

Chapter I

Introduction

1.1 INTRODUCTION

The biosphere has a variety of biomes, which are further divided into different well-known ecosystems and habitats. The ecosystems and habitats are not isolated but interlinked and delicately balanced. Any alteration in any of the ecosystems will affect our environment in general. Wetlands form an integral part of our environment. Wetland habitats are truly unique and are vital for all other biomes (Odum, 1970). To define wetlands in a single step is very difficult. RAMSAR convention 1971 defines wetlands as “areas of marsh, fen, peat lands or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed 6 meters”. In addition, the RAMSAR convention, 1971, in the article 2.1 provides that wetlands “may incorporate a riparian and coastal zone adjacent to the wetlands, the islands or bodies of marine water deeper than 6 meters at low tide lying within the wetlands”

Often wetlands are visualized as images of dank, smelly, mosquito-infested waste lands, but upon closer look wetlands are actually biologically diverse and productive ecosystems (Prasad *et al.*, 2002). Wetlands support diverse communities of plants and invertebrates, which in turn support a wide variety of birds and other vertebrates. While covering only 6% of the earth’s surface, wetlands provide a disproportionately high number of ecosystem services in

addition to maintaining biodiversity. Costanza *et al* (1997) concluded that the economic value provided by wetland ecosystems exceeded that provided by lakes, streams, forests and grasslands and was second only to that provided by estuaries.

Origin of Wetlands

Many wetlands were formed at the end of the last ice age when glaciers retreated and the shallow depressions were filled with left over water. Over the time water becomes shallower until the sediments and organic debris collected in the depressions leave behind a shallow wetland. Once wetlands form, they keep changing constantly (Kar, 2013).

Distribution of Wetlands

Currently, wetlands exist in all continents of the world except Antarctica. Globally, the aerial extent of wetland ecosystems ranges from 917 million hectares (Lehner and Doll 2004) to more than 1275 million hectares (Finlayson and Spiers 1999). Yet little is known about the extent and conditions of global wetland resources.

1.2 WETLANDS OF INDIA

Wetland ecosystem constitutes an integral part of culture and biodiversity landscapes of India. In India, wetlands are distributed in all the biogeographical regions occupying 58 million ha, including areas under wet paddy cultivation (Directory of Indian Wetlands, 1990)

The first scientific Indian national inventory of wetland was carried out at 1:250,000 scale by Space Application Center, Ahmedabad in 1992-1993 time frame. According to the findings, the total wetland extent in India is about 8.26 million hectares (Panigraphy *et al.*, 2012).

The National Wetland Atlas, prepared by the Ahmedabad (Gujarat) Space Application Centre (SAC) and Indian Space Research Organization (ISRO), has classified Puducherry among the Union territories and Tamil Nadu among the States as wetland-rich areas as they occupy 12.88% and 6.92% of the total geographic area under wetlands, respectively. In the entire country, a total of 201,506 wetlands were identified and mapped on 1:50,000 scale (Aravind, 2012).

The Ramsar Mission

The Ramsar Convention is the only global environmental treaty that deals with this particular ecosystem. The treaty was adopted in the Iranian city of Ramsar in 1971 and the Convention's member countries cover all geographic regions of the planet.

The Convention's mission is "the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world". There are 1052 Ramsar sites in

Europe, 289 sites in Asia, 359 in Africa, 175 in South America, 211 in North America and 79 sites in Oceanic Region. (Ramsar Secretariat, 2013).

The Government of India became a contracting member party of the Ramsar Convention on 1 February 1982. India has 26 wetlands in the Ramsar List (MoEF, 2013).

Table 1.1

Ramsar list of Indian wetlands of International importance

Sl. No.	Name of the Wetlands	State
1.	Ashtamudi Wetland	Kerala
2.	Bhitarkanika Mangroves	Orissa
3.	Bhoj Wetland	Madhya Pradesh
4.	Chandra Taal	Himachal Pradesh
5.	Chilika Lake	Orissa
6.	Deepor Beel	Assam
7.	East Calcutta Wetlands	West Bengal
8.	Harike Wetland	Punjab
9.	Hokera Wetland	Jammu and Kashmir
10.	Kanjli Wetland	Punjab
11.	Keoladeo National Park	Rajasthan
12.	Kolleru Lake	Andhra Pradesh
13.	Loktak Lake	Manipur
14.	Nalsarovar Bird Sanctuary	Gujarat

Sl. No.	Name of the Wetlands	State
15.	Point Calimere Wildlife and Bird Sanctuary	Tamil Nadu
16.	Pong Dam Lake	Himachal Pradesh
17.	Renuka Wetland	Himachal Pradesh
18.	Ropar	Punjab
19.	Rudrasagar Lake	Tripura
20.	Sambhar Lake	Rajasthan
21.	Sasthamkotta Lake	Kerala
22.	Surinsar-Mansar Lakes	Jammu and Kashmir
23.	Tsomoriri	Jammu and Kashmir
24.	Upper Ganga River	Uttar Pradesh
25.	Vembanad-Kol Wetland	Kerala
26.	Wular Lake	Jammu and Kashmir

1.3 RATIONALE OF THE STUDY

In Tamil Nadu, Tiruchirappalli district is one of the fastest growing districts in terms of urbanization. Although it is the river Cauvery delta area that has agricultural significance, nowadays agricultural lands and small wetlands are shrinking due to unchecked real estate exploitation (Jayaraj, 2011). Due to heavy urbanization, many wetlands both small and big are disappearing in Tiruchirappalli district. For the conservation of wetlands, inventory and detailed study of the concern wetland is the basic requisite and therefore, taking cognizance of this significance, the present investigation is undertaken.

Although wetlands are the most productive habitats with a variety of flora and fauna, they are often overlooked in terms of environmental conservation (Prasad *et al.*, 2002; Bassi *et al.*, 2014; Job *et al.*, 2014).

1.4 BACKGROUND OF THE STUDY

Wetlands go by different names. Classification of wetlands is an essential prerequisite for wetland inventory. Various countries adapt regional, national and local wetland classifications. These classifications are mainly based on conservation and management goals. But at the international level, differences exist in the definition and classification. Finlayson and Vander Valk (1995) emphasized the need to develop a common international classification system.

1.4.1. Aim

1. To identify potential wetlands of Tiruchirappalli district using GIS applications.
2. To find out boundary changes of three randomly selected wetlands in Tiruchirappalli district by using remote sensing and GIS applications.
3. To carry out in-depth study of one of the biggest wetlands of Tiruchirappalli district (Thiruthalyur wetland).

1.4.2. Objectives

1. To identify the total number of wetlands in Tiruchirappalli district and group them according to their size and study the distribution pattern.
2. To evaluate the boundary changes of three large wetlands of Tiruchirappalli district, namely, Thiruthalyur wetland (Thuraiyur taluk), Nagayanallur wetland (Musiri taluk) and Mullipadi wetland (Musiri taluk), all of which are maintained by Public Works Department (PWD) of Tamil Nadu.
3. To elucidate the detailed study of Thiruthalyur wetland and to ascertain the present status by analyzing the following features through the years 2011-2013.

I. Abiotic factors

- a. Soil study
- b. Water Quality Assessment

II. Biotic factors

- a. Study of flora
- b. Plankton study
- c. Benthic macro invertebrates
- d. Fishes and
- e. Avifauna

III. Socio-economic and cultural aspects of the wetland.

4. To study the impact of climate change on the wetland ecosystems.
5. To suggest the means of mitigation, restoration and management of the wetlands.

1.4.3. Scope of the study

The present investigation of inventory of wetlands of Tiruchirappalli district and boundary analysis of the selected wetlands will pave the way to draw the attention of environmentalists, policy makers, Non Governmental Organizations (NGOs) and Government Organizations whose main focus is environment conservation. Any environmental issue has to be globally thought over and locally acted upon. In Tamil Nadu, especially in Tiruchirappalli district, continuous monsoon failure over a period of years seriously affect wetlands and village ponds, which has a disastrous impact over the livelihood of the village people and the environment as a whole (Job *et al.*, 2014). In view of the above, this study will form a base for further research in wetlands of Tiruchirappalli Districts, and for drafting the strategies for conservation.

1.4.4. Limitations of the Study

The study on wetland inventory and boundary analysis solely depends on obtaining satellite imagery, which is very expensive

for an individual researcher. Time limitation is found to be another limiting factor.

1.5. CHAPTERIZATION

The present research findings are divided into the following five main chapters.

Chapter 1 deals with a general introduction, status of wetlands in Tamil Nadu with an emphasis on Tiruchirappalli district, aim and objective, limitations of the study and scope of the study.

Chapter 2 comprises of literature reviews which are relevant to the present study.

Chapter 3 deals with a description of the study area and the methods used for the study in general.

Chapter 4 deals with results and discussion of inventory mapping, distribution and boundary analysis of wetlands of Tiruchirappalli district and indepth study of Thiruthalaiyur Wetland and the impact of climate change on the wetlands of Tiruchirappalli District.

Chapter 5 concludes the study with some suggestions.