Chapter 1
Introduction

“Riparian” word derived from the Latin word ‘Ripa’, it means the bank of a river, pond or lake of the surrounding landscape (Tabacchi et al., 1990, Junk & Piedade, 1997, Goebel et al., 2003). It located next to streams, rivers, lakes, ponds, wetlands and have direct influence on aquatic and wildlife habitat. Riparian zone is after described as the area between land and water (Chris et al., 2008). Riparian vegetation is one of the main components of stream bank soil bioengineering. Understanding riparian vegetation concepts is extremely important. Riparian zone is known as gallery forests and streamside forests (Brinson, 1990). Riparian vegetations are highly threatened ecosystems as they are inherently rare habitats on earth surface (Hynes, 1970).

The sediment transport processes occurring at a larger scale and a longer time frame, played an important role in shaping the structure and composition of the riparian area (Shine & Nakamura, 2005). These area or zones can be defined as the areas of the stream bank, including side channel and associated banks and they include upland areas not normally inundated during high water conditions. The distribution of plants that are tolerant to either flooding or drought are also helpful in delimiting riparian ecosystems (Nilsson, 1983).

Dimensions of the riparian vegetation are determined by its unique spatial patterns and temporal riparian zone vary with the size of the river, from narrow and relatively simple strips of land along the head water streams to heterogeneous flood plains in many Kilometers wide along lower reaches of major rivers.
The riparian zone has complex interactions among hydrology, geomorphology, light and temperature influence the structure, dynamics and composition of riparian ecosystems (Brinson, 1990; Malanson, 1993). Riparian plants were given an important role in the river continuum concept (Vannote et al., 1980; Minshall et al., 1985) which predicts that the load and quality of organic matter and the biota in the stream/river channel from the head waters to the lower river courses increases with riparian vegetation and river width.

Riparian Vegetation is often described as the area between land and water. Riparian Vegetation is one of the main components of stream bank soil bioengineering. The riparian ecosystems support a prevalence of vegetation typically adapted for life in saturated soil conditions (Gosselink et al., 1981).

Riparian ecosystem contains higher number of species than adjacent upland habitats within the same geographic location (Naiman et al., 1993). The linear structure, floods, strength of competitive interactions, succession and shifting mosaic of landforms provides a diversity of microhabitats, resulting high plant species richness in the riparian zones (Kolliola & Puhakka, 1988; Decamps & Tabacchi, 1994; Pollock et al., 1998). The current peninsula Indian riparian forest can be considered as topical forest refugia (Farooqui et al., 2010).

In riparian zone vegetation intercepts and detains agricultural runoff from adjacent upland areas and wastewater pollution and maintains the water quality (Hsin – Hsiung & Ming – Jei, 1989; Delong & Brusven, 1998; Jones et al., 1999). The riparian zone significantly reduces nutrient runoff (Lowrance et al., 1984) and helps nutrient cycling (Johnes, 1996; Myer et al., 1999; Vorosmarty et al., 2000) and their
role in nutrient dynamics (Cummins, 1992) documented. The riparian vegetation serve as filters, transformers, sources and sinks for nutrients, sediments and pollutants associated with agriculture and urban pollutants associated with agriculture and urban runoff (Welsch, 1991; Malonson, 1993).

Riparian vegetation stabilizing riverbanks by their root system (Cordes et al., 1997), contributing root strength that maintains stream bank integrity (Brodarson, 1973, Gregory & Askhenas, 1990). The riparian zone provides flood control during high rain events (Welsch et al., 2000). Riparian vegetation controls processes related to surface and subsurface flow at the local scale (Pasche & Rouve, 1985; Bern, 1993; Darby, 1999).

The riparian zone covers for wildlife and corridors for species migration, dispersal (Wegner & Merriam, 1979; Henderson et al., 1985; Merriam & Lonoue, 1990; Cordes et al., 1997), breeding ground for birds and mammals (Rottenborn, 1999; Blair, 1996; Cockle & Richardson, 2003).

Riparian vegetation is major food sources for river organisms and help to maintain food chains and food webs (Cummins, 1924; Wootton et al., 1996). The high productivity of riparian vegetation has well – documented (Brinson et al., 1981; Day & Megonigal, 1993). Maintaining the forest in an early successional stage and creating the potential for positive net ecosystem production (Schade et al., 2002). The Biomass production of riparian vegetation differed significantly between the vegetation types, with a higher production in the forested sites (Heffing et al., 2005).
The riparian vegetation moderates stream temperature and high levels it influencing habitat suitability for fish and other aquatic organisms (Gregory et al., 1991). The functions of riparian forest as buffers to reduce the quantity of agricultural diffuse pollution that reaches streams (Lowrance et al., 1984; Peterjohn & Correll, 1984; Pinay & Decamps, 1988; Osborne & Kovacic, 1993; Vought et al., 1994). The removal of Nitrogen can be efficient in riparian vegetation (Cooper, 1990; Gilliam, 1994; Hill, 1996; Mander et al., 2000) by the denitrification process and prevents Eutrophication (Collins & Jenkins, 1996; Mcclain et al., 2003).

The riparian vegetation contributes large woody debris to streams and shaping stream habitats such as pools and riffles and influencing sediment routing (Zimmerman et al., 1967; Cummins, 1974; Mosley, 1981; Swanson, 1993, 1994). The qualitative affect of coarse woody debris (CWD) on stream hydraulics (Harmon et al., 1986; Gurnell et al., 1994; Maser & Sedell, 1994) causes water flow diversions, congestions in the main channel, reduced connectivity and enhanced local erosion.

The disturbance agents of upland ecosystems and aquatic systems such as wind, fire, debris flows, lateral channel erosion and flooding. The riparian vegetation increases the heterogeneity of water flow patterns over sediment and vegetation mosaics, leading to the development of preferential flow path ways (Thorne et al., 1997).

The riparian vegetation corridors are landscape elements that are most sensitive to plant invasion (De Ferrari & Naiman, 1994; Stohlgren et al., 1999; Brow & Peet, 2003). River regulation and flood plain environment resulting reduction of
species richness (Nilson et al., 1991) and increase of relative invisibility of exotic plant species (Decamps et al., 1995).

In riparian grassy areas traps sediments delivered from hill slopes by over land flow (Magette et al., 1989). The colonization of newly deposited sediments undergo ecological process in the upper sediment layers during dry periods because of the sheltering of the sediment surface by the vegetation cover and the capillarity provided by the rhizosphere.

The general structure of riparian vegetation consists of three layered organization of canopy trees, middle stratum of shrubs and woody climbers and herbaceous ground flora. Trees are considered the most significant component in the riparian ecosystems (Minore & Weatherly, 1994; Pettit & Froend, 2001). Shurbs provide shade and stream bank stabilization, prevent the regeneration of trees in some riparian environments, thereby resulting in gradual succession to a shrub community (Hibbs, 1987). However in the tropical riparian flood plains, seasonal herbaceous annual vegetation dominates, where large flood disturbance prevents the recruitment of woody species.

Anthropogenic activities like overgrazing, deforestation, forest fire, shifting cultivation, sand mining, urbanization, dam, and road constructions were found to be the major causes of deterioration of biodiversity in riparian area. Many forests are under great anthropogenic biodiversity, productivity and sustainability of the forests can be maintained (Kumar et al., 2002). The floristic diversity studies have been conducted different parts of the world (Whittaker and Niering, 1965; Risser and Rice, 1971; Gentry, 1988; Linder et al., 1997; Chittibabu and Parthasarathy, 2000; Sagar et
Floristic wealth in homestead agro-forestry system of Kanyakumari District was analysed (Paul and Jeeva, 2013), wetland plants of the district (Sukumaran and Jeeva, 2011; 2012) and various floristic studies were reported already from this district (Sukumaran and Parthipan, 2014; Parthipan et al., 2016; Kingston et al., 2006; Jose et al., 2014; Arul et al., 2013; Suba et al., 2014; Brintha et al., 2015; Geetha et al., 2015). Not may have been undertaken in Thamiraparani River (West) Kanyakumari District.

A total of ca.11,37,181 people inhabit Kanyakumari district, Tamil and Malayalam are the main languages. Christians and Hindus form a sizeable percentage of the population of the district and there are a number of Muslim dominated belts in the district. The cast system in the society has weakened to a great extent especially after independence because of growth of education and improvements in transports and communication. ‘Nadar’ is the major community of this district. Some of the other communities of the district are Nanjil Nadu Vellalars, Paravas, Mukthavas, Vilakki Thalanayar, Asari, Chackarevars and Kerala Mudalis, etc.

The soil of the district is broadly classified into two major groups namely, red and alluvium soils. Red soil is further classified into red loam and sandy soils. Alluvium soil is divided into coastal and river alluvium soils. An area of the district occupied by red soil is greater than alluvial soil. The black colour of forest soil is mainly due to high contents of humus and minerals.

The district has a favorable agro-climatic condition, which is suitable for growing a number of crops. The proximity of equator, its topography and other climate factors favour the growth of various crops. The paddy varieties grown in the
second crop season in Thovalai and Agasteeswaram taluks are grown during the first crop season in Kalkulam and Vilavancode taluks. This shows that there is distinct variation in the climatic conditions prevailing within the district. Unlike other district in Tamilnadu, it has a rainfall both during the South West and the North East monsoons. The South West monsoon period starts from the month of June and ends in September, while the North East monsoon period starts from October and ends in the middle of December.

Kanyakumari is the southernmost district of Tamil Nadu. The district lies between 77° 15’ and 77° 36’ of the eastern longitudes and 8° 03’ and 8° 35’ of the northern Latitudes. The mountains and hills of this area are rich in endemic species and house numerous species, many of which have not yet been identified. Also, the large number of primitive flowering species truly signifies the region to be a hot spot for studies of floristic diversity. The importance of such diversity – related studies were identified only recently and apart from inventory, disturbance intensity on regeneration (Denslow, 1995; Kennard et al., 2002). Across the world, 25 hotspots have been identified on the basis of species endemism and degree of habit loss (Mayers et al., 2000). Of these Eastern Ghats and Western Ghats are confined to the Indian subcontinent. Studies on the riparian vegetation and floristic diversity of Kanyakumari district are lacking.
Objectives

The present study aims at surveying the floristic biodiversity and analyzing the vegetation of the Kuzhithurai Thamirabarani River, which is also called as Kuzhithuraiar of Kanyakumari district to assess the biodiversity of flowering plants, with special reference on rare, endemic and threatened species. This investigation gains importance because of the study area faces a lot of threats, mostly anthropogenic, sand mining, flood, agricultural activities, collection of medicinal plants, collection of timber and non-timber forest products, etc.