Remote Sensing for Land use Land cover change Management- A case study of Ghatkesar Mandal, Ranga Reddy District

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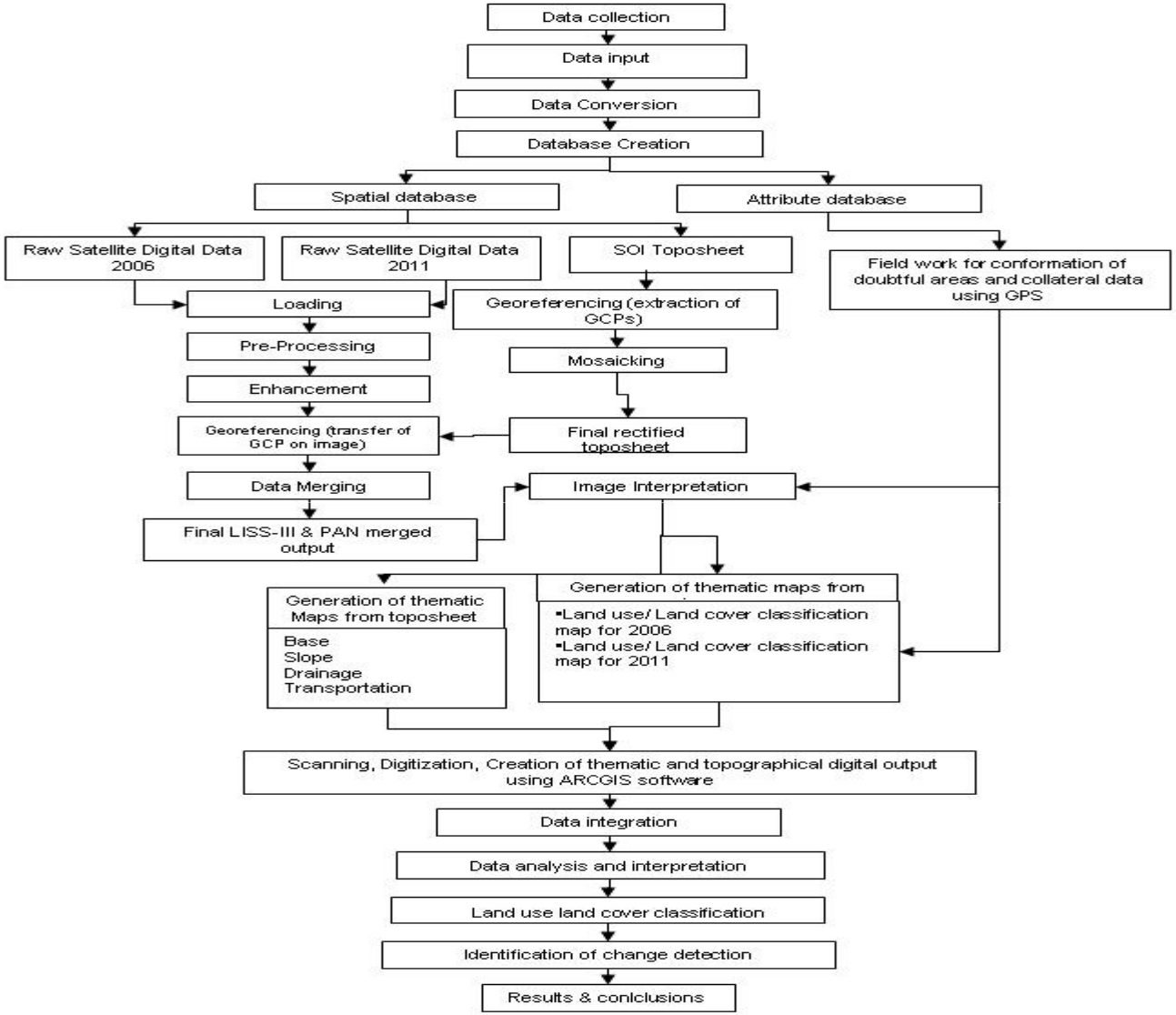
STUDY OBJECTIVES

- The study area is Ghatkesar Mandal which is under Ranga Reddy District of Hyderabad.
- Land use/land cover mapping using 2006 and 2011 satellite data.
- To analyze the nature and extent of Land use/land cover changes of the study area

Study Area

- The District is located in the Central Part of the Deccan Plateau and lies between 16^0 30' and 18^0 20' of North Latitude and $77^0$30' and $79^0$30' of East Longitudes.
- Ghatkesar is a village and mandal in Ranga Reddy District, located on the outskirts Hyderabad, India. It is on the National Highway 202, having coordinates ranging between 17^0 27´14˝ N and 78^0 41´11˝. It has an average elevation of 469 meters (1541 feet).



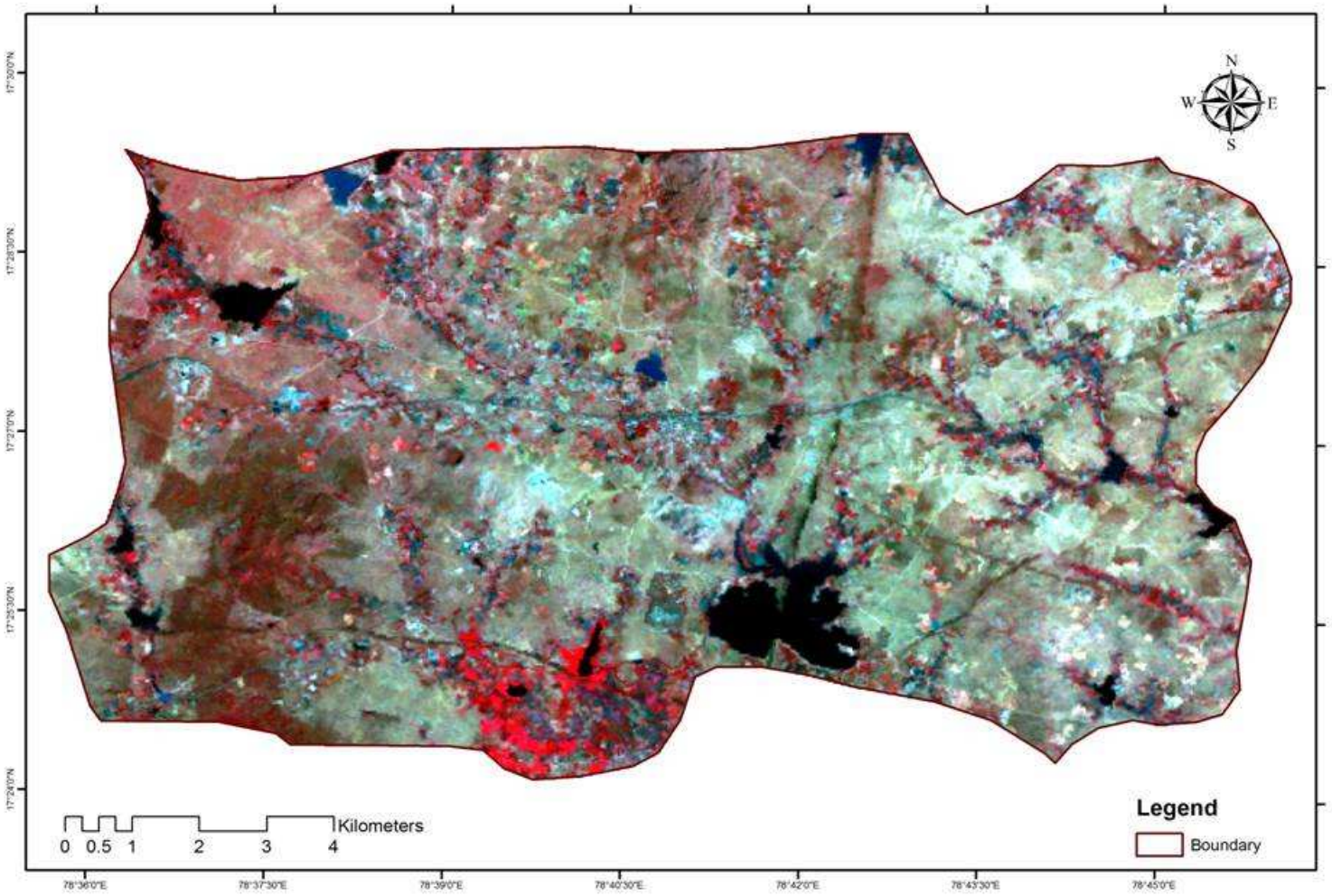
Flow chart showing the methodology adopted for the present study

Methodology

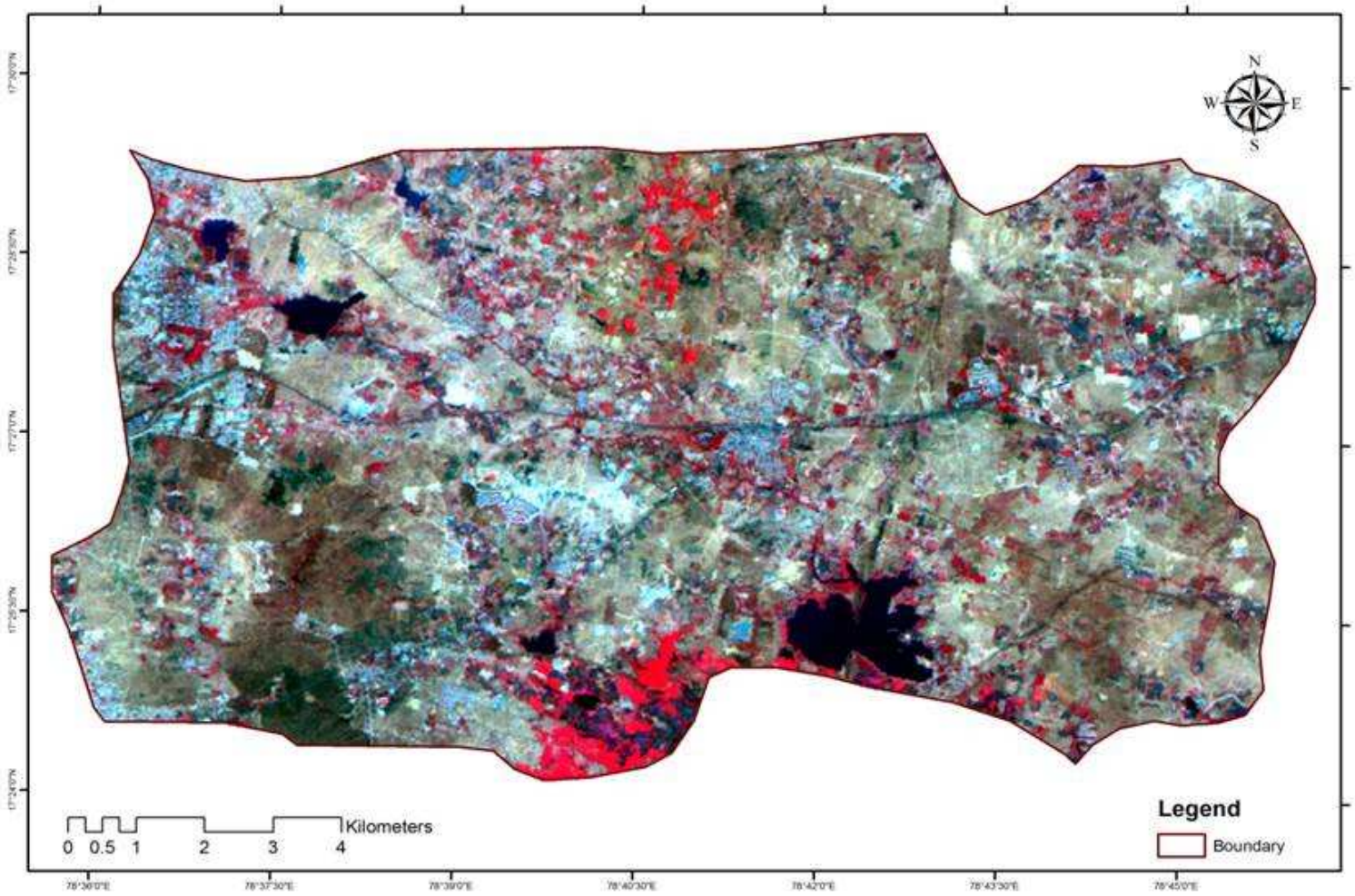
- Survey of India toposheets No. 56K/10, 56K/11, 56K/14, 56K/15 on 1:50,000 scale.
- Acquisition of IRS-1D LISS-III and PAN satellite data of the year 2006 & 2011 from NRSC, Balanagar, Hyderabad and toposheets from Survey of India, Hyderabad.
- Geo-referencing of toposheets based on latitude and longitudinal values.
- Edge matching of the toposheets and preparation of digital mosaic depicting the study area.

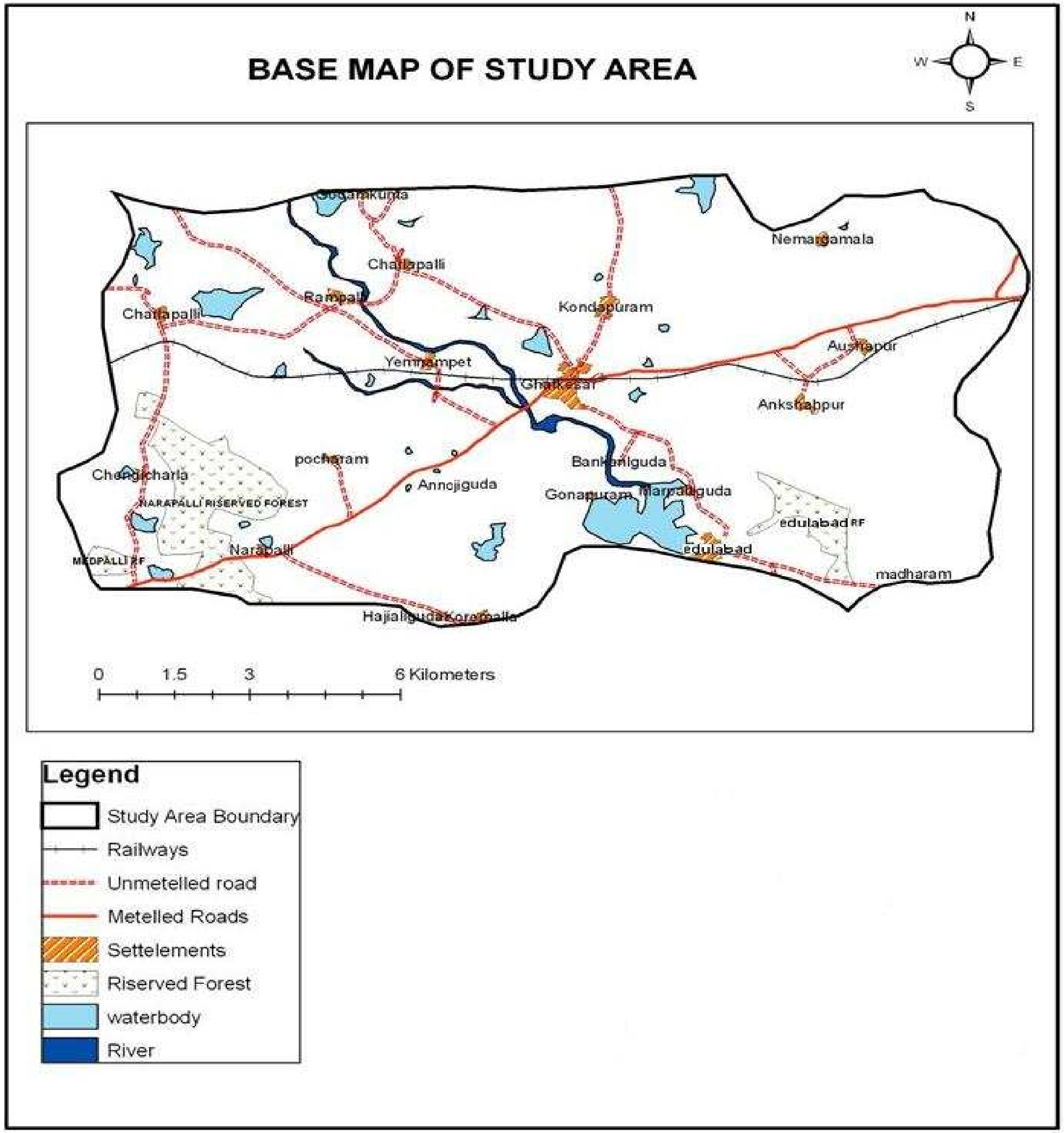
- Geo-coding and geo-referencing of LISS III and PAN digital data by extracting the Ground Control Points (GCPs) from SOI toposheets.
- Digital image enhancement and application of correction models for making the digital data free from errors and distortions both radiometry and geometry of the satellite data.
- Generation of thematic maps using ARC GIS software.

IRS 1D LISS-III SATELLITE IMAGERY-2006



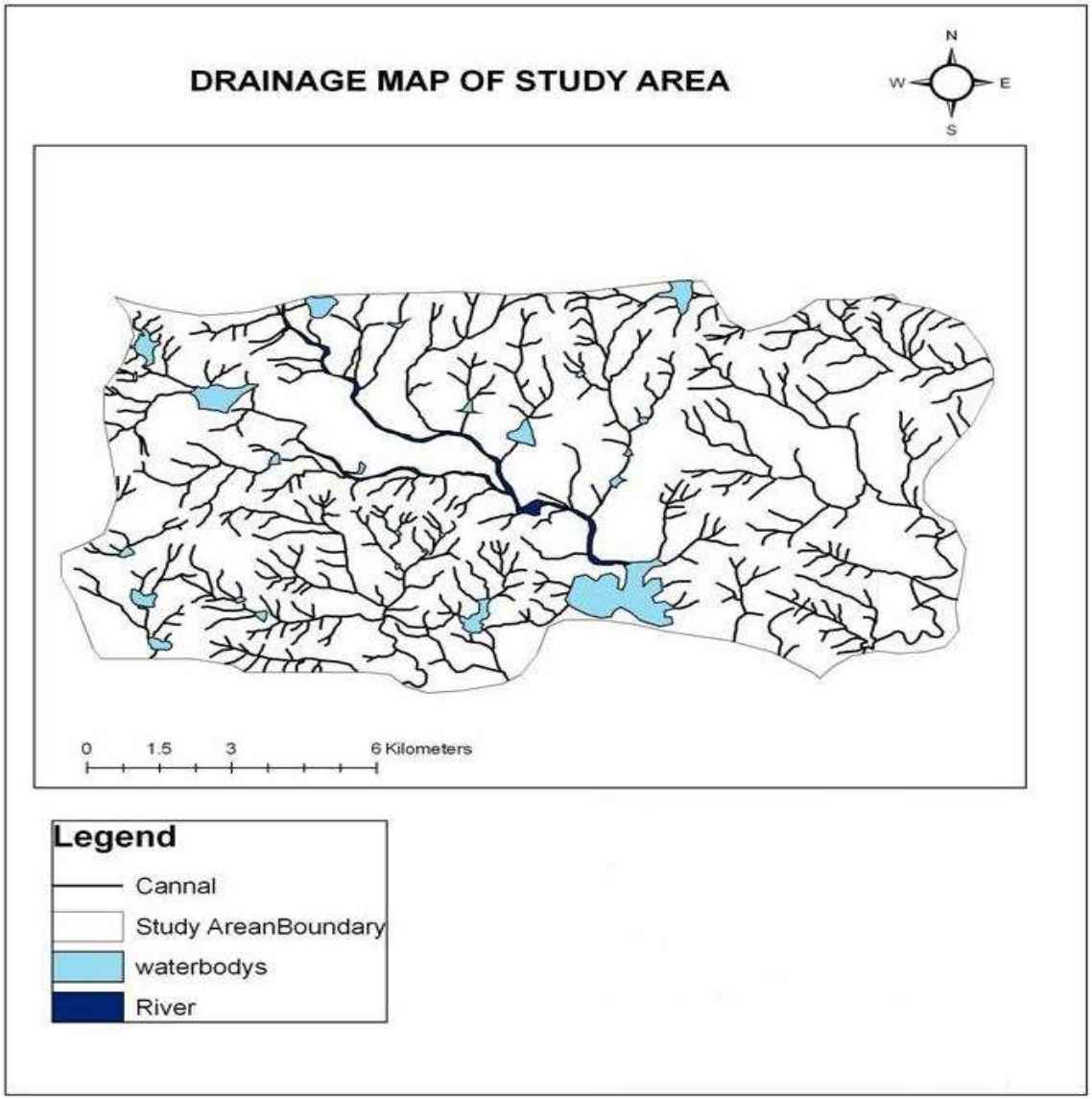
IRS 1D LISS-III SATELLITE IMAGERY-2011




BASE MAP OF STUDY AREA
N
S
E
W
Nemargamala
Challapalli
Kondapuram
Chattapalli
Yemmampet
Ghatkesar
Aushapur
Ankshahpur
pocharam
Chengicharla
NARAPALLI RISERVED FOREST
Annojiguda
Bankariguda
Gonapuram
Narapalli
edulabad
edulabad RF
madharam
MEDPALLI RF
0
1.5
3
6 Kilometers
Legend
Study Area Boundary
Railways
Unmetelled road
Metelled Roads
Settelements
Riserved Forest
waterbody
River

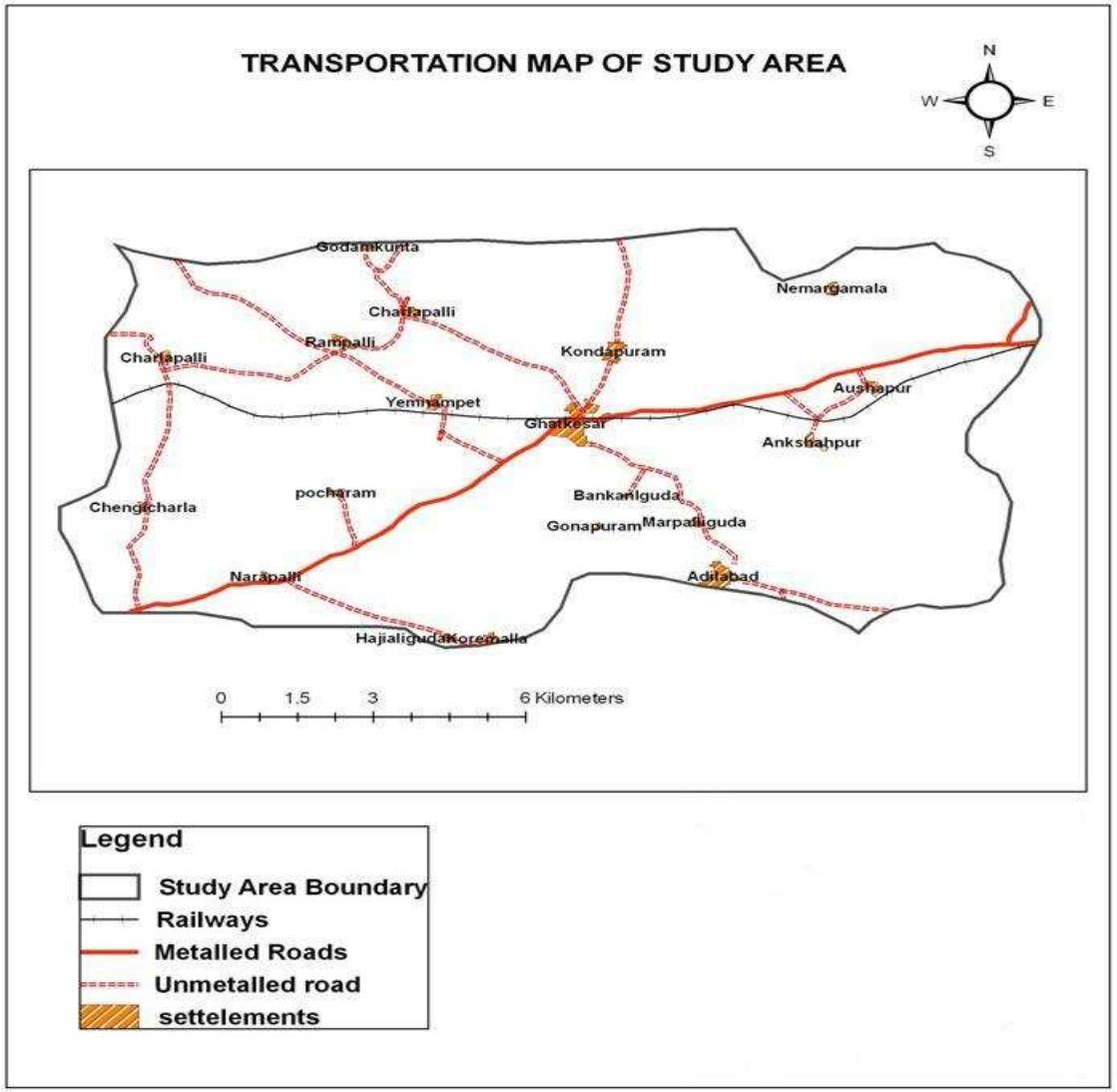
Base Map

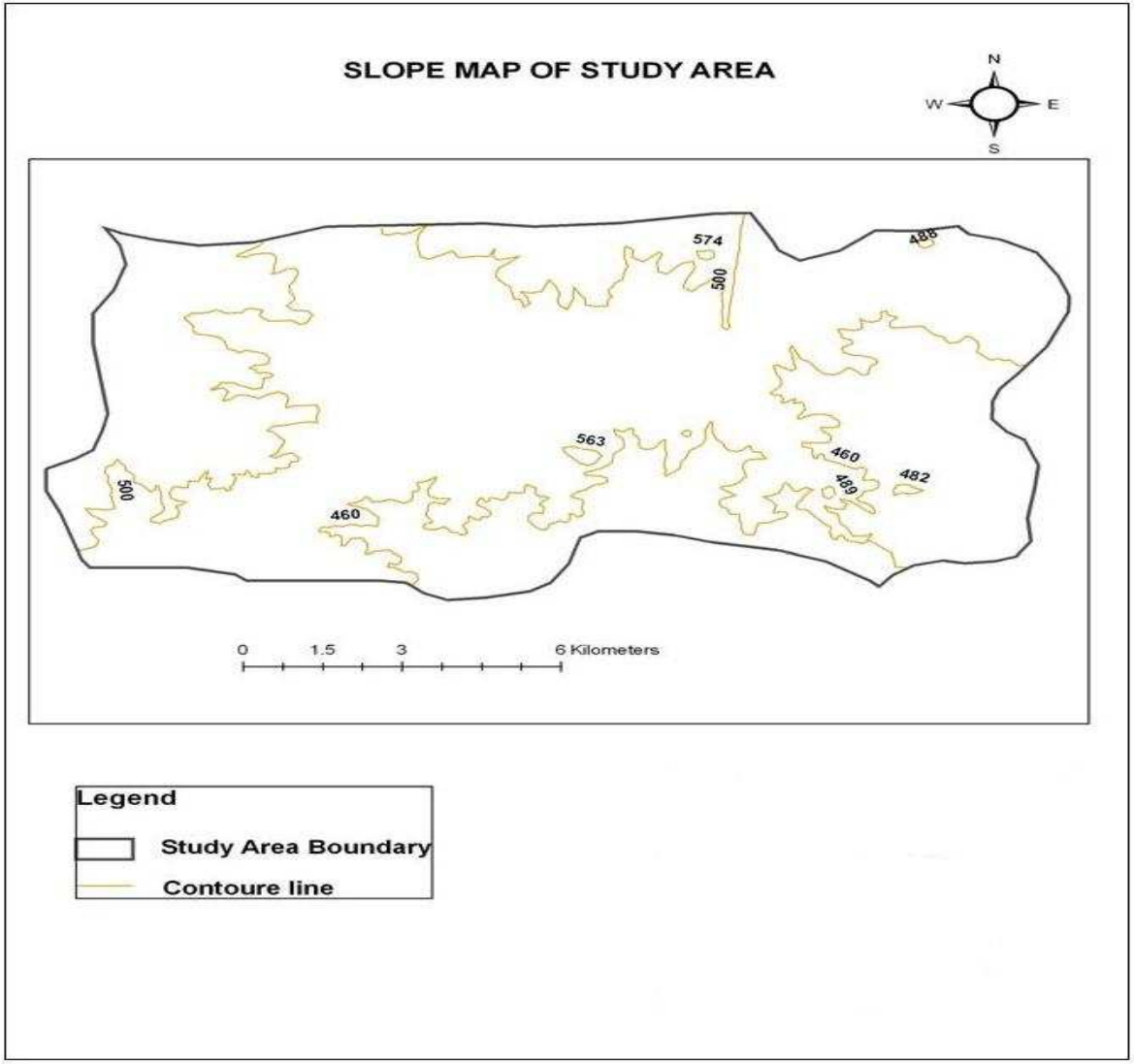
- The major settlements in the present study area are in Charlapalli, Chengicharla, Narapalli, Hajialguda,Koremalla, Edulabad,Nemargamala,Rampalli,Kondapur,Ghatkesar,Gonapur,Bankanguda,Maripalliguda,Pocharam,Yemnampet,Godamkunta, Ankshahpur ,Aushapur etc.


DRAINAGE MAP OF STUDY AREA
N
W
E
S
0
1.5
3
6 Kilometers
Legend
Cannal
Study AreanBoundary
waterbodys
River

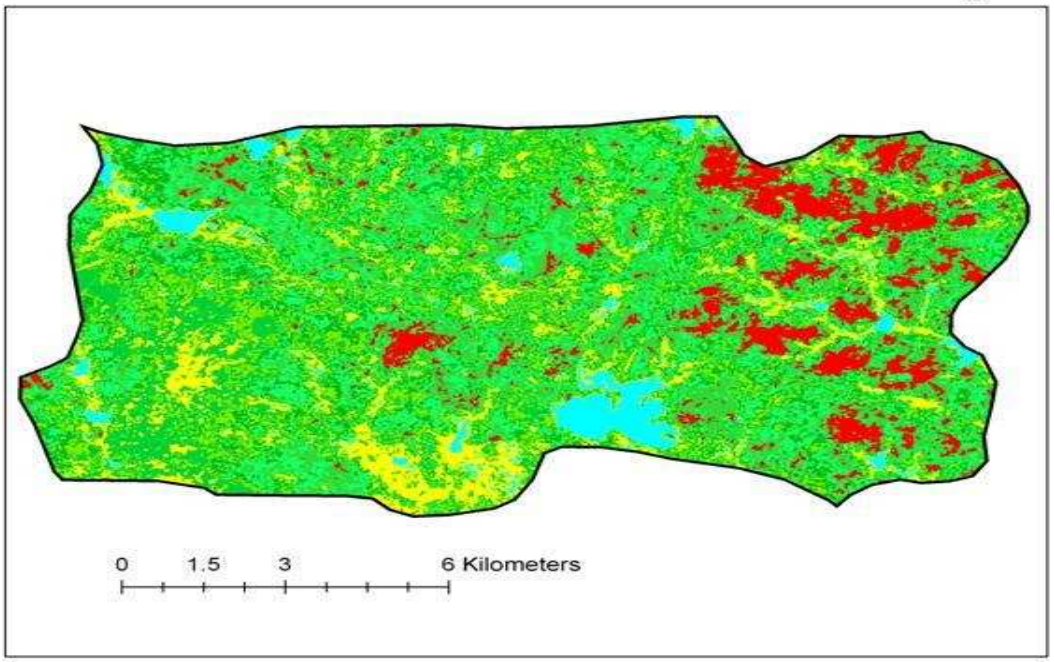
Drainage Map

- A drainage map showing waterbodies and with Irregular branching of channels in tree like fashion is observed which is a characteristic of dendritic pattern of drainage which usually develops on Homogenous massive rocks and flat lying strata.


TRANSPORTATION MAP OF STUDY AREA
N
W
E
S
GodamKunta
Nemargamala
Chatlapalli
Rampalli
Charlapalli
Kondapuram
Yemnampet
Ghatkesar
Aushapur
Ankushapur
pocharam
Bankamlguda
Chengicharla
Gonapuram
Marpalliguda
Narapalli
Adilabad
Hajialiguda
Korremalla
0
1.5
3
6 Kilometers
Legend
Study Area Boundary
Railways
Metalled Roads
Unmetalled road
settelements


SLOPE MAP OF STUDY AREA
N
W
E
S
574
500
488
563
460
482
489
500
460
0
1.5
3
6 Kilometers
Legend
Study Area Boundary
Contoure line

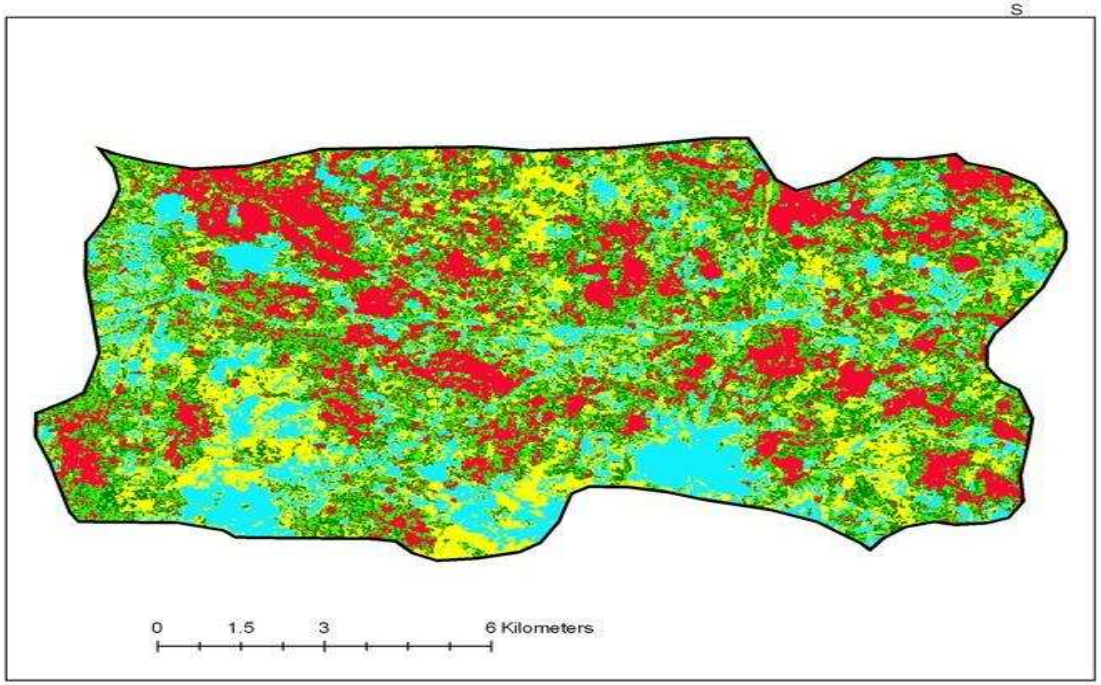
LAND USE / LAND COVER MAP - 2006



Legend

- Study Area Boundary
- Waterbodies-Reservoir/Tanks-Dry & Wet
- Natural/Semi natural Grassland & Grazing Land
- Forest Area
- Agricultural Land/Double crop Area
- Built Up Land

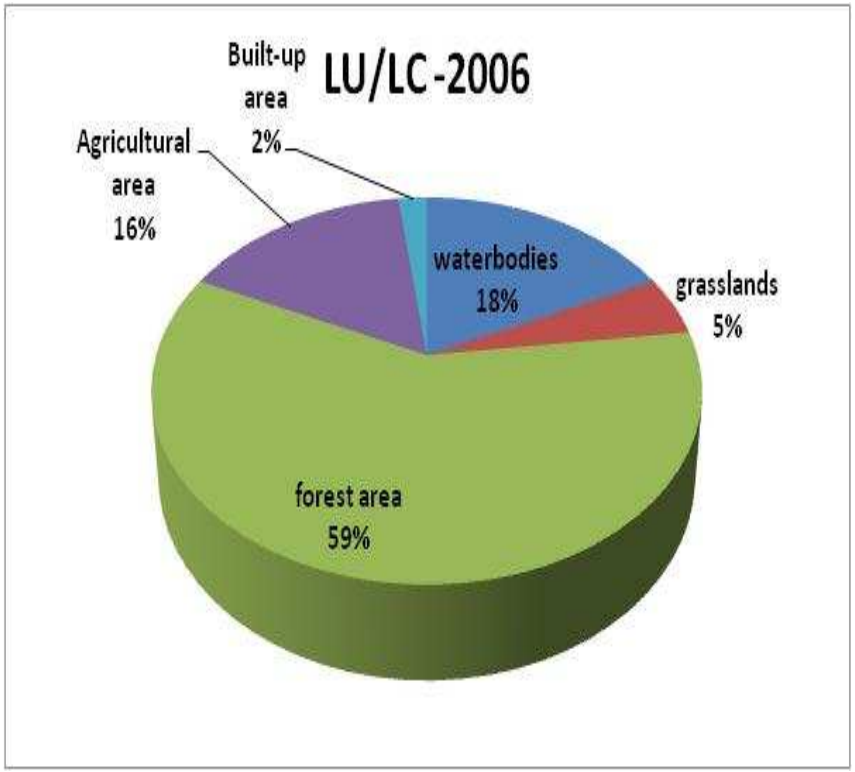
LAND USE / LAND COVER MAP - 2011

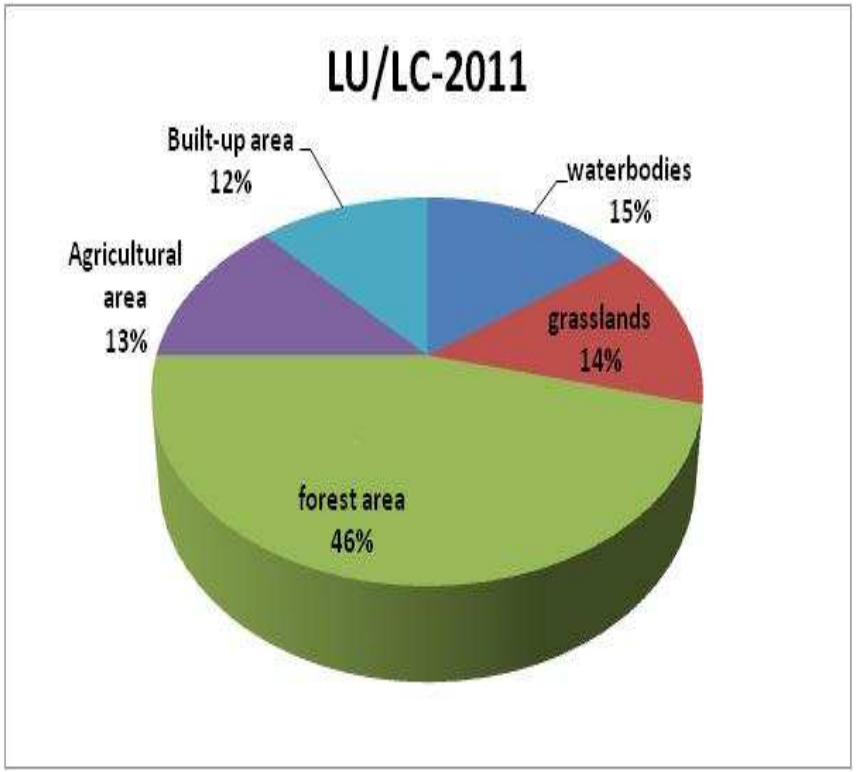


Legend

- Study Area Boundary
- Waterbodies-Reservoir/Tanks-Dry & Wet
- Natural/Semi natural grassland & Grazing land
- Forest Area
- Agricultural Land / Double Crop Area
- Built Up Land

LEGEND	2006		2011	
	PERCENTAGE	AREA (Ha)	PERCENTAGE	AREA (Ha)
WATER BODIES	18%	3004.02	2503.35	15%
GRASSLAND	5%	834.45	2336.46	14%
FOREST AREA	59%	9846.51	7676.94	46%
AGRICULTURAL LAND	16%	2670.24	2169.57	13%
BUILT UP LAND	2%	333.78	2002.68	12%
TOTAL	100%	16689	16689	100%

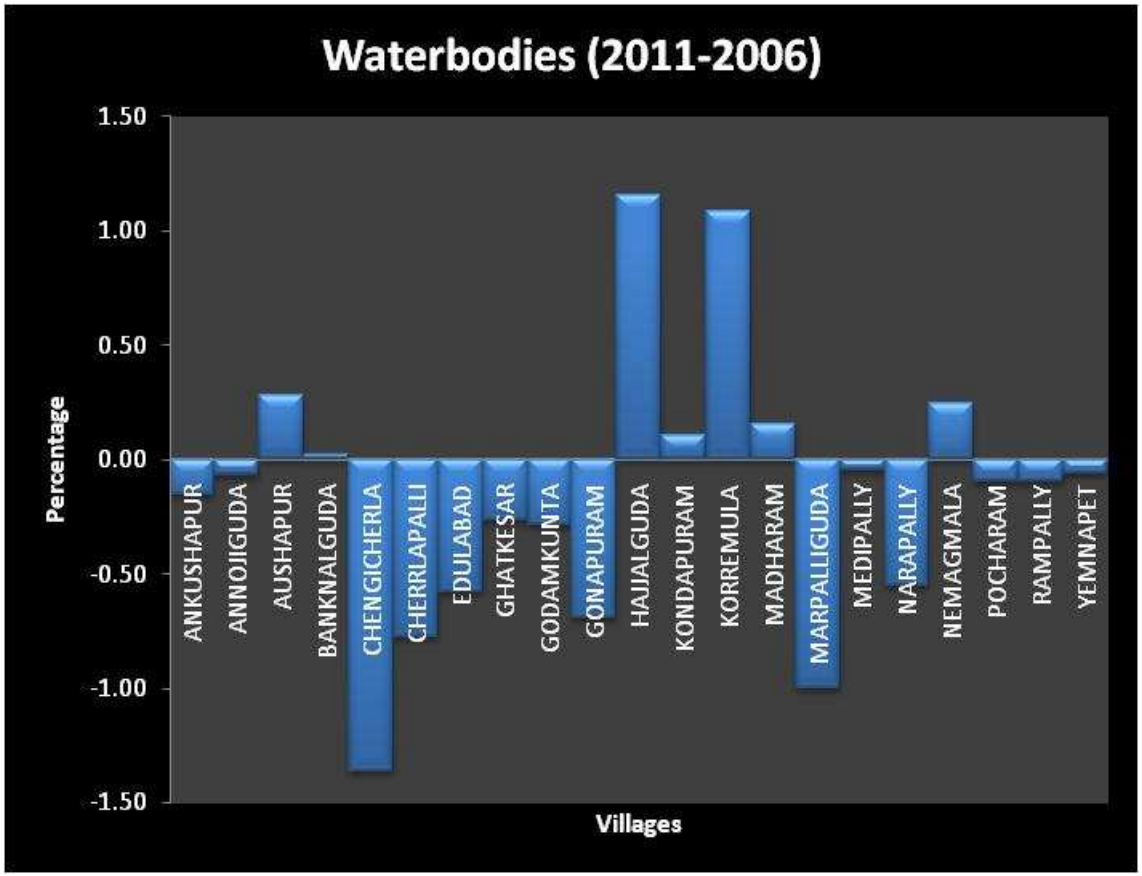

LU/LC-2006
Built-up area 2%
Agricultural area 16%
waterbodies 18%
grasslands 5%
forest area 59%


LU/LC-2011
Built-up area 12%
waterbodies 15%
Agricultural area 13%
grasslands 14%
forest area 46%

waterbodies

- Waterbodies like Pirzadiguda chervu,Nalla Cheruvu,Rampalli cheuvu,rayapet cheruvu,Edulabad cheruvu and Erimuli vagu comes under study area of Ghatkesar Mandal.

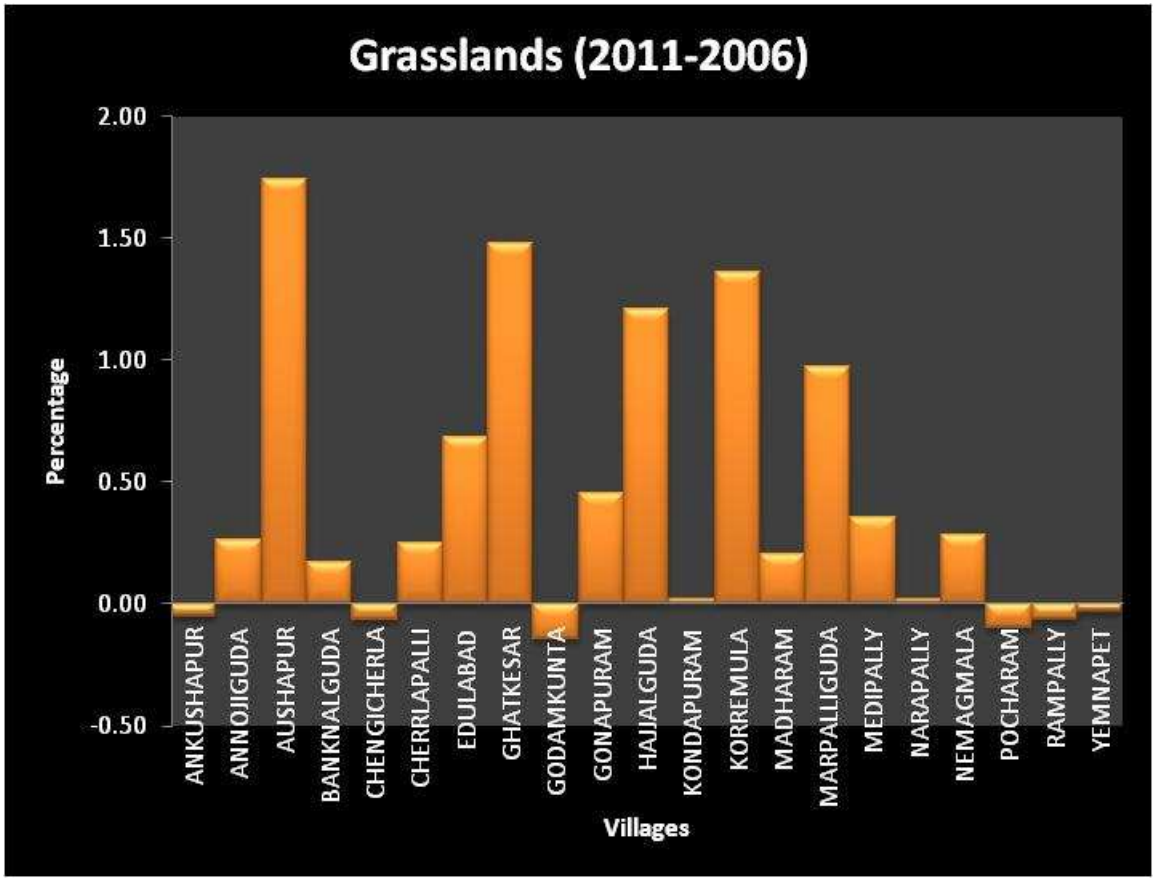
Villages	Percentage
ANKUSHAPUR	-0.15
ANNOJIGUDA	-0.07
AUSHAPUR	0.28
BANKNALGUDA	0.02
CHENGICHERLA	-1.36
CHERRLAPALLI	-0.77
EDULABAD	-0.58
GHATKESAR	-0.26
GODAMKUNTA	-0.28
GONAPURAM	-0.69
HAJJALGUDA	1.16
KONDAPURAM	0.11
KORREMULA	1.09
MADHARAM	0.16
MARPALLIGUDA	-1.00
MEDIPALLY	-0.05
NARAPALLY	-0.55
NEMAGMALA	0.24
POCHARAM	-0.09
RAMPALLY	-0.10
YEMNAPET	-0.06



Grasslands

- They are a source of goods and services such as food and forage, energy and wildlife habitat, and also provide carbon and water storage and watershed protection for many major river systems.

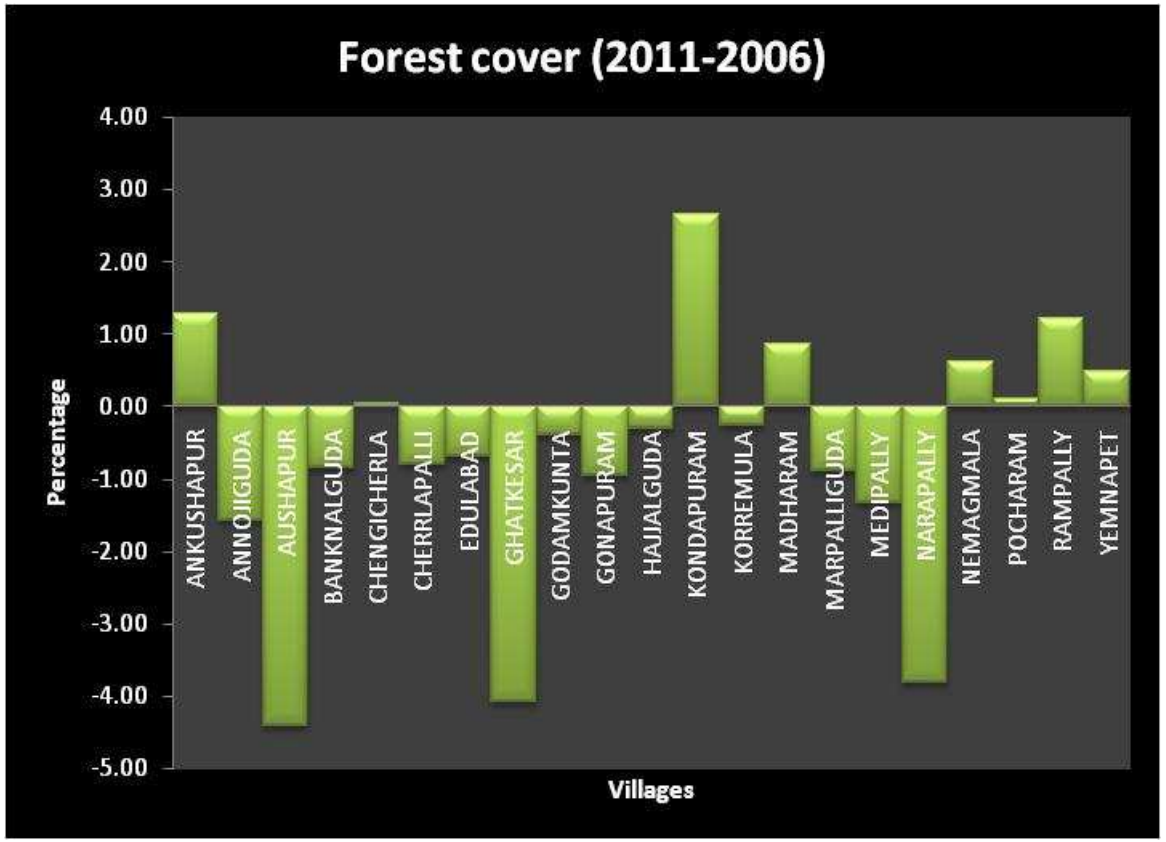
Villages	Percentage
ANKUSHAPUR	-0.05
ANNOJIGUDA	0.26
AUSHAPUR	1.74
BANKNALGUDA	0.17
CHENGICHERLA	-0.07
CHERRLAPALLI	0.25
EDULABAD	0.68
GHATKESAR	1.48
GODAMKUNTA	-0.15
GONAPURAM	0.45
HAJJALGUDA	1.21
KONDAPURAM	0.02
KORREMULA	1.36
MADHARAM	0.20
MARPALLIGUDA	0.97
MEDIPALLY	0.36
NARAPALLY	0.02
NEMAGMALA	0.28
POCHARAM	-0.10
RAMPALLY	-0.06
YEMNAPET	-0.03



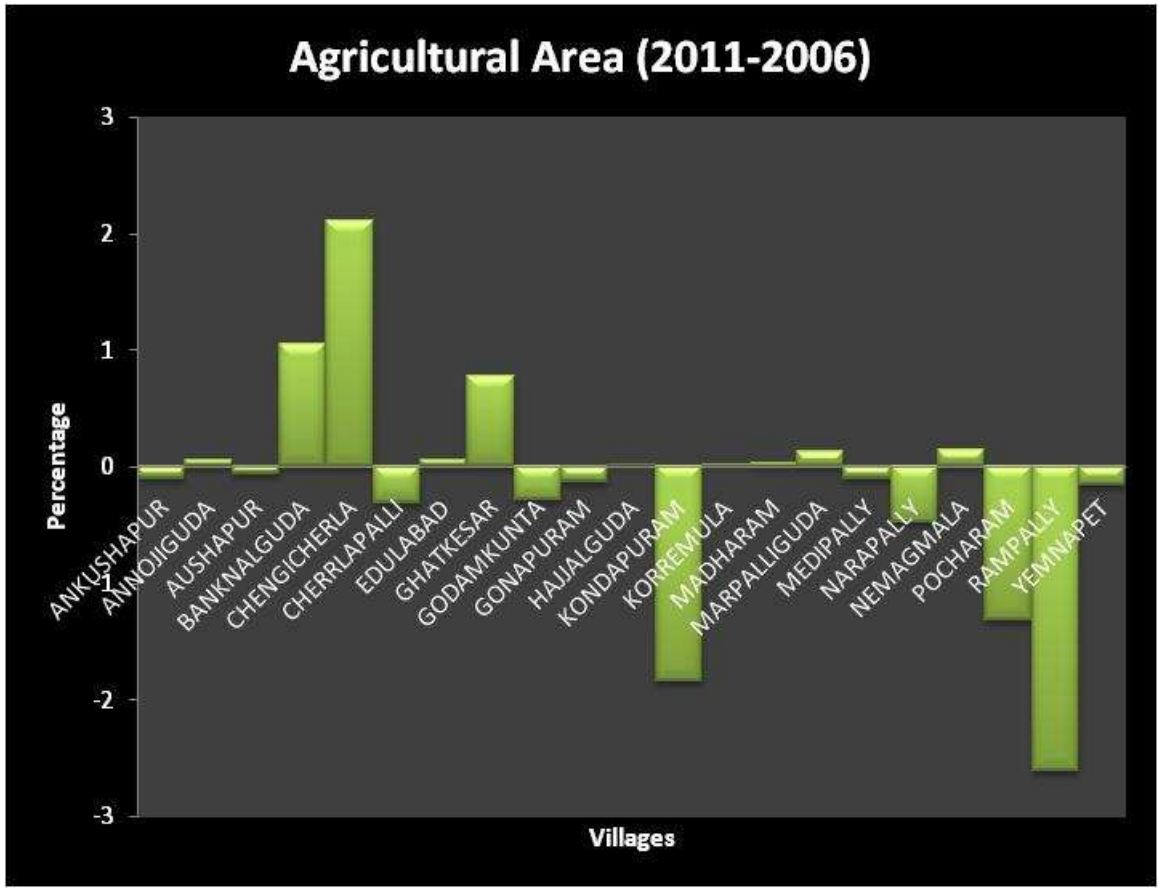
Forest area

- Reserved forest (RF) found in study area are Narapally RF, Chengicherla RF, Edulabad RF,Medipally RF.

Villages	Percentage
ANKUSHAPUR	1.28
ANNOJIGUDA	-1.58
AUSHAPUR	-4.42
BANKNALGUDA	-0.84
CHENGICHERLA	0.05
CHERRLAPALLI	-0.80
EDULABAD	-0.69
GHATKESAR	-4.07
GODAMKUNTA	-0.40
GONAPURAM	-0.96
HAJJALGUDA	-0.31
KONDAPURAM	2.66
KORREMULA	-0.28
MADHARAM	0.86
MARPALLIGUDA	-0.89
MEDIPALLY	-1.33
NARAPALLY	-3.81
NEMAGMALA	0.63
POCHARAM	0.11
RAMPALLY	1.22
YEMNAPET	0.48



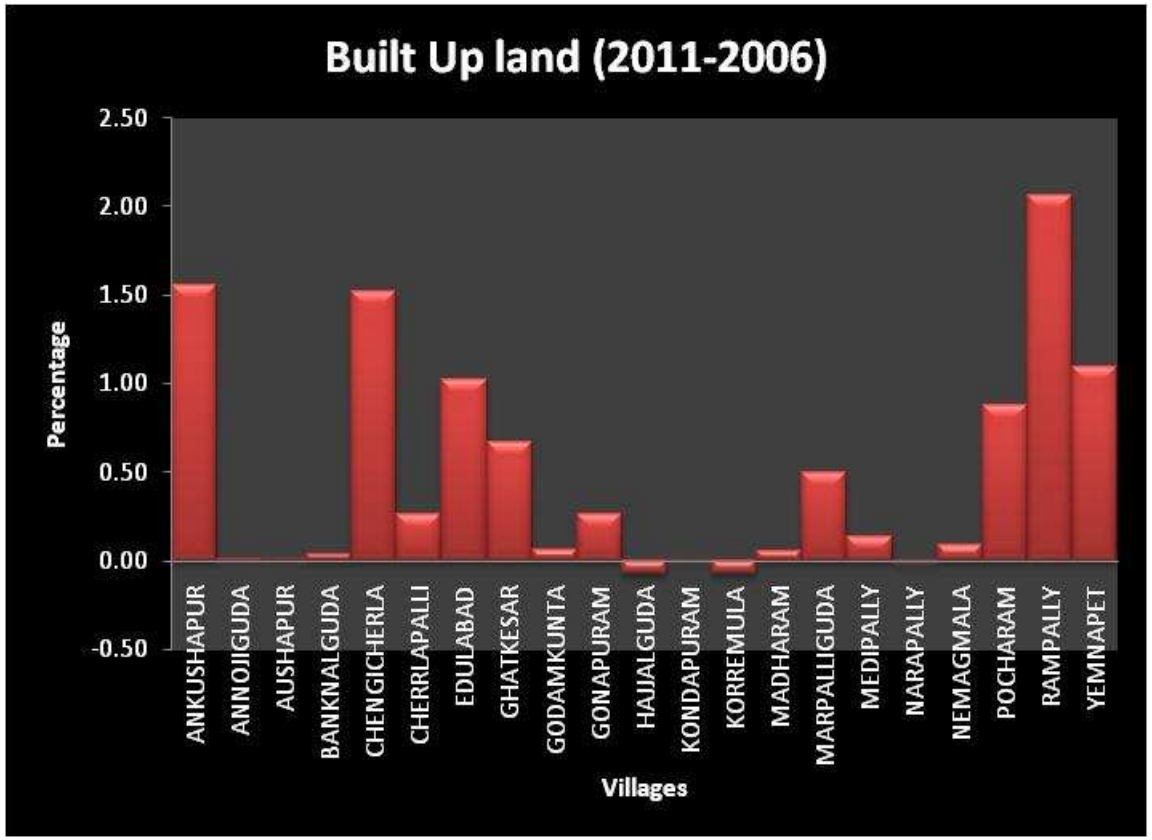
Villages	Percentage
ANKUSHAPUR	-0.10
ANNOJIGUDA	0.06
AUSHAPUR	-0.07
BANKNALGUDA	1.05
CHENGICHERLA	2.11
CHERRLAPALLI	-0.31
EDULABAD	0.06
GHATKESAR	0.77
GODAMKUNTA	-0.29
GONAPURAM	-0.13
HAJJALGUDA	0.01
KONDAPURAM	-1.84
KORREMULA	0.02
MADHARAM	0.04
MARPALLIGUDA	0.13
MEDIPALLY	-0.10
NARAPALLY	-0.48
NEMAGMALA	0.15
POCHARAM	-1.31
RAMPALLY	-2.61
YEMNAPET	-0.16



Built up land

- The increase in built-up areas has the highest impact on the environment due to disturbance resulting from transport, noise, resource use, waste dumping and pollution.
- Transport networks that connect cities add to the fragmentation and degradation of the natural landscape.
- The intensity and patterns of urban sprawl are the result of three main factors - economic development, demand for housing and extension of transport networks.
- The Government of Andhra Pradesh has taken up major Infrastructure facilities in Hyderabad City & one of the items is construction of Outer Ring Road.

Villages	Pecentage
ANKUSHAPUR	1.55
ANNOJIGUDA	0.01
AUSHAPUR	0.00
BANKNALGUDA	0.04
CHENGICHERLA	1.52
CHERRLAPALLI	0.26
EDULABAD	1.02
GHATKESAR	0.67
GODAMKUNTA	0.06
GONAPURAM	0.27
HAJJALGUDA	-0.07
KONDAPURAM	-0.01
KORREMULA	-0.07
MADHARAM	0.06
MARPALLIGUDA	0.50
MEDIPALLY	0.14
NARAPALLY	-0.02
NEMAGMALA	0.09
POCHARAM	0.88
RAMPALLY	2.06
YEMNAPET	1.09



Recommendations

1) To prevent soil erosion and flooding Riparian forest along Erimulli Vagu River is necessary which will act as buffers.

2) Promoting Agro-forestry in villages might protect and enhance crop or livestock production systems and can increase income.

3) Alley cropping systems provide a way to lower risk by diversifying production. In alley cropping an agricultural crop is grown simultaneously with a long-term tree crop to provide annual income while the tree crop matures. When nut-bearing trees are used they can provide an intermediate product for sale. In addition to improving annual cash flow, these systems also protect annual crops, reduce soil erosion, and provide wildlife habitat.

4) Promoting Green- belts along road margins.

5) Residential colony plantations.

6) Block plantations in waste lands, institutional lands and silvi pasture.

7)Watershed management though check dams, Farm ponds, sunken ponds, Gully plugging, contour trenching ,bench terracing, afforestration, horticulture development, fodder cultivation and pasture development.

8) Growing short duration legume crops like green gram, cowpea can help mitigate drought.

9) Growing alternative crops like perennial gasses for live stock farming.

10) Implementing stringent laws to discourage formation of built up land.

11) The grasslands are the most neglected, abused and least protected ecosystems in India.

They remain unprotected unless they are notified as Protected Areas under the Wild Life (Protection) Act, 1972 or notified as Protected or Reserve Forest under the Indian Forest Act, 1927.

To plan and implement, with the involvement and consent of state governments and local communities, landscape level strategies for grassland management.

12) The practice of stall-feeding should be encouraged among livestock owners in order to prevent over grazing consequent depletion of available forest fodder resources.

13) To develop a policy of regulated grazing that is managed on scientific principles so that desirable vegetation development could be ensured.

Acknowledgements

- Dr.T.Vijayalakshmi,Co-Author, is working as Assistant Professor in Jawaharlal Nehru Tehcnological Univesity Hyderabad. Areas of Specialization in Environmental Geomatics, Environmental Impact Assessment, Water Quality Assessment & Mapping. Water Harvesting.
- Dr.Santosh Kumar Co-Author ,is working as Lecturer in Jawaharlal Nehru Tehcnological Univesity Hyderabad. **Areas of Specialization** in Environmental Science & Geomatics, Remote Sensing & GIS, GPS.

Thank you