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Spatio-Temporal changes of Land use/Land cover of Pindrangi Village Using High Resolution Satellite Imagery

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Abstract: *Interpretation of high resolution satellite imagery revealed various Land use/Land cover features in Pindrangi village , High resolution Satellite imagery was acquired from the goggle earth through Sasplanet software, The data were acquired for the years 1984, 1994, 2004 and 2014. High resolution Satellite imagery was processed in Arc Map 10.4.1. Further an analysis of the decadal sequence imagery pertaining to decadal aimed at detecting the land use / land cover change has indicated that the plantation has phenomenally increased by 235.20he during the study period, at the same period, Crop land (Paddy)which occupied about 26.875he in 1984 has been reduced to 17.29 he by 2014 mainly due to encroachment of plantation like Casurina/Eucalyptus and mango Scrubs area has decreased by 35.52 he. The present study with the help of GIS and remote sensing (RS) is also a similar attempt in recording and quantifying change in land use and land cover in village level as spatial and temporal extents. The conversion of fallow land and Crop land in to plantation around 12.91 % in study area.*

Keywords: *Land use/land cover, Temporal Changes, Arc Gis 10.4.1.*

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I. Introduction

A rational assessment of land and itsscientific utilization has become important. It is possible only if the whole complex of land use is studied at the district, tahsil or even village levelby taking into account the local physical and socio-economic conditions(Ali Mohmmed 1978); the present study is mainly micro level in Pindrangi village has identified Plantation boom and decreasing trend of paddy, has transformed in to physical and socio-economic conditions of study area within the four decades. lMicro level landuse mapping is important for evolution, management and conservation of natural resources of an area. Hence, it is desirable to monitor the trends in land use/land cover. The modern techniques of remote sensing and Geographic information systems(GIS) are very useful tools for analysing the trends in land use/land cover through time (Obi Reddy *et al*., 2001).Remote sensing and gis applications in the identification of aquaculture hotspots at village level (K.Nageswararao et al.,2003). It is also useful for planners to evolutes the possibilities and limitations of further spatial development to avoid or restrict undesirable trends of land exploitation to adjust the forms of land use to the land capability and to direct the expansion of intensive land utilization into suitable areas (Nageswar Rao and Vaidyanathan, 1990).Impactof human land use practices on the occurrence of droughts – a case study of Godhavari delta region (B.Hema Malini et al.,) Land use/ land cover inventories form essential component in land resources evolution and environmental studies (NRSA).Land use is any kind of permanent or cyclic human intervention onthe environment to satisfy human needs and the land use capability orland suitability is the potential capability of given tract and to supportdifferent types of land utilization under given cultural and socioeconomicconditions (Vink A.P.A. 1975).The study of land use pattern is of prime concern to geographers toknow the relationship between man and natural environment (Tripathiand Vishwakarma, 1988).In this paper, an attempt is made to study the extent of changing land use practices due to the plantation (Casurina , Mango) boom in study area.

Study area

The Study area has witnessed a large-scale Plantation(casurina, Eucalyptus and Mango) development during the recent years, as evident from the satellite imagery of the area. While the Plantation(casurina, Eucalyptus and Mango) has encroached on to the paddy area in the north western parts of the study area, its spread is mainly into the fallow lands in the south, western and eastern parts. In order to achieve the stated objective of identifying the plantation growthin this village, due encroaching predominantly on to the cropland as well as fallow land, is selected for the study.The study area situated between the latitude of 17^{o} 56'N and

longitude is 83° 05', and bounded by on the nort lankavanipalem, on the east Srungavaram, on the west D.Agraharam and on the south Marrivalasa. It consists of 2327 populationaccording to 2011 census (Fig 1). Pindrangi village also panchayati in K.Kotapadu mandal Visakhapatnam district of Andhra Pradesh spread over an area of about 473.04 he.

Most of the people of this areaworking inmining like quary which was situated near to this village, thatswhy most of the study area has fallow land in this village during the period of 1984 to 2004 later on due to decreasing of mining activity simelteniously the fallow land converted in to Plantaion.The major crops in this area is plantation such asCasurina, Eucalyptus and Mango followed by paddy and Vegetable crops in monsoon season.The general climate of the area is tropical type mostly the rainfall occurred during southwest monsoon season (June- September), while the retreating monsoon season (October-November) accounts for the rest of the rainfall. October is the rainiest month. Hottest month of the study area is May Mean monthly temperatures range from 25°C to 39°C. Coldest month is December.

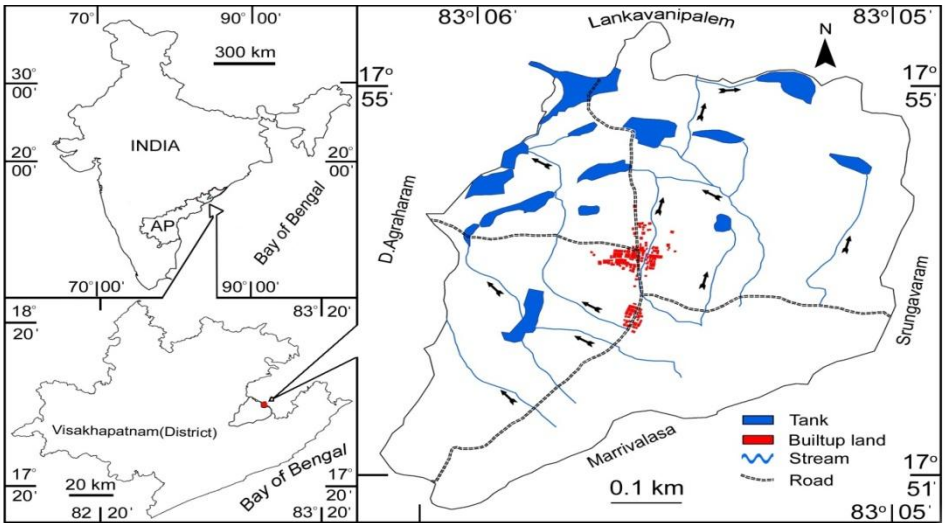
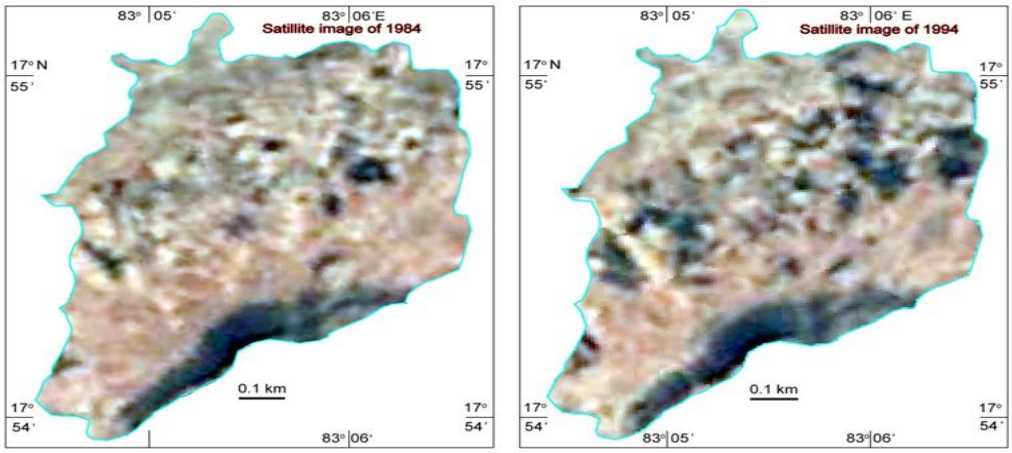


Fig 1 . Location map of Study area (Pindrangi village)

II. Methodology

In the present study we used the four high resolution datasets which we acquire from the google earth in distinct years on decadel, they are 1984, 1994, 2004 and 2014. We rectified these datasets with base map of Arc Gis 10.4.1 and elevation and eye alt of vary among them 1984 and 1994 around 90 mt and 11.90 km, 2004 and 2014 are around 126 mt and 4.53 km respectively, further they were digitally processed and the various geomorphological and land use/land cover features were interpreted (Fig. 2)supplemented by field observations. in order to understand the trends in land use/land cover changes in the area. on-screen digitisation was made to map land use land cover based on their geometric boundaries. The land use/land cover datasets of 1984, 1994, 2004 and2014 were 'unioned' in the GIS to extract (by 'querying'), the data on conversion of each land use/land cover category into other types in the study area as a whole. Change matrices were prepared for the study area,separately. Further, based on the magnitude of conversion of fallow land and agriculture land into plantation at each dataset shows the drastic change in study area during 1984, 1994, 2004 and 2014.



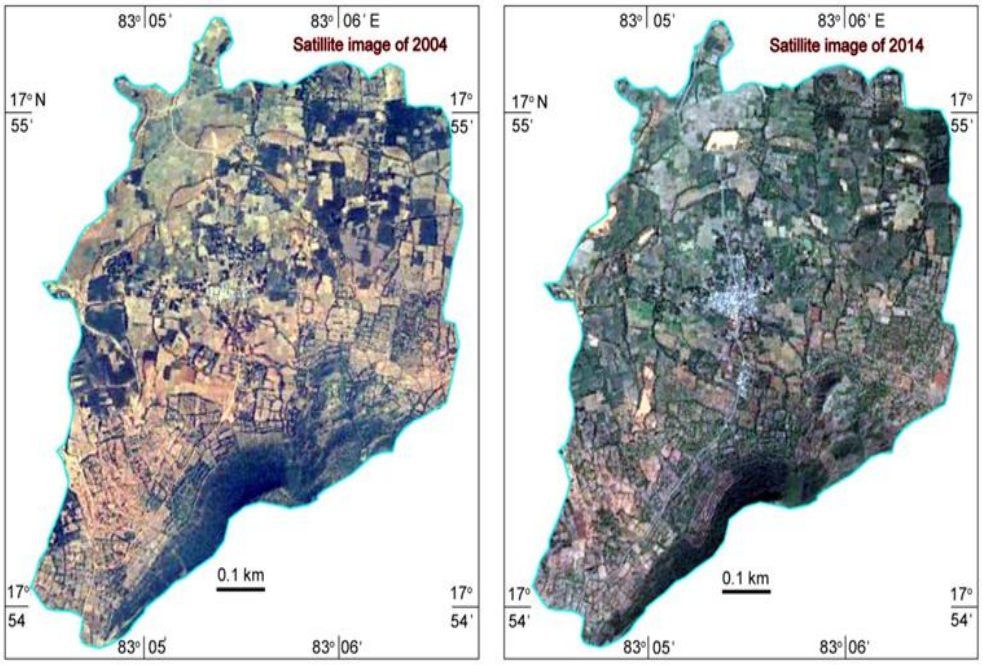
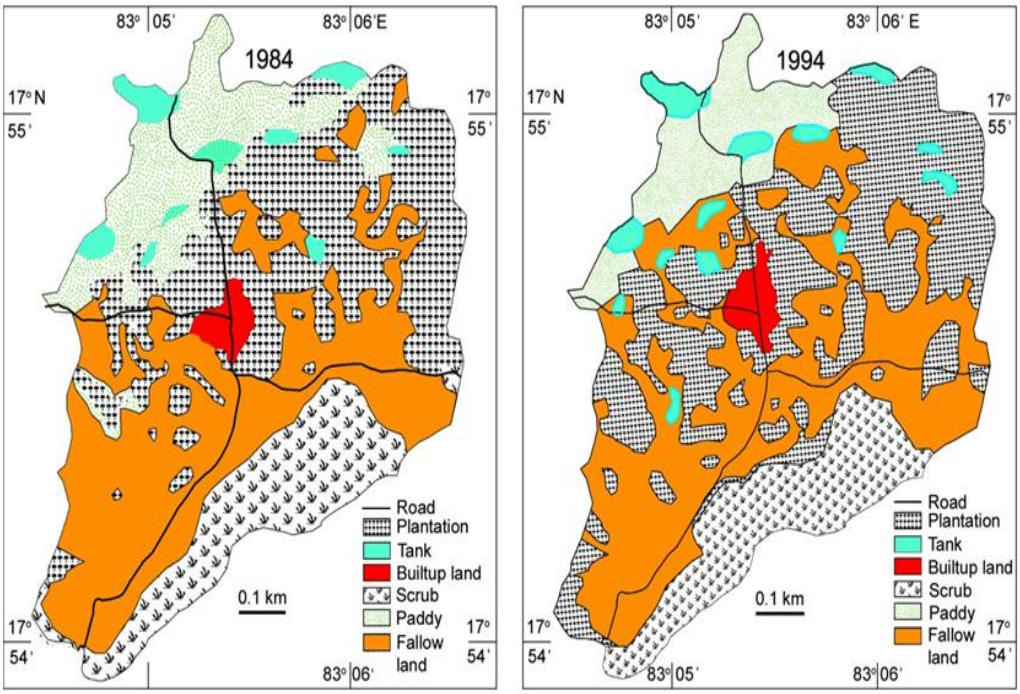


Fig. 2 Satillite images of Pindrangi village during 1984, 1994, 2004 and 2014

III. Results And Discussion

The term land use is more commonly referred to the human activity on the Earth's surface. The main reason behind the LU/LC changes includes lack of water availability and low fetile soils , In the study area have experienced so many significant changes in land use pattern during the study period,the socio-economic development plays very important role in bringining changes in land use pattern , in the time span of study period Scrubs, Paddy, fallow land have shows the negative trend (Table 1)out of total geographical area.we used modern technologies like remote sensing and GIS to enumerate LU/LC. On the basis of interpretation of remote sensing imagery, field surveys, and existing study area conditions, we have classified the study area into seven categories, they arePaddy, built-up area, scrubs, plantation(Casurina, eucalyptus and mango)fallow land, water body(Table 1). We used multiple datasets(1984,1994,2004 and 2014) to enumerate land use/land cover changes in study period (Fig 3).



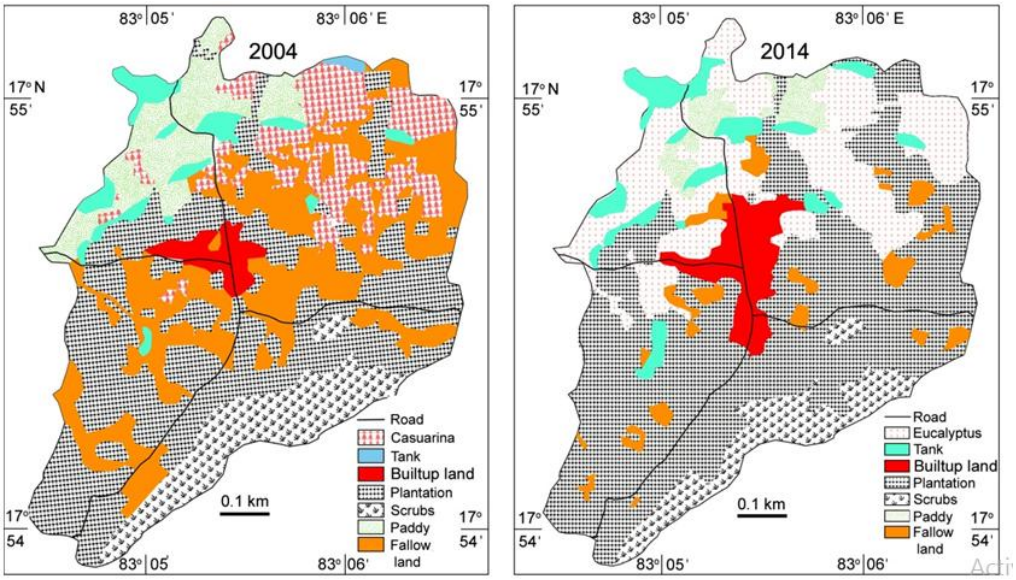


Fig. 3 Temporal change of landuse/landcover map of study area during the study period

Coversion of landuse/Landcover and change detection between 1984 – 1994

The categories of landuse landcover of study area showed both positive and negative growth in area of total geographical area (473.48 he). Table 1 the built up area occupies an area of 1.6 % in 1984 , it could be shown the positive trend in 1994 around 2.0 %. Where as the rest of the categories like plantation (31.0% - 33.6%) tanks (3.0 % - 3.5%) are shown positive trend some of the categories are shown the negative trend such as scrubs (14.9% - 14.6%), paddy (13.5%-10.7%) and uncultivated land (36.1%-35.6%) during the period of 1984-1994. In the change detection of the landuse landcover plantation shows the positive trend (+2.59%) followed by tanks (0.55%) and builtup area (0.38%) during the period of 1984-9194.While -13.3 hectares paddy, uncultivated land -2.29 hectares and -1.18 hectares scrubs of area were converted into plantation.(Fig 3).

Table.1 Landuse Land cover changes and detection of Pindrangi village among 1984-1994, 194-2004 and 2004-2014

LU/LC Categories	1984		1994		2004		2014		Change Detection					
									1984-1994		1994-2004		2004-2014	
	HECTARES	%	HECTARES	%	HECTARES	%	HECTARES	%	HECTARES	%	HECTARES	%	HECTARES	%
Builtup area	7.55	1.6	9.38	2.0	11.93	2.51	26.08	5.50	+1.83	+0.38	+2.55	+0.54	+14.15	+2.99
Scrubs	70.36	14.9	69.18	14.6	47.76	10.08	35.52	7.50	-1.18	-0.24	-21.42	-4.52	-12.24	-02.58
Plantation	146.61	31.0	158.89	33.6	174.06	36.76	235.20	49.67	+12.28	+2.59	+15.17	+3.16	+61.14	+12.91
Paddy	63.98	13.5	50.68	10.7	45.41	9.59	18.06	3.81	-13.3	-2.80	-5.27	-1.11	-27.35	-5.78
Uncultivated land	170.85	36.1	168.56	35.6	120.17	25.38	24.72	5.22	-2.29	-0.48	-48.39	-10.22	-95.45	-20.16
Tanks	14.13	3.0	16.78	3.5	18.78	3.96	24.92	5.26	+2.65	+0.55	+2.0	+0.46	+6.14	+1.30
Casurina/ Eucalyptus	-	-	-	-	54.83	11.58	108.92	23.00	-	-	+11.58	+11.58	+54.09	+42.51
Total Geographical area	473.48	100.00	473.48	100.00	473.48	100.00	473.48	100.00	1					

Coversion of landuse/Landcover and change detection between 1994 – 2004

During the study period all the categories showed showed both positive and negative growth in total geographical area (473.48 he). Table 1 the built up area occupies an area of 2.0% in 1994 , consequently the built up area hasshown the increasing in 2004 around 2.51% because builtup area increased due to the gradual constructional development and isolated settlements are gradually increased. However the rest of the categories like plantation (33.6%-36.67%) tanks (3.5% 3.95%) are shown positive trend some of the categories shows the negative trend such as scrubs (14.5-10.08%), paddy (10.07-9.59%) and uncultivated land (35.6-25.38%) during the period of 1994-2004. In the change detection of the landuse landcover plantation shows the positive trend (+3.16%) followed by builtup area (+0.54%) and tanks (+0.46%) (Fig 3) (Table 1).

Coversion of landuse/Landcover and change detection between 2004 – 2014

The categories of landuse landcover of study area showed both positive and negative growth in total geographical area (473.48 he). Table 2 the built up area occupies an area of 2.51 % in 2004 , it could be shown the positive trend in 2014 around 5.5 % because builtup area increased due to the gradual constructional development and isolated settlements are gradually increased and change detections are 2004 (2.55%) to 2014

(2.99%) (Fig.4)study period.However the rest of the categories like plantation (36.76% - 49.67%) tanks (3.96 % 5.26%) are shown positive trend some of the categories are shown the negative trend such as scrubs (10.08% - 7.50%), paddy (9.59%-3.81%) and uncultivated land (25.38%-5.22%) during the period of 2004-2014. In the change detection of the landuse landcover plantation shows the positive trend (+12.91%) followed by builtup area (2.99%) and tanks (+1.30%). In 2014 paddy area converted in to Casurina around 11.58%consequently northern eastern and the plantation area and paddy converted in to Eucalyptus 23.00% in 2014 because of lack water speciality in study area one more thing is most of the people are moving to Visakhapatnam for employement.

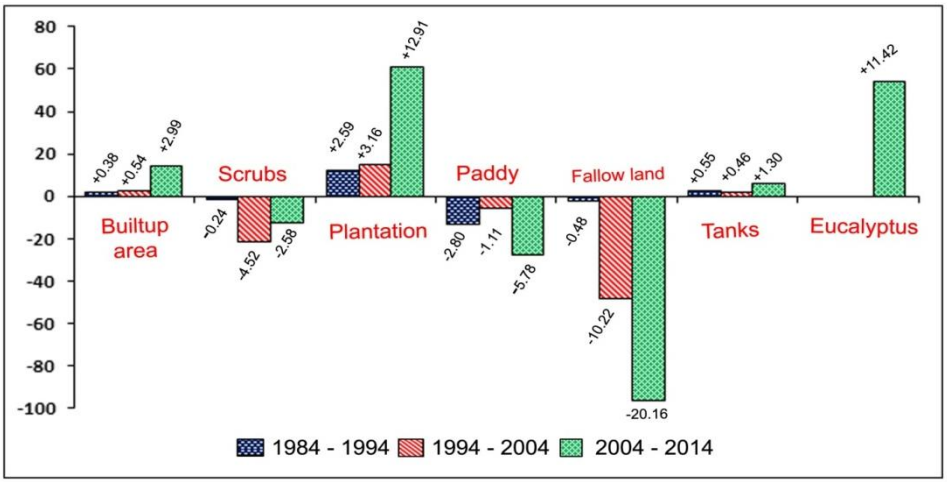


Figure.4 Landuse Land cover change detection of datasets 1984-1994, 1994-2004 and 2004-2014.

IV. Conclusion

The present study undertaken for the detection of possible land use and land cover changes, monitoring and evaluation in Pindrangi village high resolution landsat images temporally like 1984,1994,2004 and 2014 which we downloaded from the sasplanet software . The result of present work indicates there have been important land use land cover changes in between 1984 to 1994 and 2004-2014 time periods in the study area. The statistical analysis shows that the major changes have been occurred inuncultivated land , paddy and platntation, mostly we findout positive and negative variations in landuse/landcover. The positive change detection occurred in plantation, paddy and tanks Similarly the rest of the categories such as scrubs, paddy uncultivated land shows negative trend(Fig.3 and Fig.4). So that lack of water speciality for cultivation paddy could decline and plantation improves the rest of the categories also shows change like uncultivated land decline but it can converted in to plantation(Casurina, Eucalyptus and Mango) specially between 2004 to 2014 land change occured within the plantation area they are casurina and eucalyptus, casurina converted in to eucalyptus due to insufficient water in study area.

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References

[1] Ali Mohammed (1978), 'Studies in Agricultural Geography', Rajesh Publications, New Delhi, 1978, pp-1-6.
[2] Nageswara Rao.K (2003)Remote Sensing and GIS Applications in the Identification of Aquaculture Hotspots at Village Level Journal of the Indian Society of Remote Sensing, Vol. 31, No. 2.
[3] Nageshwara Rao K. and Vaidyanathan R. (1981), 'Landuse capability studies from Arial Photo-Interpretation -A case study from Krishna Delha', India Geographical Review of India. Vol.43,
[4] No.3 pp-226-236.
[5] Vink, A. P. A. (1975): 'Land use in Advancing AgriculturalSpringer Verlag Berlin', Heidelberg, New York.
[6] Kumar J. (1986),'Landuse Analysis : A case study of Nalanda District', Bihar Inter-India Publications New Delhi-p.1.

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