INTRODUCTION

1.1 INTRODUCTION

Water as resource is not evenly distributed over time and space. Habitants living all over the world need fresh water resources available for their life span. One of the most important issues in water resource is management of groundwater systems to avoid or minimize the negative effects on the environment and to maximize economic benefits. People residing near the coastal environments are facing the seawater intrusion problem either because of overexploitation or due to poor recharging of groundwater. In global water resources about 97.2 % is salt water, mainly in oceans. The available fresh water over the globe is 2.8 % and out of this, 0.6 % is stored as groundwater and the remaining 2.2 % forms the surface water. At present nearly one fifth of all the water used in world is obtained from underground source, especially in semi-arid regions. During the last few decades, groundwater has been extensively developed for domestic, agricultural and industrial purposes.

The available fresh water resources are loosing its quality and polluted with time. Now a days, supply of fresh water to the existing population is becoming a daydream. Present day population gain more awareness about preserving the existing fresh water resources from pollution. United Nation’s General Assembly has declared the Year 2003 as the “Year of Fresh Water”. Traditionally people lived along riverside irrespective of the presence or absence of the water since they
were able to obtain fresh water from groundwater resources. Water present below the surface of any lake and river is nearly 30 and 3000 times greater in quantity respectively than the water exist on the surface (Raghunath, 1987).

Therefore, it is clear that river basins hold high potential of groundwater resources all over the world. A detailed integrated hydrogeological investigations of Gundar River of Tamilnadu State in Southern India has been chosen for the present study.

1.2 Scope

In the recent times, the demand for water has increased many folds due to increased domestic and industrial needs. The present groundwater resources and natural recharge to groundwater do not cope up with the demand. The qualities of groundwater resources deteriorate with time by dissolving the soluble components of the rocks, mixing with deeper saline waters and addition of industrial effluents. Another important problem along the coastal regions of all over world is saline water intrusion. To prevent the quality deterioration and increase the potential of groundwater resources, proper planning and management strategies are to be adopted. The area chosen for the present study experiences a semi arid climate and covers the coastal region with Ephemeral River. Groundwater becomes the only source for the domestic, agricultural and industrial needs. This study is aimed to identify the groundwater potential that exists in this region.

The study of following features would be of greater use in quantifying the resources.
➢ Identification of fresh water zones
➢ Extent of saline water intrusion into the aquifer.
➢ Areas of high recharge.
➢ Water Quality changes with reference to seasons.

1.3 STUDY AREA

The Gundar basin lies in the southern part of Tamil Nadu state in Indian sub continent. The Gundar River originates at an altitude of 500 m near Kothaimalai of Saptur reserve forest belonging to the Varushanadu hills in Tamil Nadu. Entire Gundar river basin covers an area of 5,647 Km², spreading over in five districts of Tamil Nadu. The area chosen for the present study is restricted to the lower Gundar basin that covers part of Ramanathapuram and Virudhunagar districts. The Gundar river coalesces at the Bay of Bengal after covering a distance of nearly 150 Km.

Geographically, the study area falls between 9°00’00” and 9°45’00” North Latitudes and 78°10’00” and 78°45’00” East Longitudes (Fig.1.1). This area is covered in the following Survey of India topo sheet numbers 58 K / 2,3,6,7,11 & 12. The study area is bounded by Kariapatti and Aruppukottai blocks of Virudhunagar district in the north and northwest and Mudukulathur and Kadaladi blocks in the east. The Bay of Bengal forms the southern boundary. The total areal extent of the study area is 970 Km² with a population of 0.8 million.

Agriculture is the main occupation of the people. A large number of rain fed tanks that exist in this region store rainwater, support the
agricultural and domestic needs for a short spell after the rainy season. Fishing and palm industries are the other occupations of the settlements along the coast. Tiruchuli, Kamudhi, Mudukulathur, Kadaladi and Sayalkudi are some of the important towns in this domain where a few small industries are situated.

The temple city Madurai is situated at a distance of 35 Km Northwest of the study area that can be accessed through state highway. The important towns of this area are connected to other cities and towns of Tamil Nadu through state highways. A railway line connecting Manamadurai and Virudhunagar runs across this region.

1.4 AIMS AND OBJECTIVES

Fresh water, being a scare commodity, it has been aimed to evaluate the groundwater resource, including its quality. The following are objectives planned in the present study: -

I. To evaluate the groundwater resources through an integrated approach,
II. To identify groundwater potential zones using GIS application,
III. To identify recharge zones using isotope techniques and
IV. To develop a groundwater model of Lower Gundar Basin.
1.5 Review of Literature

Numerous hydrogeological investigations have been carried out in river basins both at national and international levels. Lakshman Hitra and Kabini sub basins of Karnataka State have been studied by Viswanathiah et al. (1978). Hydrogeochemical investigation of Bhadra basin has been carried out by Narasimha Prasad et al. (1983). Detailed hydrogeological studies of Tamabraparani river basin have been carried out by Balasubramanian et al (1985). Tiwari (1986) has studied the significance of hydrogeological framework of the Heran river basin, Gujarat. Nagar et al. (1988) has studied Palaeostructural analyses of Seismogeologic data in Southern part of Broach block of South Cambay basin. San Jacinto basin (USA) has been studied by Michael Schelhhtor et al. (1989). Pinaki Majumdar et al. (1996) carried out detailed study on Bellonpalli Pranhita – Godavari basin. A detailed hydrogeomorphological features of Varaha river basin has been mapped by Murthy et al. (1999). Institute for Water Studies (IWS) is an integral unit of Public Works Department, Tamil Nadu has done some hydrogeological investigations of the Gundar basin. Author (2003) himself has carried out hydrogeochemical studies of the lower Gundar basin.

1.6 Organization of Thesis

Thesis is organized in seven chapters. The first chapter is Introductory with scope, objectives with description of the study area. The second chapter deals with geology, sub surface geology, geomorphology, lineament and palaeochannel, land use, drainage and soils. Using Remote Sensing techniques and GIS applications in
identification of groundwater potential is also planned. The third chapter delivers about the hydrometeorology and hydrogeology including aquifer parameter evaluation of this region. The fourth chapter deals with hydrogeochemistry and Isotope studies. The fifth chapter converses the hydrogeophysics and its applications. The sixth chapter describes the ground water modeling and its applications in the study area. The seventh chapter comprises summary of this study and conclusion besides suggestions for the future.