Chapter - 1
1.1 SCOPE

"WATER IS LIFE, CARE IT BEFORE IT BECOMES RARE"

"Water is life" it is the most essential natural resource for sustaining life and environment. The available water resources are under pressure due to increased demands, the time is not far when the water, which we have always thought to be available in abundance and free gift of nature, will become a scare commodity, it will continue to be so if proper management is not evolved and taken care off. A blue revolution is necessary similar to green revolution in food production evolved during the year 1950.

The fresh water is getting exhausted day by day and nearly 26 countries around the globe are now considered to be water scarce. Conservation of water by reducing wastage, recycling and reuse, artificial recharge is required to minimize the scarcity. Water management has been practiced since ancient times, but today this has to be done on priority basis to ensure water for all. In Karnataka majority of the water supply schemes are dependent on groundwater. The number of wells and bore wells have increase five fold during the last fifty years. Groundwater levels are declining at the rate of one meter or more per year on account of following reasons.

- Over exploitation in the form of excessive withdrawal either locally or over a large area to meet the increasing water demand.

- Non-availability of other source of water.
Disuse of ancient means of water conservation

Unreliability of municipal water supplies in terms of quality, quantity and time drives the people to have their own source.

Failure of monsoon

Large scale quarrying in the district.

1.2 AIMS AND OBJECTIVES OF THE PRESENT STUDY

Though groundwater is replenishable natural resource, when withdrawals exceed the limits of dynamic recharge, it will cause irreversible damages. As it is, South India is a hard rock terrain, where the rate of groundwater recharge is poor, hence competitive exploitation of groundwater has resulted in drastic adverse effects like depletion and drying of wells, deterioration of the quality and ingress of seawater in coastal areas.

In recent years, bore wells for agricultural purposes are drilled on a massive scale by the farmers, without carving for minimum interference distance to be maintained between the extraction structures. There by the groundwater levels are drastically affected. This has necessitated monitoring of groundwater resources development of Udigala watershed by the author. He has tried to tackle this problem based on the voluminous hydrogeological data.

To reach this goal attempt has been made by the author on the assessment of morpho-metric behaviour, hydrometeorological characteristics, lithology, geological
structures, water bearing characteristics of aquifers, identification of groundwater recharge zones by using weighted overlay method (using Arc GIS software).

1.2.1 Objectives

The following are the major objectives.

1. To understand the various attributes data required for planning using thematic maps, viz land use, land cover, soil types, geomorphology, geology, topographic maps, stream network and surface water.

2. To identify and delineate the major and minor structural features using remotely sensed database.

3. To evaluate the spatial and geometrical characteristics of the structural features through the application of geoelectrical methods.

4. To understand the geophysical conditions and the depth at which groundwater exists.

5. To evaluate the groundwater quality for different development purposes.

1.3 GENERAL FEATURES OF UDIGALA WATERSHED

1.3.1 Location, Extent and Accessibility of the Study Area

Udigala watershed of Chamarajanagar district, Karnataka comes under the semi arid region. It lies between 76° 50' to 77° longitude and 11° 50' to 12° latitude with the geographical areal extent of 152 sq.kms covering 35 villages coming under survey of India toposheet No. 58 A/13 on a scale of 1:50,000. The area covers the villages of Chamarajanagar taluk; all the villages are well connected by better roads.
A southern railway meter gauge line connects the head quarters passing through the eastern part of the study area (Map 1a, 1b).

1.3.2 Climate

The entire area has a semi arid condition. Data from the India meteorological observatory shows mean minimum temperature of 15°C, and a mean maximum temperature of 33°C. The rainy season is from May to October with an annual rainfall 765mm (1901 to 1970), post 1970 rainfall being inconsistent.

1.3.3 Physiography

Udigala watershed is in the Southern maidan region of the four fold division of the physiography of Karnataka. The Biligirirangan hill range forms the western, Gummi- malai the southern, Chamarajanagar in the eastern and Cauvery on the North forms the physiographic limits. The average elevation is 686 m with undulating terrain.

1.3.4 Surface water facility

Rainfall is the only source for surface water bodies and also for groundwater recharge. There are 6 major lakes and 10 minor lakes, majority of them are silted and encroached.

1.3.5 Vegetation and Forest

The area forms an undulating terrain and major and minor hillocks covered with trees of varied types like teak, hone, rosewood, dindiga, eucalyptus and sandal
MAP 1.1b
LOCATION OF STUDY AREA
wood. Local varieties like neem, tamarind, mango, jack and acacia arabica are very common in the area.

1.3.6 Crops

Paddy, Ragi, Jowar, horticultural crops like vegetables, coconuts and flowers are grown in the valley fill regions of the area.

1.3.7 Industries

Sericulture industry forms the basic livelihood of the people of this area, which includes silk worm rearing and silk filatures.

1.4 BRIEF RESUME OF GROUNDWATER INVESTIGATION IN UDIGALA WATERSHED

Not much work has been done in this area related to groundwater investigations. The department of Mines and Geology, Government of Karnataka has published three bulletins giving raw data about rainfall, pumping and recovery test and chemical analysis – S.A. Wajid et al., 1972.

1.5 ORDER OF PRESENTATION

This doctoral thesis is split into eight chapters, the details of which are as follows.

Chapter 1 - Forms introduction and it briefs about the reasons for the choice of this problem and the general features of the watershed.
Chapter 2 - Deals with the geology of the area with an emphasis on the lithological and structural aspects.

Chapter 3 - Deals with the hydrological investigations using the meteorological parameters.

Chapter 4 - Deals with drainage system. The morphometric analysis is done based in linear, areal, and relief aspects. The morphometric details and area is measured by using episometer and planimeter. For relief features, data from the toposheets (1: 50,000) scale is considered and a relief map is prepared.

Chapter 5 - Determination of hydrogeological parameters constitutes the topics of this chapter, where grid deviation, watertable maps, transmissivity and storage coefficient, specific capacity and specific yield is dealt.

Chapter 6 - Deals with the geo physical studies. These studies help to demarcate the groundwater potential zones.

Chapter 7 - A hydrogeochemical aspects of the groundwater is dealt under this chapter where eighteen thematic maps are discussed. Hydrogeochemical model is prepared by using principal component, cluster and land regression analysis.

Chapter 8 - Deals with summary and conclusion. The author has tried sincerely to document the above said chapter in detail supported by computer program, diagrams, thematic maps supported and with bibliography.
The author has attempted to document all the above said details. A large volume of data and the listing of the BASIC computer programs used are shown in appendices, with number of binary diagrams, thematic maps and bibliography for the benefit of readers.