

**Impact Evaluation of Watershed  
Development Programme using  
Remote Sensing  
and  
Geographic Information System**

**Monitoring and evaluation are vital components of watershed development planning. Advanced technology of Remote Sensing and Geographic Information System provide a sound scientific platform in this endeavour. A case study is placed here to demonstrate the capability of the modern tool for monitoring and evaluation purposes.**

# OBJECTIVE

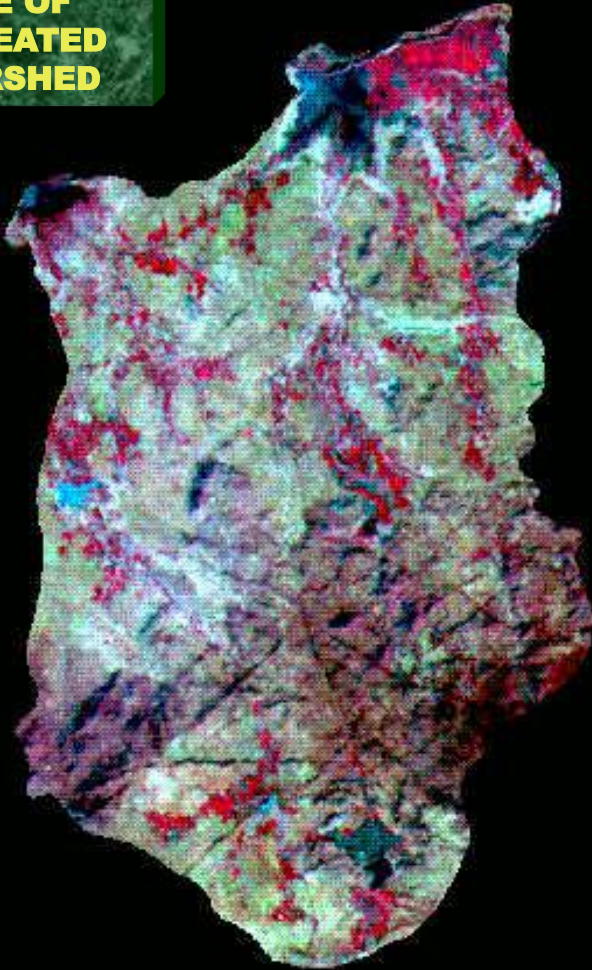
- **To ascertain the impact of Watershed Development using Remote Sensing and GIS**
  - **by assessing the changes in land use / land cover condition and**
  - **overall bio-mass change**

# Material & Methods

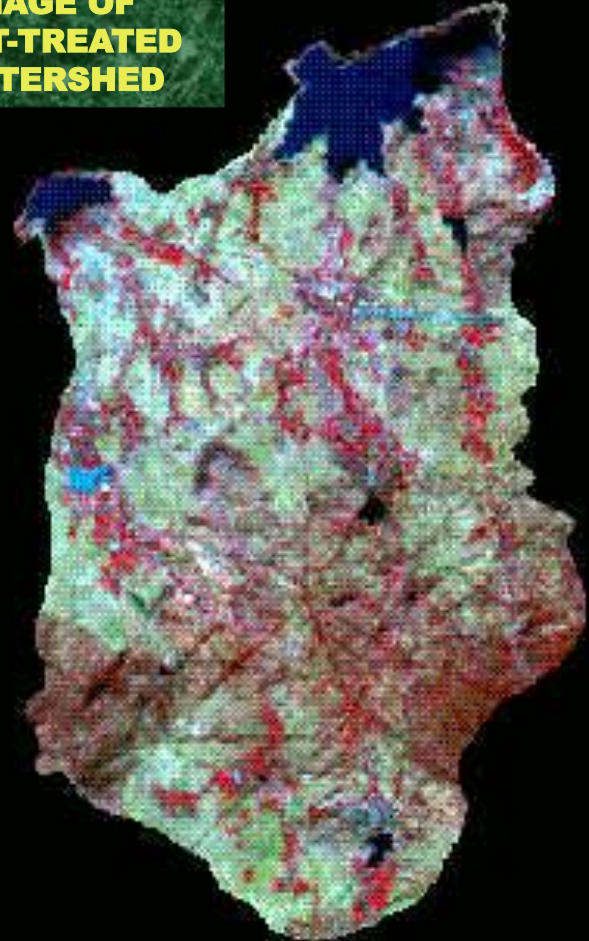
- **Procurement of Digital Satellite Data for pre and post treatment periods having same date of pass**
- **Supervised classification of image with ground verification for Detection of Change in Land Use/ Land Cover condition**
- **Generation of Normalized Vegetation Index for studying Overall Change in Biomass**
- **Estimation of change in land use/land cover condition during pre and post treatment period**
- **Estimation of overall change in biomass**

# FCC (432) OF BUKKAPATNAM TANKWATERSHED

**IMAGE OF  
PRE-TREATED  
WATERSHED**



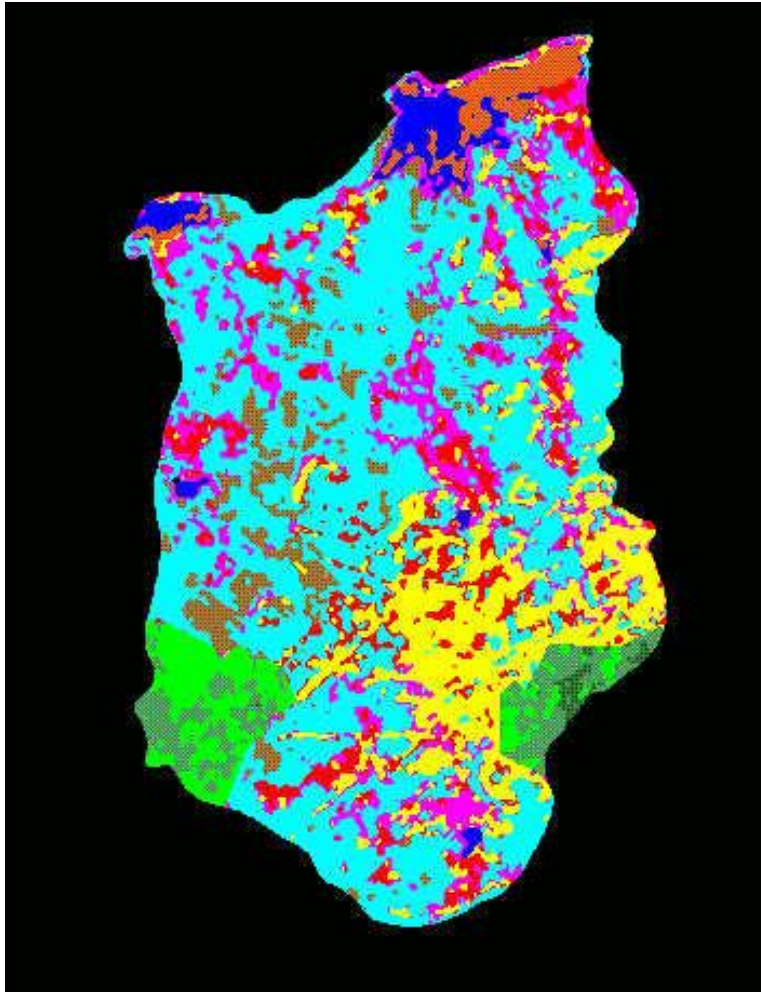
**IMAGE OF  
POST-TREATED  
WATERSHED**



**IRS-1A LISS-IIA2**  
**Date of Pass: 19 DEC.1990**

**IRS-1B LISS-IIA2**  
**Date of Pass: 25 DEC.1997**

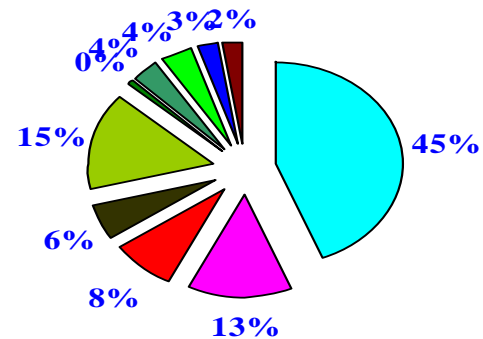
**Fig.3 LAND USE / LAND COVER MAP OF PRE-TREATED WATERSHED**



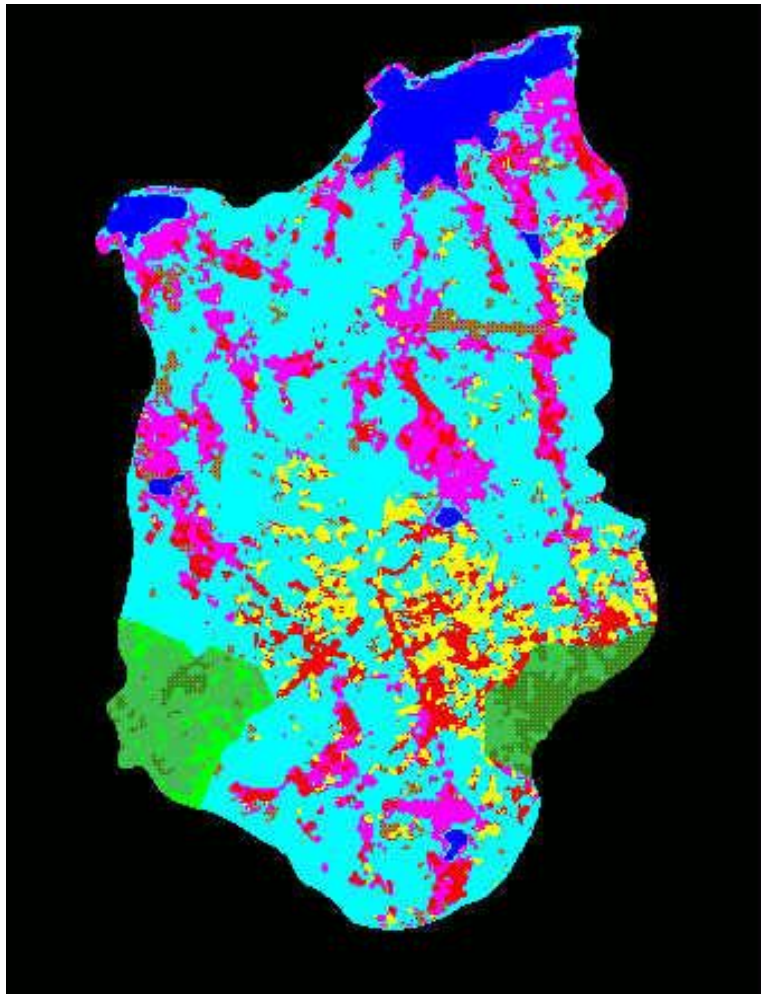
**LEGEND**

-  **RAINFED**
-  **IRRIGATED**
-  **PLANTATION/MISCL.TREE CROPS**
-  **FALLOW/NON-AGRICULTURAL USE**
-  **GRASS LAND / WASTE LAND**
-  **FOREST CLOSED**
-  **FOREST OPEN**
-  **FOREST DEGRADED**
-  **WATERBODIES**
-  **VEGITATION IN TANK AREA**

**AREA DISTRIBUTION**



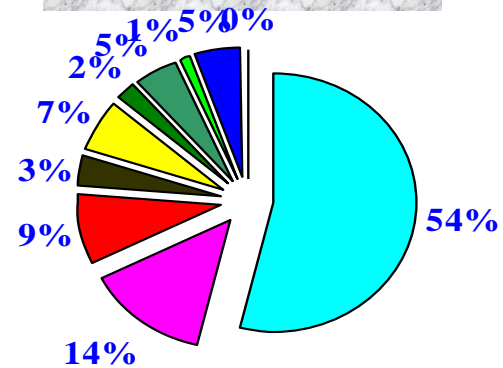
**Fig. 4 LAND USE / LAND COVER MAP OF POST-TREATED WATERSHED**



**LEGEND**

-  **RAINFED**
-  **IRRIGATED**
-  **PLANTATION/ MISC L TREE CROPS**
-  **FALLOW/NON-AGRICULTURAL USE**
-  **GRASS LAND / WASTE LAND**
-  **FOREST CLOSED**
-  **FOREST OPEN**
-  **FOREST DEGRADED**
-  **WATERBODIES**

**AREA DISTRIBUTION**



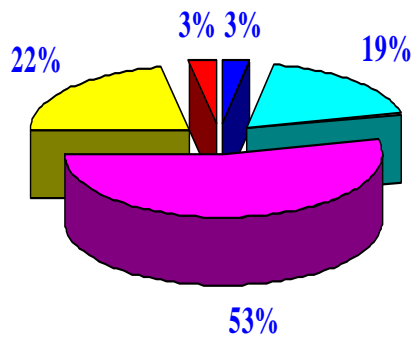
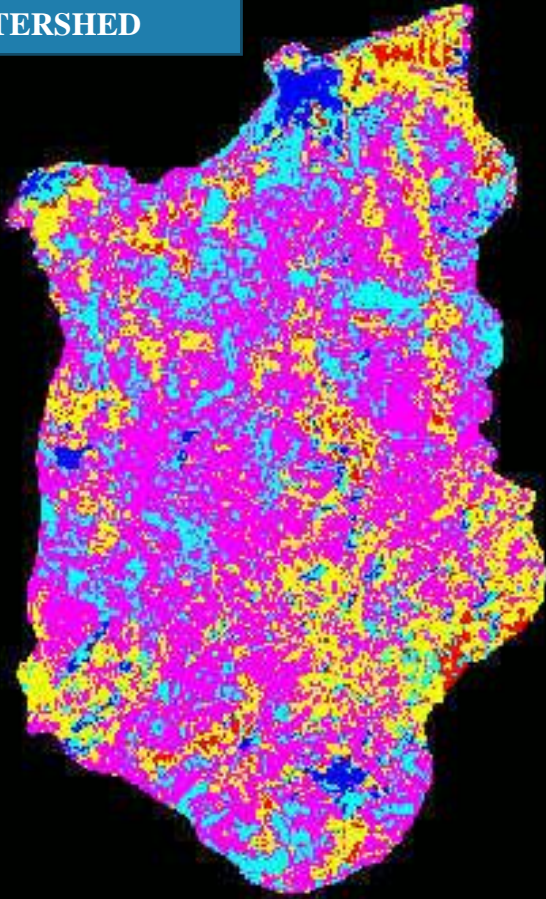
## CHANGE IN LAND USE / LAND COVER

(Area in ha.)

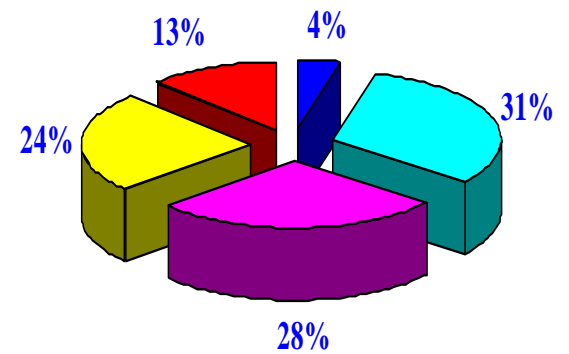
SL. NO.	LAND USE/LAND COVER	1990	1997	CHANGES
1.	<b>AGRICULTURAL CROP</b>			
	<b>RAINFED CROP</b>	4201	4989	+788
	<b>IRRIGATED</b>	1181	1316	+135
	<b>TOTAL</b>	5382	6305	+923
2.	<b>PLANTATION/MISCL.TREE CROPS</b>	772	817	+45
3.	<b>FALLOW/NON-AGRICULTURAL USE</b>	534	305	-229
4.	<b>GRASS LAND / WASTE LAND</b>	1416	629	-787
5.	<b>NOTIFIED FOREST</b>			
	<b>CLOSED (&gt;40%)</b>	45	213	+168
	<b>OPEN (10-40%)</b>	344	437	+93
	<b>DEGRADED (&lt;10%)</b>	378	117	-261
	<b>TOTAL</b>	767	767	NIL
6.	<b>WATERBODIES</b>	253	502	+249
7.	<b>VEGETATION IN TANK AREA</b>	201	-	-201



**NDVI CLASSES OF  
PRE-TREATED  
WATERSHED**



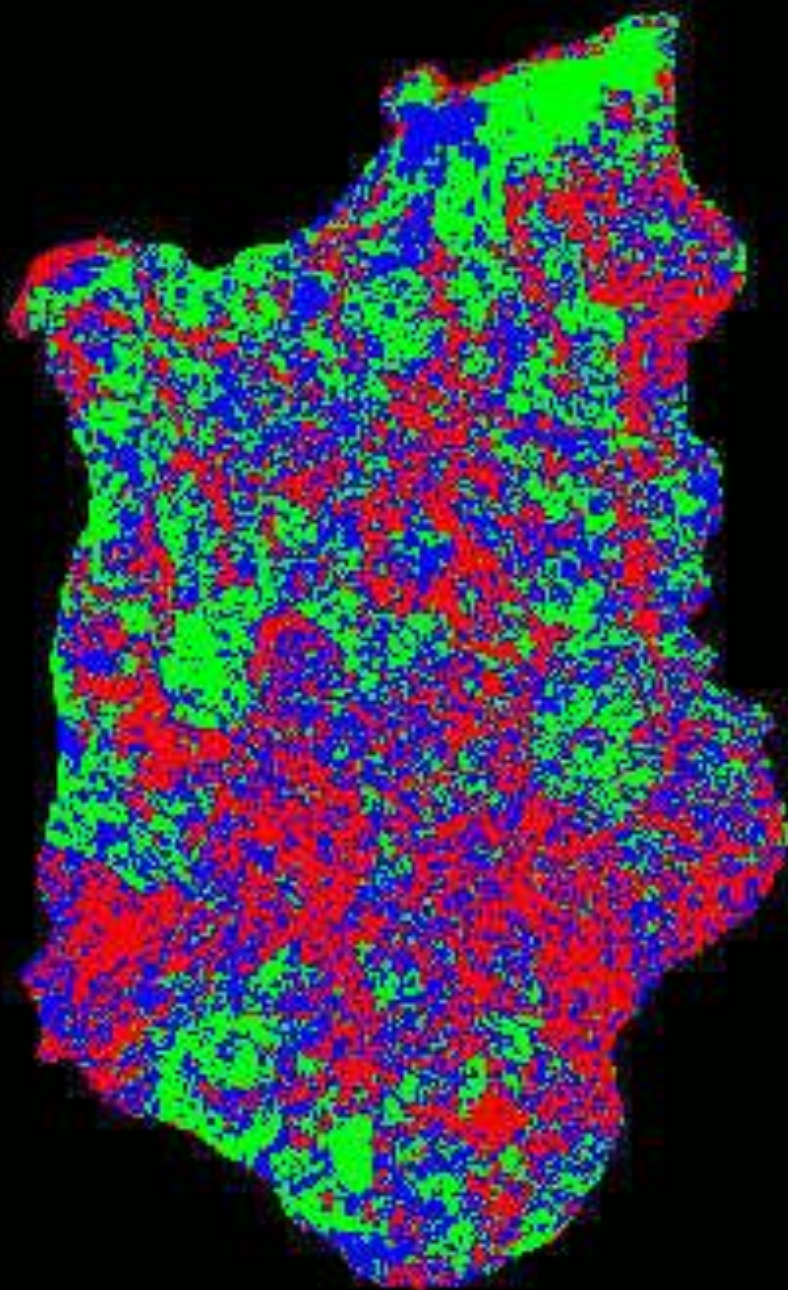
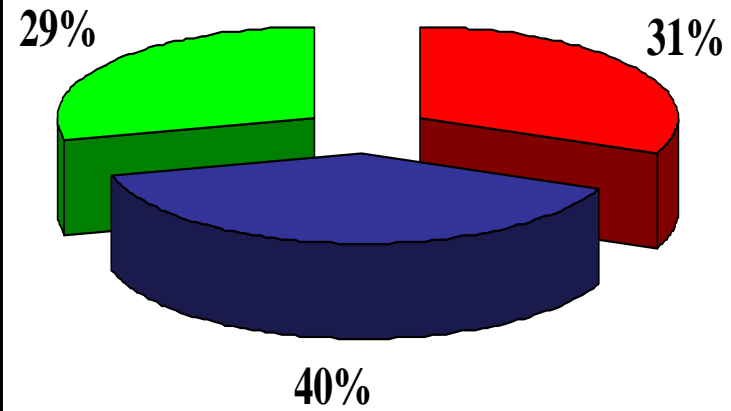
**NDVI CLASSES OF  
POST-TREATED  
WATERSHED**



# NDVI TRANSFORMATION

## LEGEND

- INCREASED
- NO CHANGE
- DECREASED



# CHANGE IN BIOMASS

SL. NO.	NDVI CLASS	PRE-TREATMENT	POST-TREATMENT	CHANGES
1.	VERY HIGH	256	1177	+921
2.	HIGH	2082	2255	+173
3.	MEDIUM	4994	2577	-2417
4.	LOW	1729	2928	+1199
5.	VERY LOW	264	388	+124
	<b>TOTAL</b>	<b>9325</b>	<b>9325</b>	

Sl. No.	CHANGE IN NDVI	AREA IN HECT.
1.	INCREASED	2929
2.	NO-CHANGE	3699
3.	DECREASED	2697
	<b>TOTAL</b>	<b>9325</b>

# FINDINGS

Important visible changes observed in the treated watershed are summarized below:

**In agriculture sector, more area has been brought under cultivation**

- Increase in irrigated area
- Decrease in Fallow Land
- Conversion of Waste Land/Grass Land into cropped area

No significant increase in the area under Dry land Horticulture and Agro-forestry has been observed though a very large number of plants under dry land horticulture (32300) and agro-forestry (47615) were raised in the watershed. This may be due to:

- a. Improper selection of plant species
- b. Poor health of saplings
- c. Poor maintenance of saplings

# FINDINGS

- **Change detection study also indicates the reduction in the spatial extent of grassland/ wasteland, and fallow areas. These lands have been reclaimed for agricultural use by adopting suitable conservation measures.**
- **Significant change have been observed in non arable land. This is mainly due to overseeding of grasses in this area which has contributed to the biomass increase in the watershed.**
- **Though a large number of plants/trees ( 20050 trees and 80622 shrubs) were raised in this area but the satellite picture as well as ground observation does not reflect significant improvement in this area.**
- **The closed, open and degraded categories of forest have been identified under notified forest area based on canopy closure/density using vegetation index algorithm though no activity was undertaken in this area under NWDPRA programme.**
- **Increase in the number of water bodies and water spread area are also seen by the change detection study of the satellite images.**