

# CREATION OF INTEGRATED RURAL DEVELOPMENT INFORMATION SYSTEM USING REMOTE SENSING AND GIS - A MODAL STUDY ON PRAKASAM DISTRICT, A.P

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## ABSTRACT

The present study deals with application of Information Technology for Integrating Rural development by preparing a model for Prakasam district. This study considers the modal study area as Racherla Mandal in Markapur division in Prakasam district. The study aimed to prepare a web design for evaluating all the rural developmental factors suggested by the Ministry of Rural Development, Government of India such as land, water, crop/agricultural, and socio-economical conditions of the study area. To evaluate the above the study uses the remote sensing and GIS techniques on watershed basis.

This application works like a collaboration tool for exploring data resources using other technology (GIS) and helps to define the needs of rural areas and allows to make communicate with remote user. This project deals with the design of database of Prakasam district on such as irrigation, population, agriculture, weather, and other details up to mandal level. Each mandal has the above details and access to their revenue division, district, state along with other mandals in the district. Each division has the mandal wise details of the above and access to the respected district, state, all mandals in that division, along with the other divisions in that district. Each district (modal as Prakasam) has the division, district wise details along with the access to the all divisions, mandals, other districts in that state.

The application used for the management of RACHERLA WATERSHED of Prakasam district, with an emphasis to integrate the development of the action plans for land and water resources for its sustainability. It also deals with the crop water resources in Racherla mandal along with the socio-economical conditions of the people. The results of estimated crop water requirements for main crops are analyzed. The action plans, information about the mandal in all aspects are collected and represented as web design for Internet for the benefit of planners, administrators, and end users. Such computerized action plans can be used by decision makers who are involved in developing and managing watersheds with proper environmental protection for the upliftment of Socio-economic conditions in rural areas.

**Keywords:** Rural development, Remote sensing, GIS, water resources

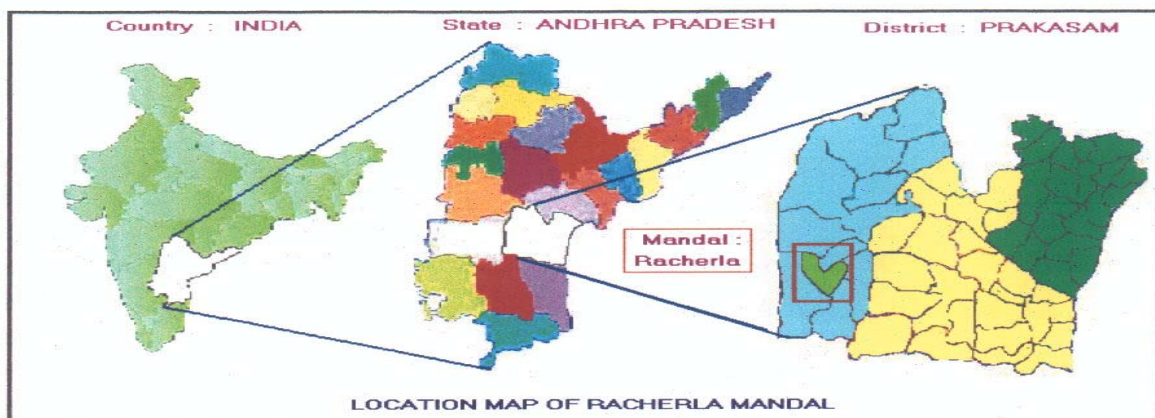
## INTRODUCTION

“The development of India lies in the development of villages”, said by M. K. Gandhi, the father of nation. This enough shows the target of any development is towards rural. The development in rural areas must be followed with the agricultural development. According to the guidelines given by Ministry of Rural development, Government of India, the integrated approach for sustainable development of rural area lies in the development of land, water, and crop/agriculture with a view of social economic conditions. To evaluate all the rural development factors as said above, the study uses the remote sensing and GIS techniques on watershed basis. So the Government of India planned for utilizing all the natural resources with integrating all the developmental tools such as information technology because Information Technology is act as a collaboration tool for exploring data resources using other technology like GIS and helps to define the needs of rural people.

The Government of Andhra Pradesh took a forward step in this regard by correlate all the developmental activities with information technology by computerizing them in a view of making the state as SWARNANDHRA PRADESH. In order to keep the traditional name of ANNAPOORNA, rural development and agricultural related sectors also must be come under computerization. In this regard this project is viewed. For any developmental activist proper planning and management of the watershed is a must. The concluding session of International Conference on Water Resources conducted by International Water Resources Association (IWRA) at University of Illinois, Chicago, USA revealed that the developmental program would be implemented “On the basis of the watershed boundaries instead of political boundaries of the area”.

A watershed is an area from which runoff resulting from precipitation flows past a single point (outlet) in to a large stream, river, lake or ocean. Water shed management is the process of formulation and carrying out a course of action involving modification of the natural system of watershed to achieve specified objectives such as management of water, land vegetative resources for optimum production with minimum hazard to natural resources. RS & GIS techniques which are quick and accurate are being effectively used in recent times as tools for water shed management.

Keeping the above view the study is carried out in **RACHERLA WATERSHED** as this mandal is drought prone area, and the area mainly depend upon rainfall for agriculture. The concentrated study area is Racherla mandal in Prakasam district, which fall under semi-arid zone in peninsular India, with scanty and erratic rainfall. These areas have been identified as chronically drought affected areas in the state. In this area the agro-ecological situation is characterized by single crop systems due to predominantly rainfed cultivation with low and erratic rainfall. The total geographical area of Racherla mandal is 670.80 Sq. km. The Racherla watershed lies between Northern latitude 15°20' to 15°40' and Eastern longitude 78°50' to 78°5' with covering an area of 421.8 Sq. km which falls in 57I/14, 57I/15, 57M/2 and 57M/3 topographical maps of Survey Of India on 1:50,000 scale. The study area has shown 3 prominent physiographic divisions based on diversity in relief and topography are structural hills, plains and valleys. The climate of the study area experiences as dry, tropical semi-arid type with hot summer during March to May followed by southwest monsoon from June to September. October to December constitute the northeast monsoon and the winter season is from January and February. Mild winter, low rainfall and severe summer are general characters of the seasons. The average rainfall recorded in the area is 101.01c.m. As there are no major reservoirs and good management technique in tapping the water, the rainfall goes as surface runoff causing floods during rainy days. The average maximum temperature of the area ranges from 29.82<sup>0</sup>c in winter to 39.66<sup>0</sup>c in summer. The drainage of the study area is mainly under sub-parallel to sub-dendritic pattern. On the whole the drainage pattern is sub-dendritic. However, other types of trellis, angulate, radial, dichotomous etc are present within it. Most of the stream courses are controlled by geologic structure. The soils in the study area are broadly two varieties. They are black soils and red soils scattered all over the area. Red soils are more predominant than the black soils in the area.



**METHODOLOGY**

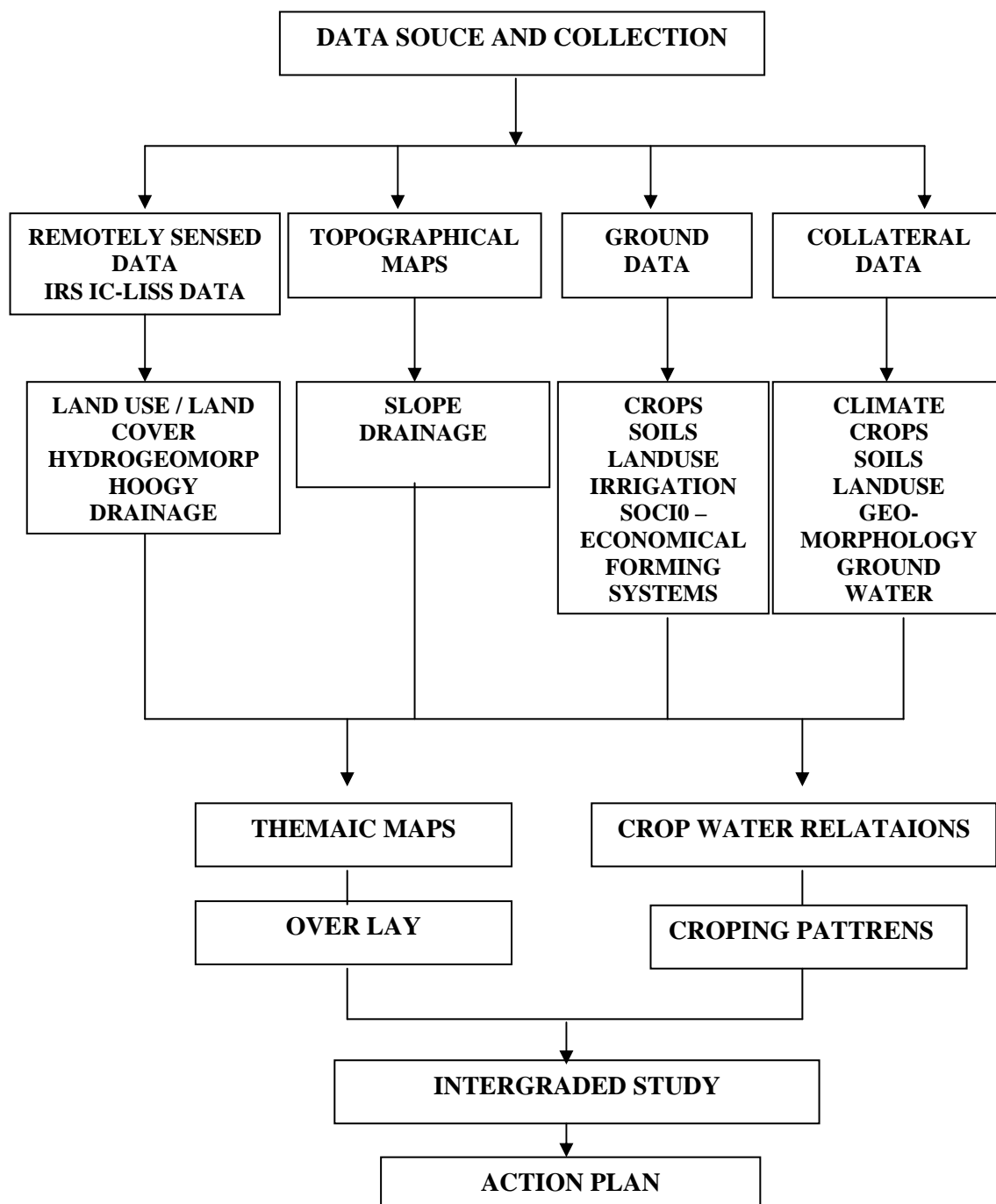


Fig : Methodology for Watershed Management in Rural development.

**METHODOLOGY**

This project deals with the preparation of a web design for Internet accessing which can be easily accessible and user friendly for entire Prakasam district which deals with the design of database of that district on such as irrigation, population, agriculture, weather, watershed and other details up to mandal level. Each mandal has the above details and access to their revenue division, district, state along with other mandals in the district. Each division has the mandal wise, division wise details of the above and access to the respected district, state, all mandals in that division, mandal details in that district, along with the other divisions in that district.

Each district (model as Prakasam) has the division, district wise details along with the access to all divisions, mandals in that district and other districts in the state. The model study area in this project is Racherla watershed in the Racherla mandal, Markapur division, Prakasam district.

The approach used for evaluation of rural development factors as said above are with remote sensing and GIS techniques. Interpretation of Land use/ land cover map for evaluating land utilization, Hydrogeomorphology map for ground prospects, slope map for terrain properties and drainage map for drainage characteristics of watershed which are prepared with the help of satellite imagery and toposheets. To get the accurate ground control, deletions of certain features like road network, water bodies, canals, settlements etc., on the toposheets are used for exact matching with those on the satellite imagery, this led to the preparation of base map. Drainage, slope, maps are prepared from the toposheets and land use / land cover, hydrogeomorphology maps are prepared with satellite imagery and toposheets.

Action plans for land and water (including ground water) resources development are interpreted from the land, water, ground water development maps which are prepared by overlying the thematic maps. Ground Water Prospects map is generated by overlying the Hydrogeomorphology and slope map. Similarly, Land resources map is generated with land use / land cover, slope maps and Water resources development map is generated using slope and drainage maps.

To evaluate the crop/agriculture, by studying the existing cropping patterns and the available water resources in the study area with a view of available natural resources using above study for the extraction of feasibility condition for its development. Depending on the soils, climate, local practices by the people, socio-economic conditions of the people and also keeping in view of long term market prospects, cropping patterns are determined based on crop water requirement in view of water availability. To compute the crop water requirement by analyzing the meteorological data to optimize irrigation water requirement in order to use existing water for effective irrigation production. Suitable cropping patterns for a command area are recommended with the help of the above study.

## CONCLUSIONS

From the analysis of the results the following conclusions are drawn.

Based on the study from the thematic maps,

1. The Land use / Land cover categories found in the watershed are 42.176% area under Kharif Unirrigated. The Double crop area is 8.38%. The area under Land With and With Out Scrub are 16.07% and 8.52%. The area under Fallow, Deciduous Forest, Barren Sheet Rock and Structural Hill are 0.377%, 2.506%, 2.573% and 17.63%. The Land use/ Land cover information can be further useful for integration with other Mapbase information and analysis.
2. In Hydrogeomorphology map most of the area is covered by Structural Hills and these areas are not favorable for Ground water development and many of these areas show Gully erosion where suitable erosion protection measures has to be under taken for better research conditions.
3. Drainage pattern of watershed on a whole is dendritic , however other types like sub-dendritic, trellis, angular, radial, dichotom etc. are present within it.
4. The Racherla Watershed area has 56% nearly Leveled, 25% Very Steep Slope and fall under Gently Sloping is about 7% and 5% under Moderately Sloping. From the above statistics it is necessary that the area under very steep, Gentle and Moderately sloping require measures to restrict the siltation.

Overlying the above thematic maps in Arc/Info the Ground Water Prospects map, Land and water development maps are generated.

5. In Ground water prospect map there are five categories among which area under excellent fall under Bjada, Valley Fill, Pediplain Moderate were generally excepted to get more Ground water potential zones.
6. The land and water resources development are generally classified on the base of the slope, Hydrogeomorphological maps, the developmental activities suggested for land resources are Afforestation are suggested in hilly terrain areas, Silviculture, Afforestation + Contour Bunding, Fodder + Silviculture, and Fuel Wood.
7. The developmental activities suggested for water resources development are Check Dam, Percolation Tanks.
8. It is concluded that to select crops with different maturity periods to utilize the available water as the CWR demand depends on the growing stages of crop.

All the above conclusions which are drawn from the project report are suggested for better rural developmental activities with environmentally balanced protection. The same works is preferred for all the rural areas and manage it by monitoring them regularly for the rural development.

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INTERACTION WITH PROJECT

Fig: Home page of Andhra Pradesh State.

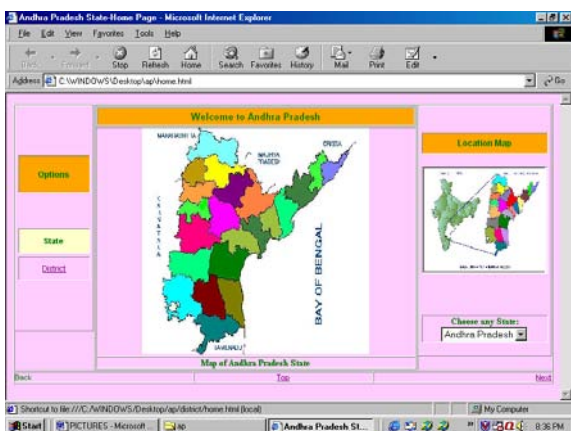


Fig: District details of Andhra Pradesh State.

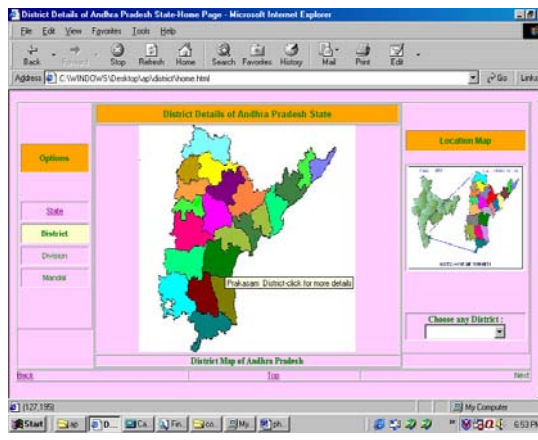


Fig: Home page of Prakasam District.

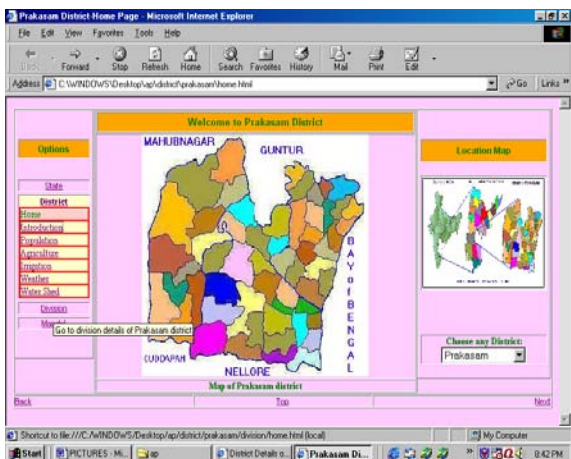


Fig: Introduction details of Praksam District

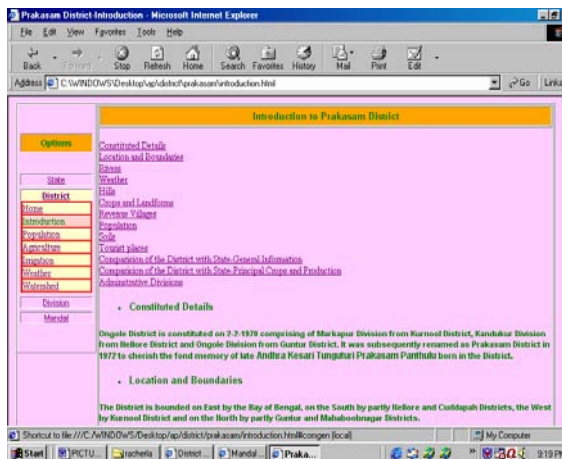


Fig: Divisional details of Prakasam District.

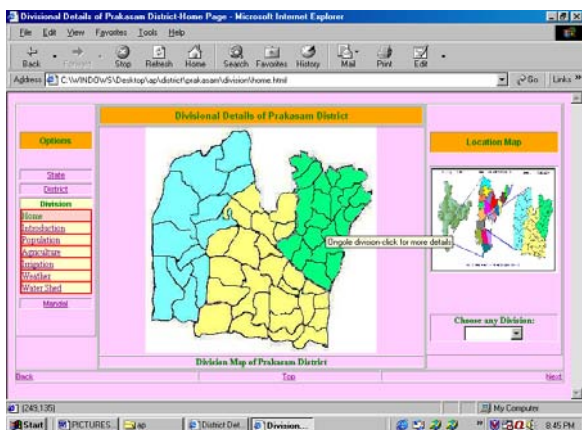


Fig: Division wise Agricultural details of Prakasam District.

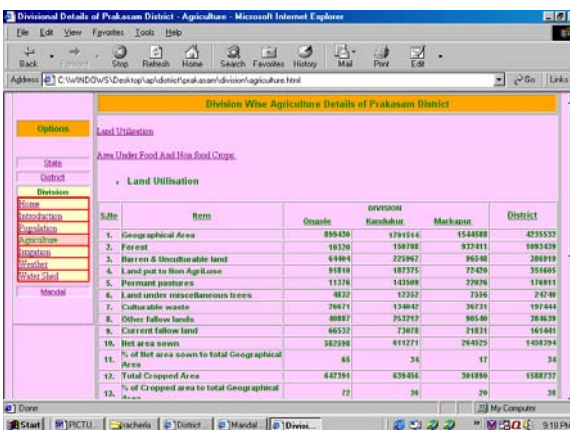


Fig: Home page of Ongole Division.

Fig: Introduction to Ongole division.

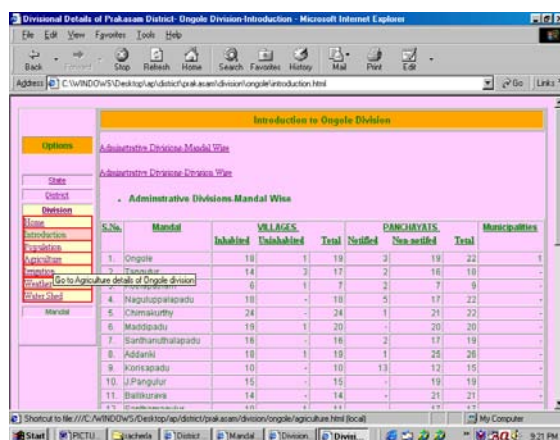
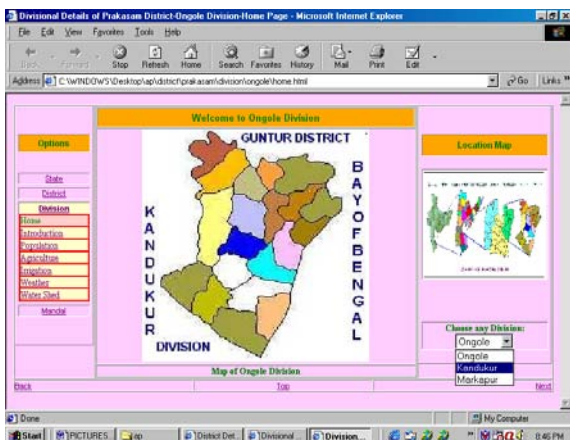


Fig: Irrigation details of Markapur Division.

Fig: Population details of Kandukur Division.

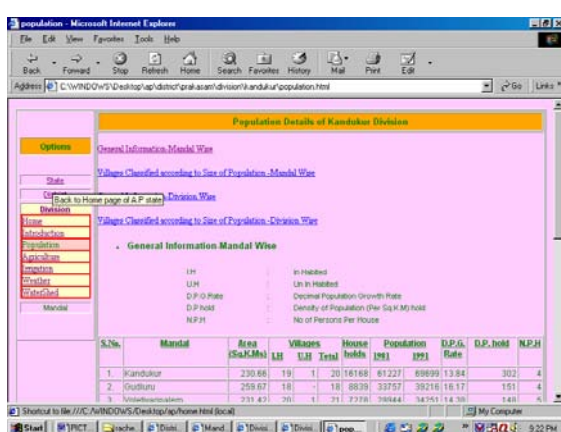
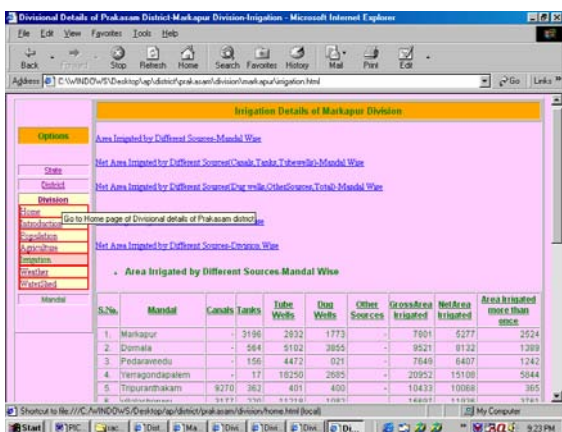


Fig: Mandal details of Prakasam District.

Fig: Home page of Kandukur Mandal allows to travel to Racherla Mandal

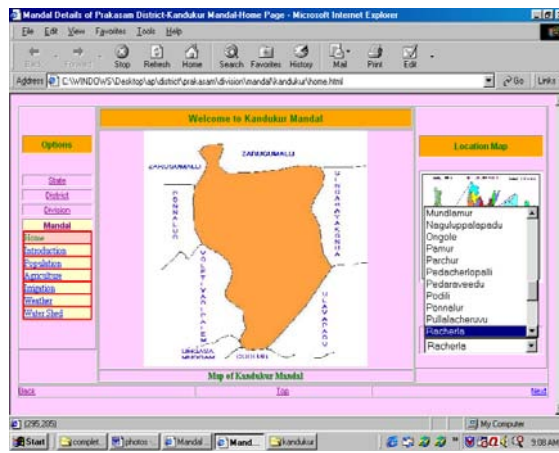
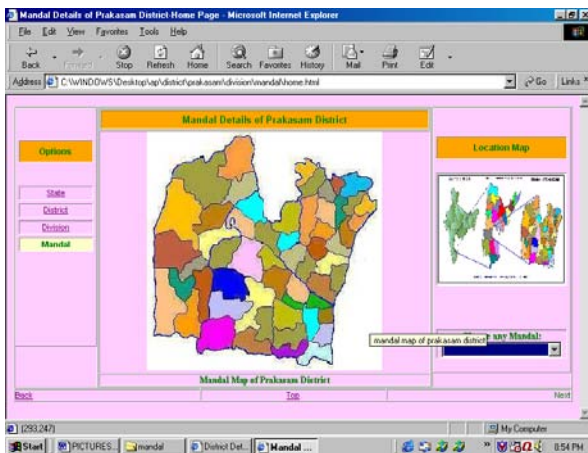


Fig: Home page of Racherla Mandal.

Fig: Population details of Racherla Mandal.

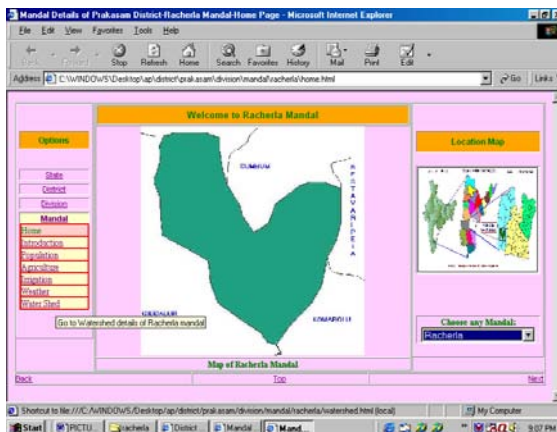
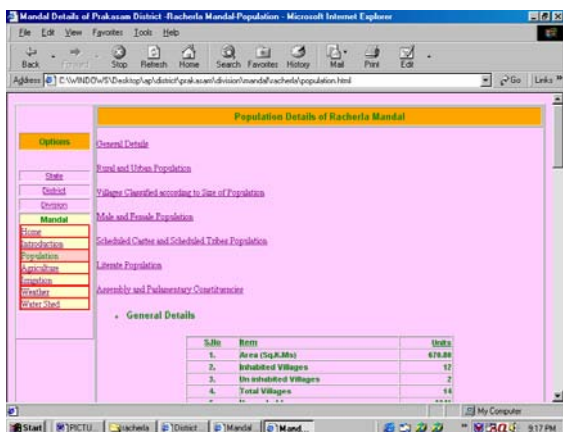


Fig: Water Shed details of Racherla Mandal. Fig: Generating new window with remote sensing information.

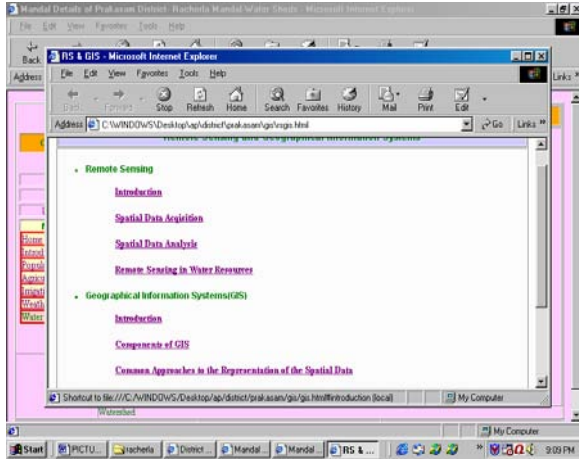
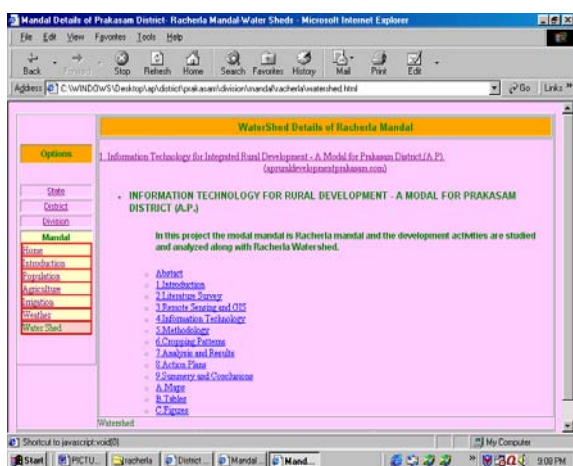


Fig: Generating new window with GIS

Fig: Location Map of Racherla Watershed. information

