (0-10 feet) which has 13%, (n=20) wetlands which contain 11-20

109 feet in depth, which represent 17(43%) wetlands depth about 21-30 feet represent 36% and 4 wetlands above

110 30 feet depth were observed. Based on the colour of wetlands we differentiate (n=11) Green in color, (n=2)

111 Black in color, (n=3) Colourless, (n=6) Greenish black in color. From the total wetlands, 50% of the Wetlands

112 are green in colour, 9% of the Wetlands are black in colour, 27% of the Wetlands are greenish black in colour,

113 14% of the wetlands are colourless which were recorded during the study period.

114 The following anthropogenic were observed in and around the wetlands in Coimbatore district. I. Companies /

115 factories (coir mills, automobile workshop, industrial manufacturing companies), II. Farm land, III. Building

116 construction (residential home, slums, government office, private companies).The study showed that 72%

117 wetlands were surrounded by farmland, 16% are covered by companies or factories, 12% wetlands are

118 occupied by residential area. Under subdivision I, 8 Wetland were recorded (Singanallur pond, Valankulam,

119 Kalapatti lake, Ganga narayana samudram, Sottayandi kuttai, Muthannan kulam, Kadathur lake, Chinnakulam)

120 during the present study. The recent changes in wetlands were within the last 5 years to identify the various

121 anthropogenic activities. Based on the changes the wetlands were classified the wetlands into I. changes

122 occurred in the area of the Wetland, II. Changes occurred in water quality, III. No changes etc. Under these

123 categories (n=28), 57% of Wetlands have never changed its characteristics in recent times, the water quality

124 have been changed in (n=18) 37% of wetlands and the area have been occupied in (n=3) 6% of the total

125 wetland. The area have been occupied in 3 Wetlands (Valankulam, Muthannan kulam, Kothavadi kulam) in the

126 form of slums, constructions and farmlands which were observed during the present study period.

127 **DISCUSSION**

128 Entire regions of India's land surface were altered through long term human use and manipulation (e.g.

129 intensive cropping, deforestation, intensive grazing and alteration of water flows).(Lee Foote et al., 1996). The

130 study also revealed that fifty percentage (50%) of wetlands vanished in Coimbatore district due to decline water

131 holding capacity, lack of desilting, building construction, dredging, blocking water channels and spreading of

132 *Vachelia nilotica* species influence the decline of wetlands status in Coimbatore district. Earlier investigations

133 have revealed that nearly 30% of lakes are used for irrigation. Fishing is being carried out in 25% of lakes

134 surveyed. About 36% of the lakes were used for washing purpose and only 3% are used for drinking.

135 Agriculture along drying margins is practiced in 21% of lakes. Approximately 35% of lakes are used for grazing

136 by cattle. Mud lifting was recorded in 30% and brick making in 38% of the lakes (Krishna et al., 1996).

137 Throughout India the landscape development pattern shows that wetland adjacent areas provide excellent dry

138 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 (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). The 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 threaten. No single effort is going to protect these wetlands (Lee Foote et al., 1996). 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 (Chakrapani et al., 1996). 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 (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).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 (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

169   wastes. (Mohan raj et al., 2000).   From the study it is observed that the wetlands support the presence of

170   eleven (11) bird's species in and around wetlands in Coimbatore district.

171   **4. CONCLUSION**
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173   In Coimbatore district forty nine percent (49%) of wetlands vanished within 20 years of time due to

174   anthropogenic activities. Apart from government regulation, better monitoring mechanism are needed to

175   increases the knowledge of the physical, chemical and biological characteristic of wetlands resources.

176   Awareness implemented through government and NGO for popularization of the importance of the lakes,

177   wetlands and their role in aquatic biodiversity and sustenance of human civilization.

178   **CONSENT**
179   Authors may use the following wordings for this section: "All authors declare that 'written informed consent was
180   obtained from the patient (or other approved parties) for publication of this case report and accompanying
181   images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board
182   members of this journal."
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FIG 2 -WETLAND PHOTO
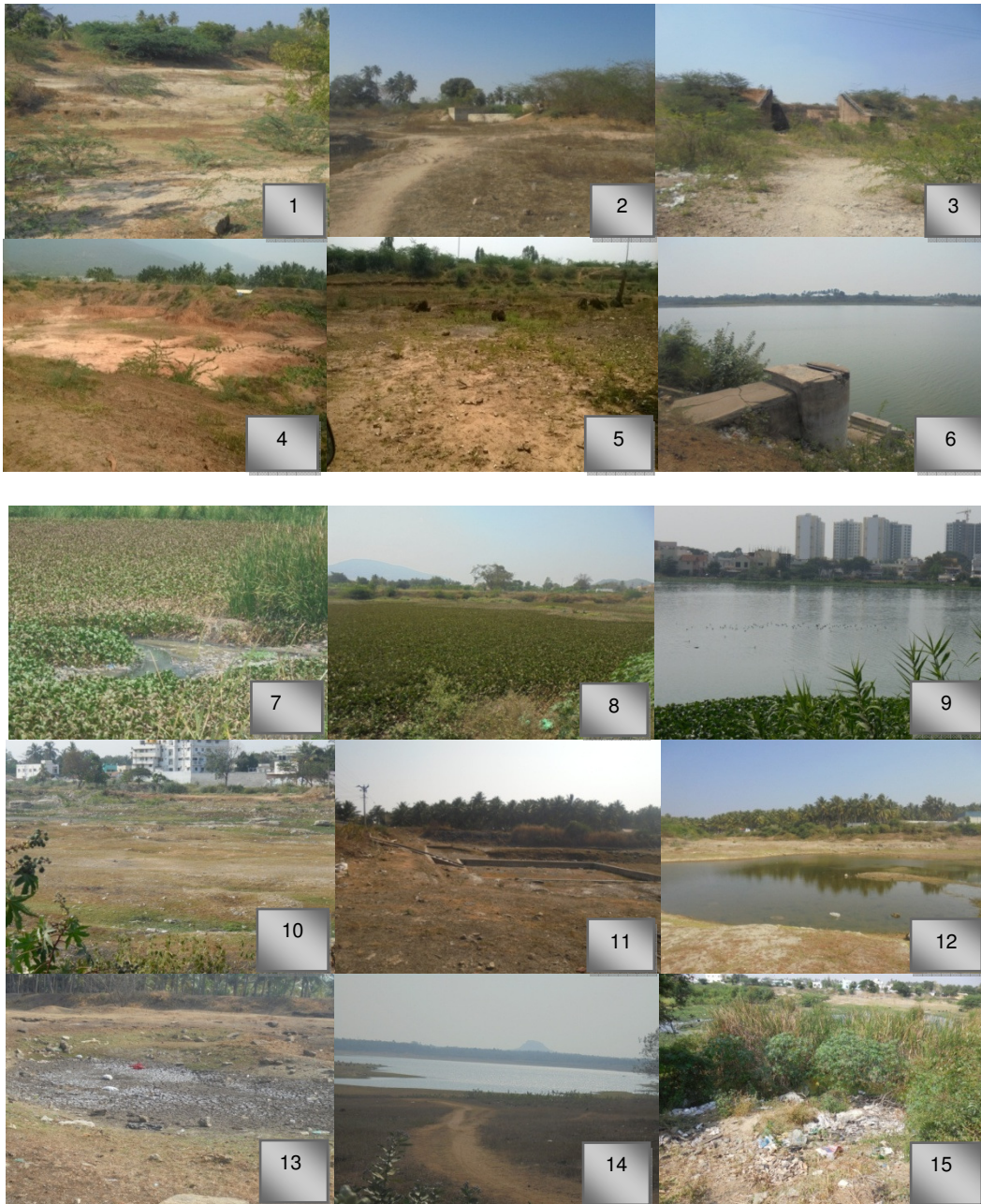
1. Sellapampalayam big lake, 2.Sellapampalayam Lake, 3.Chinnavedampatty Lake, 4.Devarayapuram pond,

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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253   16. Ganga Narayana Samudram, 17. Narasampathy lake, 18. Perur Big lake, 19. Sottayandi kuttai

254   20. Vedapatti lake, 21. Krishnampathy lake, 22. Muthannan lake, 23,24. Selvampathy lake,

255   25.Krishna pond, 26.Samathur pond, 27. Theppakulam, 28. Jakkarpalayam pond, 29. Kothavadi lake,

256   30. Irugur lake

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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

WETLAND SURVEY DATA SHEET

Dates Surveys Performed: Team Name:

Team Members: 1. 2.   Wetland name:

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

Comments