INTRODUCTION

Village information system is a geographical information system based on application which provides detailed information pertaining to demography, infrastructure and natural resources of a village. It displays geo-referenced maps of various resources, infrastructure and demography conditions. India is a developing country with 69% of population residing in rural areas and 31% of population in urban areas. They need a structured planning procedure for development of infrastructural facilities and activities both on urban and rural areas. For planning purposes the basic data at village level is much needed for the development purposes which is influenced by social, economic and population characteristics. There is a need for creation of data base in all districts from village level. These data needs would be fulfilled with proper integration among various data producers and data users and require an efficient GIS based tool which will assist to get updated scenario of the region.

Village studies are one of the most efficient ways to understand the farming systems in rural areas and identify socio-economic and instutional constraints based for the farming community. The information system at village level will help the citizens, planners, academicians and government officers, for decentralized development planning to up grade the socio economic conditions of the village people. Geo informatics has the potential to enrich the rural lives and bring revolutionary changes. It helps to identify disaster prone areas and mapping of infrastructure amenities required for management. The decision support system can help all stages of disaster management such as preparedness, warning, and mitigation. Studies at village level will help to identify the areas with poor infrastructure like
transport, canal networks, education, health, electricity and telecom network. The decision makers along with planners, policy makers and administrators feel helpless while planning natural and socio-economic conditions of a region. In the absence of accurate studies about all kinds of resources available at village level, it is necessary to do mapping of resources from the gross root levels.

Therefore studies from village level will help to solve the complex problems of resource allocation and decision making. With the above said concepts in mind the author has taken Garladinne mandal to study about the village information system of Anantapur district.

**Study area:** Garladinne mandal covers an area of about 304.97 sq km and lies in the Anantapur district of Andhra Pradesh in between $14^0 49'' 14'\text{'}$ to $14^0 57'' 20'\text{'}$ North latitudes and $77^0 35'' 48'\text{'}$ to $77^0 43'' 43'\text{'}$ East longitudes. (Fig1.1) There are 18 revenue villages in Garladinne mandal. The total population of Garladinne mandal is about 53,882 (2011 census). Geologically, it is mainly comprised of Archean rocks consisting of granitic gneisses with dolerite and quartzite intrusions. The annual rainfall is about 568 mm. The annual minimum temperature of $14^0\text{C}$ is noticed in January and the annual maximum temperature of $42^\circ\text{C}$ is noticed in the month of April. Climatologically the mandal is located in dry sub-humid type of climate. NH-44 is major North-South National Highway in India and it connecting Varanasi-Kanyakumari and Broad gauge Railway line connecting Bangalore - Mumbai and Bangalore - Hyderabad pass through the centre of the Garladinne mandal of Anantapur district.
LOCATION MAP OF GARLADINNE MANDAL - ANANTAPUR DISTRICT

Fig:1.1
Objectives: The main objectives of the study are

1. to evaluate the land resources of the Garladinne mandal,
2. to study the water resources and water balance elements of the Garladinne mandal,
3. to map the land use, irrigation and cropping pattern of the Garladinne mandal,
4. to study the human resources of the Garladinne mandal at village level,
5. to bring out levels of village development of the Garladinne mandal,
6. to delineate the watersheds of the Garladinne mandal and study various watersheds development programmes taken up in the watersheds and bring out impact of watershed development programmes in Garladinne mandal,
7. to study Budedu revenue village land and water resources, population, occupation, social-economic conditions, land use, irrigation, cropping pattern, health conditions and infrastructure facilities and
8. to suggest appropriate measures to be adopted for the development of villages in Garladinne mandal.
SATILITE IMAGE OF ANANTAPUR DISTRICT

Fig. 1.3
**Methodology** :- The land resources of the Garladinne mandal are studied using Survey of India toposheets on scale 1:50000 and LISS IV data on scale 1:50000. The relief, slope, drainage, landforms, soils, land use, erosion susceptibility and hydrogeomorphology maps are prepared and superimposed to get the land capability classification.

The surface water resources of the Garladinne mandal are studied from the distribution of monthly, seasonal and annual rainfall of the Garladinne mandal.

The ground water resources are studied from the average ground water level variations collected from 15 controlled wells of the Garladinne mandal over period of ten years (2003-2012) to study the ground water level variations, ground water level fluctuations, change in ground water level, rise and fall in ground water level and assessment of ground water potential at village level adopting rainfall recharge method. The ground water potential map of the Garladinne mandal at village level has been prepared. The recharge of the annual rainfall has been worked out by various methods like Seghals method (1970) Krishna Rao method (1970) Radhakrisna et al method (1974) and US geological method. The average of four methods is taken as recharge of the Garladinne mandal.

The water balance of the Garladinne mandal has been worked out adopting Thornthwaite and Mather (1955) method. The water balance elements at monthly levels are worked out. They are precipitation, potential evapotranspiration, actual evapotranspiration, water deficit, water surplus, moisture adequacy, Aridity Index and Moisture Index. The water balance of the Garladinne mandal has been brought out.
The land use, irrigation, cropping pattern at village level are collected from 18 revenue villages for the year 2010-11 and data has been used to workout concentration, efficiency, intensity, diversification and crop combination of the Garladinne mandal at village level using various methods.

The socio-economic data at village level has been collected during the year 2010-11 about the population, occupation, income, land holdings, health, education and occurrence of crimes, road network and communications. The data is used to bring out levels of development of villages of Garladinne mandal.

The watersheds are delineated based on drainage, altitude, on 1:50000 scale. There are about 11 major and seven micro watersheds. The watershed development programmes taken up in the watersheds are evaluated and impact of the watershed development programmes of Garladinne mandal at each watershed level is described. Prioritization of watersheds has been carried out basing on intensity of soil removal and erosion index.

The Budedu village has been taken as a sample survey to map the land resources, water resources, land use, irrigation, cropping pattern, socio-economic conditions and related to problems. From about 100 households the primary data is collected to study the occupation, education status, infrastructural facilities and problems associated with land, water and socio-economic conditions.

Finally based on land resources, water resources, water balance, land use, irrigation, cropping pattern, socio-economic conditions and watershed development
programmes, the action plan at village level for all 18 revenue villages has been suggested.

**SOURCE OF DATA**

The data pertaining to relief and drainage is collected from survey of India topographic sheets 57 F/5 & 57 F/9. The land systems, landforms, drainage soils, land use, erosion susceptibility hydro geomorphic units are interpreted from IRS IB Geocoded data and LISS-IV data on scale 1:50,000. The data pertaining to rainfall and temperature is collected from Garladinne rain-gauge station. The monthly ground water level data from 15 controlled wells is collected from 2003-2012 from Ground Water Department, Anantapur district. The land use, irrigation, and cropping pattern data for the year 2010-11 is collected at village level from Garladinne mandal office. The data pertaining to population, literacy, religion and occupation has also been collected at village level from Mandal Revenue Office, Garladinne. The number of schools and strength of students in Primary, Upper primary and High schools has been collected from District Educational Office, Anantapur. The data pertaining to health is collected from Garladinne Primary Health Center. The crime data has been taken from Station House Officer of Garladinne mandal. The data pertaining to watershed programs implemented in Garladinne mandal has been collected from DWAMA, (District Water Management Agency) Anantapur. The Primary data and survey has carried out to study the socio-economic conditions and to map resources of Buddedu village of Garladinne mandal.
GOOGLE MAP OF GARLADINNE MANDAL

Fig. 1.4
Review of literature

The literature available is limited because the concept of Village Information system has emerged as an important tool of village and mandal development planning. The review of literature is described from 2000 onwards.

Shahaji Phand et al. (2000) described that rapid development of telecommunications and computer based information technology seems to provide a promising solution for delivering of extension services. It can be utilized effectively to fulfill the information needs through computer based information systems software which have much scope for inclusion of interactivity users control and could become readily accessible at village level agencies. Animal health information system is one such need based, interactive software developed for dairy owners, using various multimedia tools and java language. The field testing of AHIS revealed that it has greater perceived utility and effectiveness in transmitting the information. The study concludes that IT enabled information systems can be utilized for faster dissemination of expert advice in multiple locations by using the infrastructure of grass root level village agencies.

Thomas R Preston (2000) has carried out studies on livestock production from local resources in an integrated farming system through renewable energy from the sun can energy needed to provide food. The sun can also provide the energy needed to produce the food required for a world population expected to double by the year 2050. The challenge is to capture the energy in systems of production and utilization which at the same time will contribute to alleviation of poverty, creation of jobs a more equitable life-style, protection of the environment and increased biodiversity.
Haja Andrianasolo and Jean-Paul Gonzalez (2000) in their studies on the emergence of viral diseases transmitted by vectors conducted that GIS technology plays an important role in health care systems introducing issues in space technology, methodology and science against the emerging viral diseases.

Ramachandran et al. (2001) have studied a Decision Support System (DSS) for local administration in Paramakudi taluk of Ramanathapuram district, Tamil Nadu.

UBUKATA Fumikazu (2001) has studied based on a field survey in two neighboring villages in Khon Kaen province, northeast Thailand. This research examines how recent economic changes have affected the expansion of eucalyptus farm forest, and how differences in the villages arose during the expansion process. Two kinds of analysis: static statistical analysis of the households and historical dynamics of the villages since the 1980s, were conducted. First, it was found that there were three stages of development in these villages: the factor substitution process for land, the factor substitution process for labor, and the process after the economic crisis. Second, differences in planting behavior arose as differences of response to the second stage of development. Both the history of each village and socio-economic attributes of each household affected the response. This indicates that the villagers’ eucalyptus planting was one economic-rational response to the recent changes in the rural economic environments caused by rapid economic growth. Finally, it was also found that recent land transactions, especially after the economic crisis, tend to differentiate the management scale of eucalyptus farm forest. Farm forest management is, thus, entering into another stage.
Lal et al. (2002) have concluded that the information was seldom used for planning of work schedule, prioritization of clients, community needs assessment and the supervisors never used the information as management tool to monitor and evaluate the services and development of health teams at sub centre level.

Shiferaw et al. (2003) have narrated the irrigation investment and ground water depletion in Indian semi-arid village. They have concluded in this study that the number of wells and groundwater abstraction are increasing much faster than what could be sustained through rainwater harvesting and recharging facilities. This has led to the drying up of many wells. The unregulated use and depletion of groundwater is likely to have serious consequences for the poor farmers as their livelihoods will have to depend increasingly on the drought-prone rain fed agriculture.

Adinarayana et al. (2004) in their studies on Village level information system (VLIS) of tribal oriented and rural based Thane district in Maharashtra state have concluded that the development of a digital base map as basic spatial infrastructure for a range of GIS rural applications. It is very difficult to achieve in the short to medium term. The main limitations are a lack of appreciation of what GIS can and cannot do, lack of resources and trained personnel, inefficient bureaucratic processes, lack of data, and lack of hardware and software vendor support. In addition, it is suggested that small to medium scale GIS projects are the best option to introduce the GIS concept in the districts, to gain acceptance of the technology. In this regard, high resolution satellite imagery offers an opportunity to obtain the basic spatial data infrastructure or digital map base required to support small to medium scale rural GIS in future. VLIS could have direct application in the districts, even though personnel, institutional and financial issues will continue to constrain adoption.
Shukla and Goel (2004) have tried to present the GIS coupled strategy to support the health services in the rural areas. The NRIS data is made use of as a main data source. The disease taken as an example is malaria. The application is intended to predict the risk zones and spatial coherency of the regions for transmitting the disease in general. A spatial model combined with empirical analysis is proposed to present the general potential of a region for the disease occurrence so that advance health decision could be made to handle the situation aptly.

Amaresh, Singh and Ravi Prakash (2004) have studied that the remote sensing and geo-electrical data combined with Geographical Information System (GIS) technique has proved to be very efficient in assessing the groundwater potential of any area. In the present paper, IRS 1C, LISS III data, geo-electrical data and litho-log data have been used to identify the groundwater potential zones by integrating various thematic maps generated on 1: 50,000 scale. These maps are integrated after assigning weight factors to the identified features in each thematic map depending upon their infiltration characteristics and the groundwater potential zones in Nagar block of Mirzapur district, Uttar Pradesh are demarcated. The area of investigation has been classified into eight categories of groundwater potentiality. The present results show that integration of all attributes provides more accurate results in identification of groundwater potential zones.

Ravindranath and Subrata Singh (2005) discusses about participatory Geographic Information System (GIS) with community forest management groups in India and the importance of 'putting people before technology' in order to make GIS a truly participatory process in landscape management.
Banik et al. (2006) have studied the natural resource inventory of Luppi village, for sustainable development. Based on the study, it can be concluded that priority should be given to long term strategies encompassing silviculture or silvi-pastoral system (cultivation of trees and pasture simultaneously) on upland, cultivation of short-duration, flash-flood tolerant, high-yielding rice variety for Aman (wet) season, and cold-tolerant rice variety for winter season in low land areas; social forestry in degraded land; agro-ecologically suited cropping systems with suitable variety choice for problem areas; and judicious nutrient management in homestead gardens that is ecologically suitable, socio-economically acceptable, technologically sound, and environmentally sustainable.

A.K. Singh and Roheet Bhatnagar (2006) have monitored the rain water harvesting structures in the Bariyatu region of Jumar basin in Ranchi district using remote sensing. They have concluded that the remote sensing are presently being used for solving problems like degradation of land, by water logging, soil erosion, contamination of surface and ground resources, changes in ecological parameter and many more. Watershed approach for optimum planning, development and management aims at harvesting all natural resources for sustainable development and better living.

Jayteerth Deshpande and Sushim Bhiwapurkar (2006) have analyzed accidents of Shivaji Nagar, Pune in the year 2004 and concluded that a total of 2001 accidents occurred of which 348 were fatal, 278 were serious and 1383 were minor; claiming about 400 lives. The advancements in IT and technologies like GIS and GPS can be put to effective use in analysis. The objective of this project is to centralize the traffic data and other related data on a GIS platform. This has been done for Shivaji Nagar
area of Pune city using ArcGIS 9. The data has been obtained from Pune Municipal Corporation and Pune Traffic Control Division. The accident records were obtained and analyzed to find out the accident prone spots of the area and to suggest short term and immediate measures to reduce road accidents. Thus GIS will offer a platform to Pune Municipal Corporation and Pune Police Department to maintain and update accident record-database and use it for further analysis and planning.

**Sreedhar Reddy** and **Pratap (2006)** have adopted an integrated remote sensing and GIS based methodology for identifying the suitable sites for artificial recharge structures and water harvesting structures in the chosen study area located in the Jangaon and the Lingala Ghanpur mandals of Warangal District, Andhra Pradesh, India.

**Williamson (2007)** has stated that cadastral systems in developing countries are important for policy makers in implementation of decisions.

**Tobias Kuemmerle et al. (2008)** used Landsat TM/ETM+ images to classify land cover maps and assess landscape pattern changes from 1990 to 2005 in Arges County, Southern Romania. Cropland abandonment was the most widespread change (21.1% abandonment rate), likely due to declining returns from farming, tenure insecurity, and demographic developments during transition. Forest cover and forest fragmentation remained remarkably stable during transition, despite widespread ownership transfers. Cropland abandonment provides opportunities for increased carbon sequestration, but threatens cultural landscapes and biodiversity. Continued monitoring is important for assessing whether abandoned croplands will eventually
reforest or be put back into production and to better understand the consequences of post-socialist land use change for ecosystems and biodiversity.

**P. Sangameswaran (2008)** has discussed about the vision of an ‘ideal village’ is used in the construction of feelings of community in a watershed development project in India. He has concluded that the successful working of shramdaan and watershed-plus measures have re-enforced the notion of idealness, brought people together for the watershed development project and, also, constructed a community which has lasted beyond the duration of the project itself.

**Graves (2008)** in his studies on integrative literature reviewed and demonstrated the use of GIS to investigate various aspects of healthcare access and health outcomes, including environmental variables of Lyme disease, socio demographic variables and teen pregnancy, geographical disparities in breast cancer mortality by racial groups, PCP and AIDS prevalence, and factors of a leptospirosis disease outbreak. The literature reviewed shows effective integration and analysis of health data using GIS technology.

**Kursat Demiryurek et al. (2008)** have analyzed the agricultural information systems and communication network used by members and non-members of the Dairy Cattle Breeders' Association provided a framework to identify the strength and weaknesses of the current systems and led to recommendations to improve their performance. They concluded that the lack of information support from the institutional sources resulted in the development of personal information sources to exchange information and diffuse technology among the farmers themselves. We recommend that more functional cooperation between public and private information sources in the system.
is needed to motivate conventional dairy farmers to convert into modern dairy farming system.

**Diepart (2008)** presents a spatial planning initiative that is being undertaken in a province of Cambodia. The paper first reviews the current institutional context underlying the initiative. Then it addresses the objectives and scope of the proposed spatial planning framework. It further details the methodology and key outputs of the planning processes. It concludes on the conditions that need to be met to put the spatial planning framework into action.

**Sundar vadan (2008)** has studied the village information system and model action plan for sustainable development of Wanaparthy Mandal of Mahabubnagar district using remote sensing and GIS techniques. Based on resource utilization, the villages are categorized into low, medium and high categories. About eight villages are fall under low category where ground water prospects are low, six villages fall under medium category where ground water prospects moderate to good and five villages fall under high category where ground water prospects are good.

**Gopal et al. (2009)** have studied of water supply & sanitation practices in India using geographic information systems. The water in the village was found to be microbiologically unfit for consumption. Analysis using direct observations supplemented by GIS maps revealed poor planning, poor engineering design and lack of policing of the water distribution system causing possible contamination of drinking water from sewage at multiple sites. Until appropriate engineering designs for water supply and sewage disposal to suit individual village needs are made available, point-of-use water disinfection methods could serve as an interim solution.
Harpinder Singh et al. (2009) have demonstrated the advantages of geoinformatics as a decision support system for local state administration.

H.R Yadav (2009) has carried out under the aegis of Natural Resource Data Management System (NRDMS) programme, attempts to address a wide range of issues concerning village development planning in India, with special reference to the Pratapgarh district in Uttar Pradesh. He made an attempt to describe the natural and human resources of the district as well as its economic and infrastructural indicators. It also makes a comprehensive study of the village level planning in Mangaura block. He analyses the impact of various rural development programmes being implemented at village and block levels.

Rejith et al. (2009) has determined the ground water quality index of highland village of Kerala using GIS technique. They have conducted that the maintenance of water quality at acceptable levels is an essential requirement for successful use of these water resources.

Gurjal et al. (2009) have conducted surveys to study the feeding practices of goats adopted by the farmers of Mewar region of southern Rajasthan. Information was collected from 360 farmers of Mewar region belonging to Udaipur, Rajasamand, Chittorgarh and Bhilwara districts.

Sundar kumar et al. (2010) have estimated the ground water quality of Rajam Mandal which is located on the east coast of Srikakulam district of Andhra Pradesh, India. The analysis suggests that the groundwater of the area needs some degree of treatment before consumption. The study helps us to understand the quality of the
water as well as to develop suitable management practices to protect the ground water resources.

Nahed-Toral et al. (2010) have carried out a participatory research and development project in establishment of agro silvopastoral systems was documented. This study was carried out in the village Tierra Nueva (TN), located in the Buffer zone of the El Ocote Biosphere Reserve (EOBIRE) in the state of Chiapas, Mexico. This zone is part of the area of influence of the Mesoamerican Biological Corridor in Mexico (MBCM). A variety of methods related to agro forestry were used, along with the Farmer Field Schools Methodology by which producers may develop new aptitudes and knowledge regarding cattle raising and conservation. The bovine production system and productive diversification of cattle raising units were analyzed. Grazing units are characterized and their carrying capacity estimated. Chemical-nutritional composition and ruminal degradation of foliage is characterized for woody fodder species. Finally, the experience is projected to the future in order to strengthen local innovation processes.

Priyesh Tiwari (2010) has described a healthcare delivery model based on mobile technology as an information transmission tool between rural patients and centrally located providers, using trained intermediaries as local facilitators, entrepreneurs and health activists.

Praveen kumar rai et al. (2010) stated that Village information system is a comprehensive and detailed study of villages at the core level and it provides complete information for decision - making based on their existing resources and capabilities. The information would range from facilities present in the village the infrastructural quality within it. A comparative analysis has been carried out in the
villages that have been taken into consideration, namely Bhopalpur, Tikri khurd, Nandapur villages, which is a part of Pindra Block of Varanasi district covering an area of about 1.68 sq.km. An attempt has been made to study the present status of water resources, land resources, soil fertility and cropping pattern etc. to prepare the digital thematic maps namely, land use, house type, source of water resources and occupational structure etc. on Arc GIS platform using high resolution IKONOS data (year 2007) in conjunction with SOI topographical map (year 1972) and field. Population data, occupation data and household level data are collected by both primary and secondary data collection methods and after information are very useful for to create better infrastructure at the village levels.

Asadi et al. (2010) have studied the “land use/land cover mapping and change detection studies around the Hyderabad International Airport”. The studies involve identifying the current land use pattern and changes occurred over a period due to the urbanisation by adopting satellite remote sensing technologies and GIS tools. IRS-1D, LISS-III geocoded data of 2000 and IRS-P6, LISS-IV geocoded data of 2008 Satellite data and toposheets from Survey of India (SOI) are acquired as primary and secondary data for analysis.

Tafaji et al. (2011) have described the use of GIS technology to assisting local Government on the sustainable management of land resources. The study not only provided the basic spatial database in communal level, but also evaluated the soil and land suitability, land use, land use changes and agricultural land urbanization. He has concluded that the present contribution is an example of the system to be applied at communal, scale in consideration of the systematic catalogue of Albania’s agricultural land quality, land potential and land use, very effective in different applications in the
land use policy and land use planning. GIS facility should serve as an assistance tool to Albanian Government. Individual government department’s usually hold only narrow collections of data that serve for their own highly specific operations.

**Jabir Ali (2011)** has analyzed the use of information and communication technology (ICT) enabled services for livestock information delivery based on primary survey of 342 livestock farmers in eight districts of Uttar Pradesh. The differences in quality of decisions on various livestock practices, between users and non-users of ICT driven information system have been assessed using analysis of variance (ANOVA) technique. Results indicate that ICT users are making significantly better quality decisions as compared to non-users.

**Anil Kumar et al. (2011)** have studied the Kanga Yam grassland in tropical region of south India and concluded that the grazing lands are cultivated every 4 to 5 years and Sorghum is sown and made into hay for animal feeding between March and June. In several places, the Cenchrus dominated grassland is also sown with legumes like Phaseolus trilobus to improve the quality of forage. Security of land tenure coupled with technological interventions has sustained the productive capacity of the grassland for over a century. The grassland also has a stable human population and healthy female to male ratio. It offers a model for replication elsewhere under similar low rainfall conditions.

**Kamat (2011)** has described the importance of village tourism in Goa. The study provides a shifting perceptive of Goa’s image. It also involves a critical diagnosis of the village centric tourism providing some valuables insights. It highlights the need for the industry to shift from beach centric approach to village/rural centric approach.
Asadi et al. (2011) have aimed to prepare the micro level planning for sustainable development of Singarayakonda mandal of Prakasam district in this digital thematic maps has prepared namely, land use/land cover, hydro-geomorphology, slope, physiography, soil, geology, drainage etc. using satellite imageries on ARC/INFO GIS platform. This constitutes the spatial database and to create information system for mandal development. The mandal taken for the study is Singarayakonda of Prakasam district. The present study resulted in information system for mandal level planning with a scope to develop the mandal further by providing the information necessary about the mandal. This system is user friendly and many decisions can be made by the user according to his choice. The Decision Support System developed here can further serve as a replica to other mandals.

Surjit (2011) has discussed the changes in agricultural production conditions over the last nine decades in Palakurichi village. The village is in the Thanjavur region of the Cauvery delta. He has concluded that in this most recent period, deterioration in irrigation water availability has restricted rice cultivation to a single-crop, direct-sown system, characterized by yields that have fallen to pre-green-revolution levels.

Merritt et al. (2011) aimed to develop a holistic understanding of the impacts of Watersheds on biophysical, social and economic systems. An integrated model is being developed that will incorporate crop production water use and hydrological (surface water and groundwater) models in addition to knowledge gained from extensive household surveys in villages in two case study catchments. The household surveys were developed based on discussions with NGOs working with the rural communities in Andhra Pradesh and are being used to examine economic and social
outcomes (positive and negative) of WD for households. Measures of equity and resilience are being developed to measure differences in outcomes between villages (e.g. upstream, downstream) and within villages (e.g. income groups, gender, land ownership, etc).

**Asadi et al. (2011)** have proposed to develop Village Information System (VIS) and model action plan for sustainable development of Vetaplem Mandal of Prakasam District in Andhra Pradesh Using geospatial technologies. VIS for Village level planning with a scope to develop the villages by providing the information necessary about the village. This system is user friendly and many decisions can be taken for natural Resources management.

**Fadil et al. (2011)** have developed a model for Bouregreg watershed, located in north central of Morocco, is to set up and calibrate the adapted model in order to simulate the functioning of the entire basin and therefore predict its response to phenomena and risks it confronts such as erosion, inundations, drought, pollution etc. Especially the purpose is to estimate the volume inflow to the dam of Sidi Mohamed Ben Abdellah (SMBA) located at the outlet of the Bouregre watershed in order to develop an efficient decision frame work to facilitate, plan and asses the management of this important reservoir. Indeed SMBA dam has a crucial role because it is the source of fresh water of about six millions of people living in the axe between Rabt and Casablanca.
Hagadoost et al. (2011) have studied to check the feasibility of using geographical information system (GIS) methods in a village-based ecological study in Bardsir- a district in Kerman Province located nearly to the central part of Iran. Data of human brucellosis, socio-economic level, and livestock characteristics (2001-3) were linked by using GIS methods. They have concluded that they could generate informative risk maps of brucellosis using health and veterinary data which might improve the quality of control programme in Iran.

Sitendar et al. (2012) have studied data related to different aspects like population and household size, land use, type of housing, electricity, telephone facility, sanitation facility, vehicles, water facility, accessibility to water and occupation of the households is collected during field survey. This information is integrated with large scale base map and has been used to develop an information system in HTML environment. The online access to the information will be useful to assess the status of infrastructure facilities and social characteristics of Muklan village.

Ravindran and Jaishankar (2012) described the natural resources, socio-economic data, land resources and soil information of Narayana puram village, Annur block Coimbatore district of Tamil Nadu.

Ahmad Shah (2012) has demonstrated spatial analysis of agricultural land use changes at micro-level in Kashmir valley in village Wanpora with help of Geographic Information System (GIS). Cadastral map of the village was registered in GIS software MapInfo in order to georeferenced it. The boundary of each plot of land was digitized and subsequently land use data of two periods i.e. 1990 and 2010 were
added to the base map inorder to understand directions and magnitude of land use changes over the period of time. A comparison of general Land use in 1990 and 2010 shows a remarkable increase in net sown area from 325.41 acres to 484.62 acres or about 28 percent of the total area of the village. The analysis of land use in Kharif 1990 and 2010 reveals that saffron cultivation which was introduced during 1980 on trial bases and covered just 0.77 percent of net cropped area and increased to 38.32 percent of net cropped land during 2010. The area under Saffron cultivation increased from mere 2.5 acres in 1990 to 187.5 acres in 2010 and therefore registered a +7330% growth rate.

**Kodge and Hire math (2012)** have designed a system for extracting geo-spatial information content from spatial database and practical issues during development.

**Mehatha (2012)** has studied the factors that influence quality and school effectiveness which is followed by a brief description on examination results as an instrument of school improvement and role of different actors in monitoring school functioning. In the last part, need of Local-level Information System (LIS) is discussed which highlights major issues and concerns in developing a LIS.

**Zhou et al. (2012)** have analyzed the differences of crop water consumption (evapotranspiration-ET), irrigation amount, soil water and water use efficiency (WUE) of winter wheat, summer maize and cotton which are the main crops in the irrigation district. This paper improved calculating methods of the capillary rise and percolation of the established model. The model was then applied to the upper, middle and lower reaches of the irrigation district.
**Suresh and Ramesh (2012)** have conducted a village level study in district Karnal to assess the changing land use and cropping pattern. The farmers prefer rice-wheat cropping pattern. This has surpassed the other crops in terms of area, production and productivity but the land of this part is now cultivated for various purposes such as vegetables, pulses, fodder and staple food in order to get a maximum return from per unit area.

**Senthil Kumar and Sheriff (2012)** performed a study for determining the information needs of different communities and designing system for linking the groups to relevant information and training resources ultimately to enable rural people to have information access for rural development.

**Omran et al. (2012)** developed a methodology to improve land use mapping accuracy for the Ismailia Governance, Egypt and to spatially and temporarily map land use change patterns in the Ismailia over the period of time 27 years.

**H.R.Yadav (2013)** has published a book on Village Information System through innovation of the Natural Infrastructure at Village Panchayat Level in Amethi. Attempt has been made to study Natural Infrastructure including Soil, Climate, Water Resources, Forest Land Use, Wastelands, Land Capability and Agro-Afforestation, Infrastructural Resources at Village Panchayat level based on Village Khasara Maps and fieldwork in Amethi.

Implementation of various rural development and health programmes are discussed in
detail in this book.

**According to special correspondent of the Hindu newspaper dated March, 19,
2013** farm ponds quench the thirst for jobs and help in recharging ground water and
felicitate fish farming under MNREGS programme. Farm ponds are being dug
throughout Thanjavur district under the Mahatma Gandhi Rural Employment
Guarantee Scheme (MGNREGS). Besides providing livelihood to a large number of
people by way of employment, the ponds, when completed, will recharge
groundwater, irrigate agricultural land, and help in taking up agriculture and allied
activities such as fishing. Twenty four persons were employed to build a farm pond of
30 metres x 28 metres at Gopalapuram in Marunkulam panchayat in Thanjavur block
on Saturday. The workers had been given a mandate to dig up to a depth of about five
feet. They were paid wages based on their work.

In the present study an attempt is made to describe the land and water
resources, water balance, land use, irrigation, cropping pattern and human resources
for planning and development of Garladinne mandal.

**Organization of thesis**

The thesis is divided into nine chapters.

The first chapter deals with introduction, study area, objectives, methodology
review of literature and organization of the thesis
The second chapter contains the evaluation of land resources of the Garladinne mandal using remote sensing data.

In the third chapter the water resources and water balance elements, recharge, and water balance of the Garladinne mandal is worked out.

The fourth chapter contains the study on land use, irrigation and cropping pattern of the Garladinne mandal.

The fifth chapter deals with human resources of the Garladinne mandal.

The study on the watershed deliniation, prioritization watershed development programmes and impact are discussed in the six chapter.

A detailed study of Budedu village has been presented in the seventh chapter.

The chapter eight deals with the action plan to be taken at village level for the development of villages of Garladinne mandal and

In the ninth chapter the summary and conclusions of the study are described.