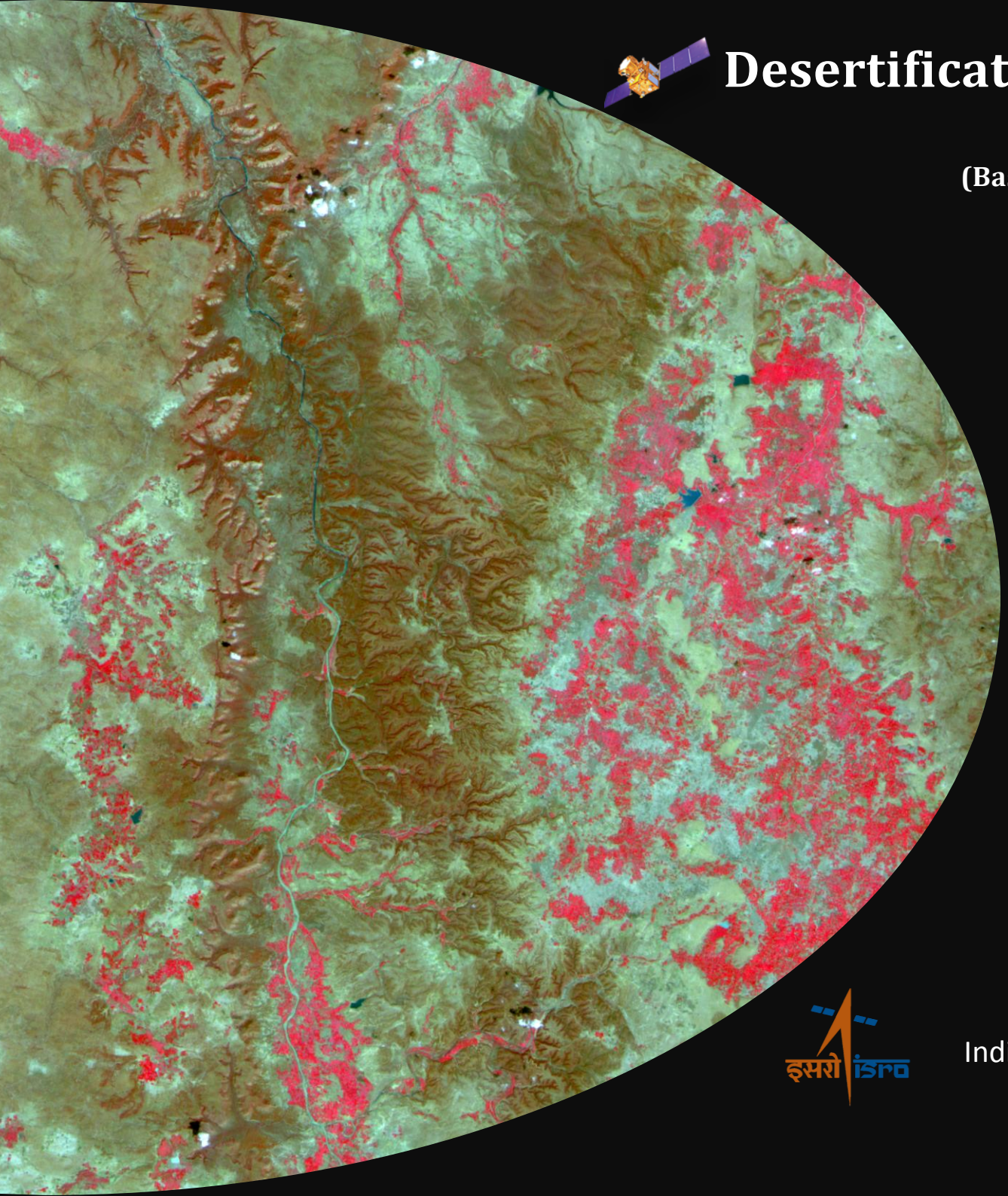
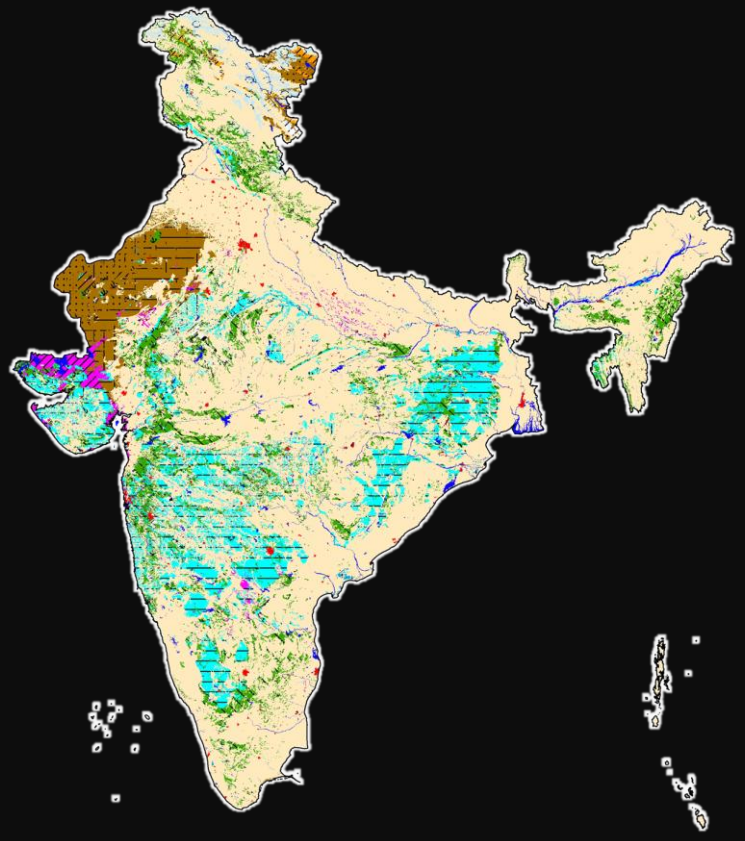
Desertification and Land Degradation Atlas of India

(Based on IRS AWiFS data of 2011-13 and 2003-05)





Space Applications Centre
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Front and back cover shows ravines and adjoining region of Chambal river and its tributaries (parts of Sheopur and Shivpuri districts of Madhya Pradesh & Kota and Sawai Madhopur districts of Rajasthan) as seen on IRS AWiFS FCC image of 18 February 2013. Front cover also shows Desertification and Land Degradation Status Map of India for timeframe 2011-13.

Desertification and Land Degradation

Atlas of India

(Based on IRS AWiFS data of 2011-13 and 2003-05)

Sponsored by
Ministry of Environment, Forest and Climate Change, Government of India

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Department of Space, Government of India
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Message

Indian Space Programme has evolved in achieving self-reliance in space technology and its application for country's overall development. Government of India is making concerted efforts on the utilization of space technology in governance and development in both Central and State Ministries. Some of the major areas of applications are natural resources inventory and management, disaster management support, tele-education, tele-medicine, meteorological and early warning services. The synergistic use of remote sensing, communication and navigation satellites is needed for efficient management and conservation of country's natural resources and maximizing the efficiency of the national missions.

India has around 70% of its total geographical area under drylands undergoing the process of desertification i.e., land degradation as a result of climatic and anthropogenic factors. The population pressure has resulted in over exploitation of land for cultivation, grazing, water resources, deforestation etc., leading to degradation of drylands. Geospatial technology utilizing satellite data provides important inputs for preparing integrated action plans for combating desertification, land degradation and drought.

I am happy to note that inventory and monitoring of desertification of the entire country has been carried out using data from Indian Remote Sensing Satellites. The outputs are helpful in prioritizing areas to be taken up for minimizing the impact of desertification and land degradation.

I congratulate the team for their valuable contributions for compiling the outcome in the form of an Atlas. It serves as a ready reference for policy makers and researchers.

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भारत सरकार / GOVERNMENT OF INDIA

Message

Land degradation is an issue of increasing global concern. It threatens not only the productivity of land but also water quality, human health and the fundamentals of ecosystems on which all life depend. It has also close connection with other major global issues, particularly climate change and biodiversity. It has been estimated that globally around 24 billion tons of fertile soil and 27,000 bio-species are lost each year. While land degradation is acutely felt in the world's arid lands, some 80 per cent is actually occurring outside these areas. For this reason, there is an urgent need to halt and reverse land degradation for ensuring food, water and environment security as well improving living conditions of population residing in such areas.

Desertification, along with climate change and the loss of biodiversity were identified as the greatest challenges to sustainable development during the 1992 Rio Earth Summit which paved the way for the conceptualization and formulation of the United Nations Convention to Combat Desertification (UNCCD). The Convention's 195 parties, including India, work together to improve the living conditions for people in drylands, maintain and restore land and soil productivity and mitigate the effects of drought.

I am happy to note that inventory and monitoring of the land under various processes of desertification and land degradation in our country is being monitored using data from Indian Remote Sensing Satellites. The first Desertification Status Mapping was carried out by the Space Application Centre (SAC) in 2007. The current report-cum-atlas "Desertification and Land Degradation Atlas of India (Based on IRS AWiFS data of 2011-13 and 2003-05 time frames)" is the second assessment giving national level spatial information on various land degradation processes and their severity of the degraded land of the country.

I congratulate the project team of Space Applications Centre, ISRO, Ahmedabad and all other partner Central/State Government Departments and Academic Institutes for their valuable contributions in bringing out the "Desertification and Land Degradation Atlas of India". I am certain that the salient findings will be extremely useful to India's reporting to UNCCD and to all others concerned with combating desertification and land degradation in the country.

(Prakash Javadekar)

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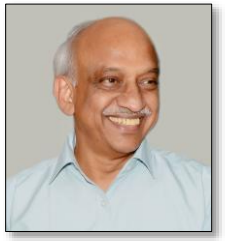

Preamble

Application of space technology in inventory, monitoring and management of national natural resources as well as in early warning and management of natural disasters has been demonstrated in our country during the past few decades.

Department of Space (DOS) has evolved a utilization programme of space technology for societal benefits viz., National Natural Resources Management System (NNRMS) which caters to the needs of various Ministries as well Central and State Departments. Recent interactions of Scientists and Engineers of DOS with various Ministries/State Departments led to redefining of priority areas as well as formulation/execution of around 160 projects for enhanced utilization of space technology in governance and development.

Combating desertification and land degradation is one of the thrust areas identified by the Ministry of Environment, Forest & Climate Change (MoEF&CC). In this direction, towards prioritizing vulnerable areas, at the behest of the Ministry, Space Applications Centre, Ahmedabad along with partner institutes has taken up the task of inventory and monitoring of desertification and land degradation of the entire country using Indian Remote Sensing Satellites (IRS) AWiFS data. Data for the time frame 2011-13 and 2003-05 in GIS environment have been analyzed and found to be useful not only in understanding the causes and processes leading to desertification and land degradation but also in accessing the success of various programs/schemes implemented for combating land degradation. I hope that the project team works further towards desertification and land degradation vulnerability modelling as well as preparation of action plans (1:10,000/1:4,000 scales) using high resolution IRS data.

I am happy to note that the desertification and land degradation status maps of the entire country have been compiled in the form of an Atlas for easy reference for use by concerned policy makers, planners, managers and researchers. I congratulate the team for their valuable contributions.

आ सी किरण कुमार

(आ. सी. किरण कुमार)
(A S Kiran Kumar)

अजय नारायण झा
AJAY NARAYAN JHA, IAS

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Secretary
Government of India
Ministry of Environment, Forest and Climate Change
सत्यमेव जयते

Foreword

Desertification and land degradation are major threats to agricultural productivity in our country. The process of desertification and land degradation are accelerating due to over-exploitation of natural resources accentuated by the impacts of climate change and increasing human and livestock population.

India is signatory to the United Nations Convention on Combating Desertification (UNCCD) and is committed to combat desertification and land degradation and achieving land degradation neutral status by 2030. In order to achieve these objectives, the Government of India is implementing large number of National Level Programmes and Schemes in the country. The Ministry of Environment, Forest and Climate Change is the nodal Ministry for the implementation of the UNCCD.

There is a requirement of regularly monitoring desertification/land degradation of the country for planning effective strategies and measures to combat desertification/ land degradation. Use of Indian Remote Sensing satellite data and GIS techniques are important and reliable tools towards this endeavour. I am pleased to note that the Space Applications Centre, Ahmedabad has collaborated with the Ministry of Environment, Forest and Climate Change along with several Central, State and academic institutions, and prepared a Desertification and Land Degradation Atlas of India on a scale of 1:500,000 of land use maps based on satellite imagery comparing the extent, process and severity of desertification and land degradation in the country.

The maps and the salient findings would be useful not only as a ready reference but also as tool for regional planning and for further identifying the gaps and in strengthening the measures required in the ongoing National Action Plan and Sustainable Land and Ecosystem Management Programme for combating desertification/land degradation. This is also an important contribution to India's reporting to the UNCCD.

I appreciate the efforts made by the national team and I am sure that this Atlas would be useful for all policy planners and other stakeholders.

(Ajay Narayan Jha)

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Preface

Inventory and monitoring desertification and land degradation processes along with assessment of its severity are major requirements of Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India, New Delhi. Ministry plans to utilize this information for India's reporting to United Nations Convention to Combat Desertification (UNCCD) and preparation of National Action Plans (NAPs) for combating desertification. Recognizing the significant role of Earth Observation Satellites and geospatial techniques in desertification and land degradation studies, MoEF&CC has entrusted a National level project on "Desertification Status Mapping of India" to Space Applications Centre, ISRO, Ahmedabad.

Desertification and Land Degradation Status Mapping in GIS environment on 1:500 K using digital IRS AWiFS data of 2011-13 and 2003-05 time frames has been carried out for entire country including change detection. The national level classification system as well the methodology for interpreting satellite data has been evolved and standardized. The geospatial database created for two timeframes along with satellite images has been put on SAC Web Portal VEDAS. This geospatial database is extremely useful for identifying vulnerable areas of desertification and land degradation and easy updation in future. State-wise maps along with respective satellite images and analysis have been brought out as "Desertification and Land Degradation Atlas of India", as a ready reference.

The analysis reveals that 96.40 mha area of the country is undergoing process of land degradation (29.32% of the total geographic area of the country) during 2011-13, while during 2003-05 the area undergoing process of land degradation is 94.53 mha (28.76% of the total geographic area of the country). Thus there is an increase of 1.87 mha area undergoing process of land degradation (constituting 0.57% of the total geographic area of the country) during the time frame 2003-05 and 2011-13. Area under desertification (arid, semi-arid and dry sub-humid regions of the country) during 2011-13 is 82.64 mha whereas during 2003-05 it is 81.48 mha. Thus there is an increase of 1.16 mha area under desertification. I understand that additionally detailed mapping for 78 vulnerable districts on 1:50 K is in progress and expected to be completed soon.

I appreciate the efforts made by the project team in bringing out the "Desertification and Land Degradation Atlas of India", and hope for its meaningful usage by planners in combating desertification/land degradation in the country.

तपन मिश्रा
Tapan Misra

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Acknowledgements

Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt. of India has identified Desertification & Land Degradation Studies as one of the thrust area under NNRMS Standing Committee on Bio-resources and Environment (NNRMS SC-B). Spatial inventory of Desertification and Land Degradation of the country based on satellite data interpretation was found to be extremely useful for India's reporting to UNCCD by MoEF&CC. There has been a requirement of monitoring changes using recent satellite data and this led to formulation and execution of the project on "Desertification Status Mapping of India", taken up by Space Applications Centre, Ahmedabad. We thank MoEF&CC for entrusting the task to SAC and funding the project.

We would like to place on record our deep sense of gratitude to Shri A.S. Kiran Kumar, Secretary DOS and Chairman ISRO and Shri Tapan Misra, Director, SAC for their encouragement and guidance in carrying out this national level project. We are thankful to Dr. T. Chandni, Adviser, RE, Dr. G.V. Subrahmanyam, former Adviser, RE, Dr. Harendra Kharkwal, Joint Director and Shri Pankaj Verma, Joint Director, RE, MoEF&CC for their continuous support in executing this project. We are also extremely thankful to Dr. T. Chandni, Adviser, RE and Ms. Bharati, Director, Green India Mission/Desertification, MoEF&CC, New Delhi for providing necessary support and valuable comments to improve the presentation of the Atlas.

We express our thanks to Dr. B. S. Gohil, Deputy Director, EPSA, Dr. J. S. Parihar, and Dr P. K. Pal, former Deputy Directors, Dr. Raj Kumar, Group Director, GHCAG, Dr. M. Chakraborty, former Group Director, GSAG, Dr. Prakash Chauhan, Group Director, BPSG and Shri Shashikant A. Sharma, Group Head, VRG for providing technical guidance, suggestions and necessary support in carrying out this project. We are thankful to the SAC Committee on, 'Space Applications: Projects Monitoring and review, Outsourcing and Inter Agency Document Review Committee', in particular Shri R M Parmar, Deputy Director SEDA & Committee Chairman and Shri Vivek Pandey, Member Secretary for their comments and suggestions. Contributions made by Shri K.L.N. Sastry and Shri R.J. Bhanderi, Scientists, SAC in the design and organisation of the geospatial database is appreciable. Significant contributions made by Shri Manish Parmar, Scientist, SAC in the analysis and presentation of the outcome including design conceptualization of the Atlas along with Ms. Arunima Dasgupta, RA from SAC are noteworthy.

We extend our gratitude to Directors/Heads of the Institutes/Vice-Chancellors of nineteen collaborating research organizations/academic institutions of the country for their support in executing this project.

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Executive Summary

Desertification is land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities leading to loss of productive ecosystem and biodiversity. There is an urgent need to stop and reverse the process of land degradation. Sustainable management of soil, water and biodiversity are required for protecting the land from further degradation.

There are global efforts to combat desertification. India is signatory to the United Nations Convention on Combating Desertification (UNCCD) and is committed to achieve the land degradation neutral status by 2030. The Convention addresses specifically the issue of Desertification, Land Degradation and Drought (DLDD). Desertification Cell at Ministry of Environment, Forest & Climate Change (MoEF&CC), Government of India, New Delhi represents India in UNCCD and has established a multi-institutional mechanism for India's reporting to UNCCD related to implementation of Indian programmes for combating desertification and land degradation.

One of the key requirement is inventory and monitoring desertification and land degradation of the country using satellite data in Geographical Information System (GIS) environment for providing baseline data to be used for prioritizing areas, carrying out desertification vulnerability and risk assessment and preparing action plans for combating desertification and land degradation.

Accordingly, Desertification and Land Degradation has been identified as one of the thrust area by the Standing Committee on Bio-resources and Environment under National Natural Resources Management System, (NNRMS SC-B), Chaired by Secretary, MoEF&CC. NNRMS SC-B provides broad guidelines about the requirements of MoEF&CC and approves relevant projects catering to its needs.

The present document "Desertification and Land Degradation Atlas of India (Based on IRS AWiFS data of 2011-13 and 2003-05)", is one of the outcome of an ongoing MoEF&CC sponsored national project entitled, "Desertification Status Mapping of India", being executed by the Space Applications Centre (SAC), Indian Space Research Organisation (ISRO), Ahmedabad along with 19 concerned Central/State government departments and academic institutes under NNRMS SC-B.

This Atlas presents Desertification /Land Degradation Status Maps depicting Land Use, Process of Degradation and Severity Level along with area statistics consolidated for entire country as well state-wise for 2011-13 and 2003-05 time frame and reports the changes. Representative sample images of Indian Remote Sensing Satellite (IRS) Advanced Wide Field Sensor (AWiFS) are also included for reference purpose. Maps have been prepared based on classification system and broad methodology standardized during previous studies/projects carried out by SAC.

On-screen visual interpretation of IRS AWiFS data (three season i.e., rabi, summer and kharif) in GIS environment on 1:500, 000 scale has been carried out. Geo-database was created using ArcGIS software package based on National Spatial Frame work on 1:250K with LCC projection and WGS 84 datum. Base layers of administrative boundaries, settlements, water bodies, road and rail networks were used as reference from ancillary datasets. Forest boundaries were taken from Forest Survey of India (FSI) and used as reference layer to delineate polygons particularly within forest areas. Ground truth data and field checks were carried out to finalize the maps. Quality Checking (QC) was carried out considering accuracy of georeferencing (Image co-registration < 2 pixels error), uniformity in projection and datum,

correctness of interpreted land use, process & severity, correctness of GIS database design and standards (MMU > 225 ha, topology checking, seamless mosaic, codification, cartographic elements) etc.

The analysis reveals that 96.40 mha area of the country is undergoing process of land degradation i.e., 29.32% of the Total Geographic Area (TGA) of the country during 2011-13, while during 2003-05 the area undergoing process of land degradation is 94.53 mha (28.76% of the TGA). Analysis shows that around 23.95% (2011-13) and 23.64% (2003-05) of desertification/land degradation with respect to total TGA is contributed by Rajasthan, Maharashtra, Gujarat, Jammu & Kashmir, Karnataka, Jharkhand, Odisha, Madhya Pradesh and Telangana in descending order. All other remaining states are contributing less than 1% (individually) of desertification/land degradation.

However, the analysis with respect to TGA of the individual states show that Jharkhand, Rajasthan, Delhi, Gujarat and Goa are showing more than 50% area under desertification/land degradation, whereas states with less than 10% area under desertification/land degradation are Kerala, Assam, Mizoram, Haryana, Bihar, Uttar Pradesh, Punjab and Arunachal Pradesh.

There is a cumulative increase of 1.87 mha area undergoing process of desertification/land degradation in the country (constituting 0.57% of the TGA of the country) during the time frame 2003-05 and 2011-13. The change analysis carried out for 2011-13 and 2003-05 time frames indicates that around 1.95 mha land has been reclaimed and 0.44 mha land has been converted from high severity to low severity degradation class, indicating improvement. On the other hand, around 3.63 mha productive land has degraded and 0.74 mha land has converted from low severity to high severity degradation class. Further, during this time frame, high desertification/land degradation changes are observed in the states of Delhi, Tripura, Nagaland, Himachal Pradesh and Mizoram (11.03-4.34 %), whereas Odisha, Rajasthan, Telangana and Uttar Pradesh have shown improvement (-0.11 to -1.27 %).

The most significant process of desertification/ land degradation in the country is Water Erosion (10.98% in 2011-13 and 10.83% in 2003-05). The second most significant process is Vegetation Degradation (8.91% in 2011-13 and 8.60% in 2003-05), which is followed by Wind erosion (5.55 % in 2011-13 and 5.58 % in 2003-05).

Area under desertification (arid, semi-arid and dry sub-humid regions of the country) during 2011-13 is 82.64 mha; whereas, during 2003-05 it is 81.48 mha. Thus there is a cumulative increase of 1.16 mha area under desertification. The most significant processes of desertification in arid region is observed to be wind erosion and in semi-arid and dry sub-humid regions vegetation degradation and water erosion dominates.

The maps and salient findings compiled in the form of Atlas are meant for a ready reference to be used by concerned policy makers, regional planners and researchers. The status of India's desertification and land degradation along with the changes can be used for India's reporting to UNCCD.

The geospatial database along with corresponding satellite data can be easily used for regional planning and to the ongoing National Action Plans (NAP) and Sustainable Land and Ecosystem Management (SLEM) program for combating desertification/land degradation and can be easily updated in future.

Table of Contents

Introduction

Desertification is the continuous degradation of land under the influence of natural and anthropological causes in arid, semi-arid and dry-sub humid conditions. Desertification affects two third countries of the world and one third of the earth's surface, on which one billion people live (one sixth of world's population). The processes of desertification and land degradation are observed to have accelerated during recent years.

As per United Nations Convention for Combating Desertification (UNCCD), Desertification is defined as "land degradation in arid, semiarid and dry sub-humid areas resulting from various factors including climatic variations and human activities" (UNCCD, 1994). Here ''land'' means the terrestrial bio-productive system'' and "land degradation" means "reduction or loss of biological or economic productivity and complexity of rainfed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns, such as:

- Soil erosion caused by wind and/or water;
- Deterioration of the physical, chemical and biological or economic properties of soil; and
- Long term loss of natural vegetation (UNCCD, 1994)

India is a signatory to the UNCCD, which was adopted on June 17, 1994. Under UNCCD, a Thematic Programme Network - 1 (TPN-1) on "Desertification Monitoring and Assessment", was identified as part of Regional Action Programme in Asia. Space Applications Centre (SAC), Indian Space Research Organisation (ISRO), Ahmedabad was identified as national nodal organisation to coordinate TPN-1 activities in the country by Ministry of Environment and Forest (MoEF), Government of India and subsequently SAC along with 17 participating agencies developed a three level national classification system (SAC 2007a) and carried out Desertification and Land Degradation Status Mapping (DSM) of India (SAC, 2007b and Ajai et al., 2009). The results were utilised by MoEF for India's reporting to UNCCD.

The Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India (GOI) has further entrusted SAC to carry out DSM of India using recent satellite data and bring out the changes. This Atlas presents State-wise Desertification/Land Degradation Status Maps prepared using on-screen visual interpretation of Indian Remote Sensing Satellite (IRS), Advanced Wide Field Sensor (AWiFS) data of 2011-13 and 2003-05 time frames in GIS environment. Area under desertification/land degradation for both time frames and changes are reported state-wise as well for the entire country.

Objective

1. Desertification and Land Degradation Status Mapping using IRS AWiFS data on 1:500,000 scale for 2011-13 and 2003-05 time frames for the entire country along with standard geospatial database.
2. To bring out the changes in Desertification and Land Degradation Status for the entire country.

Data Used

Multi-temporal digital IRS AWiFS data, ancillary information, collateral data and forest layer of Forest Survey of India (FSI) were used. IRS AWiFS is 10 bits data with 56 meters spatial resolution, 5 day repeativity, combined swath of 740 km in four spectral channels, i.e. 520-590 nm (Green), 620-680 nm (Red), 770-860 nm (NIR) and 1550-1700 nm (SWIR). False Color Composite (FCC) prepared using first three channels was used. Base layers of water bodies, rivers and administrative boundaries were taken from Natural Resources Data Base (NRDB) and road and railway network were taken from SAC National Wetland Inventory & Assessment (NWIA) project. Limited field data was also utilised to support image interpretation.

Satellite Data (2011-2013 and 2003-2005)	
Season	**Timeframe**
Kharif	September – November
Rabi	December – March
Summer	April – June

Ancillary Data	
Layer	**Source**
Forest Boundary	Forest Survey of India
Water body, Rivers	Natural Resources Data Base
Administrative boundary	
Road and railway network	SAC National Wetland Inventory & Assessment

Classification System

The classification system and the broad methodology for the desertification/land degradation mapping standardized during the previous studies/projects at SAC, ISRO (SAC 2007a, SAC, 2007b and Ajai et al., 2009) has been followed in the present work. It comprises of three elements, viz., Land Use, Process of Degradation and Severity Level. A three level Alpha-numeric code is used for codification of the DSM maps in the current project. The details of classification system are depicted below:

Level-1: Land Use		Level-2: Process of Desertification		Level-3: Severity	
Agriculture irrigated	I	**vegetation degradation**	**v**	**Low**	**1**
Agriculture unirrigated	D	water erosion	w	High	2
Forest / Plantation	**F/P**	wind erosion	e		
Grassland / Grazing land	G	salinity / alkalinity	s/a		
Land with scrub	S	water logging	l		
Barren	B	mass movement	g		
Rocky area	R	frost heaving	h		
Dune / Sandy area	E	frost shattering	f		
Glacial	C	man made	m		
Periglacial	L				
Others	T				

Forest, vegetation degradation, Low → Fv1

List of various possible cases of Desertification and Land Degradation in the country

Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Gv1,2	Grassland / Grazing land, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1,2	Agriculture irrigated, water erosion
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	Fw1,2	Forest, water erosion
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	Bs1,2	Barren, salinity / alkalinity
	Il1,2	Agriculture irrigated, water logging
	Dl1,2	Agriculture unirrigated, water logging
	Fl1	Forest, water logging
	Gl2	Grassland / Grazing land, water logging
	Sl1,2	Land with scrub, water logging
	El1,2	Dune / Sandy area, water logging
	Bg2	Barren, mass movement
	Rf1	Rocky, frost shattering
	Lf1,2	Periglacial, frost shattering
	Fm1,2	Forest, man made
	Tm1,2	Others, man made
	B	Barren
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Processes of Desertification/ Land Degradation

Vegetation degradation:

Vegetation degradation is observed mainly as deforestation / forest-blanks / shifting cultivation and degradation in grazing / grassland as well as in scrubland. At places, agriculture is observed within forest lands, this has also been classified under vegetation degradation within forest area. Vegetation is an important factor in the protection of soil and soil fertility. Destruction of vegetation, most often by human activities accelerates soil degradation leading to desertification. When a soil loses vegetation cover, it becomes more susceptible to wind and water erosion. Removal of top soil by water or wind erosion results in loss of organic material leading to decrease in soil aggregation and stability, and hence soil fertility. The water-holding capacity and the nutrient content of the soil are reduced when organic material is lost, which is an additional strain on vegetation survival. Example of vegetation degradation along with various severity were observed almost everywhere in India (Figure-1).

Figure-1: Vegetation degradation inside forest as visible in AWiFS image covering parts of Meghalaya with corresponding field photograph

Water erosion:

Water Erosion is loss of soil cover mainly due to rainfall and surface runoff water. Water erosion is observed in both hot and cold desert areas, across various land covers and with varying severity levels. The sheet erosion (mostly within agricultural lands) and rills are categorised in slight category, the narrow and shallow gullies are categorized as moderate erosion, while the deep / wide gullies and ravines are classified as severe erosion. Particularly in the context of desertification or land degradation as a whole, water erosion does not refer the river erosion.

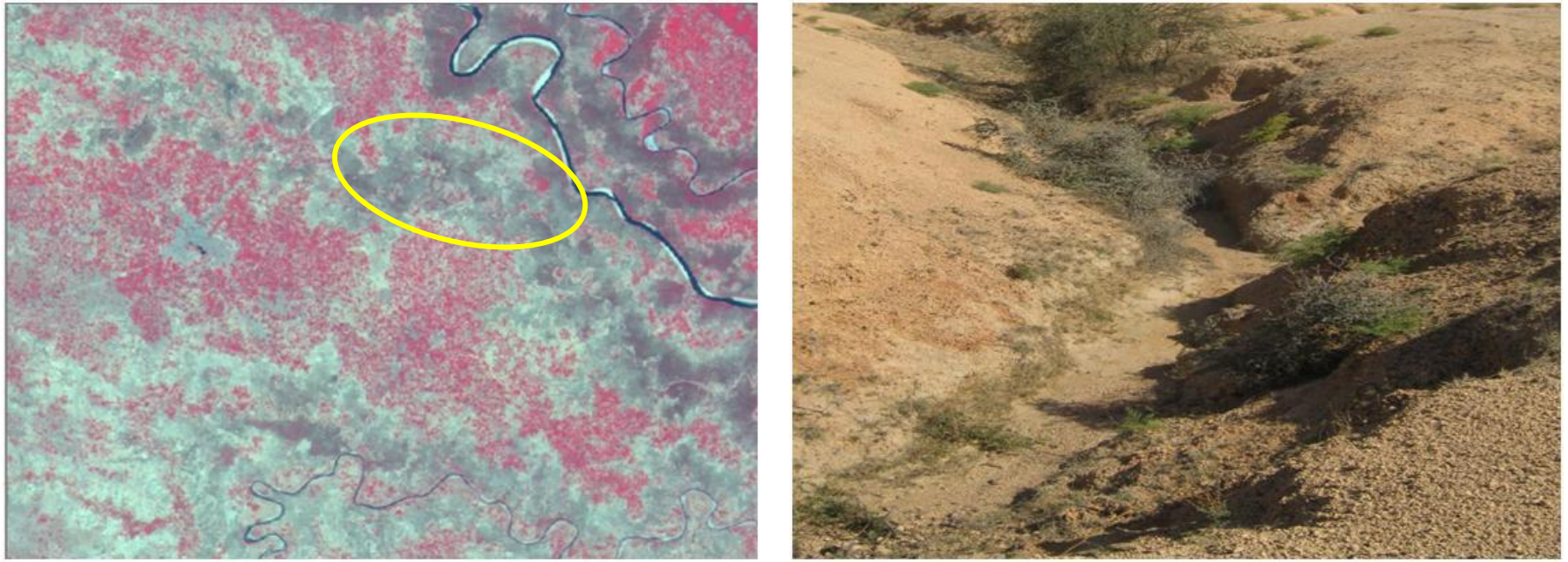


Figure-2: Gully erosion as visible in AWiFS image covering parts of Rajasthan with corresponding field photograph

Wind erosion:

Wind erosion pertains to the Aeolian activities. It denotes the spread of sand by various processes, even up to lofty altitudes of Himalayas. Wind can erode the soil very selectively and intensively in three transporting method, namely Suspension, Saltation and Soil creep. Soil is more vulnerable for wind erosion in conditions such as very sparse or no vegetative cover, increasing wind speed, loose, dry, fine or very light soil, smooth soil surface, large exposed area etc. Wind erosion removes the topsoil, which is rich in all plant nutrients and bacterial activities. Removal of topsoil reduces the capacity of the soil to function and restricts its ability to sustain future uses. Moreover, windblown dust or sand is deposited in cultivated land and buries the lands, thus reducing the production. Various kind of sand cover and their severity are classified based on the depth and spread of sand sheet/dunes and barchans. Figure-3 shows the satellite images and field photographs of wind erosion of various severity levels.

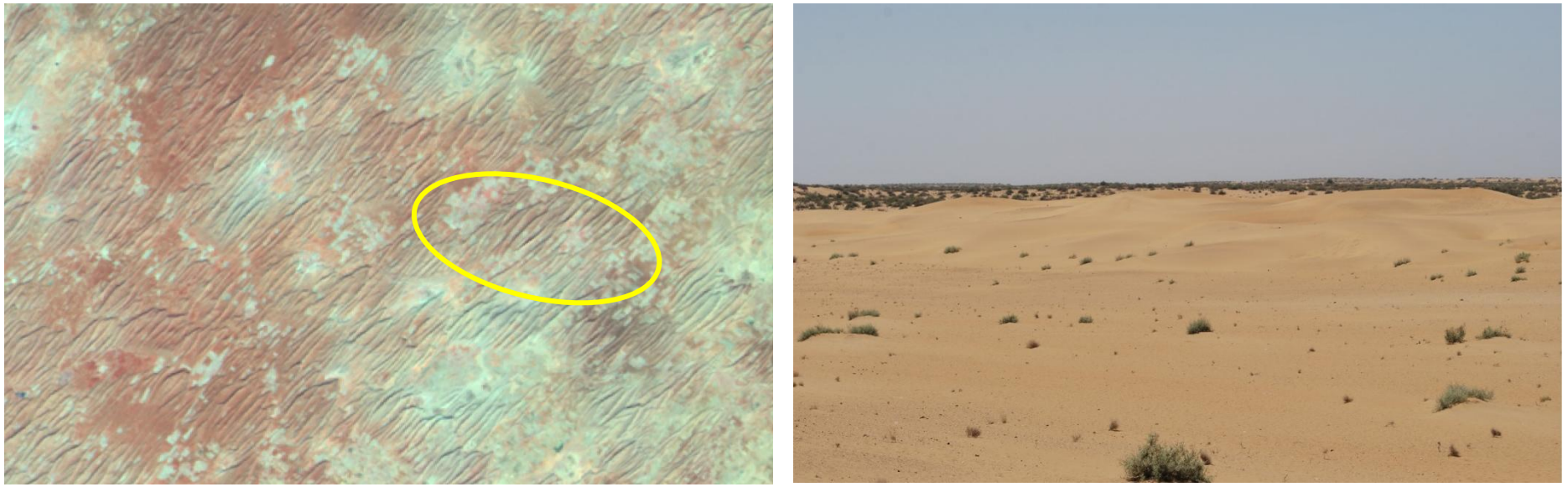


Figure-3: Sand dunes as visible in AWiFS image covering parts of Rajasthan with corresponding field photograph

Water logging:

The undrained land parcels tend to accumulate standing water for longer durations of time on the surface, this condition is called water logging viz ox-bow lakes, low lying areas, and even the shallow water tables. The severity of water logging is determined based on the period of time the water remains stagnant. Several situations can be responsible for the rise in water table like Flood, salt-rich hard pans, excess irrigation, wrong drainage planning etc. Waterlogging may lead to salinization also. Figure-4 shows waterlogging as depicted in AWiFS images and in corresponding field photographs.

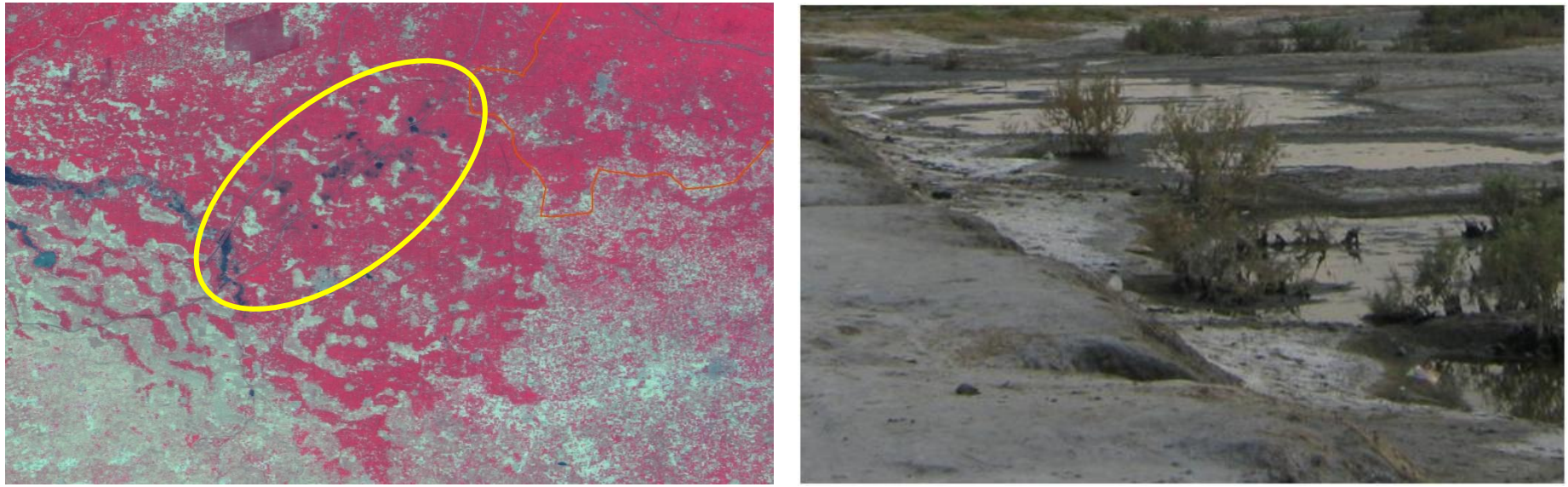


Figure-4: Water logging as visible in AWiFS image covering parts of Rajasthan with corresponding field photograph

Salinity / Alkalinity:

Salinity or Alkalinity is fundamentally the chemical property of the soils. It occurs mostly in cultivated lands, especially in the irrigated areas. At places salinity is clearly observed on satellite images, while the alkalinization is not seen and is mostly inferred based on ground truth and soil sample analysis as well as information/ published maps. Soil salinity refers to the water dissolvable salt present in soil. Salinity can develop naturally, or human-induced. The main causes are excess evapotranspiration, drought, excess irrigation, increase in toxicity, and rise in ground water table. Salinity in dry lands occurs when the water table is between 2 to 3 meters from the soil surface. The salts from the groundwater are raised by capillary action to the surface of the soil. Over time, water evaporates, and the salt remains on the surface. Salinity in irrigated land can occur due to over irrigation and excess use of fertilizers and other chemicals. Figure-5 shows AWiFS images and field photographs of salinity/alkalinity process.

Figure-5: Salinity in agricultural field as visible in AWiFS image covering parts of Uttar Pradesh with corresponding field photograph

Mass Movement:

The spontaneous downward movement of soil and rock under the influence of gravity (but without the dynamic action of moving fluids) is included under the general term Mass Movement. The mass movement processes include all forms of down slope movement of soils, overburden, or bedrock under the direct influence of gravity. Mass movement represents the spontaneous yielding of earth materials when gravitational force exceeds the internal strength of the material. It involves sliding, rolling and flowage of masses of soil, overburden and bedrock. Figure-6 shows the picture of mass movement as visible in image and corresponding ground photograph.

Figure-6: Mass movement as visible in AWiFS image covering parts of Jammu & Kashmir with corresponding field photograph

Frost Heaving:

Frost heaving is the process of ice lens formation beneath the soil surface during freezing conditions in the atmosphere. The ice grows in the direction of heat loss (vertically toward the surface), starting at the freezing front or boundary in the soil. It requires a water supply to keep feeding the ice crystal growth. The growing ice is restrained by overlying soil, which applies a load that limits its vertical growth and promotes the formation of a lens-shaped area of ice within the soil. The force of one or more growing ice lenses is sufficient to lift a layer of soil, as much as 30 cm or more. Due to coarse spatial resolution this process could not be identified in AWiFS images. However, the LISS3 satellite images and corresponding field photographs of frost heaving is shown in figure-7.

Figure-7: Frost heaving as visible in LISS3 image covering parts of Jammu & Kashmir with corresponding field photograph

Frost shattering:

Frost shattering is the essentially a process of mechanical weathering or breakdown of rocks due to regular fluctuation in temperature, around 0^{o}C, in joints or cracks in rocks. At the time of precipitation water enters into the cracks of rock. In winter, it freezes to ice and increases in volume. This creates tremendous pressure on the surrounding rock and generates cracks. This process continues over time, widens the joints/cracks, and causes pieces of rock to shatter from the main rock. The broken pieces of rocks fall down and spread over creating a stony surface called Talus or Scree. This is a regular process in a Periglacial environment. The alternating process of frost shattering slowly widens the joints/cracks, and in time, causes pieces of rock to shatter from the main rock. Figure-8 shows AWiFS images and field photographs of frost shattering process.

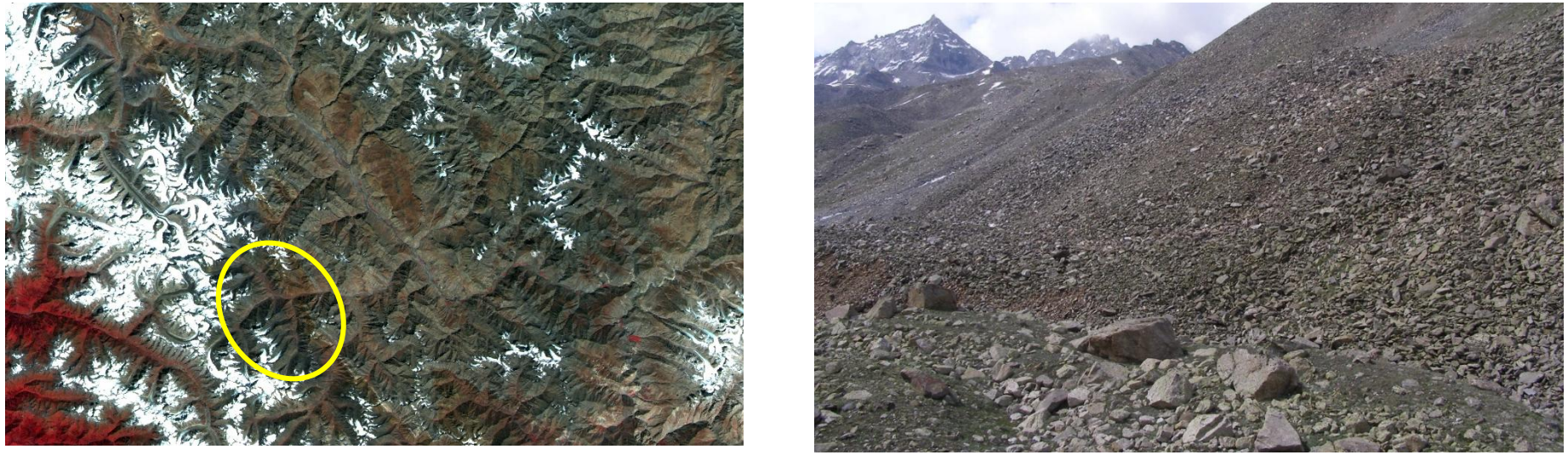


Figure-8: Frost shattering as visible in AWiFS image covering parts of Himachal Pradesh with corresponding field photograph

Man Made:

All those land degradation processes which are induced directly or indirectly by human intervention and are not natural, are categorised as Man Made desertification processes. It includes, Mining/Quarrying, Brick Kiln, Industrial Effluents, City Waste, Urban Agglomeration etc. This occurs across various land use/ land cover classes (Figure-9).

Figure-9: Open cast mining as visible in AWiFS image covering parts of Jharkhand with corresponding field photograph

Barren / Rocky area:

Barren / rocky areas are kind of wastelands which do not have productive capacity. These areas are mostly without or negligible soil cover either due to weathering and erosion of exogenetic processes or due to specific regolith made of hard rock. Figure 10 shows AWiFS images and field photographs of barren / rocky areas.

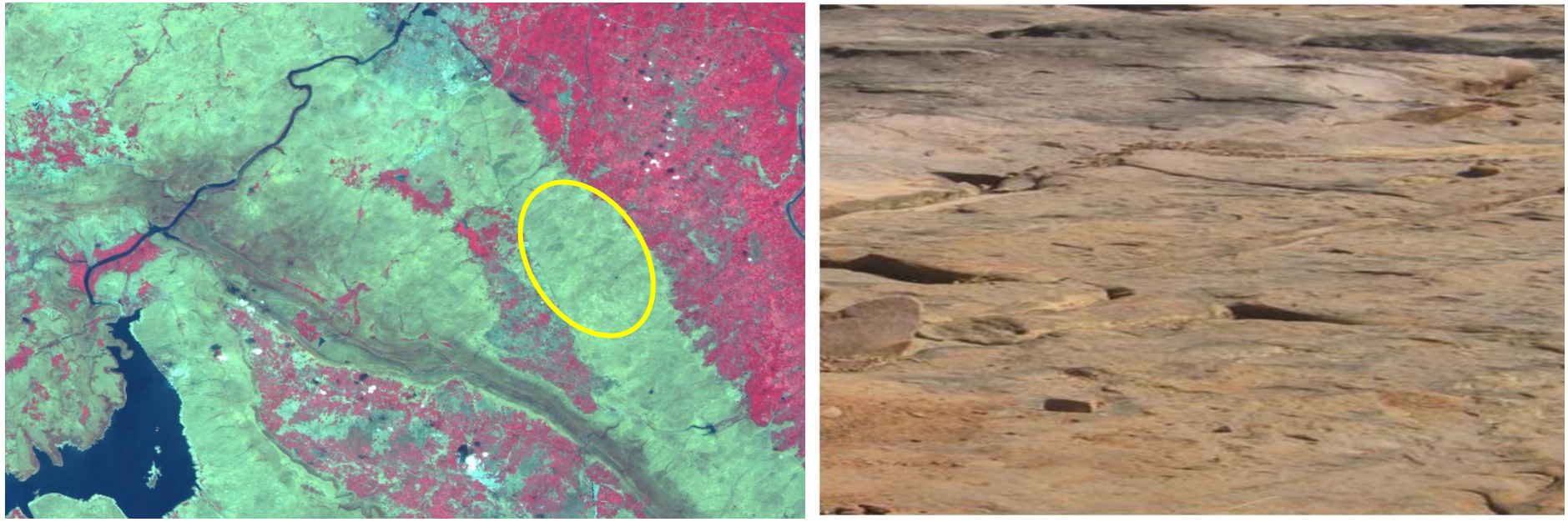


Figure-10: Rock outcrop in Aravalli range as visible in AWiFS image covering parts of Rajasthan with corresponding field photograph

Participating Organisations

S. No.	Name of Participating Organisations	Mapping Area/ Work Responsibility
1	CRDF, Centre for Environment and planning Technology (CEPT), Ahmedabad	Gujarat
2	Haryana Remote Sensing Applications Centre (HARSAC), Hisar	Haryana
3	ICAR - Central Arid Zone Research Institution (CAZRI), Jodhpur	Rajasthan
4	Institute of Remote sensing (IRS), Chennai	Tamil Nadu and Kerala
5	Jawaharlal Nehru University, (JNU), Delhi	Himachal Pradesh
6	Maharashtra Remote Sensing Applications Centre, (MRSAC), Nagpur	Maharashtra, Goa
7	Mizoram Remote Sensing Application Centre (MIRSAC), Aizawl	Mizoram and Tripura
8	MP Council of Science and Technology (MPCST), Bhopal	Madhya Pradesh and Chhattisgarh
9	Nagaland GIS & RS Centre, Kohima	Nagaland and Manipur
10	National Bureau of Soil Survey and Land Use Planning, (NBSSLUP), Bangalore	Andhra Pradesh, Telangana and Karnataka
11	North eastern Hill University, (NEHU), Shillong	Assam and Meghalaya
12	Orissa Remote Sensing Applications Centre, (ORSAC), Bhubaneshwar	Odisha
13	Remote Sensing Applications Centre, Uttar Pradesh, (RSACUP), Lucknow	Uttar Pradesh
14	Sikkim State Centre of Space Technology (SSCST), Sikkim	Sikkim
15	Soil and Land Use Survey of India, (SLUSI), Delhi	Uttarakhand, Punjab and Delhi
16	State Remote Sensing Applications Centre (SRSAC AP), Itanagar	Arunachal Pradesh
17	University of Calcutta, Kolkata	West Bengal
18	University of Jammu, Jammu	Jammu Region
19	University of Kashmir, Srinagar	Jammu and Kashmir
20	Space Applications Centre (SAC), ISRO, Ahmedabad	Project conceptualisation, formulation, overall coordination, methodology development, geospatial database design and organization, training, quality checking, analysis of outcome and Atlas Preparation Mapping – Bihar and Jharkhand

Methodology

Geo-coded AWiFS digital data were analysed using onscreen visual interpretation techniques along with ancillary information to interpret Desertification and land degradation classes. State wise preliminary Desertification Status Maps (DSM) on 1:500,000 scale were prepared in Geographical Information System (GIS) environment. Geo-database was created in GIS using ArcGIS software package based on National Spatial Frame work on 1:250K with LCC projection and WGS 84 datum. Base layers of administrative boundaries, settlements, water bodies were used as reference from NRDB datasets and road and rail networks were used as reference from SAC NWIA project. Forest boundaries were taken from Forest Survey of India (FSI) and used as reference layer to delineate polygons particularly within forest areas. Ground truth data and field checks were carried out to finalize the maps.

Quality Checking (QC) was carried out considering accuracy of georeferencing (Image co-registration < 2 pixels error), Uniformity in Projection and Datum (WGS 1984 Lambert Conformal Conical), process & severity identification and GIS database design and standards (MMU > 225 ha, topology checking, seamless mosaic, codification, cartographic elements, etc). Necessary corrections were incorporated.

State wise statistics were generated for different processes for both the time frames. Changes in desertification and land degradation classes were brought out for the timeframes 2011-13 and 2003-05. Insignificant land degradation observed in all Union Territories, hence included in No Apparent Degradation NAD.

Mapping of area under Frost Shattering process was carried out from the images showing maximum ablation zone for both the time frames.

Schematic representation of the methodology is shown in Figure 11.

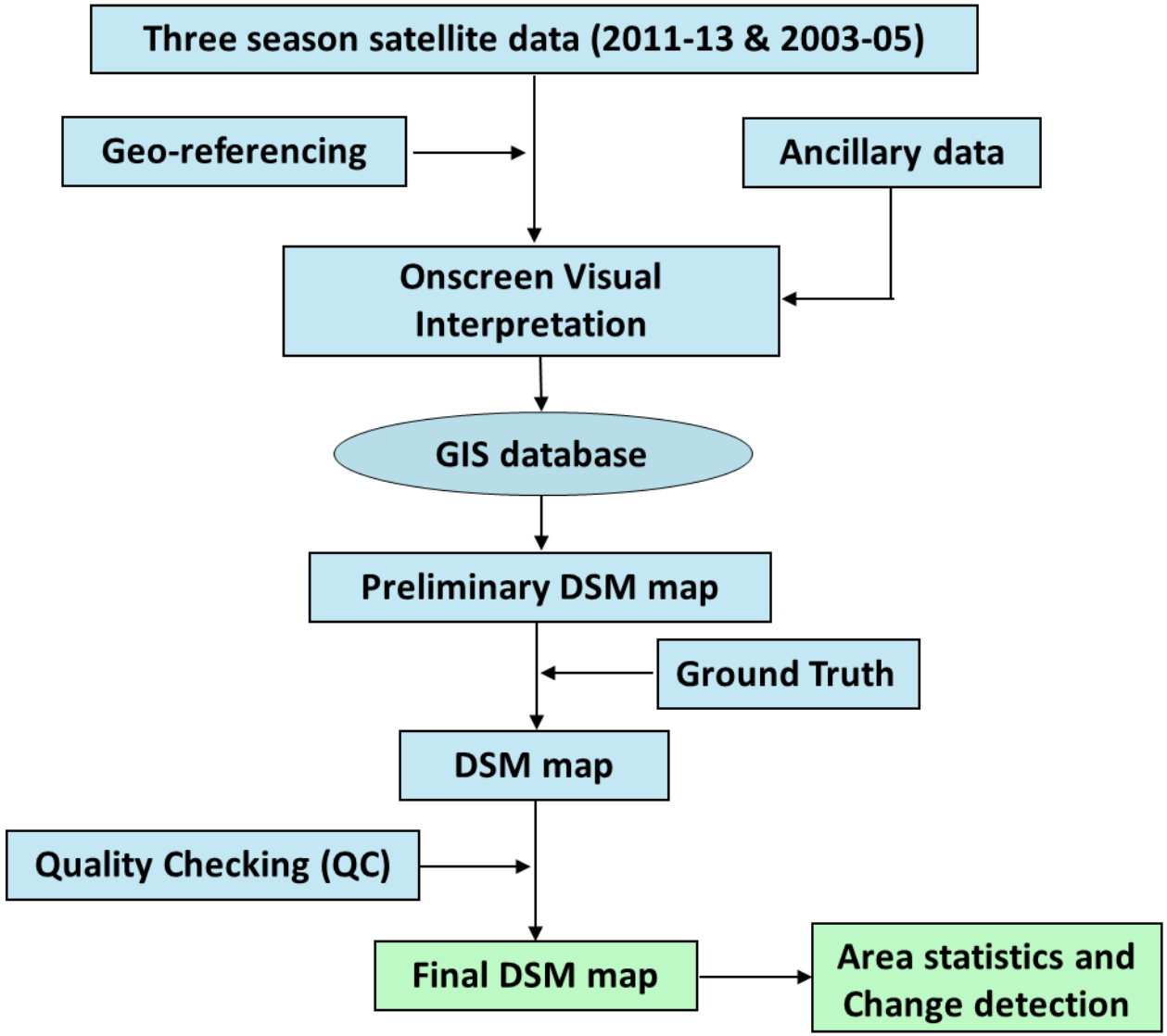
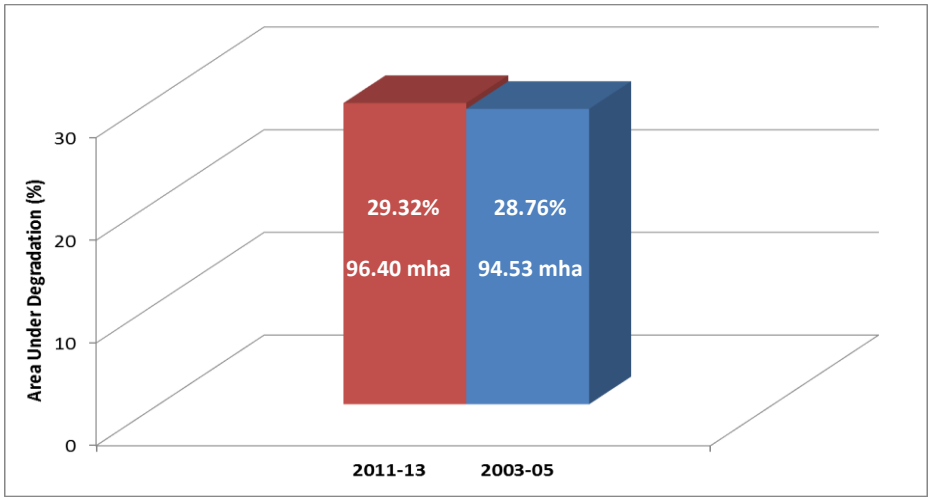


Figure-11: Schematic representation of Methodology

Desertification/ Land Degradation Status of the Country

India is the seventh largest country in the world with 328.72 mha area and is second most populated country with 1.21 billion population (Source: Census, 2011). The country level Desertification/ Land degradation map is prepared by integrating DSM of all the states.

The analysis reveals that 96.40 mha area of the country is undergoing process of land degradation i.e., 29.32% of the Total Geographic Area (TGA) of the country during 2011-13, while during 2003-05 the area undergoing process of land degradation is 94.53 mha (28.76% of the TGA).



Analysis shows that around 23.95% (2011-13) and 23.64% (2003-05) of desertification/land degradation with respect to total TGA is contributed by Rajasthan, Maharashtra, Gujarat, Jammu & Kashmir, Karnataka, Jharkhand, Odisha, Madhya Pradesh and Telangana in descending order. All other remaining states are contributing less than 1% (individually) to desertification/land degradation.

However, the analysis with respect to TGA of the individual states show that Jharkhand, Rajasthan, Delhi, Gujarat and Goa are showing more than 50% area under desertification/land degradation, whereas states with less than 10% area under desertification/land degradation are Kerala, Assam, Mizoram, Haryana, Bihar, Uttar Pradesh, Punjab and Arunachal Pradesh.

There is a cumulative increase of 1.87 mha area undergoing process of desertification/land degradation in the country (constituting 0.57% of the TGA of the country) during the time frame 2003-05 and 2011-13. The change analysis carried out for 2011-13 and 2003-05 time frames indicates that around 1.95 mha land has been reclaimed and 0.44 mha land has been converted from high severity to low severity degradation class, indicating improvement. On the other hand, around 3.63 mha productive land has degraded and 0.74 mha land has converted from low severity to high severity degradation class. Further, during this time frame, high desertification/land degradation changes are observed in the states of Delhi, Tripura, Nagaland, Himachal Pradesh and Mizoram (11.03-4.34 %), whereas Odisha, Rajasthan, Telangana and Uttar Pradesh have shown improvement (-0.11 to -1.27 %).

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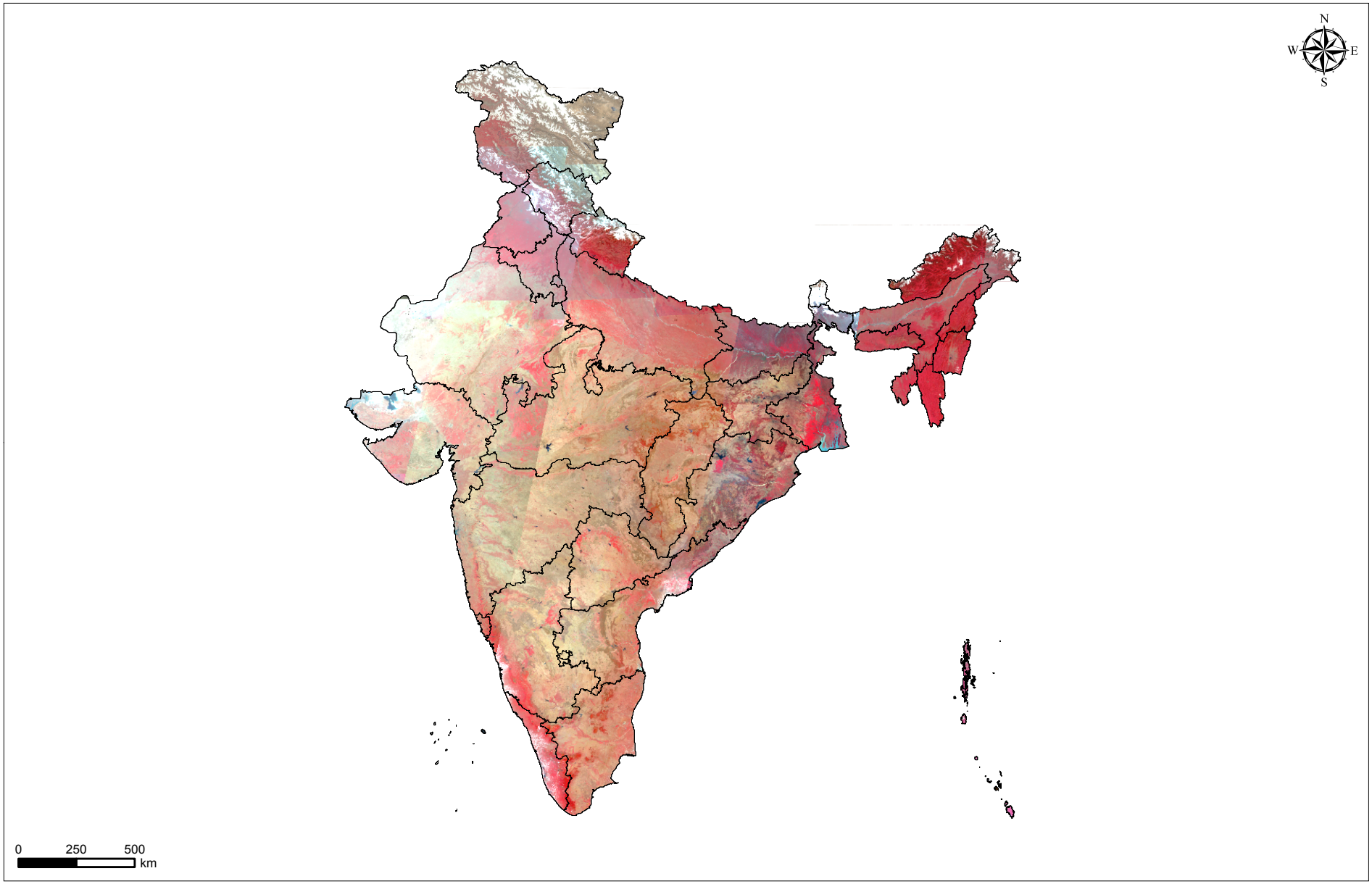
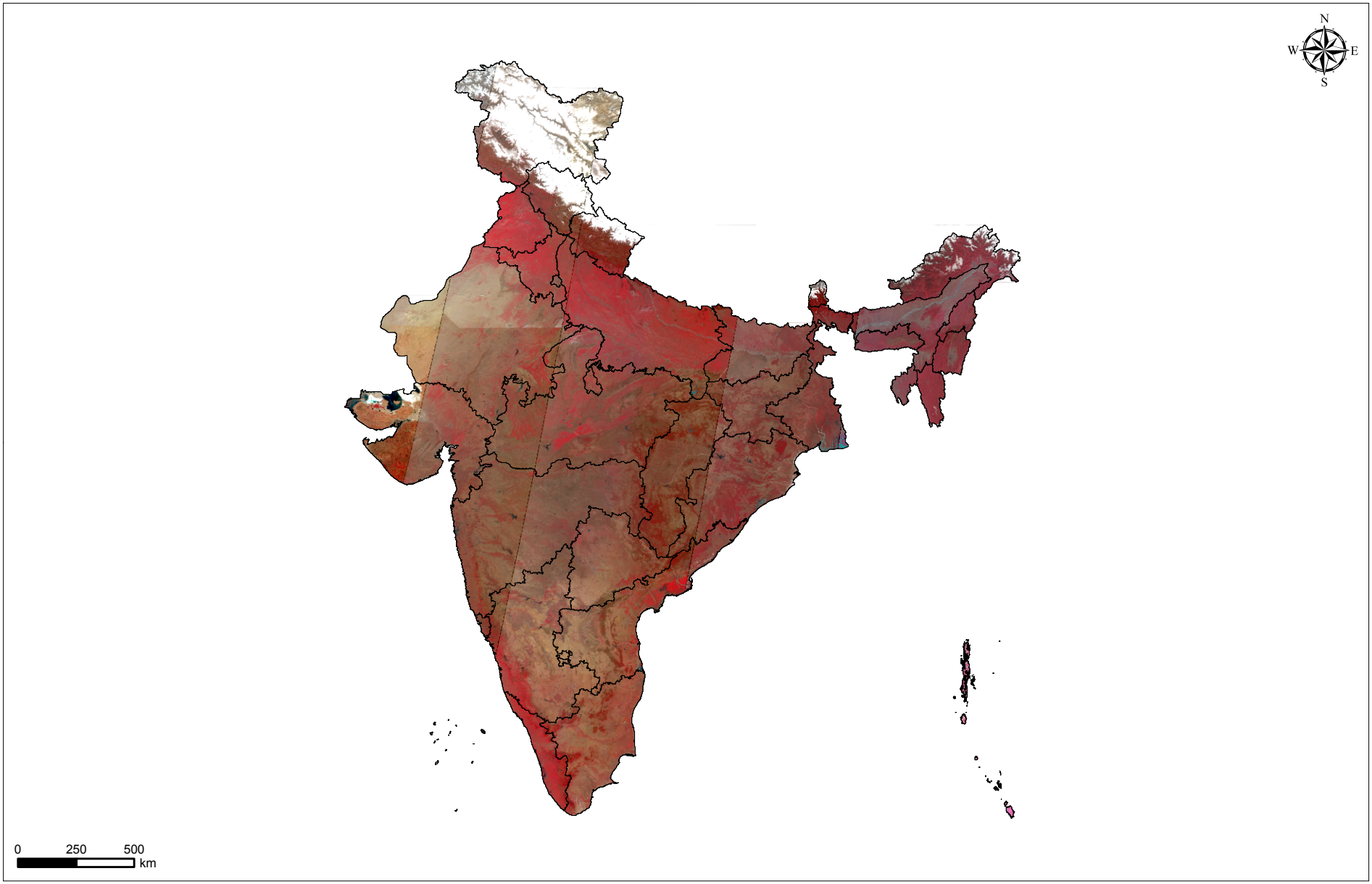
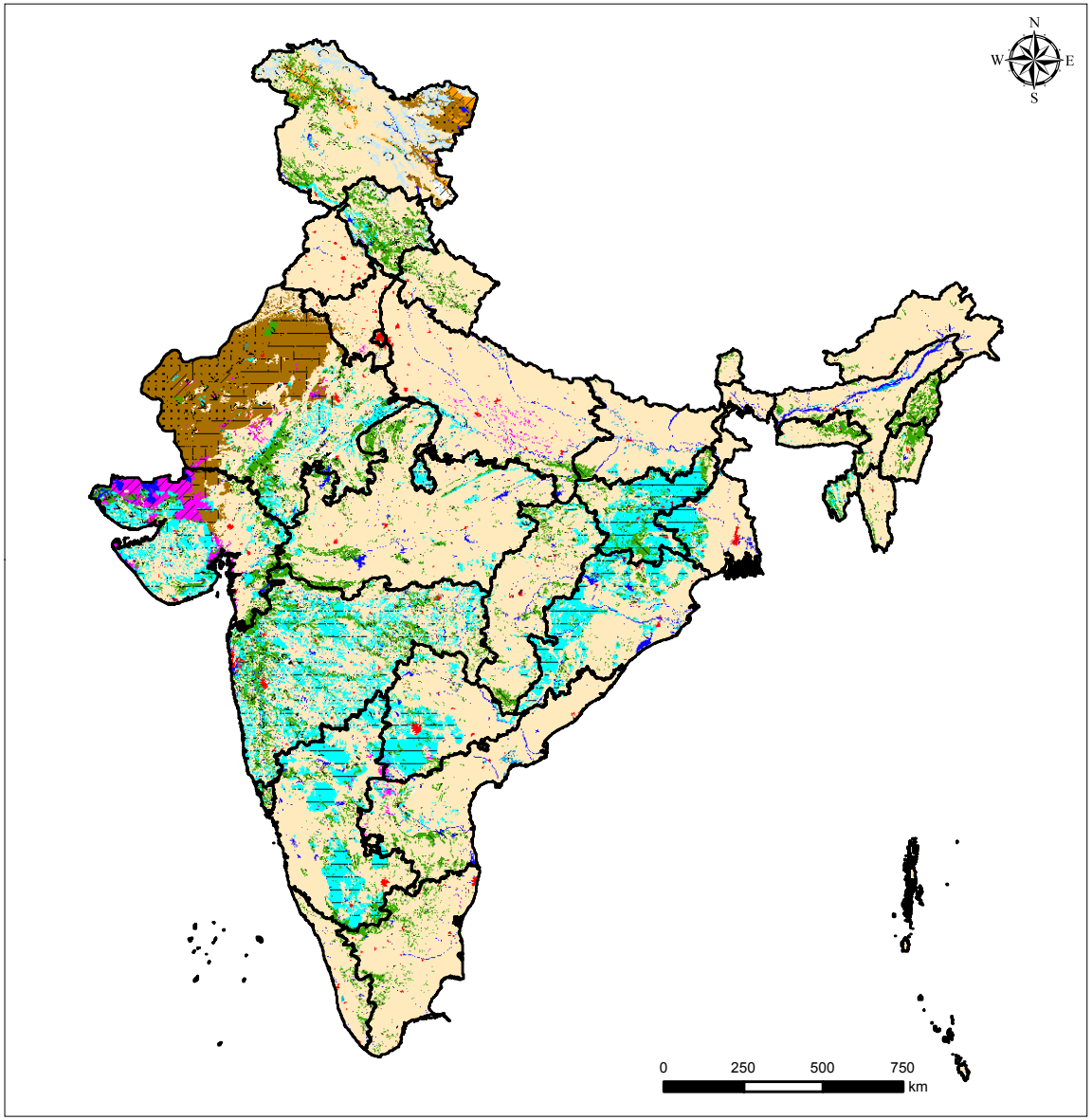
INDIA - IRS AWiFS MOSAIC 2011-13



INDIA - IRS AWiFS MOSAIC 2003-2005



DESERTIFICATION / LAND DEGRADATION STATUS MAP OF INDIA - 2011-13



Legend		
Symbol	Code	Description
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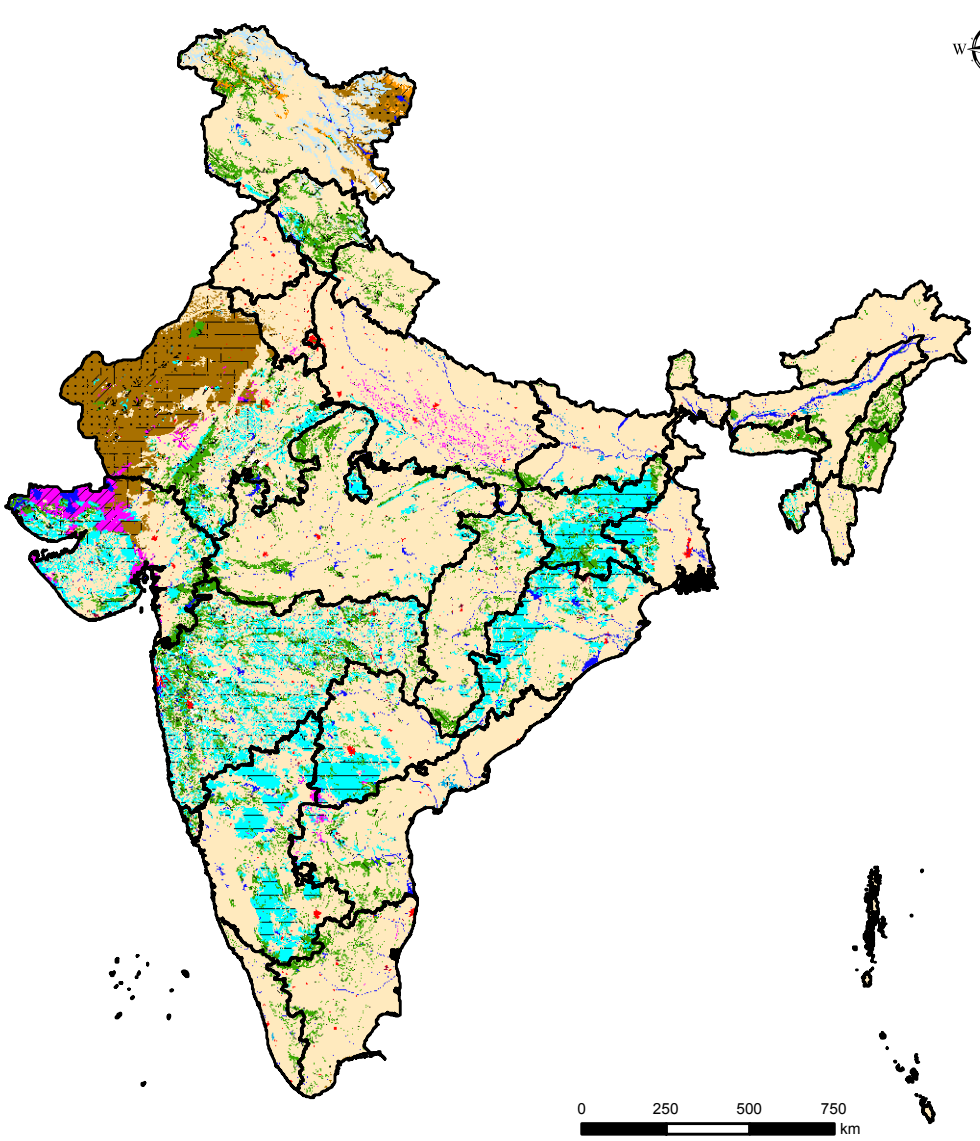
	Tm1,2	Others, man made
	B	Barren
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source: IRS AWiFS (2011-13), Ancillary Information

Prepared by:
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP OF INDIA - 2003-05



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	Is1,2	Agriculture irrigated, salinity / alkalinity
	Ds1,2	Agriculture unirrigated, salinity / alkalinity
	Gs1,2	Grassland / Grazing land, salinity / alkalinity
	Ss1,2	Land with scrub, salinity / alkalinity
	Bs1,2	Barren, salinity / alkalinity
	Il1,2	Agriculture irrigated, water logging
	Dl1,2	Agriculture unirrigated, water logging
	Fl1	Forest, water logging
	Gl2	Grassland / Grazing land, water logging
	Sl1,2	Land with scrub, water logging
	El1,2	Dune / Sandy area, water logging
	Bg2	Barren, mass movement
	Rf1	Rocky, frost shattering
	Lf1,2	Periglacial, frost shattering
	Fm1,2	Forest, man made
	Tm1,2	Others, man made
	B	Barren
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source: IRS AWiFS (2003-05), Ancillary Information

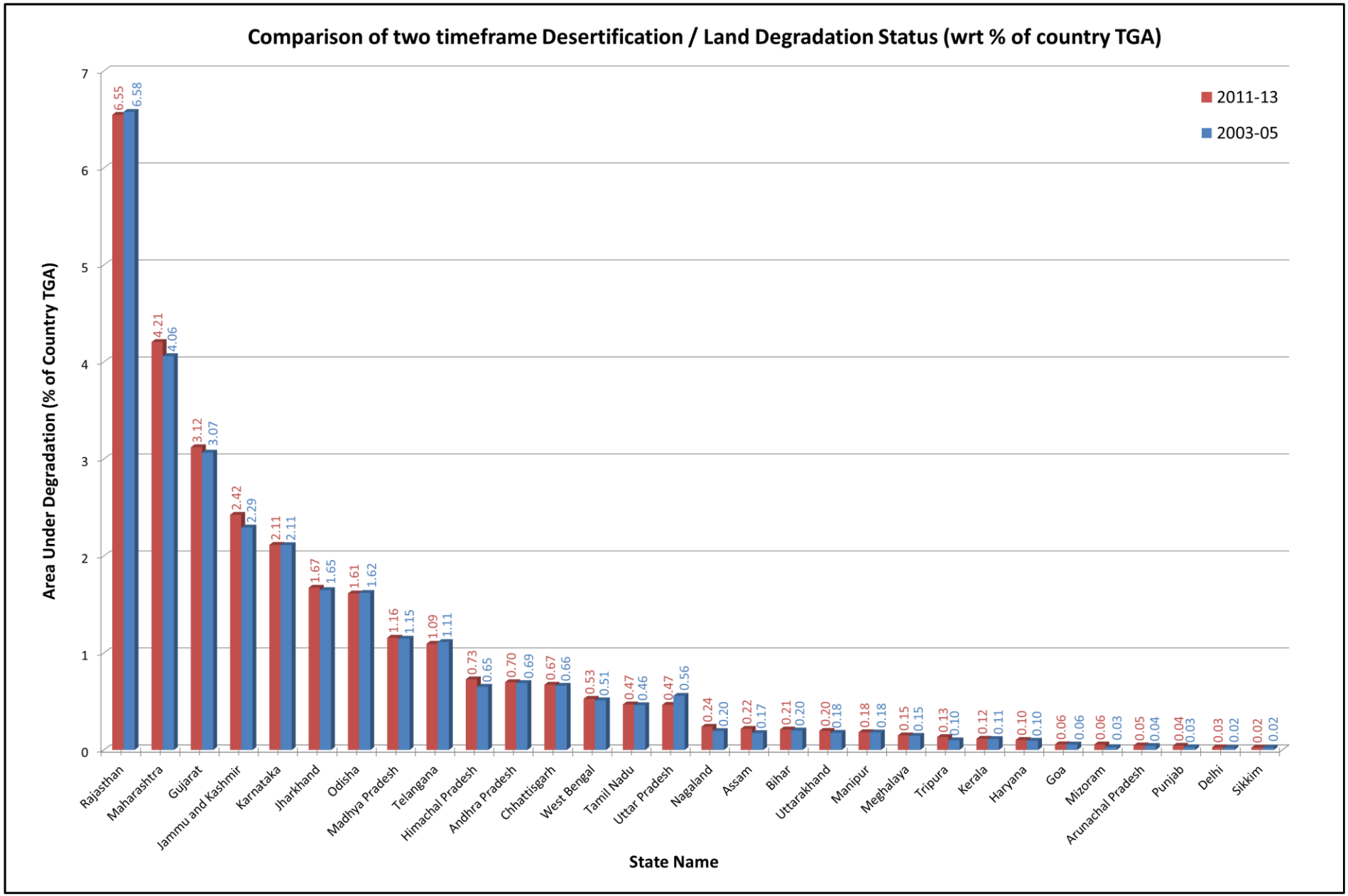
Prepared by:
Space Applications Centre,ISRO, Ahmedabad

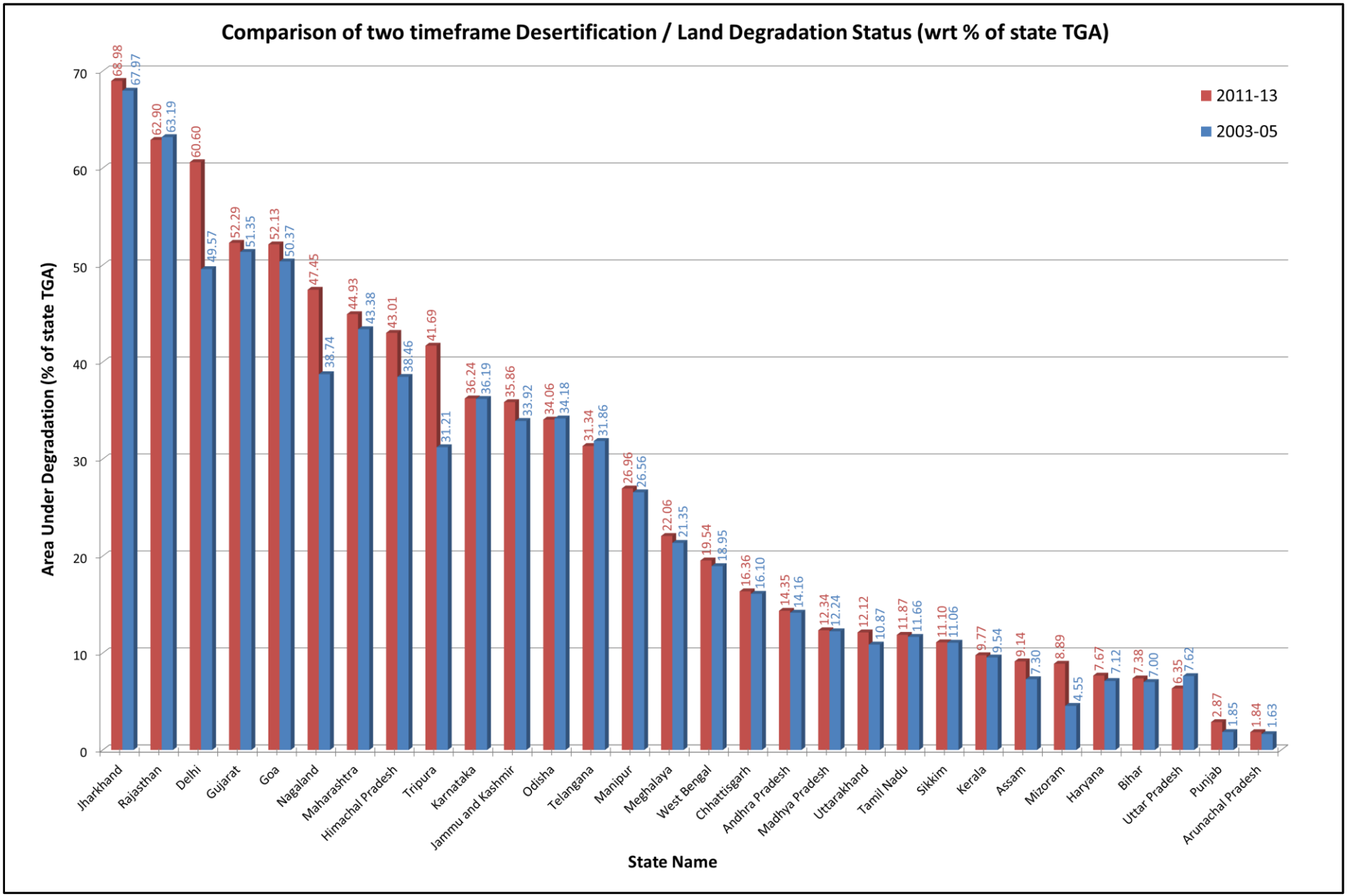
State wise Status of Desertification / Land Degradation (area in ha)

State Name	Vegetation Degradation		Water Erosion		Wind Erosion		Salinity		Water Logging		Frost Shattering		Mass Movement	
	2011-13	2003-05	2011-13	2003-05	2011-13	2003-05	2011-13	2003-05	2011-13	2003-05	2011-13	2003-05	2011-13	2003-05
Andhra Pradesh	1164257	1168447	789433	783830	3986	4722	117952	117239	132334	125755	-	-	-	-
Arunachal Pradesh	120499	107845	-	-	-	-	-	-	-	-	20186	19072	-	-
Assam	471958	322540	31424	31424	-	-	-	-	186667	193669	-	-	-	-
Bihar	242525	255073	321175	304364	-	-	-	-	106628	78450	-	-	-	-
Chhattisgarh	1348089	1348122	783645	770387	-	-	-	-	-	-	-	-	-	-
Delhi	9980	9980	-	-	-	-	-	-	347	347	-	-	-	-
Goa	138172	132301	33889	33892	-	-	-	-	9005	9003	-	-	-	-
Gujarat	2319826	2255417	3859497	3788099	1177105	1179548	2645405	2643828	3375	3375	-	-	-	-
Haryana	41411	40514	13568	13568	151797	148151	27841	27841	12530	8822	-	-	-	-
Himachal Pradesh	1790803	1582938	268261	233990	-	-	-	-	-	-	332423	322417	-	-
Jammu and Kashmir	1951000	1907187	146932	110222	1670244	1650577	-	-	70563	46548	2968279	2750257	927986	843554
Jharkhand	1379038	1307162	4036785	4037261	-	-	-	-	-	-	-	-	-	-
Karnataka	1712386	1704569	5043041	5059629	2159	2159	86740	86582	-	-	-	-	-	-
Kerala	337613	328638	-	-	-	-	-	-	11989	12906	-	-	-	-
Madhya Pradesh	2523801	2514983	1125418	1120221	-	-	-	-	7788	7788	-	-	-	-
Maharashtra	4884005	4890778	8060753	7622800	-	-	29089	30054	-	-	-	-	-	-
Manipur	575603	574706	8070	8070	-	-	-	-	5026	5026	-	-	-	-
Meghalaya	435527	414659	53149	54046	-	-	-	-	1548	5881	-	-	-	-
Mizoram	167050	81854	8119	7444	-	-	-	-	-	-	-	-	-	-
Nagaland	778421	637957	-	-	-	-	-	-	-	-	-	-	-	-
Orissa	745122	752929	4409413	4442556	-	-	-	-	36439	36439	-	-	-	-
Punjab	32561	18705	14116	1897	-	-	-	-	-	-	-	-	-	-
Rajasthan	2606221	2596003	2116314	2116082	15197874	15332054	363768	365666	18421	18421	-	-	-	-
Sikkim	74318	74205	-	-	-	-	-	-	-	-	3730	3730	-	-
Tamil Nadu	1385478	1368330	6411	6411	30429	30429	9878	9878	-	-	-	-	-	-
Telangana	541145	538533	2854285	2951871	-	-	86514	81917	-	-	-	-	-	-
Tripura	236374	125058	186900	189533	-	-	-	-	-	-	-	-	-	-
Uttar Pradesh	413476	414176	586961	610989	-	-	307571	636202	33620	33907	-	-	-	-
Uttarakhand	606616	545610	11943	11943	-	-	-	-	-	-	13786	13786	-	-
West Bengal	265277	264325	1329539	1299542	-	-	-	-	17627	13261	-	-	-	-
Total	**29298553**	**28283544**	**36099042**	**35610069**	**18233594**	**18347639**	**3674759**	**3999206**	**653908**	**599597**	**3338404**	**3109262**	**927986**	**843554**

State wise Status of Desertification / Land Degradation (area in ha)

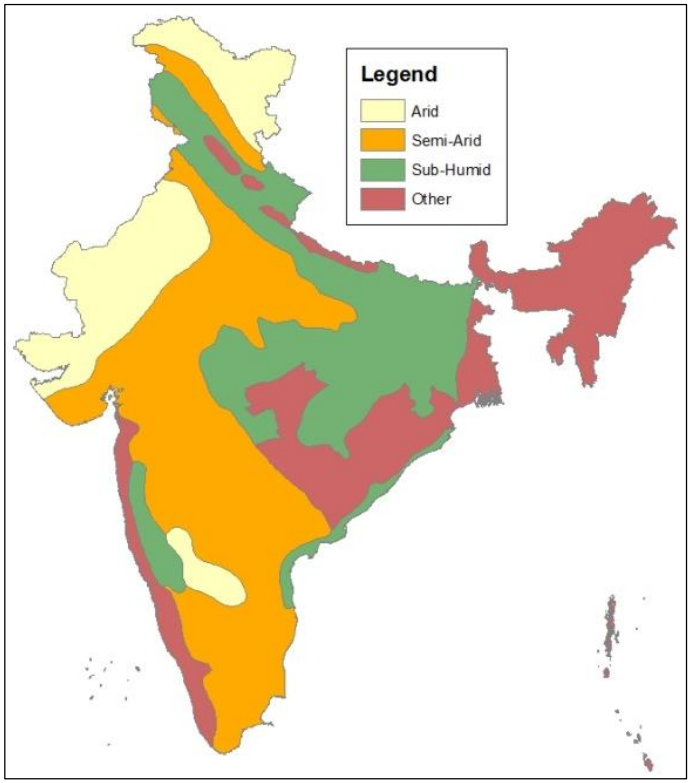
State Name	Manmade		Barren/Rocky		Settlement		Total Area under Desertification (ha)		Total Area under Desertification (%)		No Apparent Degradation	
	2011-13	2003-05	2011-13	2003-05	2011-13	2003-05	2011-13	2003-05	2011-13	2003-05	2011-13	2003-05
Andhra Pradesh	20833	20565	20521	20521	49441	26649	**2298758**	**2267728**	**14.35**	**14.16**	**13447078**	**13476591**
Arunachal Pradesh	-	-	-	-	13247	9769	**153933**	**136686**	**1.84**	**1.63**	**8144850**	**8162237**
Assam	-	-	-	-	26548	24583	**716596**	**572215**	**9.14**	**7.30**	**6591013**	**6735134**
Bihar	984	984	-	-	23496	20669	**694809**	**659539**	**7.38**	**7.00**	**8511828**	**8527091**
Chhattisgarh	40541	31972	7222	7222	31656	18685	**2211153**	**2176388**	**16.36**	**16.10**	**11130592**	**11166012**
Delhi	-	-	-	-	79541	63187	**89868**	**73514**	**60.60**	**49.57**	**57307**	**73661**
Goa	3374	3374	-	-	8533	7889	**192973**	**186458**	**52.13**	**50.37**	**168648**	**174991**
Gujarat	51637	50524	39218	39218	165578	117447	**10261641**	**10077455**	**52.29**	**51.35**	**8533439**	**8718876**
Haryana	5962	4894	-	-	85855	70792	**338964**	**314583**	**7.67**	**7.12**	**4082236**	**4106617**
Himachal Pradesh	656	656	-	-	2097	1365	**2394240**	**2141366**	**43.01**	**38.46**	**3123624**	**3376690**
Jammu and Kashmir	-	-	218679	218679	15924	11790	**7969607**	**7538814**	**35.86**	**33.92**	**14027316**	**14455333**
Jharkhand	52734	49730	-	-	30169	24503	**5498726**	**5418657**	**68.98**	**67.97**	**2398866**	**2469577**
Karnataka	20876	18704	3389	2887	82409	66413	**6951000**	**6940943**	**36.24**	**36.19**	**11984329**	**11994157**
Kerala	-	-	-	-	29984	28968	**379587**	**370512**	**9.77**	**9.54**	**3455238**	**3464358**
Madhya Pradesh	19454	16024	31495	30457	96359	82379	**3804315**	**3771853**	**12.34**	**12.24**	**26502030**	**26648676**
Maharashtra	19912	19912	506163	509789	326013	275272	**13825935**	**13348604**	**44.93**	**43.38**	**16415568**	**16873660**
Manipur	-	-	-	-	13260	5290	**601959**	**593093**	**26.96**	**26.56**	**1613978**	**1622844**
Meghalaya	-	-	-	-	4656	4239	**494880**	**478825**	**22.06**	**21.35**	**1746580**	**1762634**
Mizoram	-	-	-	-	12285	6575	**187453**	**95873**	**8.89**	**4.55**	**1903762**	**1998679**
Nagaland	-	-	-	-	8257	4347	**786678**	**642304**	**47.45**	**38.74**	**869562**	**1013937**
Orissa	63851	51445	5128	5053	44161	33481	**5304114**	**5321903**	**34.06**	**34.18**	**9758929**	**9741425**
Punjab	1641	652	-	-	96335	71861	**144653**	**93115**	**2.87**	**1.85**	**4849651**	**4901242**
Rajasthan	53058	50865	1052374	1047818	118482	98696	**21526512**	**21625604**	**62.90**	**63.19**	**12546925**	**12448140**
Sikkim	-	-	-	-	700	546	**78749**	**78482**	**11.10**	**11.06**	**630234**	**630500**
Tamil Nadu	13965	13965	515	515	97223	87133	**1543898**	**1516660**	**11.87**	**11.66**	**11344261**	**11371500**
Telangana	16982	14592	1979	1979	97951	69591	**3598856**	**3658482**	**31.34**	**31.86**	**7689491**	**7631019**
Tripura	-	-	-	-	13854	12711	**437128**	**327302**	**41.69**	**31.21**	**608776**	**716717**
Uttar Pradesh	5970	4028	-	-	181399	135962	**1528997**	**1835263**	**6.35**	**7.62**	**22115961**	**21831845**
Uttarakhand	-	-	-	-	15908	9903	**648253**	**581241**	**12.12**	**10.87**	**4667750**	**4738936**
West Bengal	15102	14112	-	-	106386	90941	**1733931**	**1682181**	**19.54**	**18.95**	**6884910**	**6926022**
Total	**407531**	**366998**	**1886682**	**1884137**	**1877708**	**1481638**	**96398166**	**94525643**	**29.32**	**28.76**	**225804731**	**227759103**

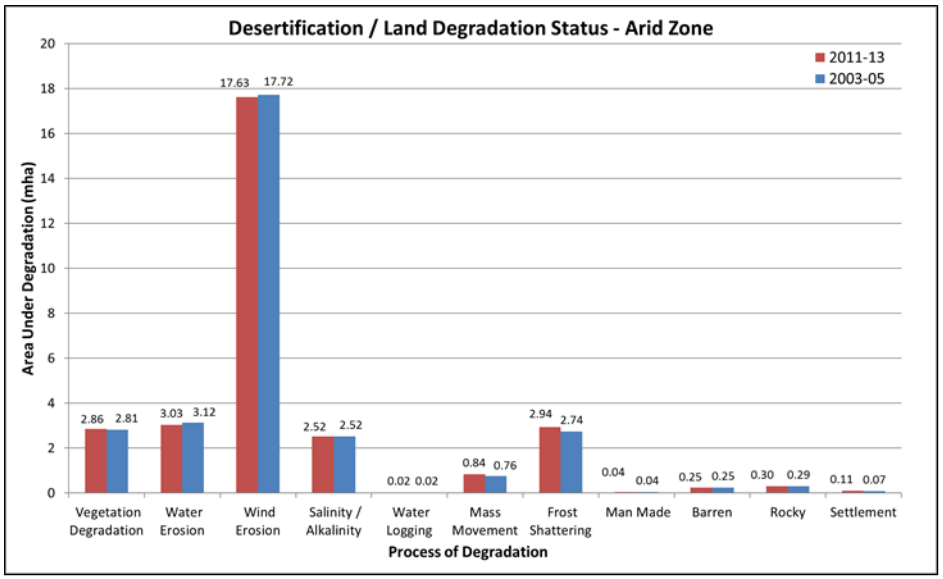

Comparison of two timeframe Desertification / Land Degradation Status (wrt % of country TGA)
2011-13
2003-05
Area Under Degradation (% of Country TGA)
0
1
2
3
4
5
6
7
6.55 6.58
4.21 4.06
3.12 3.07
2.42 2.29
2.11 2.11
1.67 1.65
1.61 1.62
1.16 1.15
1.09 1.11
0.73 0.65
0.70 0.69
0.67 0.66
0.53 0.51
0.47 0.46
0.47 0.56
0.24 0.20
0.22 0.17
0.21 0.20
0.20 0.18
0.18 0.18
0.15 0.15
0.13 0.10
0.12 0.11
0.10 0.10
0.06 0.06
0.06 0.03
0.05 0.04
0.04 0.03
0.03 0.02
0.02 0.02
Rajasthan
Maharashtra
Gujarat
Jammu and Kashmir
Karnataka
Jharkhand
Odisha
Madhya Pradesh
Telangana
Himachal Pradesh
Andhra Pradesh
Chhattisgarh
West Bengal
Tamil Nadu
Uttar Pradesh
Nagaland
Assam
Bihar
Uttarakhand
Manipur
Meghalaya
Tripura
Kerala
Haryana
Goa
Mizoram
Arunachal Pradesh
Punjab
Delhi
Sikkim
State Name

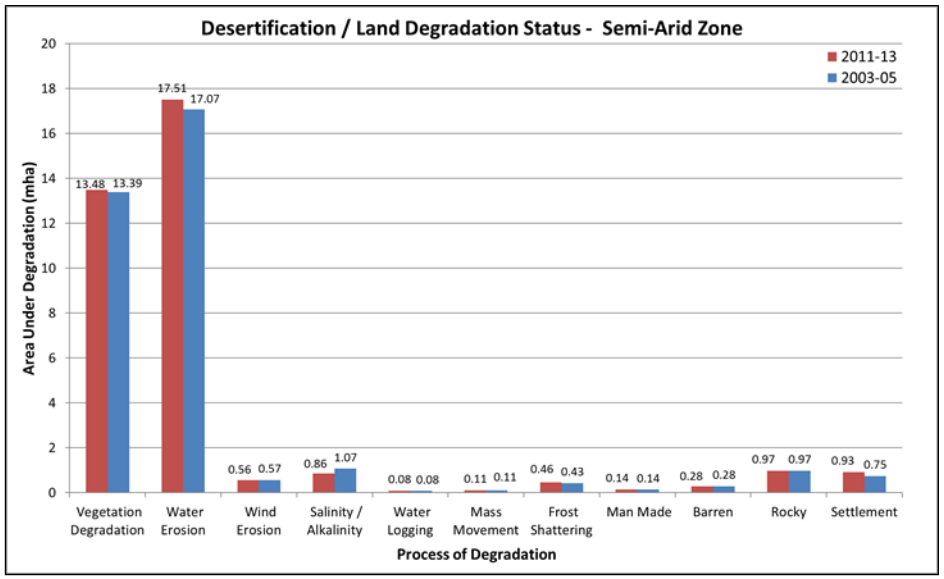

Comparison of two timeframe Desertification / Land Degradation Status (wrt % of state TGA)
Area Under Degradation (% of state TGA)
State Name
2011-13
2003-05
0
10
20
30
40
50
60
70
Jharkhand 68.98 67.97
Rajasthan 62.90 63.19
Delhi 60.60 49.57
Gujarat 52.29 51.35
Goa 52.13 50.37
Nagaland 47.45 38.74
Maharashtra 44.93 43.38
Himachal Pradesh 43.01 38.46
Tripura 41.69 31.21
Karnataka 36.24 36.19
Jammu and Kashmir 35.86 33.92
Odisha 34.06 34.18
Telangana 31.34 31.86
Manipur 26.96 26.56
Meghalaya 22.06 21.35
West Bengal 19.54 18.95
Chhattisgarh 16.36 16.10
Andhra Pradesh 14.35 14.16
Madhya Pradesh 12.34 12.24
Uttarakhand 12.12 10.87
Tamil Nadu 11.87 11.66
Sikkim 11.10 11.06
Kerala 9.77 9.54
Assam 9.14 7.30
Mizoram 8.89 4.55
Haryana 7.67 7.12
Bihar 7.38 7.00
Uttar Pradesh 6.35 7.62
Punjab 2.87 1.85
Arunachal Pradesh 1.84 1.63

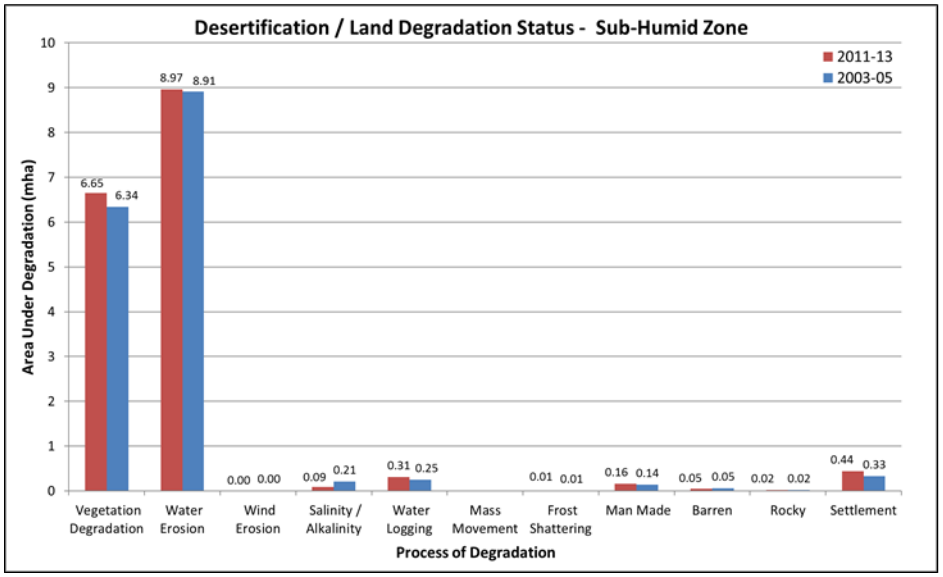
Land degradation within dryland regions is called Desertification. The map below shows the dryland regions of India (Source: National Bureau of Soil Survey and Land Use Planning, Bangalore). The process wise status of land degradation in Arid, Semi-Arid and Dry-Sub Humid regions for time frames 2011-13 and 2003-05 is given in the below tables:

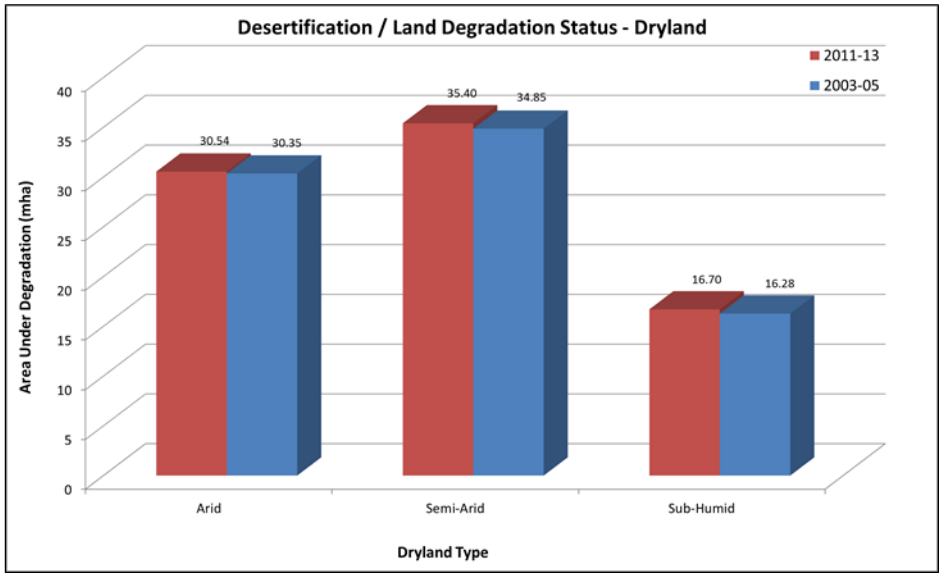
Process of Degradation	Area under Desertification (mha)							
	2011-13				2003-05			
	Arid	Semi-Arid	Sub-Humid	Total	Arid	Semi-Arid	Sub-Humid	Total
Vegetation Degradation	2.86	13.48	6.65	22.99	2.81	13.39	6.34	22.55
Water Erosion	3.03	17.51	8.97	29.51	3.12	17.07	8.91	29.11
Wind Erosion	17.63	0.56	0.00	18.19	17.72	0.57	0.00	18.30
Salinity / Alkalinity	2.52	0.86	0.09	3.48	2.52	1.07	0.21	3.80
Water Logging	0.02	0.08	0.31	0.42	0.02	0.08	0.25	0.36
Mass Movement	0.84	0.11	-	0.96	0.76	0.11	-	0.87
Frost Shattering	2.94	0.46	0.01	3.41	2.74	0.43	0.01	3.18
Man Made	0.04	0.14	0.16	0.35	0.04	0.14	0.14	0.32
Barren	0.25	0.28	0.05	0.58	0.25	0.28	0.05	0.58
Rocky	0.30	0.97	0.02	1.29	0.29	0.97	0.02	1.28
Settlement	0.11	0.93	0.44	1.47	0.07	0.75	0.33	1.15
Grand Total	**30.54**	**35.40**	**16.70**	**82.64**	**30.35**	**34.85**	**16.28**	**81.48**



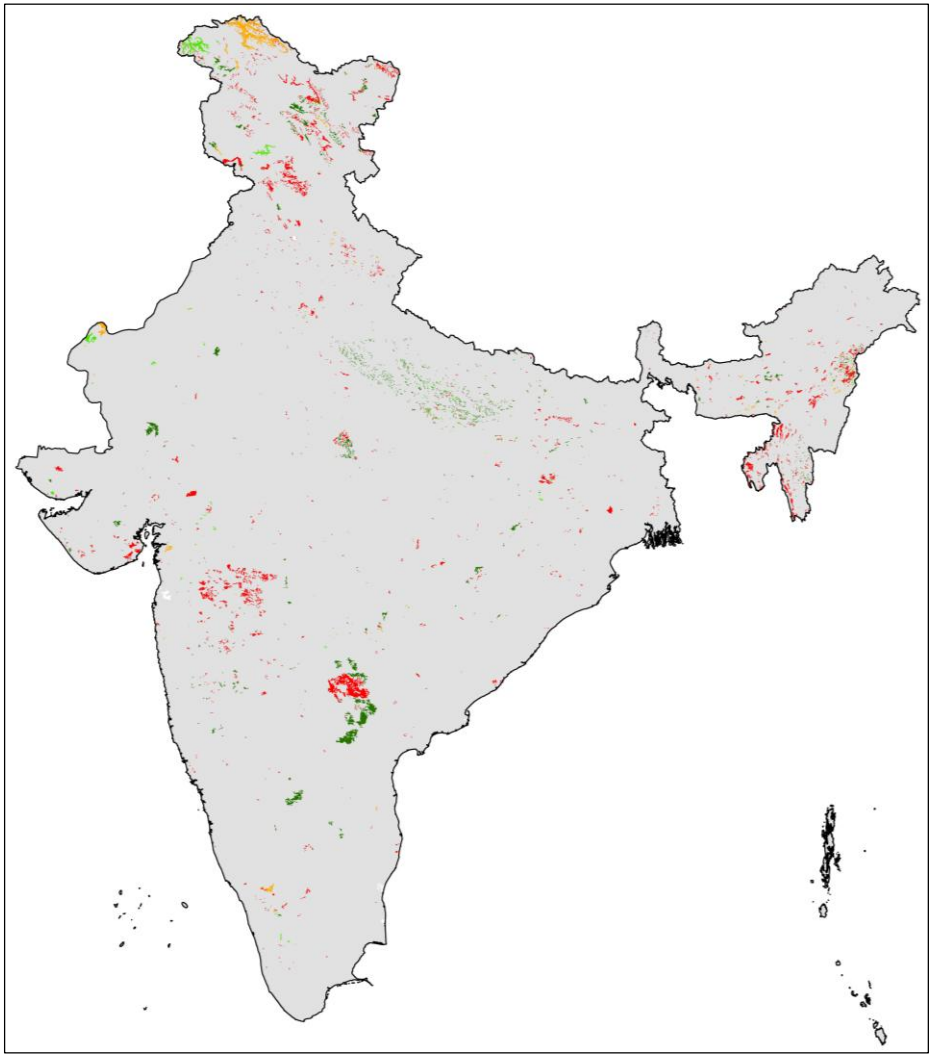

Desertification / Land Degradation Status - Arid Zone
2011-13
2003-05
Area Under Degradation (mha)
Vegetation Degradation
Water Erosion
Wind Erosion
Salinity / Alkalinity
Water Logging
Mass Movement
Frost Shattering
Man Made
Barren
Rocky
Settlement
Process of Degradation

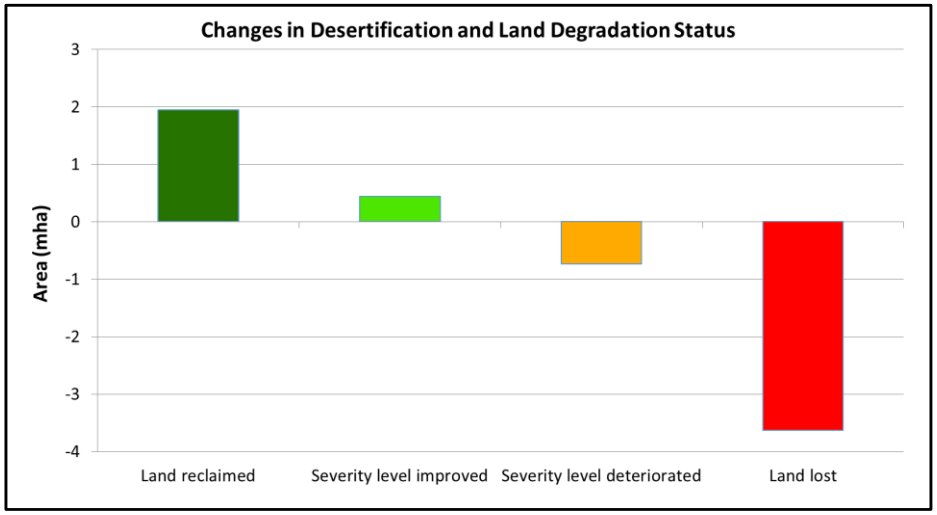

Desertification / Land Degradation Status - Semi-Arid Zone
2011-13
2003-05
Area Under Degradation (mha)
Vegetation Degradation
Water Erosion
Wind Erosion
Salinity / Alkalinity
Water Logging
Mass Movement
Frost Shattering
Man Made
Barren
Rocky
Settlement
Process of Degradation


Desertification / Land Degradation Status - Sub-Humid Zone
2011-13
2003-05
Area Under Degradation (mha)
Vegetation Degradation
Water Erosion
Wind Erosion
Salinity / Alkalinity
Water Logging
Mass Movement
Frost Shattering
Man Made
Barren
Rocky
Settlement
Process of Degradation


Desertification / Land Degradation Status - Dryland
2011-13
2003-05
Area Under Degradation (mha)
Arid
Semi-Arid
Sub-Humid
Dryland Type

Changes in Desertification and Land Degradation Status

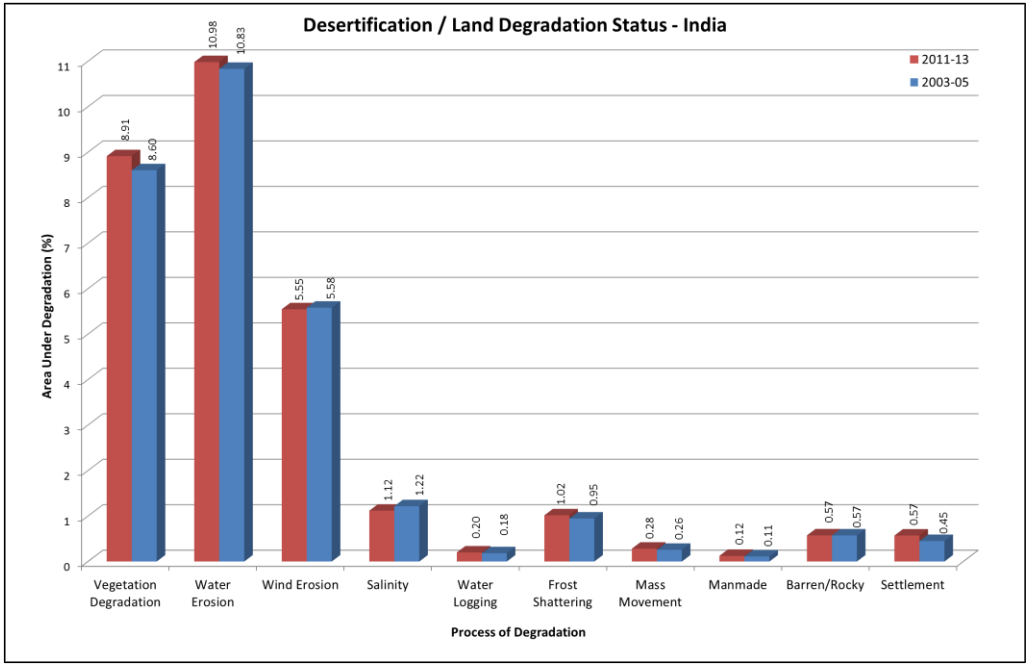




Color Code	Changes in Desertification and Land Degradation Status			
	2011-13	2003-05	Area (mha)	Remarks
	No Apparent Degradation	Degraded	1.95	Land reclaimed (+)
	Degraded Low Severity	Degraded High Severity	0.44	Severity level improved (+)
	Degraded High Severity	Degraded Low Severity	0.74	Severity level deteriorated (-)
	Degraded	No Apparent Degradation	3.63	Land lost (-)

Process wise changes in Desertification/ Land Degradation Status

Process of Desertification / Land Degradation	2011-13		2003-05		Change (mha)
	Area (mha)	Area (%)	Area (mha)	Area (%)	(2011-13) - (2003-05)
Vegetation Degradation	29.30	8.91	28.28	8.60	1.02
Water Erosion	36.10	10.98	35.61	10.83	0.49
Wind Erosion	18.23	5.55	18.35	5.58	-0.12
Salinity	3.67	1.12	4.01	1.22	-0.34
Water Logging	0.65	0.20	0.60	0.18	0.05
Frost Shattering	3.34	1.02	3.11	0.95	0.23
Mass Movement	0.93	0.28	0.84	0.26	0.09
Manmade	0.41	0.12	0.37	0.11	0.04
Barren/Rocky	1.89	0.57	1.88	0.57	0.01
Settlement	1.88	0.57	1.48	0.45	0.40
Total Area under Desertification	**96.40**	**29.32**	**94.53**	**28.76**	**1872523**
No Apparent Degradation	**226.73**	**68.97**	**228.68**	**69.57**	**-1954372**
Total Geographical Area (mha)	**328.72**				



Highlights of Analysis

S. No.	Description	Area (mha)		Area (%)	
		2011-13	2003-05	2011-13	2003-05
1	Total area under Desertification/ Land Degradation (wrt country TGA)	96.40	94.53	29.32	28.76
2	Total area under No Apparent Degradation (wrt country TGA)	226.73	228.68	68.97	69.57
3	State under highest desertification/Land degradation – Rajasthan (wrt country TGA)	21.53	21.63	6.55	6.58
4	State under second highest Desertification/ Land Degradation – Maharashtra (wrt country TGA)	13.83	13.35	4.21	4.06
5	State under third highest Desertification/Land degradation – Gujarat (wrt country TGA)	10.26	10.08	3.12	3.07
6	State under highest Desertification/ Land Degradation - Jharkhand (wrt state TGA)	5.50	5.42	68.98	67.97
7	State under second highest Desertification/ Land Degradation - Rajasthan (wrt state TGA)	21.53	21.63	62.90	63.19
8	State under third highest Desertification/ Land Degradation - Delhi (wrt state TGA)	0.09	0.07	60.60	49.57
9	State under lowest Desertification/Land degradation – Sikkim (wrt country TGA)	0.08	0.08	0.02	0.02
10	State under second lowest Desertification/Land degradation – Delhi (wrt country TGA)	0.09	0.07	0.03	0.02
11	State under third lowest Desertification/Land degradation – Punjab (wrt country TGA)	0.14	0.09	0.04	0.03
12	State under lowest Desertification/ Land Degradation - Arunachal Pradesh (wrt state TGA)	0.15	0.14	1.84	1.63
13	State under second lowest Desertification/ Land Degradation - Punjab (wrt state TGA)	0.14	0.09	2.87	1.85
14	State under third lowest Desertification/ Land Degradation - Uttar Pradesh (wrt state TGA)	1.53	1.84	6.35	7.62
15	Cumulative change in area under Desertification/ Land Degradation (2011-13 & 2003-05)	1.87 mha		0.57 %	
16	Land reclaimed (from degraded in 2003-05 to No Apparent Degradation in 2011-13)	1.95 mha			
17	Land improvement (from high severity level degradation in 2003-05 to low severity degradation in 2011-13)	0.44 mha			
18	Land degraded (from low severity level degradation in 2003-05 to high severity degradation in 2011-13)	0.74 mha			
19	Land degraded (from No Apparent Degradation in 2003-05 to degraded in 2011-13)	3.63 mha			

S. No.	Description	Area (mha)		Area (%)	
		2011-13	2003-05	2011-13	2003-05
20	State under highest increase in degradation (2011-13 & 2003-05) – Delhi (wrt state TGA)	0.01		11.03	
21	State under second highest increase in degradation (2011-13 & 2003-05) – Tripura (wrt state TGA)	0.11		10.47	
22	State under third highest increase in degradation (2011-13 & 2003-05) – Nagaland (wrt state TGA)	0.14		8.71	
23	State showing highest improvement (2011-13 & 2003-05) – Uttar Pradesh (wrt state TGA)	0.30		1.27	
24	State showing second highest improvement (2011-13 & 2003-05) – Telangana (wrt state TGA)	0.06		0.52	
25	State showing third highest improvement / gain (2011-13 & 2003-05) – Rajasthan	0.99		0.29	
26	Process of Desertification/ Land Degradation with largest area - Water Erosion (mha)	36.10	35.61	10.98	10.83
27	Process of Desertification/ Land Degradation with second largest area - Vegetation Degradation (mha)	29.30	28.28	8.91	8.60
28	Process of Desertification/ Land Degradation with third largest area - Wind Erosion (mha)	18.23	18.35	5.55	5.58
29	Process of Desertification/ Land Degradation with lowest area - Man Made (mha)	0.41	0.37	0.12	0.11
30	Process of Desertification/ Land Degradation with second lowest area - Water Logging (mha)	0.65	0.60	0.20	0.18
31	Process of Desertification/ Land Degradation with third lowest area - Mass Movement (mha)	0.93	0.84	0.28	0.26
32	Area under Desertification in Arid region (wrt country TGA)	30.54	30.35	9.29	9.23
33	Area under Desertification in Semi-Arid region (wrt country TGA)	35.40	34.85	10.77	10.60
34	Area under Desertification in Sub-Humid region (wrt country TGA)	16.70	16.28	5.08	4.95
35	Area under Land Degradation in Drylands (wrt country TGA)	82.64	81.48	25.14	24.78

State wise Maps and Statistics

Andhra Pradesh

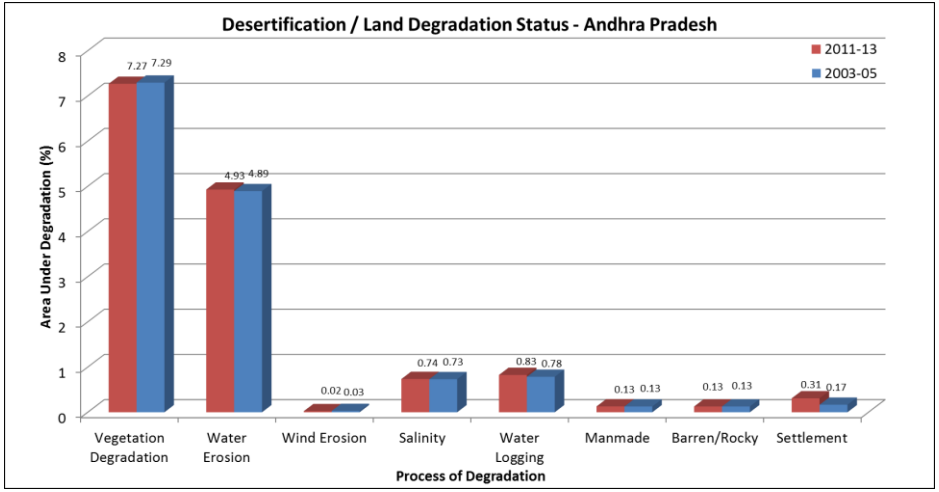
Andhra Pradesh is located in south-eastern part of India with 1,60,205 sq km area. The state has population of 4,93,86,799 with 308 population density, 993 sex ratio and 67.02% literacy (Census 2011). Hyderabad is the capital of Andhra Pradesh.

The state is dotted with hill ranges from the north to the south, running erratically down the middle of the country dividing it into western part or Rayalseema and eastern or coastal Andhra. Godavari, Krishna, Tungbhadra and Pennar are the major rivers of the state. Andhra Pradesh has several noteworthy beaches along the Bay of Bengal. Coastal region experiences humid tropical climate with regular cyclones and storm surges whereas western part experiences relatively dry and cool climate. Average annual temperature ranges from 12°C to 40°C.

Andhra Pradesh is observed with 14.35% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Andhra Pradesh has increased about 0.19% since 2003-05.

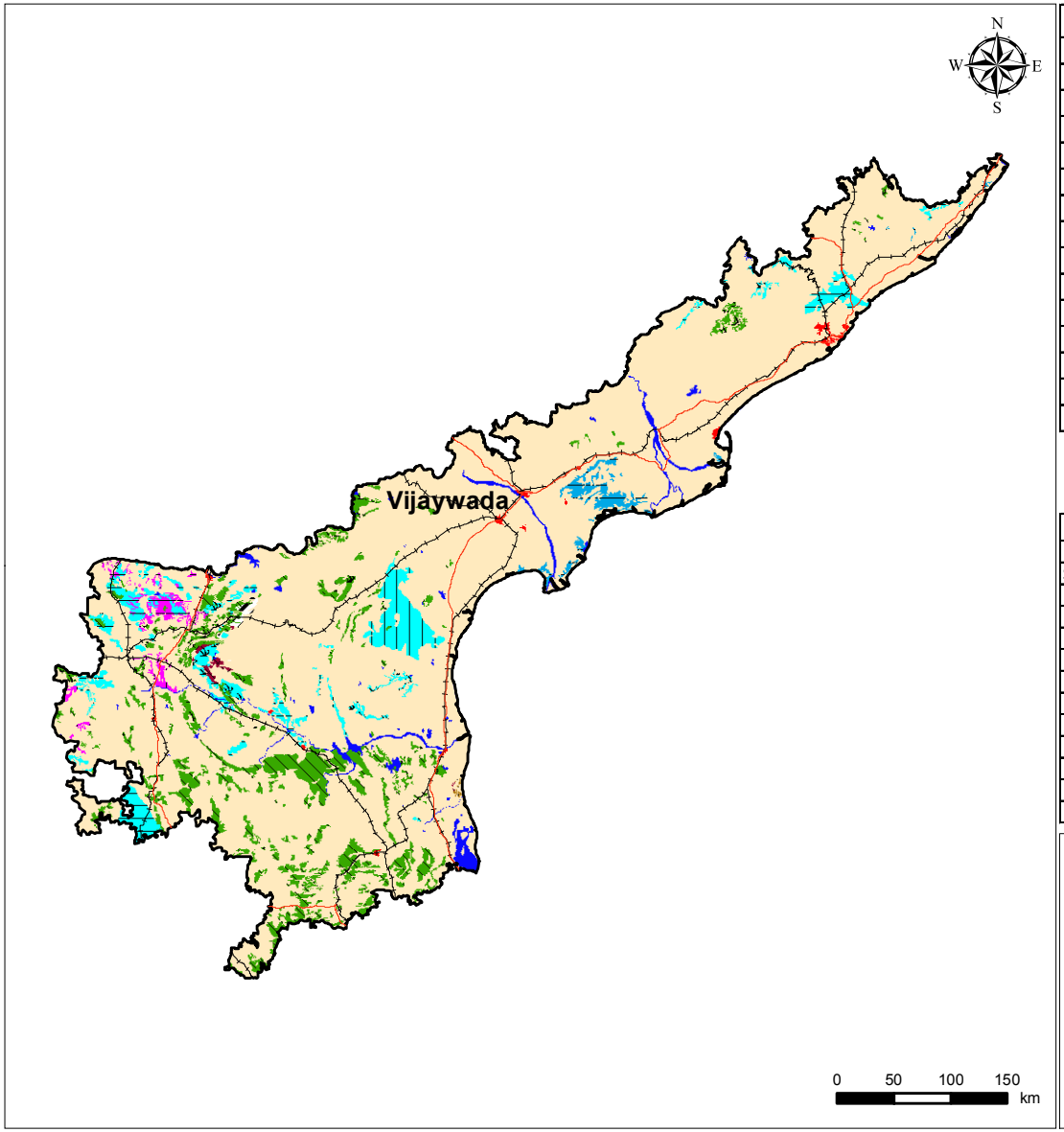
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (7.27% in 2011-13 and 7.29% in 2003-05) followed by Water Erosion (4.93% in 2011-13 and 4.89% in 2003-05). Among other processes contributing less than 1%, water logging and salinity dominate.

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	1164257	7.27	1168447	7.29	-4190
Water Erosion	789433	4.93	783830	4.89	5603
Wind Erosion	3986	0.02	4722	0.03	-736
Salinity	117952	0.74	117239	0.73	714
Water Logging	132334	0.83	125755	0.78	6579
Manmade	20833	0.13	20565	0.13	268
Barren/Rocky	20521	0.13	20521	0.13	0
Settlement	49441	0.31	26649	0.17	22792
Total Area under Desertification	**2298758**	**14.35**	**2267728**	**14.16**	**31030**
No Apparent Degradation	**13447078**	**83.94**	**13476591**	**84.12**	**-29513**
Total Geographical Area (ha)	**16020500**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	742319	4.63	745341	4.65	-3022
2	Fv2	Forest, vegetation degradation, High	204439	1.28	201159	1.26	3280
3	Sv1	Land with scrub, vegetation degradation, Low	134038	0.84	139306	0.87	-5268
4	Sv2	Land with scrub, vegetation degradation, High	83460	0.52	82640	0.52	820
5	Iw1	Agriculture irrigated, water erosion, Low	254346	1.59	181910	1.14	72436
6	Dw1	Agriculture unirrigated, water erosion, Low	423564	2.64	492047	3.07	-68484
7	Sw1	Land with scrub, water erosion, Low	85773	0.54	93707	0.58	-7934
8	Sw2	Land with scrub, water erosion, High	25750	0.16	16166	0.10	9585
9	Ee2	Dune / Sandy area, wind erosion, High	3986	0.02	4722	0.03	-736
10	Is1	Agriculture irrigated, salinity / alkalinity, Low	37910	0.24	45195	0.28	-7285
11	Ds1	Agriculture unirrigated, salinity / alkalinity, Low	80042	0.50	72043	0.45	7999
12	Dl1	Agriculture unirrigated, water logging, Low	132334	0.83	125755	0.78	6579
13	Tm2	Others, man made, High	20833	0.13	20565	0.13	268
14	R	Rocky	20521	0.13	20521	0.13	0
15	S	Settlement	49441	0.31	26649	0.17	22792
Total Area Under Desertification/ Land Degradation			**2298758**	**14.35**	**2267728**	**14.16**	**31030**
20	W	Water body/ Drainage	274664	1.71	276181	1.72	-1517
21	NAD	No Apparent Degradation	13447078	83.94	13476591	84.12	-29513
Total Geographical Area (ha)			**16020500**	**100**	**16020500**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
ANDHRA PRADESH (2011-13)



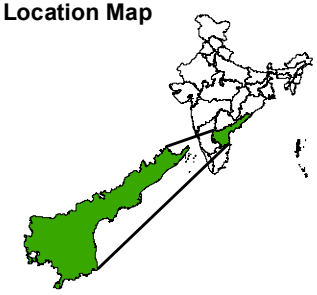
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Sw1,2	Land with scrub, water erosion
	Ee2	Dune / Sandy area, wind erosion
	Is1	Agriculture irrigated, salinity / alkalinity
	Ds1	Agriculture unirrigated, salinity / alkalinity
	Dl1	Agriculture unirrigated, water logging
	Tm2	Others, man made
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

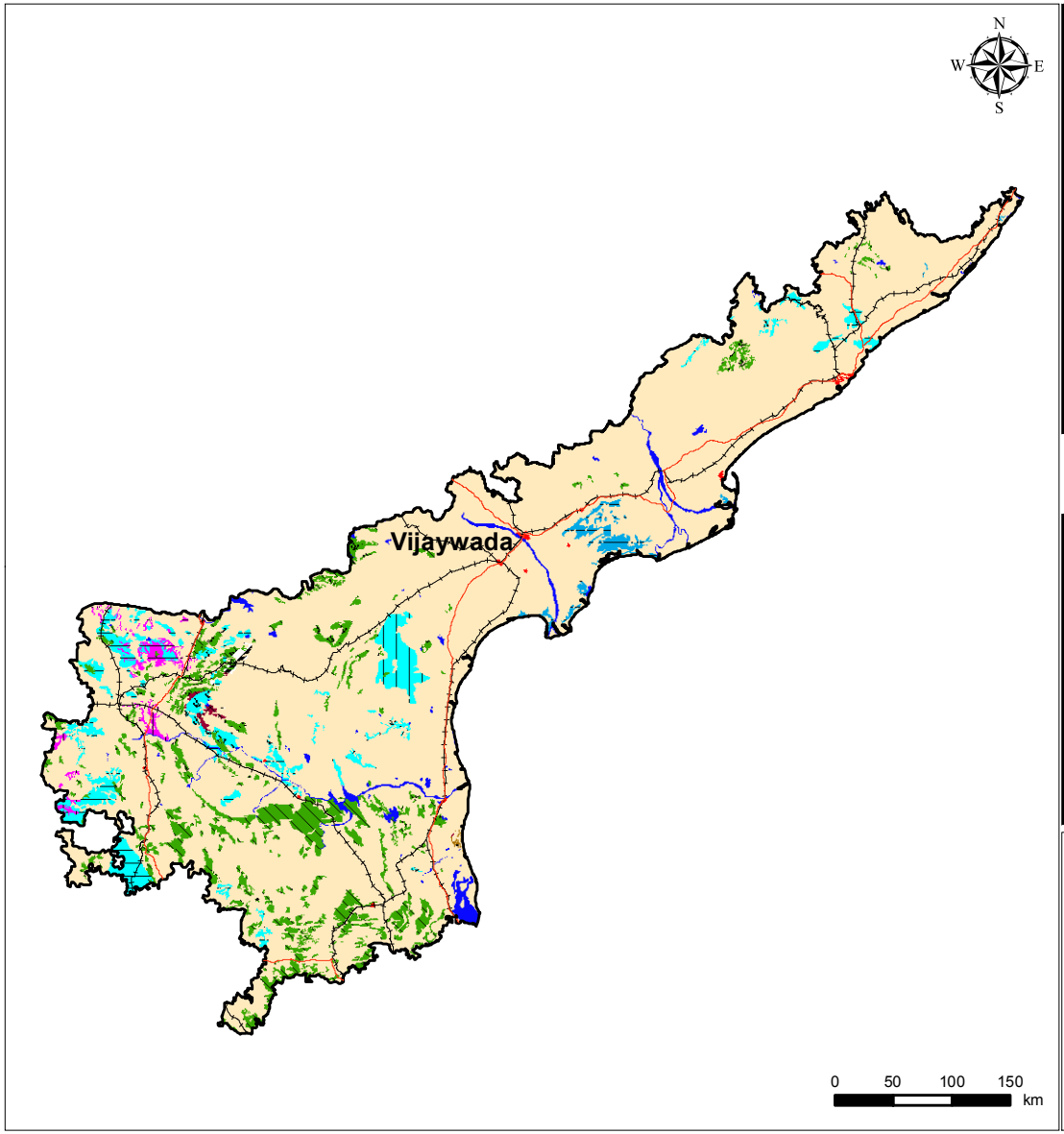


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
National Bureau of Soil Survey and Land Use Planning, Bengaluru
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
ANDHRA PRADESH (2003-05)



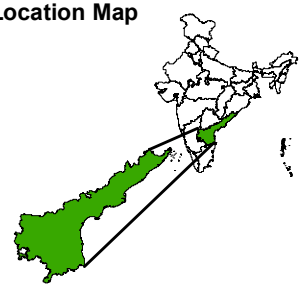
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Sw1,2	Land with scrub, water erosion
	Ee2	Dune / Sandy area, wind erosion
	Is1	Agriculture irrigated, salinity / alkalinity
	Ds1	Agriculture unirrigated, salinity / alkalinity
	Dl1	Agriculture unirrigated, water logging
	Tm2	Others, man made
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

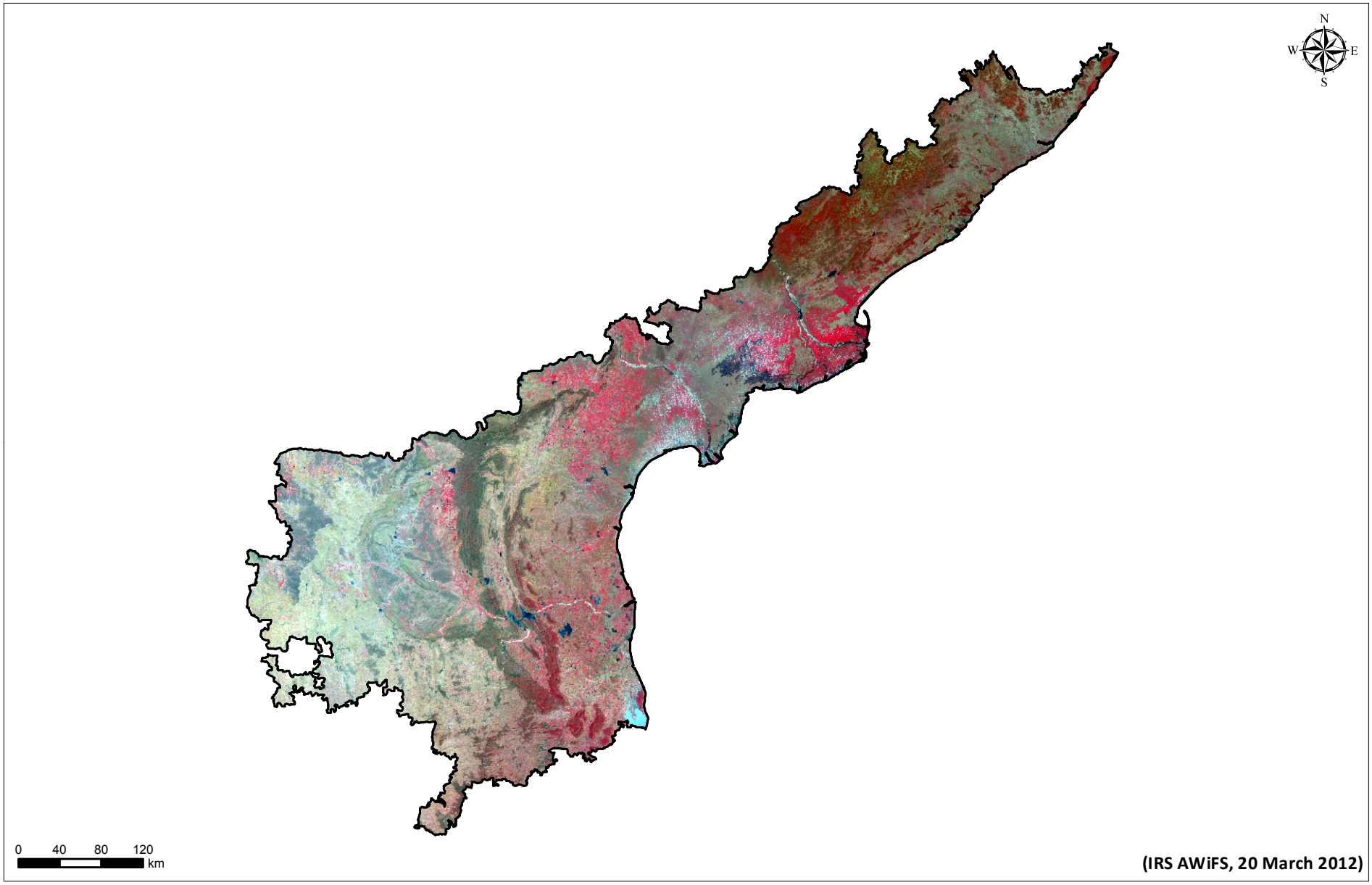


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

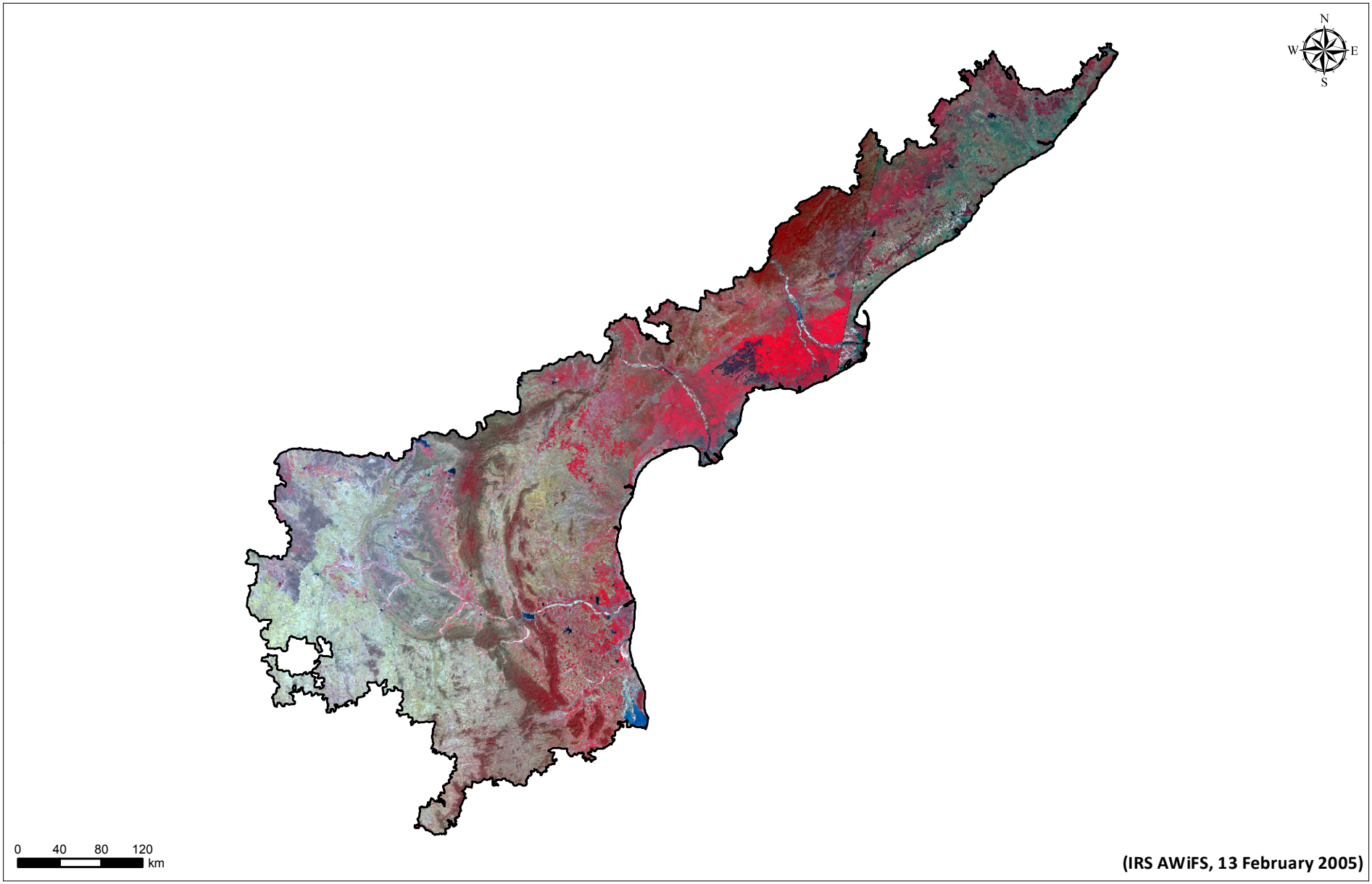
Prepared by:
National Bureau of Soil Survey and Land Use Planning, Bengaluru
&
Space Applications Centre,ISRO, Ahmedabad

ANDHRA PRADESH - IRS AWiFS 2012



(IRS AWiFS, 20 March 2012)

ANDHRA PRADESH - IRS AWiFS 2005



(IRS AWiFS, 13 February 2005)

Arunachal Pradesh

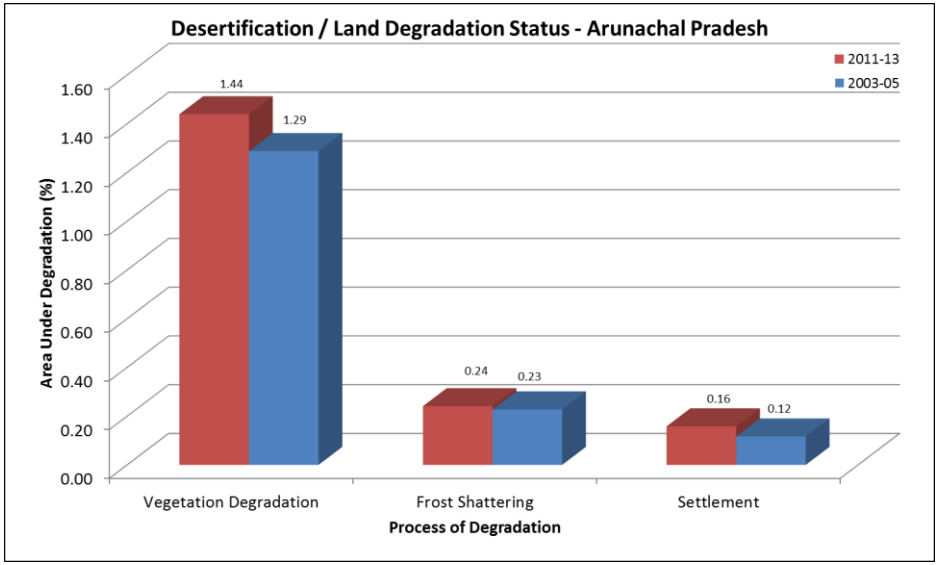
Arunachal Pradesh is located in north-east part of India with 83,743 sq km area. The state has population of 13,83,727; with 17 population density, 938 sex ratio and 65.38% literacy (Census 2011). Itanagar is the capital of Arunachal Pradesh.

The land of Arunachal Pradesh is mostly mountainous with the Himalayan ranges. These divide the state into five river valleys: Kameng, Subansiri, Siang, Lohit and Tirap. All these valleys are fed by snow. The climate of Arunachal Pradesh varies with elevation; alpine or Tundra climate in very high elevation, temperate climate in Middle Himalayas and humid/sub-tropical climate with hot summers and mild winters in sub-Himalayan. Arunachal Pradesh receives heavy rainfall of 2,000-4,100 mm annually, most of it between May and September.

Arunachal Pradesh is the state with lowest desertification/ land degradation area in the country with respect to state TGA, i.e., 1.84% for period 2011-13. The land degradation area in Arunachal Pradesh has increased about 0.21% since 2003-05.

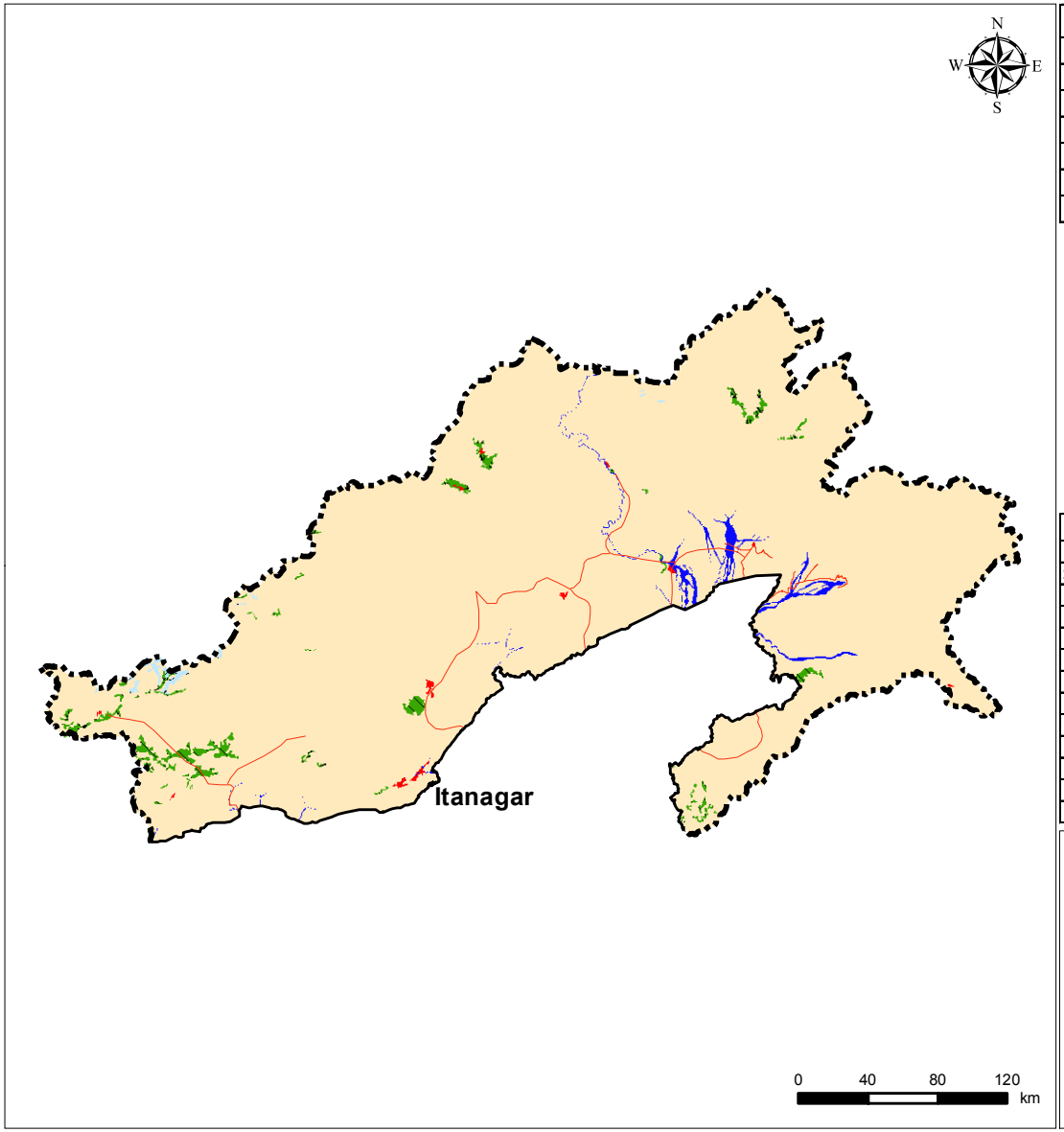
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (1.44% in 2011-13 and 1.29% in 2003-05) followed by Frost Shattering (0.24% in 2011-13 and 0.23% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	120499	1.44	107845	1.29	12655
Frost Shattering	20186	0.24	19072	0.23	1114
Settlement	13247	0.16	9769	0.12	3478
Total Area under Desertification	**153933**	**1.84**	**136686**	**1.63**	**17247**
No Apparent Degradation	**8144850**	**97.26**	**8162237**	**97.47**	**-17387**
Total Geographical Area (ha)	**8374300**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	63026	0.75	55720	0.67	7306
2	Fv2	Forest, vegetation degradation, High	11849	0.14	7395	0.09	4453
3	Sv1	Land with scrub, vegetation degradation, Low	37699	0.45	36804	0.44	895
4	Sv2	Land with scrub, vegetation degradation, High	7926	0.09	7926	0.09	0
5	Lf1	Periglacial, frost shattering, Low	3695	0.04	2581	0.03	1114
6	Lf2	Periglacial, frost shattering, High	16491	0.20	16491	0.20	0
7	S	Settlement	13247	0.16	9769	0.12	3478
Total Area Under Desertification/ Land Degradation			**153933**	**1.84**	**136686**	**1.63**	**17247**
8	W	Water body/ Drainage	75517	0.90	75378	0.90	140
9	NAD	No Apparent Degradation	8144850	97.26	8162237	97.47	-17387
Total Geographical Area (ha)			**8374300**	**100**	**8374300**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
ARUNACHAL PRADESH (2011-13)



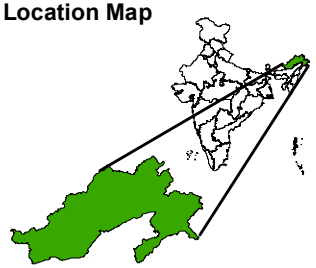
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Lf1,2	Periglacial, frost shattering
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

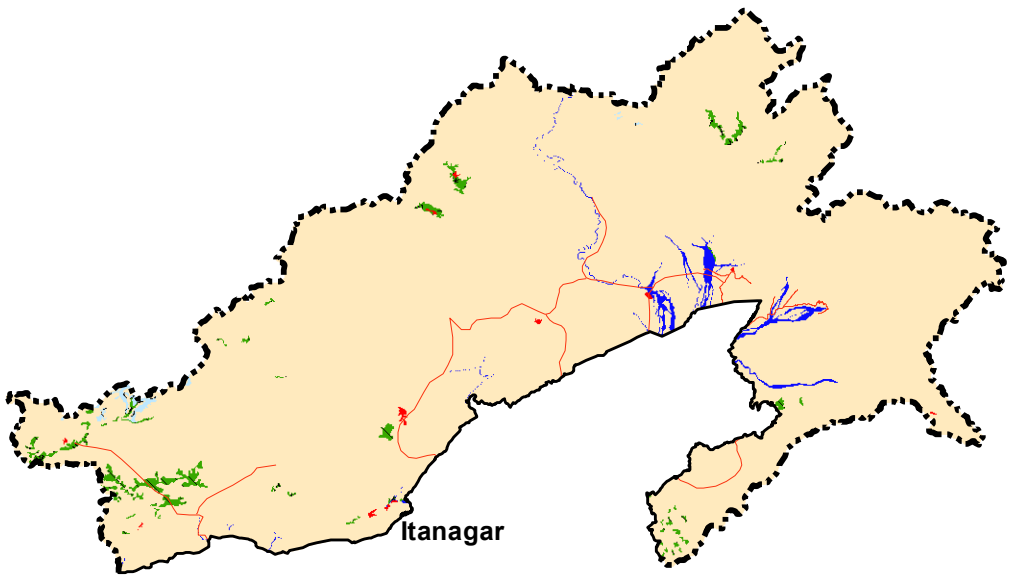


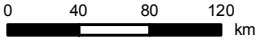
	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
State Remote sensing Applications Centre, Itanagar
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
ARUNACHAL PRADESH (2003-05)





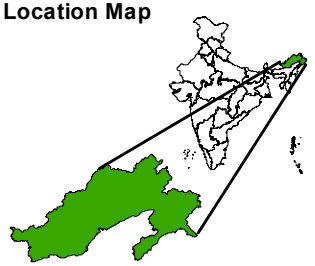
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Lf1,2	Periglacial, frost shattering
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

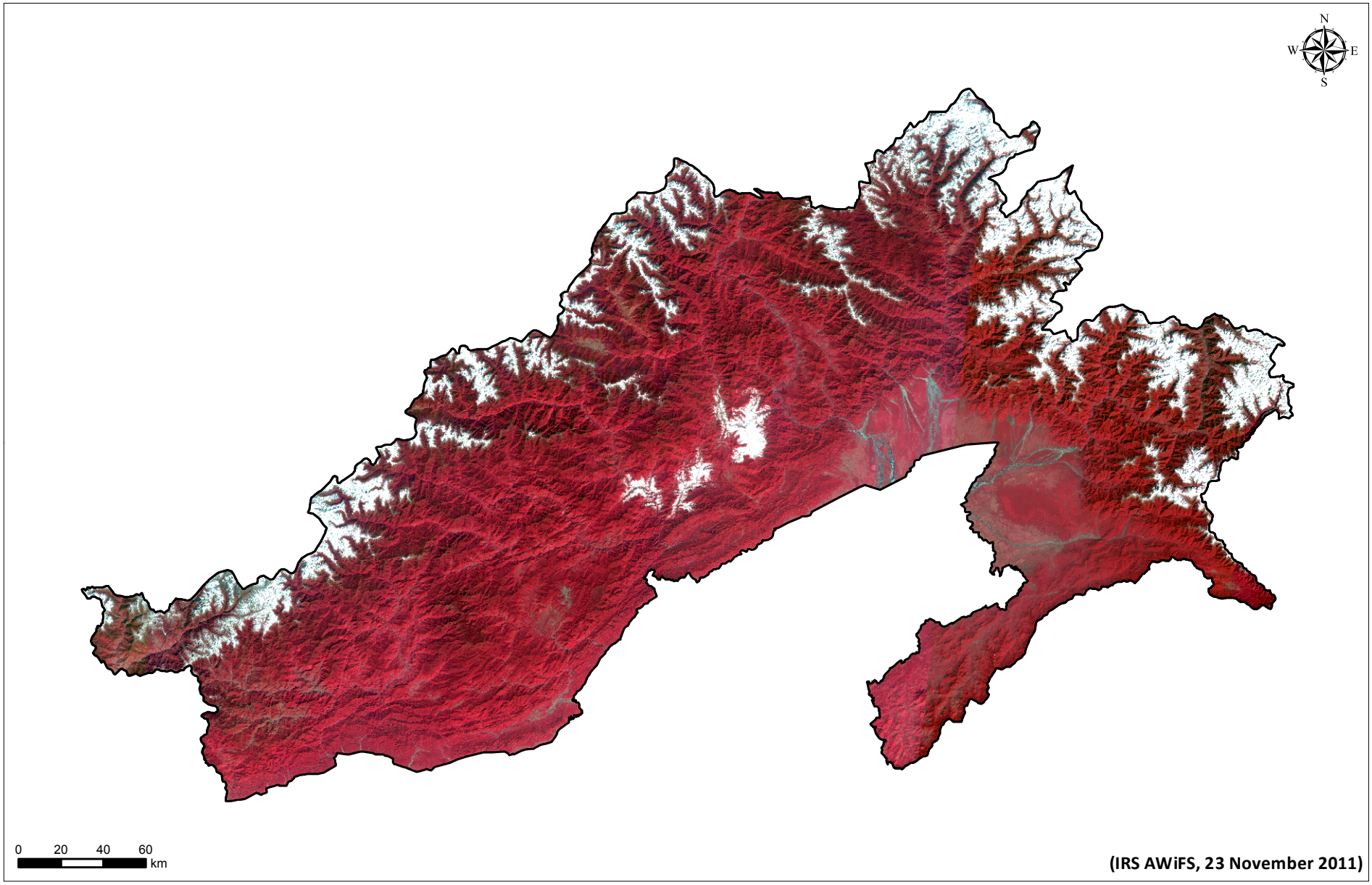


	International boundary
	State boundary
	Major roads
	Rail

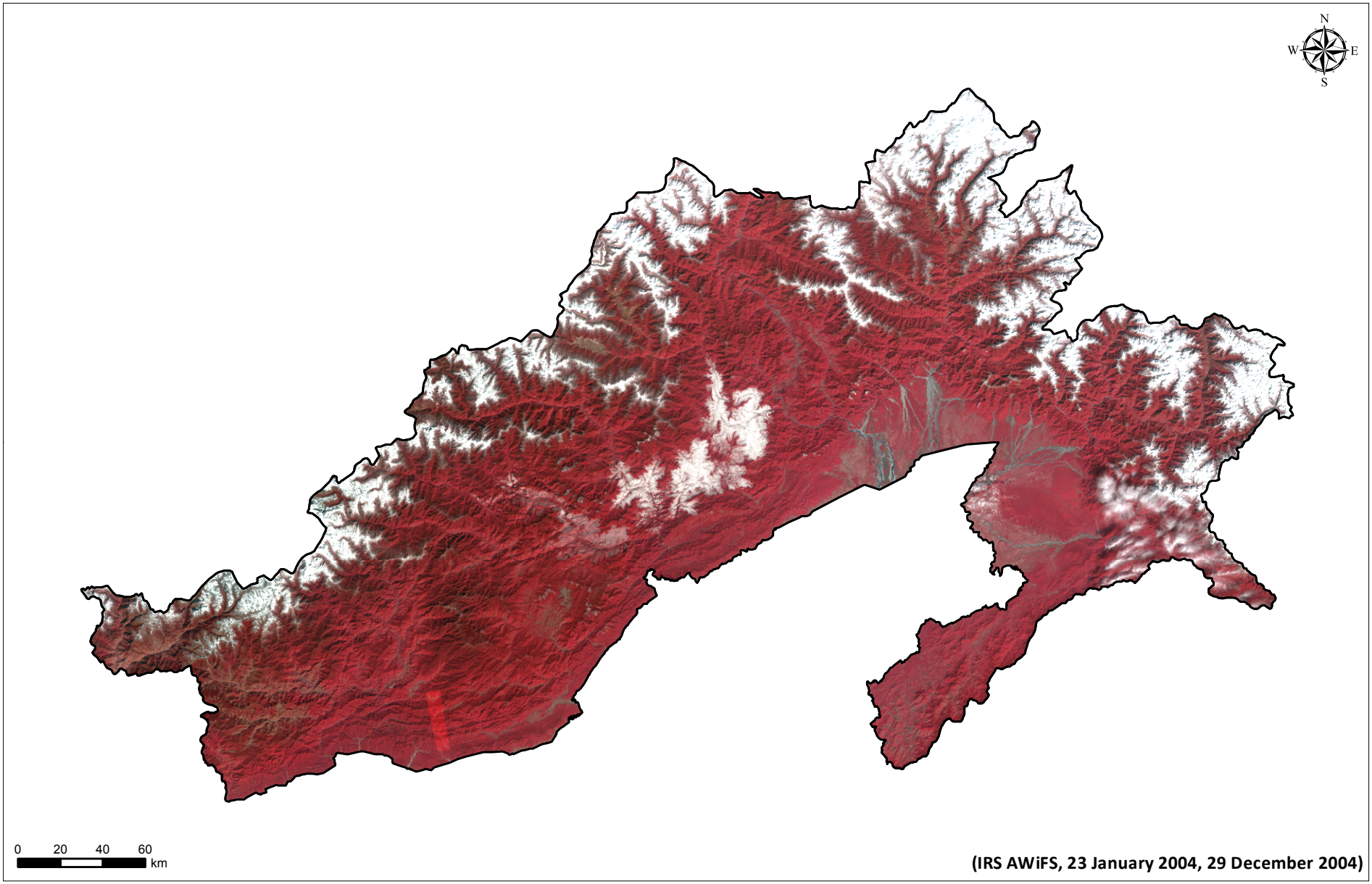
Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

Prepared by:
State Remote sensing Applications Centre, Itanagar
&
Space Applications Centre,ISRO, Ahmedabad

ARUNACHAL PRADESH - IRS AWiFS 2011



ARUNACHAL PRADESH - IRS AWiFS 2004



(IRS AWiFS, 23 January 2004, 29 December 2004)

Assam

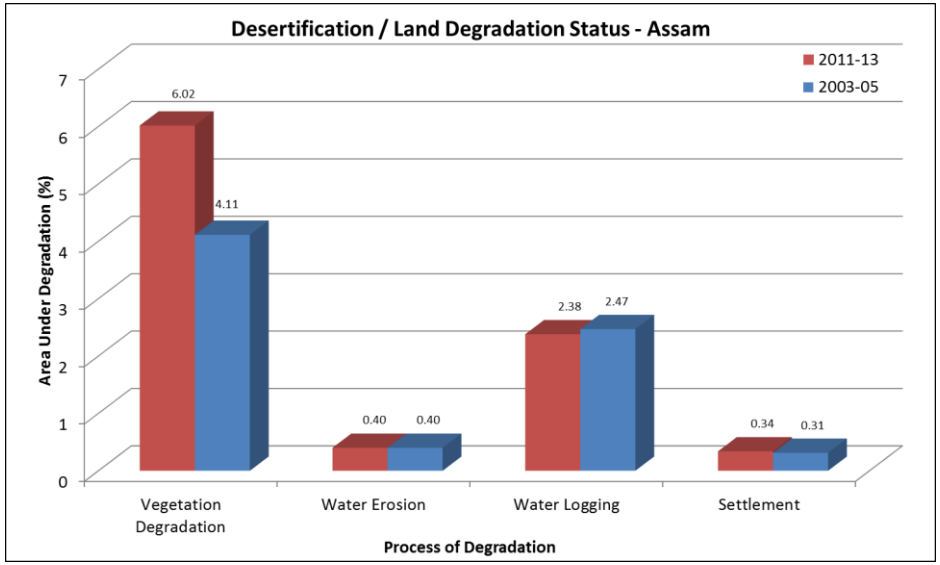
Assam is located in eastern part of India with 78,438 sq km area. The state has population of 3,12,05,576; with 398 population density, 958 sex ratio and 72.19% literacy (Census 2011). Guwahati is the capital of Assam.

Assam contains three of six physiographic divisions of India - The Northern Himalayas (Eastern Hills), The Northern Plains (Brahmaputra plain) and Deccan Plateau (Karbi Anglong). Geomorphic studies conclude that the Brahmaputra, the life-line of Assam is an antecedent river, older than the Himalayas. Assam experiences sub-alpine climate in hilly regions and excessive humid weather in the plains with 6°C - 38°C temperature, very heavy rainfall and high humidity. All the lands of Assam are characterized by alluvial qualities.

Assam is observed with 9.14% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Assam has increased about 1.84% since 2003-05.

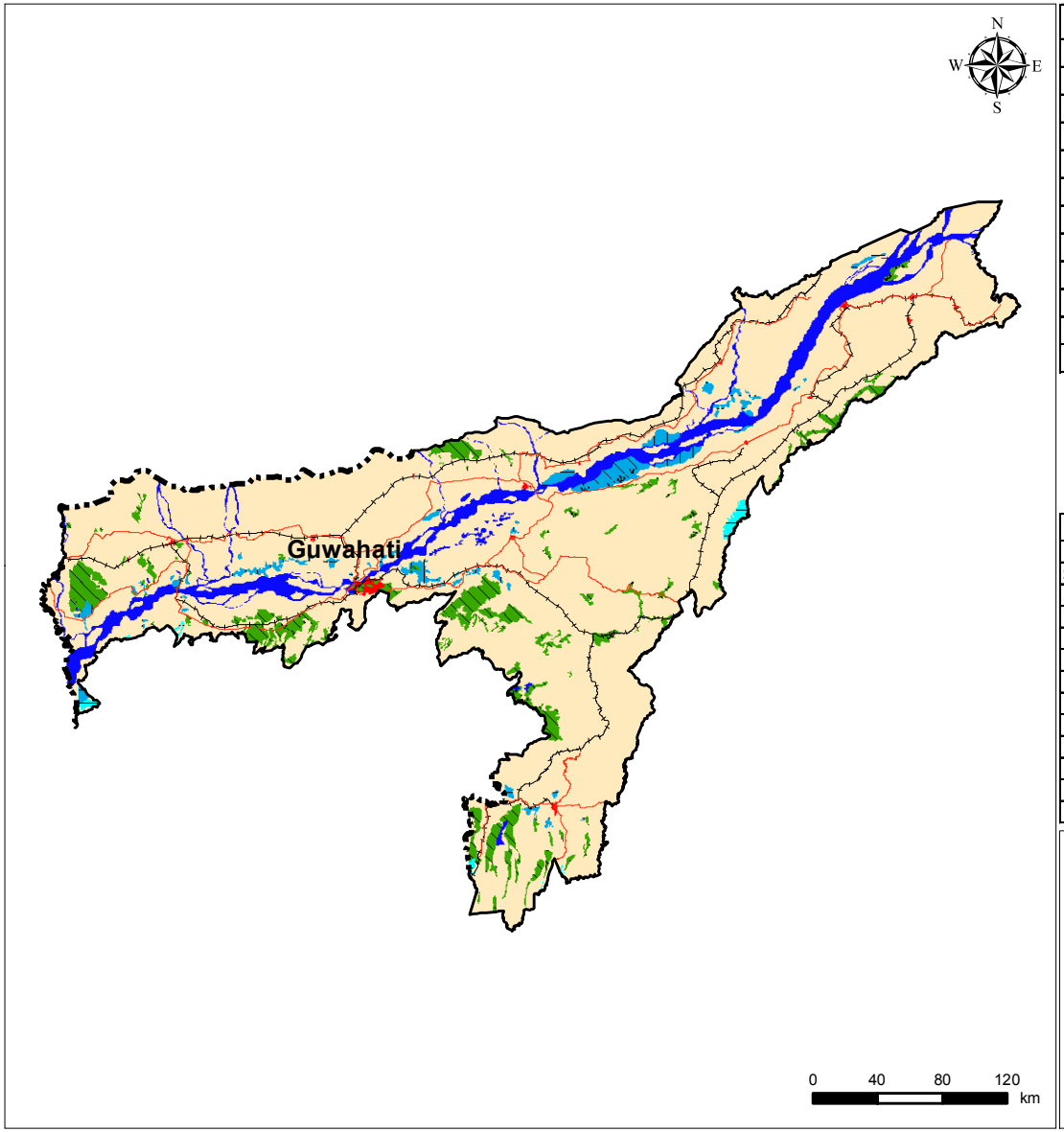
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (6.02% in 2011-13 and 4.11% in 2003-05) followed by Water Logging (2.38% in 2011-13 and 2.47% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	471958	6.02	322540	4.11	149418
Water Erosion	31424	0.40	31424	0.40	0
Water Logging	186667	2.38	193669	2.47	-7001
Settlement	26548	0.34	24583	0.31	1964
Total Area under Desertification	**716596**	**9.14**	**572215**	**7.30**	**144381**
No Apparent Degradation	**6591013**	**84.03**	**6735134**	**85.87**	**-144121**
Total Geographical Area (ha)	**7843800**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	383751	4.89	266709	3.40	117042
2	Fv2	Forest, vegetation degradation, High	18365	0.23	7782	0.10	10583
3	Sv1	Land with scrub, vegetation degradation, Low	66045	0.84	44252	0.56	21793
4	Sv2	Land with scrub, vegetation degradation, High	3797	0.05	3797	0.05	0
5	Iw1	Agriculture irrigated, water erosion, Low	839	0.01	839	0.01	0
6	Dw1	Agriculture unirrigated, water erosion, Low	30585	0.39	30585	0.39	0
7	Il1	Agriculture irrigated, water logging, Low	77285	0.99	102592	1.31	-25307
8	Il2	Agriculture irrigated, water logging, High	2810	0.04	-	-	2810
9	Dl1	Agriculture unirrigated, water logging, Low	62148	0.79	46652	0.59	15496
10	Fl1	Forest, water logging, Low	27022	0.34	27022	0.34	0
11	Sl1	Land with scrub, water logging, Low	17402	0.22	17402	0.22	0
12	S	Settlement	26548	0.34	24583	0.31	1964
Total Area Under Desertification/ Land Degradation			**716596**	**9.14**	**572215**	**7.30**	**144381**
13	W	Water body/ Drainage	536191	6.84	536451	6.84	-260
14	NAD	No Apparent Degradation	6591013	84.03	6735134	85.87	-144121
Total Geographical Area (ha)			**7843800**	**100**	**7843800**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
ASSAM (2011-13)



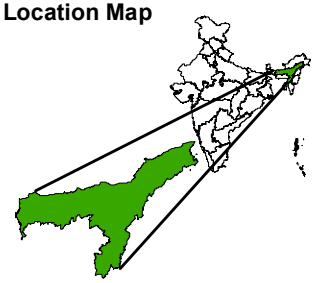
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Il1,2	Agriculture irrigated, water logging
	Dl1	Agriculture unirrigated, water logging
	Fl1	Forest, water logging
	Sl1	Land with scrub, water logging
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

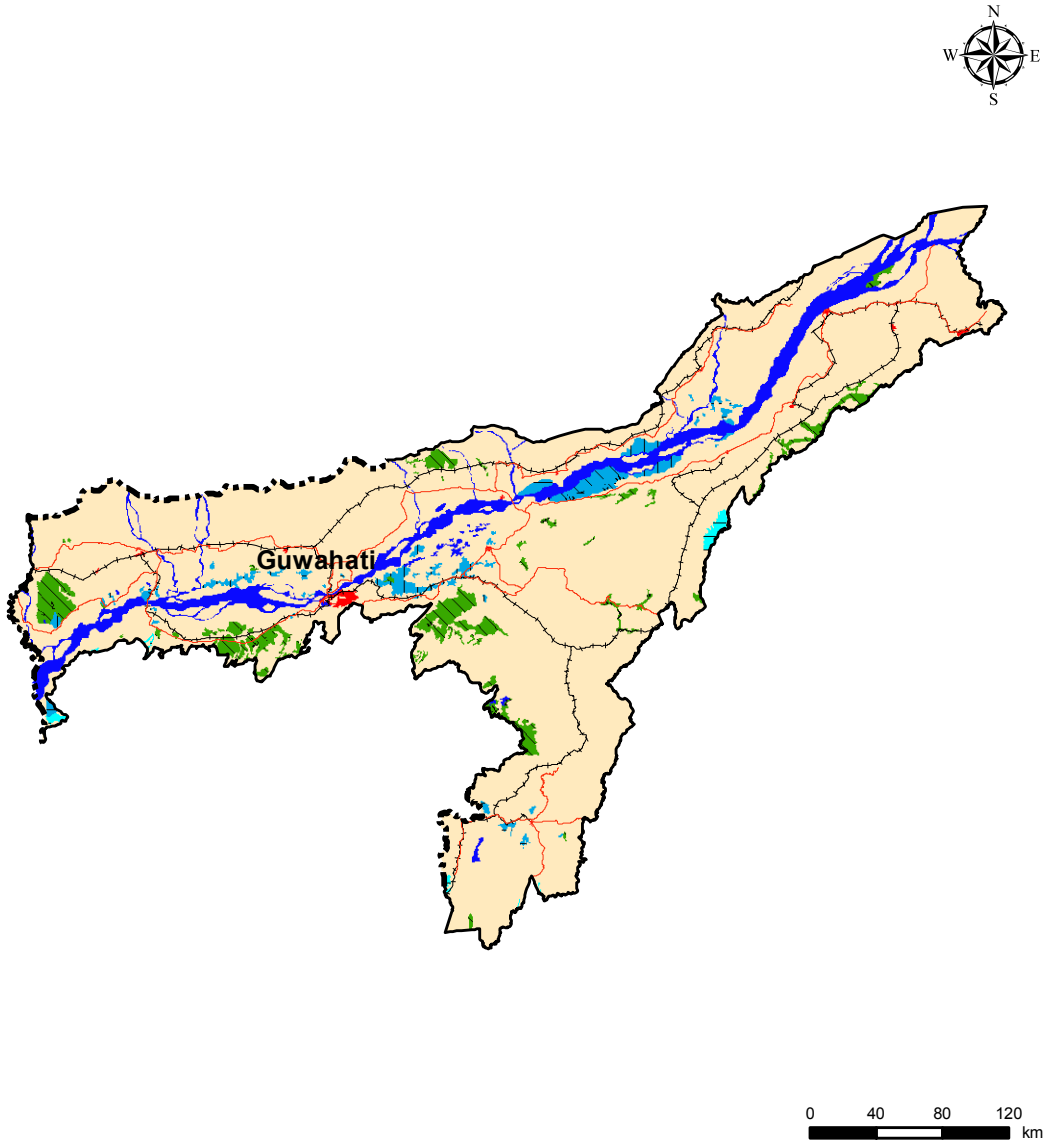


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
North Eastern Hill University, Shillong
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
ASSAM (2003-05)



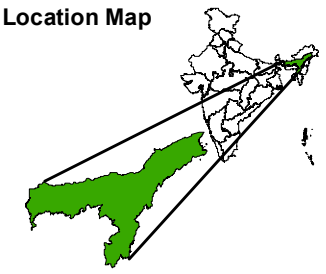
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Il1	Agriculture irrigated, water logging
	Dl1	Agriculture unirrigated, water logging
	Fl1	Forest, water logging
	Sl1	Land with scrub, water logging
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

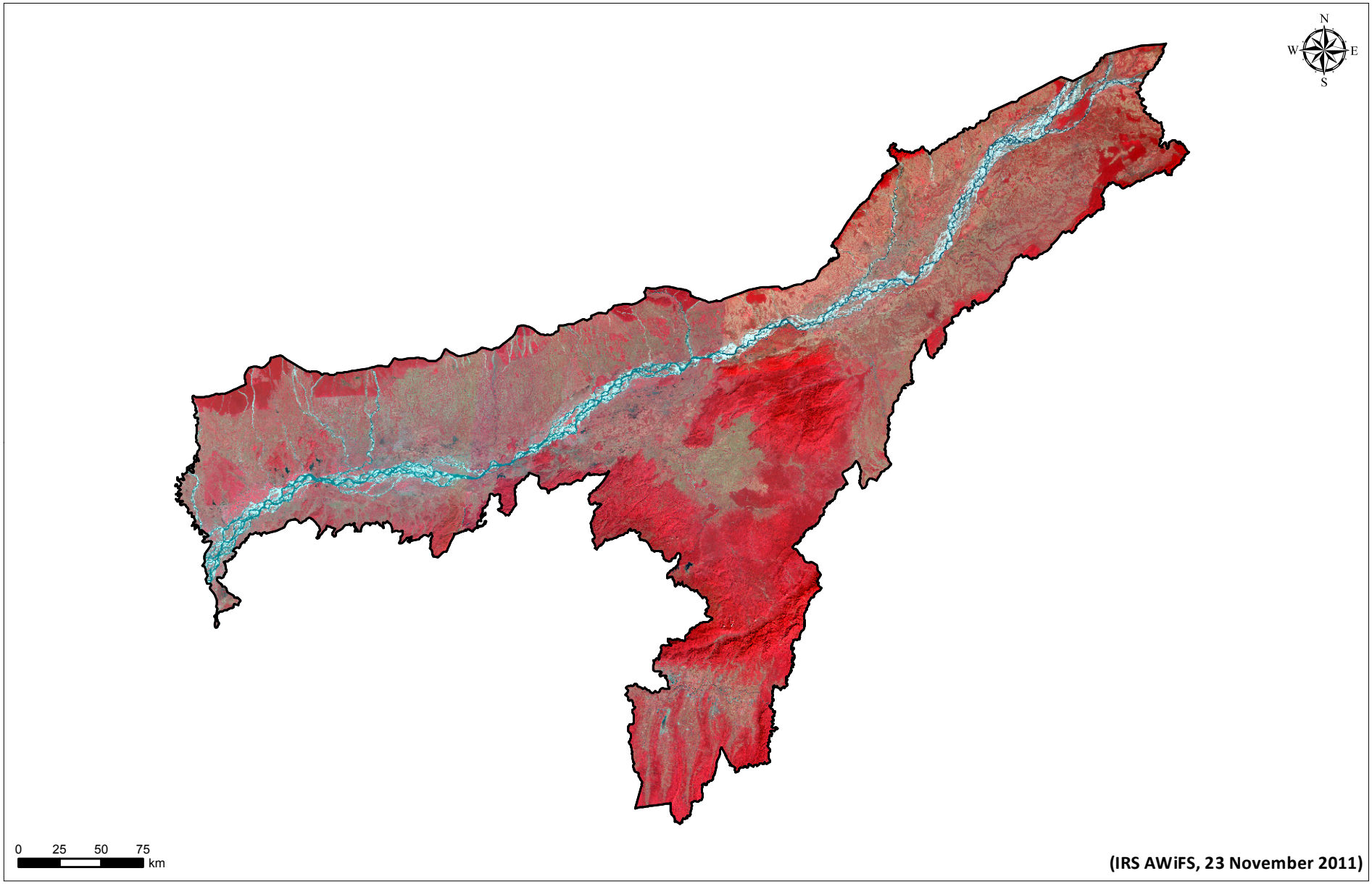


	International boundary
	State boundary
	Major roads
	Rail

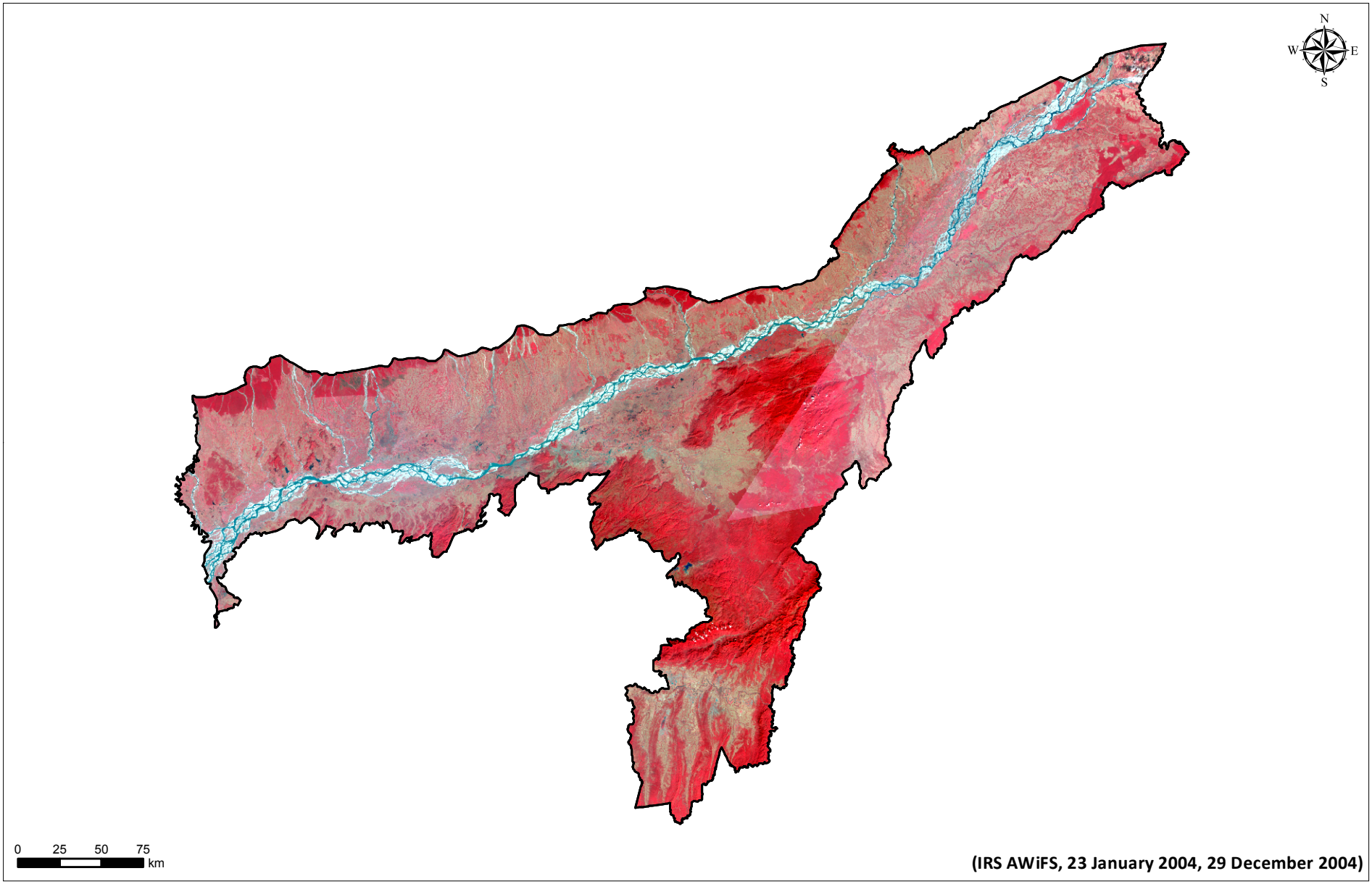
Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

Prepared by:
North Eastern Hill University, Shillong
&
Space Applications Centre,ISRO, Ahmedabad

ASSAM - IRS AWiFS 2011



ASSAM - IRS AWiFS 2004



(IRS AWiFS, 23 January 2004, 29 December 2004)

Bihar

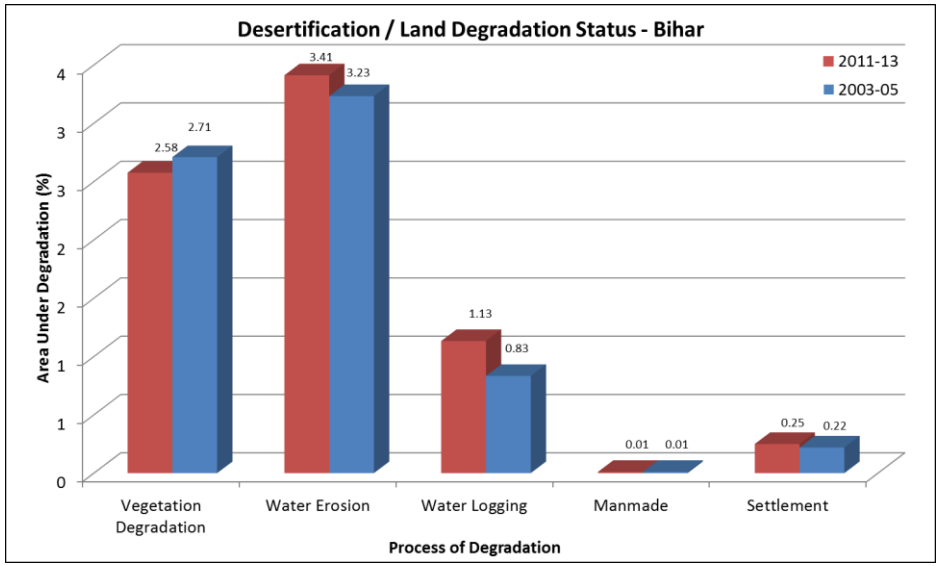
Bihar is located in northern part of India, bordering with Nepal, and covers 94,163 sq km area. The state has population of 10,40,99,452; with 1106 population density, 918 sex ratio and 61.80% literacy (Census 2011). Patna is the capital of Bihar.

The physiography of the state exhibits three distinct divisions, the northern mountains, the Indo-Gangetic alluvial plain and the undulating highlands of plateau. Major ranges of the state are Rajgir hills, Bateswar hills, Kaimur hills, Brahmayoni hills etc. Main rivers are Ganga, Kosi, Gandak and Son. Climate is characterised by cold winter (lowest temperatures being around 0-10°C in December-January), hot summer (35-40°C in April-June) and heavy rainfall in monsoon season. The Indo-Gangetic plain consist fertile alluvial soil, getting rejuvenated regularly supporting very good agriculture and horticulture.

Bihar is observed with 7.38% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Bihar has increased about 0.38% since 2003-05.

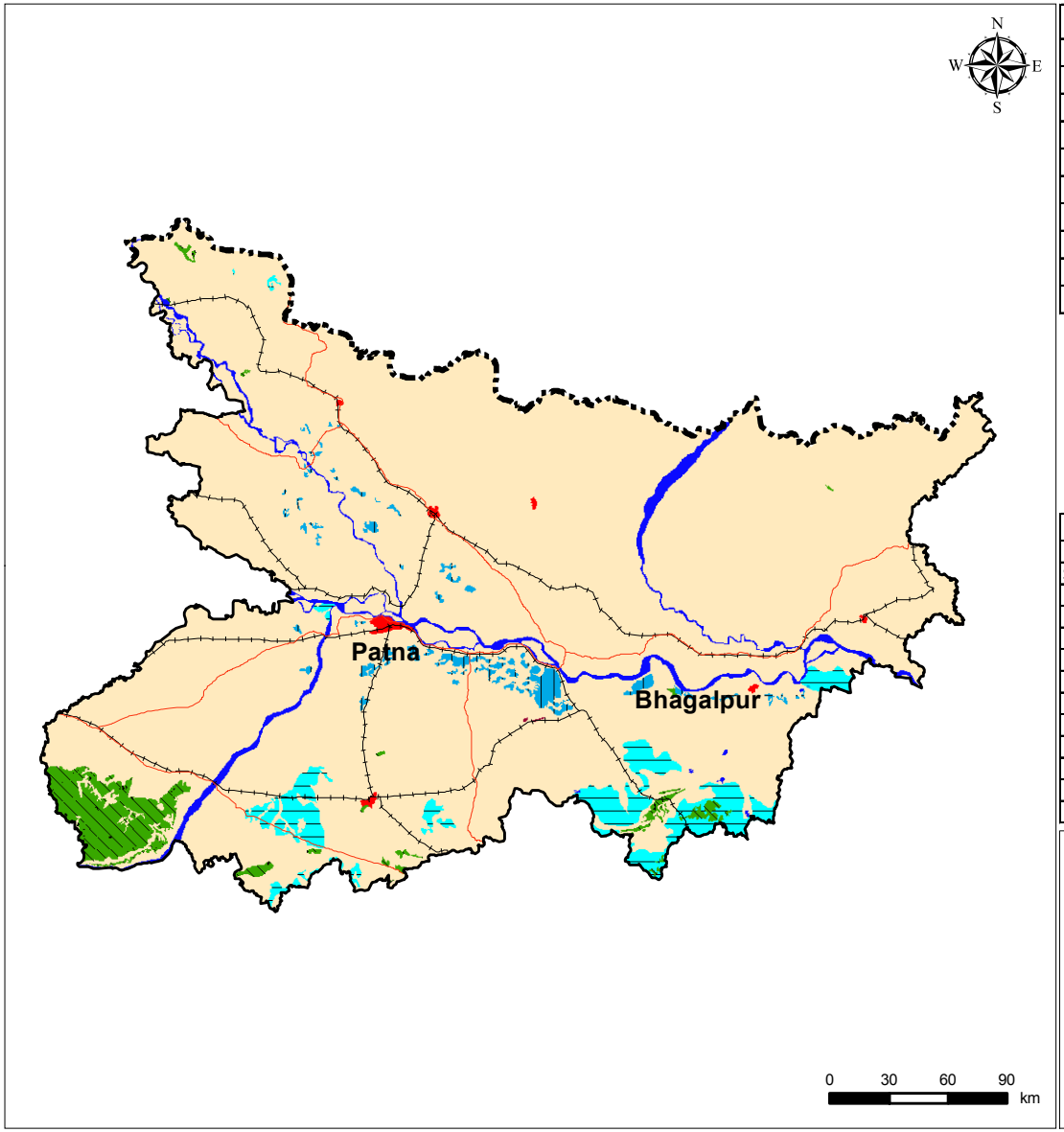
The most significant process of desertification/ land degradation in the state is Water Erosion (3.41% in 2011-13 and 3.23% in 2003-05) followed by Vegetation Degradation (2.58% in 2011-13 and 2.71% in 2003-05) and Water Logging (1.13% in 2011-13 and 0.83% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	242525	2.58	255073	2.71	-12547
Water Erosion	321175	3.41	304364	3.23	16811
Water Logging	106628	1.13	78450	0.83	28178
Manmade	984	0.01	984	0.01	0
Settlement	23496	0.25	20669	0.22	2828
Total Area under Desertification	**694809**	**7.38**	**659539**	**7.00**	**35270**
No Apparent Degradation	**8511828**	**90.39**	**8527091**	**90.56**	**-15263**
Total Geographical Area (ha)	**9416300**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	213346	2.27	220844	2.35	-7498
2	Fv2	Forest, vegetation degradation, High	-	-	6067	0.06	-6067
3	Sv1	Land with scrub, vegetation degradation, Low	29179	0.31	28161	0.30	1018
4	Dw1	Agriculture unirrigated, water erosion, Low	321175	3.41	304364	3.23	16811
5	Il1	Agriculture irrigated, water logging, Low	101847	1.08	75384	0.80	26463
6	Dl1	Agriculture unirrigated, water logging, Low	4781	0.05	3065	0.03	1715
7	Tm1	Others, man made, Low	984	0.01	984	0.01	0
8	S	Settlement	23496	0.25	20669	0.22	2828
Total Area Under Desertification/ Land Degradation			**694809**	**7.38**	**659539**	**7.00**	**35270**
9	W	Water body/ Drainage	209663	2.23	229670	2.44	-20007
10	NAD	No Apparent Degradation	8511828	90.39	8527091	90.56	-15263
Total Geographical Area (ha)			**9416300**	**100**	**9416300**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
BIHAR (2011-13)



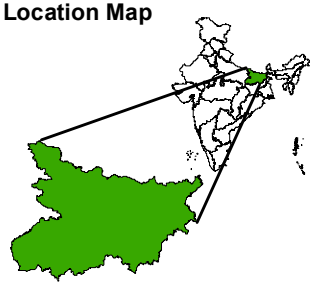
Legend

Symbol	Code	Description
	Fv1	Forest, vegetation degradation
	Sv1	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Il1	Agriculture irrigated, water logging
	Dl1	Agriculture unirrigated, water logging
	Tm1	Others, man made
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

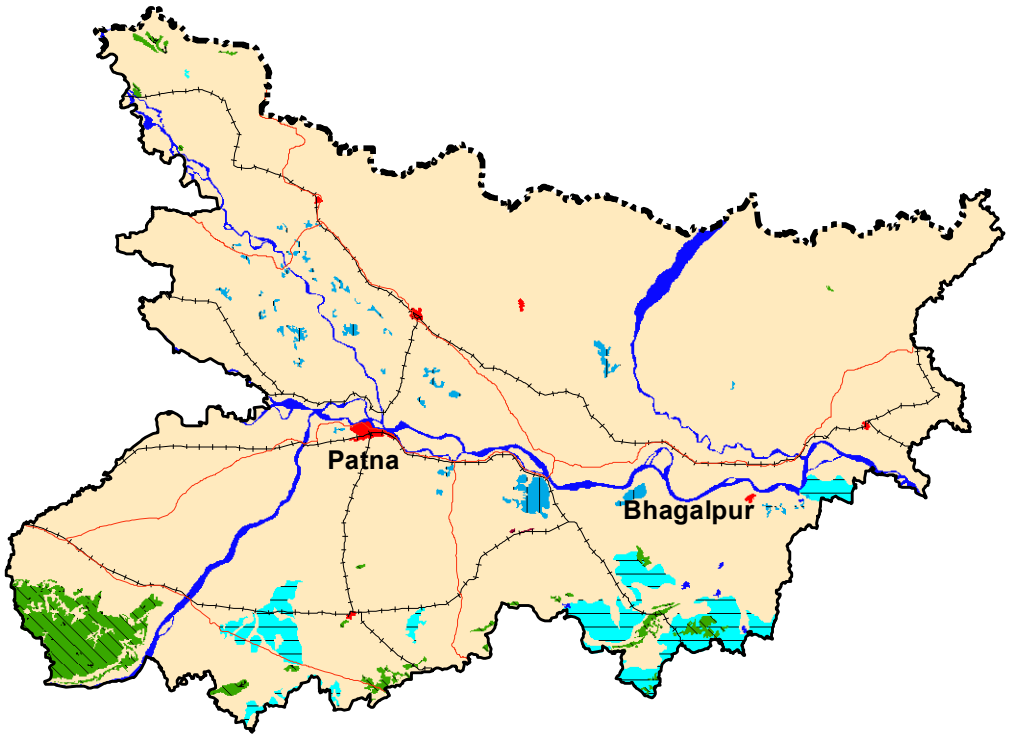


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
BIHAR (2003-05)



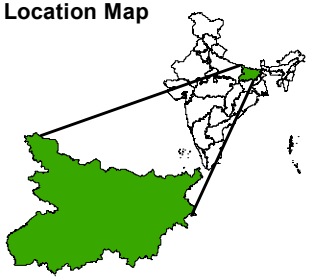
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Il1	Agriculture irrigated, water logging
	Dl1	Agriculture unirrigated, water logging
	Tm1	Others, man made
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

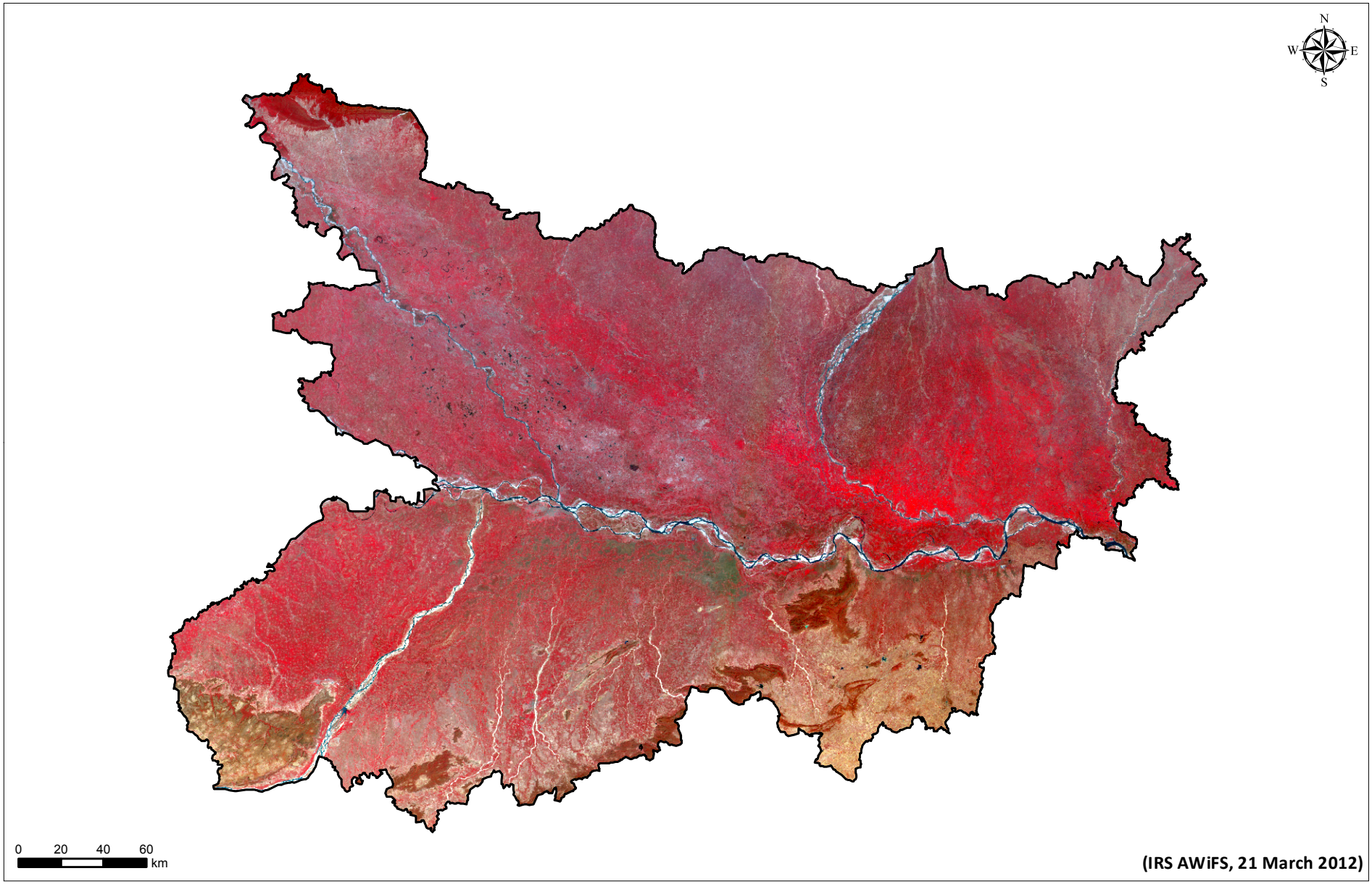


	International boundary
	State boundary
	Major roads
	Rail

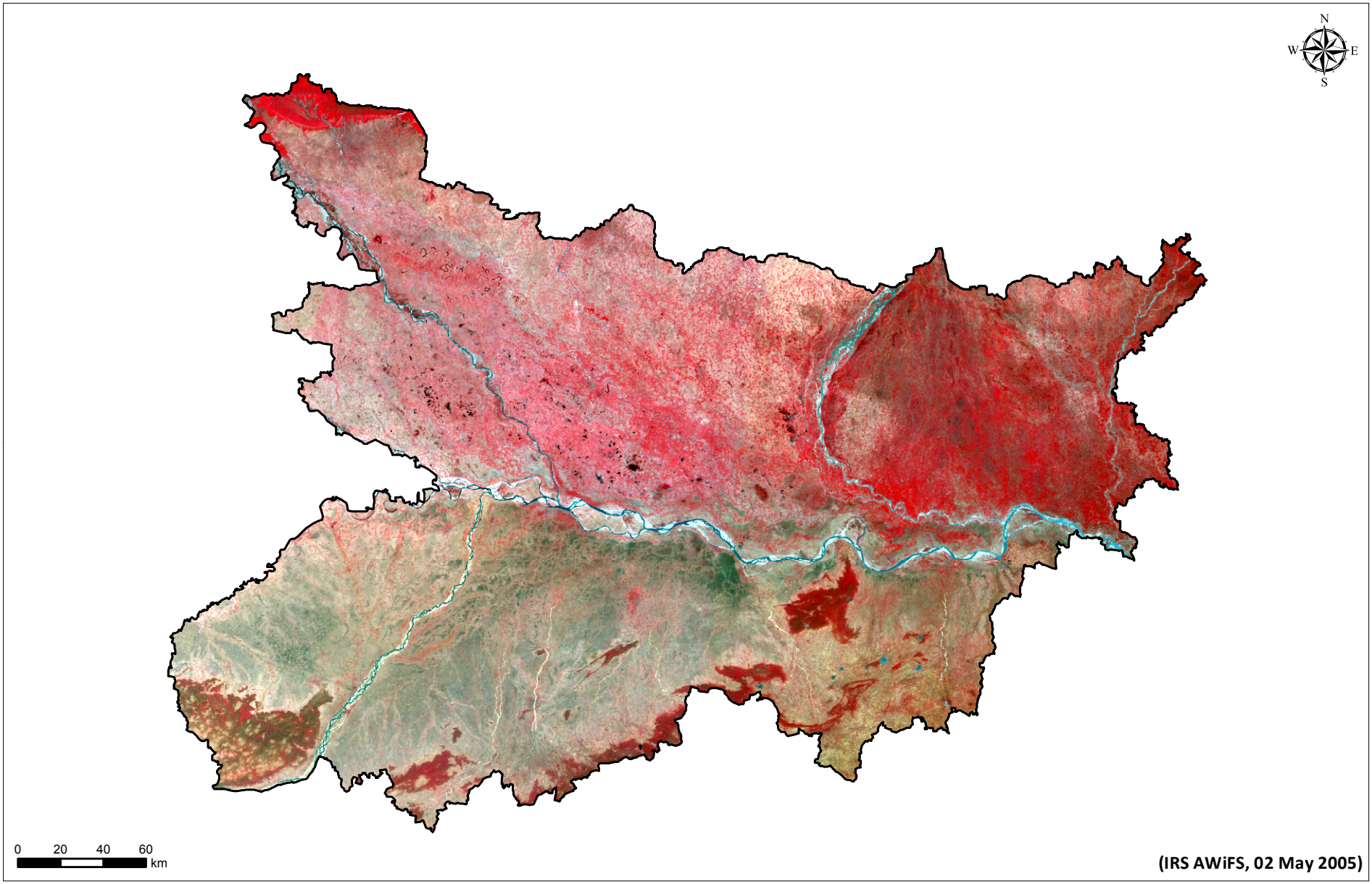
Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

Prepared by:
Space Applications Centre,ISRO, Ahmedabad

BIHAR - IRS AWiFS 2012



BIHAR - IRS AWiFS 2005



Chhattisgarh

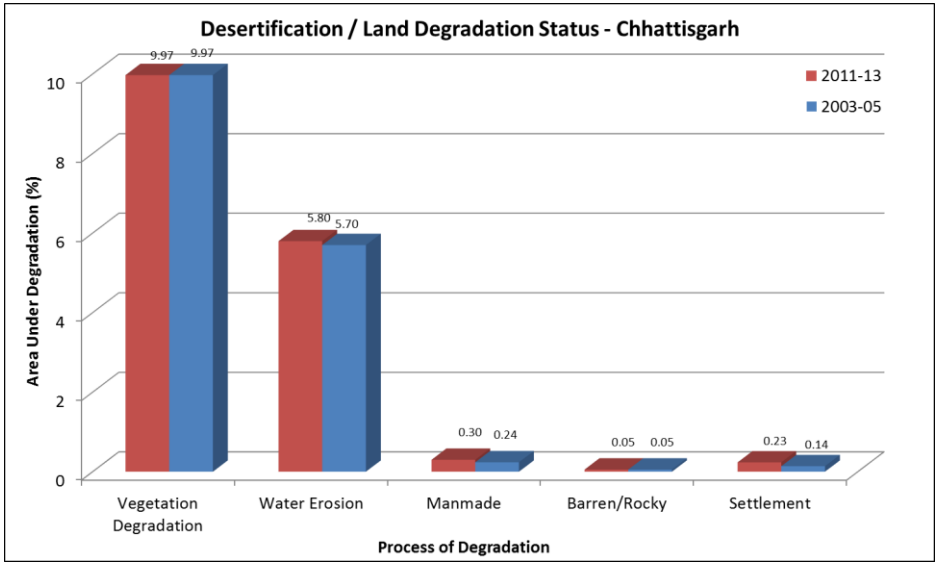
Chhattisgarh is located in central part of India with 1,35,192 sq km area. The state has population of 2,55,45,198; with 189 population density, 991 sex ratio and 70.28% literacy (Census 2011). Raipur is the capital of Chhattisgarh.

The major geographic feature of Chhattisgarh is Vindhyan ranges, with four principal rivers namely Narmada, Godavari, Rihand and Mahanadi. The soil is mainly red lateritic soil. The state is endowed with huge mineral deposits and forest resources. The climate of Chhattisgarh is mainly dry and hot, experiencing severe dust storm in summer season and good amount of rainfall in monsoon.

Chhattisgarh is observed with 16.36% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Chhattisgarh has increased about 0.26% since 2003-05.

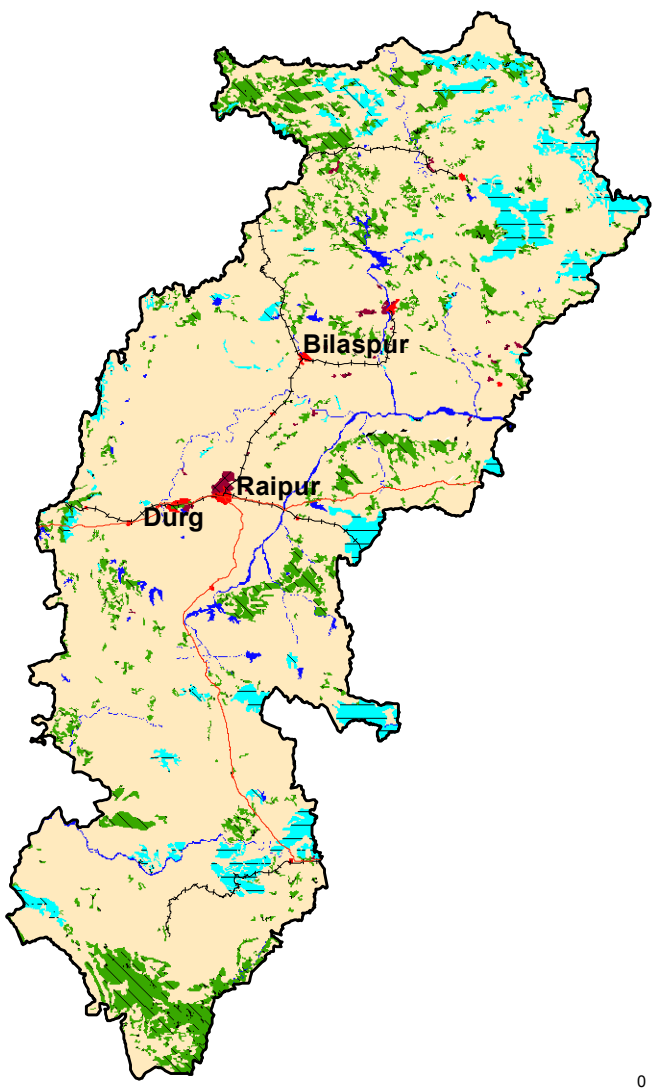
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (9.97% both in 2011-13 and 2003-05) followed by Water Erosion (5.80% in 2011-13 and 5.70% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	1348089	9.97	1348122	9.97	-33
Water Erosion	783645	5.80	770387	5.70	13258
Manmade	40541	0.30	31972	0.24	8569
Barren/Rocky	7222	0.05	7222	0.05	0
Settlement	31656	0.23	18685	0.14	12971
Total Area under Desertification	**2211153**	**16.36**	**2176388**	**16.10**	**34765**
No Apparent Degradation	**11130592**	**82.33**	**11166012**	**82.59**	**-35420**
Total Geographical Area (ha)	**13519200**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	1087547	8.04	1085360	8.03	2188
2	Fv2	Forest, vegetation degradation, High	21761	0.16	21761	0.16	0
3	Sv1	Land with scrub, vegetation degradation, Low	212550	1.57	214772	1.59	-2221
4	Sv2	Land with scrub, vegetation degradation, High	26230	0.19	26230	0.19	0
5	Iw1	Agriculture irrigated, water erosion, Low	18377	0.14	6325	0.05	12052
6	Dw1	Agriculture unirrigated, water erosion, Low	592962	4.39	588835	4.36	4127
7	Fw1	Forest, water erosion, Low	106860	0.79	106860	0.79	0
8	Sw1	Land with scrub, water erosion, Low	58740	0.43	61661	0.46	-2920
9	Sw2	Land with scrub, water erosion, High	6706	0.05	6706	0.05	0
10	Fm1	Forest, man made, Low	1055	0.01	1055	0.01	0
11	Tm1	Others, man made, Low	33958	0.25	26798	0.20	7160
12	Tm2	Others, man made, High	5528	0.04	4119	0.03	1409
13	R	Rocky	7222	0.05	7222	0.05	0
14	S	Settlement	31656	0.23	18685	0.14	12971
Total Area Under Desertification/ Land Degradation			**2211153**	**16.36**	**2176388**	**16.10**	**34765**
15	W	Water body/ Drainage	177455	1.31	176800	1.31	655
16	NAD	No Apparent Degradation	11130592	82.33	11166012	82.59	-35420
Total Geographical Area (ha)			**13519200**	**100**	**13519200**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
CHHATTISGARH (2011-13)



Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Fw1	Forest, water erosion
	Sw1,2	Land with scrub, water erosion
	Fm1	Forest, man made
	Tm1,2	Others, man made
	R	Rocky
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
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	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
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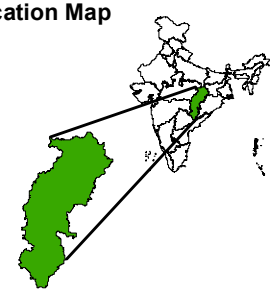
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

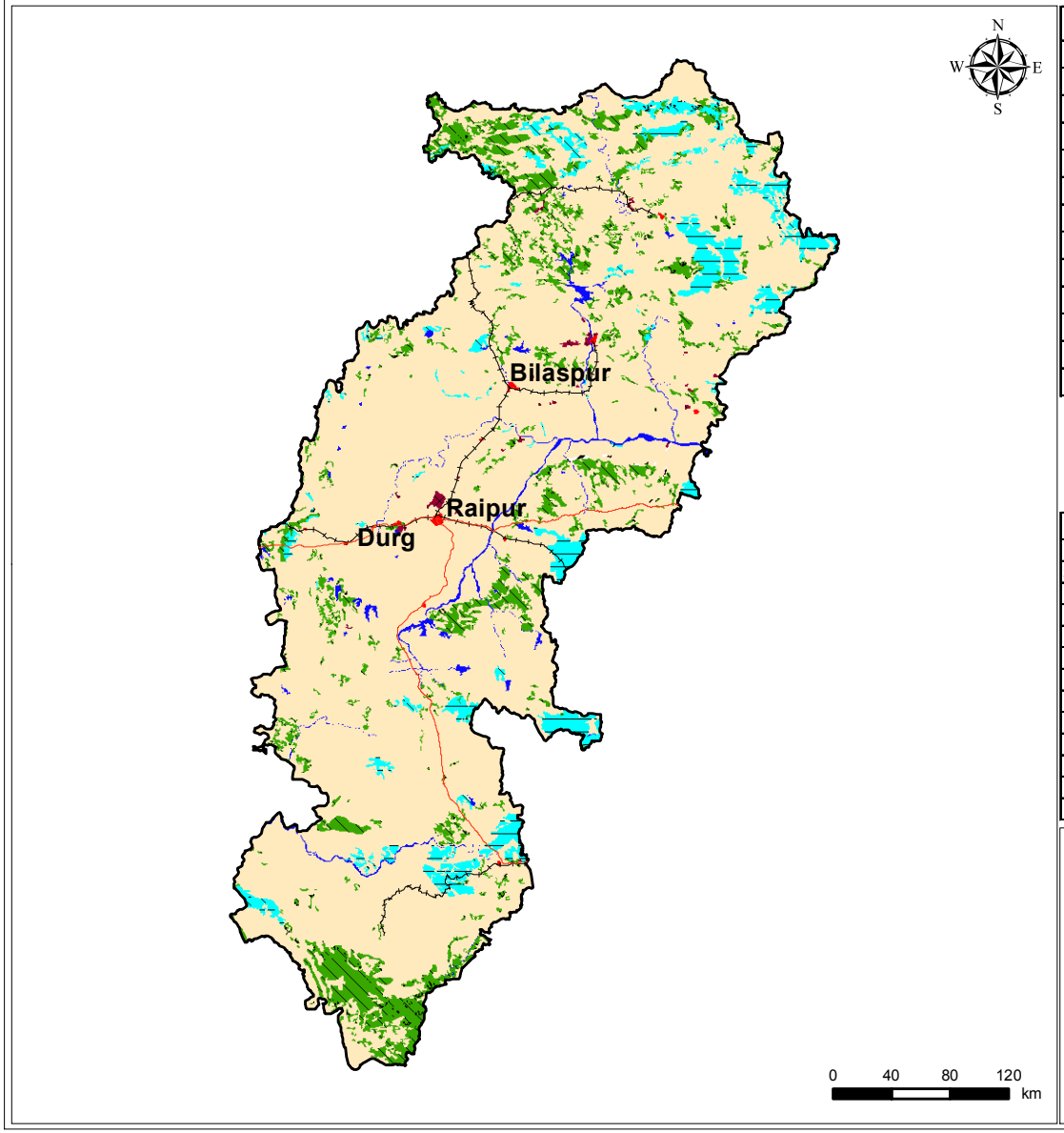


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Madhya Pradesh Council of Science & Technology, Bhopal
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
CHHATTISGARH (2003-05)



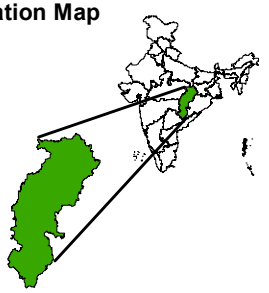
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Fw1	Forest, water erosion
	Sw1,2	Land with scrub, water erosion
	Fm1	Forest, man made
	Tm1,2	Others, man made
	R	Rocky
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

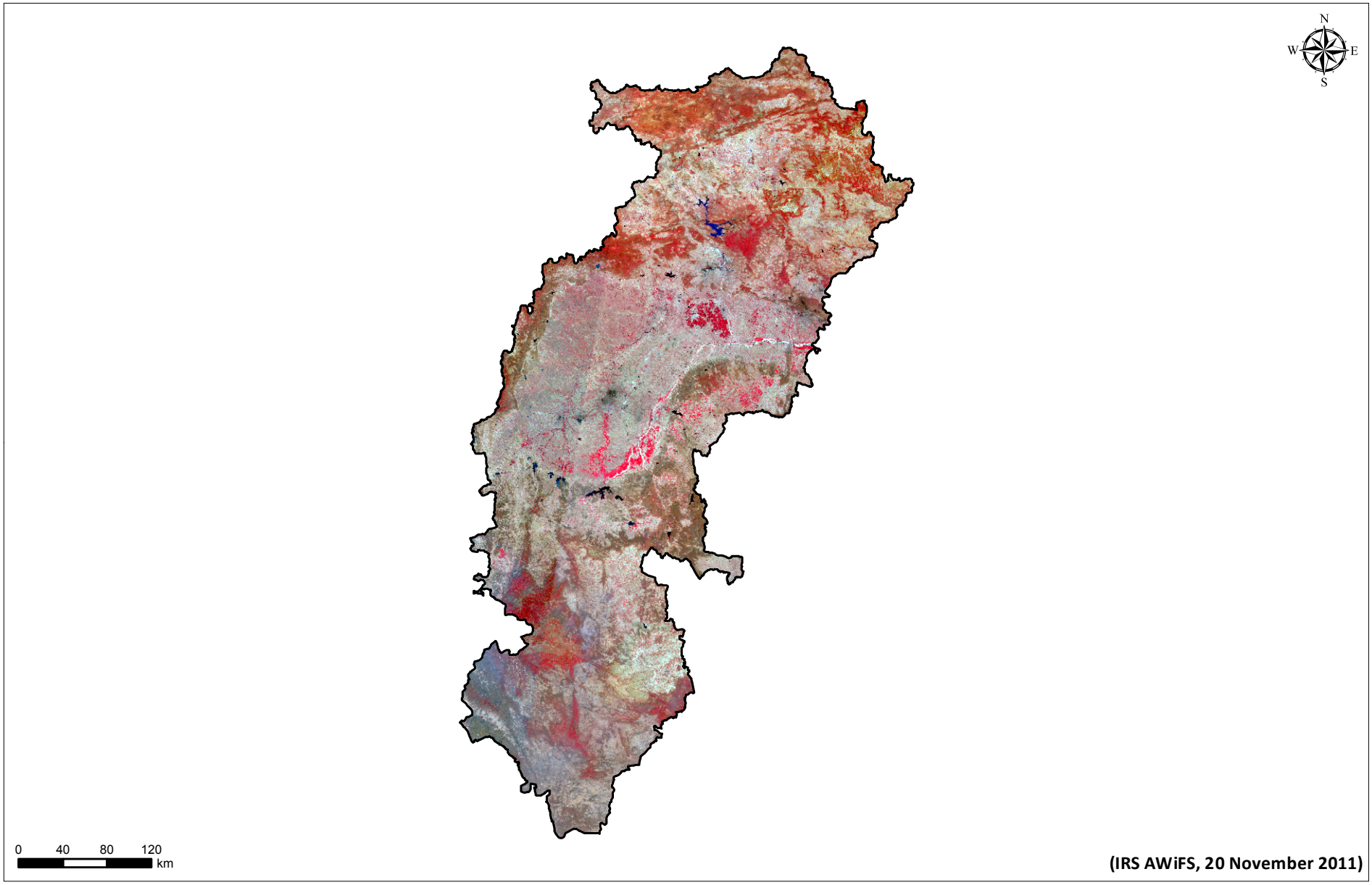


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

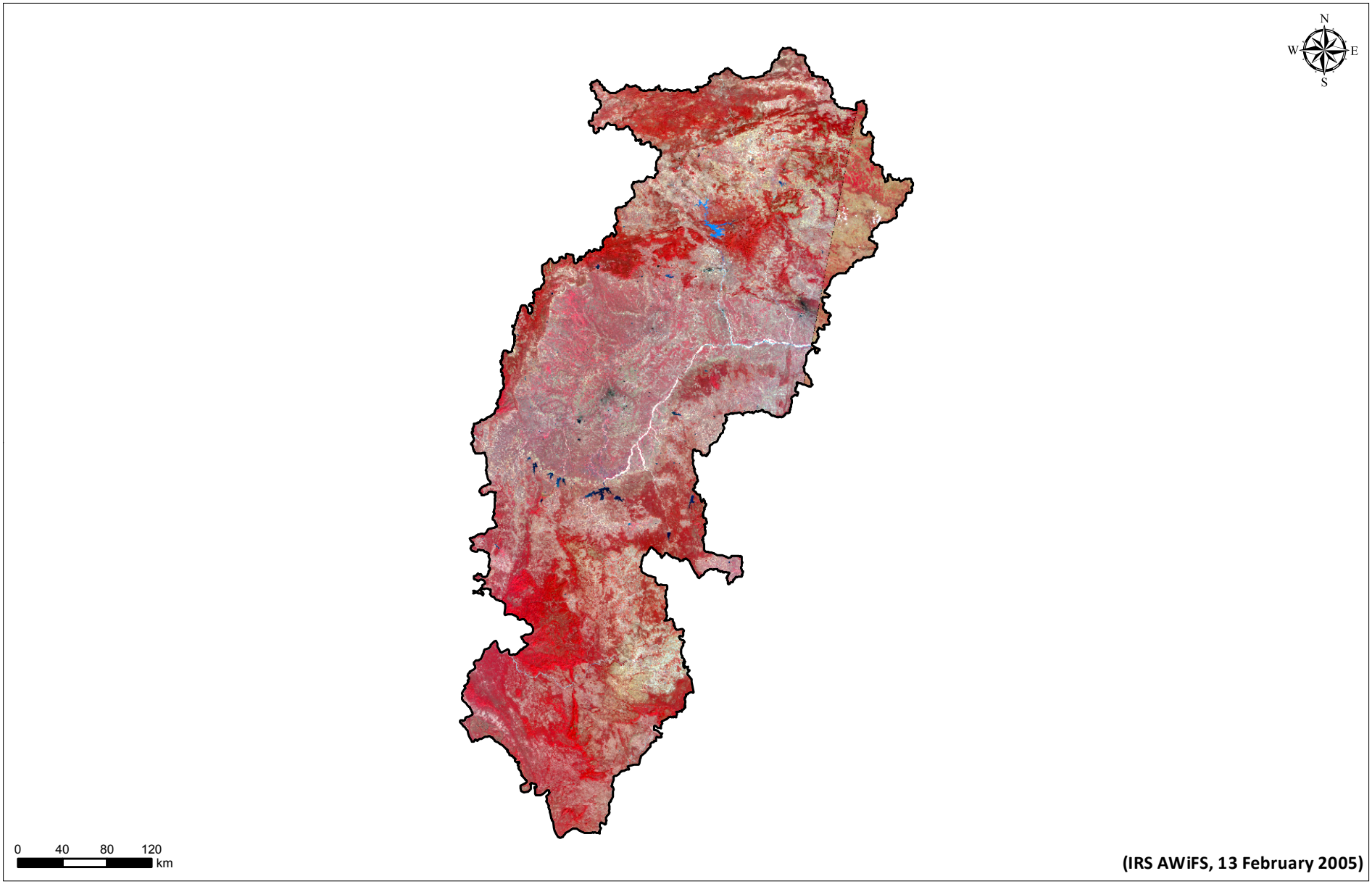
Prepared by:
Madhya Pradesh Council of Science & Technology, Bhopal
&
Space Applications Centre,ISRO, Ahmedabad

CHHATTISGARH - IRS AWiFS 2011



(IRS AWiFS, 20 November 2011)

CHHATTISGARH - IRS AWiFS 2005



(IRS AWiFS, 13 February 2005)

Delhi

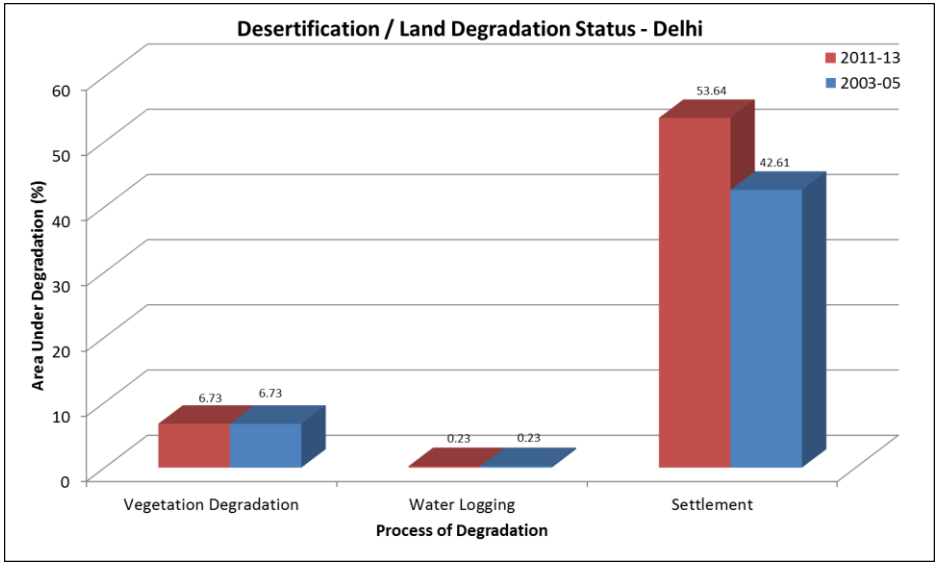
Delhi is the capital of India with 1,483 sq km area. The state has population of 1,67,87,941; with 11320 population density, 868 sex ratio and 86.21% literacy (Census 2011). New Delhi, sprawled over the west bank of the river Yamuna, is one of the fastest growing cities in India.

The topography of Delhi is divided into two divisions, the ridges and the Yamuna Flood Plain. It is interesting to note here that each of these regions is marked by distinct type of vegetation, mainly comprising of medium size trees and herbs. However, Delhi is known for its varied flowering plants. Delhi experiences humid tropical steppe type of climate with extreme temperatures in winter (near 0°C) and summer (more than 45°C).

Delhi is the state showing third highest desertification/ land degradation area in the country with respect to state TGA, i.e., 60.60% for period 2011-13. The desertification/ land degradation area in Delhi has increased about 11.03% since 2003-05, which is primarily due to increase in urbanisation.

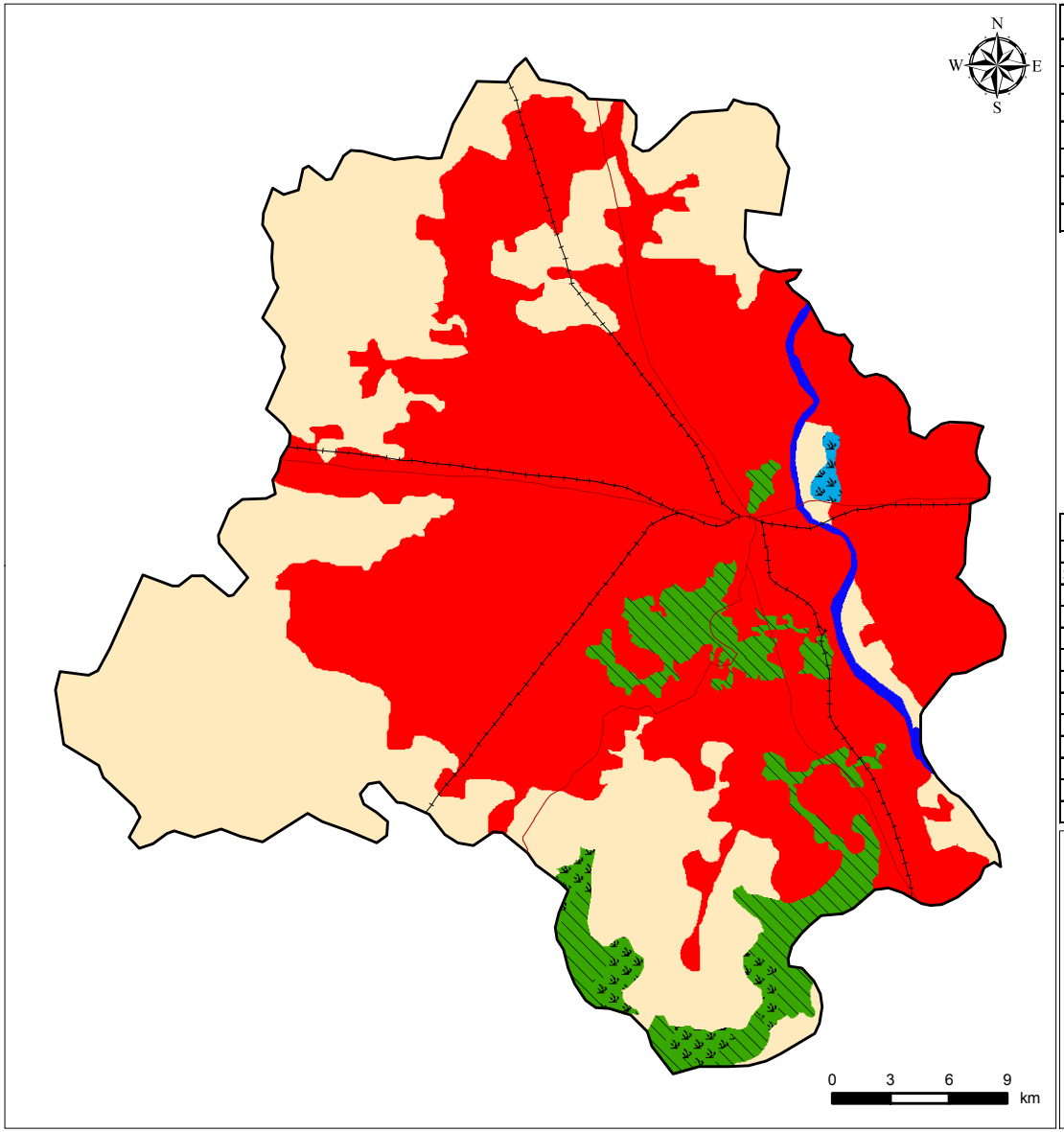
53.64% area of the state is occupied by settlement in 2011-13 which was 42.61 % in 2003-05. Other significant process of desertification/ land degradation is Vegetation Degradation (6.73% in 2011-13 and 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	9980	6.73	9980	6.73	0
Water Logging	347	0.23	347	0.23	0
Settlement	79541	53.64	63187	42.61	16354
Total Area under Desertification	**89868**	**60.60**	**73514**	**49.57**	**16354**
No Apparent Degradation	**57307**	**38.64**	**73661**	**49.67**	**-16354**
Total Geographical Area (ha)	**148300**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	6499	4.38	8168	5.51	-1669
2	Fv2	Forest, vegetation degradation, High	1669	1.13	-	-	1669
3	Sv1	Land with scrub, vegetation degradation, Low	1812	1.22	1812	1.22	0
4	Sl2	Land with scrub, water logging, High	347	0.23	347	0.23	0
5	S	Settlement	79541	53.64	63187	42.61	16354
Total Area Under Desertification/ Land Degradation			**89868**	**60.60**	**73514**	**49.57**	**16354**
6	W	Water body/ Drainage	1125	0.76	1125	0.76	0
7	NAD	No Apparent Degradation	57307	38.64	73661	49.67	-16354
Total Geographical Area (ha)			**148300**	**100**	**148300**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS
DELHI (2011-13)



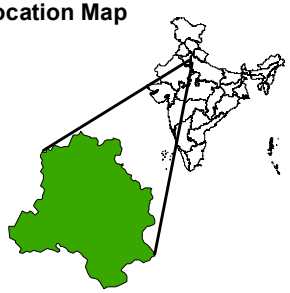
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1	Land with scrub, vegetation degradation
	Sl2	Land with scrub, water logging
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

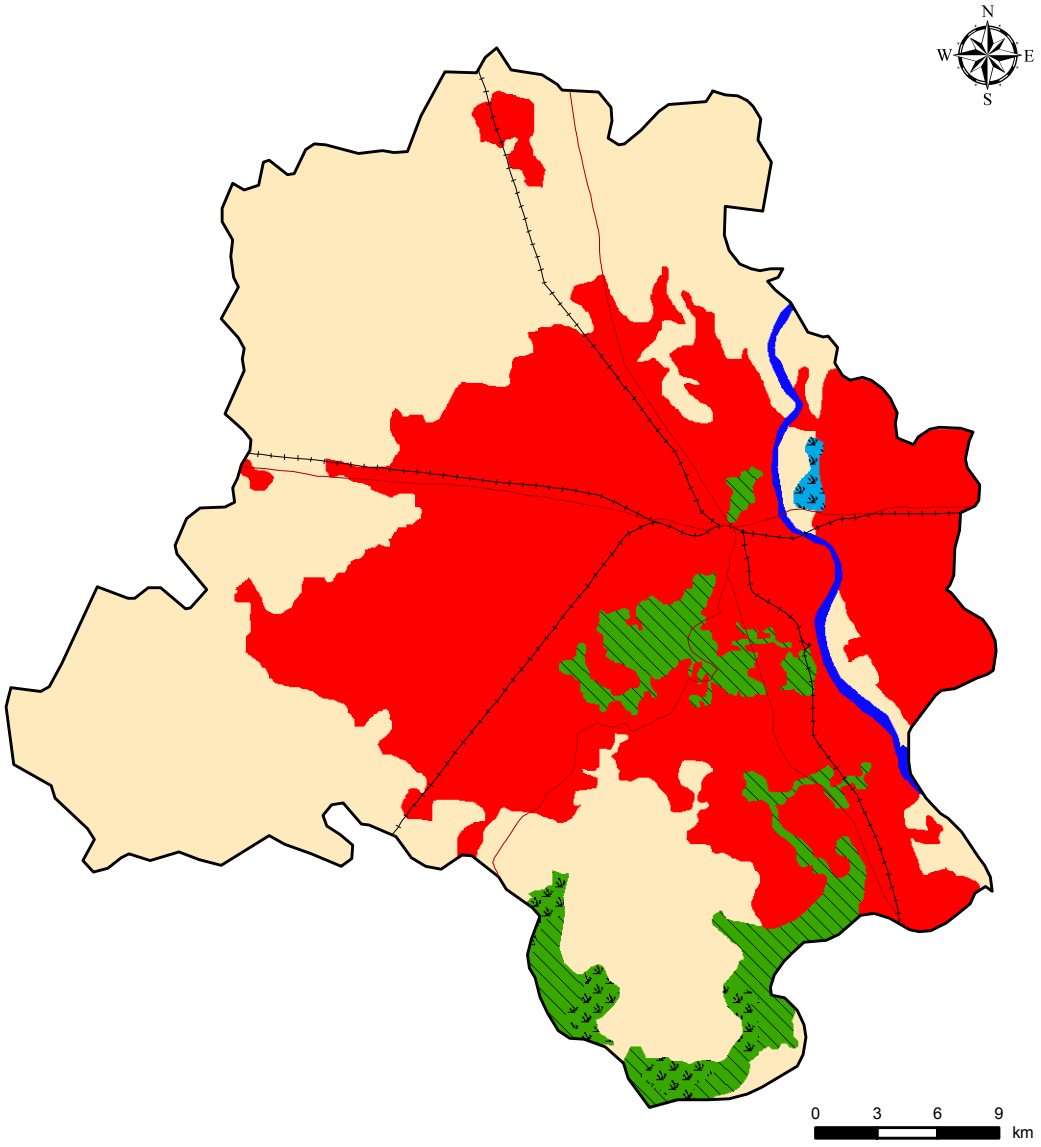


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Soil and Land Use Survey of India, New Delhi
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS
DELHI (2003-05)



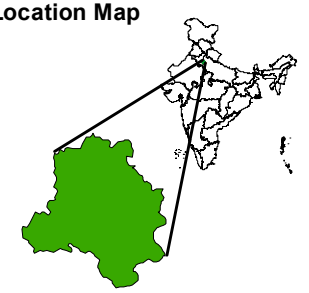
Legend

Symbol	Code	Description
	Fv1	Forest, vegetation degradation
	Sv1	Land with scrub, vegetation degradation
	Sl2	Land with scrub, water logging
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

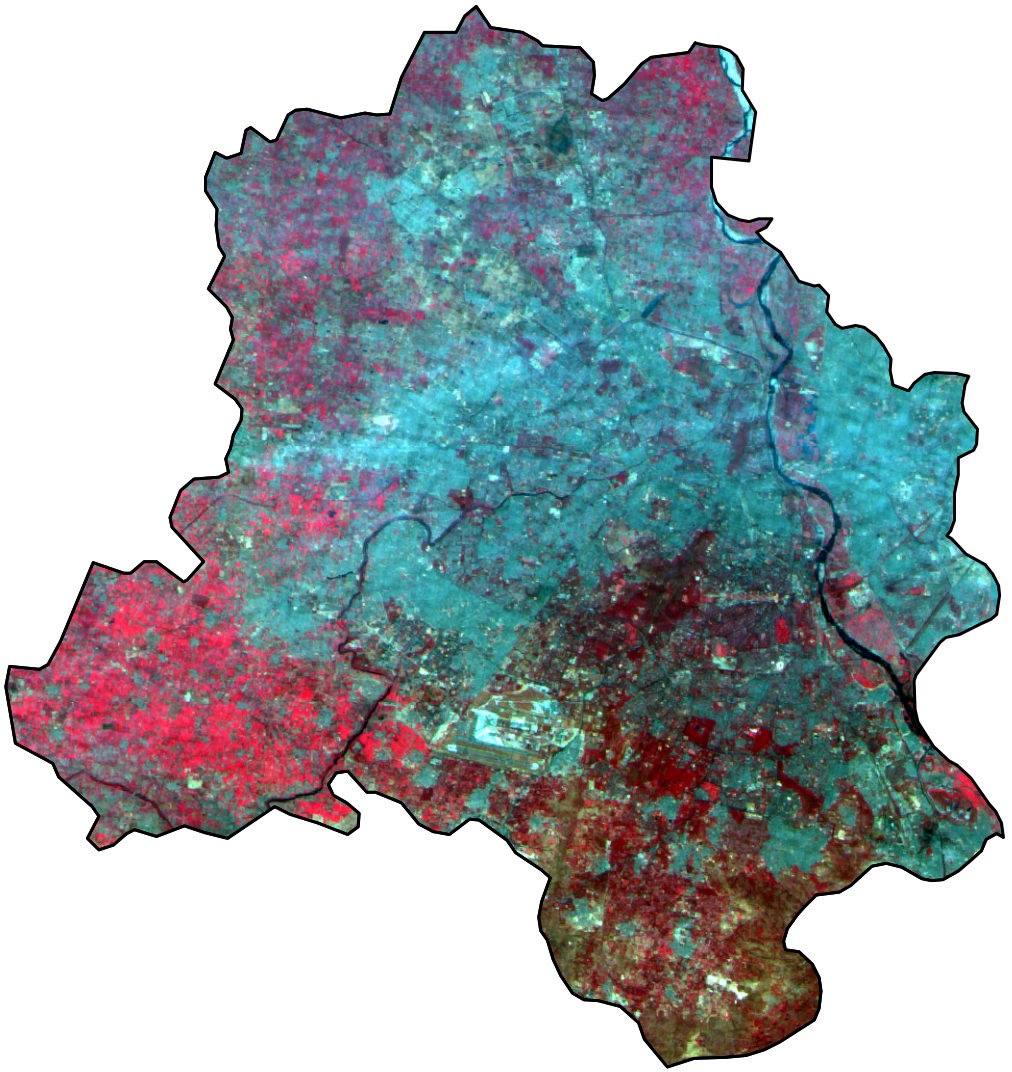


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

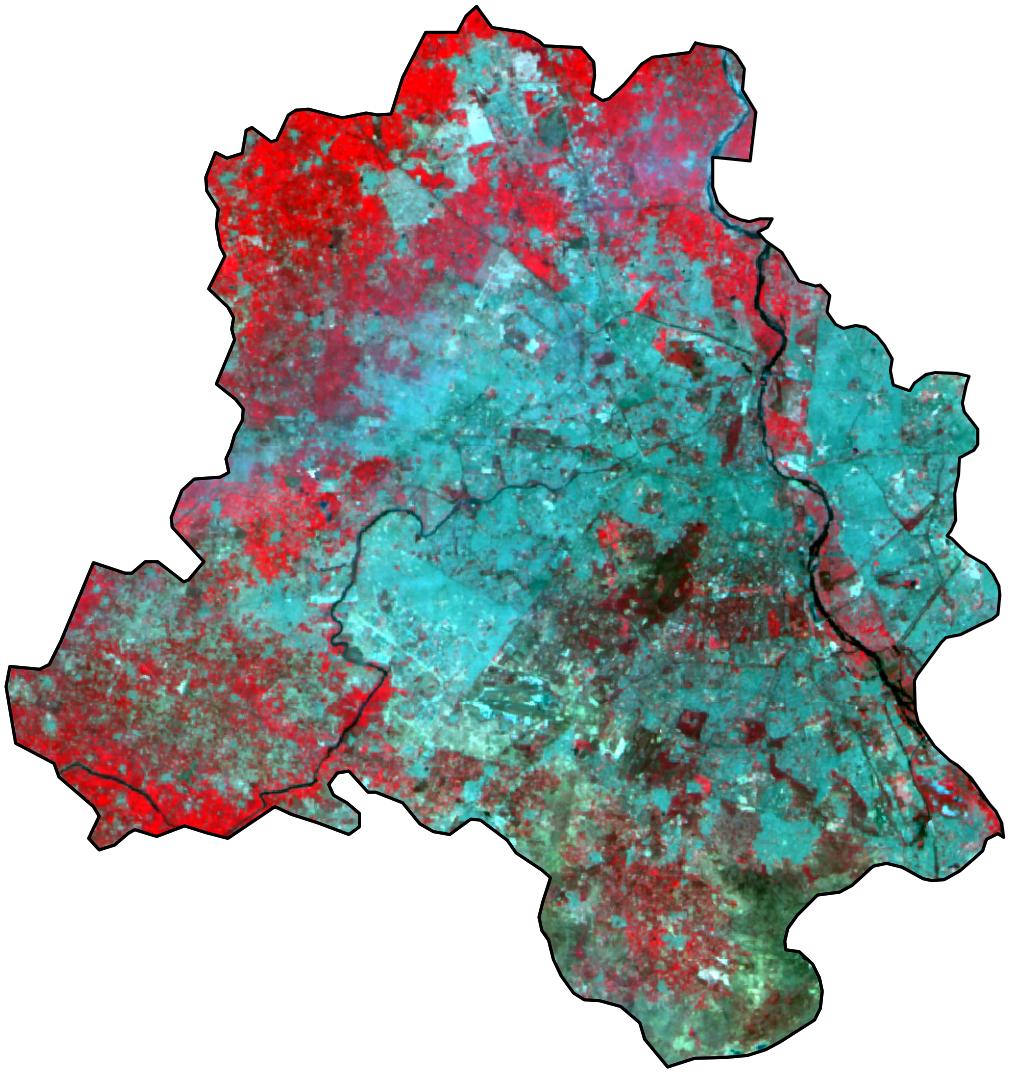
Prepared by:
Soil and Land Use Survey of India, New Delhi
&
Space Applications Centre,ISRO, Ahmedabad

DELHI - IRS AWiFS 2011



(IRS AWiFS, 14 December 2011)

DELHI - IRS AWiFS 2005



(IRS AWiFS, 08 March 2005)

Goa

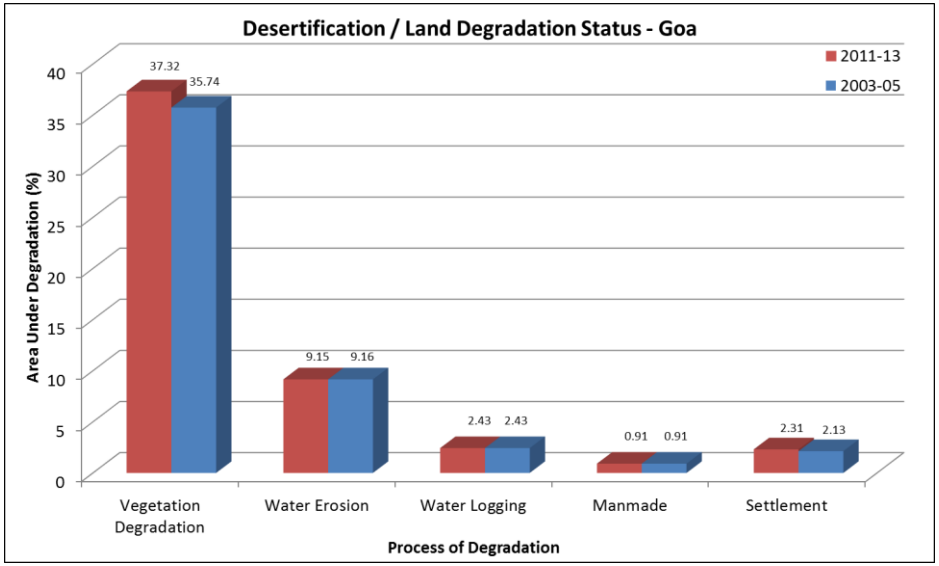
Goa is situated on the western coast of the Indian Peninsula with 3,702 sq km area. The state has population of 14,58,545; with 394 population density, 973 sex ratio and 88.70% literacy (Census 2011). Panaji is the capital of Goa.

The Goa landscape is characterised by hills of Western Ghats and coastal plain. Terekhol River separates Goa from Maharashtra. Other major rivers are Zuari and Mandovi. One third of Goa is covered by forests. The Western Ghats form the drainage area for most of the rivers flowing in the coastal region. The soil is mainly black cotton soil. The climate of Goa is of a tropical monsoon type with a searing heat in the summer months, and cold winter. The monsoons have varied influence over different regions, causing heavy rain at some places and mild rainfall in others.

Goa is observed with 52.13% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Goa has increased about 1.76% since 2003-05.

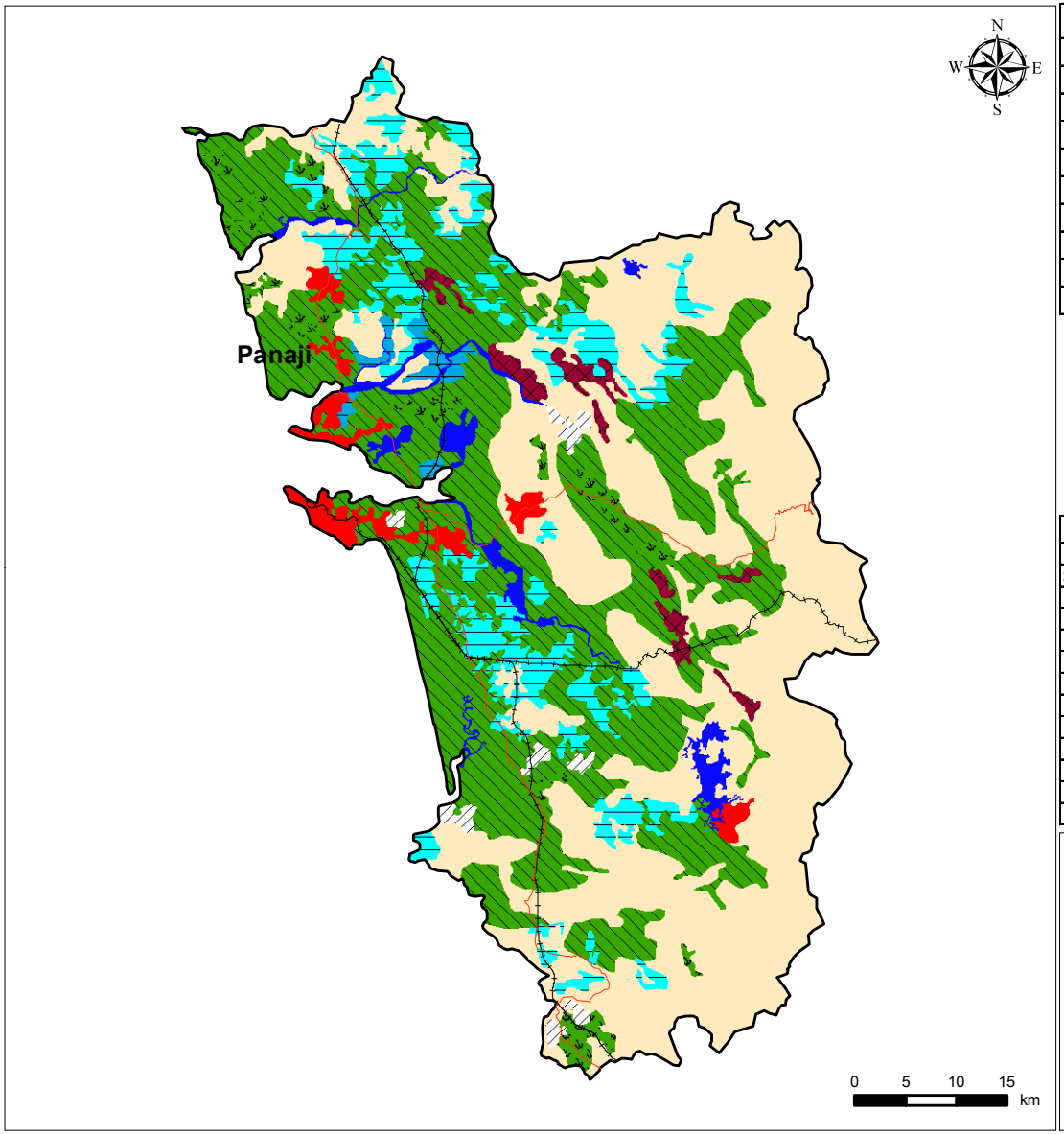
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (37.32% in 2011-13 and 35.74% in 2003-05) followed by Water Erosion (9.15% in 2011-13 and 9.16% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	138172	37.32	132301	35.74	5871
Water Erosion	33889	9.15	33892	9.16	-3
Water Logging	9005	2.43	9003	2.43	2
Manmade	3374	0.91	3374	0.91	0
Settlement	8533	2.31	7889	2.13	645
Total Area under Desertification	**192973**	**52.13**	**186458**	**50.37**	**6514**
No Apparent Degradation	**168648**	**45.56**	**174991**	**47.27**	**-6343**
Total Geographical Area (ha)	**370200**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	129086	34.87	122836	33.18	6249
2	Fv2	Forest, vegetation degradation, High	-	-	379	0.10	-379
3	Sv1	Land with scrub, vegetation degradation, Low	5458	1.47	5458	1.47	0
4	Sv2	Land with scrub, vegetation degradation, High	3629	0.98	3629	0.98	
5	Dw1	Agriculture unirrigated, water erosion, Low	33889	9.15	33892	9.16	-3
6	Il1	Agriculture irrigated, water logging, Low	3133	0.85	3131	0.85	2
7	Dl1	Agriculture unirrigated, water logging, Low	5872	1.59	5872	1.59	0
8	Tm2	Others, man made, High	3374	0.91	3374	0.91	0
9	S	Settlement	8533	2.31	7889	2.13	645
Total Area Under Desertification/ Land Degradation			**192973**	**52.13**	**186458**	**50.37**	**6514**
9	W	Water body/ Drainage	8579	2.32	8750	2.36	-171
10	NAD	No Apparent Degradation	168648	45.56	174991	47.27	-6343
Total Geographical Area (ha)			**370200**	**100**	**370200**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
GOA (2011-13)



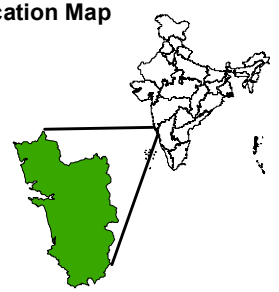
Legend

Symbol	Code	Description
	Fv1	Forest, vegetation Degradation
	Sv1,2	Land with scrub, vegetation Degradation
	Dw1	Agriculture unirrigated, water erosion
	Dl1	Land with scrub, water erosion
	Tm2	Others, man made
	B	Barren
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

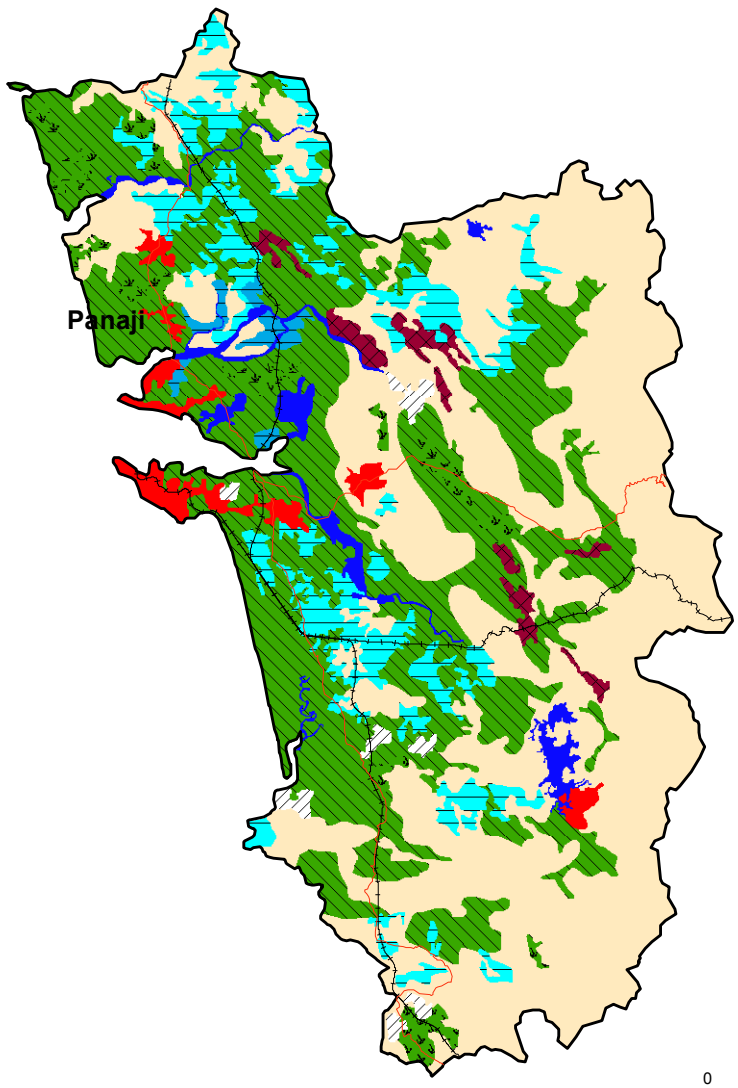


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Maharashtra Remote Sensing Applications Centre, Nagpur
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
GOA (2003-05)



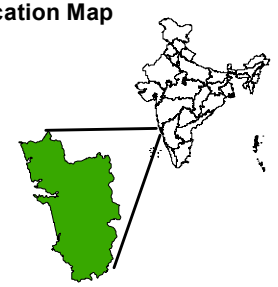
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation Degradation
	Sv1,2	Land with scrub, vegetation Degradation
	Dw1	Agriculture unirrigated, water erosion
	Dl1	Land with scrub, water erosion
	Tm2	Others, man made
	B	Barren
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

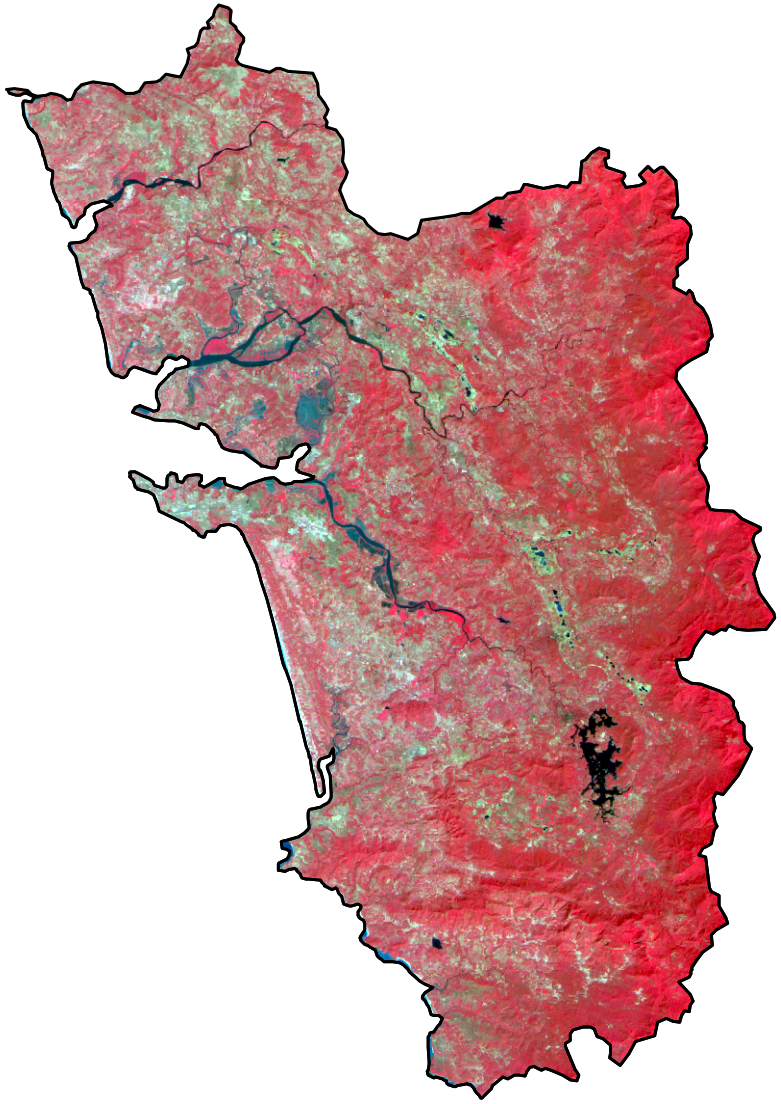


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

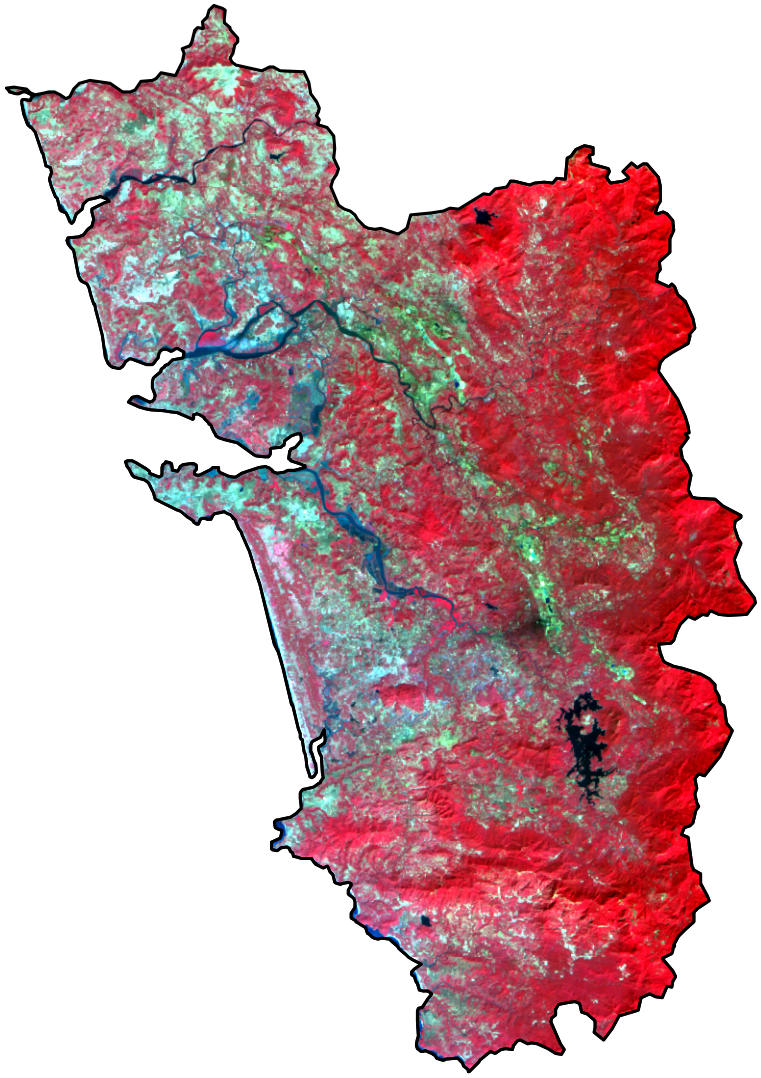
Prepared by:
Maharashtra Remote Sensing Applications Centre, Nagpur
&
Space Applications Centre,ISRO, Ahmedabad

GOA - IRS AWiFS 2012



(IRS AWiFS, 21 March 2012)

GOA - IRS AWiFS 2005



(IRS AWiFS, 19 January 2005)

Gujarat

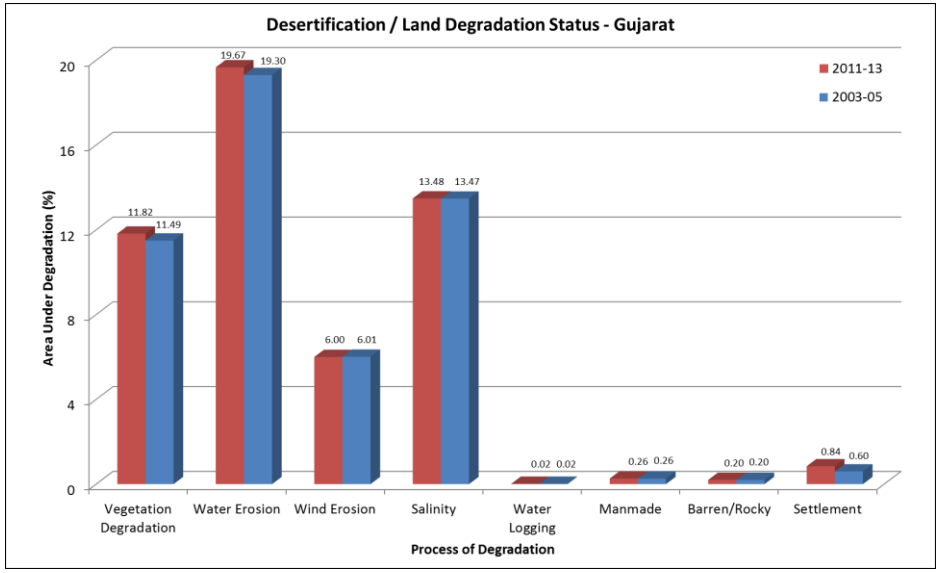
Gujarat is located in western most state of India, with 1,96,244 sq km area. The state has population of 6,04,39,692; with 308 population density, 919 sex ratio and 78.03% literacy (Census 2011). Gandhinagar is the capital of Gujarat.

The major geographic features of Gujarat are Rann of Katchh, alluvial plain, Sourashtra peninsula, Girnar hills, Vindhyan ranges and coastal plain. The main rivers of the state include Sabasmati, Mahi, Narmada, Tapi, Bhadar and Shetrunji. Gujarat soils are of various types like sandy, saline, Clay, loamy and black cotton soil. The state comprises characteristics of arid region in western and northern part, and semi-arid region in southern and eastern part. Gujarat experiences extreme climate of very hot and dry summer and very cold winter with average annual rainfall of 625 mm.

Gujarat is the state with third highest area under desertification/ land degradation with respect to country TGA and fourth highest with respect to state TGA. The state is observed with 52.29% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Gujarat has increased about 0.94% since 2003-05.

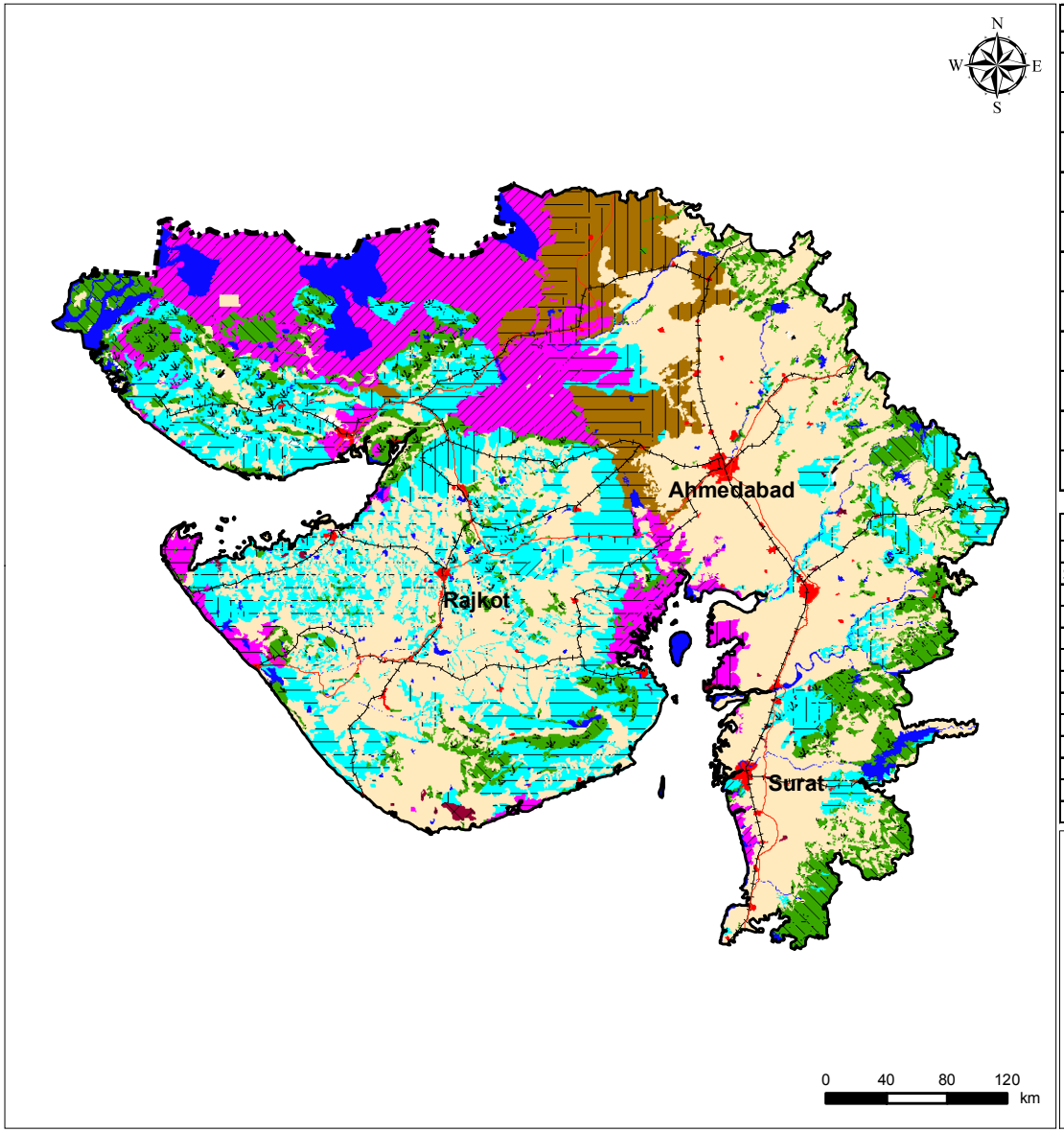
The most significant process of desertification/ land degradation in the state is Water Erosion (19.67% in 2011-13 and 19.30% in 2003-05) followed by Salinity (13.48% in 2011-13 and 13.47% in 2003-05), Vegetation Degradation (11.82% in 2011-13 and 11.49% in 2003-05) and Wind Erosion (6.00% in 2011-13 and 6.01% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	2319826	11.82	2255417	11.49	64409
Water Erosion	3859497	19.67	3788099	19.30	71398
Wind Erosion	1177105	6.00	1179548	6.01	-2443
Salinity	2645405	13.48	2643828	13.47	1578
Water Logging	3375	0.02	3375	0.02	0
Manmade	51637	0.26	50524	0.26	1113
Barren/Rocky	39218	0.20	39218	0.20	0
Settlement	165578	0.84	117447	0.60	48131
Total Area under Desertification	**10261641**	**52.29**	**10077455**	**51.35**	**184186**
No Apparent Degradation	**8533439**	**43.48**	**8718876**	**44.43**	**-185437**
Total Geographical Area (ha)	**19624400**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	996011	5.08	915630	4.67	80381
2	Fv2	Forest, vegetation degradation, High	330431	1.68	341637	1.74	-11206
3	Gv1	Grassland / Grazing land, vegetation degradation, Low	326	0.00	326	0.00	0
4	Gv2	Grassland / Grazing land, vegetation degradation, High	753	0.00	753	0.00	0
5	Sv1	Land with scrub, vegetation degradation, Low	813165	4.14	815377	4.15	-2211
6	Sv2	Land with scrub, vegetation degradation, High	179140	0.91	181694	0.93	-2555
7	Iw1	Agriculture irrigated, water erosion, Low	814119	4.15	784519	4.00	29599
8	Iw2	Agriculture irrigated, water erosion, High	30056	0.15	30056	0.15	0
9	Dw1	Agriculture unirrigated, water erosion, Low	2218365	11.30	2156985	10.99	61380
10	Dw2	Agriculture unirrigated, water erosion, High	114763	0.58	123716	0.63	-8953
11	Fw1	Forest, water erosion, Low	3635	0.02	3635	0.02	0
12	Sw1	Land with scrub, water erosion, Low	497389	2.53	526898	2.68	-29509
13	Sw2	Land with scrub, water erosion, High	104855	0.53	84016	0.43	20839
14	Bw1	Barren, water erosion, Low	76315	0.39	78273	0.40	-1958
15	Ie1	Agriculture irrigated, wind erosion, Low	632811	3.22	634764	3.23	-1952
16	De1	Agriculture unirrigated, wind erosion, Low	324639	1.65	325129	1.66	-490
17	De2	Agriculture unirrigated, wind erosion, High	219655	1.12	219655	1.12	0
18	Is1	Agriculture irrigated, salinity / alkalinity, Low	141119	0.72	141119	0.72	0
19	Ds1	Agriculture unirrigated, salinity / alkalinity, Low	401391	2.05	399754	2.04	1637
20	Ds2	Agriculture unirrigated, salinity / alkalinity, High	9424	0.05	9424	0.05	0
21	Gs1	Grassland / Grazing land, salinity / alkalinity, Low	8384	0.04	8384	0.04	0
22	Gs2	Grassland / Grazing land, salinity / alkalinity, High	9550	0.05	9550	0.05	0
23	Ss1	Land with scrub, salinity / alkalinity, Low	60426	0.31	60486	0.31	-59
24	Ss2	Land with scrub, salinity / alkalinity, High	1541	0.01	1541	0.01	0
25	Bs1	Barren, salinity / alkalinity, Low	164042	0.84	164042	0.84	0
26	Bs2	Barren, salinity / alkalinity, High	1849528	9.42	1849528	9.42	0
27	Dl1	Agriculture unirrigated, water logging, Low	3375	0.02	3375	0.02	0
28	Tm1	Others, man made, Low	29342	0.15	29342	0.15	0
29	Tm2	Others, man made, High	22295	0.11	21182	0.11	1113
30	B	Barren	23664	0.12	23664	0.12	0
31	R	Rocky	15554	0.08	15554	0.08	0
32	S	Settlement	165578	0.84	117447	0.60	48131
Total Area Under Desertification/ Land Degradation			**10261641**	**52.29**	**10077455**	**51.35**	**184186**
33	W	Water body/ Drainage	829320	4.23	828069	4.22	1251
34	NAD	No Apparent Degradation	8533439	43.48	8718876	44.43	-185437
Total Geographical Area (ha)			**19624400**	**100**	**19624400**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
GUJARAT (2011-13)



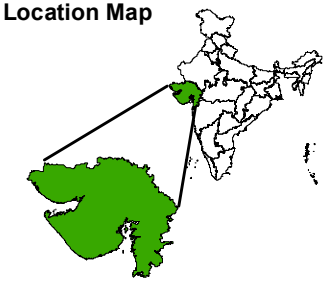
Legend

Symbol	Code	Description	Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation		Ds1,2	Agriculture unirrigated, salinity / alkalinity
	Gv1,2	Grassland / Grazing land, vegetation degradation		Gs1,2	Grassland / Grazing land, salinity / alkalinity
	Sv1,2	Land with scrub, vegetation degradation		Ss1,2	Land with scrub, salinity / alkalinity
	Iw1,2	Agriculture irrigated, water erosion		Bs1,2	Barren, salinity / alkalinity
	Dw1,2	Agriculture unirrigated, water erosion		Dl1	Agriculture unirrigated, water logging
	Fw1	Forest, water erosion		Tm1,2	Others, man made
	Sw1,2	Land with scrub, water erosion		B	Barren
	Bw1	Barren, water erosion		R	Rocky
	Ie1	Agriculture irrigated, wind erosion		S	Settlement
	De1,2	Agriculture unirrigated, wind erosion		W	Water body / Drainage
	Is1	Agriculture irrigated, salinity / alkalinity		NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

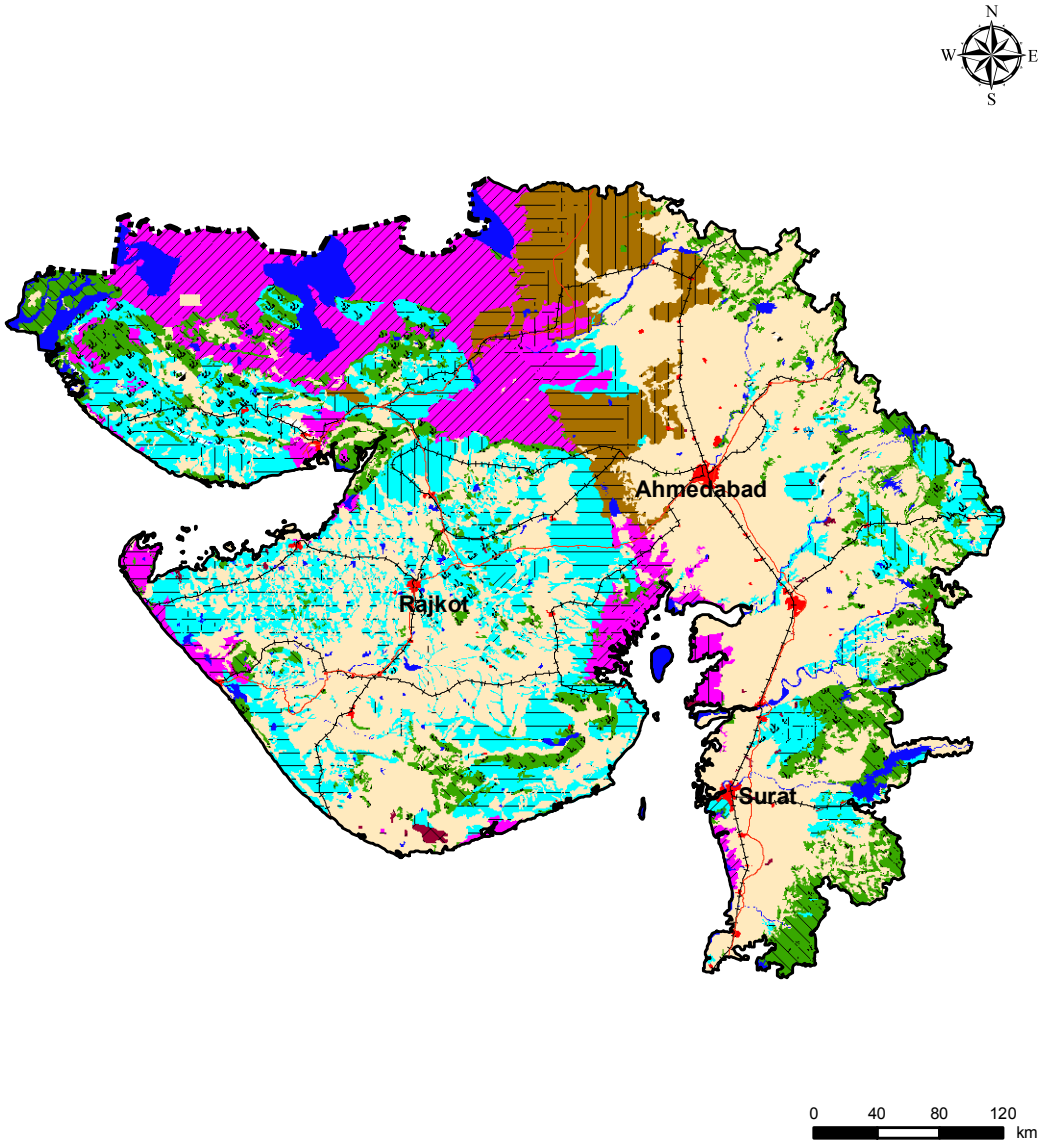


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Centre for Environment Planning and Technology University, Ahmedabad
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
GUJARAT (2003-05)



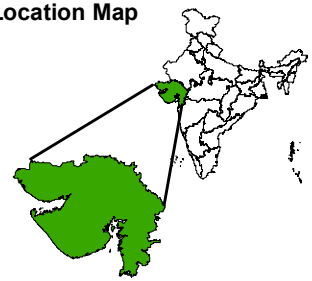
Legend

Symbol	Code	Description	Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation		Ds1,2	Agriculture unirrigated, salinity / alkalinity
	Gv1,2	Grassland / Grazing land, vegetation degradation		Gs1,2	Grassland / Grazing land, salinity / alkalinity
	Sv1,2	Land with scrub, vegetation degradation		Ss1,2	Land with scrub, salinity / alkalinity
	Iw1,2	Agriculture irrigated, water erosion		Bs1,2	Barren, salinity / alkalinity
	Dw1,2	Agriculture unirrigated, water erosion		Dl1	Agriculture unirrigated, water logging
	Fw1	Forest, water erosion		Tm1,2	Others, man made
	Sw1,2	Land with scrub, water erosion		B	Barren
	Bw1	Barren, water erosion		R	Rocky
	Ie1	Agriculture irrigated, wind erosion		S	Settlement
	De1,2	Agriculture unirrigated, wind erosion		W	Water body / Drainage
	Is1	Agriculture irrigated, salinity / alkalinity		NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

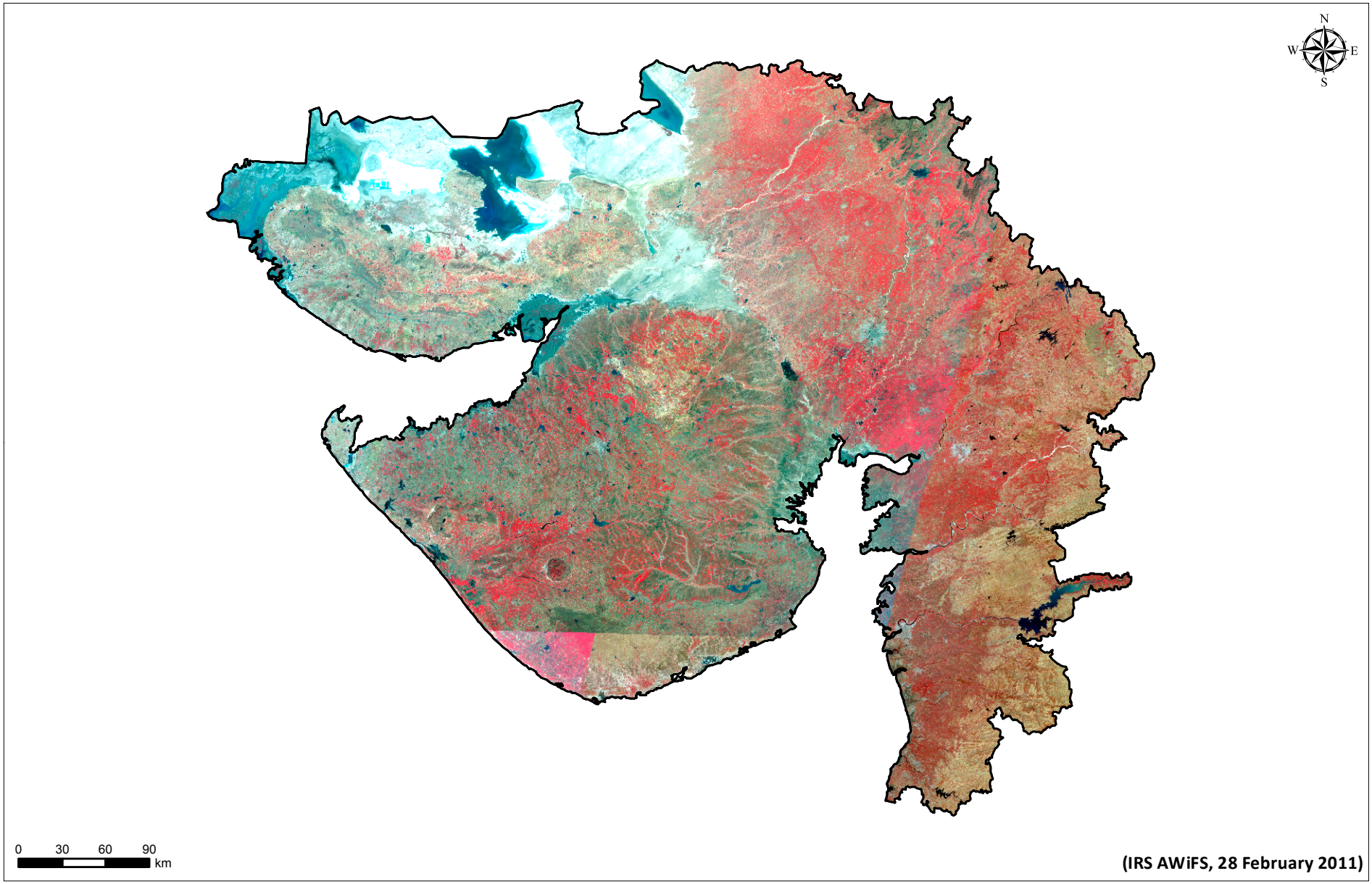


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

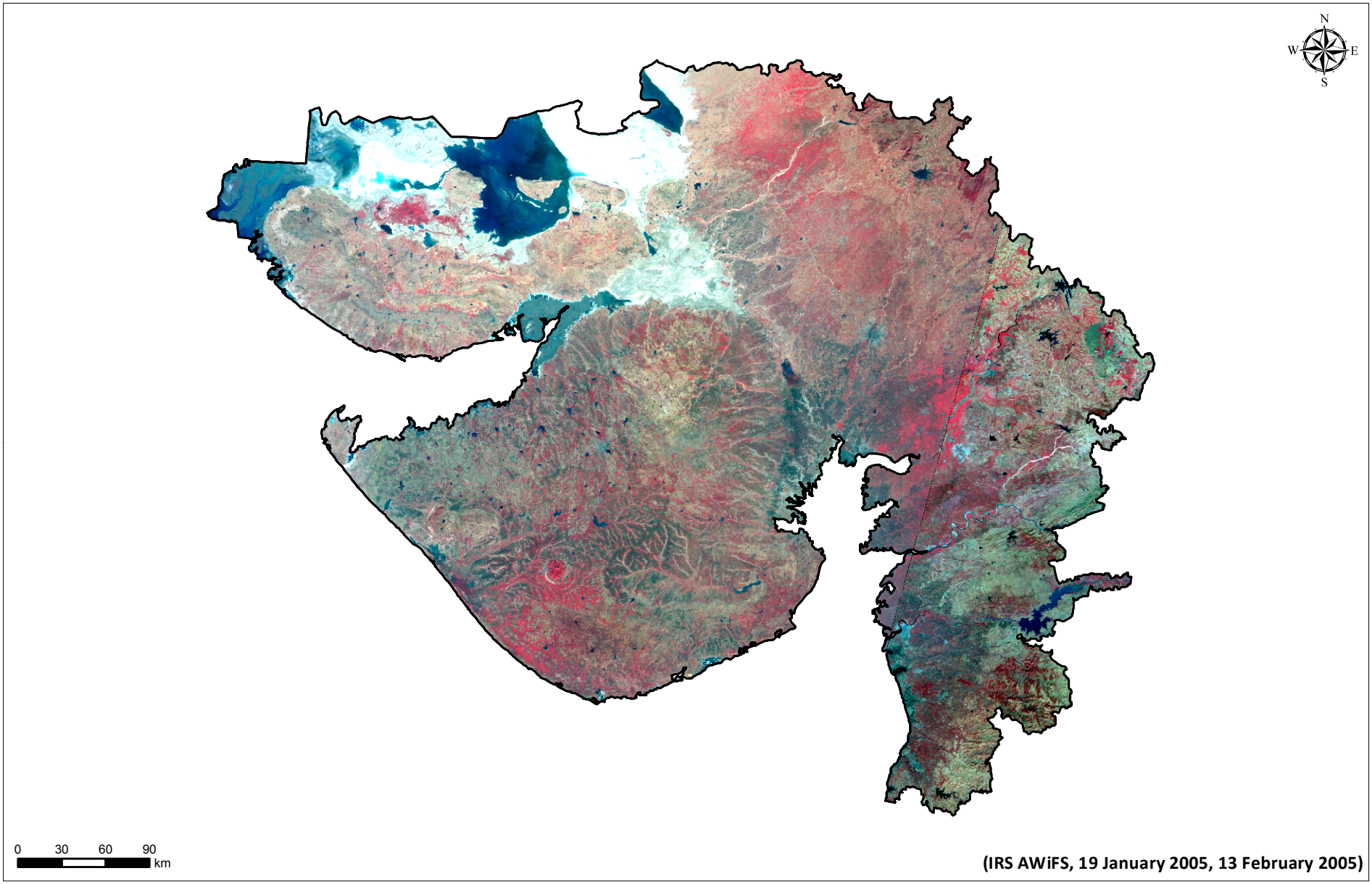
Prepared by:
Centre for Environment Planning and Technology University, Ahmedabad
&
Space Applications Centre,ISRO, Ahmedabad

GUJARAT - IRS AWiFS 2011



(IRS AWiFS, 28 February 2011)

GUJARAT - IRS AWiFS 2005



(IRS AWiFS, 19 January 2005, 13 February 2005)

Haryana

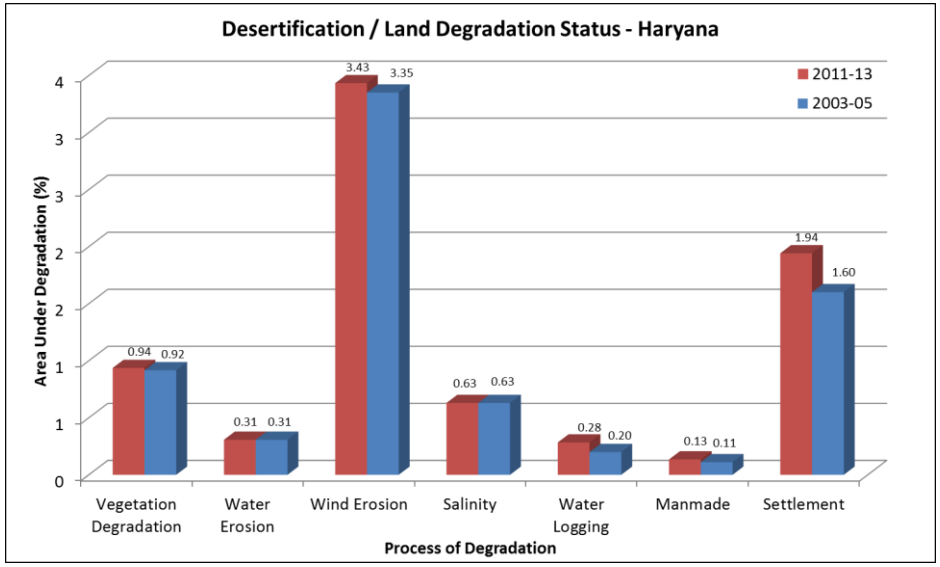
Haryana is a state in north India, with the area of 44,212 sq km. The state has population of 2,53,51,462; with 573 population density, 879 sex ratio and 75.55% literacy (Census 2011). Chandigarh is the capital of Haryana.

The major physiographic divisions of Haryana are sub-Himalayan Terai and Indo-Gangetic plain. The plain is fertile and slopes from north to south with 700 and 900 ft height above sea level. South-west of Haryana is dry, sandy and barren. The Ghaggar river passes through northern fringes of the state. The location of the state in the northern plains of India makes the place very hot during summer and too cold during winter. The state experiences very hot summer (45° C in May-June) and too cold winter (4° C - 5° C in December-January) and maximum rainfall in month of July-September.

Haryana is observed with 7.67% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Haryana has increased about 0.55% since 2003-05.

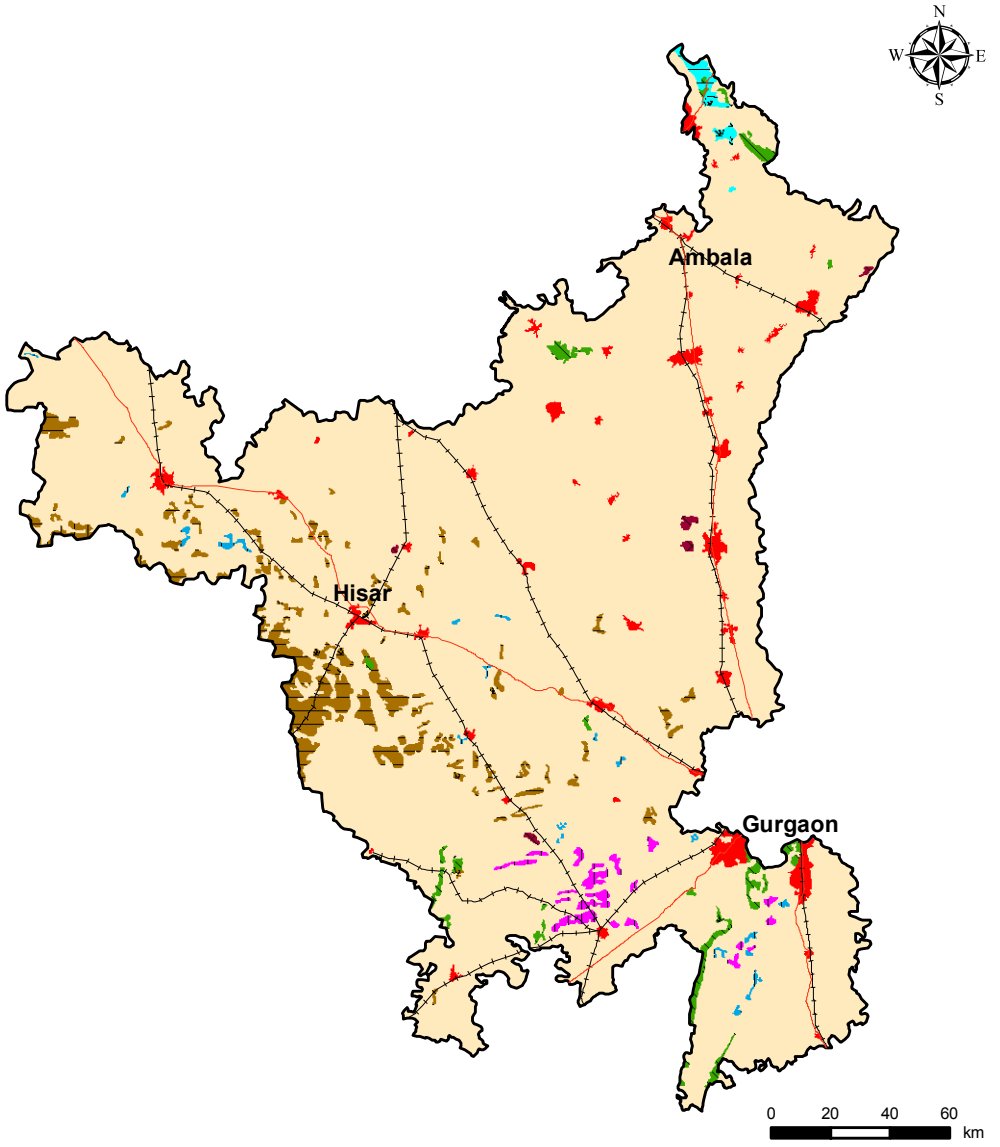
The most significant process of desertification/ land degradation in the state is Wind Erosion (3.43% in 2011-13 and 3.35% in 2003-05) followed by Settlement (1.94% in 2011-13 and 1.60% in 2003-05) and Vegetation Degradation (0.94% in 2011-13 and 0.92% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	41411	0.94	40514	0.92	897
Water Erosion	13568	0.31	13568	0.31	0
Wind Erosion	151797	3.43	148151	3.35	3646
Salinity	27841	0.63	27841	0.63	0
Water Logging	12530	0.28	8822	0.20	3708
Manmade	5962	0.13	4894	0.11	1068
Settlement	85855	1.94	70792	1.60	15063
Total Area under Desertification	**338964**	**7.67**	**314583**	**7.12**	**24382**
No Apparent Degradation	**4082236**	**92.33**	**4106617**	**92.88**	**-24382**
Total Geographical Area (ha)	**4421200**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	31225	0.71	29302	0.66	1924
2	Fv2	Forest, vegetation degradation, High	6500	0.15	7527	0.17	-1027
3	Sv1	Land with scrub, vegetation degradation, Low	1269	0.03	1269	0.03	0
4	Sv2	Land with scrub, vegetation degradation, High	2417	0.05	2417	0.05	0
5	Iw1	Agriculture irrigated, water erosion, Low	320	0.01	320	0.01	0
6	Dw1	Agriculture unirrigated, water erosion, Low	7906	0.18	7906	0.18	0
7	Sw1	Land with scrub, water erosion, Low	5342	0.12	5342	0.12	0
8	Ie1	Agriculture irrigated, wind erosion, Low	6310	0.14	6310	0.14	0
9	De1	Agriculture unirrigated, wind erosion, Low	128973	2.92	127555	2.89	1419
10	Se1	Land with scrub, wind erosion, Low	16513	0.37	14286	0.32	2227
11	Is1	Agriculture irrigated, salinity / alkalinity, Low	27841	0.63	27841	0.63	0
12	Il1	Agriculture irrigated, water logging, Low	10840	0.25	7568	0.17	3273
13	Il2	Agriculture irrigated, water logging, High	1690	0.04	1254	0.03	435
14	Tm2	Others, man made, High	5962	0.13	4894	0.11	1068
15	S	Settlement	85855	1.94	70792	1.60	15063
Total Area Under Desertification/ Land Degradation			**338964**	**7.67**	**314583**	**7.12**	**24382**
16	NAD	No Apparent Degradation	4082236	92.33	4106617	92.88	-24382
Total Geographical Area (ha)			**4421200**	**100**	**4421200**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
HARYANA (2011-13)



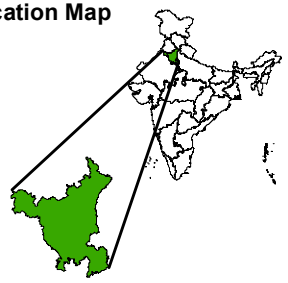
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Sw1	Land with scrub, water erosion
	Ie1	Agriculture irrigated, wind erosion
	De1	Agriculture unirrigated, wind erosion
	Se1	Land with scrub, water erosion
	Is1	Agriculture irrigated, salinity / alkalinity
	Il1, 2	Agriculture irrigated, water logging
	Tm2	Others, man made
	S	Settlement
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

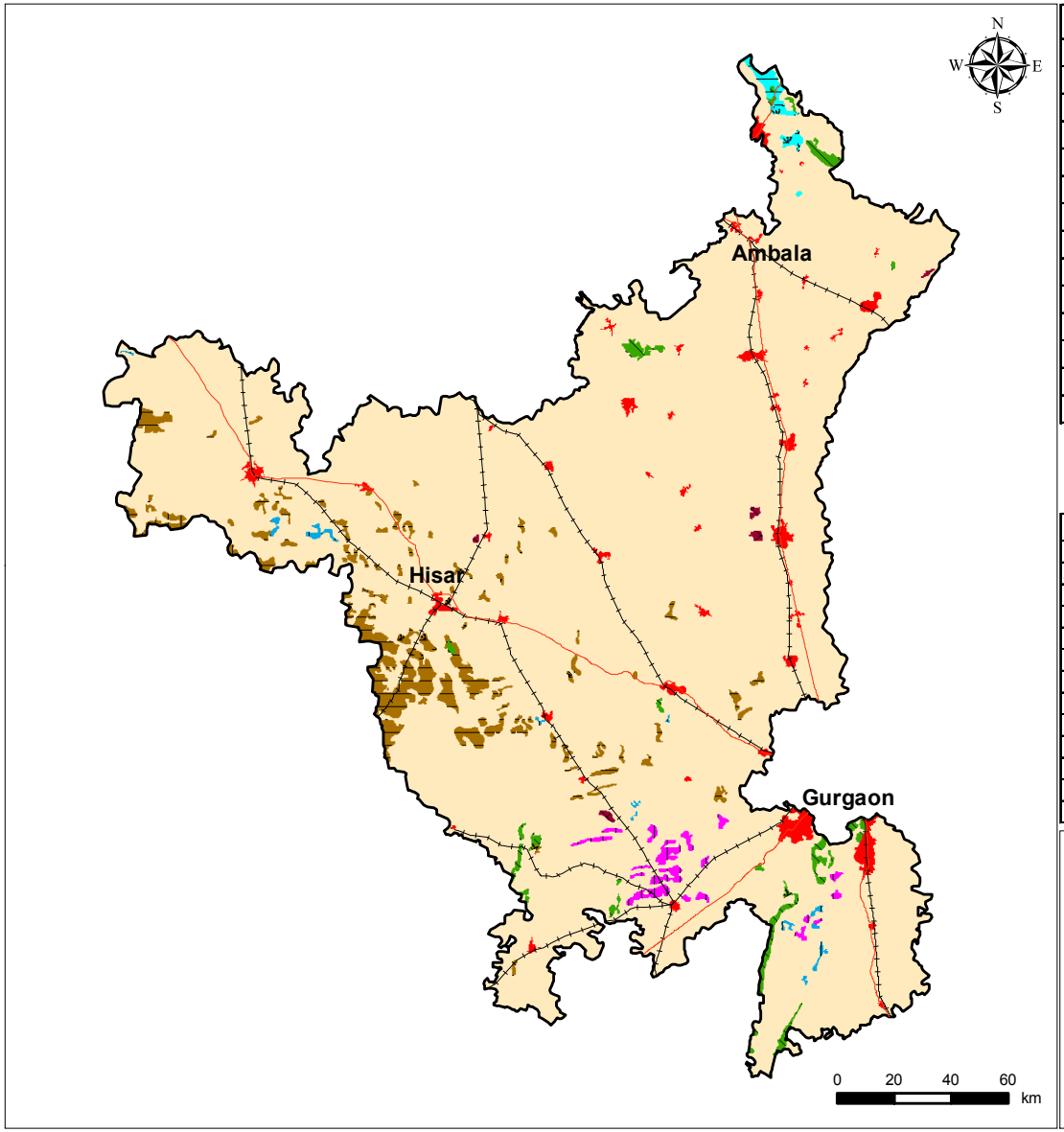


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Haryana Space Applications Centre, Hisar
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
HARYANA (2003-05)



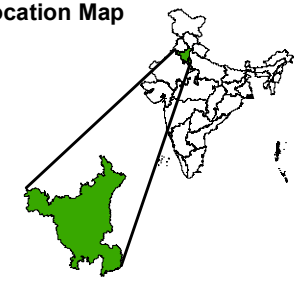
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Sw1	Land with scrub, water erosion
	Ie1	Agriculture irrigated, wind erosion
	De1	Agriculture unirrigated, wind erosion
	Se1	Land with scrub, water erosion
	Is1	Agriculture irrigated, salinity / alkalinity
	Il1, 2	Agriculture irrigated, water logging
	Tm2	Others, man made
	S	Settlement
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

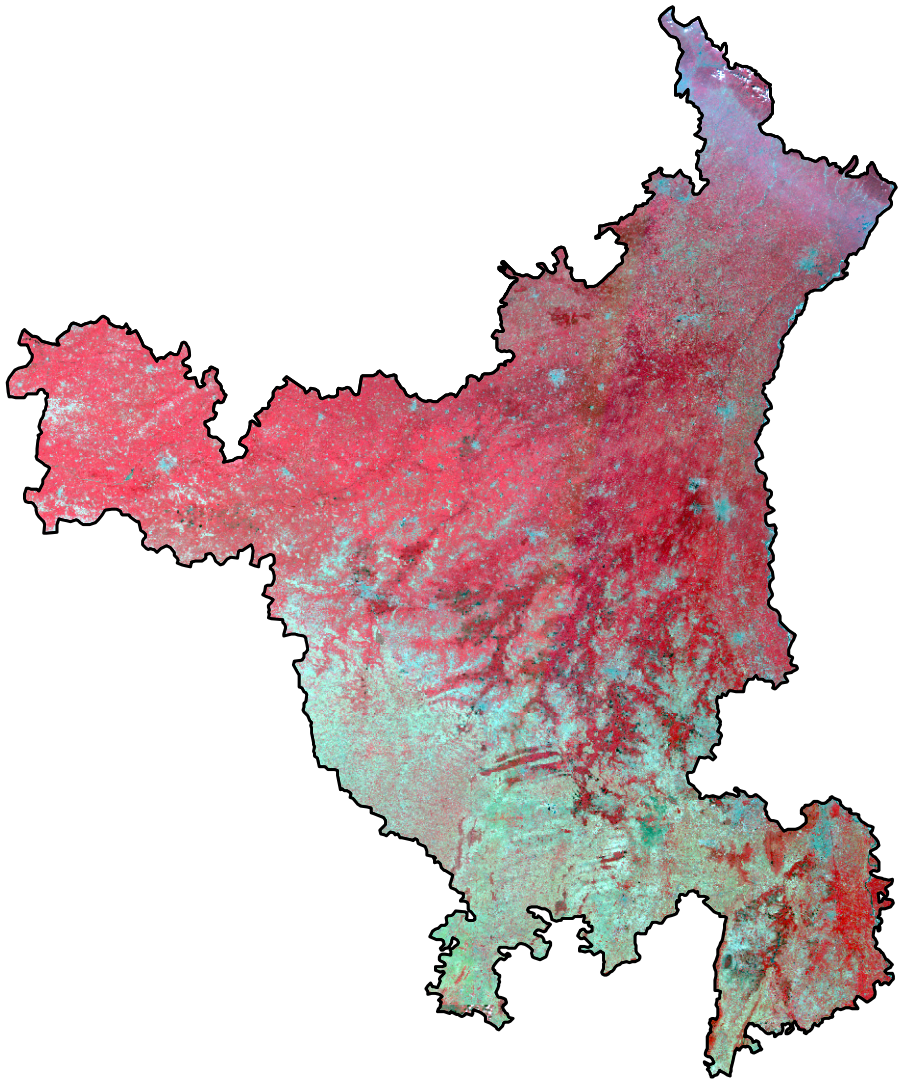


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

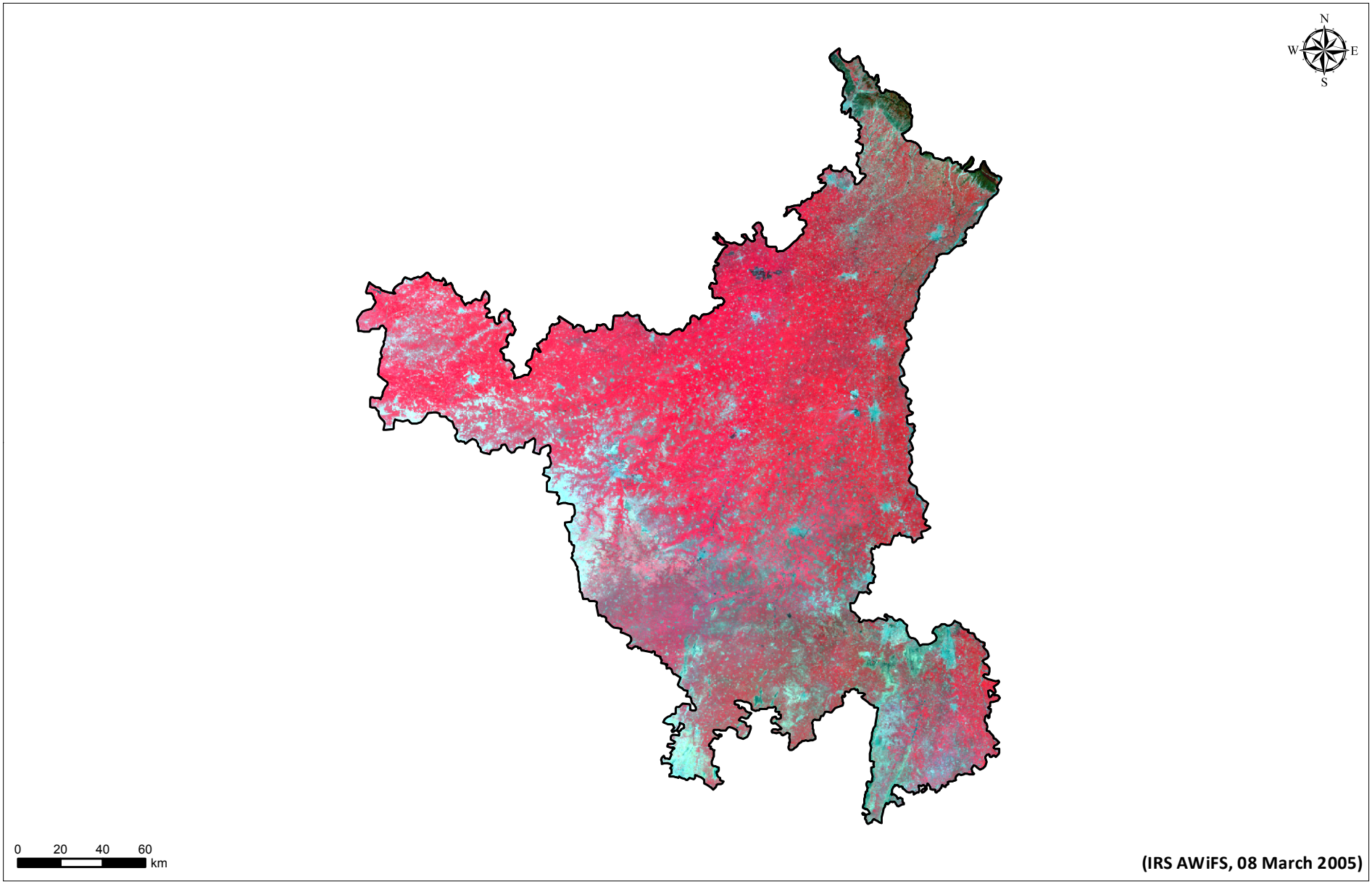
Prepared by:
Haryana Space Applications Centre, Hisar
&
Space Applications Centre,ISRO, Ahmedabad

HARYANA - IRS AWiFS 2011



(IRS AWiFS, 28 February 2011)

HARYANA - IRS AWiFS 2005



Himachal Pradesh

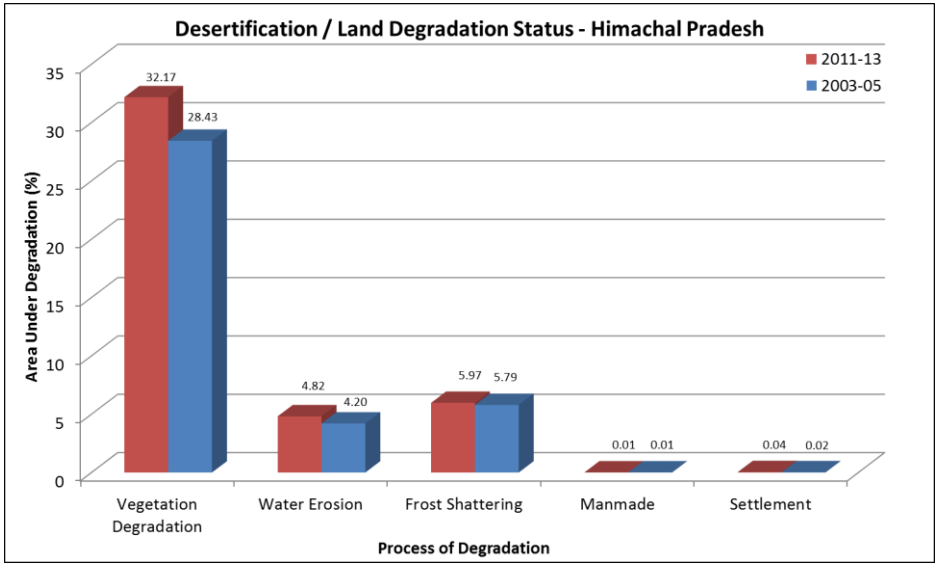
Himachal Pradesh is located in northern part of India, spread over 55,673 sq km area. The state has population of 68,64,602; with 123 population density, 972 sex ratio and 82.80% literacy (Census 2011). Shimla is the capital of Himachal Pradesh.

The major physiographic divisions of Himachal Pradesh from south to north are outer Himalayas or Shivaliks in the southern part, lesser Himalayas in central zone and greater Himalayas in northern zone. The major ranges of the state are Pir Panjal and Zanskar with Sutlej as a main river. Himachal is also well known for its rich flora and fauna. Forests cover about 38% total area of the state. The state experiences Alpine climate with cool dry summer and very cold winter.

Himachal Pradesh is observed with 43.01% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Himachal Pradesh has increased about 4.55% since 2003-05.

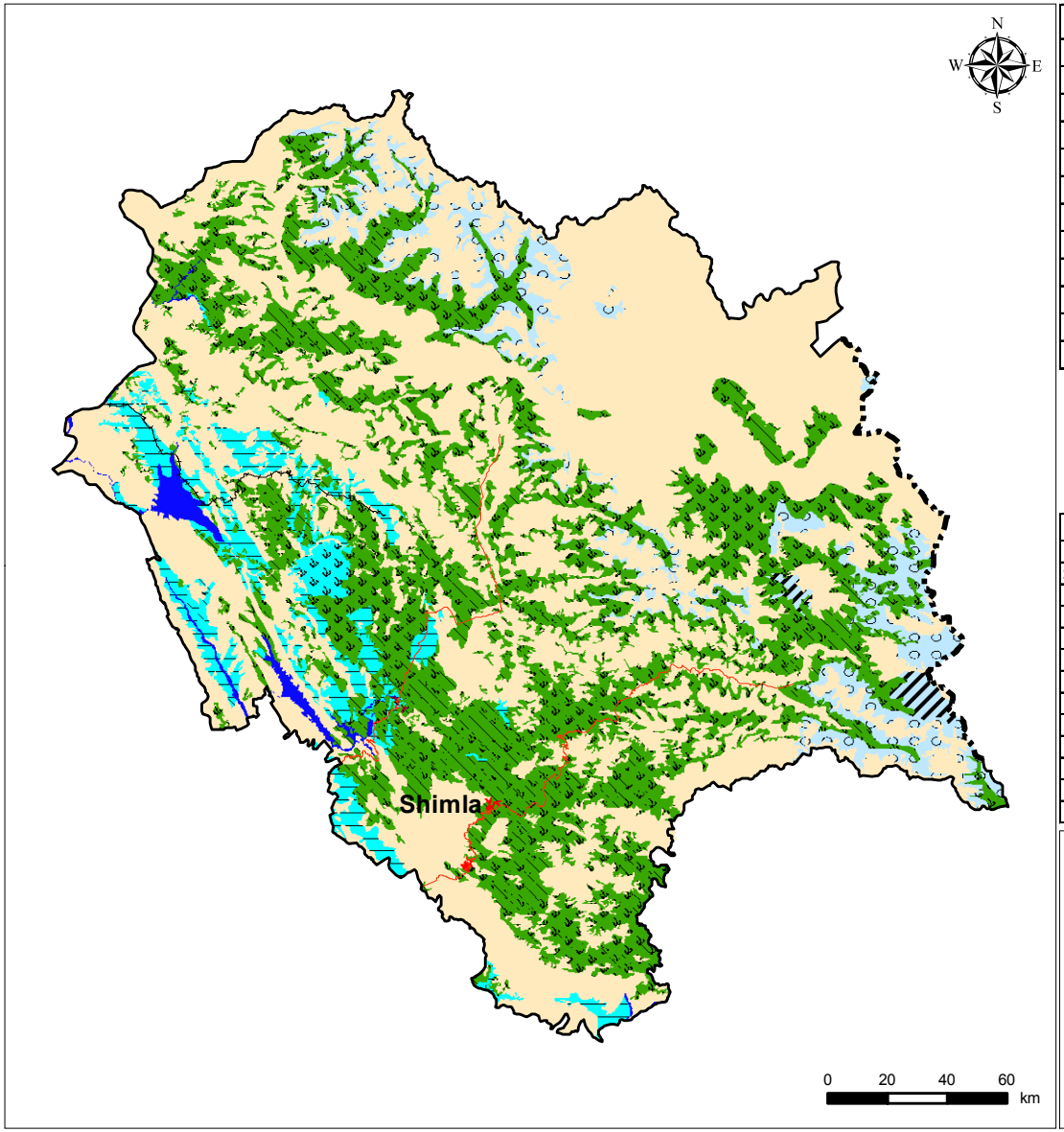
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (32.17% in 2011-13 and 28.43% in 2003-05) followed by Frost Shattering (5.97% in 2011-13 and 5.79% in 2003-05) and Water Erosion (4.82% in 2011-13 and 4.20% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	1790803	32.17	1582938	28.43	207866
Water Erosion	268261	4.82	233990	4.20	34271
Frost Shattering	332423	5.97	322417	5.79	10005
Manmade	656	0.01	656	0.01	0
Settlement	2097	0.04	1365	0.02	732
Total Area under Desertification	**2394240**	**43.01**	**2141366**	**38.46**	**252874**
No Apparent Degradation	**3123624**	**56.11**	**3376690**	**60.65**	**-253067**
Total Geographical Area (ha)	**5567300**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	439490	7.89	345669	6.21	93821
2	Fv2	Forest, vegetation degradation, High	58431	1.05	57380	1.03	1051
3	Sv1	Land with scrub, vegetation degradation, Low	957829	17.20	871875	15.66	85954
4	Sv2	Land with scrub, vegetation degradation, High	335053	6.02	308013	5.53	27039
5	Dw1	Agriculture unirrigated, water erosion, Low	238348	4.28	204561	3.67	33787
6	Fw1	Forest, water erosion, Low	4727	0.08	4727	0.08	0
7	Sw1	Land with scrub, water erosion, Low	25186	0.45	24702	0.44	484
8	Lf1	Periglacial, frost shattering, Low	105613	1.90	105220	1.89	393
9	Lf2	Periglacial, frost shattering, High	197093	3.54	187481	3.37	9612
10	Rf1	Rocky, frost shattering, Low	29717	0.53	29717	0.53	0
11	Tm2	Others, man made, High	656	0.01	656	0.01	0
12	S	Settlement	2097	0.04	1365	0.02	732
Total Area Under Desertification/ Land Degradation			**2394240**	**43.01**	**2141366**	**38.46**	**252874**
13	W	Water body/ Drainage	49436	0.89	49243	0.88	193
14	NAD	No Apparent Degradation	3123624	56.11	3376690	60.65	-253067
Total Geographical Area (ha)			**5567300**	**100**	**5567300**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
HIMACHAL PRADESH (2011-13)



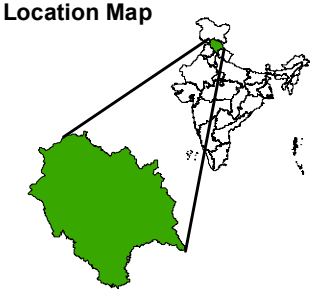
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Fw1	Forest, water erosion
	Sw1	Land with scrub, water erosion
	Lf1,2	Periglacial, frost shattering
	Rf1	Rocky, frost shattering
	Tm2	Others, man made
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

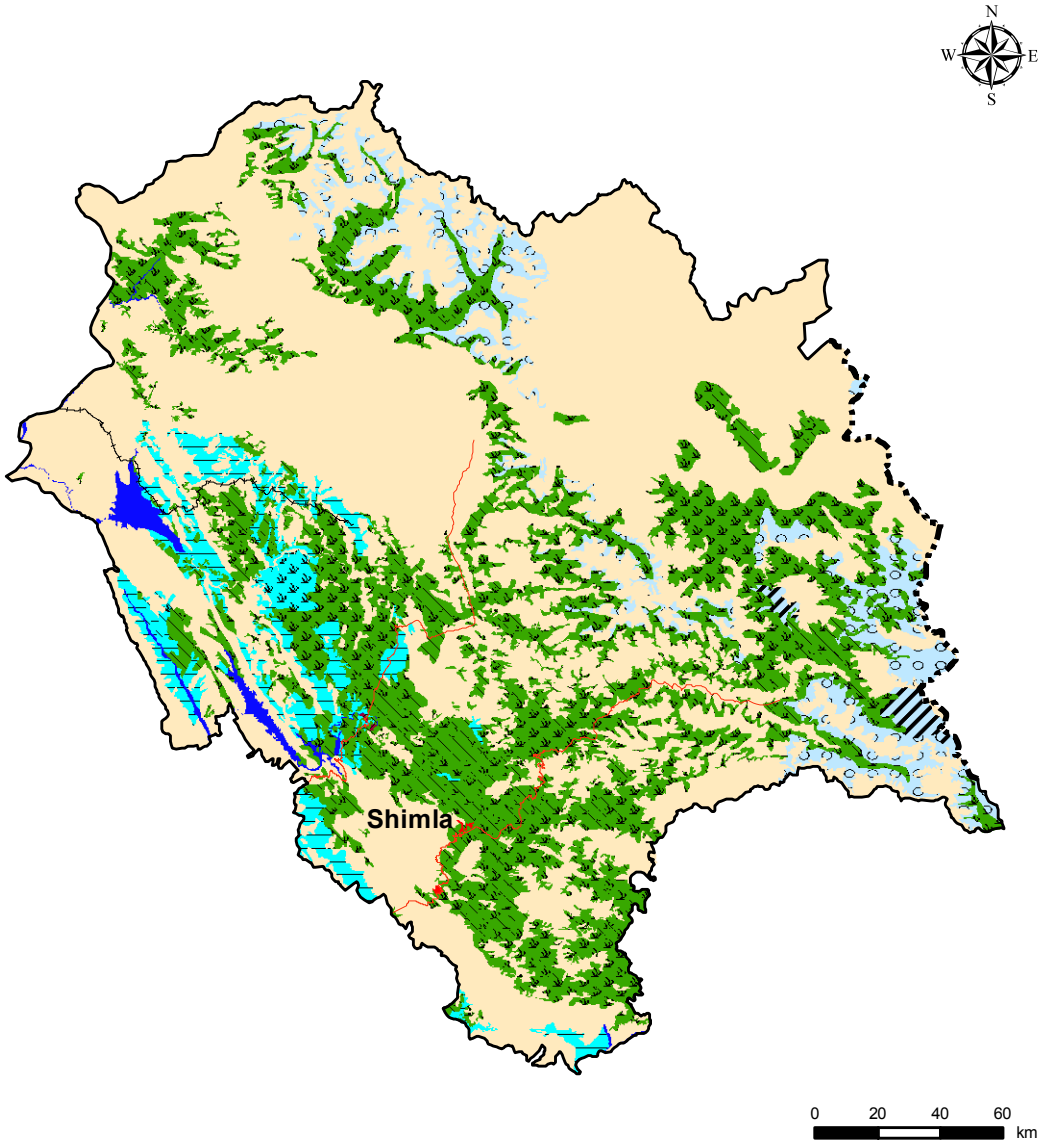


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Jawaharlal Nehru University, New Delhi
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
HIMACHAL PRADESH (2003-05)



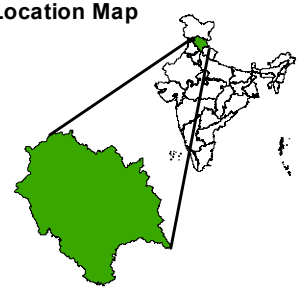
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Fw1	Forest, water erosion
	Sw1	Land with scrub, water erosion
	Lf1,2	Periglacial, frost shattering
	Rf1	Rocky, frost shattering
	Tm2	Others, man made
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map



	International boundary
	State boundary
	Major roads
	Rail

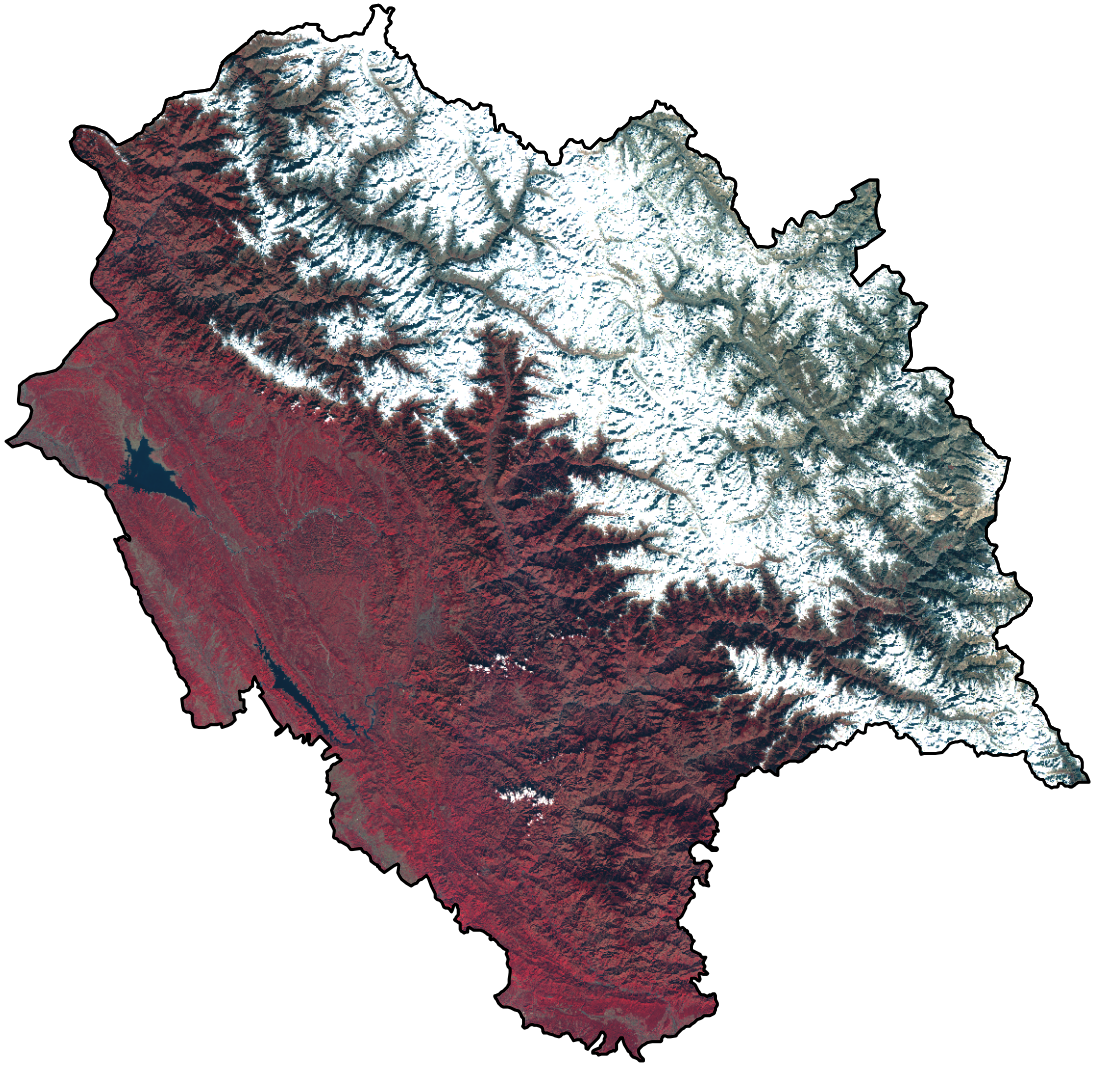
Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

Prepared by:
Jawaharlal Nehru University, New Delhi
&
Space Applications Centre,ISRO, Ahmedabad

HIMACHAL PRADESH - IRS AWiFS 2011

(IRS AWiFS, 14 December 2011)

HIMACHAL PRADESH - IRS AWiFS 2004



(IRS AWiFS, 08 November 2004)

Jammu and Kashmir

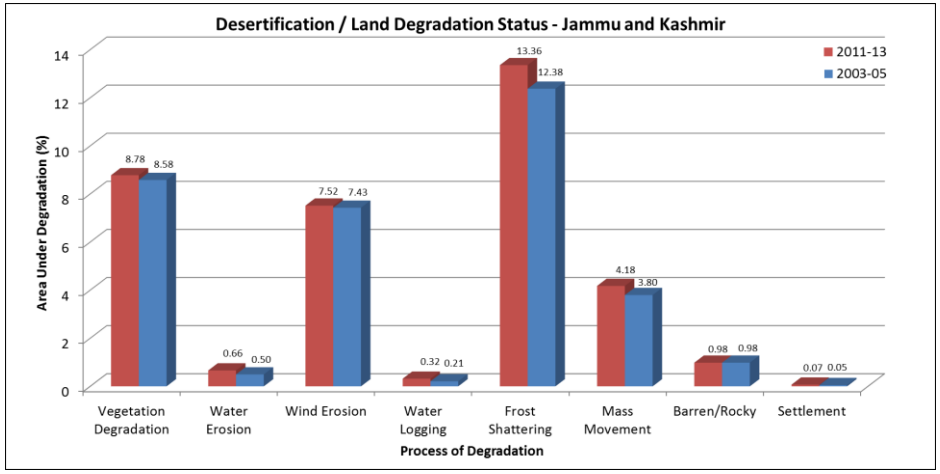
Jammu and Kashmir is the northern most state of India, bordering with Pakistan, Afghanistan and China, and spread over 2,22,236 sq km area. The state has population of 1,25,41,302; with 56 population density, 889 sex ratio and 67.16% literacy (Census 2011). Srinagar is the summer capital, and Jammu is the winter capital of the state.

Jammu and Kashmir consists of Jammu region, Kashmir Valley and Ladakh region. The state has several ranges like The Himalayas, Pir Panjal and Karakoram and valleys such as the Kashmir Valley, Chenab Valley, Punch Valley etc. Jhelum, Indus, Tawi, Ravi and Chenab are the major rivers. Kashmir and Ladakh regions have several glaciers, viz. Siachen, Baltoro, Durungdrung etc. The climate varies greatly owing to its rugged topography. The state experiences very heavy though erratic rainfall.

Jammu and Kashmir is observed with 35.86% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Jammu and Kashmir has increased about 1.94% since 2003-05.

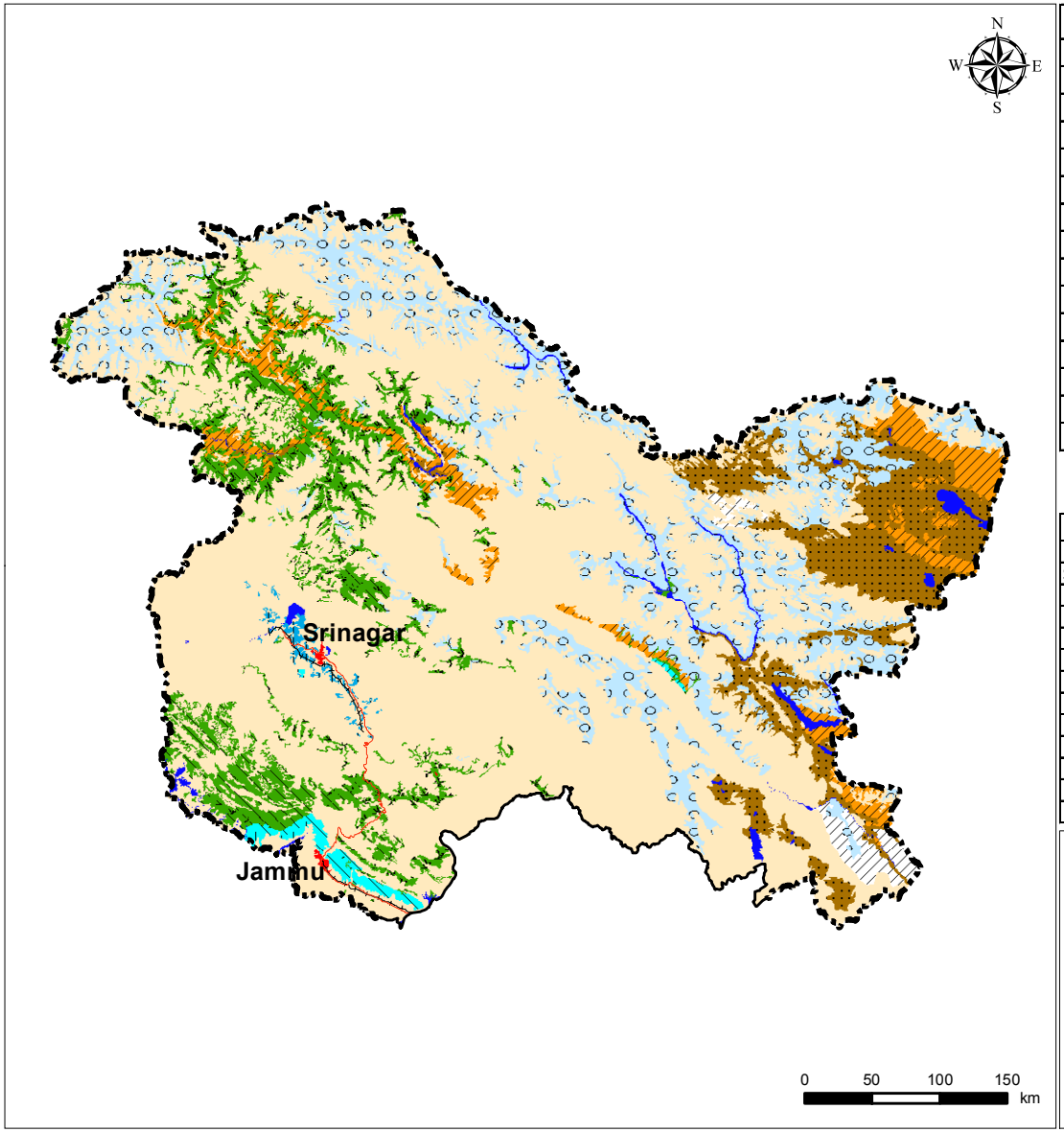
The most significant process of desertification/ land degradation in the state is Frost Shattering (13.36% in 2011-13 and 12.38% in 2003-05) followed by Vegetation Degradation (8.78% in 2011-13 and 8.58% in 2003-05), Wind Erosion (7.52% in 2011-13 and 7.43% in 2003-05) and Mass Movement (4.18% in 2011-13 and 3.80% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	1951000	8.78	1907187	8.58	43813
Water Erosion	146932	0.66	110222	0.50	36710
Wind Erosion	1670244	7.52	1650577	7.43	19667
Water Logging	70563	0.32	46548	0.21	24015
Frost Shattering	2968279	13.36	2750257	12.38	218023
Mass Movement	927986	4.18	843554	3.80	84432
Barren/Rocky	218679	0.98	218679	0.98	0
Settlement	15924	0.07	11790	0.05	4133
Total Area under Desertification	**7969607**	**35.86**	**7538814**	**33.92**	**430793**
No Apparent Degradation	**14027316**	**63.12**	**14455333**	**65.04**	**-428017**
Total Geographical Area (ha)	**22223600**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	643968	2.90	694734	3.13	-50766
2	Fv2	Forest, vegetation degradation, High	209794	0.94	194602	0.88	15192
3	Sv1	Land with scrub, vegetation degradation, Low	1050715	4.73	913519	4.11	137196
4	Sv2	Land with scrub, vegetation degradation, High	46523	0.21	104332	0.47	-57809
5	Iw1	Agriculture irrigated, water erosion, Low	21154	0.10	13701	0.06	7453
6	Fw1	Forest, water erosion, Low	98863	0.44	53111	0.24	45753
7	Fw2	Forest, water erosion, High	15559	0.07	15559	0.07	0
8	Sw1	Land with scrub, water erosion, Low	2130	0.01	18626	0.08	-16496
9	Bw1	Barren, water erosion, Low	9225	0.04	9225	0.04	0
10	Ee1	Dune / Sandy area, wind erosion, Low	1670244	7.52	1650577	7.43	19667
11	Il1	Agriculture irrigated, water logging, Low	70563	0.32	46548	0.21	24015
12	Lf1	Periglacial, frost shattering, Low	1815686	8.17	1952155	8.78	-136470
13	Lf2	Periglacial, frost shattering, High	1152593	5.19	798101	3.59	354492
14	Bg2	Barren, mass movement, High	927986	4.18	843554	3.80	84432
15	B	Barren	218679	0.98	218679	0.98	0
16	S	Settlement	15924	0.07	11790	0.05	4133
Total Area Under Desertification/ Land Degradation			**7969607**	**35.86**	**7538814**	**33.92**	**430793**
17	W	Water body/ Drainage	226677	1.02	229452	1.03	-2776
18	NAD	No Apparent Degradation	14027316	63.12	14455333	65.04	-428017
Total Geographical Area (ha)			**22223600**	**100**	**22223600**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
JAMMU & KASHMIR (2011-13)



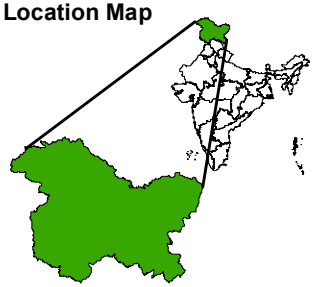
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Fw1,2	Forest, water erosion
	Sw1	Land with scrub, water erosion
	Bw1	Barren, water erosion
	Ee1	Dune / Sandy area, wind erosion
	Il1	Agriculture irrigated, water logging
	Bg2	Barren, mass movement
	Lf1,2	Periglacial, frost shattering
	B	Barren
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

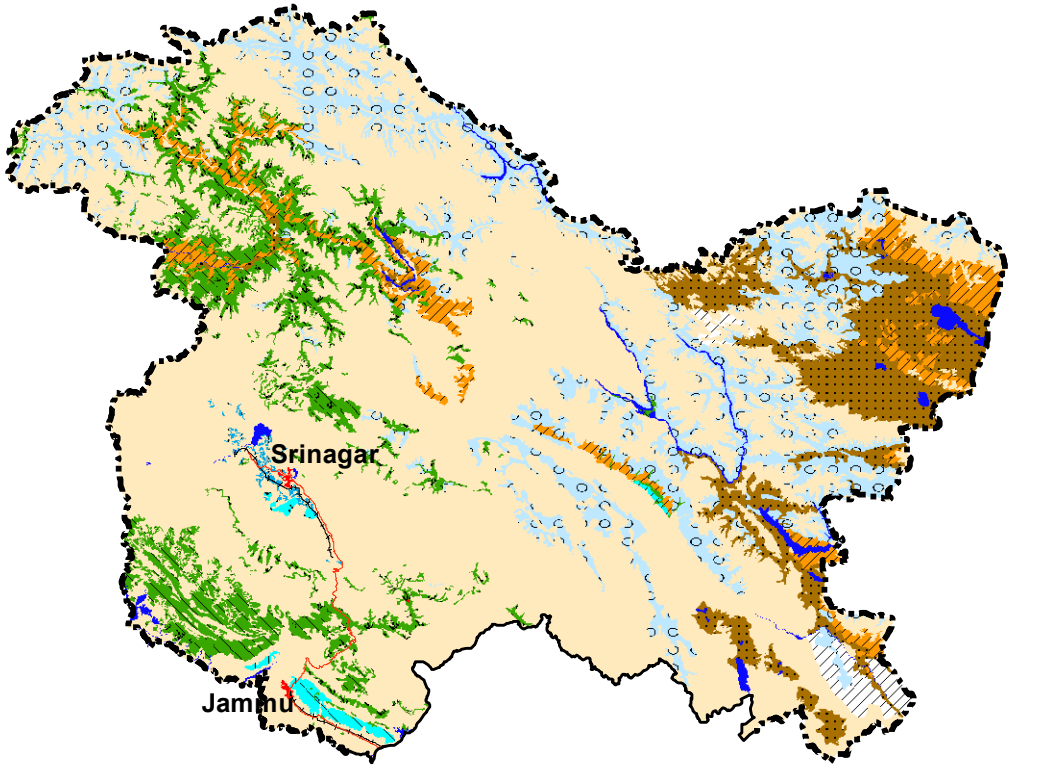


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
University of Kashmir, Srinagar
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
JAMMU & KASHMIR (2003-05)



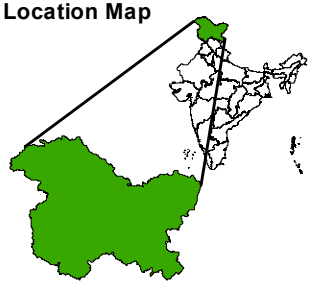
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Fw1,2	Forest, water erosion
	Sw1	Land with scrub, water erosion
	Bw1	Barren, water erosion
	Ee1	Dune / Sandy area, wind erosion
	Il1	Agriculture irrigated, water logging
	Bg2	Barren, mass movement
	Lf1,2	Periglacial, frost shattering
	B	Barren
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

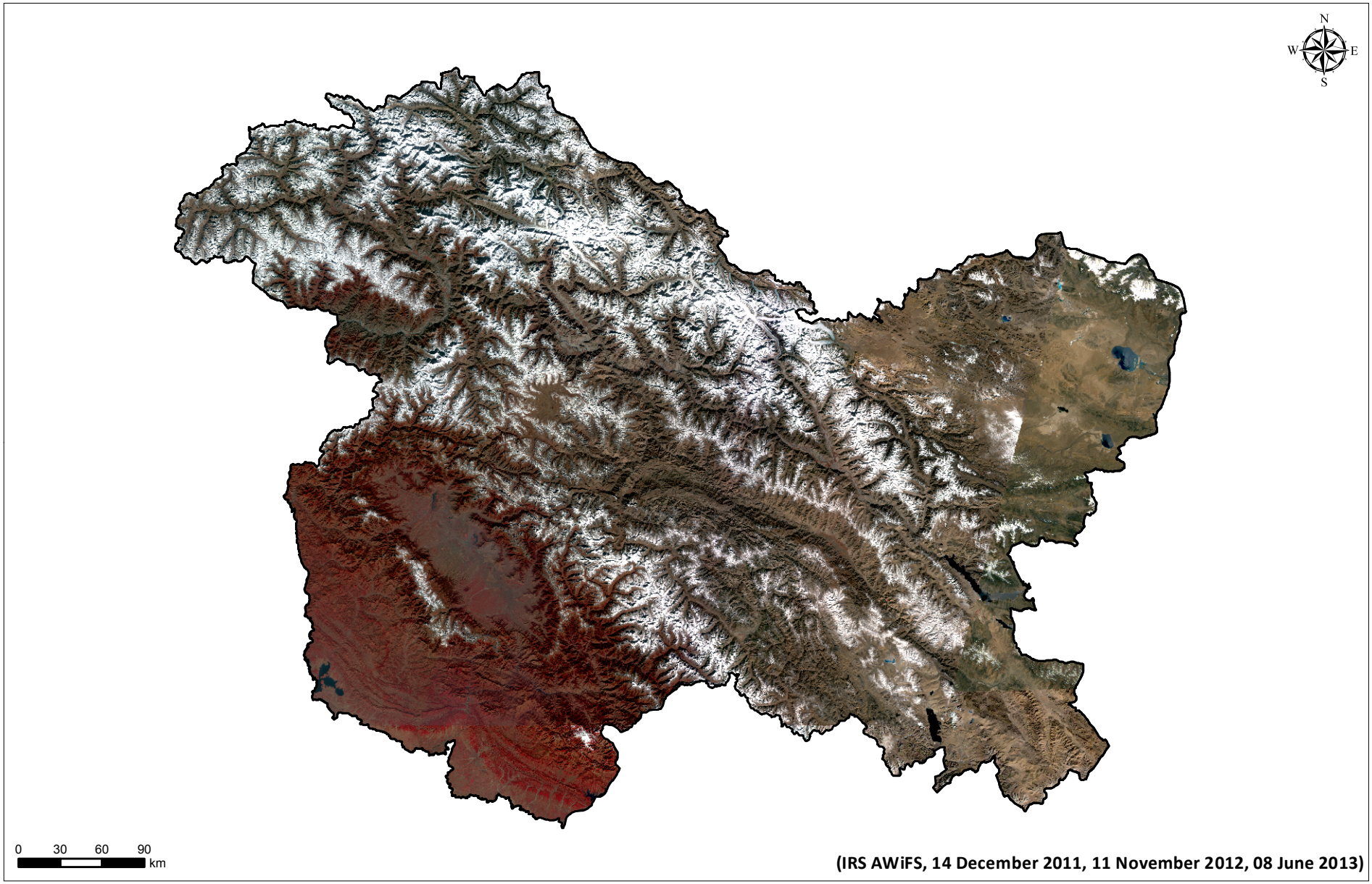


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

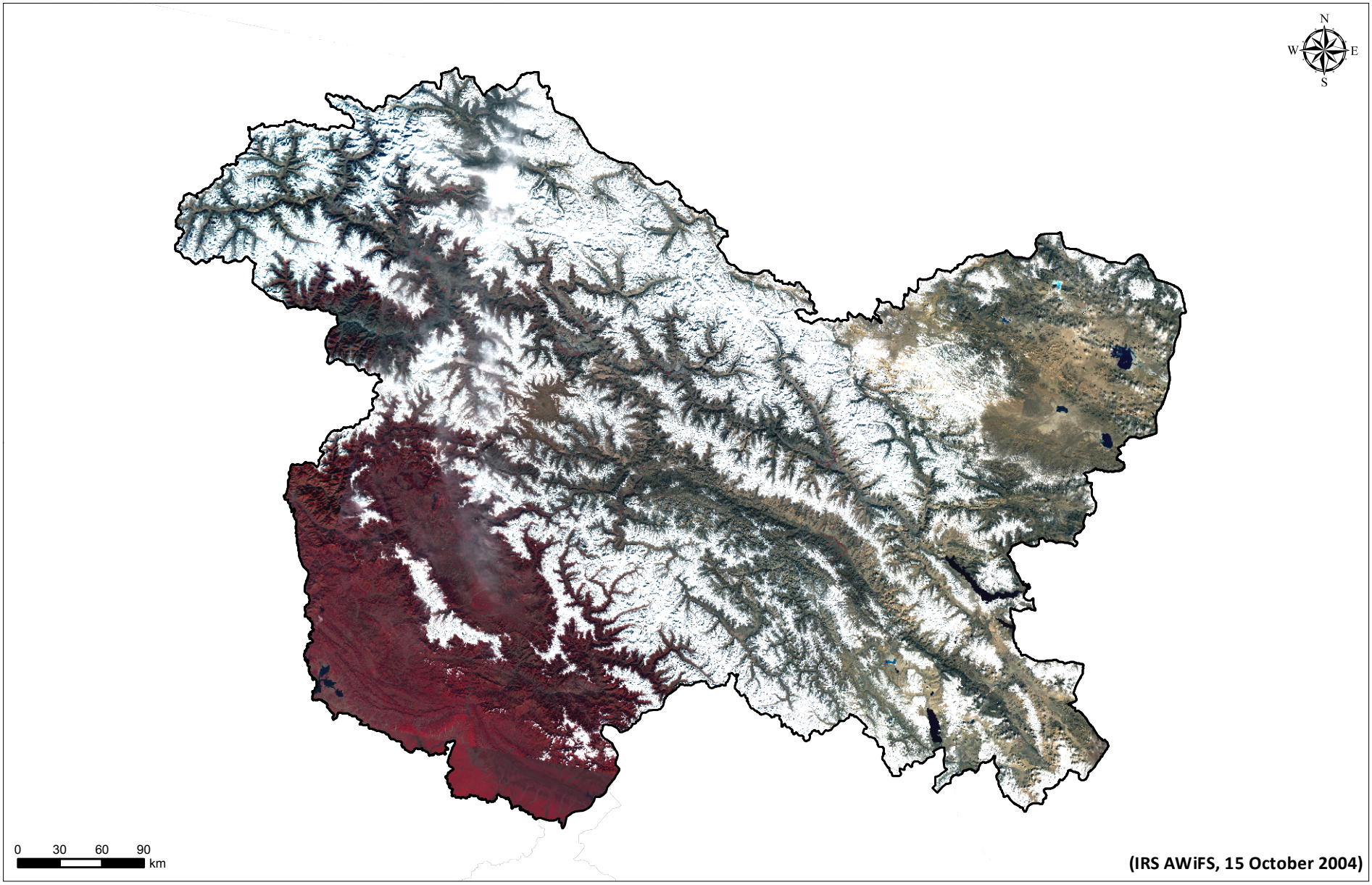
Prepared by:
University of Kashmir, Srinagar
&
Space Applications Centre,ISRO, Ahmedabad

JAMMU & KASHMIR - IRS AWiFS 2011-2013



(IRS AWiFS, 14 December 2011, 11 November 2012, 08 June 2013)

JAMMU & KASHMIR - IRS AWiFS 2004



Jharkhand

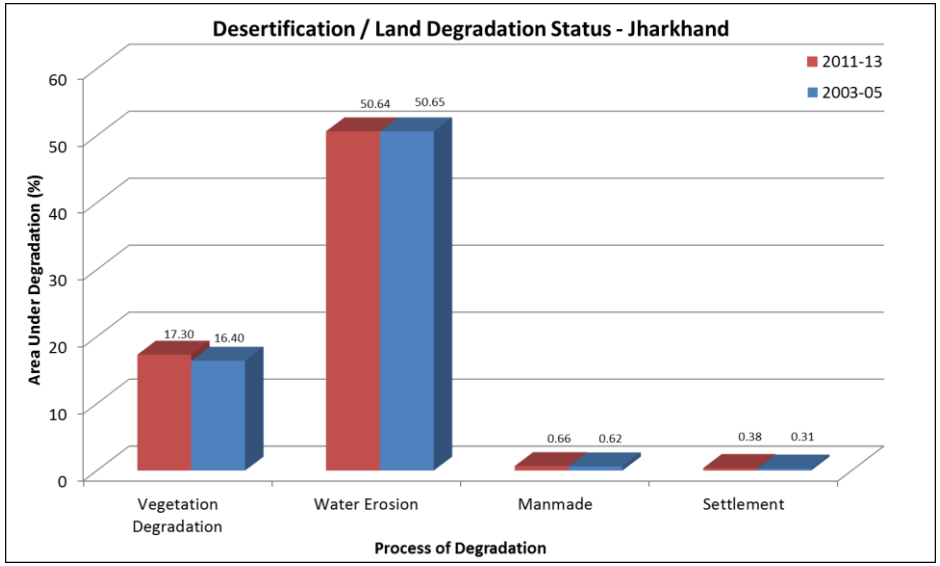
Jharkhand is located in east part of India with 79,716 sq km area. The state has population of 3,29,88,134; with 414 population density, 948 sex ratio and 66.41% literacy (Census 2011). Ranchi is the capital of Jharkhand.

The major part of Jharkhand state comprises Chota Nagpur Plateau being rich in minerals and is covered with dense forests. The state has a diverse topography of plain land and hilly regions. A number of rivers like Damodar, Brahmani, Koel, Subarnarekha and Kharkai flow through the state forming majestic waterfalls in the hilly regions. The plains of Jharkhand are very fertile and have different types of soil like the Red soil, Micacious soil (having mica particles), Sandy soil, Black soil, Laterite soil. The climate of the state is moderate (neither extreme hot nor cold) with heavy rainfall in monsoon season from 1,000 mm to 1,500 mm.

Jharkhand is the state with highest area under desertification/ land degradation in the country with respect to state TGA, i.e., 68.98% for period 2011-13. The desertification/ land degradation area in Jharkhand has increased about 1.01% since 2003-05.

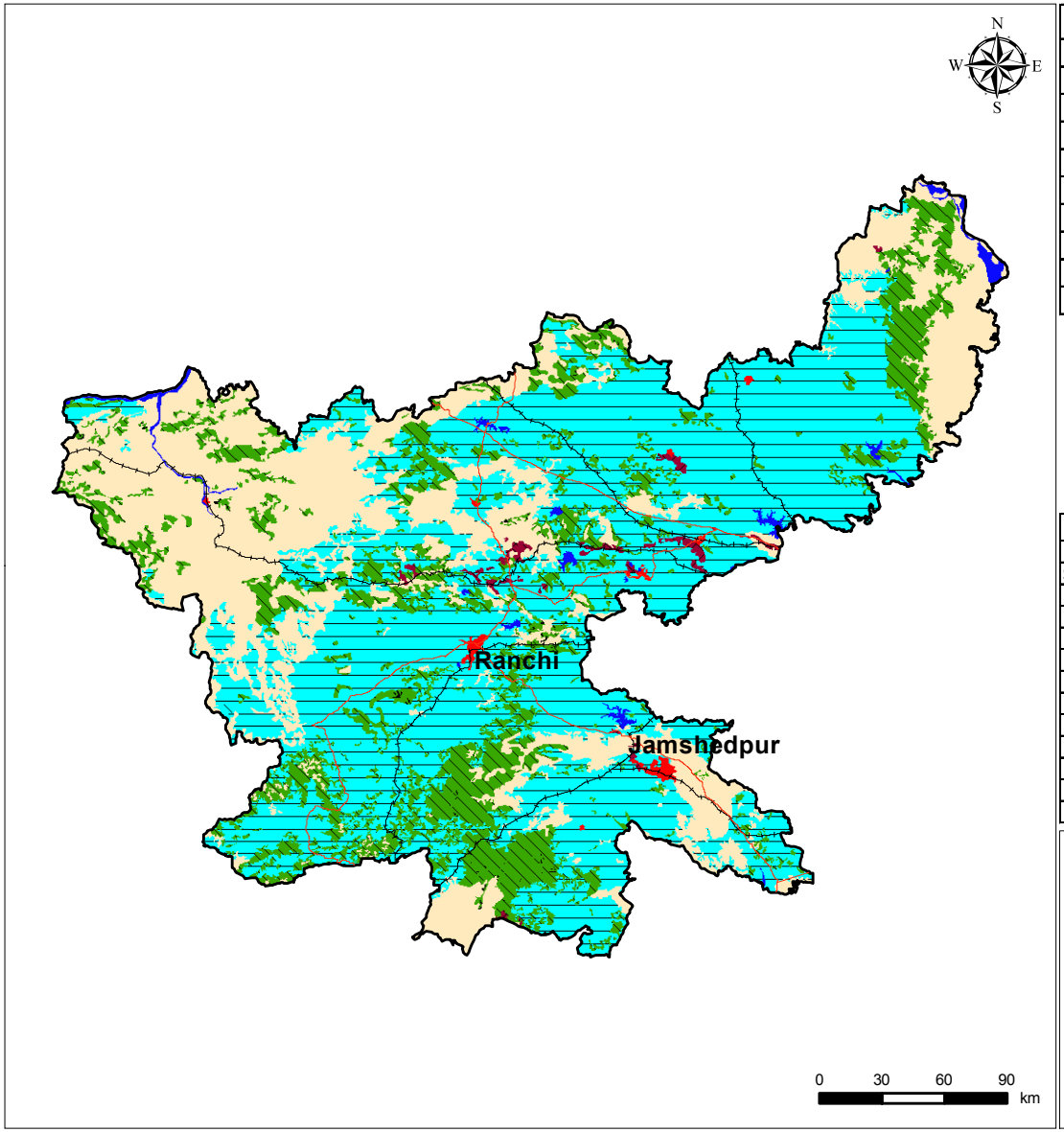
The most significant process of desertification/ land degradation in the state is Water Erosion (50.64% in 2011-13 and 50.65% in 2003-05) followed by Vegetation Degradation (17.30% in 2011-13 and 16.40% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	1379038	17.30	1307162	16.40	71876
Water Erosion	4036785	50.64	4037261	50.65	-476
Manmade	52734	0.66	49730	0.62	3004
Settlement	30169	0.38	24503	0.31	5666
Total Area under Desertification	**5498726**	**68.98**	**5418657**	**67.97**	**80070**
No Apparent Degradation	**2398866**	**30.09**	**2469577**	**30.98**	**-70711**
Total Geographical Area (ha)	**7971600**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	1322056	16.58	1239016	15.54	83040
2	Fv2	Forest, vegetation degradation, High	2039	0.03	13203	0.17	-11164
3	Sv1	Land with scrub, vegetation degradation, Low	49156	0.62	49156	0.62	0
4	Sv2	Land with scrub, vegetation degradation, High	5787	0.07	5787	0.07	0
5	Dw1	Agriculture unirrigated, water erosion, Low	4034046	50.61	4034522	50.61	-476
6	Fw1	Forest, water erosion, Low	2739	0.03	2739	0.03	0
7	Fm2	Forest, man made, High	11610	0.15	11610	0.15	0
8	Tm1	Others, man made, Low	5095	0.06	4655	0.06	440
9	Tm2	Others, man made, High	36028	0.45	33465	0.42	2564
10	S	Settlement	30169	0.38	24503	0.31	5666
Total Area Under Desertification/ Land Degradation			**5498726**	**68.98**	**5418657**	**67.97**	**80070**
11	W	Water body/ Drainage	74008	0.93	83366	1.05	-9358
12	NAD	No Apparent Degradation	2398866	30.09	2469577	30.98	-70711
Total Geographical Area (ha)			**7971600**	**100**	**7971600**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
JHARKHAND (2011-13)



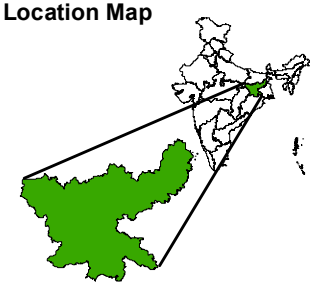
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Fw1	Forest, water logging
	Fm2	Forest, man made
	Tm1,2	Others, man made
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

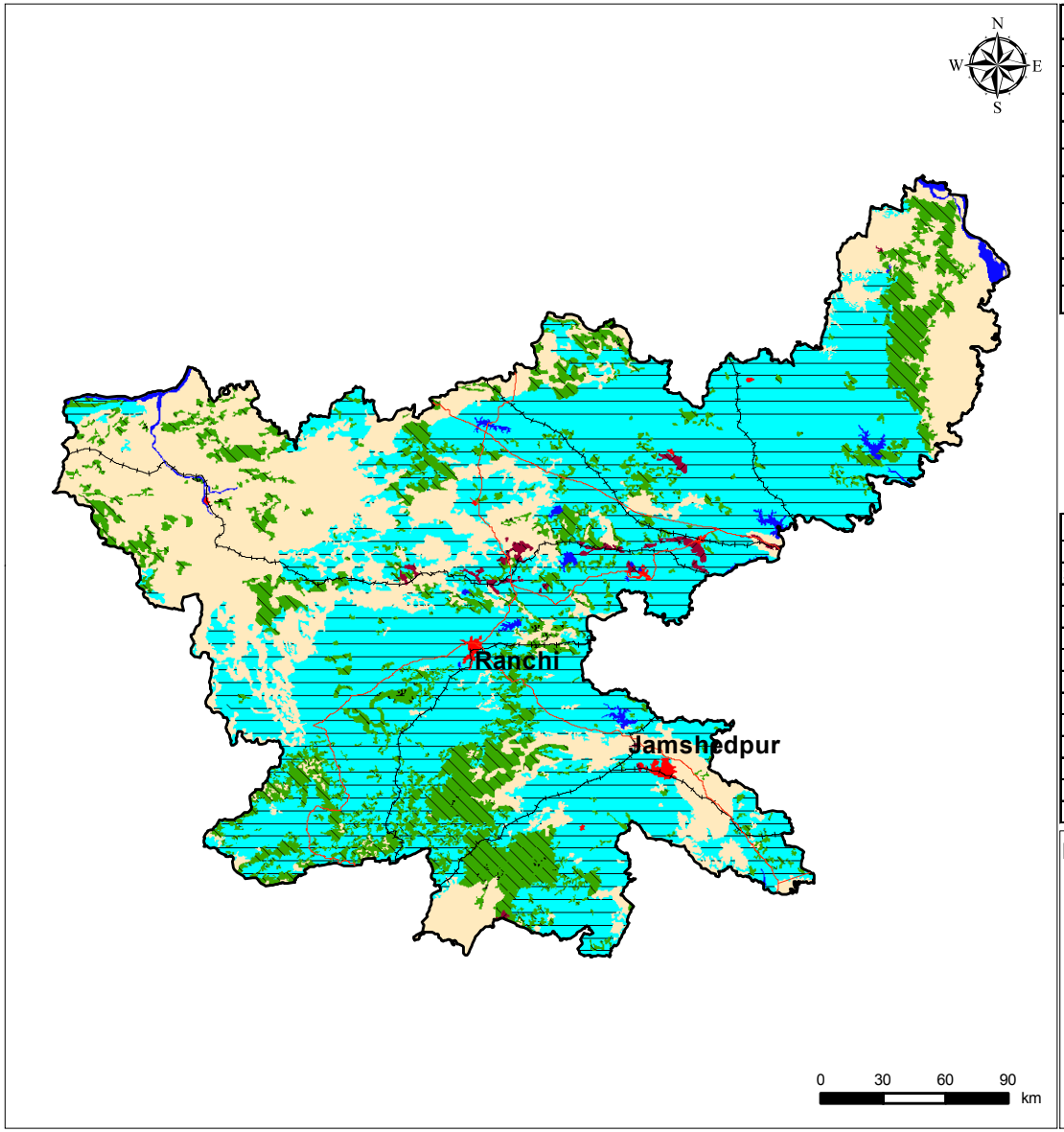


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
JHARKHAND (2003-05)



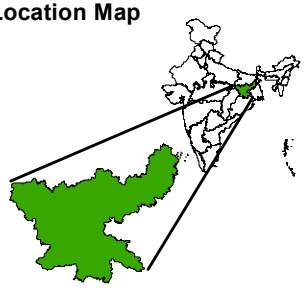
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Fw1	Forest, water logging
	Fm2	Forest, man made
	Tm1,2	Others, man made
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

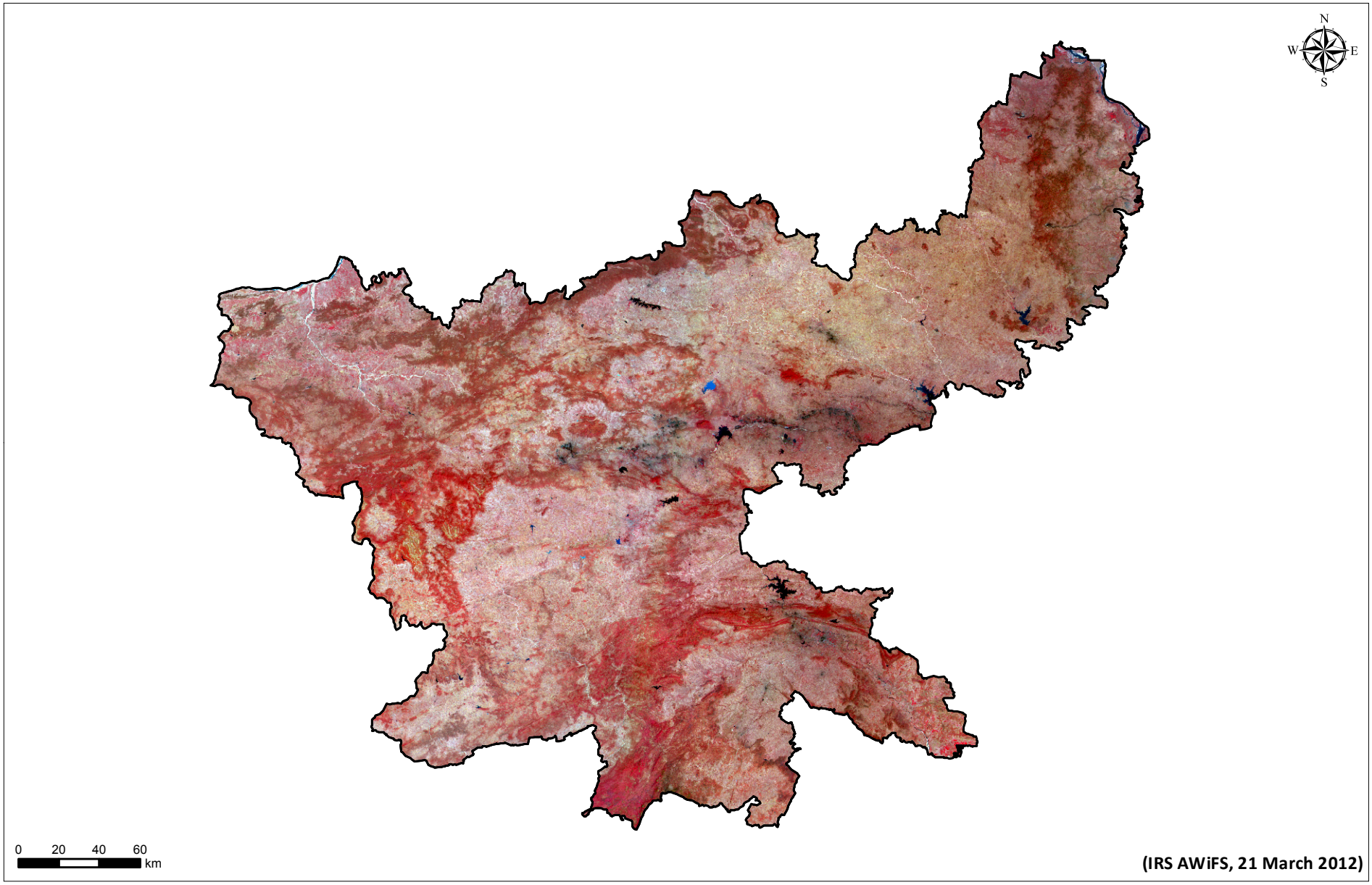


	International boundary
	State boundary
	Major roads
	Rail

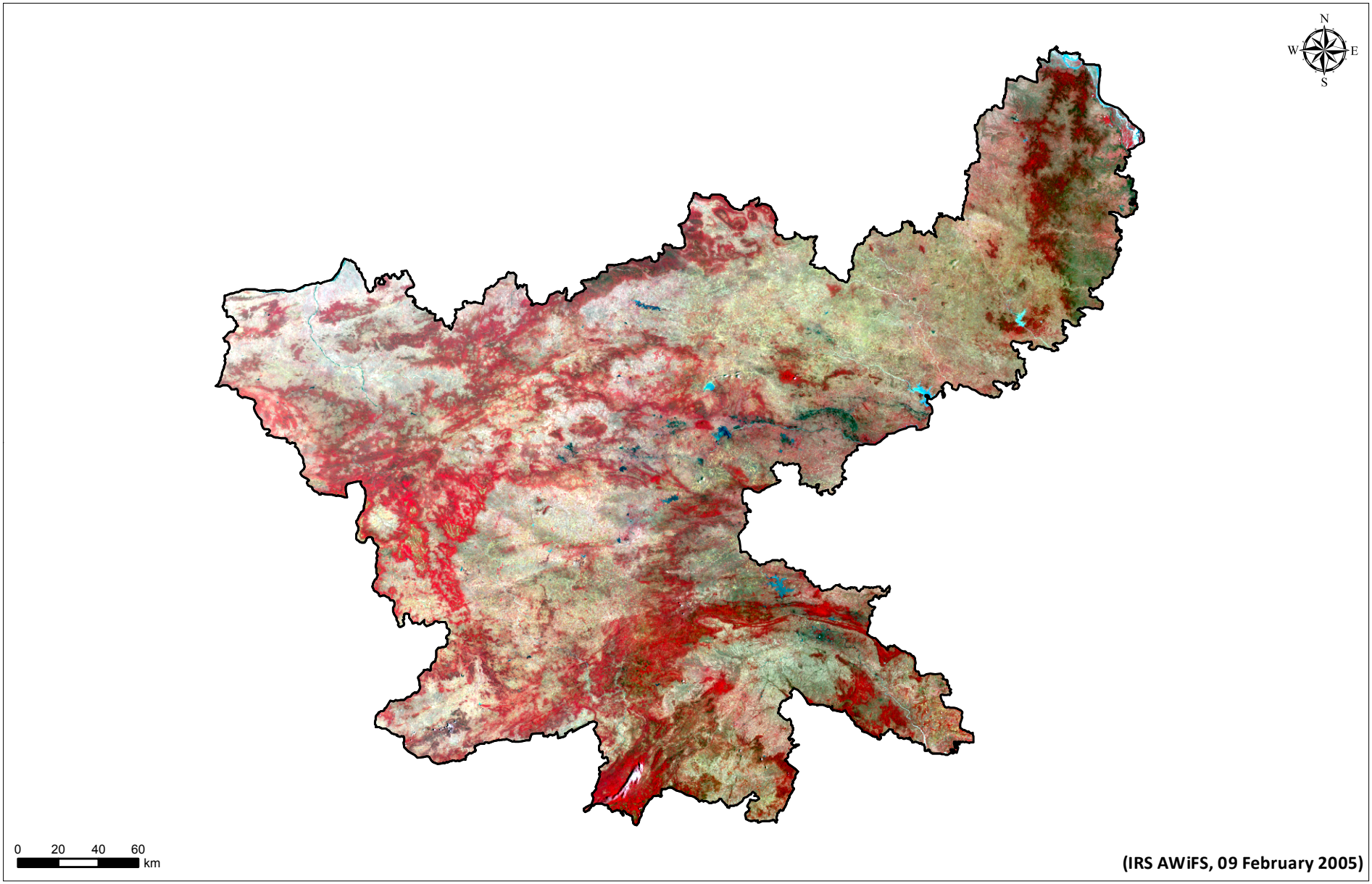
Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

Prepared by:
Space Applications Centre,ISRO, Ahmedabad

JHARKHAND - IRS AWiFS 2012



JHARKHAND - IRS AWiFS 2005



Karnataka

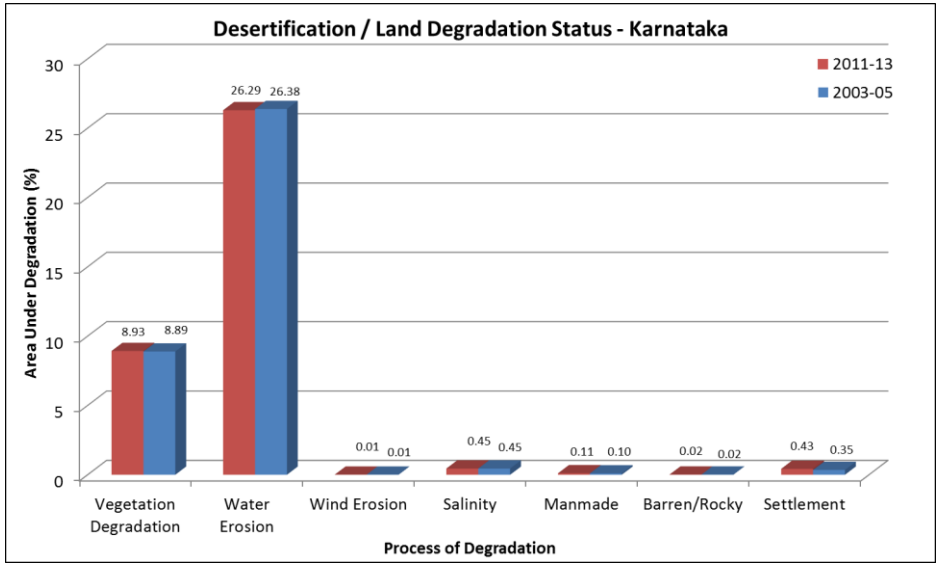
Karnataka is located in southern part of India with 1,91,791 sq km area. The state has population of 6,10,95,297; with 319 population density, 973 sex ratio and 75.36% literacy (Census 2011). Bengaluru is the capital of Karnataka.

Karnataka has three natural regions like the Coastal strip (Paschima Karavali), the Western Ghats (Malenadu or Sahyadris) and the Deccan plateau (Bayaluseema). The Sahyadris are covered with evergreen forests. Krishna and the Kaveri are the main rivers of the state, which drain the plateau regions of the state. The state experiences semi-arid tropical climate. The average annual temperature ranges from 10°C to 45°C. Rainfall is very high in coastal region, about 3500mm but low in interiors.

Karnataka is observed with 36.24% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Karnataka has increased about 0.05% since 2003-05.

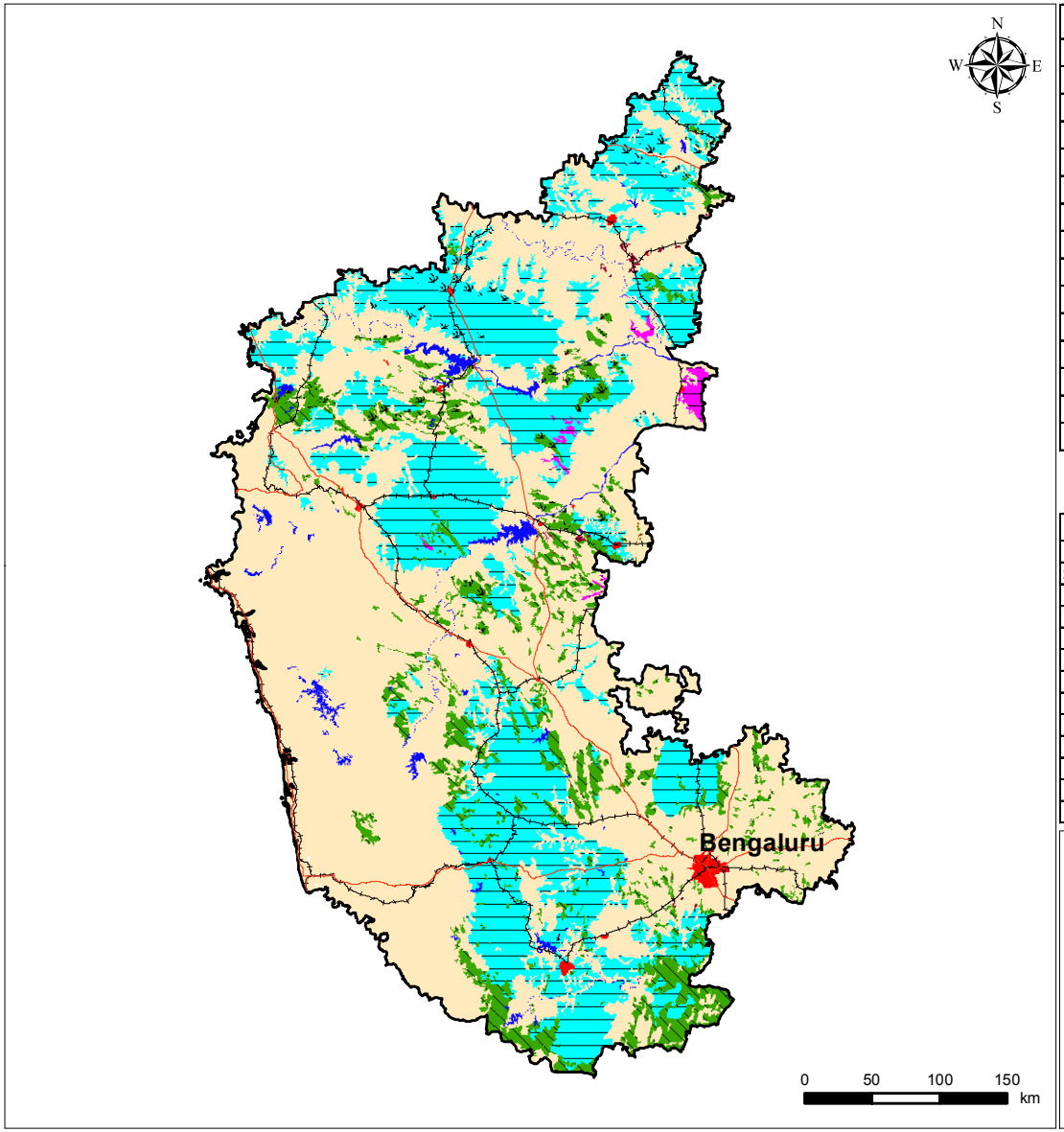
The most significant process of desertification/ land degradation in the state is Water Erosion (26.29% in 2011-13 and 26.38% in 2003-05) followed by Vegetation Degradation (8.93% in 2011-13 and 8.89% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	1712386	8.93	1704569	8.89	7817
Water Erosion	5043041	26.29	5059629	26.38	-16588
Wind Erosion	2159	0.01	2159	0.01	0
Salinity	86740	0.45	86582	0.45	158
Manmade	20876	0.11	18704	0.10	2172
Barren/Rocky	3389	0.02	2887	0.02	502
Settlement	82409	0.43	66413	0.35	15996
Total Area under Desertification	**6951000**	**36.24**	**6940943**	**36.19**	**10057**
No Apparent Degradation	**11984329**	**62.49**	**11994157**	**62.54**	**-9828**
Total Geographical Area (ha)	**19179100**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	1020270	5.32	1049116	5.47	-28846
2	Fv2	Forest, vegetation degradation, High	356658	1.86	317471	1.66	39187
3	Sv1	Land with scrub, vegetation degradation, Low	43904	0.23	45862	0.24	-1958
4	Sv2	Land with scrub, vegetation degradation, High	291555	1.52	292120	1.52	-566
5	Iw1	Agriculture irrigated, water erosion, Low	7225	0.04	7225	0.04	0
6	Dw1	Agriculture unirrigated, water erosion, Low	4763027	24.83	4779131	24.92	-16104
7	Sw1	Land with scrub, water erosion, Low	272790	1.42	273273	1.42	-484
8	Ee1	Dune / Sandy area, wind erosion, Low	1556	0.01	1556	0.01	0
9	Ee2	Dune / Sandy area, wind erosion, High	604	0.00	604	0.00	0
10	Is1	Agriculture irrigated, salinity / alkalinity, Low	6407	0.03	6249	0.03	158
11	Ds1	Agriculture unirrigated, salinity / alkalinity, Low	80333	0.42	80333	0.42	0
12	Tm1	Others, man made, Low	4613	0.02	4613	0.02	0
13	Tm2	Others, man made, High	16263	0.08	14091	0.07	2172
14	B	Barren	1099	0.01	597	0.00	502
15	R	Rocky	2290	0.01	2290	0.01	0
16	S	Settlement	82409	0.43	66413	0.35	15996
Total Area Under Desertification/ Land Degradation			**6951000**	**36.24**	**6940943**	**36.19**	**10057**
21	W	Water body/ Drainage	243771	1.27	244000	1.27	-229
22	NAD	No Apparent Degradation	11984329	62.49	11994157	62.54	-9828
Total Geographical Area (ha)			**19179100**	**100**	**19179100**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
KARNATAKA (2011-13)



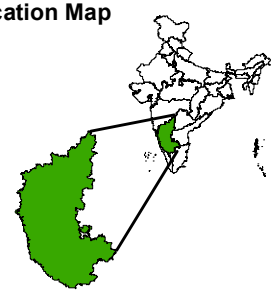
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Sw1	Land with scrub, water erosion
	Ee1, 2	Dune / Sandy area, wind erosion
	Is1	Agriculture irrigated, salinity / alkalinity
	Ds1	Agriculture unirrigated, salinity / alkalinity
	Tm1,2	Others, man made
	B	Barren
	R	Rocky
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

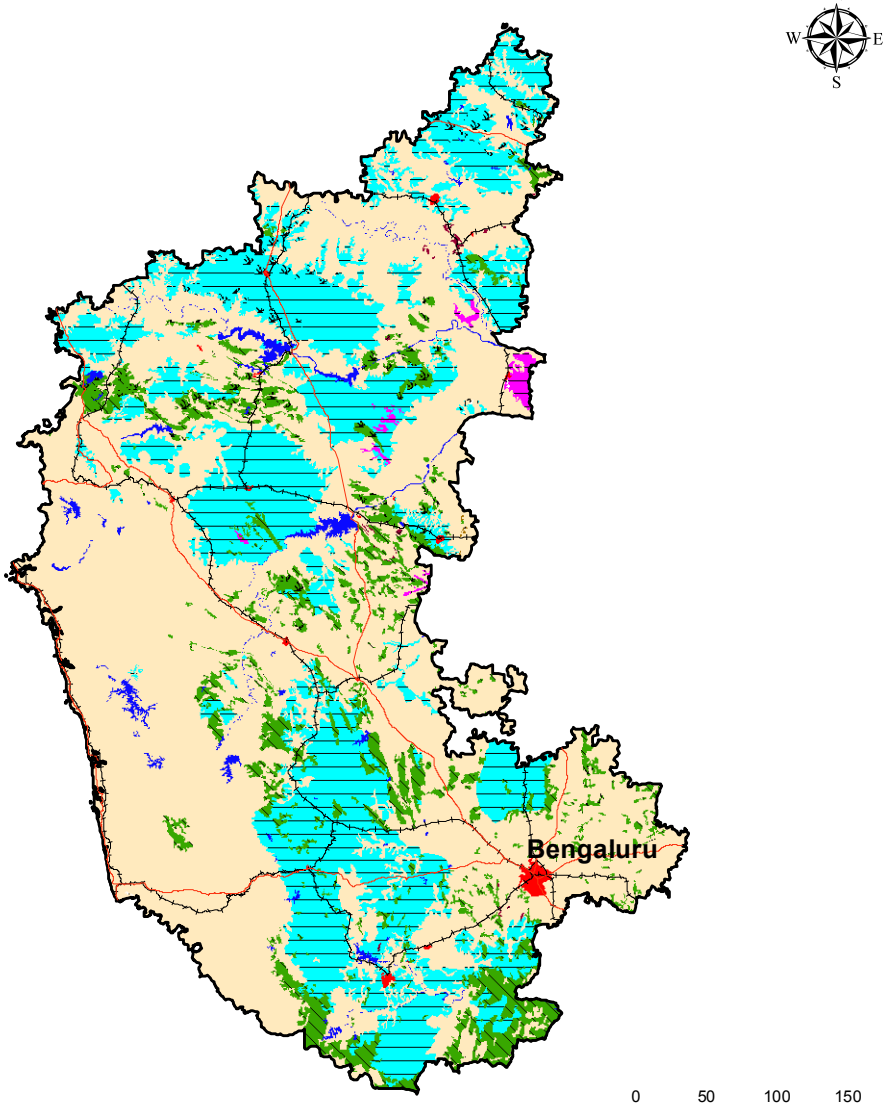


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
National Bureau of Soil Survey and Land Use Planning, Bengaluru
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
KARNATAKA (2003-05)



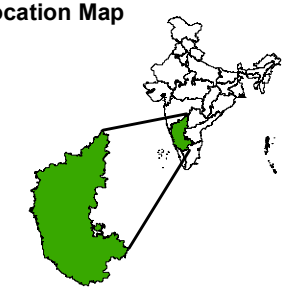
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Sw1	Land with scrub, water erosion
	Ee1, 2	Dune / Sandy area, wind erosion
	Is1	Agriculture irrigated, salinity / alkalinity
	Ds1	Agriculture unirrigated, salinity / alkalinity
	Tm1,2	Others, man made
	B	Barren
	R	Rocky
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

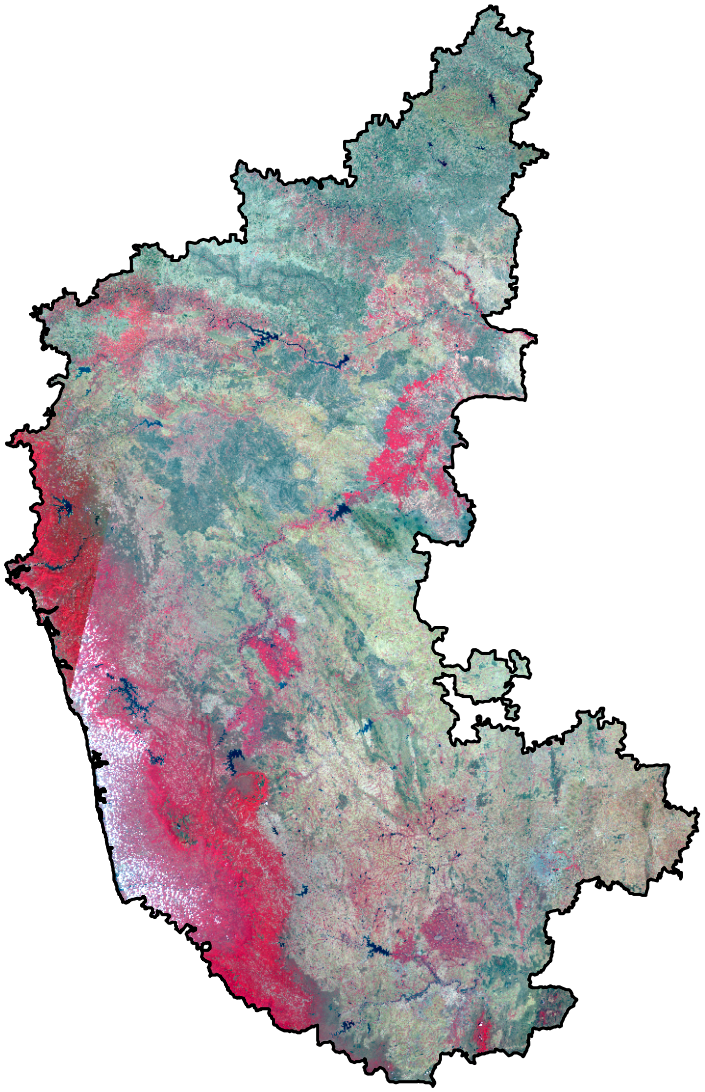


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

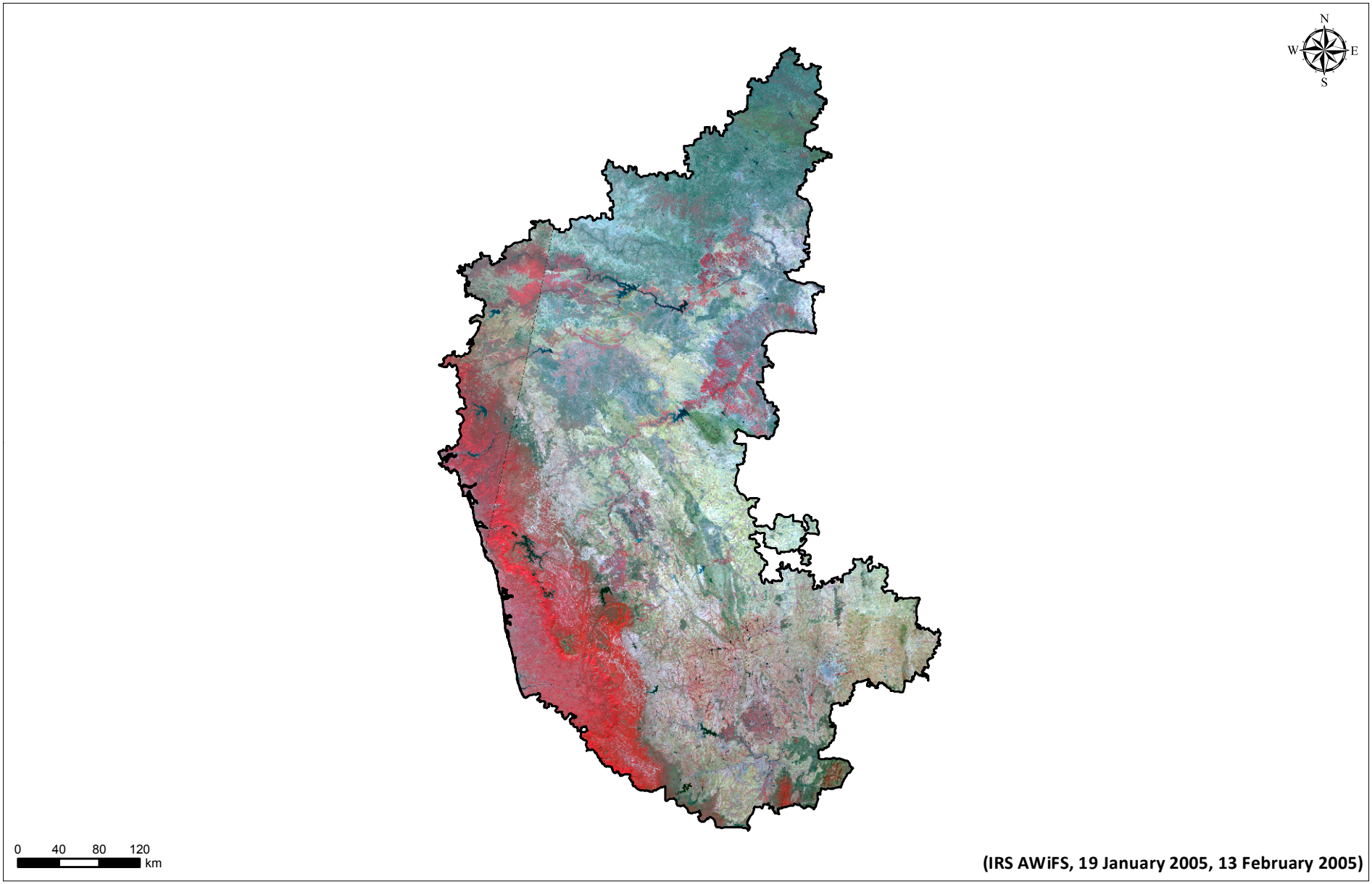
Prepared by:
National Bureau of Soil Survey and Land Use Planning, Bengaluru
&
Space Applications Centre,ISRO, Ahmedabad

KARNATAKA - IRS AWiFS 2012



(IRS AWiFS, 20 March 2012)

KARNATAKA - IRS AWiFS 2005



(IRS AWiFS, 19 January 2005, 13 February 2005)

Kerala

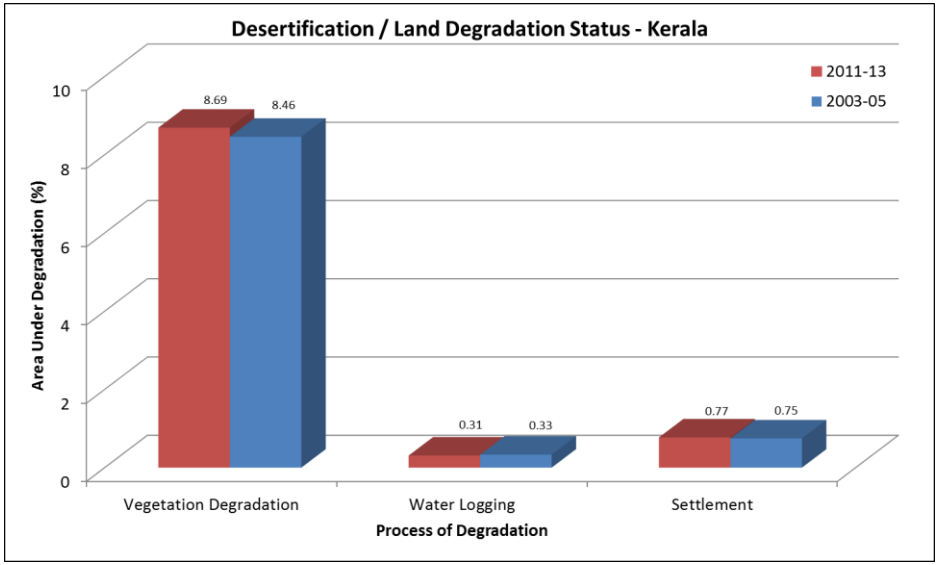
Kerala is located in south west corner of India with 38,852 sq km area. The state has population of 3,34,06,061; with 860 population density, 1084 sex ratio and 94% literacy (Census 2011). Thiruvananthapuram is the capital of Kerala.

Kerala may be divided into three geographical regions high land of Western Ghats, undulating hills and valleys and coastal plain. Peryar, Bharatapuzha and Pampa are the three major rivers of Kerala. Kerala experiences tropical climate with average annual temperature of 35° C. rainfall both in monsoon and winter. The climate is characterised by rainfall both in monsoon and winter season.

Kerala is observed with 9.77% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Kerala has increased about 0.23% since 2003-05.

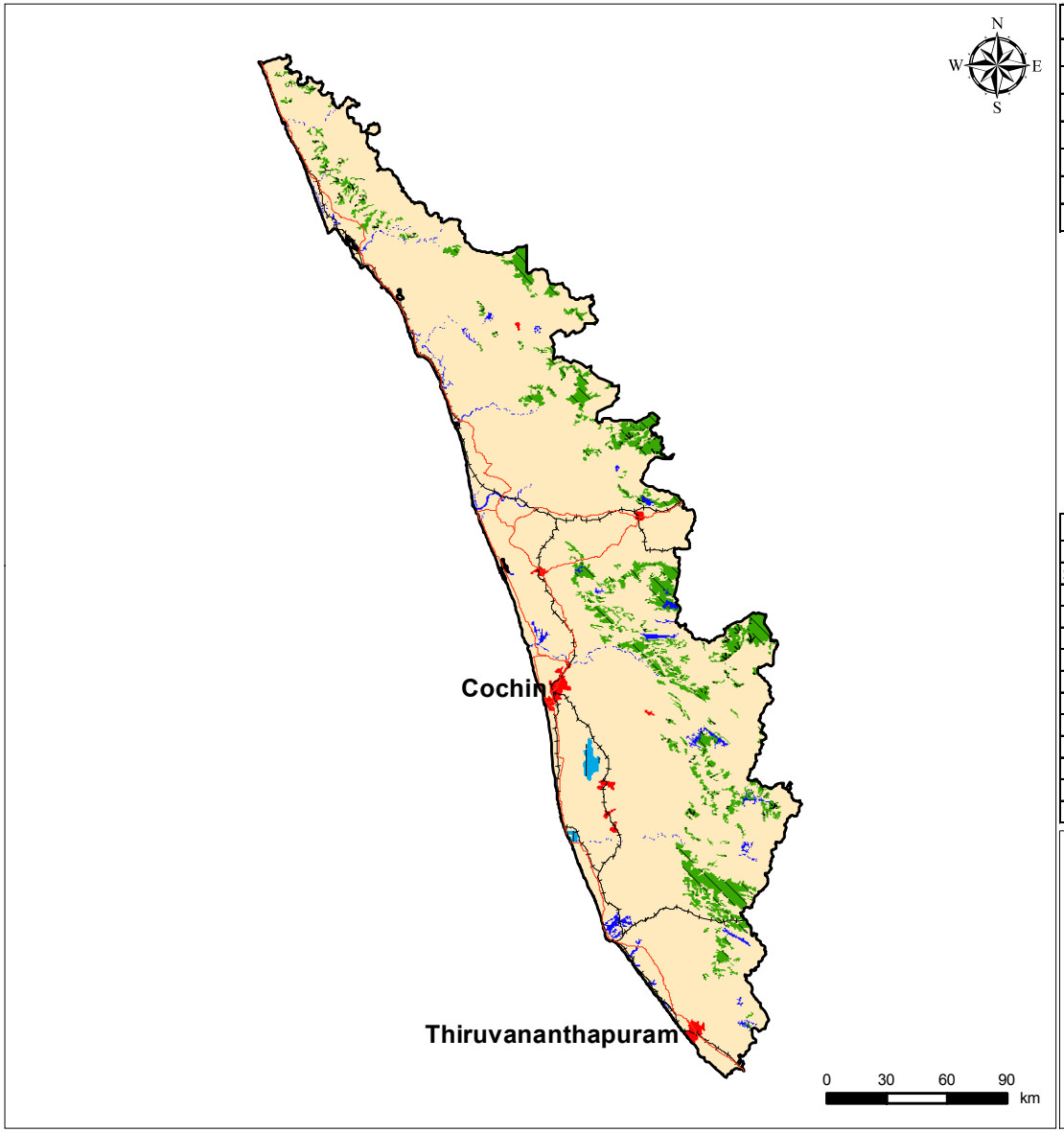
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (8.69% in 2011-13 and 8.46% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	337613	8.69	328638	8.46	8975
Water Logging	11989	0.31	12906	0.33	-917
Settlement	29984	0.77	28968	0.75	1017
Total Area under Desertification	**379587**	**9.77**	**370512**	**9.54**	**9075**
No Apparent Degradation	**3455238**	**88.93**	**3464358**	**89.17**	**-9121**
Total Geographical Area (ha)	**3885200**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	234646	6.04	227159	5.85	7487
2	Fv2	Forest, vegetation degradation, High	22964	0.59	21572	0.56	1392
3	Sv1	Land with scrub, vegetation degradation, Low	71947	1.85	71850	1.85	97
4	Sv2	Land with scrub, vegetation degradation, High	8057	0.21	8057	0.21	0
5	Il1	Agriculture irrigated, water logging, Low	11989	0.31	12906	0.33	-917
6	S	Settlement	29984	0.77	28968	0.75	1017
Total Area Under Desertification/ Land Degradation			**379587**	**9.77**	**370512**	**9.54**	**9075**
7	W	Water body/ Drainage	50376	1.30	50330	1.30	46
8	NAD	No Apparent Degradation	3455238	88.93	3464358	89.17	-9121
Total Geographical Area (ha)			**3885200**	**100**	**3885200**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
KERALA (2011-13)



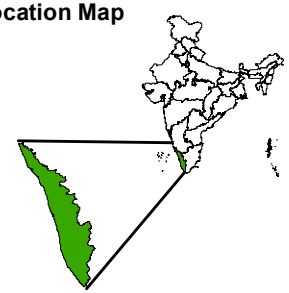
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Il1	Agriculture irrigated, water logging
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

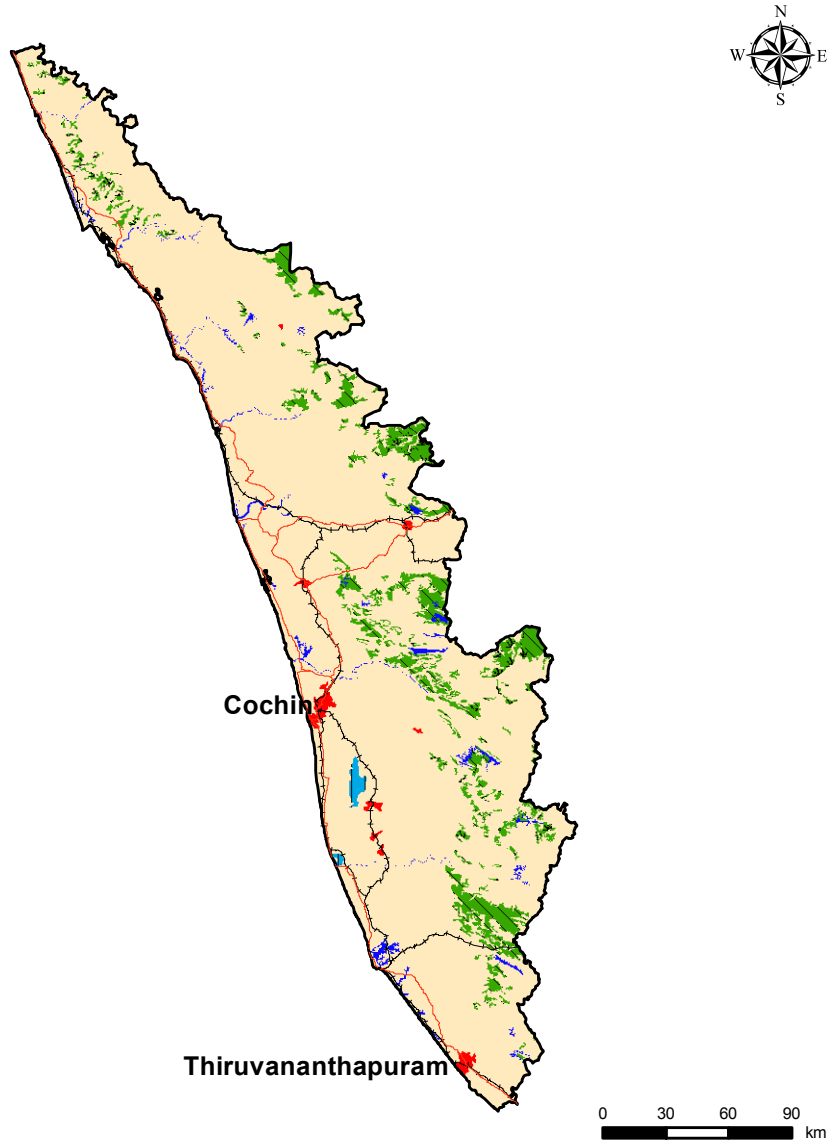


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Institute of Remote Sensing Anna University, Chennai
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
KERALA (2003-05)



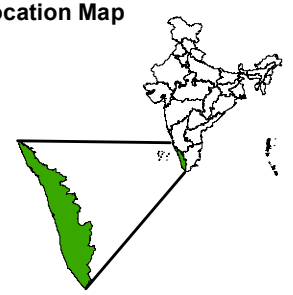
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Il1	Agriculture irrigated, water logging
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

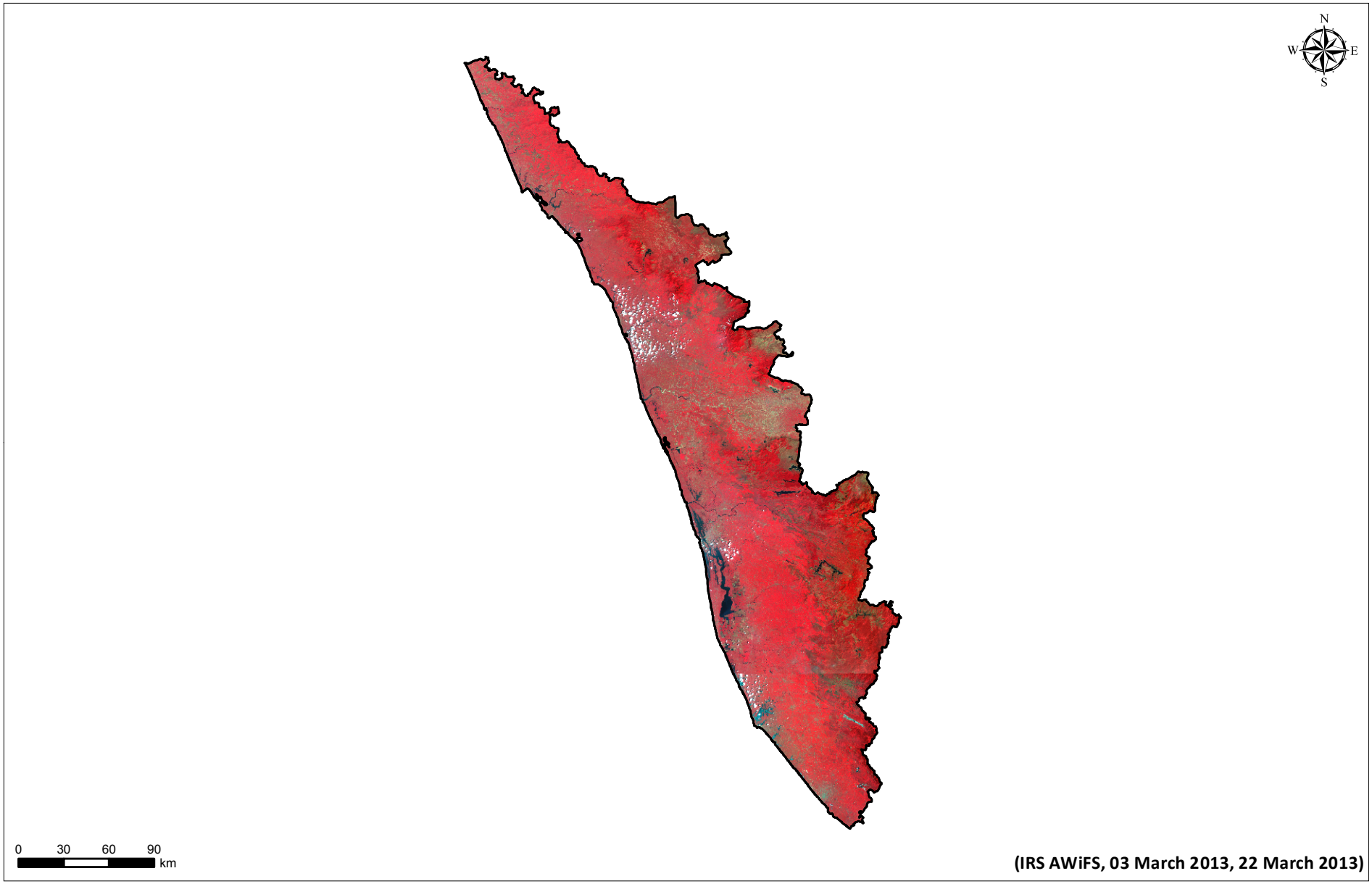


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

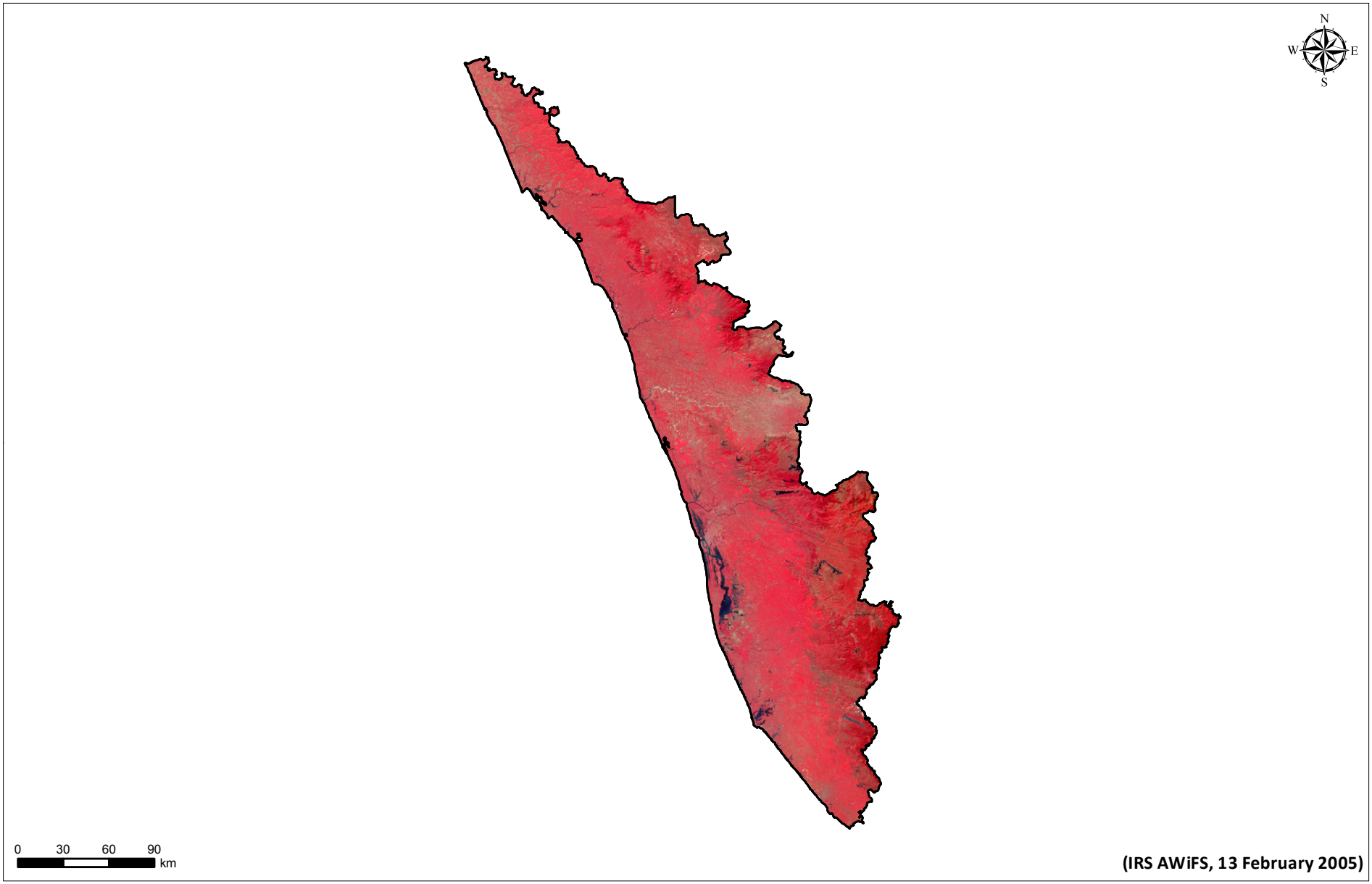
Prepared by:
Institute of Remote Sensing, Anna University, Chennai
&
Space Applications Centre,ISRO, Ahmedabad

KERALA - IRS AWiFS 2013



(IRS AWiFS, 03 March 2013, 22 March 2013)

KERALA - IRS AWiFS 2005



(IRS AWiFS, 13 February 2005)

Madhya Pradesh

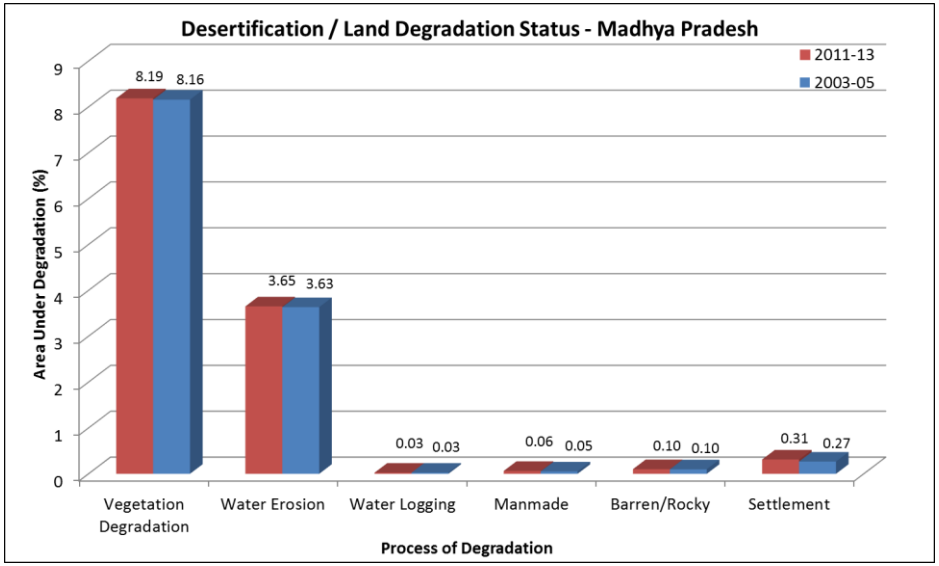
Madhya Pradesh, the second largest state in the country, is located in the heart of the country with 3,08,252 sq km area. The state has population of 7,26,26,809; with 236 population density, 931 sex ratio and 69.32% literacy (Census 2011). Bhopal is the capital of Madhya Pradesh.

Madhya Pradesh has varied geo-structural divisions, viz. undulating plateaus, Vindhya Hills, Escarpments, Bhander-Kaimur ranges, and plains. The major rivers are Chambal, Narmada, Betwa etc. The state has variety of forests like Dry thorn forests, tropical moist deciduous and evergreen forest with a diverse soil like Black cotton soil, light sandy soil and rich alluvial soil. The state experiences hot and dry summer and cold winter with rainfall of 990 mm in monsoon.

Madhya Pradesh is observed with 12.34% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Madhya Pradesh has increased about 0.10% since 2003-05.

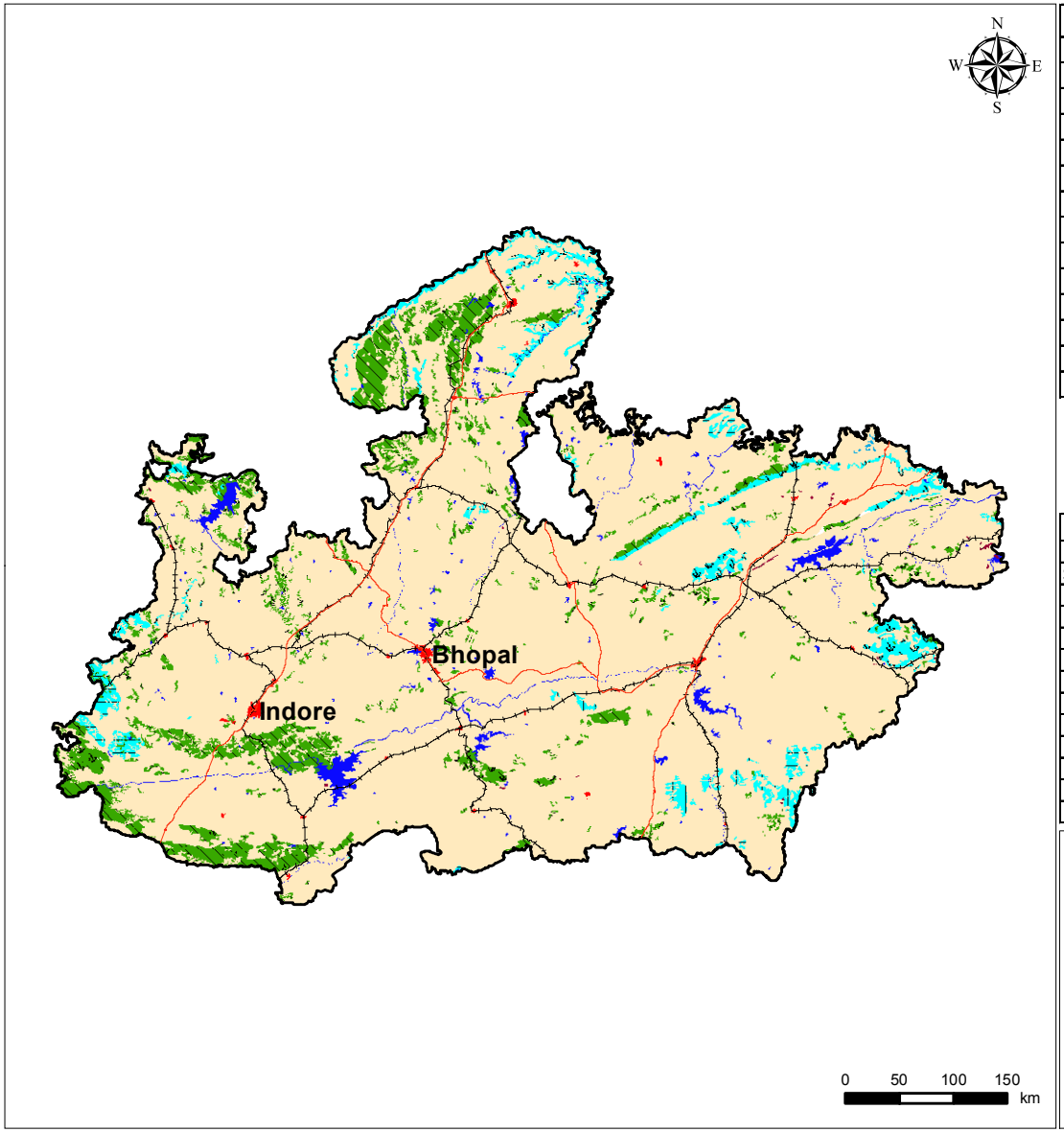
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (8.19% in 2011-13 and 8.16% in 2003-05) followed by Water Erosion (3.65% in 2011-13 and 3.63% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	2523801	8.19	2514983	8.16	8818
Water Erosion	1125418	3.65	1120221	3.63	5197
Water Logging	7788	0.03	7788	0.03	0
Manmade	19454	0.06	16024	0.05	3430
Barren/Rocky	31495	0.10	30457	0.10	1037
Settlement	96359	0.31	82379	0.27	13980
Total Area under Desertification	**3804315**	**12.34**	**3771853**	**12.24**	**32462**
No Apparent Degradation	**26502030**	**85.98**	**26648676**	**86.45**	**-146646**
Total Geographical Area (ha)	**30825200**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	1714199	5.56	1711055	5.55	3144
2	Fv2	Forest, vegetation degradation, High	100505	0.33	101474	0.33	-969
3	Sv1	Land with scrub, vegetation degradation, Low	568500	1.84	561495	1.82	7005
4	Sv2	Land with scrub, vegetation degradation, High	140597	0.46	140958	0.46	-362
5	Iw1	Agriculture irrigated, water erosion, Low	141866	0.46	141866	0.46	0
6	Dw1	Agriculture unirrigated, water erosion, Low	212513	0.69	208277	0.68	4236
7	Dw2	Agriculture unirrigated, water erosion, High	37107	0.12	41602	0.13	-4495
8	Fw1	Forest, water erosion, Low	102708	0.33	102708	0.33	0
9	Fw2	Forest, water erosion, High	26930	0.09	26930	0.09	0
10	Sw1	Land with scrub, water erosion, Low	505091	1.64	499635	1.62	5456
11	Sw2	Land with scrub, water erosion, High	99203	0.32	99203	0.32	0
12	Il1	Agriculture irrigated, water logging, Low	7788	0.03	7788	0.03	0
13	Fm2	Forest, man made, High	2533	0.01	2533	0.01	0
14	Tm1	Others, man made, Low	4407	0.01	2571	0.01	1835
15	Tm2	Others, man made, High	12514	0.04	10920	0.04	1595
16	R	Rocky	31495	0.10	30457	0.10	1037
17	S	Settlement	96359	0.31	82379	0.27	13980
Total Area Under Desertification/ Land Degradation			**3804315**	**12.34**	**3771853**	**12.24**	**32462**
21	W	Water body/ Drainage	518855	1.68	404671	1.31	114184
22	NAD	No Apparent Degradation	26502030	85.98	26648676	86.45	-146646
Total Geographical Area (ha)			**30825200**	**100**	**30825200**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
MADHYA PRADESH (2011-13)



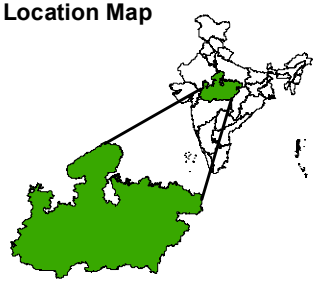
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1,2	Agriculture unirrigated, water erosion
	Fw1,2	Forest, water erosion
	Sw1,2	Land with scrub, water erosion
	Il1	Agriculture irrigated, water logging
	Fm2	Forest, man made
	Tm1,2	Others, man made
	R	Rocky
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

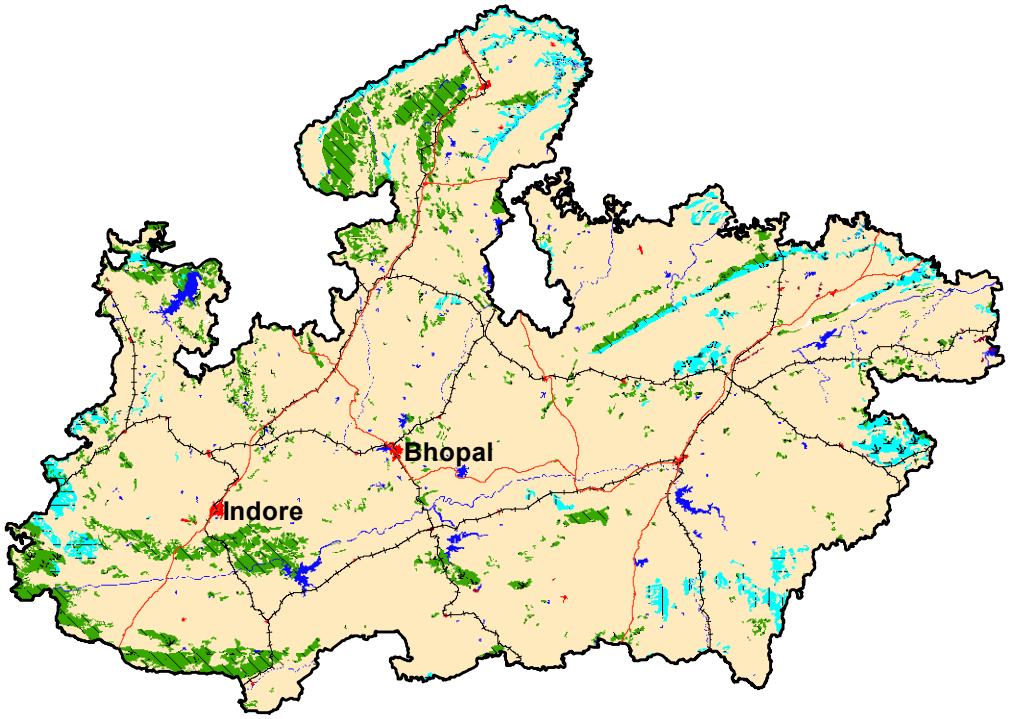


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Madhya Pradesh Council of Science & Technology, Bhopal
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
MADHYA PRADESH (2003-05)



Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1,2	Agriculture unirrigated, water erosion
	Fw1,2	Forest, water erosion
	Sw1,2	Land with scrub, water erosion
	Il1	Agriculture irrigated, water logging
	Fm2	Forest, man made
	Tm1,2	Others, man made
	R	Rocky
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
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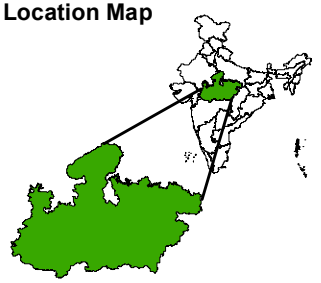
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

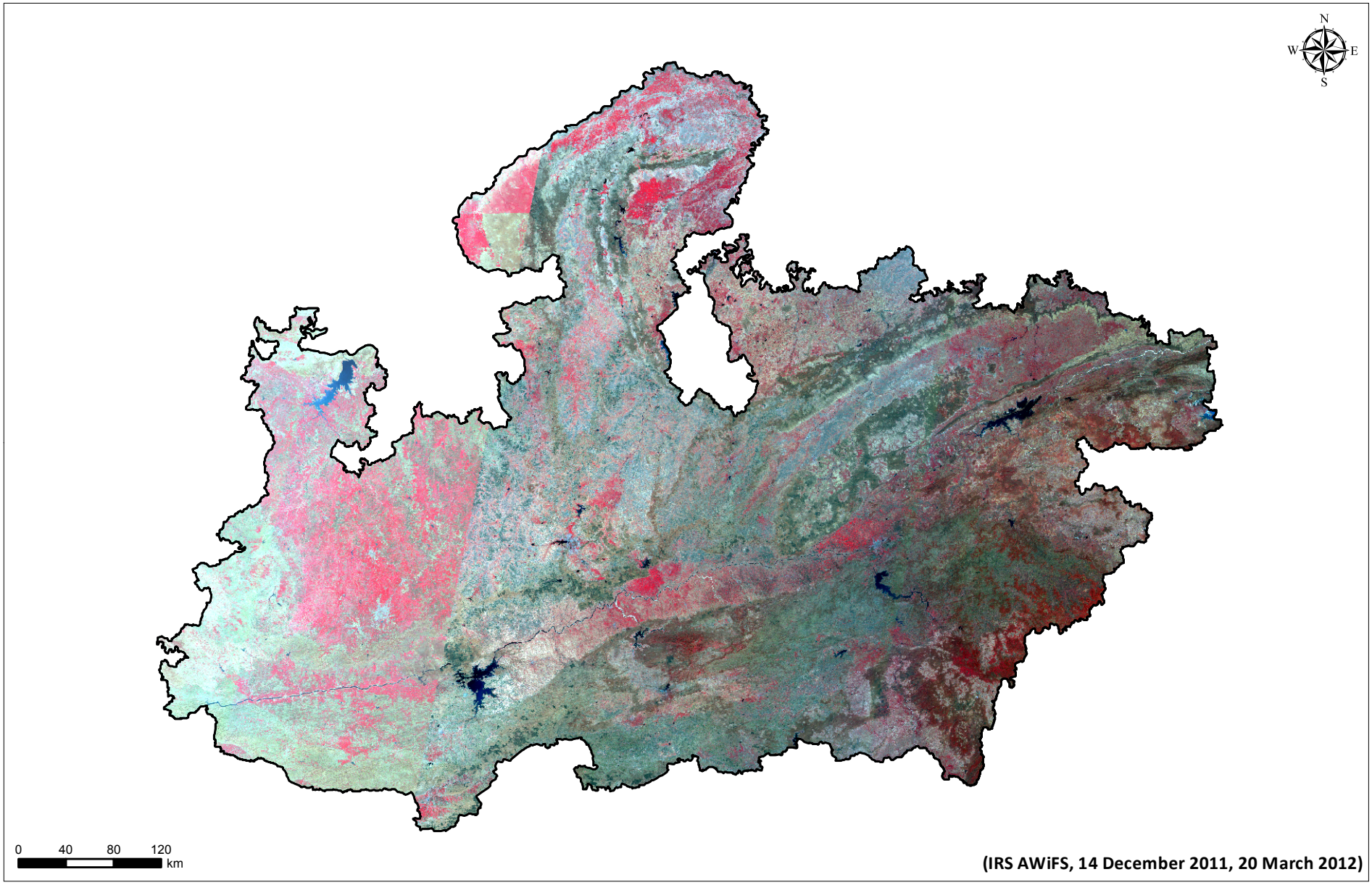


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

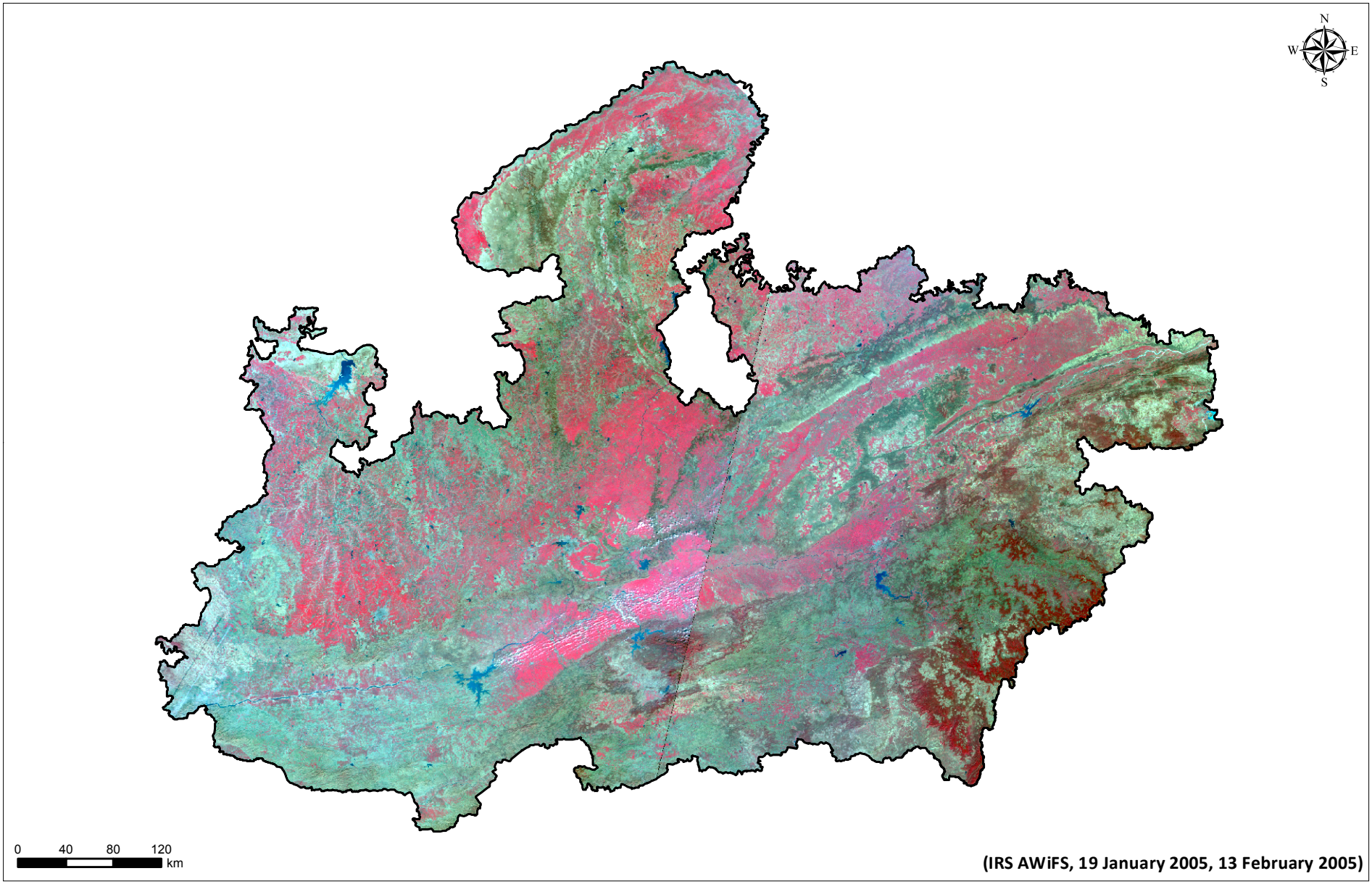
Prepared by:
Madhya Pradesh Council of Science & Technology, Bhopal
&
Space Applications Centre,ISRO, Ahmedabad

MADHYA PRADESH - IRS AWiFS 2011-2012



(IRS AWiFS, 14 December 2011, 20 March 2012)

MADHYA PRADESH - IRS AWiFS 2005



(IRS AWiFS, 19 January 2005, 13 February 2005)

Maharashtra

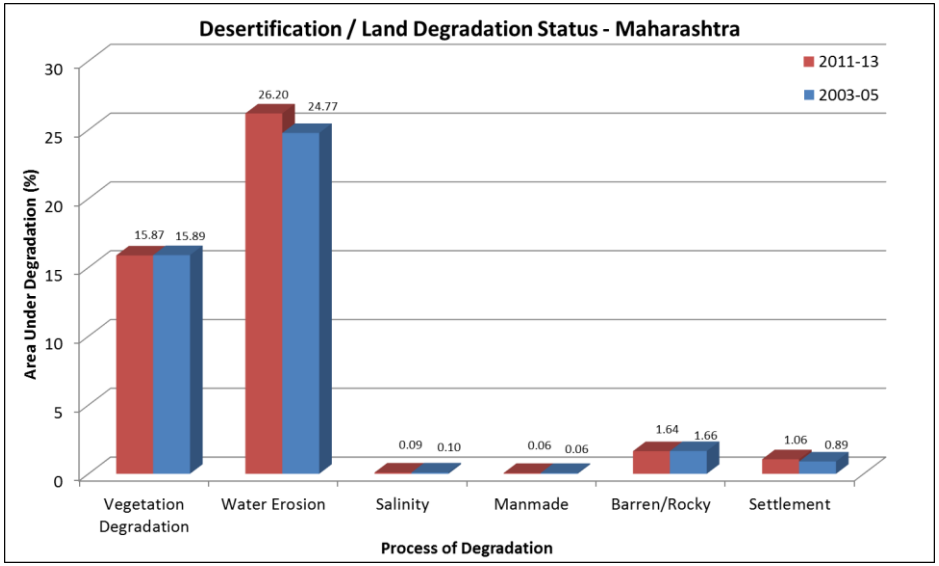
Maharashtra is located in south-western part of India and is the third largest state by area in India with 3,07,713 sq km area. The state has population of 11,23,74,333; with 365 population density, 929 sex ratio and 82.34% literacy (Census 2011). Mumbai is the capital of Maharashtra and also the financial capital of the country.

The major geographic features of Maharashtra are Sahyadri Range, Western Ghats, Deccan Plateau, Konkan coastal belt and the river valleys. The main rivers of the state include Krishna, Bhima, Godavari, Tapi-Purna and Wardha-Wainganga. The soil which dominates the state is the black soil, also known as the black cotton soil. The climate is of a tropical monsoon type with a searing heat in the summer months, and cold winter. The monsoons have varied influence over different regions, causing heavy rain at some places and mild rainfall in others.

Maharashtra is the state with second highest area under desertification/ land degradation with respect to country TGA, i.e., 44.93% for period 2011-13. The desertification/ land degradation area in Maharashtra has increased about 1.55% since 2003-05.

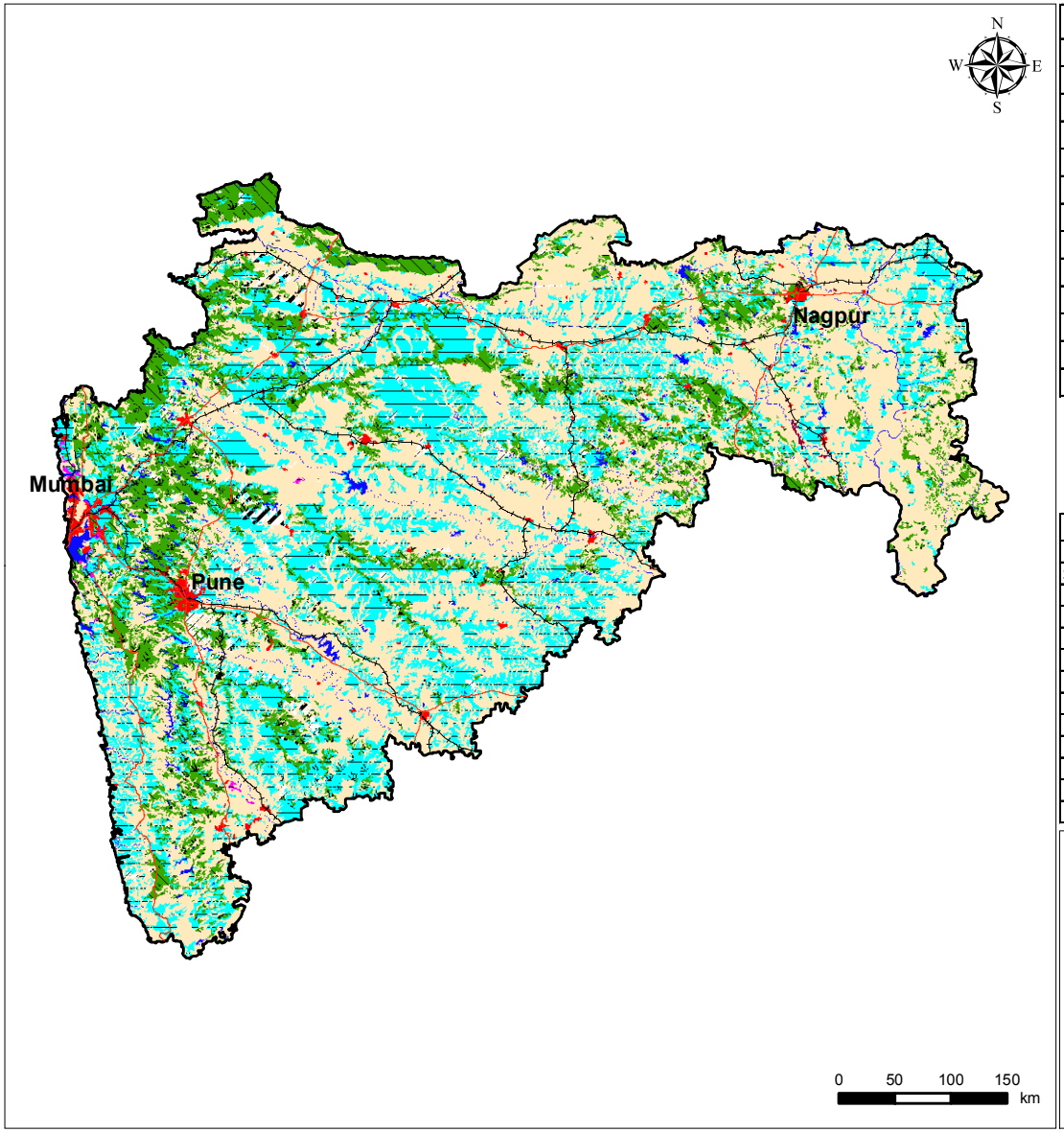
The most significant process of desertification/ land degradation in the state is Water Erosion (26.20% in 2011-13 and 24.77% in 2003-05) followed by Vegetation Degradation (15.87% in 2011-13 and 15.89% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	4884005	15.87	4890778	15.89	-6773
Water Erosion	8060753	26.20	7622800	24.77	437953
Salinity	29089	0.09	30054	0.10	-965
Manmade	19912	0.06	19912	0.06	0
Barren/Rocky	506163	1.64	509789	1.66	-3626
Settlement	326013	1.06	275272	0.89	50741
Total Area under Desertification	**13825935**	**44.93**	**13348604**	**43.38**	**477331**
No Apparent Degradation	**16415568**	**53.35**	**16873660**	**54.84**	**-458092**
Total Geographical Area (ha)	**30771300**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	1820506	5.92	1822046	5.92	-1540
2	Fv2	Forest, vegetation degradation, High	901500	2.93	899120	2.92	2380
3	Sv1	Land with scrub, vegetation degradation, Low	1095887	3.56	1097710	3.57	-1823
4	Sv2	Land with scrub, vegetation degradation, High	1066113	3.46	1071902	3.48	-5789
5	Iw1	Agriculture irrigated, water erosion, Low	11825	0.04	11825	0.04	0
6	Iw2	Agriculture irrigated, water erosion, High	3218	0.01	3218	0.01	0
7	Dw1	Agriculture unirrigated, water erosion, Low	7458536	24.24	7019398	22.81	439137
8	Sw1	Land with scrub, water erosion, Low	477141	1.55	477536	1.55	-395
9	Sw2	Land with scrub, water erosion, High	110034	0.36	110823	0.36	-789
10	Ds1	Agriculture unirrigated, salinity / alkalinity, Low	29089	0.09	30054	0.10	-965
11	Tm1	Others, man made, Low	11445	0.04	11445	0.04	0
12	Tm2	Others, man made, High	8468	0.03	8468	0.03	0
13	B	Barren	334594	1.09	338220	1.10	-3626
14	R	Rocky	171569	0.56	171569	0.56	0
15	S	Settlement	326013	1.06	275272	0.89	50741
Total Area Under Desertification/ Land Degradation			**13825935**	**44.93**	**13348604**	**43.38**	**477331**
16	W	Water body/ Drainage	529797	1.72	549036	1.78	-19239
17	NAD	No Apparent Degradation	16415568	53.35	16873660	54.84	-458092
Total Geographical Area (ha)			**30771300**	**100**	**30771300**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
MAHARASHTRA (2011-13)



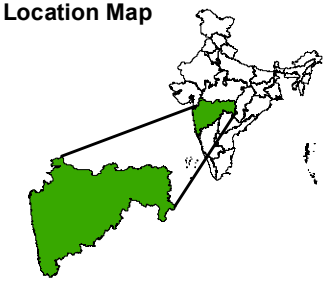
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1,2	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Sw1,2	Land with scrub, water erosion
	Ds1	Agriculture unirrigated, salinity / alkalinity
	Tm1,2	Others, man made
	B	Barren
	R	Rocky
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

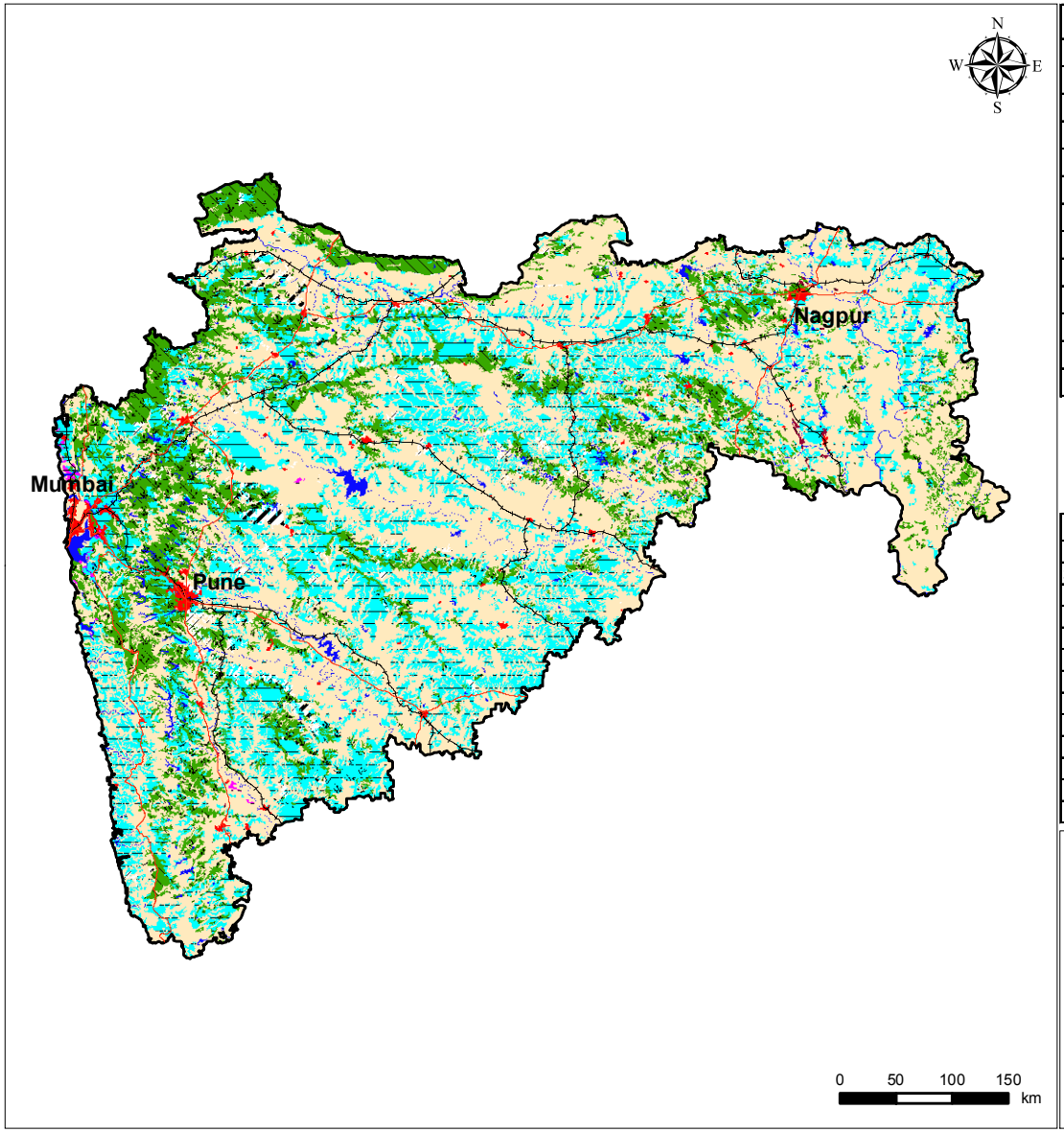


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Maharashtra Remote Sensing Applications Centre, Nagpur
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
MAHARASHTRA (2003-05)



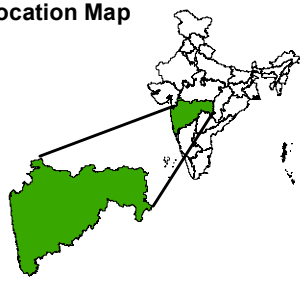
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1,2	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Sw1,2	Land with scrub, water erosion
	Ds1	Agriculture unirrigated, salinity / alkalinity
	Tm1,2	Others, man made
	B	Barren
	R	Rocky
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

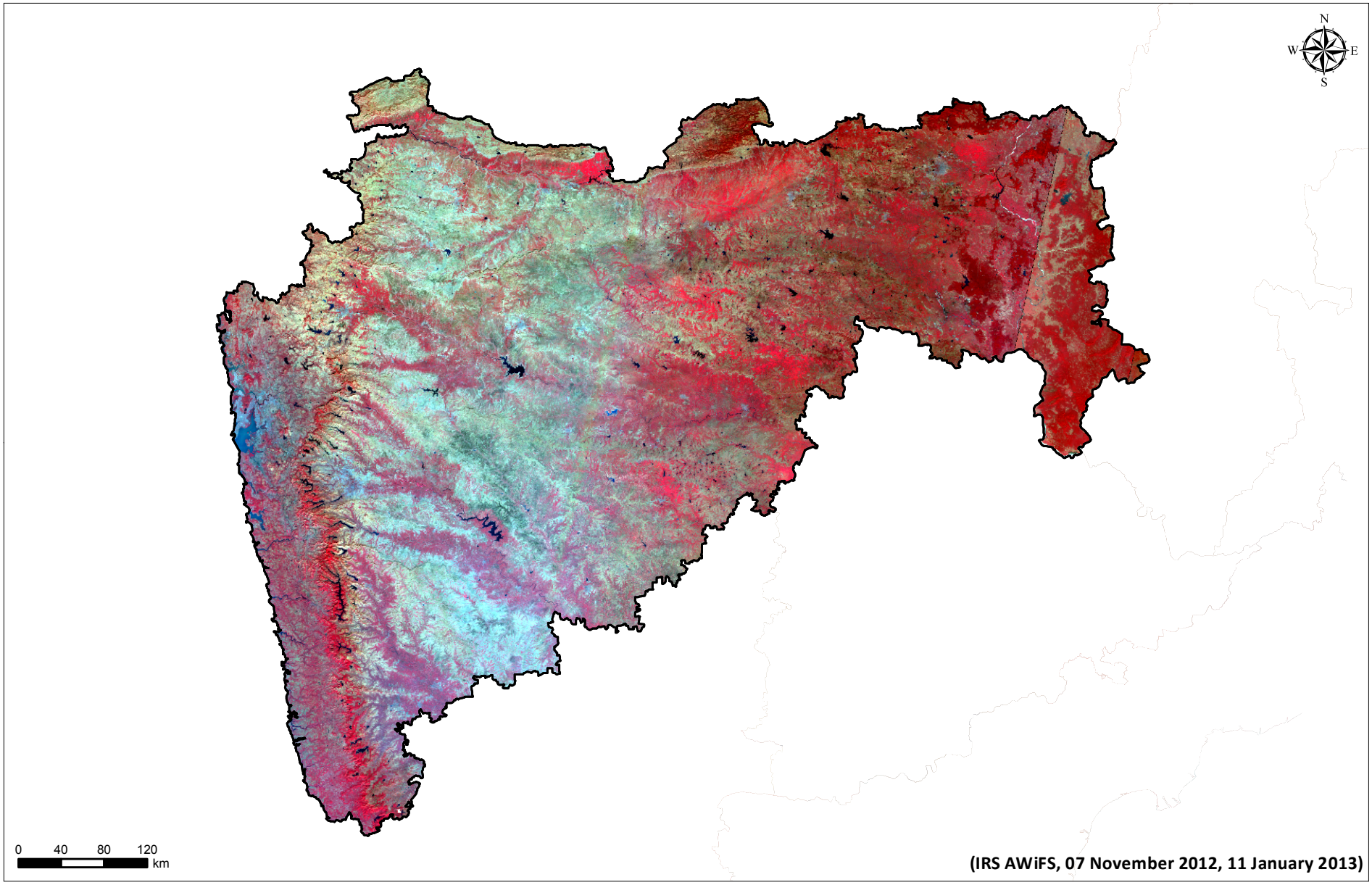


	International boundary
	State boundary
	Major roads
	Rail

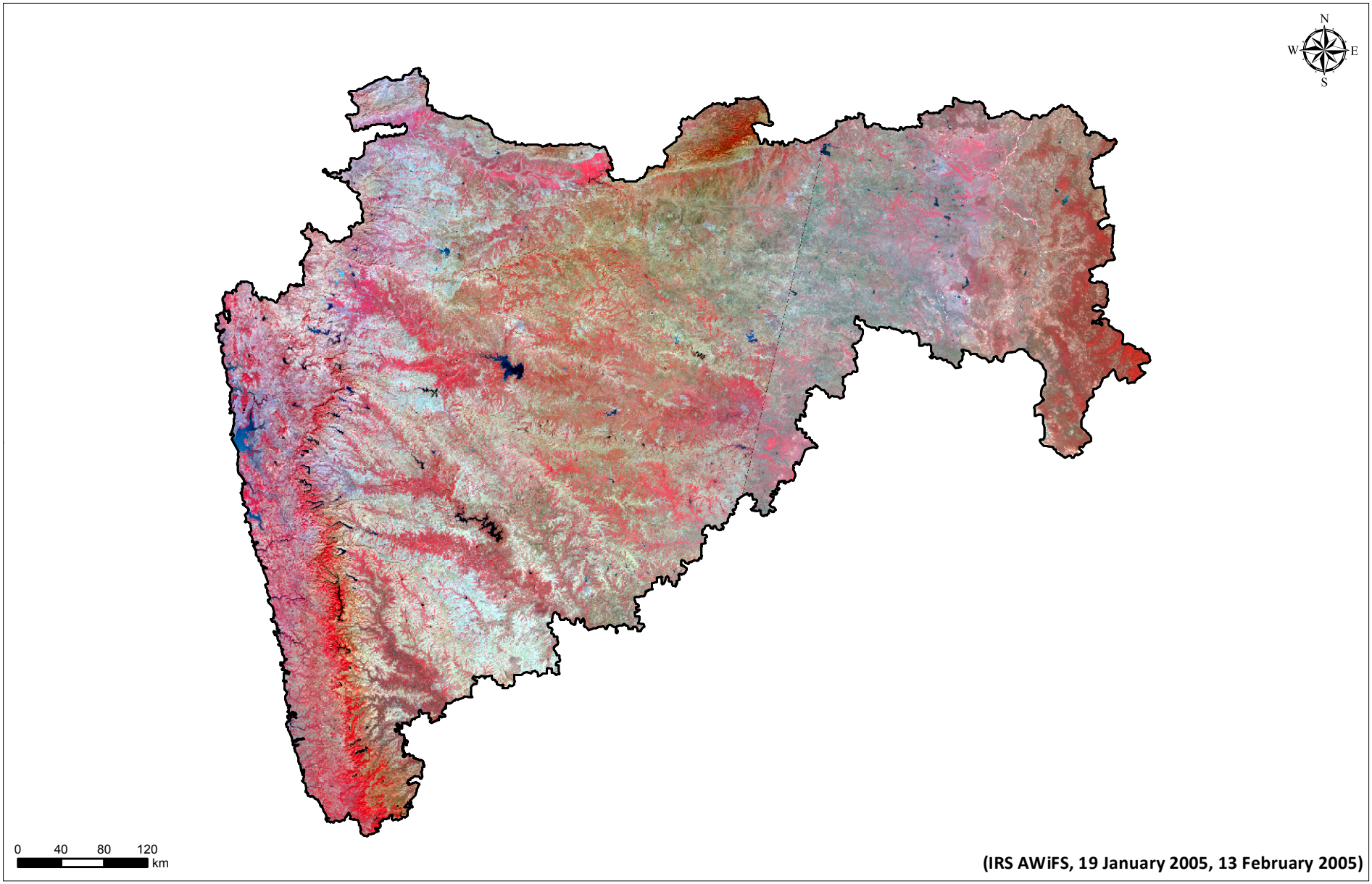
Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

Prepared by:
Maharashtra Remote Sensing Applications Centre, Nagpur
&
Space Applications Centre,ISRO, Ahmedabad

MAHARASHTRA - IRS AWiFS 2012-2013



MAHARASHTRA - IRS AWiFS 2005



(IRS AWiFS, 19 January 2005, 13 February 2005)

Manipur

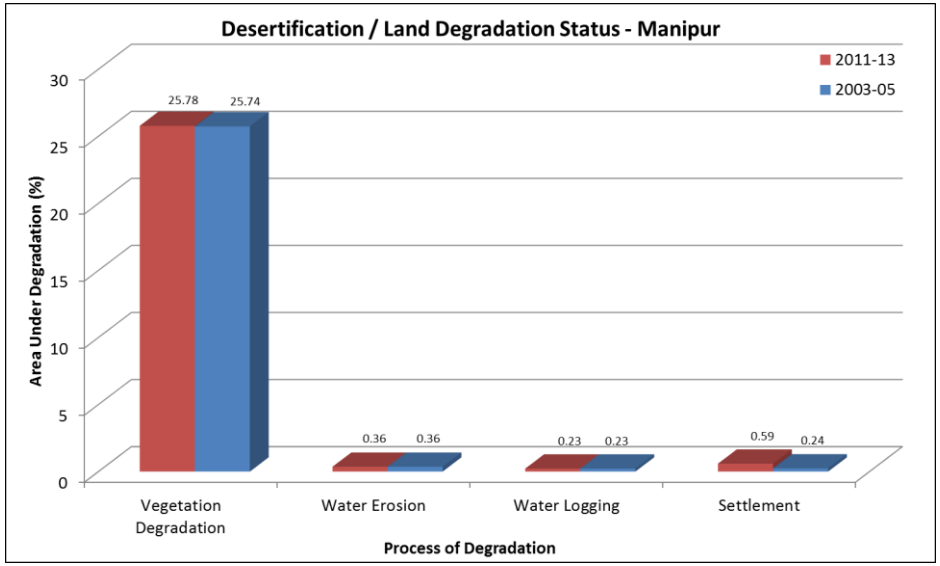
Manipur is northeastern state of India bordering with Myanmar and covers 22,327 sq km area. The state has population of 25,70,390; with 115 population density, 992 sex ratio and 79.21% literacy (Census 2011). Imphal is the capital of Manipur.

Geographically, the state is divided into hills and the valleys. The average elevation of the valley is about 790 m above the sea level and that of the hills is between 1500 m and 1800m. The main river basins are Barak, Manipur, Yu and Lanye river basin. Manipur has international fame for its significant wetland, Loktak Lake. The southwest monsoon chiefly determines the weather and rainfall throughout the state. Rainfall varies from 1000 mm to 3500 mm and average rainfall is 1500 mm. Temperature ranges from sub-zero to 36°C.

Manipur is observed with 26.96% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Manipur has increased about 0.40% since 2003-05.

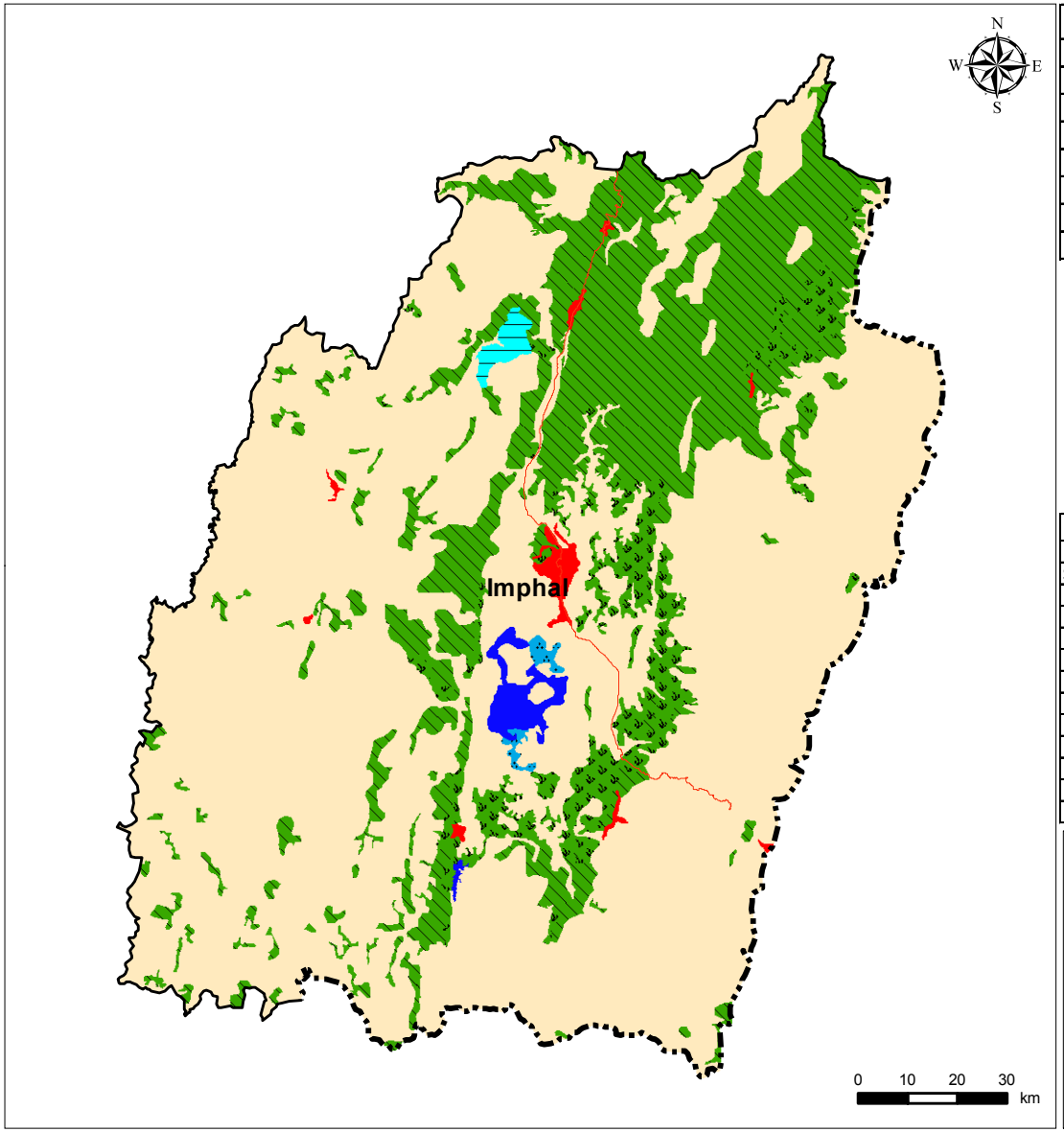
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (25.78% in 2011-13 and 25.74% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	575603	25.78	574706	25.74	896
Water Erosion	8070	0.36	8070	0.36	0
Water Logging	5026	0.23	5026	0.23	0
Settlement	13260	0.59	5290	0.24	7970
Total Area under Desertification	**601959**	**26.96**	**593093**	**26.56**	**8867**
No Apparent Degradation	**1613978**	**72.29**	**1622844**	**72.69**	**-8867**
Total Geographical Area (ha)	**2232700**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	400892	17.96	397489	17.80	3403
2	Fv2	Forest, vegetation degradation, High	63822	2.86	64020	2.87	-198
3	Sv1	Land with scrub, vegetation degradation, Low	84262	3.77	86535	3.88	-2273
4	Sv2	Land with scrub, vegetation degradation, High	26627	1.19	26663	1.19	-36
5	Dw1	Agriculture unirrigated, water erosion, Low	8070	0.36	8070	0.36	0
6	Gl2	Grassland / Grazing land, water logging, High	5026	0.23	5026	0.23	0
7	S	Settlement	13260	0.59	5290	0.24	7970
Total Area Under Desertification/ Land Degradation			**601959**	**26.96**	**593093**	**26.56**	**8867**
8	W	Water body/ Drainage	16763	0.75	16763	0.75	0
9	NAD	No Apparent Degradation	1613978	72.29	1622844	72.69	-8867
Total Geographical Area (ha)			**2232700**	**100**	**2232700**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
MANIPUR (2011-13)



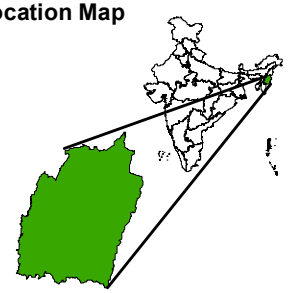
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Gl2	Grassland / Grazing land, water logging
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

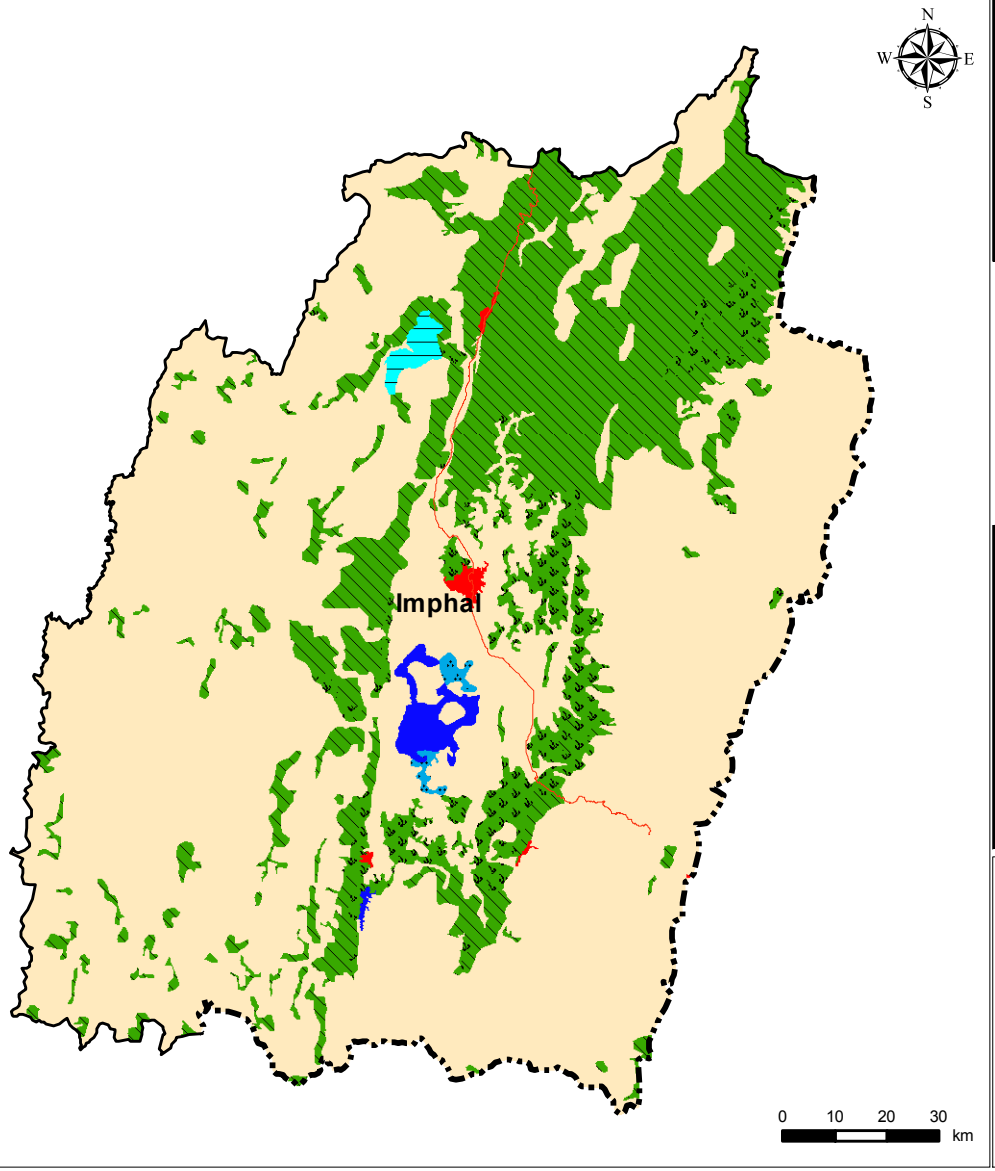


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Nagaland GIS & Remote Sensing Centre, Kohima
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
MANIPUR (2003-05)



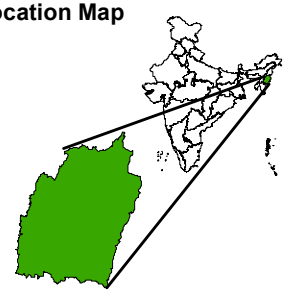
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Gl2	Grassland / Grazing land, water logging
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

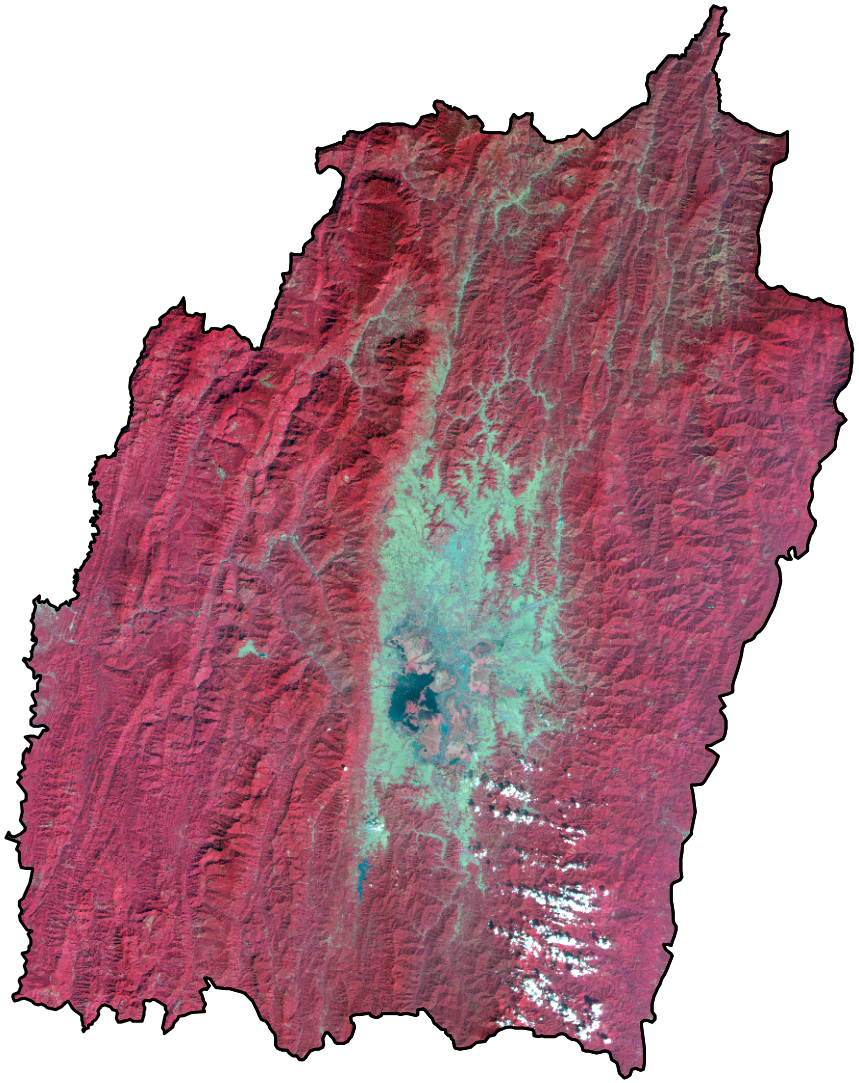


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

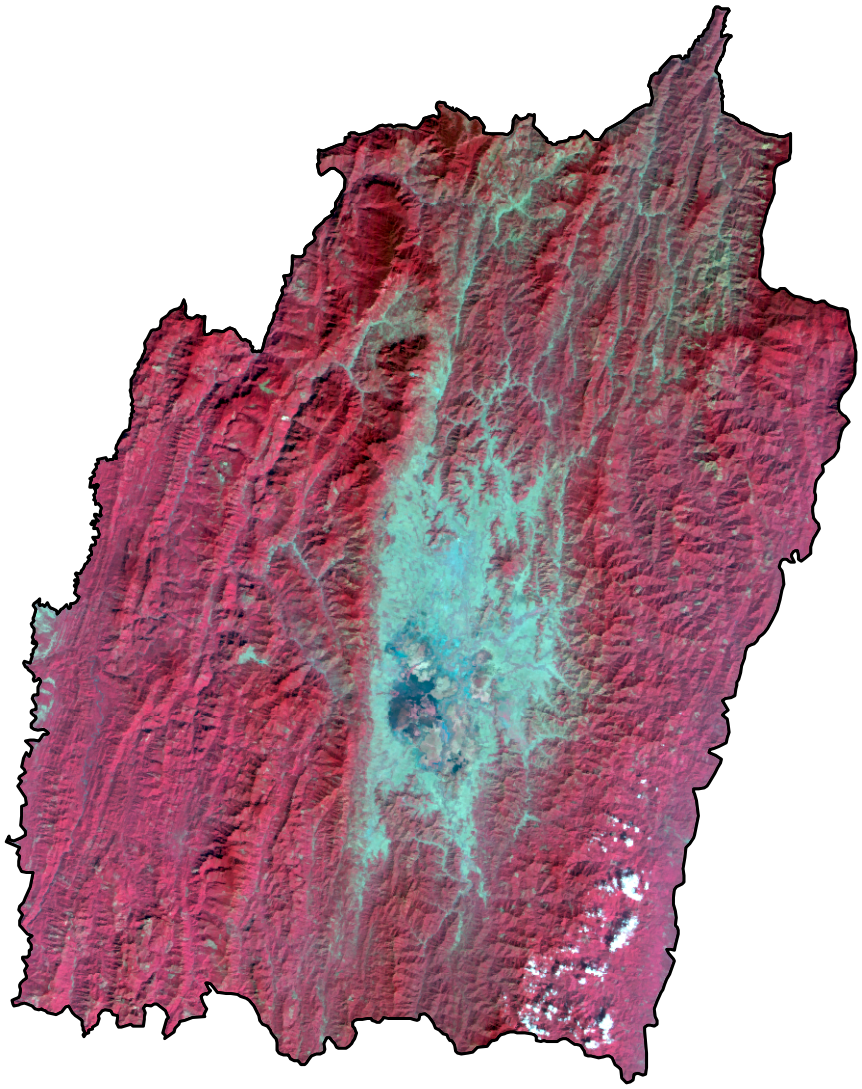
Prepared by:
Nagaland GIS & Remote Sensing Centre, Kohima
&
Space Applications Centre,ISRO, Ahmedabad

MANIPUR - IRS AWiFS 2011



(IRS AWiFS, 23 November 2011)

MANIPUR - IRS AWiFS 2004



(IRS AWiFS, 29 December 2004)

Meghalaya

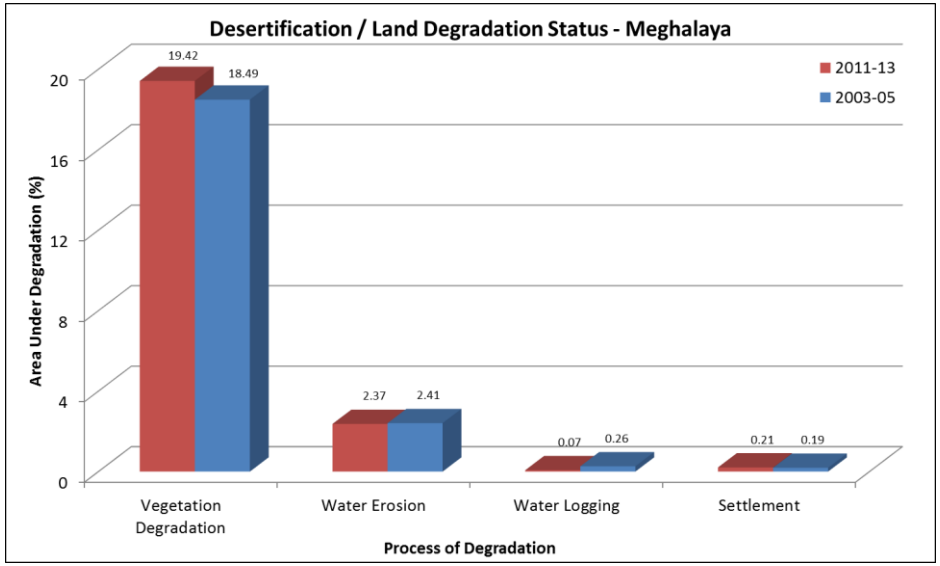
Meghalaya is located in north-east part of India with 22,429 sq km area. The state has population of 29,66,889; with 132 population density, 989 sex ratio and 74.43% literacy (Census 2011). Shillong is the capital of Meghalaya.

Meghalaya is a plateau representing the extension of peninsular India towards the north-east. The plateau, older than surrounding Himalayas, formed due to block displacement with some of the oldest rock of the earth. Meghalaya includes the Khasi, the Garo, the Jaintia hills and the Assam ranges at its border. The major rivers are the Ringgi, Kalu, Ajagar, Simsang. Digaru, Umkhri etc. The temperature varies from 25 °C to 4 °C. The average annual rainfall is around 2600 mm, for western part, 2750 mm northern part and 4000 mm for eastern part of the state. Cherrapunji receives the highest rainfall, around 12000 mm annually.

Meghalaya is observed with 22.06% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Meghalaya has increased about 0.71% since 2003-05.

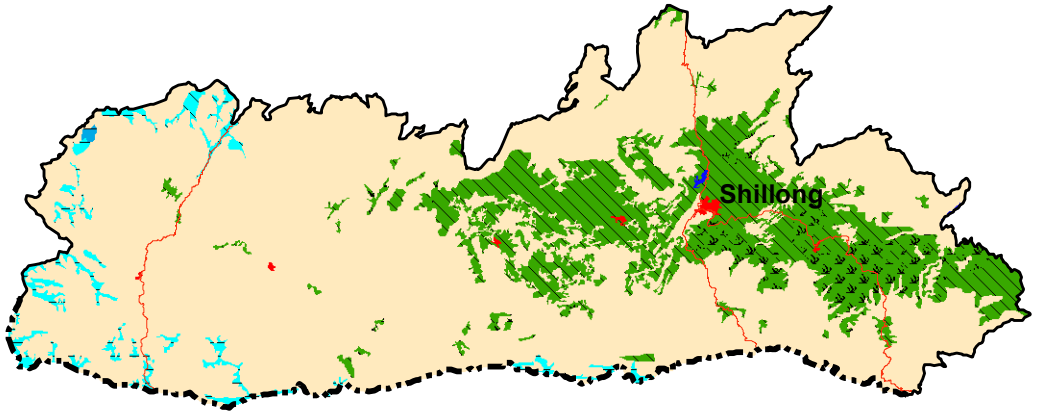
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (19.42% in 2011-13 and 18.49% in 2003-05) followed by Water Erosion (2.37% in 2011-13 and 2.41% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	435527	19.42	414659	18.49	20868
Water Erosion	53149	2.37	54046	2.41	-897
Water Logging	1548	0.07	5881	0.26	-4333
Settlement	4656	0.21	4239	0.19	417
Total Area under Desertification	**494880**	**22.06**	**478825**	**21.35**	**16055**
No Apparent Degradation	**1746580**	**77.87**	**1762634**	**78.59**	**-16055**
Total Geographical Area (ha)	**2242900**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	289502	12.91	286242	12.76	3259
2	Fv2	Forest, vegetation degradation, High	51510	2.30	33806	1.51	17704
3	Sv1	Land with scrub, vegetation degradation, Low	6119	0.27	6119	0.27	0
4	Sv2	Land with scrub, vegetation degradation, High	88396	3.94	88492	3.95	-96
5	Dw1	Agriculture unirrigated, water erosion, Low	43998	1.96	44895	2.00	-897
6	Fw1	Forest, water erosion, Low	9151	0.41	9151	0.41	0
7	Dl1	Agriculture unirrigated, water logging, Low	1548	0.07	5881	0.26	-4333
8	S	Settlement	4656	0.21	4239	0.19	4656
Total Area Under Desertification/ Land Degradation			**494880**	**22.06**	**478825**	**21.35**	**16055**
9	W	Water body/ Drainage	1441	0.06	1441	0.06	0
10	NAD	No Apparent Degradation	1746580	77.87	1762634	78.59	-16055
Total Geographical Area (ha)			**2242900**	**100**	**2242900**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
MEGHALAYA (2011-13)



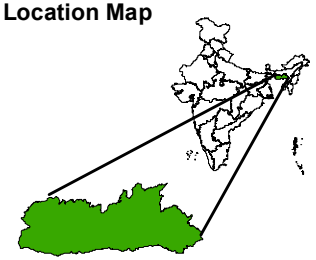
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Fw1	Forest, water erosion
	Dl1	Agriculture unirrigated, water logging
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

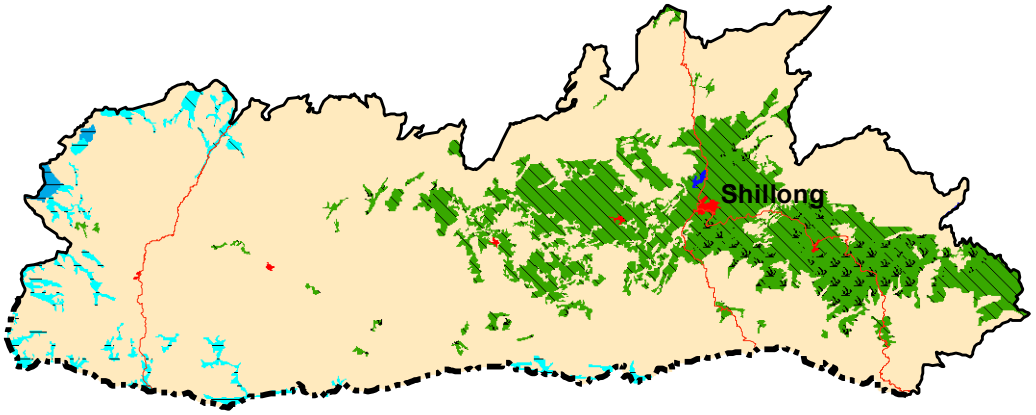


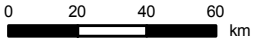
	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
North Eastern Hill University, Shillong
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
MEGHALAYA (2003-05)





Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Fw1	Forest, water erosion
	Dl1	Agriculture unirrigated, water logging
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
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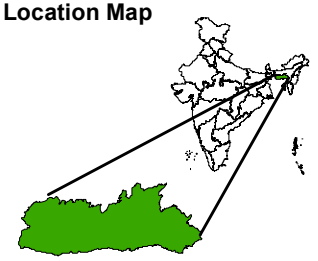
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

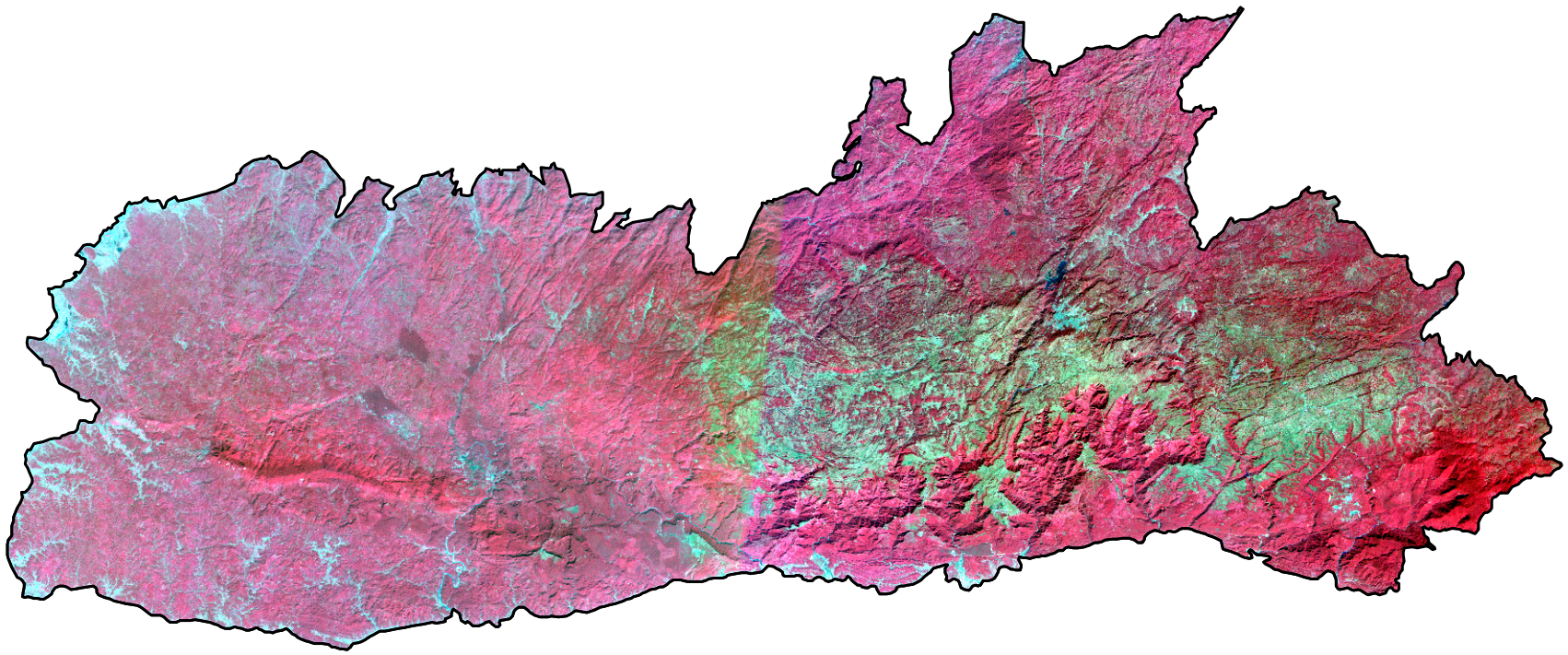


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

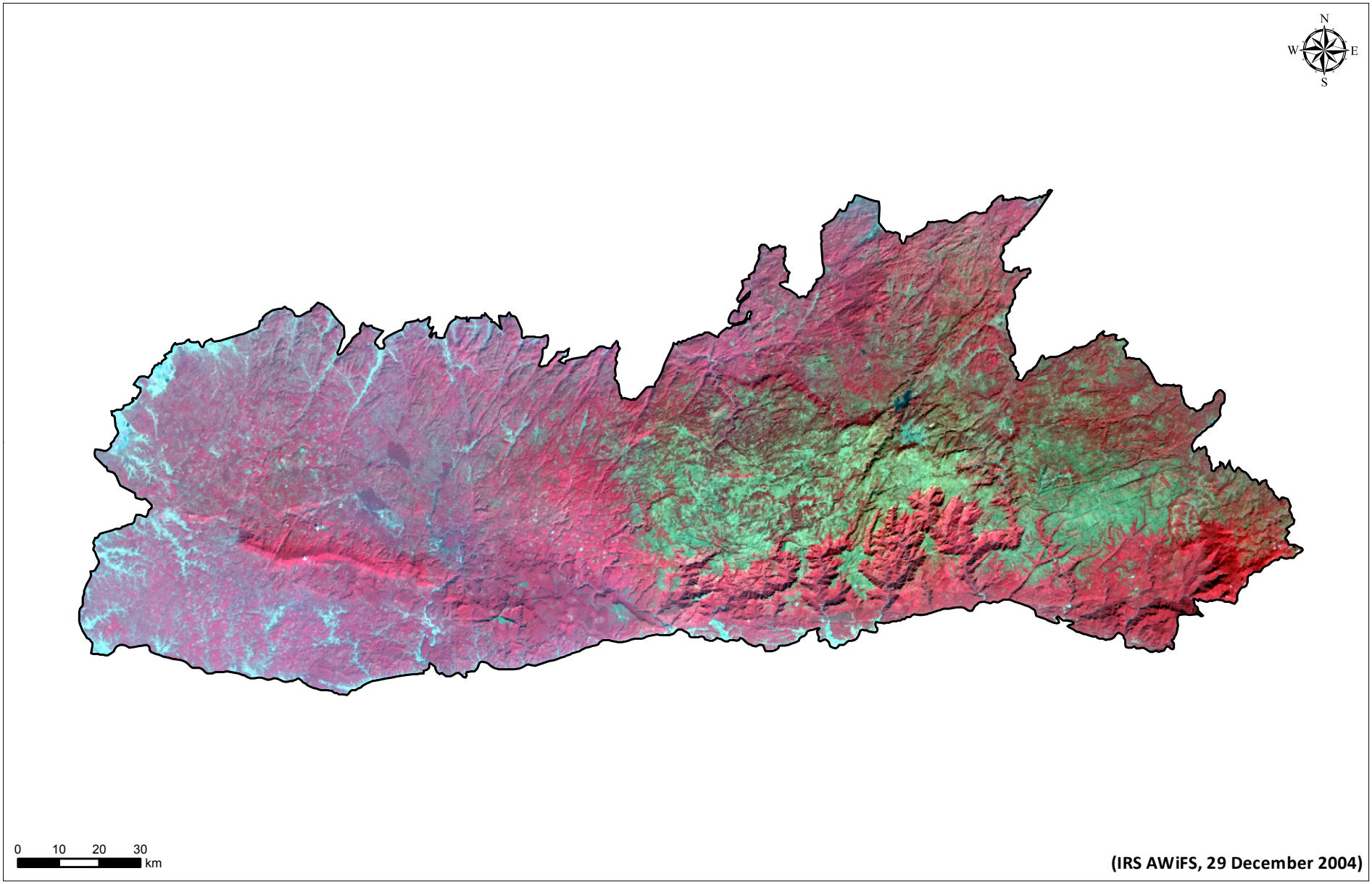
Prepared by:
North Eastern Hill University, Shillong
&
Space Applications Centre,ISRO, Ahmedabad

MEGHALAYA - IRS AWiFS 2011



(IRS AWiFS, 23 November 2011)

MEGHALAYA - IRS AWiFS 2004



Mizoram

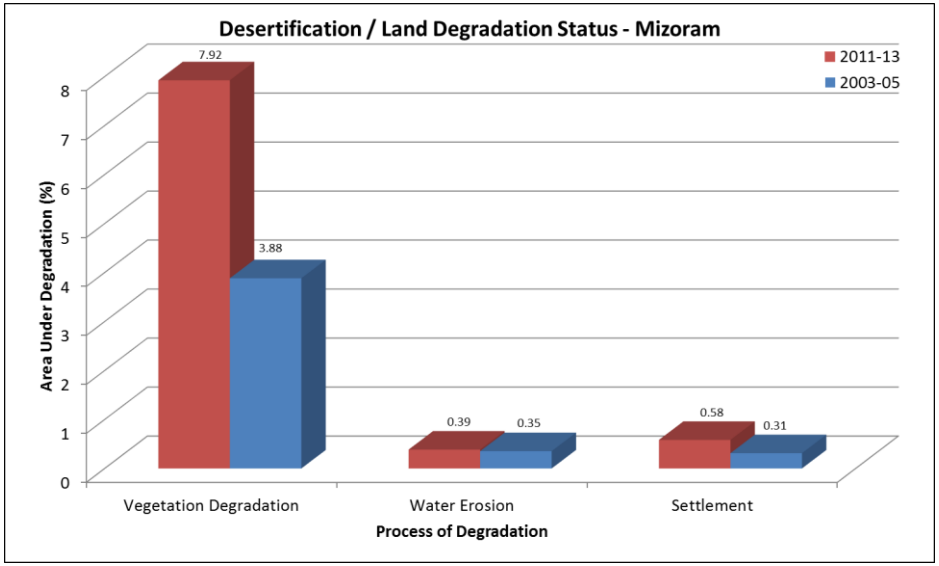
Mizoram is a border state of northeastern India with 21,081 sq km area. The state has population of 10,97,206; with 52 population density, 976 sex ratio and 91.33% literacy (Census 2011). Aizawl is the capital of Mizoram.

Mizoram topography is conspicuous with the presence of hills and mountain ranges. The state is adorned with lush green mountains and free flowing rivers, with many natural resources. Major rivers like Tlau, Tlawng, Tuirini, Serlui and Mat. Some of the important lakes are Palak, tamdil, Rengdil etc. The general climate of Mizoram is one of the most pleasing one in the country with moderate temperatures throughout the year. The temperature ranges between 11° to 30° C. Mizoram witnesses heavy rainfall in all parts of the state during the rainy season, with an annual average rainfall of 3000 mm.

Mizoram is observed with 8.89% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Mizoram has increased about 4.34% since 2003-05.

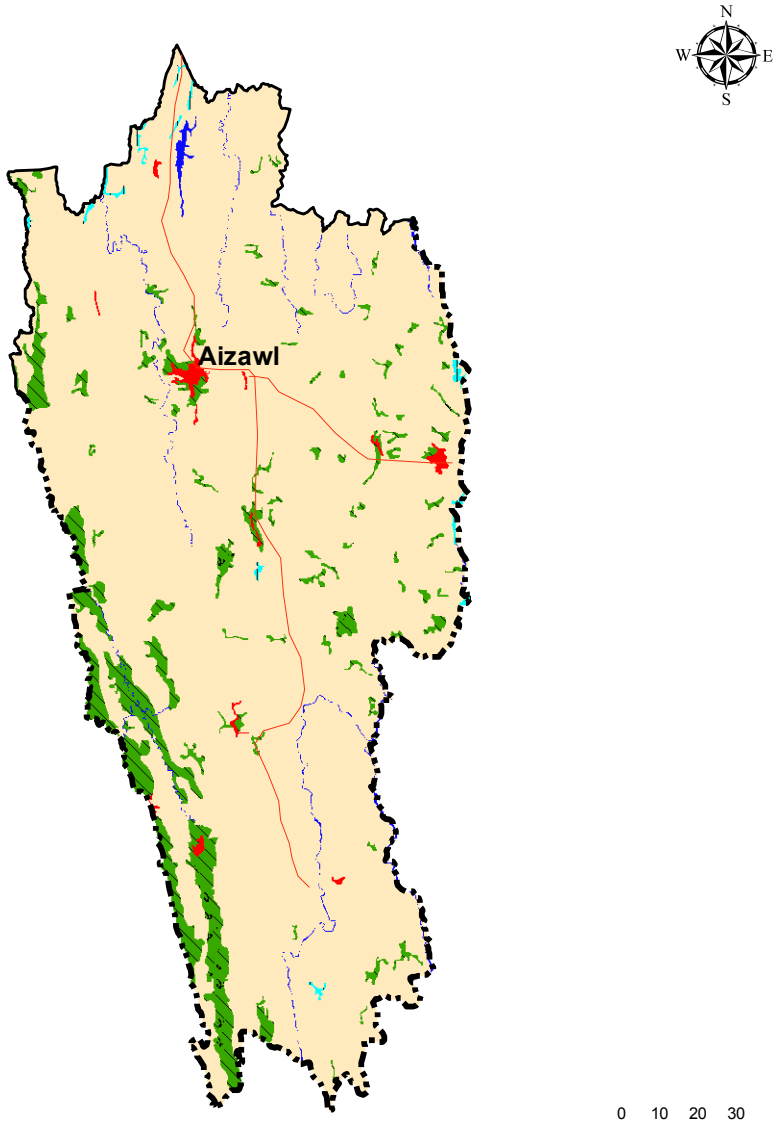
The most significant process of desertification/ land degradation in the state Vegetation Degradation (7.92% in 2011-13 and 3.88% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	167050	7.92	81854	3.88	85196
Water Erosion	8119	0.39	7444	0.35	675
Settlement	12285	0.58	6575	0.31	5710
Total Area under Desertification	**187453**	**8.89**	**95873**	**4.55**	**91580**
No Apparent Degradation	**1903762**	**90.31**	**1998679**	**94.81**	**-94917**
Total Geographical Area (ha)	**2108100**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	144709	6.86	69545	3.30	75163
2	Fv2	Forest, vegetation degradation, High	11805	0.56	2237	0.11	9568
3	Sv1	Land with scrub, vegetation degradation, Low	8148	0.39	7684	0.36	464
4	Sv2	Land with scrub, vegetation degradation, High	2387	0.11	2387	0.11	0
5	Iw1	Agriculture irrigated, water erosion, Low	8119	0.39	7444	0.35	675
6	S	Settlement	12285	0.58	6575	0.31	5710
Total Area Under Desertification/ Land Degradation			**187453**	**8.89**	**95873**	**4.55**	**91580**
7	W	Water body/ Drainage	16885	0.80	13548	0.64	3337
8	NAD	No Apparent Degradation	1903762	90.31	1998679	94.81	-94917
Total Geographical Area (ha)			**2108100**	**100**	**2108100**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
MIZORAM (2011-13)



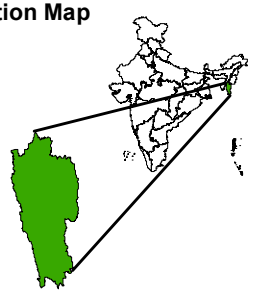
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

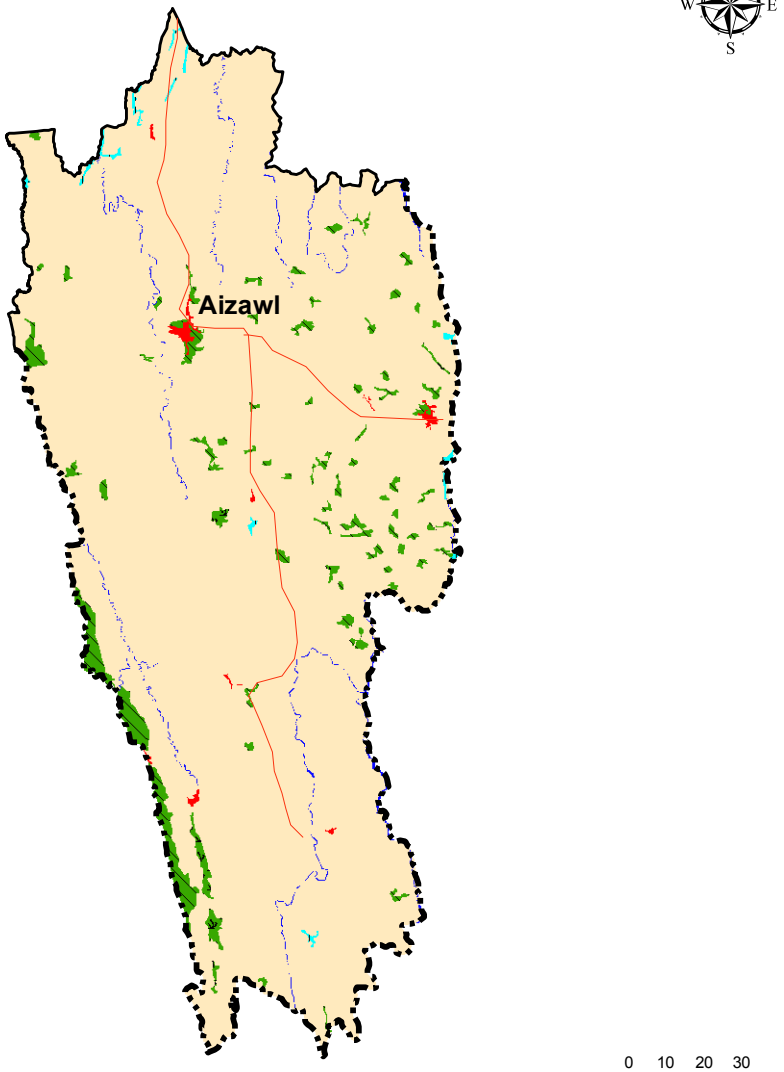


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Mizoram Remote Sensing Applications Centre, Aizawl
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
MIZORAM (2003-05)



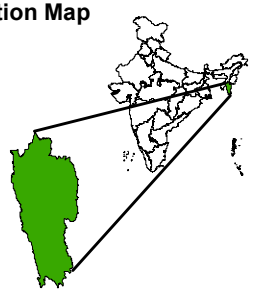
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map



	International boundary
	State boundary
	Major roads
	Rail

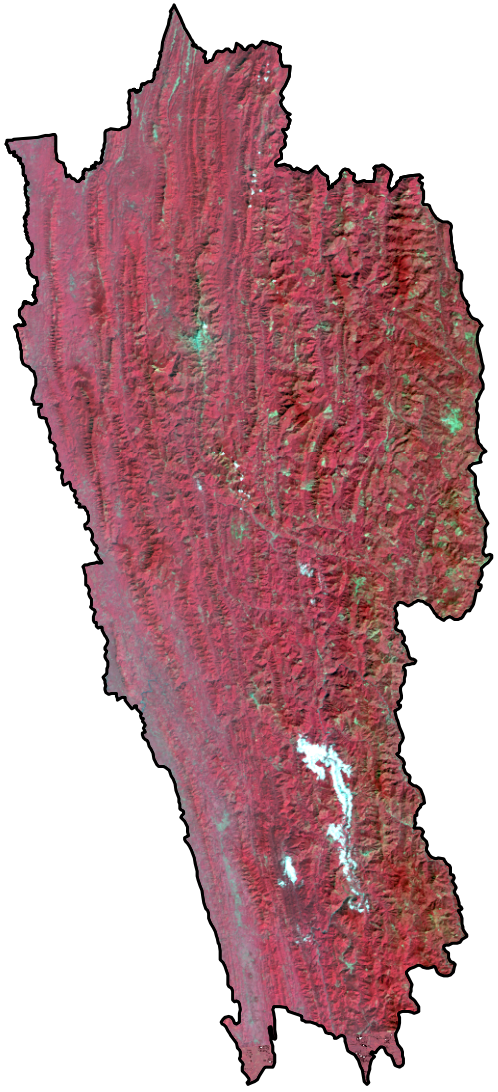
Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

Prepared by:
Mizoram Remote Sensing Applications Centre, Aizawl
&
Space Applications Centre,ISRO, Ahmedabad

MIZORAM - IRS AWiFS 2011

(IRS AWiFS, 23 November 2011)

MIZORAM - IRS AWiFS 2004



(IRS AWiFS, 29 December 2004)

Nagaland

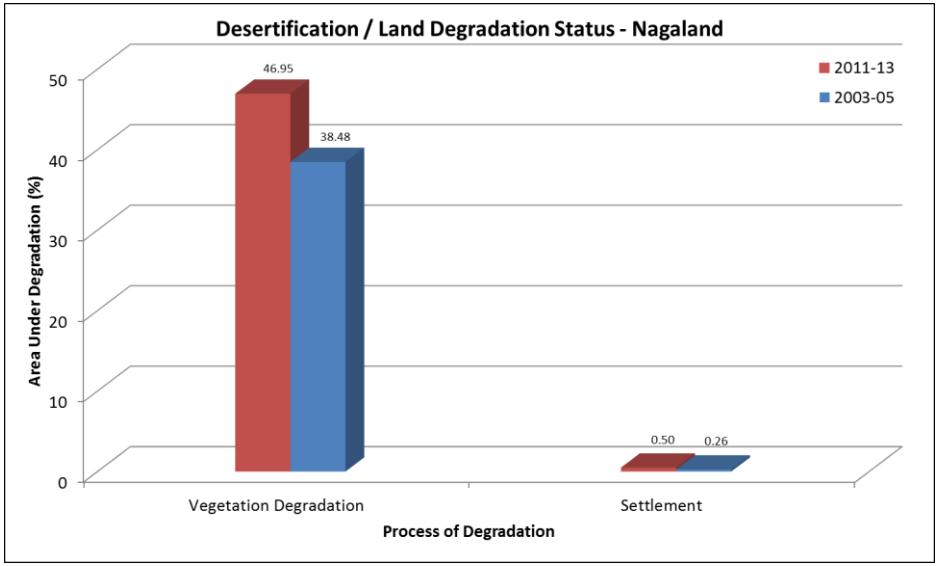
Nagaland is north eastern state of India, bordering Myanmar, with 16,579 sq km area. The state has population of 19,78,502; with 119 population density, 931 sex ratio and 79.55% literacy (Census 2011). Kohima is the capital of Nagaland.

The state is mostly mountainous except those areas bordering Brahmaputra valley and mostly covered by dense woody forest. Mount Saramati is the highest peak in Nagaland with a height of 3,840 metres, and its range forms a natural barrier between Nagaland and Myanmar. Doyang, Diphu, Barak are the major rivers. Nagaland has a largely monsoon climate with high humidity levels. Annual rainfall averages around 1,800–2500 mm, concentrated in the months of May to September. Temperatures range from 4 °C to 40 °C. In winter, frost is common at high elevations.

Nagaland is the state with third highest increase in area under desertification/ land degradation in the country with respect to state TGA, i.e., 8.71% from 2003-05 to 2011-13. The state is observed with 47.45% and 38.74% area under desertification/ land degradation for period 2011-13 and 2003-05 respectively.

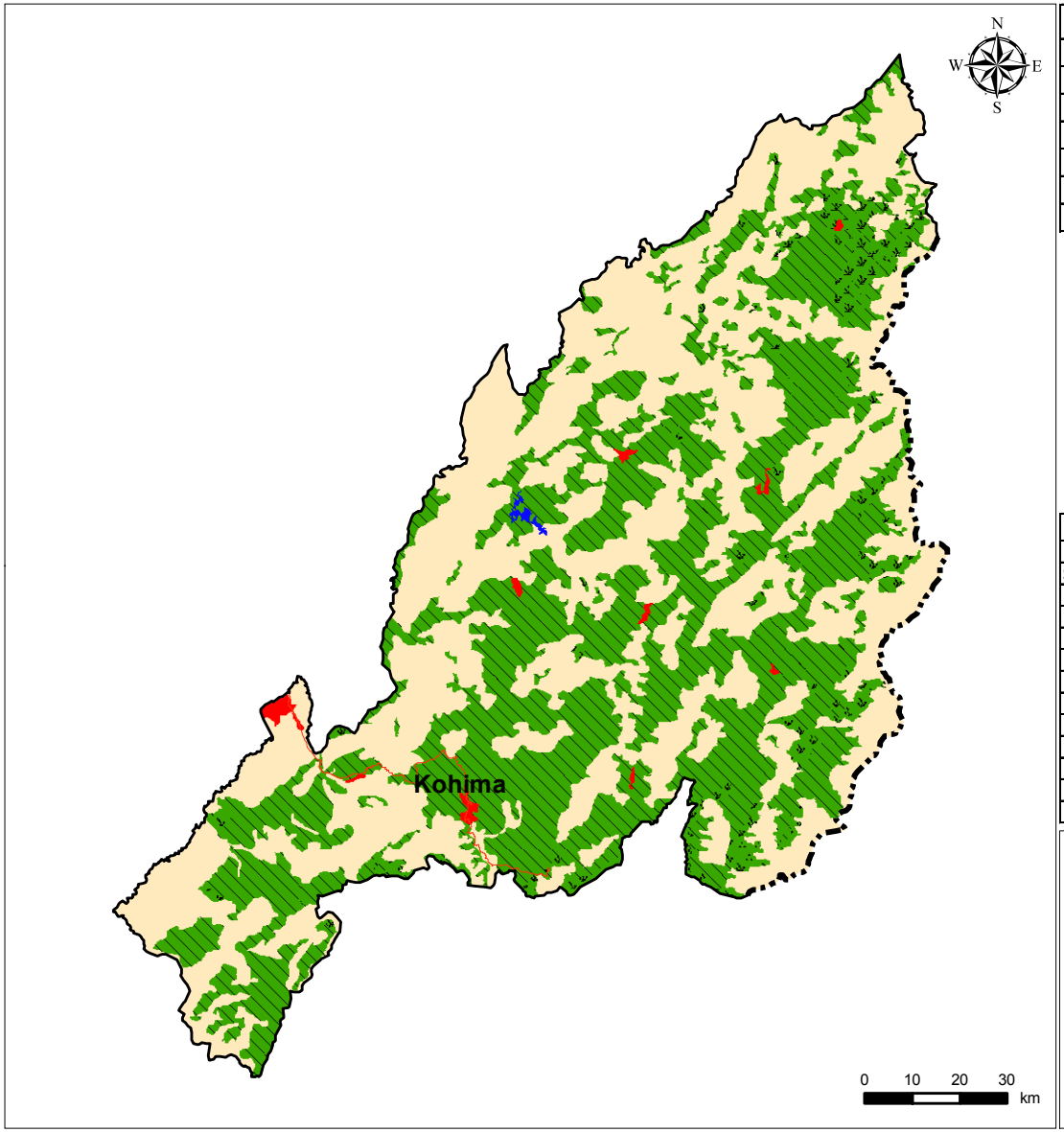
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (46.95% in 2011-13 and 38.48% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	778421	46.95	637957	38.48	140464
Settlement	8257	0.50	4347	0.26	3911
Total Area under Desertification	**786678**	**47.45**	**642304**	**38.74**	**144374**
No Apparent Degradation	**869562**	**52.45**	**1013937**	**61.16**	**-144374**
Total Geographical Area (ha)	**1657900**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	621356	37.48	527757	31.83	93599
2	Fv2	Forest, vegetation degradation, High	86615	5.22	51178	3.09	35437
3	Gv2	Grassland / Grazing land, vegetation degradation, High	2459	0.15	2459	0.15	0
4	Sv1	Land with scrub, vegetation degradation, Low	57047	3.44	42503	2.56	14544
5	Sv2	Land with scrub, vegetation degradation, High	10943	0.66	14059	0.85	-3116
6	S	Settlement	8257	0.50	4347	0.26	3911
Total Area Under Desertification/ Land Degradation			**786678**	**47.45**	**642304**	**38.74**	**144374**
7	W	Water body/ Drainage	1659	0.10	1659	0.10	0
8	NAD	No Apparent Degradation	869562	52.45	1013937	61.16	-144374
Total Geographical Area (ha)			**1657900**	**100**	**1657900**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
NAGALAND (2011-13)



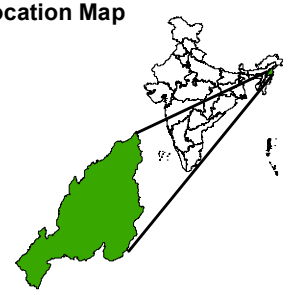
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Gv2	Grassland / Grazing land, vegetation degradation
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

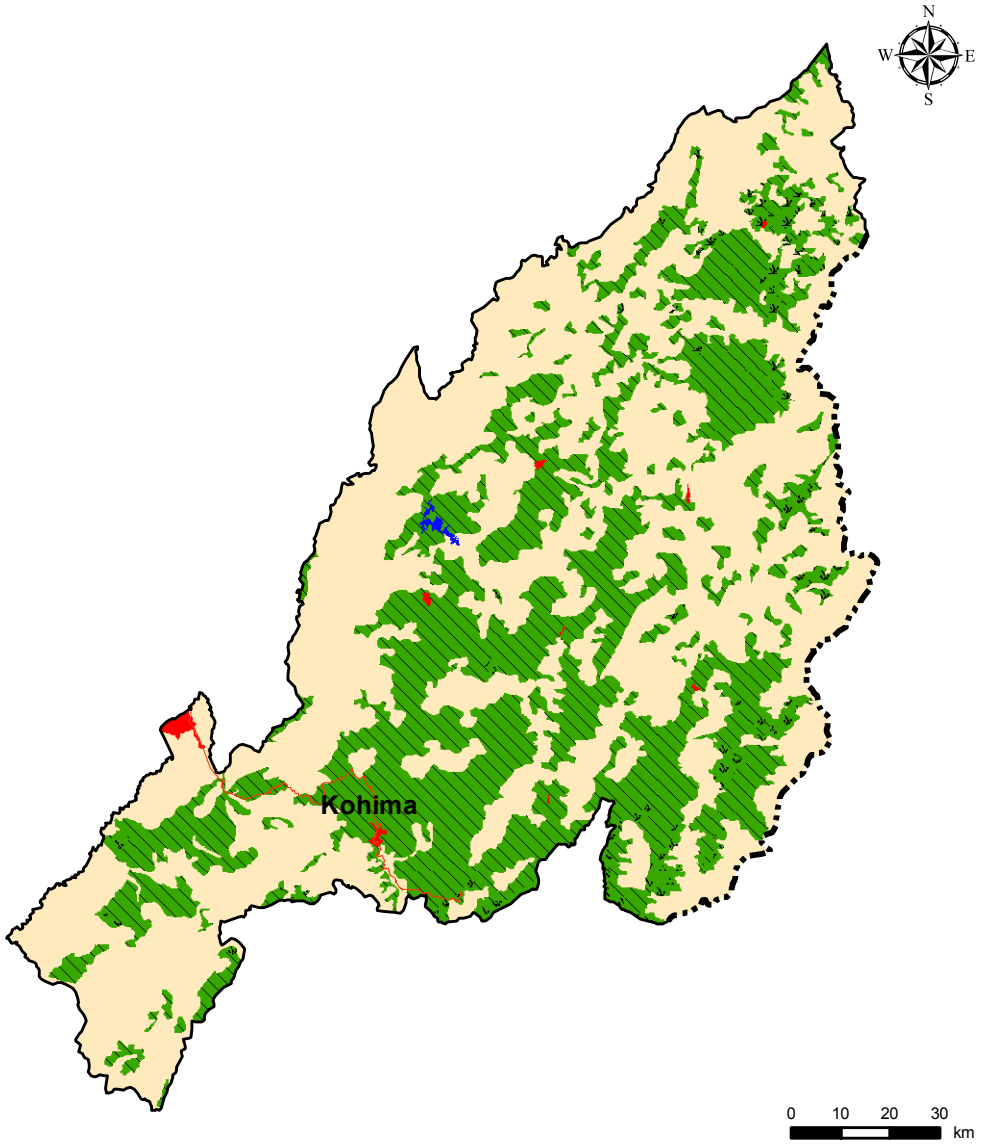


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Nagaland GIS & Remote Sensing Centre, Kohima
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
NAGALAND (2003-05)



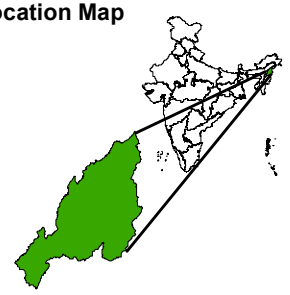
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Gv2	Grassland / Grazing land, vegetation degradation
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

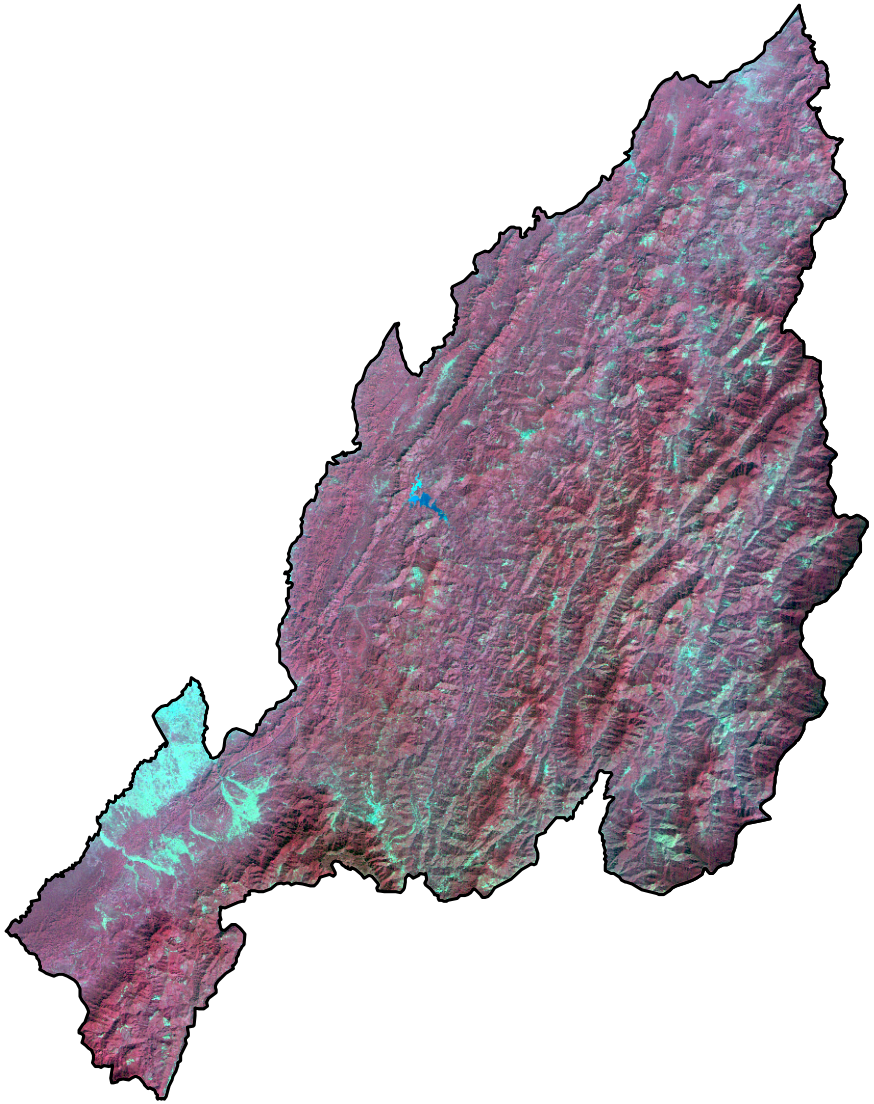


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

Prepared by:
Nagaland GIS & Remote Sensing Centre, Kohima
&
Space Applications Centre,ISRO, Ahmedabad

NAGALAND - IRS AWiFS 2011



(IRS AWiFS, 23 November 2011)

NAGALAND - IRS AWiFS 2004

(IRS AWiFS, 29 December 2004)

Odisha

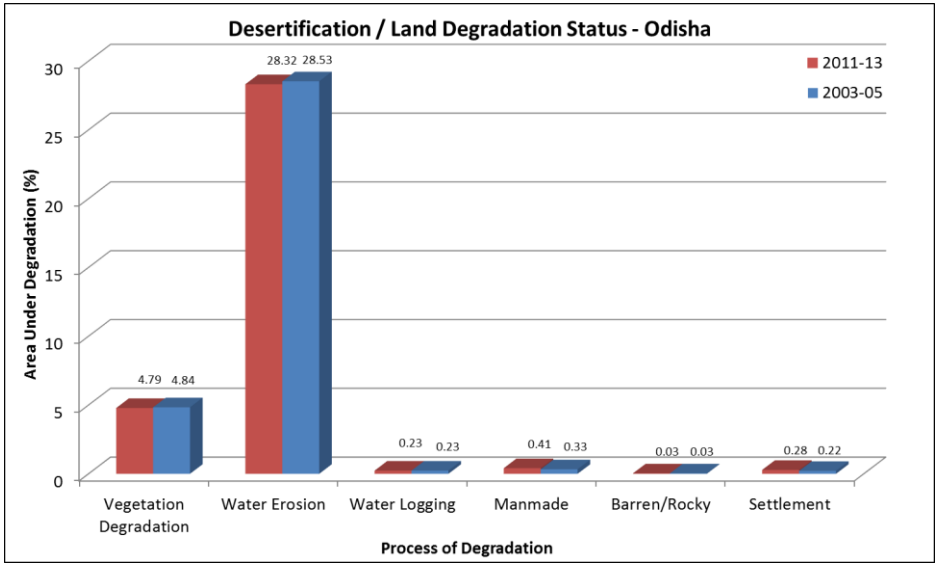
Odisha is located on the eastern coast of India with 1,55,707 sq km area. The state has population of 4,19,74,218; with 270 population density, 979 sex ratio and 72.87% literacy (Census 2011). Bhubaneshwar is the capital of Odisha.

Physiographically, Odisha is divided into Coastal plains, Middle mountainous region and Plateaus and rolling up lands. Mahanadi, Rishikullya, Shubarnarekha, Baitarani etc. are major rivers. Odisha consists the largest lagoon of the country, Chilika. The state experiences tropical climate. The average annual temperature ranges between 15°C to 42°C.The average rainfall is 1500 mm.

Odisha is observed with 34.06% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Odisha has decreased about 0.12% since 2003-05.

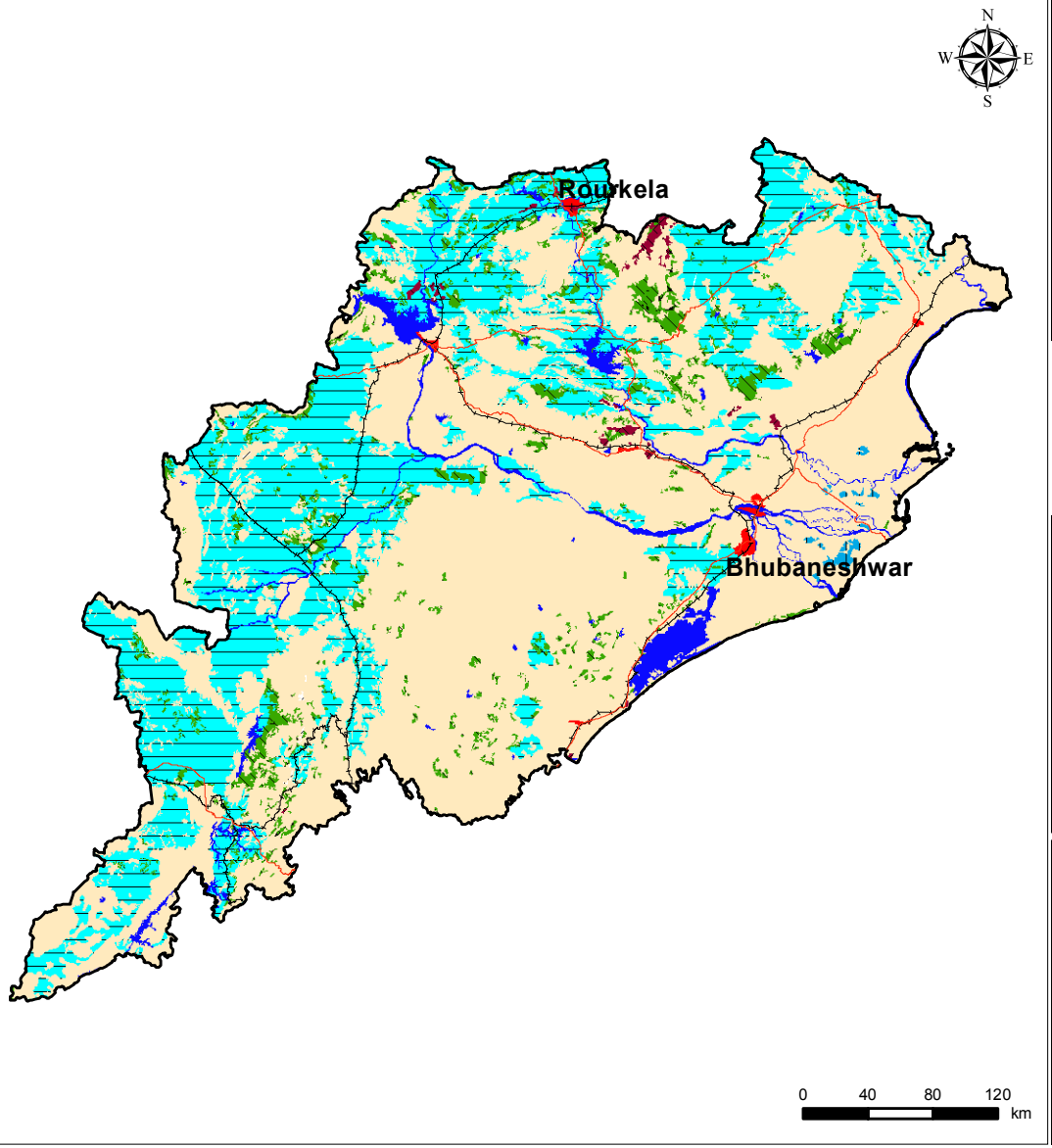
The most significant process of desertification/ land degradation is Water Erosion (28.32% in 2011-13 and 28.53% in 2003-05) followed by Vegetation Degradation (4.79% in 2011-13 and 4.84% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	745122	4.79	752929	4.84	-7807
Water Erosion	4409413	28.32	4442556	28.53	-33143
Water Logging	36439	0.23	36439	0.23	0
Manmade	63851	0.41	51445	0.33	12406
Barren/Rocky	5128	0.03	5053	0.03	75
Settlement	44161	0.28	33481	0.22	10680
Total Area under Desertification	**5304114**	**34.06**	**5321903**	**34.18**	**-17789**
No Apparent Degradation	**9758929**	**62.67**	**9741425**	**62.56**	**17504**
Total Geographical Area (ha)	**15570700**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	613663	3.94	621446	3.99	-7783
2	Fv2	Forest, vegetation degradation, High	83839	0.54	83837	0.54	2
3	Sv1	Land with scrub, vegetation degradation, Low	43572	0.28	43598	0.28	-26
4	Sv2	Land with scrub, vegetation degradation, High	4048	0.03	4048	0.03	0
5	Dw1	Agriculture unirrigated, water erosion, Low	4409413	28.32	4442556	28.53	-33143
6	Il1	Agriculture irrigated, water logging, Low	36439	0.23	36439	0.23	0
7	Fm1	Forest, man made, Low	12051	0.08	11845	0.08	205
8	Tm1	Others, man made, Low	46018	0.30	36884	0.24	9134
9	Tm2	Others, man made, High	5783	0.04	2716	0.02	3067
10	B	Barren	5128	0.03	5053	0.03	75
11	S	Settlement	44161	0.28	33481	0.22	10680
Total Area Under Desertification/ Land Degradation			**5304114**	**34.06**	**5321903**	**34.18**	**-17789**
12	W	Water body/ Drainage	507657	3.26	507372	3.26	285
13	NAD	No Apparent Degradation	9758929	62.67	9741425	62.56	17504
Total Geographical Area (ha)			**15570700**	**100**	**15570700**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
ODISHA (2011-13)



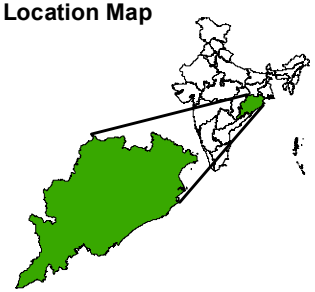
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Il1	Agriculture irrigated, water logging
	Fm1	Forest, man made
	Tm1,2	Others, man made
	B	Barren
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

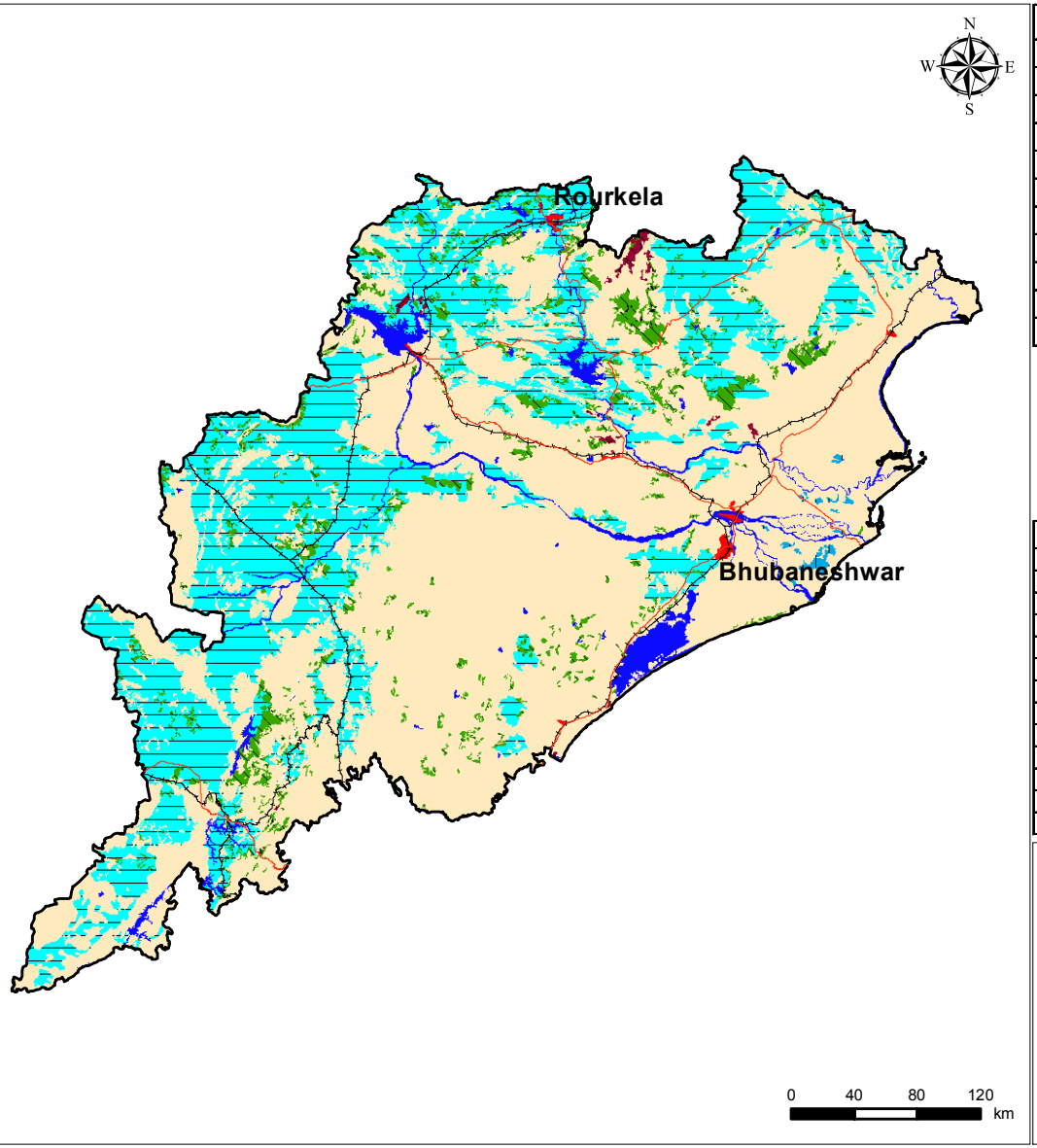


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Odisha Space Applications Centre, Bhubneshwar
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
ODISHA (2003-05)



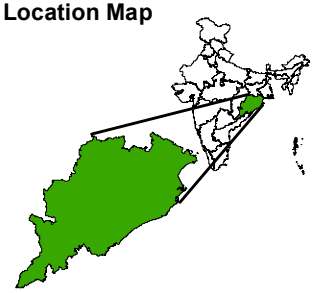
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Il1	Agriculture irrigated, water logging
	Fm1	Forest, man made
	Tm1,2	Others, man made
	B	Barren
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

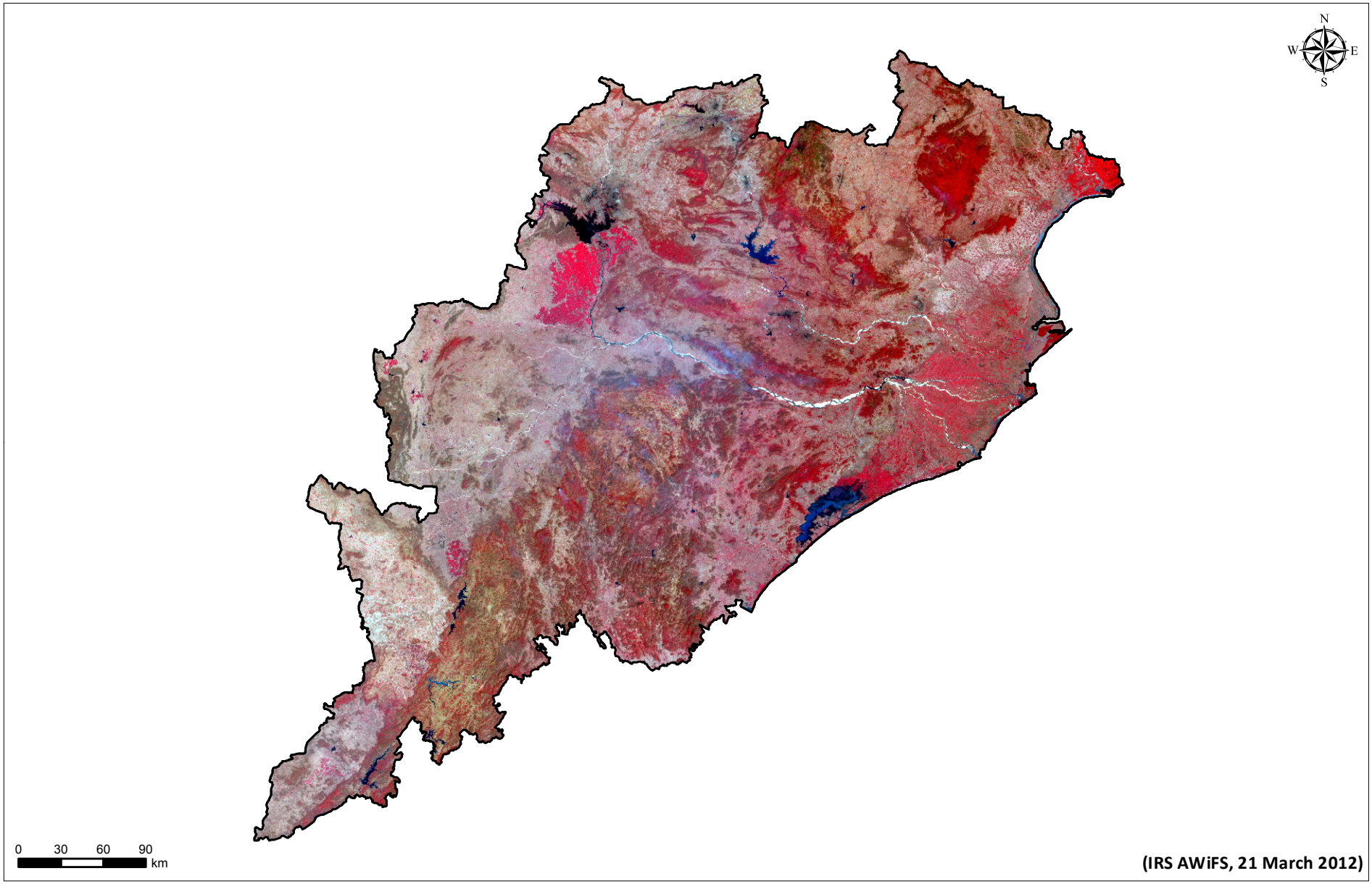


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

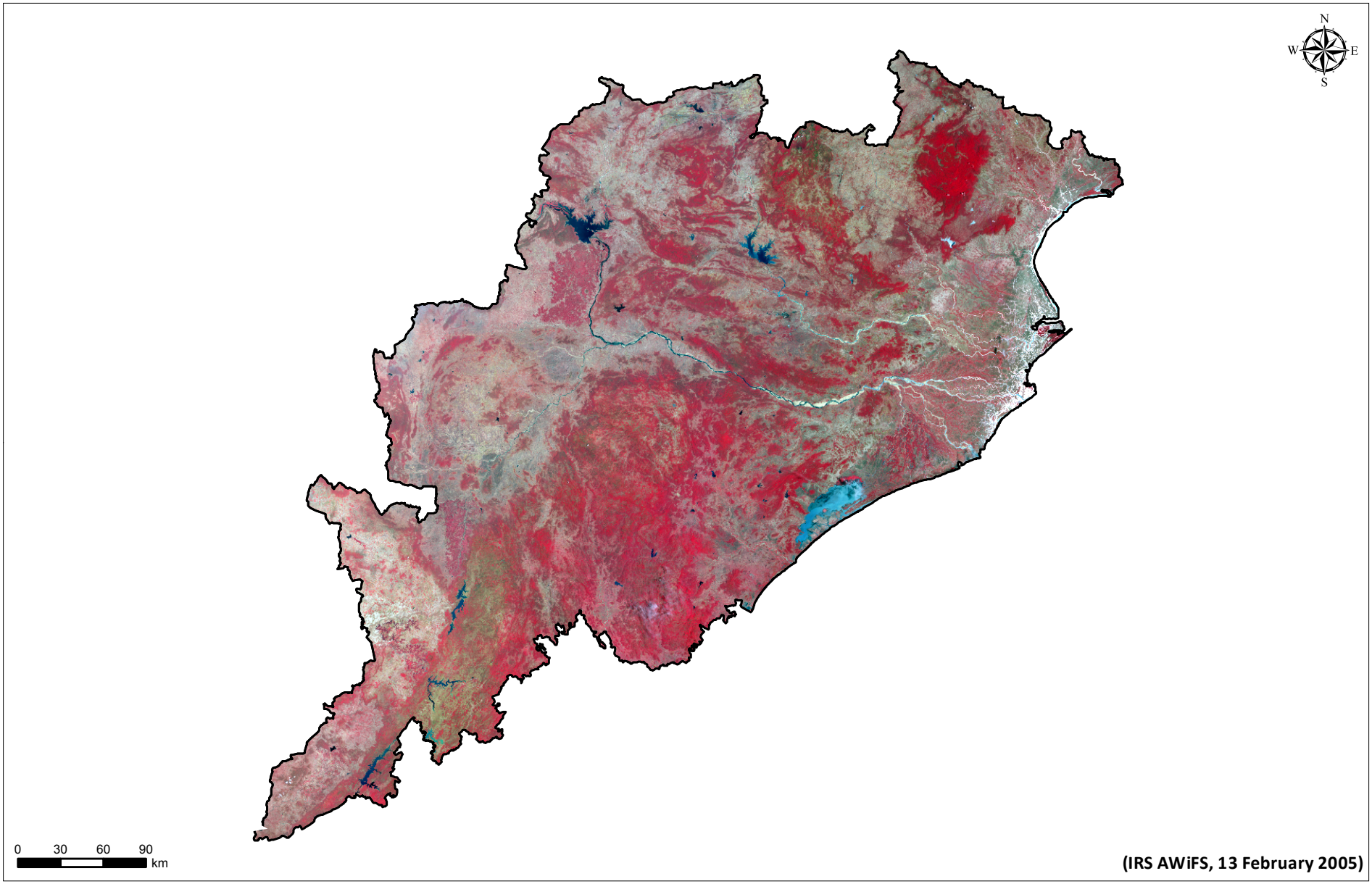
Prepared by:
Odisha Space Applications Centre, Bhubneshwar
&
Space Applications Centre,ISRO, Ahmedabad

ODISHA - IRS AWiFS 2012



(IRS AWiFS, 21 March 2012)

ODISHA - IRS AWiFS 2005



(IRS AWiFS, 13 February 2005)

Punjab

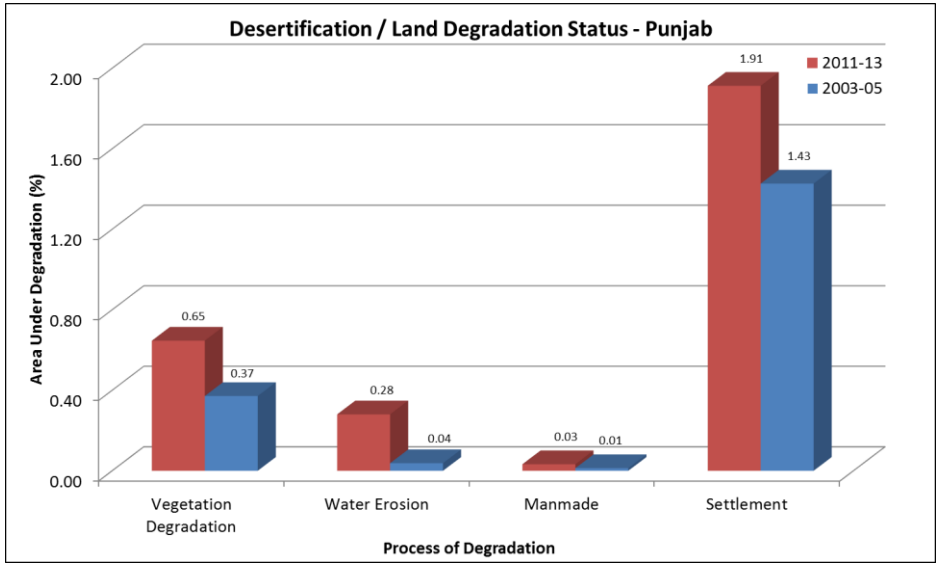
Punjab, the north-western border state of India, bordering Pakistan; and spreads over 50,362 sq km area. The state has population of 2,77,43,338; with 551 population density, 895 sex ratio and 75.84% literacy (Census 2011). Chandigarh is the capital of the state.

The major geographic features of Punjab are Shivalik Hills in the north, alluvial plain almost in all over the state and semi-arid area in west gradually merging with Thar desert. The major rivers of Punjab are Beas and Sutlej. Agriculture is the largest industry of this state due to very fertile soil with variety of soil profile characteristics. Punjab's climate is characterised by extreme hot and extreme cold conditions with average annual rainfall about 450 to 950 mm.

Punjab is the state with third lowest area under desertification/ land degradation with respect to country TGA and second lowest area under desertification/ land degradation with respect to state TGA. The state is observed with 2.87% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Punjab has increased about 1.02% since 2003-05.

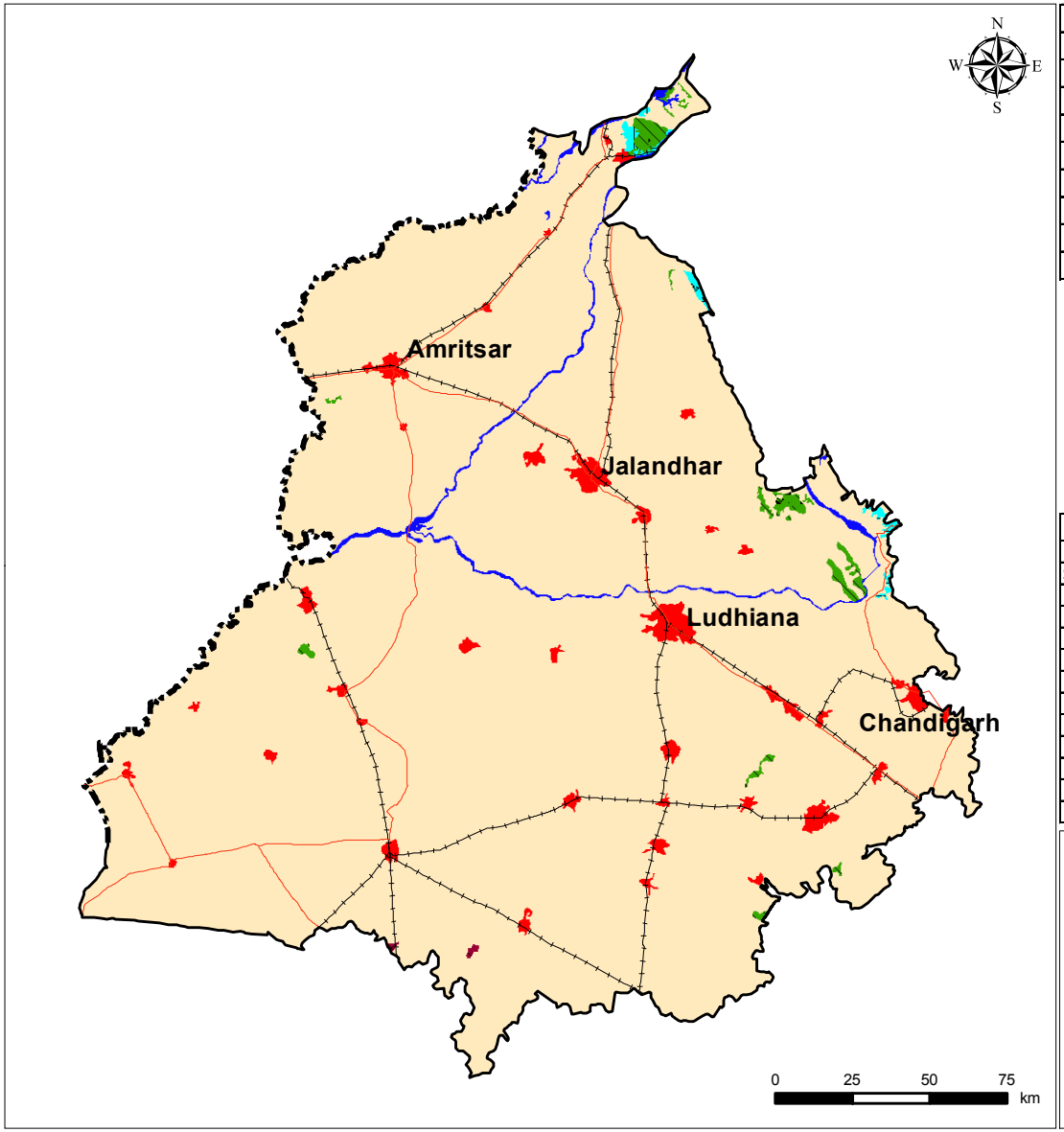
1.91% area of the state is occupied by settlement in 2011-13 which was 1.43 % in 2003-05. The other significant process of desertification/ land degradation is Vegetation Degradation (0.65% in 2011-13 and 0.37% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	32561	0.65	18705	0.37	13856
Water Erosion	14116	0.28	1897	0.04	12219
Manmade	1641	0.03	652	0.01	989
Settlement	96335	1.91	71861	1.43	24474
Total Area under Desertification	**144653**	**2.87**	**93115**	**1.85**	**51538**
No Apparent Degradation	**4849651**	**96.30**	**4901242**	**97.32**	**-51591**
Total Geographical Area (ha)	**5036200**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	22298	0.44	14717	0.29	7580
2	Fv2	Forest, vegetation degradation, High	3845	0.08	3398	0.07	447
3	Sv1	Land with scrub, vegetation degradation, Low	6418	0.13	590	0.01	5828
4	Iw1	Agriculture irrigated, water erosion, Low	3951	0.08	-	-	3951
5	Dw1	Agriculture unirrigated, water erosion, Low	7049	0.14	1897	0.04	5151
6	Sw1	Land with scrub, water erosion, Low	3116	0.06	-	-	3116
7	Tm1	Others, man made, Low	1641	0.03	652	0.01	989
8	S	Settlement	96335	1.91	71861	1.43	24474
Total Area Under Desertification/ Land Degradation			**144653**	**2.87**	**93115**	**1.85**	**51538**
12	W	Water body/ Drainage	41897	0.83	41843	0.83	53
13	NAD	No Apparent Degradation	4849651	96.30	4901242	97.32	-51591
Total Geographical Area (ha)			**5036200**	**100**	**5036200**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS
PUNJAB (2011-13)

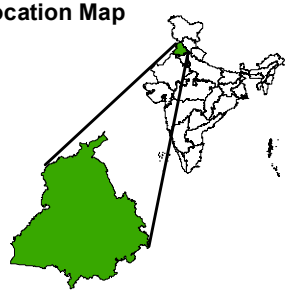


Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Sw1	Land with scrub, water erosion
	Tm1	Others, man made
	S	Settlement
	W	Water body /Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

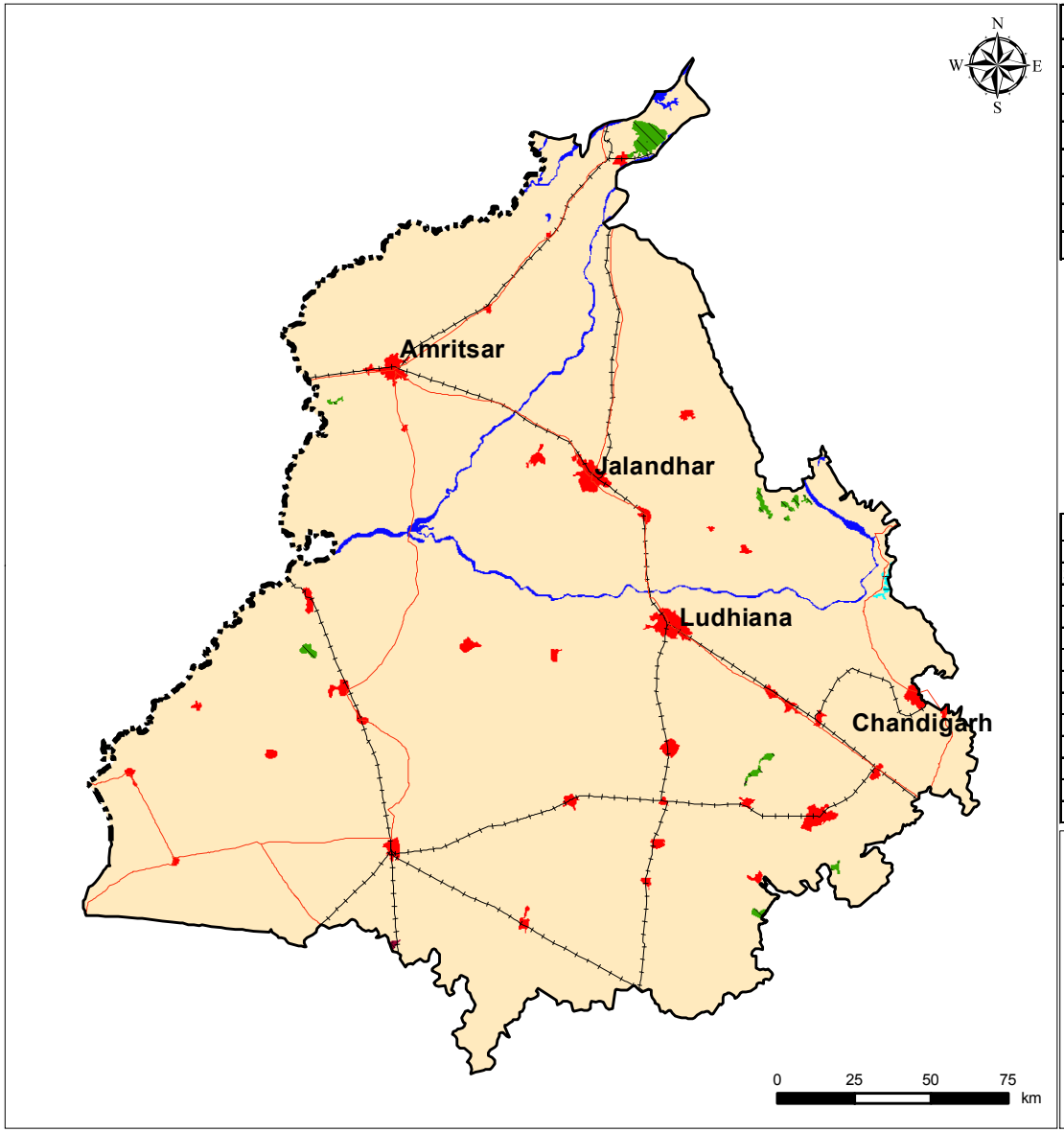


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Soil and Land Use Survey of India, New Delhi
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS
PUNJAB (2003-05)



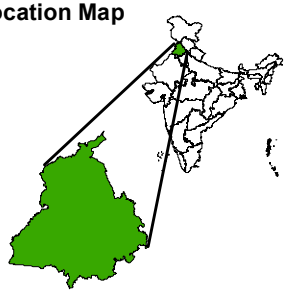
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Tm1	Others, man made
	S	Settlement
	W	Water body /Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

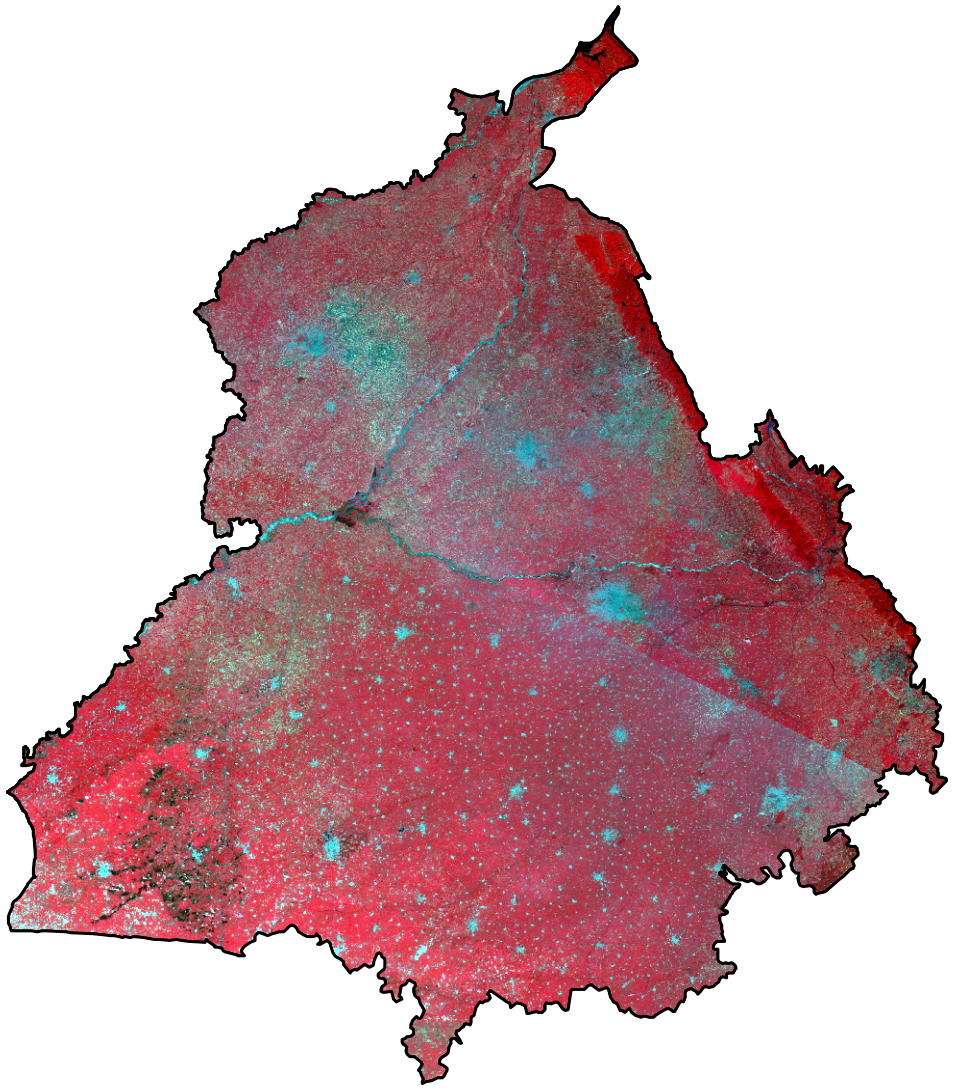


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

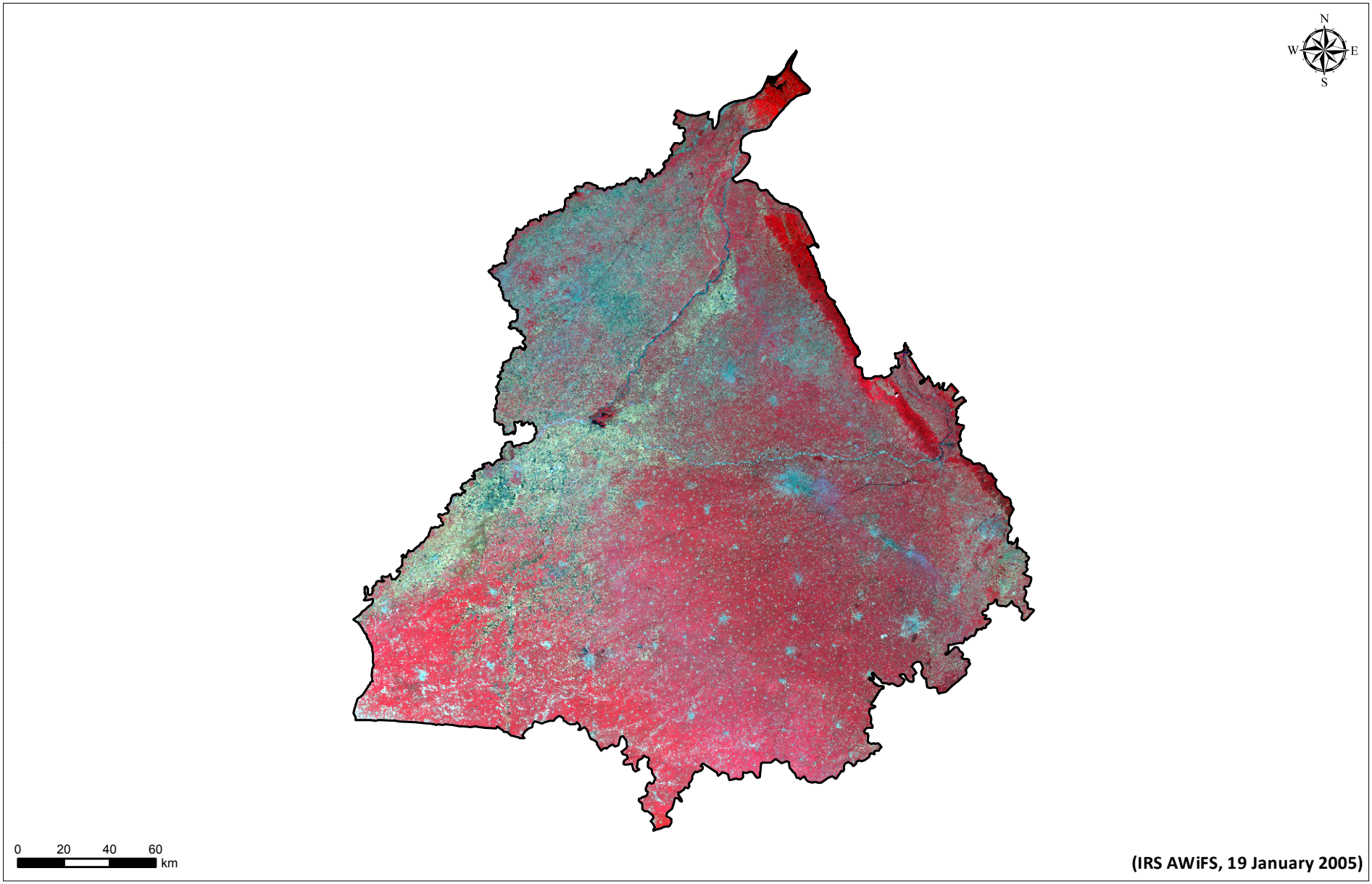
Prepared by:
Soil and Land Use Survey of India, New Delhi
&
Space Applications Centre,ISRO, Ahmedabad

PUNJAB - IRS AWiFS 2011-2012



(IRS AWiFS, 03 October 2011, 04 October 2012)

PUNJAB - IRS AWiFS 2005



(IRS AWiFS, 19 January 2005)

Rajasthan

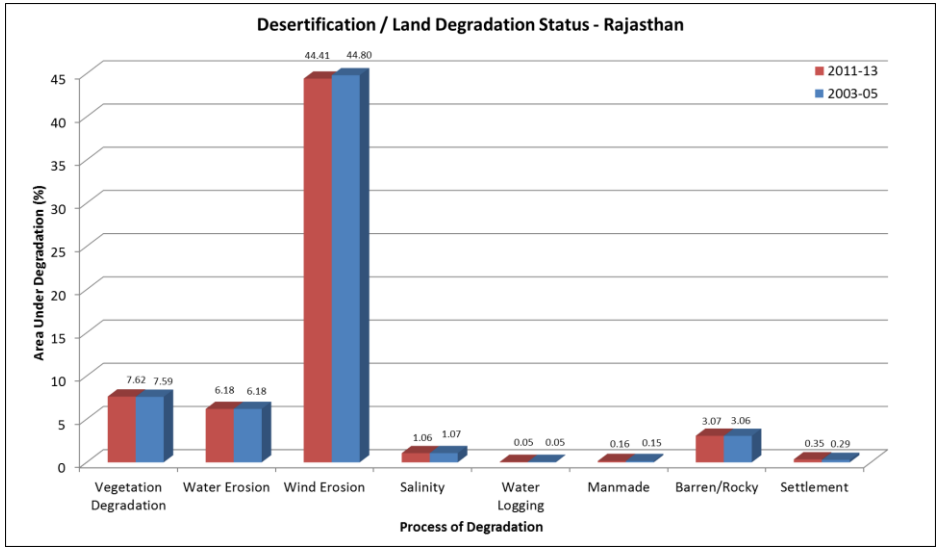
Rajasthan, located in north western part of India, bordering Pakistan, is the largest state of the country by area with 3,42,239 sq km area. The state has population of 6,85,48,437; with 200 population density, 928 sex ratio and 66.11% literacy (Census 2011). Jaipur is the capital of Rajasthan.

The major geographic features of Rajasthan are Thar desert, alluvial plain and Aravalli ranges. The main rivers of the state include Chambal, Luni, Banas, Ghaggar, Mahi, Sabarmati, etc. Rajasthan soils are mostly sandy, saline, alkaline and chalky (calcareous), Clay, loamy and black lava and so on. The state comprises characteristics of arid region in west and semi-arid region in eastern part. Rajasthan experiences extreme climate or weather and consists of four distinct seasons i.e., pre-monsoon, monsoon, post-monsoon and winter with very scanty rainfall.

Rajasthan is the state with highest area under desertification/ land degradation with respect to country TGA and second highest area under desertification/ land degradation with respect to state TGA. The state is observed with 62.90% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Rajasthan has decreased about 0.29% since 2003-05.

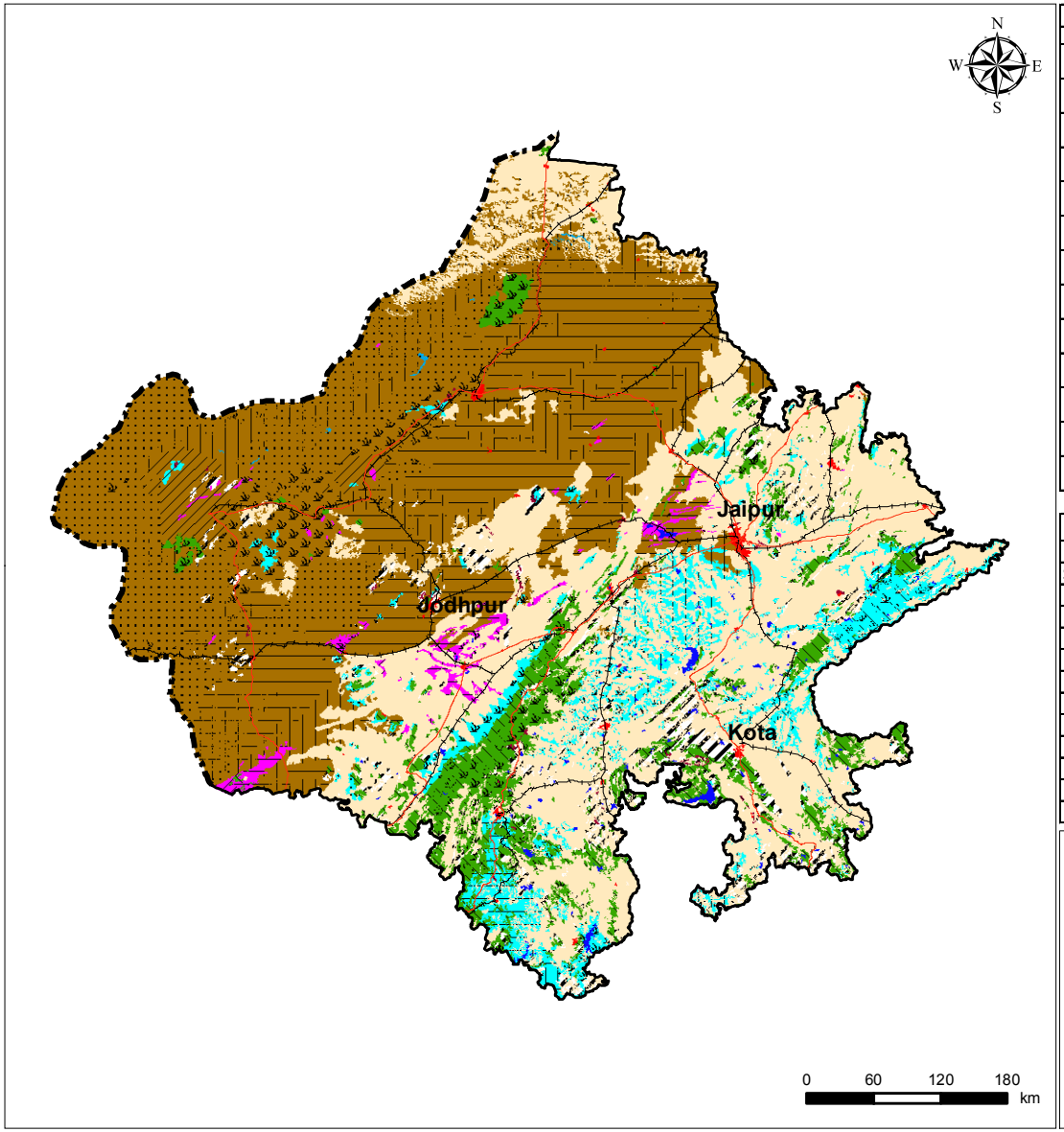
The most significant process of desertification/ land degradation in the state is Wind Erosion (44.41% in 2011-13 and 44.80% in 2003-05) followed by Vegetation Degradation (7.62% in 2011-13 and 7.59% in 2003-05) and Water Erosion (6.18% in both 2011-13 and 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	2606221	7.62	2596003	7.59	10218
Water Erosion	2116314	6.18	2116082	6.18	233
Wind Erosion	15197874	44.41	15332054	44.80	-134180
Salinity	363768	1.06	365666	1.07	-1898
Water Logging	18421	0.05	18421	0.05	0
Manmade	53058	0.16	50865	0.15	2193
Barren/Rocky	1052374	3.07	1047818	3.06	4556
Settlement	118482	0.35	98696	0.29	19786
Total Area under Desertification	**21526512**	**62.90**	**21625604**	**63.19**	**-99092**
No Apparent Degradation	**12546925**	**36.66**	**12448140**	**36.37**	**98785**
Total Geographical Area (ha)	**34223900**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	1479558	4.32	1469518	4.29	10039
2	Fv2	Forest, vegetation degradation, High	252480	0.74	252480	0.74	0
3	Sv1	Land with scrub, vegetation degradation, Low	832578	2.43	832399	2.43	179
4	Sv2	Land with scrub, vegetation degradation, High	41606	0.12	41606	0.12	0
5	Iw1	Agriculture irrigated, water erosion, Low	673640	1.97	673640	1.97	0
6	Iw2	Agriculture irrigated, water erosion, High	4970	0.01	4970	0.01	0
7	Dw1	Agriculture unirrigated, water erosion, Low	334003	0.98	334003	0.98	0
8	Fw1	Forest, water erosion, Low	83173	0.24	83173	0.24	0
9	Fw2	Forest, water erosion, High	133375	0.39	133375	0.39	0
10	Sw1	Land with scrub, water erosion, Low	658589	1.92	658008	1.92	581
11	Sw2	Land with scrub, water erosion, High	184926	0.54	184926	0.54	0
12	Bw1	Barren, water erosion, Low	15003	0.04	15351	0.04	-349
13	Ew1	Dune / Sandy area, water erosion, Low	28636	0.08	28636	0.08	0
14	Ie1	Agriculture irrigated, wind erosion, Low	2885396	8.43	2908241	8.50	-22845
15	Ie2	Agriculture irrigated, wind erosion, High	89837	0.26	88382	0.26	1455
16	De1	Agriculture unirrigated, wind erosion, Low	5340669	15.61	5426579	15.86	-85909
17	De2	Agriculture unirrigated, wind erosion, High	808076	2.36	822834	2.40	-14758
18	Se1	Land with scrub, wind erosion, Low	1136345	3.32	1139509	3.33	-3164
19	Se2	Land with scrub, wind erosion, High	319	0.00	319	0.00	0
20	Be1	Barren, wind erosion, Low	588937	1.72	596828	1.74	-7891
21	Ee1	Dune / Sandy area, wind erosion, Low	2497673	7.30	2510506	7.34	-12833
22	Ee2	Dune / Sandy area, wind erosion, High	1850621	5.41	1838855	5.37	11765
23	Is1	Agriculture irrigated, salinity / alkalinity, Low	31610	0.09	31610	0.09	0
24	Ds1	Agriculture unirrigated, salinity / alkalinity, Low	154674	0.45	155653	0.45	-979
25	Ds2	Agriculture unirrigated, salinity / alkalinity, High	19058	0.06	19058	0.06	0
26	Ss1	Land with scrub, salinity / alkalinity, Low	27716	0.08	27716	0.08	0
27	Ss2	Land with scrub, salinity / alkalinity, High	32360	0.09	32360	0.09	0
28	Bs1	Barren, salinity / alkalinity, Low	5184	0.02	6103	0.02	-919
29	Bs2	Barren, salinity / alkalinity, High	93166	0.27	93166	0.27	0
30	Il1	Agriculture irrigated, water logging, Low	9032	0.03	9032	0.03	0
31	El1	Dune / Sandy area, water logging, Low	8801	0.03	8801	0.03	0
32	El2	Dune / Sandy area, water logging, High	588	0.00	588	0.00	0
33	Fm2	Forest, man made, High	422	0.00	422	0.00	0
34	Tm1	Others, man made, Low	15748	0.05	13417	0.04	2332
35	Tm2	Others, man made, High	36887	0.11	37026	0.11	-139
36	B	Barren	9195	0.03	9195	0.03	0
37	R	Rocky	1043179	3.05	1038623	3.03	4556
38	S	Settlement	118482	0.35	98696	0.29	19786
Total Area Under Desertification/ Land Degradation			**21526512**	**62.90**	**21625604**	**63.19**	**-99092**
39	W	Water body/ Drainage	150463	0.44	150156	0.44	307
40	NAD	No Apparent Degradation	12546925	36.66	12448140	36.37	98785
Total Geographical Area (ha)			**34223900**	**100**	**34223900**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
RAJASTHAN (2011-13)



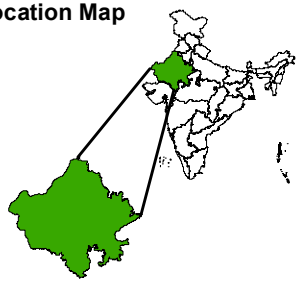
Legend

Symbol	Code	Description	Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation		Is1	Agriculture irrigated, salinity / alkalinity
	Sv1,2	Land with scrub, vegetation degradation		Ds1,2	Agriculture unirrigated, salinity / alkalinity
	Iw1,2	Agriculture irrigated, water erosion		Ss1,2	Land with scrub, salinity / alkalinity
	Dw1	Agriculture unirrigated, water erosion		Bs1,2	Barren, salinity / alkalinity
	Fw1,2	Forest, water erosion		Il1	Agriculture irrigated, water logging
	Sw1,2	Land with scrub, water erosion		El1,2	Dune / Sandy area, water logging
	Bw1	Barren, water erosion		Fm2	Forest, manmade
	Ew1	Dune / Sandy area, water erosion		Tm1,2	Others, man made
	Ie1,2	Agriculture irrigated, wind erosion		B	Barren
	De1,2	Agriculture unirrigated, wind erosion		R	Rocky
	Se1,2	Land with scrub, wind erosion		S	Settlement
	Be1	Barren, wind erosion		W	Water body / Drainage
	Ee1,2	Dune / Sandy area, wind erosion		NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

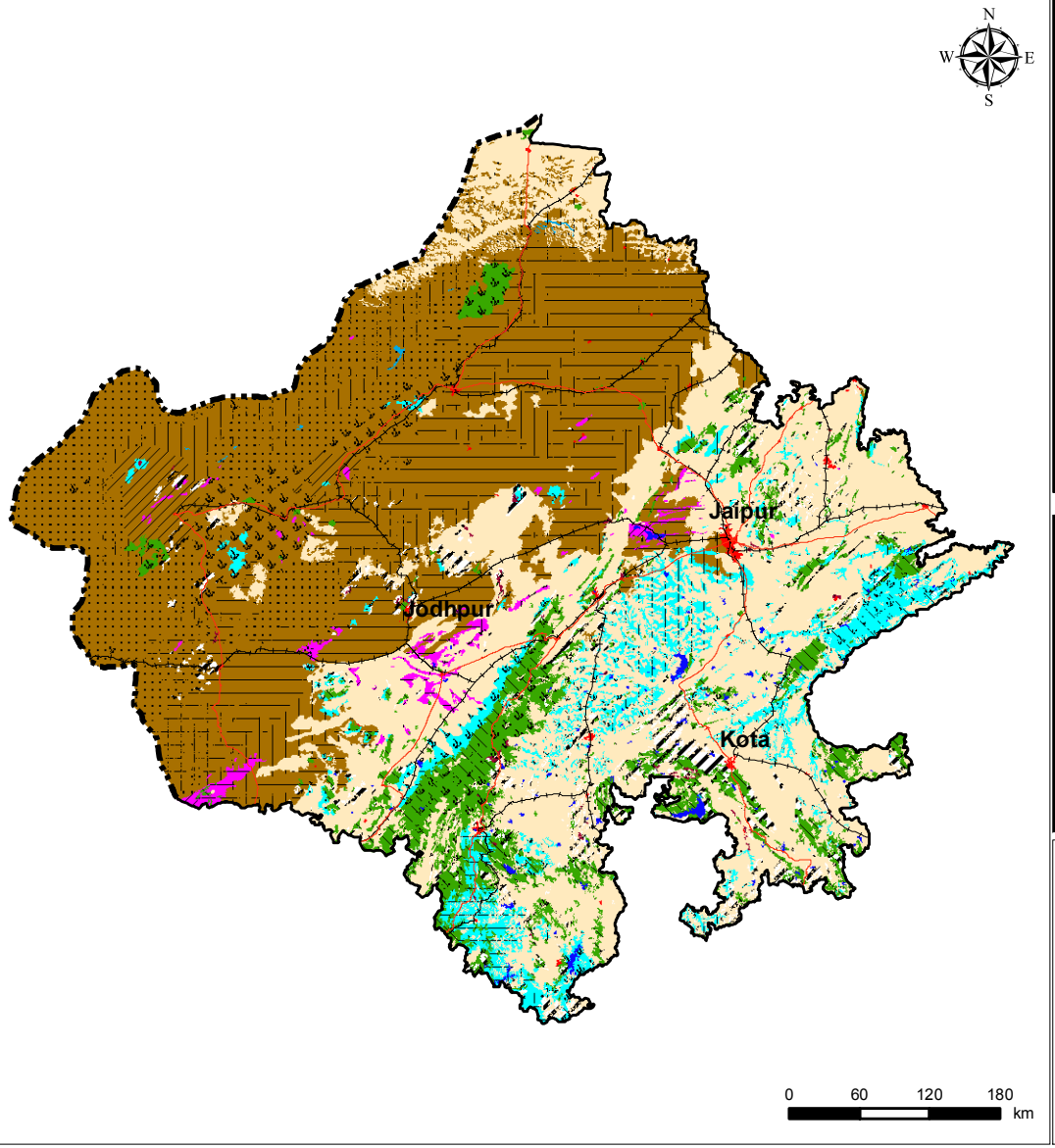


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Central Arid Zone Research Institute, Jodhpur
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
RAJASTHAN (2003-05)



Legend

Symbol	Code	Description	Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation		Is1	Agriculture irrigated, salinity / alkalinity
	Sv1,2	Land with scrub, vegetation degradation		Ds1,2	Agriculture unirrigated, salinity / alkalinity
	Iw1,2	Agriculture irrigated, water erosion		Ss1,2	Land with scrub, salinity / alkalinity
	Dw1	Agriculture unirrigated, water erosion		Bs1,2	Barren, salinity / alkalinity
	Fw1,2	Forest, water erosion		Il1	Agriculture irrigated, water logging
	Sw1,2	Land with scrub, water erosion		El1,2	Dune / Sandy area, water logging
	Bw1	Barren, water erosion		Fm2	Forest, manmade
	Ew1	Dune / Sandy area, water erosion		Tm1,2	Others, man made
	Ie1,2	Agriculture irrigated, wind erosion		B	Barren
	De1,2	Agriculture unirrigated, wind erosion		R	Rocky
	Se1,2	Land with scrub, wind erosion		S	Settlement
	Be1	Barren, wind erosion		W	Water body / Drainage
	Ee1,2	Dune / Sandy area, wind erosion		NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
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	C	Glacial		m	man made		
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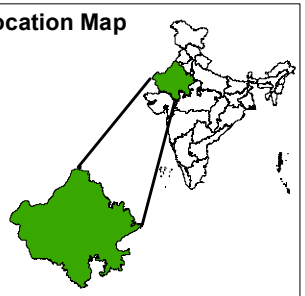
Location Map

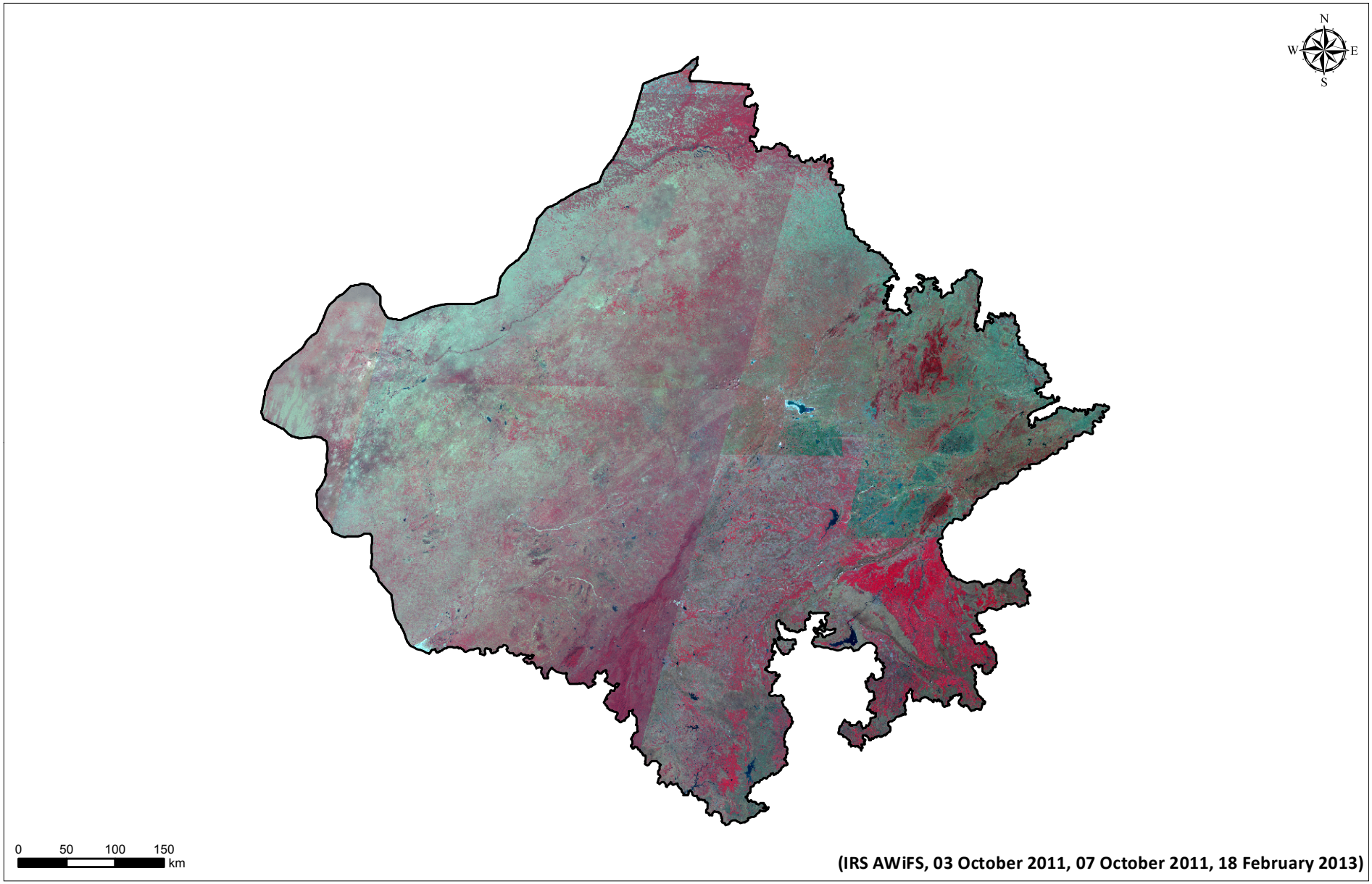


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

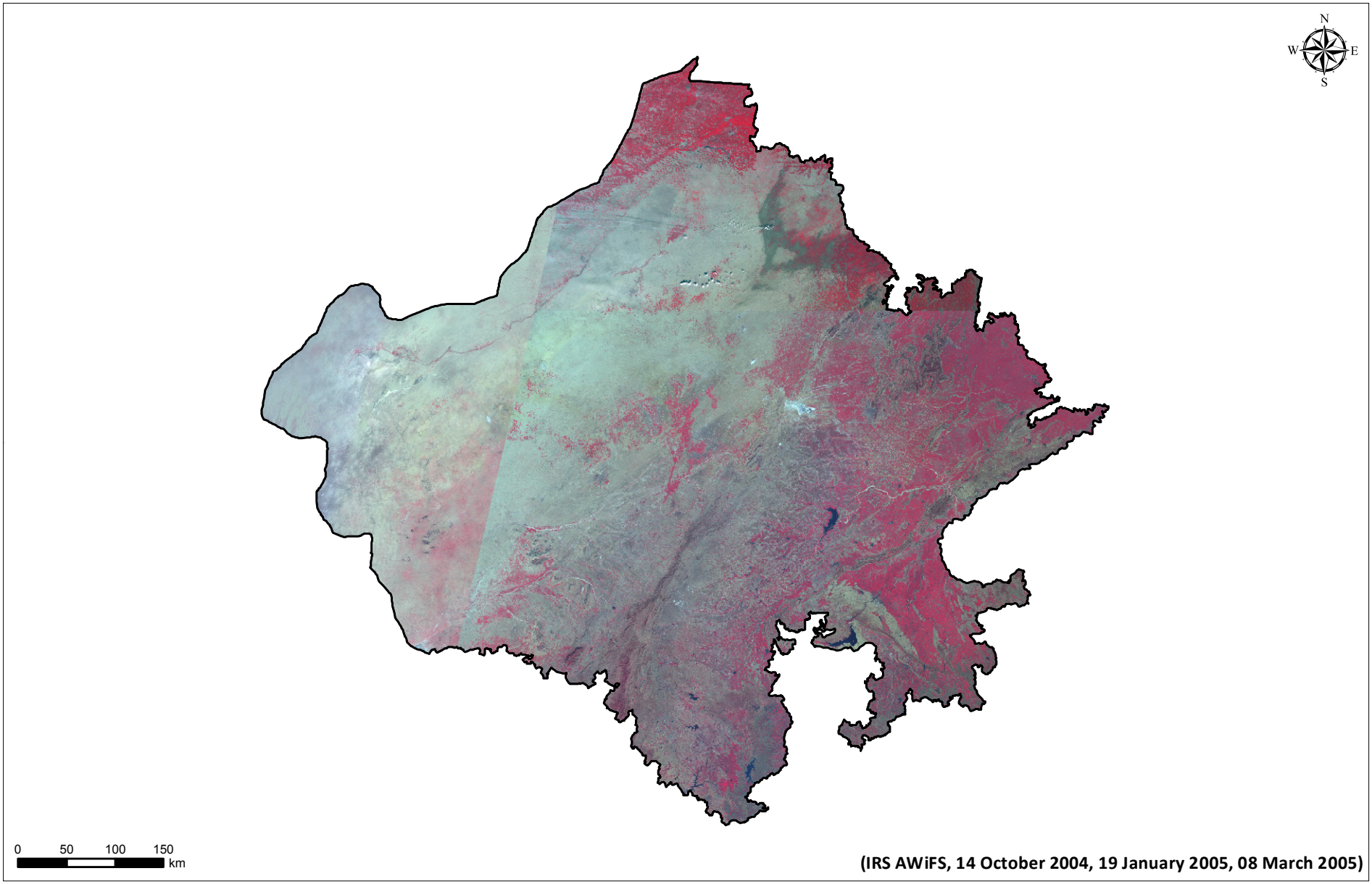
Prepared by:
Central Arid Zone Research Institute, Jodhpur
&
Space Applications Centre,ISRO, Ahmedabad

RAJASTHAN - IRS AWiFS 2011-2013



(IRS AWiFS, 03 October 2011, 07 October 2011, 18 February 2013)

RAJASTHAN - IRS AWiFS 2004-2005



(IRS AWiFS, 14 October 2004, 19 January 2005, 08 March 2005)

Sikkim

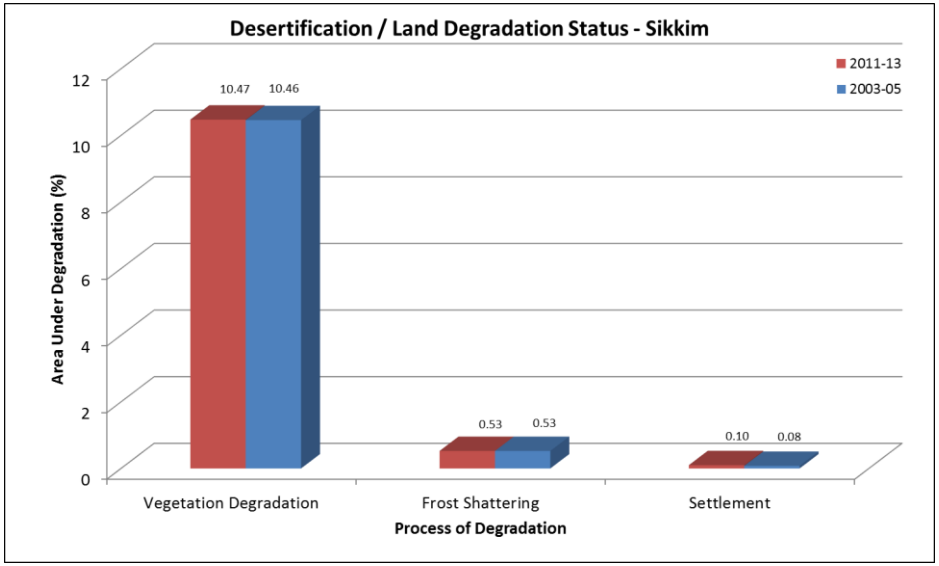
Sikkim is located in northern part of India bordering Nepal, Bhutan and China with 7,096 sq km area. The state has population of 6,10,577; with 86 population density, 890 sex ratio and 81.42% literacy (Census 2011). Gangtok is the capital of Sikkim.

Sikkim is a mountain state of eastern Himalaya having world's third largest peak Kanchanjunga, 28,162 feet height. Two principle mountain ranges are the Singilela and Chola, which start in the north and continue, following a more or less southerly direction. Between these ranges are the major rivers, Rangit and Teesta, forming the main channels of drainage. Sikkim experiences temperate Alpine climate with snowfall in winter season. The temperature ranges from below 0°C in winter to 20°C in summer.

Sikkim is the state with lowest area under desertification/ land degradation with respect to country TGA, however with respect to state TGA it is observed that 11.10% area is under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Sikkim has increased about 0.04% since 2003-05.

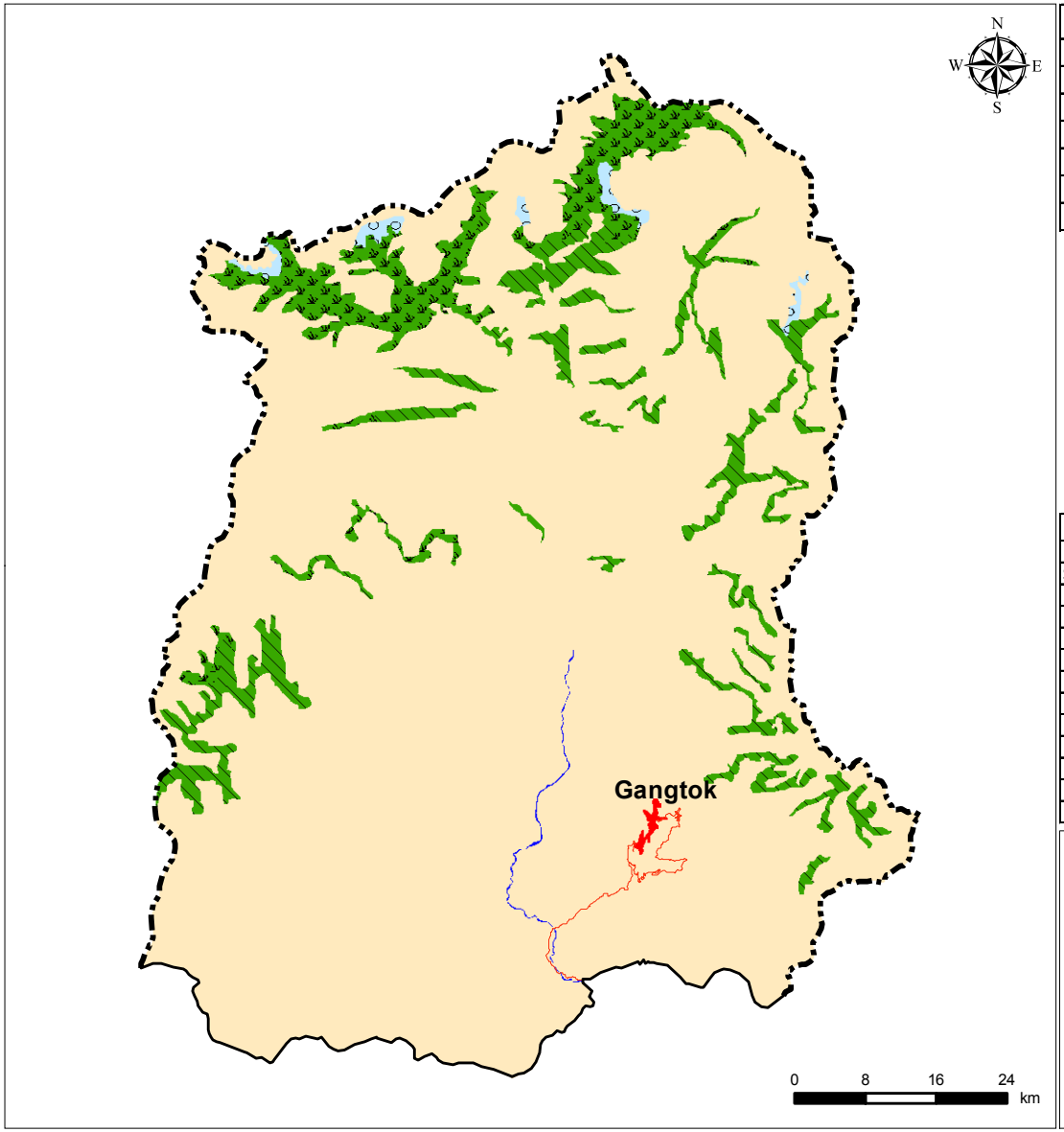
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (10.47% in 2011-13 and 10.46% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	74318	10.47	74205	10.46	114
Frost Shattering	3730	0.53	3730	0.53	0
Settlement	700	0.10	546	0.08	153
Total Area under Desertification	**78749**	**11.10**	**78482**	**11.06**	**267**
No Apparent Degradation	**630234**	**88.82**	**630500**	**88.85**	**-267**
Total Geographical Area (ha)	**709600**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	14816	2.09	14223	2.00	593
2	Fv2	Forest, vegetation degradation, High	25842	3.64	23473	3.31	2370
3	Sv1	Land with scrub, vegetation degradation, Low	19409	2.74	21915	3.09	-2506
4	Sv2	Land with scrub, vegetation degradation, High	14251	2.01	14594	2.06	-343
5	Lf2	Periglacial, frost shattering, High	3730	0.53	3730	0.53	0
6	S	Settlement	700	0.10	546	0.08	153
Total Area Under Desertification/ Land Degradation			**78749**	**11.10**	**78482**	**11.06**	**267**
7	W	Water body/ Drainage	618	0.09	618	0.09	0
8	NAD	No Apparent Degradation	630234	88.82	630500	88.85	-267
Total Geographical Area (ha)			**709600**	**100**	**709600**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
SIKKIM (2011-13)



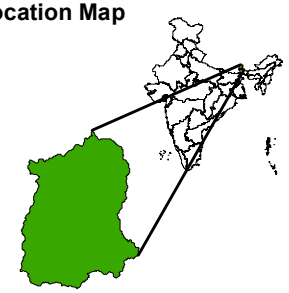
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Lf2	Periglacial, frost shattering
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map



	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
State Council of Science & Technology, Sikkim
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
SIKKIM (2003-05)

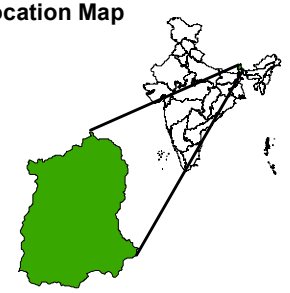
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Lf2	Periglacial, frost shattering
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

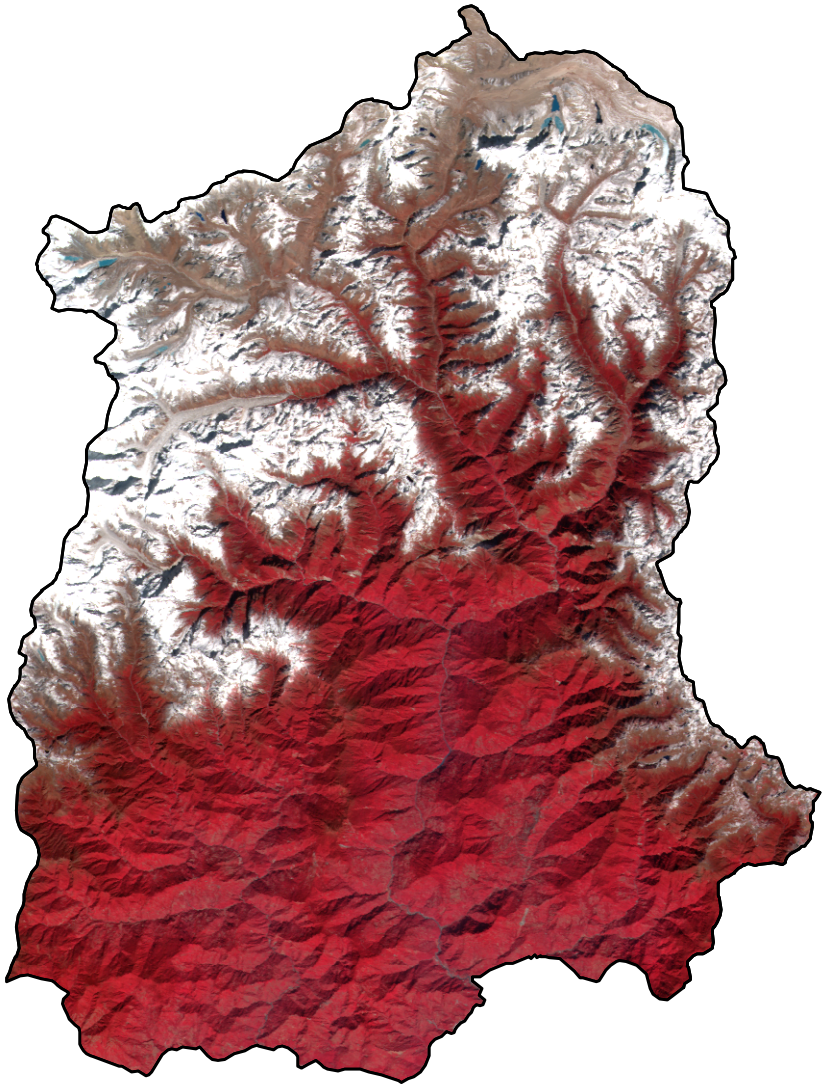


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

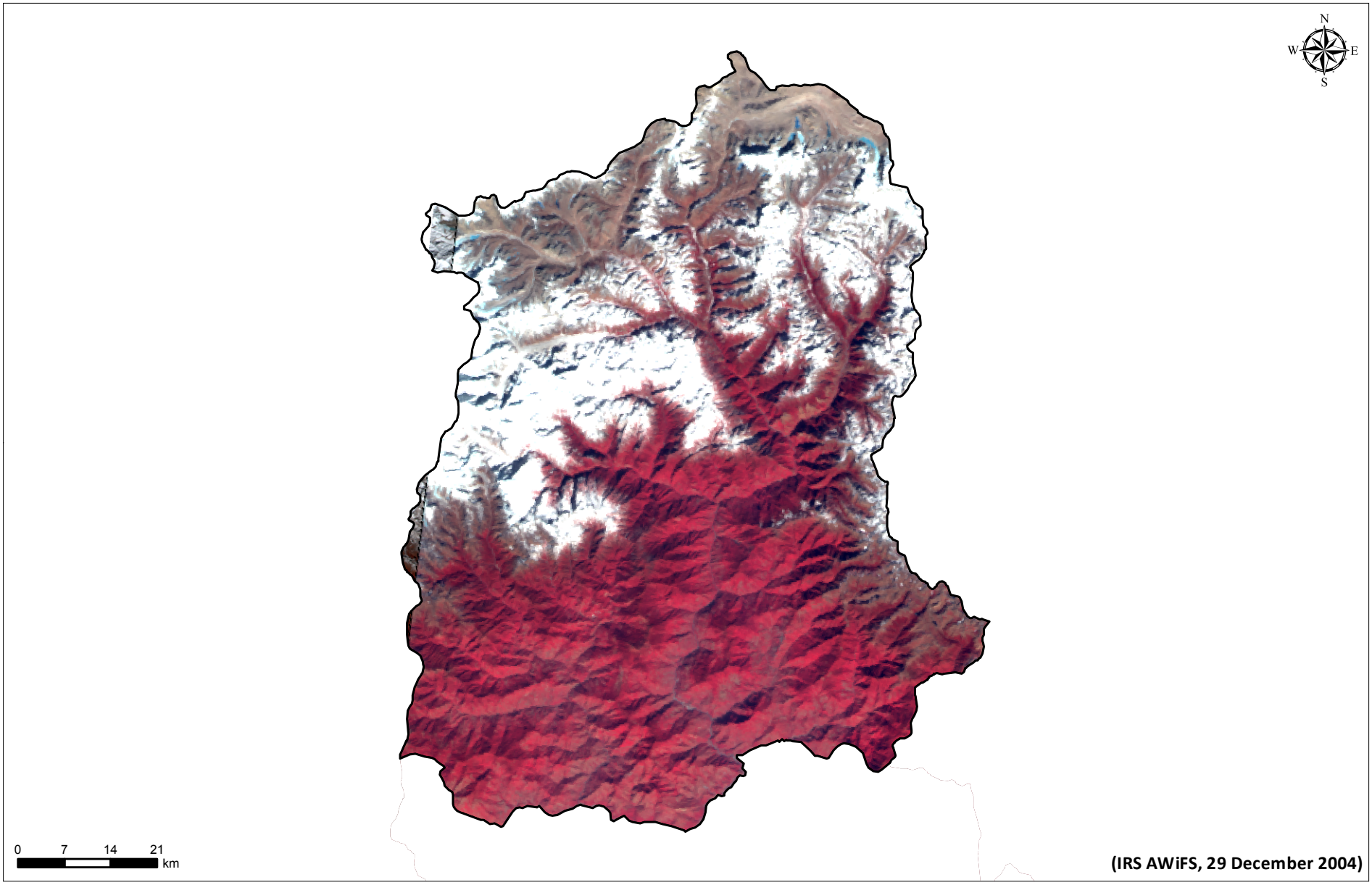
Prepared by:
State Council of Science & Technology, Sikkim
&
Space Applications Centre,ISRO, Ahmedabad

SIKKIM - IRS AWiFS 2011



(IRS AWiFS, 23 November 2011)

SIKKIM - IRS AWiFS 2004



Tamil Nadu

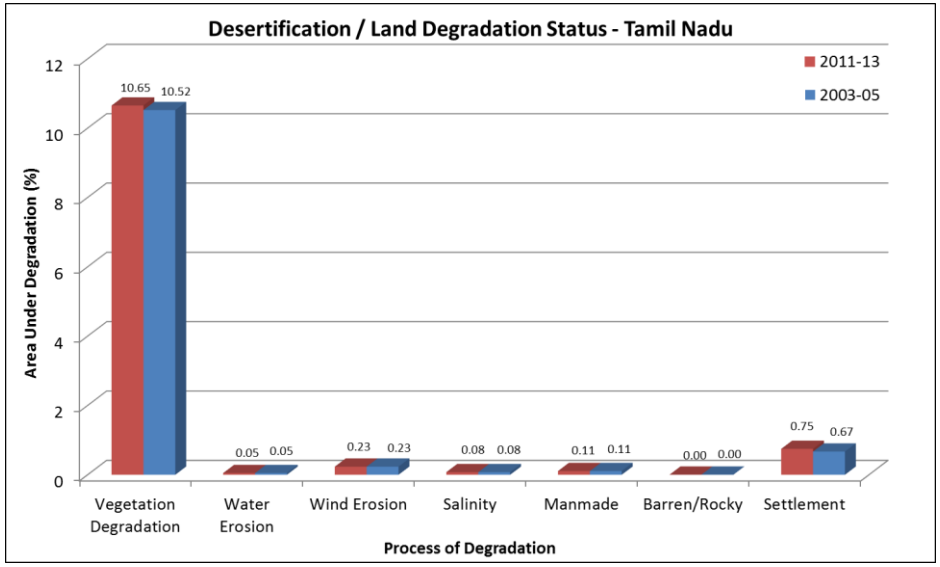
Tamil Nadu is situated on the south eastern side of the Indian peninsula with 1,30,060 sq km area. The state has population of 7,21,47,030; with 555 population density, 996 sex ratio and 80.09% literacy (Census 2011). Chennai is the capital of Tamil Nadu.

Tamil Nadu is the only state in India having both Western Ghats and Eastern Ghats mountains, both meeting at the Nilgiri Hills in south. Kaveri, Bhavani, Manjalar, Palar etc. are the major rivers of the state. The climate of the state ranges from dry sub-humid to semi-arid. Tamil Nadu is highly dependent on monsoon and thereby is prone to droughts when the monsoons fail. The normal annual rainfall of the state is about 945 mm.

Tamil Nadu is observed with 11.87% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Tamil Nadu has increased about 0.21% since 2003-05.

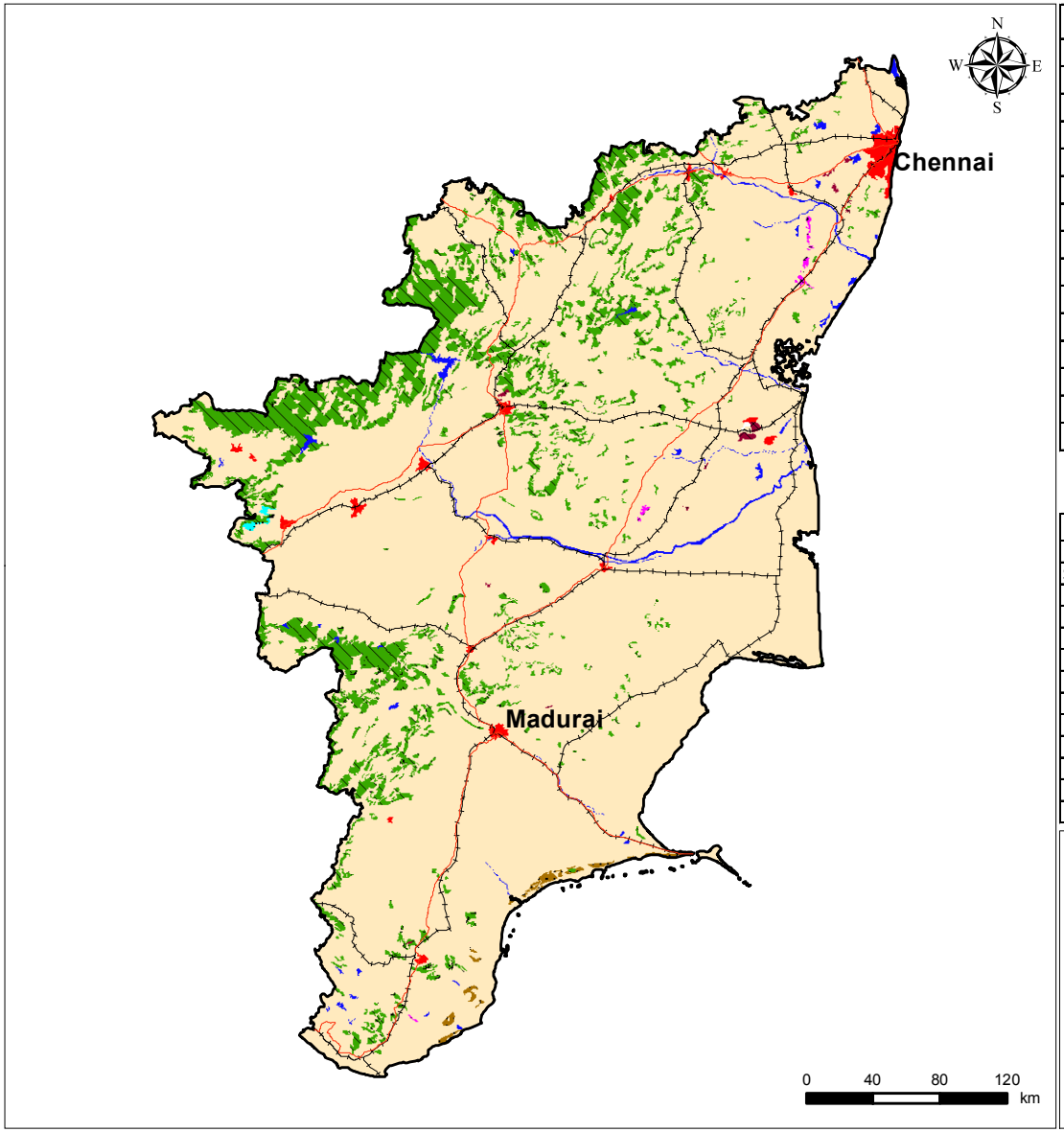
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (10.65% in 2011-13 and 10.52% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	1385478	10.65	1368330	10.52	17148
Water Erosion	6411	0.05	6411	0.05	0
Wind Erosion	30429	0.23	30429	0.23	0
Salinity	9878	0.08	9878	0.08	0
Manmade	13965	0.11	13965	0.11	0
Barren/Rocky	515	0.00	515	0.00	0
Settlement	97223	0.75	87133	0.67	10090
Total Area under Desertification	**1543898**	**11.87**	**1516660**	**11.66**	**27238**
No Apparent Degradation	**11344261**	**87.22**	**11371500**	**87.43**	**-27238**
Total Geographical Area (ha)	**13006000**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	926953	7.13	904211	6.95	22743
2	Fv2	Forest, vegetation degradation, High	324576	2.50	330360	2.54	-5783
3	Sv1	Land with scrub, vegetation degradation, Low	72354	0.56	69102	0.53	3252
4	Sv2	Land with scrub, vegetation degradation, High	61594	0.47	64658	0.50	-3063
5	Iw2	Agriculture irrigated, water erosion, High	1069	0.01	1069	0.01	0
6	Sw1	Land with scrub, water erosion, Low	3931	0.03	3931	0.03	0
7	Sw2	Land with scrub, water erosion, High	1411	0.01	1411	0.01	0
8	Ie1	Agriculture irrigated, wind erosion, Low	1957	0.02	1957	0.02	0
9	Ee1	Dune / Sandy area, wind erosion, Low	28472	0.22	28472	0.22	0
10	Ds1	Agriculture unirrigated, salinity / alkalinity, Low	4534	0.03	4534	0.03	0
11	Ss1	Land with scrub, salinity / alkalinity, Low	2869	0.02	2869	0.02	0
12	Bs1	Barren, salinity / alkalinity, Low	2475	0.02	2475	0.02	0
13	Tm2	Others, man made, High	13965	0.11	13965	0.11	0
14	R	Rocky	515	0.00	515	0.00	0
15	S	Settlement	97223	0.75	87133	0.67	10090
Total Area Under Desertification/ Land Degradation			**1543898**	**11.87**	**1516660**	**11.66**	**27238**
16	W	Water body/ Drainage	117841	0.91	117841	0.91	0
17	NAD	No Apparent Degradation	11344261	87.22	11371500	87.43	-27238
Total Geographical Area (ha)			**13006000**	**100**	**13006000**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
TAMIL NADU (2011-13)



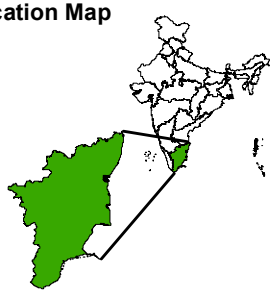
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw2	Agriculture irrigated, water erosion
	Sw1,2	Land with scrub, water erosion
	Ie1	Agriculture unirrigated, wind erosion
	Ee1	Dune / Sandy area, wind erosion
	Ds1	Agriculture unirrigated, salinity / alkalinity
	Ss1	Land with scrub, salinity / alkalinity
	Bs1	Barren, salinity / alkalinity
	Tm2	Others, man made
	R	Rocky
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

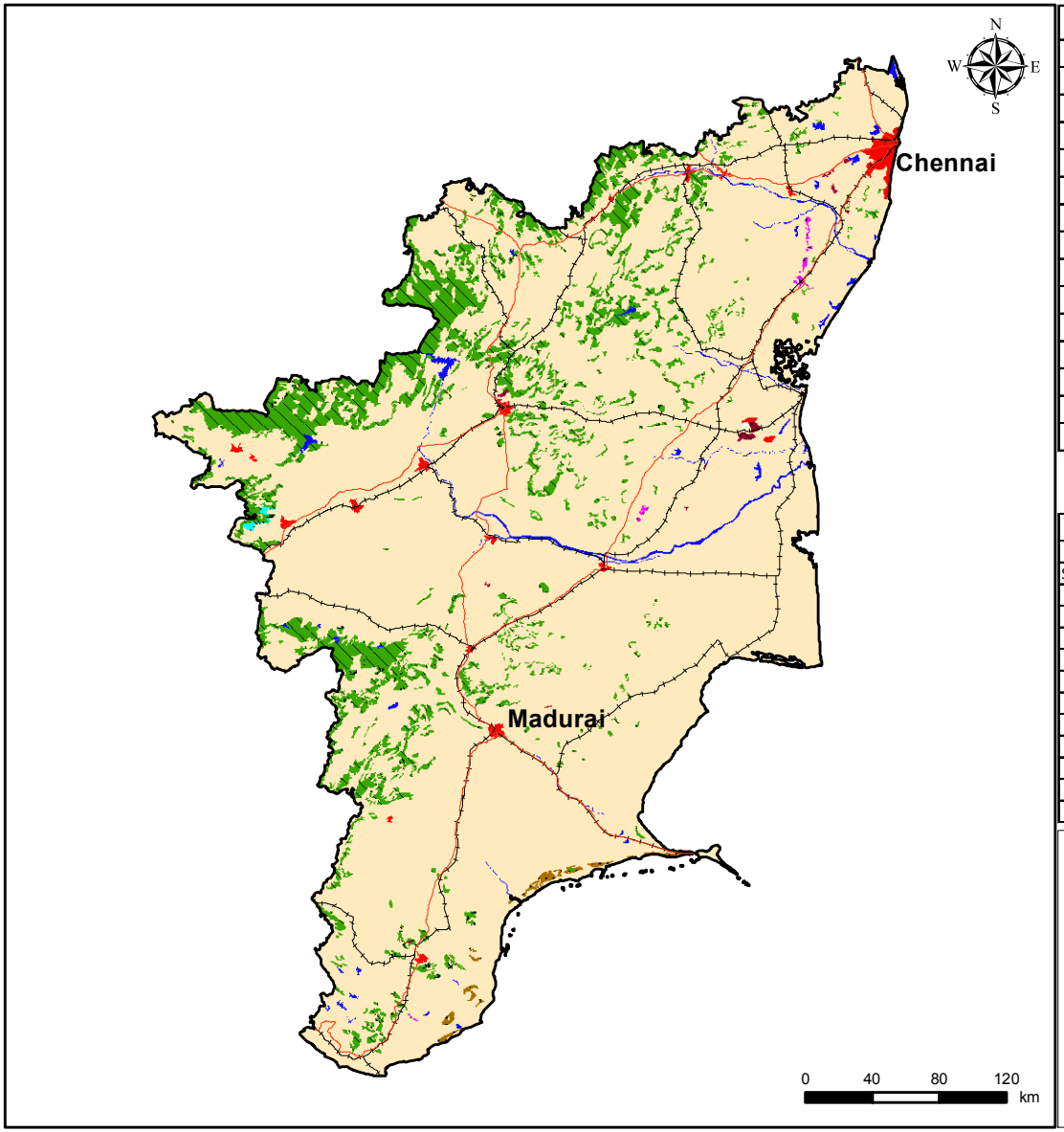


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Institute of Remote Sensing Anna University, Chennai
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
TAMIL NADU (2003-05)



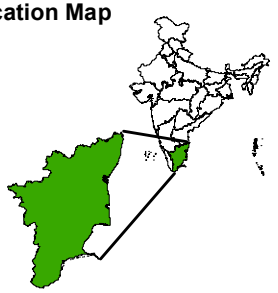
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw2	Agriculture irrigated, water erosion
	Sw1,2	Land with scrub, water erosion
	Ie1	Agriculture unirrigated, wind erosion
	Ee1	Dune / Sandy area, wind erosion
	Ds1	Agriculture unirrigated, salinity / alkalinity
	Ss1	Land with scrub, salinity / alkalinity
	Bs1	Barren, salinity / alkalinity
	Tm2	Others, man made
	R	Rocky
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

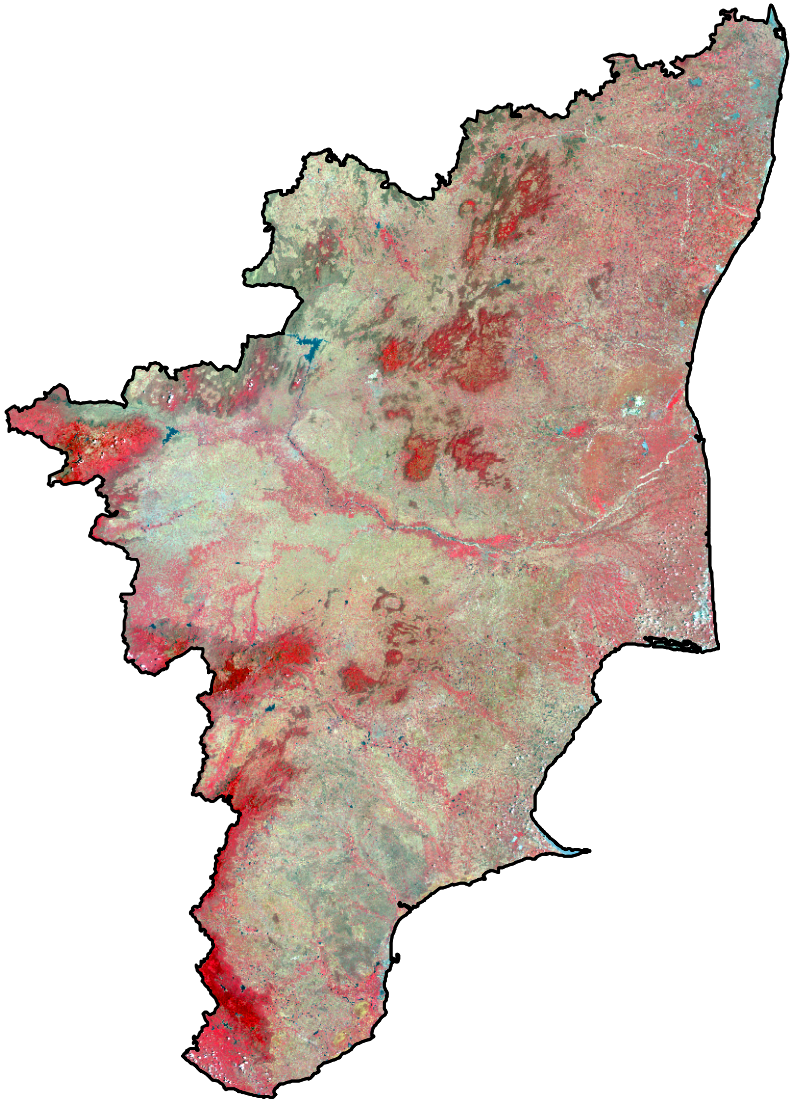


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

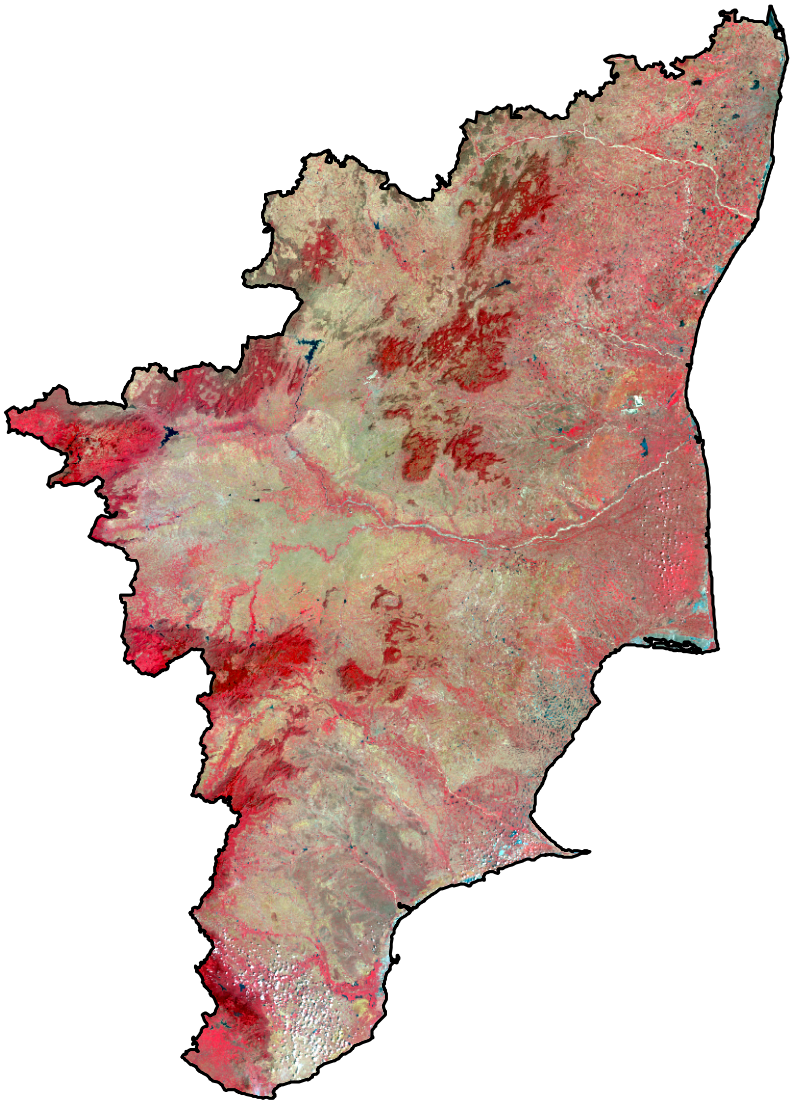
Prepared by:
Institute of Remote Sensing, Anna University, Chennai
&
Space Applications Centre,ISRO, Ahmedabad

TAMIL NADU - IRS AWiFS 2012



(IRS AWiFS, 20 March 2012)

TAMIL NADU - IRS AWiFS 2005



(IRS AWiFS, 13 February 2005)

Telangana

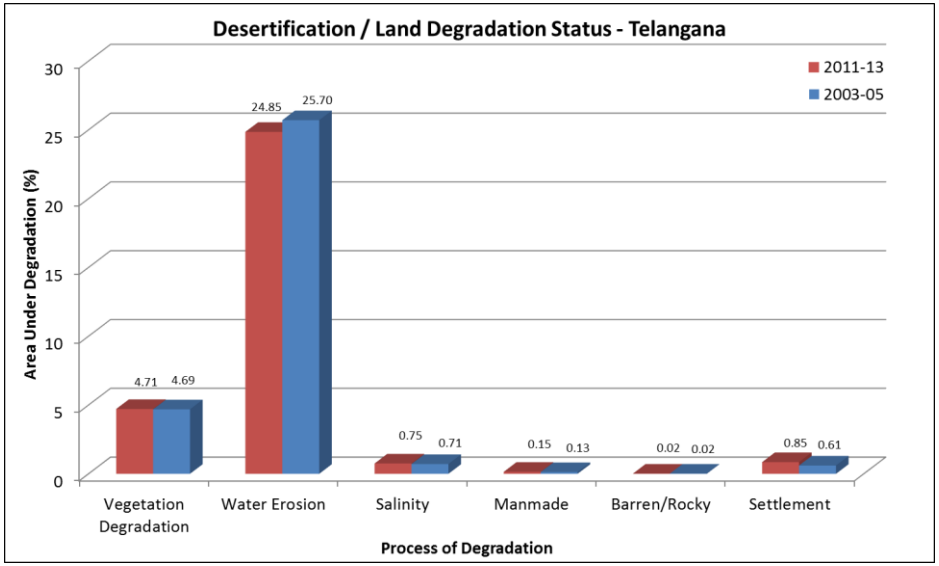
Telangana is the country's newest state formed on 2nd of June 2014. It is located in the south-central part of India spreading over 1,14,840 sq km area. The state has population of 3,51,93,978 with 306 population density, 988 sex ratio and 66.46% literacy (Census 2011). Hyderabad is the capital of Telangana.

Telangana is situated in the central stretch of the eastern seaboard of the Indian Peninsula. The area is divided into Eastern Ghats and the plains. The topography is characterised by undulating uplands with small erosional hills and depressions. The Deccan plateau is drained by two major rivers, Godavari and Krishna, with other minor rivers such as Manair, Bhima, Dindi, Kinnerasani, Manjeera, Peddavagu etc. Telangana experiences dry tropical climate with 10°C to 40°C temperature and low rainfall.

Telangana is observed with 31.34% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Telangana has decreased about 0.52% since 2003-05.

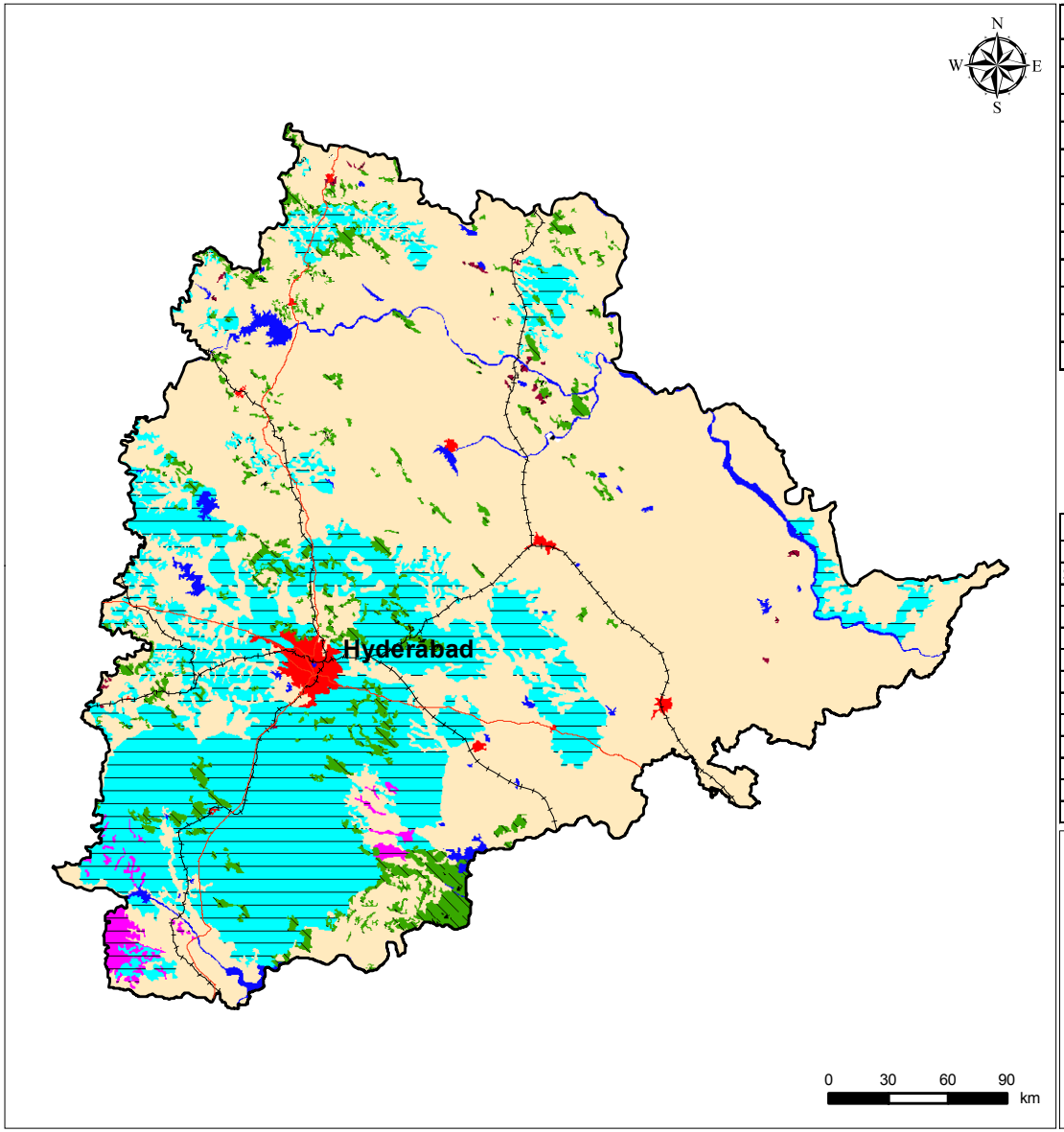
The most significant process of desertification/ land degradation in the state is Water Erosion (24.85% in 2011-13 and 25.70% in 2003-05) followed by Vegetation Degradation (4.71% in 2011-13 and 4.69 in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	541145	4.71	538533	4.69	2612
Water Erosion	2854285	24.85	2951871	25.70	-97586
Salinity	86514	0.75	81917	0.71	4597
Manmade	16982	0.15	14592	0.13	2390
Barren/Rocky	1979	0.02	1979	0.02	0
Settlement	97951	0.85	69591	0.61	28360
Total Area under Desertification	**3598856**	**31.34**	**3658482**	**31.86**	**-59626**
No Apparent Degradation	**7689491**	**66.96**	**7631019**	**66.45**	**58472**
Total Geographical Area (ha)	**11484000**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	334300	2.91	340728	2.97	-6428
2	Fv2	Forest, vegetation degradation, High	151049	1.32	142139	1.24	8909
3	Sv1	Land with scrub, vegetation degradation, Low	21774	0.19	20201	0.18	1573
4	Sv2	Land with scrub, vegetation degradation, High	34022	0.30	35464	0.31	-1442
5	Iw1	Agriculture irrigated, water erosion, Low	1775	0.02	1775	0.02	0
6	Dw1	Agriculture unirrigated, water erosion, Low	2838578	24.72	2936164	25.57	-97586
7	Sw1	Land with scrub, water erosion, Low	13932	0.12	13932	0.12	0
8	Ds1	Agriculture unirrigated, salinity / alkalinity, Low	86514	0.75	81917	0.71	4597
9	Tm1	Others, man made, Low	5463	0.05	5463	0.05	0
10	Tm2	Others, man made, High	11519	0.10	9129	0.08	2390
11	R	Rocky	1979	0.02	1979	0.02	0
12	S	Settlement	97951	0.85	69591	0.61	28360
Total Area Under Desertification/ Land Degradation			**3598856**	**31.34**	**3658482**	**31.86**	**-59626**
13	W	Water body/ Drainage	195653	1.70	194499	1.69	1154
14	NAD	No Apparent Degradation	7689491	66.96	7631019	66.45	58472
Total Geographical Area (ha)			**11484000**	**100**	**11484000**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
TELANGANA (2011-13)



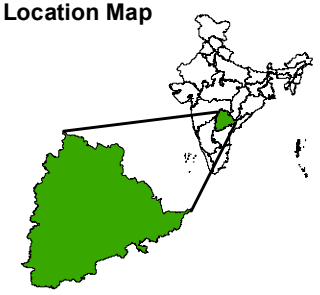
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Sw1	Land with scrub, water erosion
	Ds1	Agriculture unirrigated, salinity / alkalinity
	Tm1,2	Others, man made
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

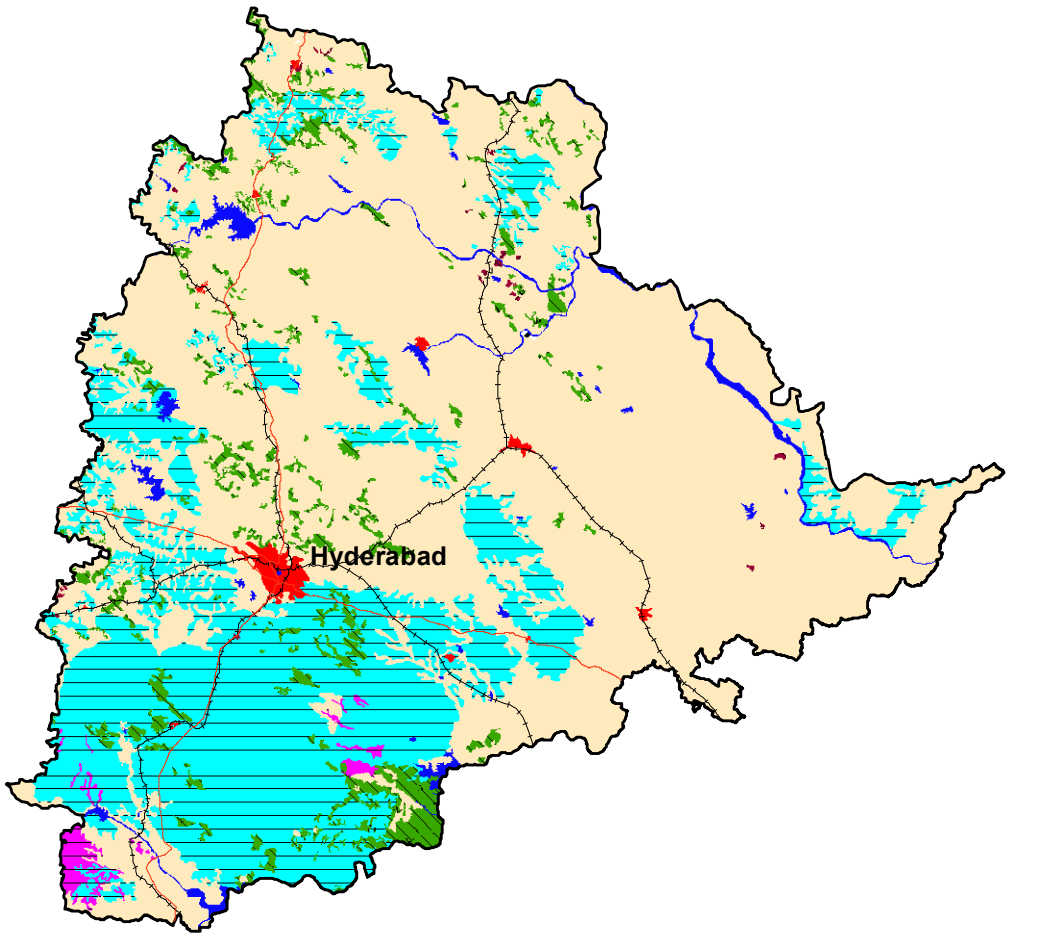


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
National Bureau of Soil Survey and Land Use Planning, Bengaluru
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
TELANGANA (2003-05)



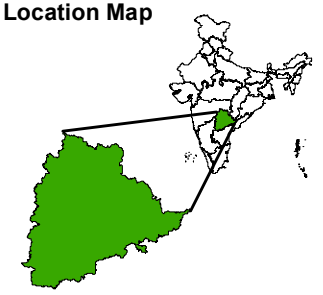
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Sw1	Land with scrub, water erosion
	Ds1	Agriculture unirrigated, salinity / alkalinity
	Tm1,2	Others, man made
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

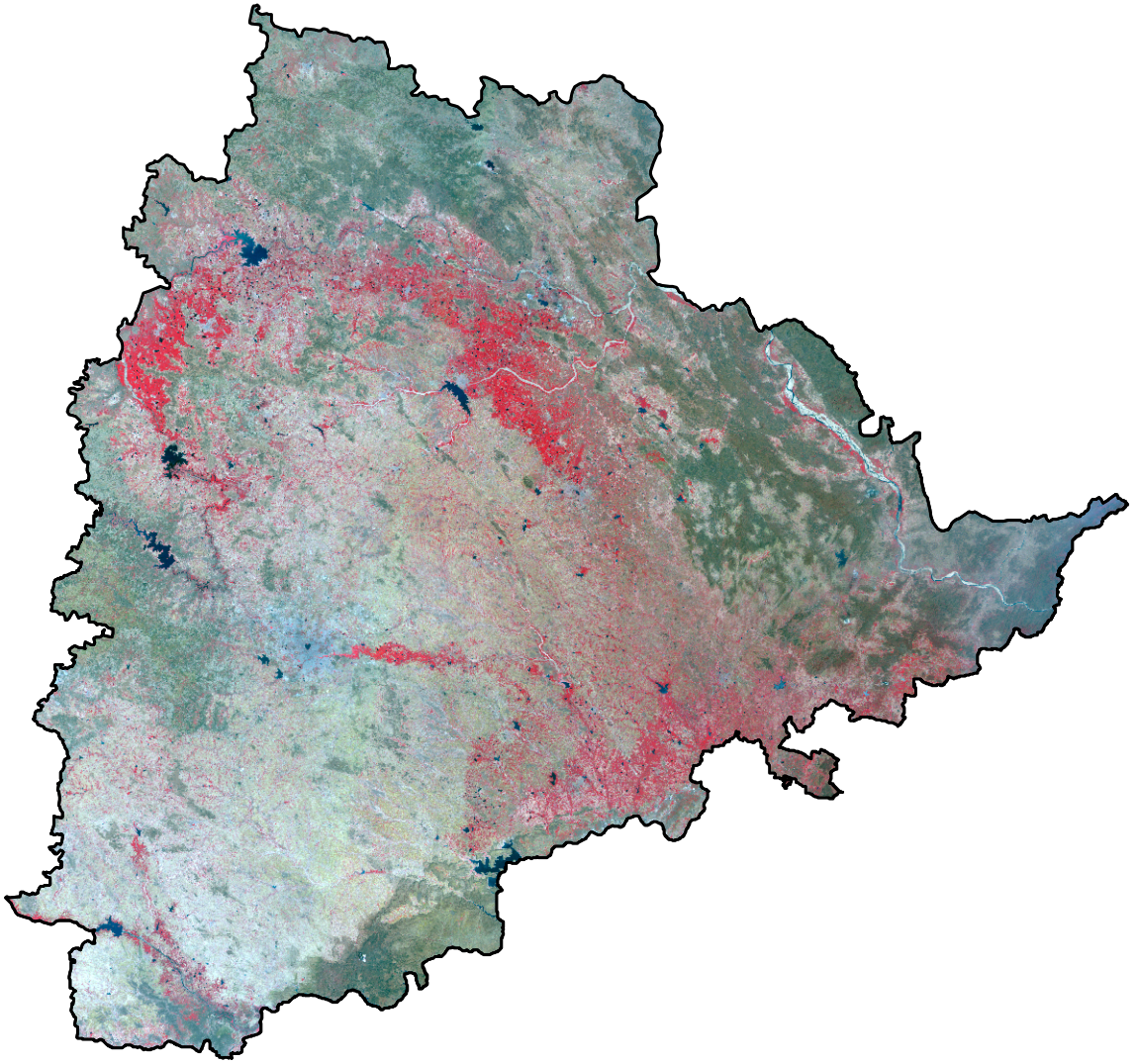


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

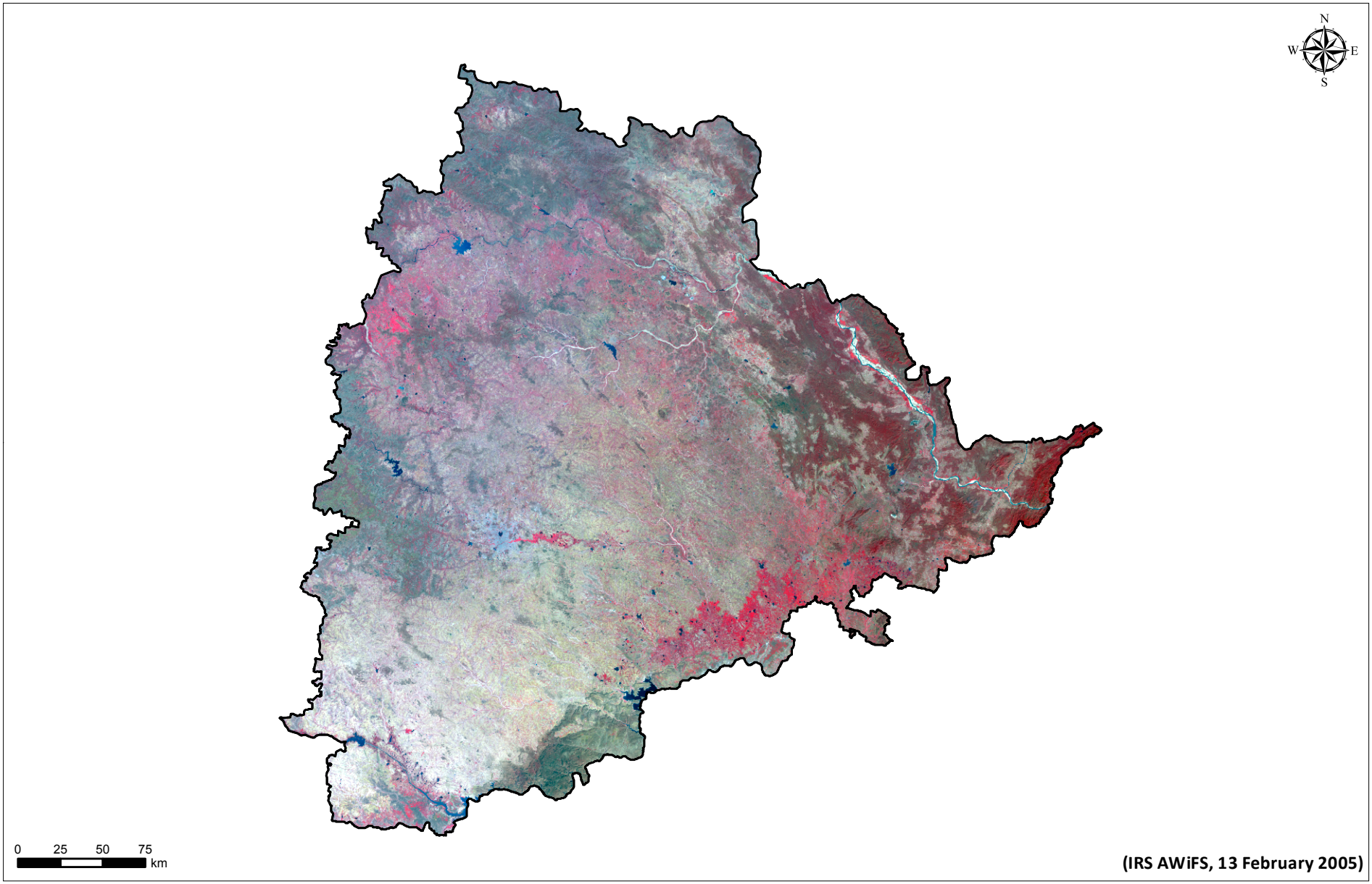
Prepared by:
National Bureau of Soil Survey and Land Use Planning, Bengaluru
&
Space Applications Centre,ISRO, Ahmedabad

TELANGANA - IRS AWiFS 2012



(IRS AWiFS, 20 March 2012)

TELANGANA - IRS AWiFS 2005



(IRS AWiFS, 13 February 2005)

Tripura

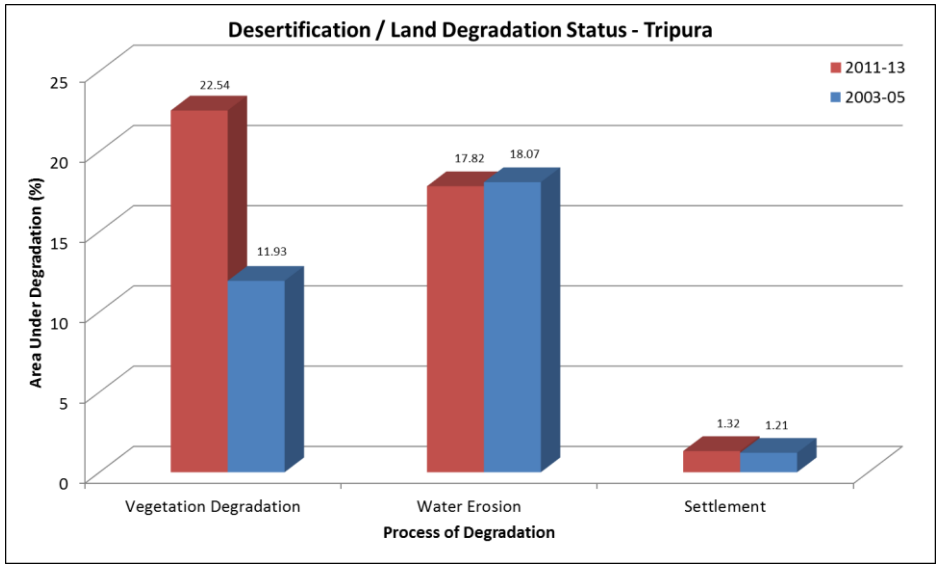
Tripura is one of the seven sisters' states of India bordering with Bangladesh and Myanmar; and covers 10,486 sq km area. The state has population of 36,73,917; with 350 population density, 960 sex ratio and 87.22% literacy (Census 2011). Agartala is the capital of Tripura.

Tripura is marked by two distinct geographical features like mountain ranges and alluvial plain. Major ranges are Deotamura, South Baramura and Atharamura hills. Burima, Gomati, Khowai, Howrah, Longai, Dhalai, Muhuri etc. are major rivers. The state experiences tropical climate with five distinct seasons. The state is high rainfall zone with the incidence of very high concentration of rainfall (up to 450 mm per day) in the monsoon season, with average annual rainfall of 2025 mm. The average annual temperature ranges from 15°C to 34°C with occasional thunderstorms in summer.

Tripura is the state with second highest increase in area under desertification/ land degradation in the country with respect to state TGA, i.e., 10.48% from 2003-05 to 2011-13. The state is observed with 41.69% and 31.21 area under desertification/ land degradation for period 2011-13 and 2003-05 respectively.

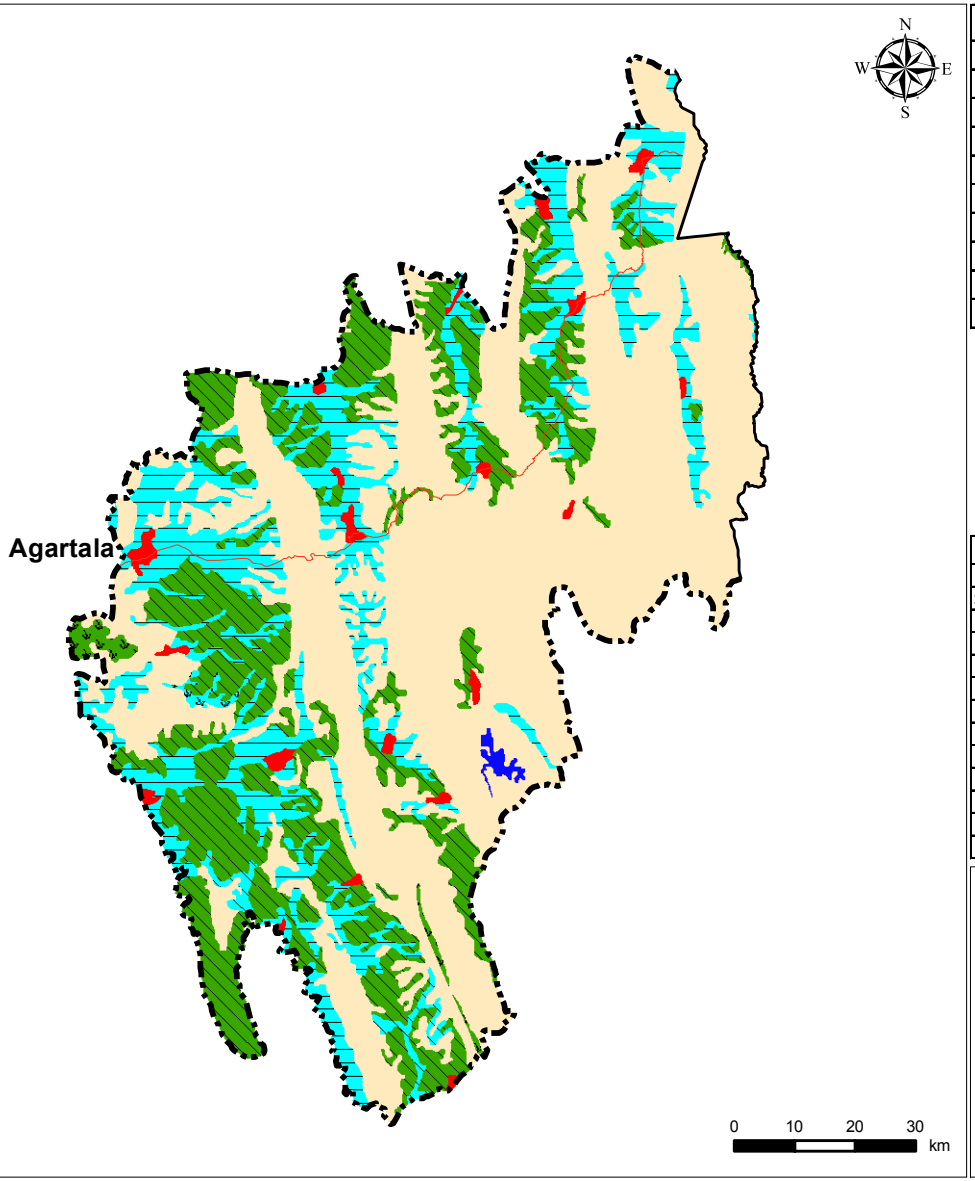
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (22.54% in 2011-13 and 11.93% in 2003-05) followed by Water Erosion (17.82% in 2011-13 and 18.07% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	236374	22.54	125058	11.93	111317
Water Erosion	186900	17.82	189533	18.07	-2633
Settlement	13854	1.32	12711	1.21	1143
Total Area under Desertification	**437128**	**41.69**	**327302**	**31.21**	**109826**
No Apparent Degradation	**608776**	**58.06**	**716717**	**68.35**	**-107941**
Total Geographical Area (ha)	**1048600**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	229444	21.88	122949	11.73	106495
2	Sv1	Land with scrub, vegetation degradation, Low	6931	0.66	2109	0.20	4822
3	Iw1	Agriculture irrigated, water erosion, Low	334	0.03	334	0.03	0
4	Dw1	Agriculture unirrigated, water erosion, Low	175260	16.71	177892	16.96	-2633
5	Fw1	Forest, water erosion, Low	8789	0.84	8789	0.84	0
6	Sw1	Land with scrub, water erosion, Low	2517	0.24	2517	0.24	0
7	S	Settlement	13854	1.32	12711	1.21	1143
Total Area Under Desertification/ Land Degradation			**437128**	**41.69**	**327302**	**31.21**	**109826**
13	W	Water body/ Drainage	2696	0.26	4581	0.44	-1885
14	NAD	No Apparent Degradation	608776	58.06	716717	68.35	-107941
Total Geographical Area (ha)			**1048600**	**100**	**1048600**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
TRIPURA (2011-13)



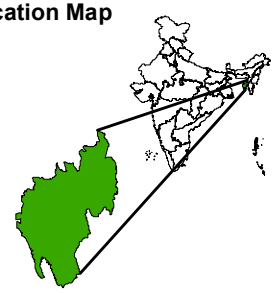
Legend

Symbol	Code	Description
	Fv1	Forest, vegetation degradation
	Sv1	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Fw1	Forest, water erosion
	Sw1	Land with scrub, water erosion
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

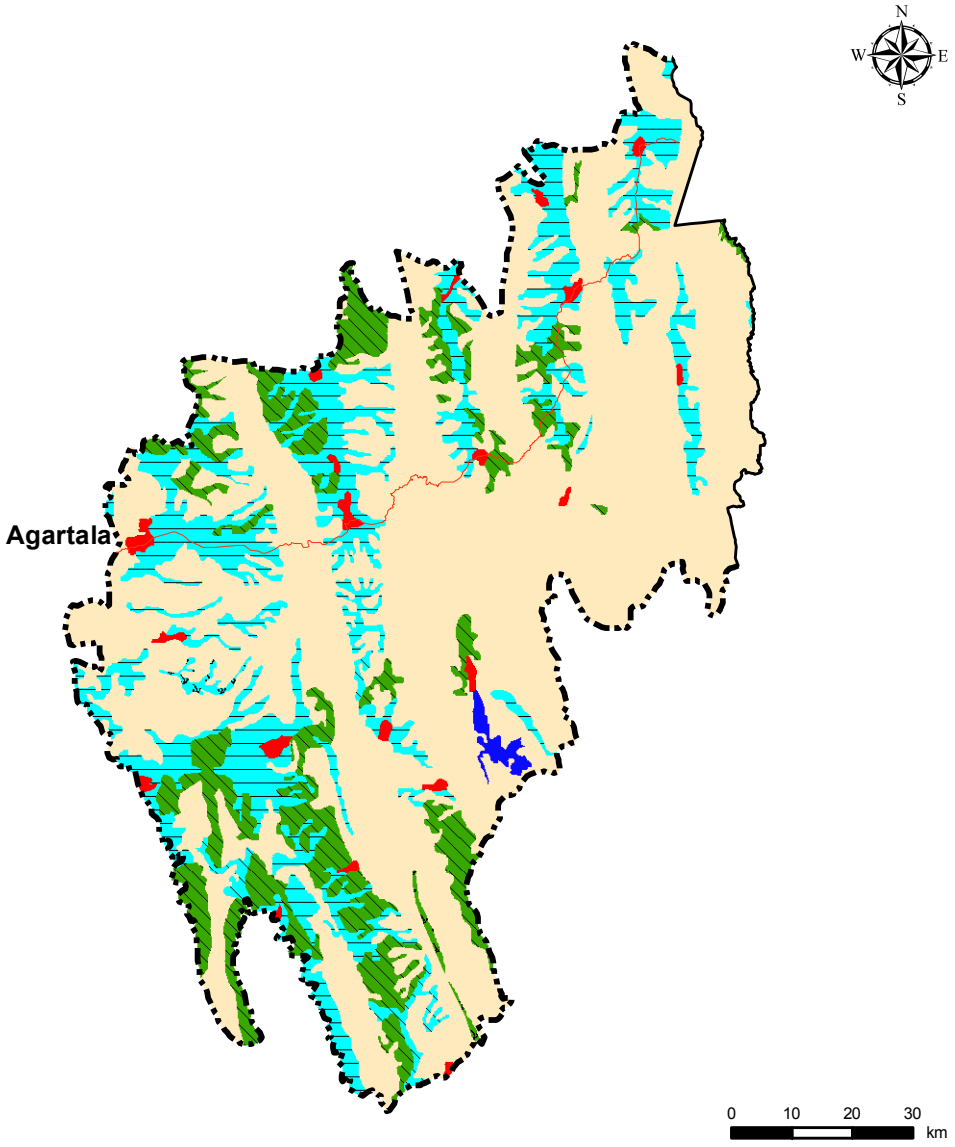


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS-P6 AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Mizoram Remote Sensing Applications Centre, Aizawl
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
TRIPURA (2003-05)



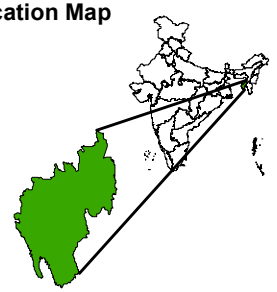
Legend

Symbol	Code	Description
	Fv1	Forest, vegetation degradation
	Sv1	Land with scrub, vegetation degradation
	Iw1	Agriculture irrigated, water erosion
	Dw1	Agriculture unirrigated, water erosion
	Fw1	Forest, water erosion
	Sw1	Land with scrub, water erosion
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

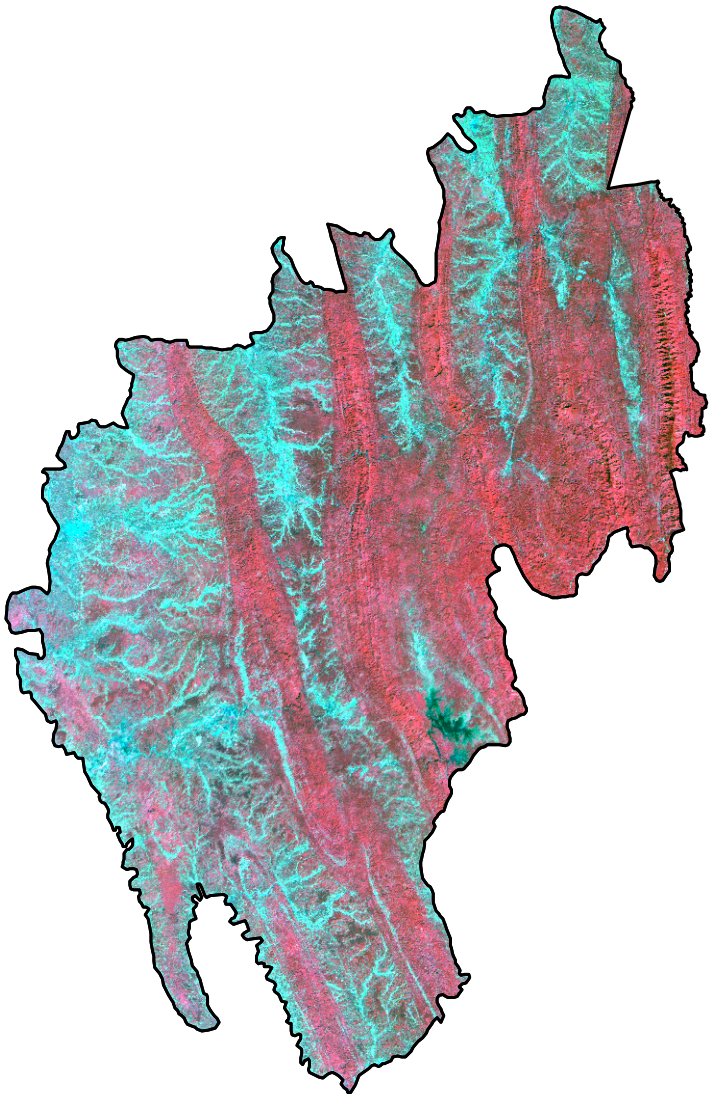


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

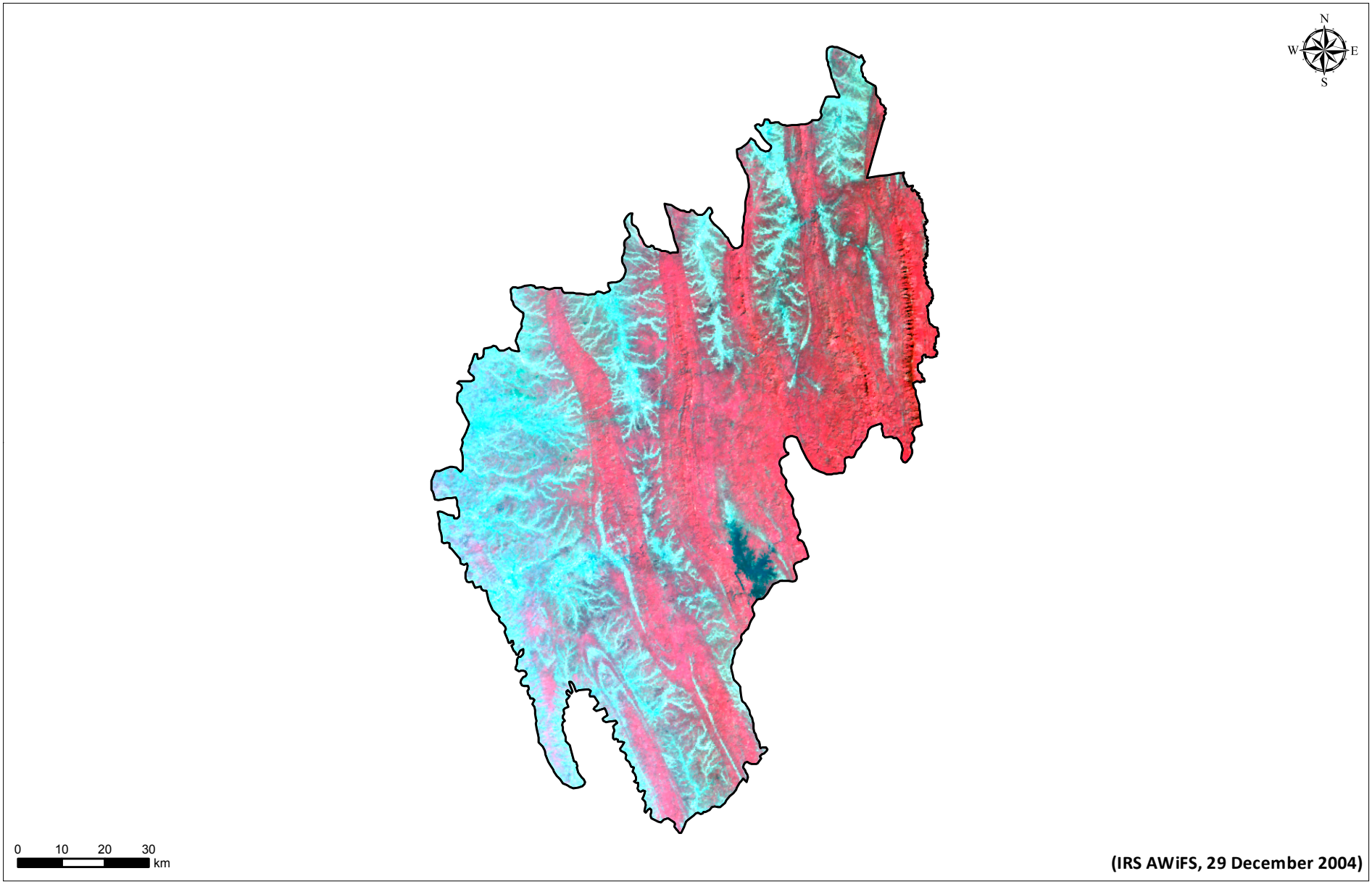
Prepared by:
Mizoram Remote Sensing Applications Centre, Aizawl
&
Space Applications Centre,ISRO, Ahmedabad

TRIPURA - IRS AWiFS 2011



(IRS AWiFS, 23 November 2011)

TRIPURA - IRS AWiFS 2004



(IRS AWiFS, 29 December 2004)

Uttar Pradesh

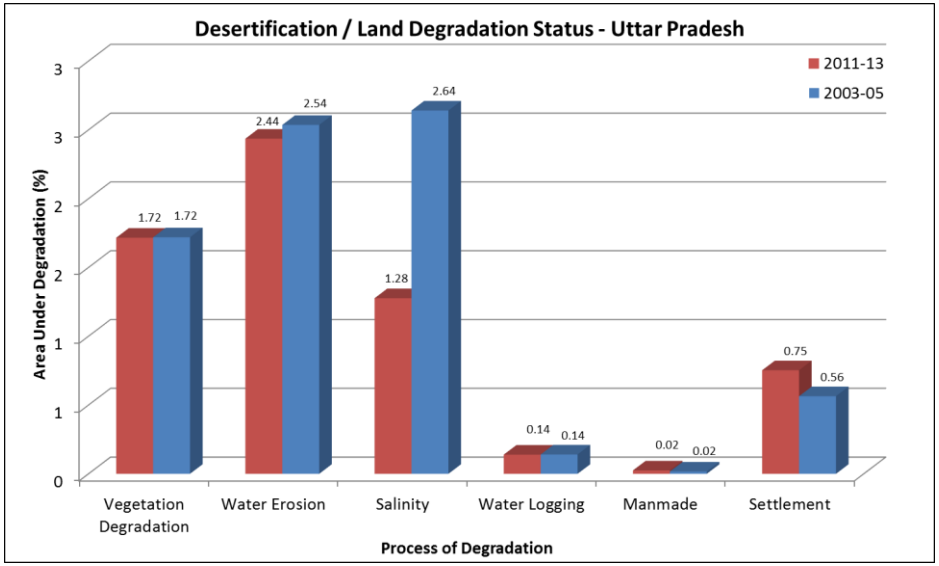
Uttar Pradesh is located in northern part of India bordering with Nepal; spreading over 2,40,928 sq km area and most populous state of the country with population of 19,98,12,341. The state has 829 population density, 912 sex ratio and 67.68% literacy (Census 2011). Lucknow is the capital of Uttar Pradesh.

Geographically Uttar Pradesh is divided into Shivalik foothills, Terai, Gangetic plains and Vindhya hills and plateau. The main rivers are Ganges, Yamuna, Ghaghara, Gandak, Koshi, Gomati, Ramganga etc. Soils of the state are very fertile. In southern bank of Ganges, few places are effected by water logging and sodicity. The climate of Uttar Pradesh is characterised by hot and dry summer and cold winter with average annual rainfall of 990 mm in monsoon.

Uttar Pradesh is the state with highest reclaimed land in the country with respect to state TGA, i.e., 1.27% (0.30 mha) from 2003-05 to 2011-13. The state is also third lowest in the country with 6.35% area under desertification/ land degradation for period 2011-13. The major land reclaimed is area effected by salinity.

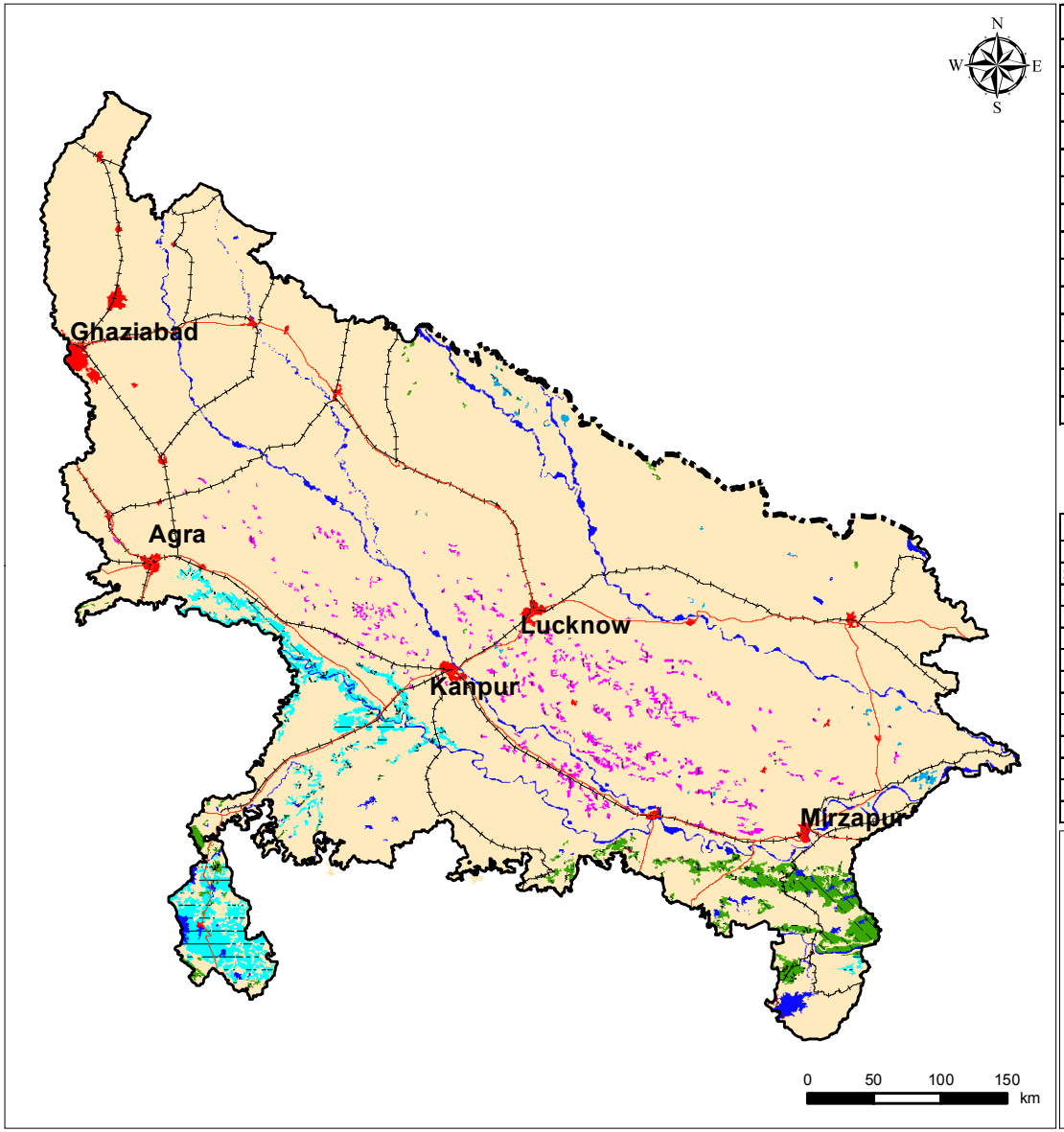
The most significant process of desertification/ land degradation in the state is Water Erosion (2.44% in 2011-13 and 2.54% in 2003-05) followed by Vegetation Degradation (1.72% both in 2011-13 and 2003-05) and Salinity (1.28% in 2011-13 and 2.64% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	413476	1.72	414176	1.72	-700
Water Erosion	586961	2.44	610989	2.54	-24027
Salinity	307571	1.28	636202	2.64	-328631
Water Logging	33620	0.14	33907	0.14	-287
Manmade	5970	0.02	4028	0.02	1941
Settlement	181399	0.75	135962	0.56	45437
Total Area under Desertification	**1528997**	**6.35**	**1835263**	**7.62**	**-306266**
No Apparent Degradation	**22115961**	**91.79**	**21831845**	**90.62**	**284116**
Total Geographical Area (ha)	**24092800**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	199183	0.83	198521	0.82	662
2	Fv2	Forest, vegetation degradation, High	16367	0.07	15788	0.07	580
3	Sv1	Land with scrub, vegetation degradation, Low	114276	0.47	114276	0.47	0
4	Sv2	Land with scrub, vegetation degradation, High	83650	0.35	85592	0.36	-1941
5	Dw1	Agriculture unirrigated, water erosion, Low	304830	1.27	336178	1.40	-31348
6	Fw1	Forest, water erosion, Low	88153	0.37	80753	0.34	7400
7	Fw2	Forest, water erosion, High	11984	0.05	11984	0.05	0
8	Sw1	Land with scrub, water erosion, Low	179392	0.74	179471	0.74	-79
9	Sw2	Land with scrub, water erosion, High	2603	0.01	2603	0.01	0
10	Is1	Agriculture irrigated, salinity / alkalinity, Low	287470	1.19	529570	2.20	-242099
11	Is2	Agriculture irrigated, salinity / alkalinity, High	18650	0.08	105182	0.44	-86532
12	Ds1	Agriculture unirrigated, salinity / alkalinity, Low	1450	0.01	1450	0.01	0
13	Il1	Agriculture irrigated, water logging, Low	11476	0.05	12158	0.05	-682
14	Il2	Agriculture irrigated, water logging, High	15342	0.06	14947	0.06	395
15	Fl1	Forest, water logging, Low	6802	0.03	6802	0.03	0
16	Tm1	Others, man made, Low	3110	0.01	1781	0.01	1330
17	Tm2	Others, man made, High	2859	0.01	2248	0.01	611
18	S	Settlement	181399	0.75	135962	0.56	45437
Total Area Under Desertification/ Land Degradation			**1528997**	**6.35**	**1835263**	**7.62**	**-306266**
21	W	Water body/ Drainage	447842	1.86	425692	1.77	22150
22	NAD	No Apparent Degradation	22115961	91.79	21831845	90.62	284116
Total Geographical Area (ha)			**24092800**	**100**	**24092800**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
UTTAR PRADESH (2011-13)



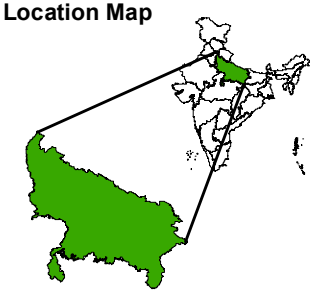
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Fw1,2	Forest, water erosion
	Sw1,2	Land with scrub, water erosion
	Is1,2	Agriculture irrigated, salinity / alkalinity
	Ds1	Agriculture unirrigated, salinity / alkalinity
	Il1,2	Agriculture irrigated, water logging
	Fl1	Forest, water logging
	Tm1,2	Others, man made
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

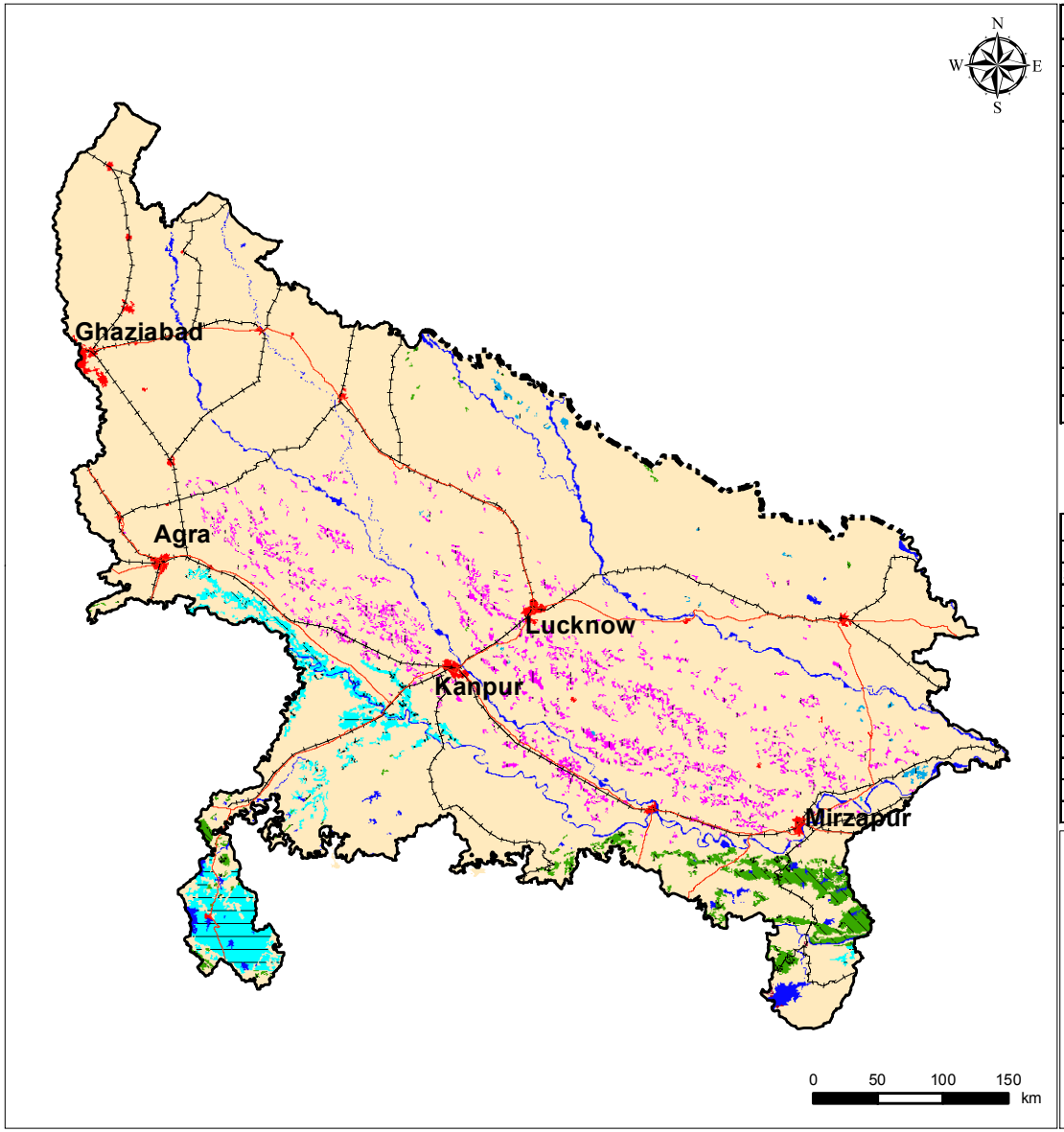


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
UP Remote Sensing Applications Centre, Lucknow
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
UTTAR PRADESH (2003-05)



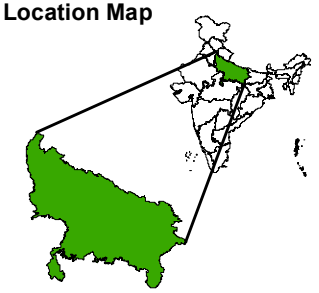
Legend

Symbol	Code	Description
	Fv1,2	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Fw1,2	Forest, water erosion
	Sw1,2	Land with scrub, water erosion
	Is1,2	Agriculture irrigated, salinity / alkalinity
	Ds1	Agriculture unirrigated, salinity / alkalinity
	Il1,2	Agriculture irrigated, water logging
	Fl1	Forest, water logging
	Tm1,2	Others, man made
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

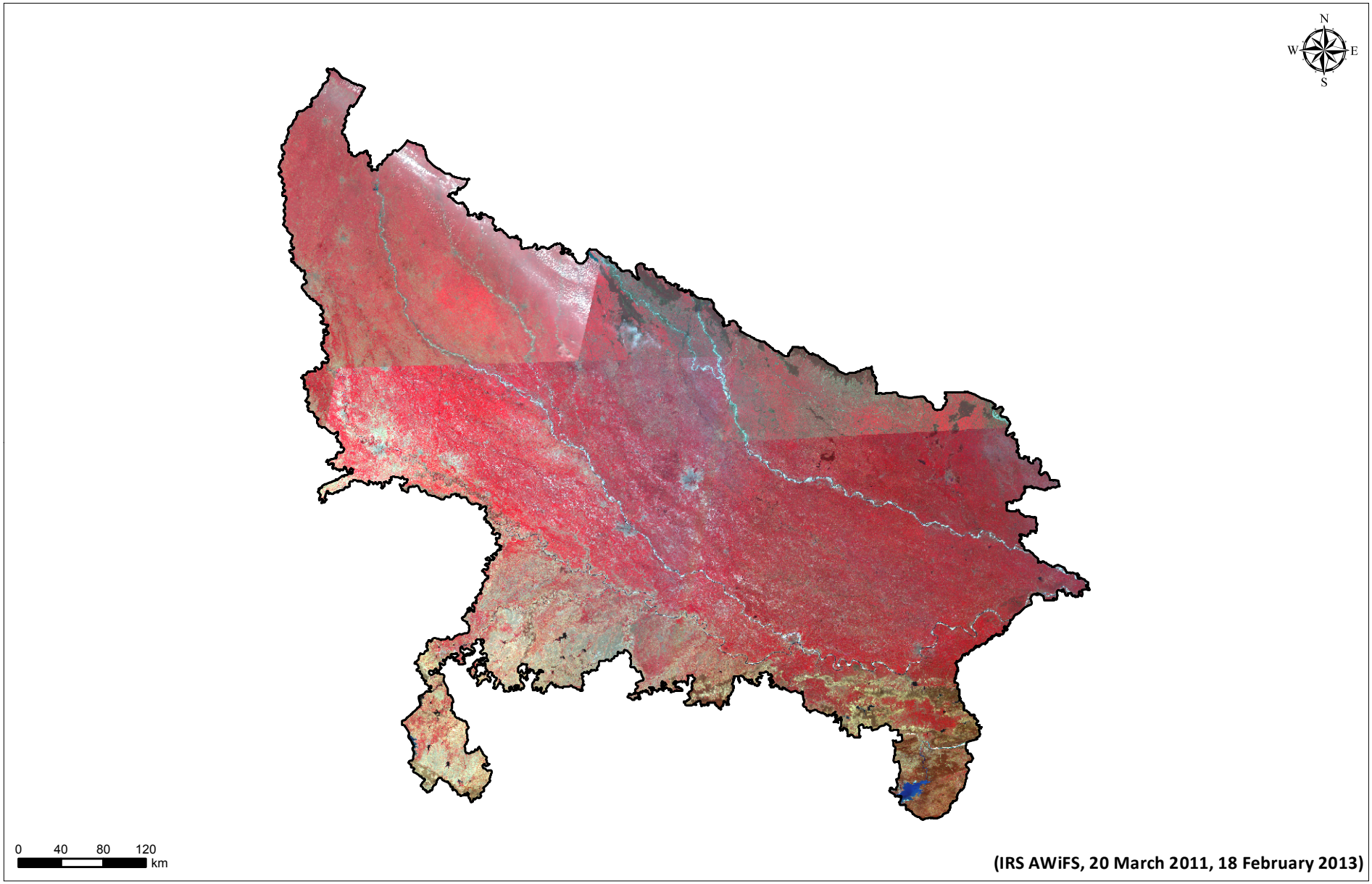


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

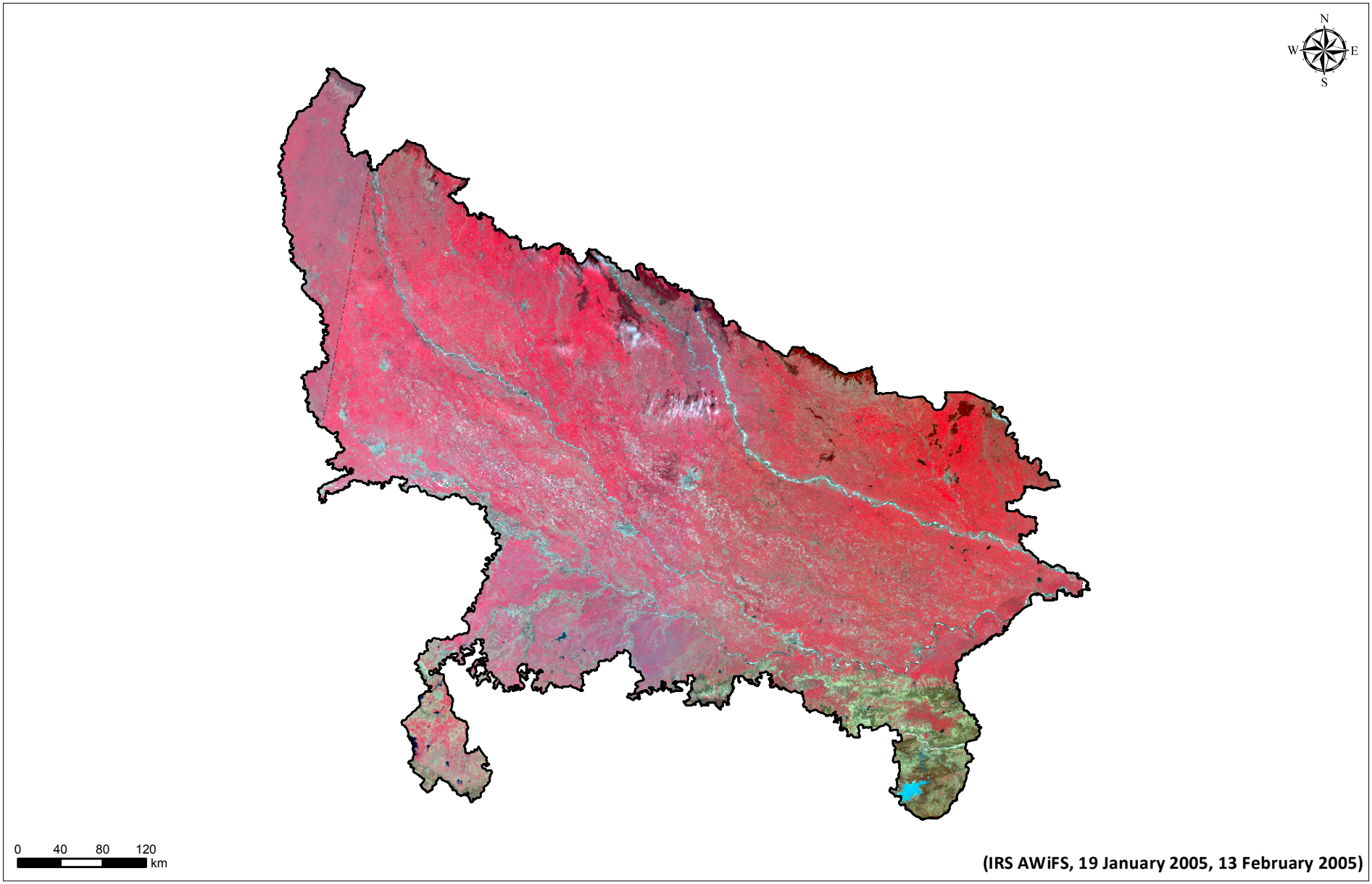
Prepared by:
UP Remote Sensing Applications Centre, Lucknow
&
Space Applications Centre,ISRO, Ahmedabad

UTTAR PRADESH - IRS AWiFS 2011-2013



(IRS AWiFS, 20 March 2011, 18 February 2013)

UTTAR PRADESH - IRS AWiFS 2005



(IRS AWiFS, 19 January 2005, 13 February 2005)

Uttarakhand

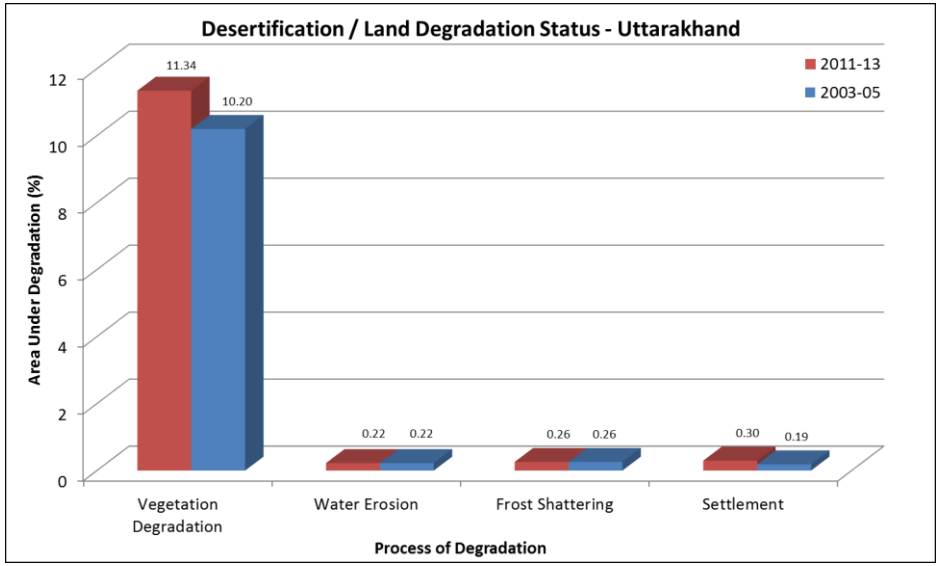
Uttarakhand is located in northern part of India bordering with China and Nepal, with 53,483 sq km area. The state has population of 1,00,86,292; with 189 population density, 963 sex ratio and 78.82% literacy (Census 2011). Dehradun is the capital of Uttarakhand.

Most of the northern parts of the state are part of Greater Himalaya ranges with Nanda Devi (7816 m) as the highest peak, covered by the high Himalayan peaks and glaciers, while the lower foothills are densely forested. Two of India's mightiest rivers, the Ganges and the Yamuna originates from the glaciers of Uttarakhand, namely Gangotri and Yamunotri respectively. The climate of Uttarakhand is of humid sub-tropical type with cool summer and very cold winter. The northern part of the state experiences heavy snowfall in winter season.

Uttarakhand is observed with 12.12% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in Uttarakhand has increased by 1.25% since 2003-05.

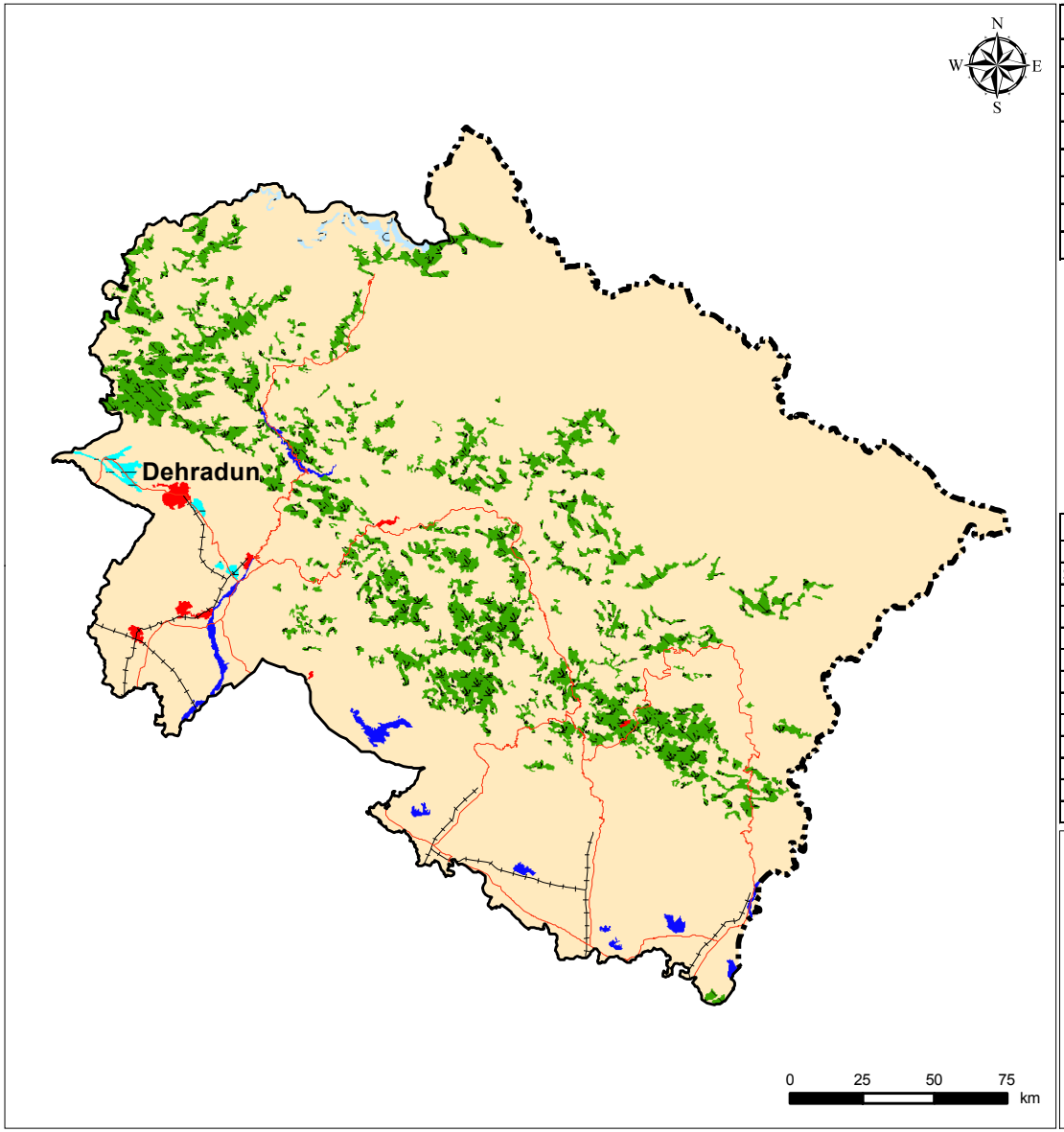
The most significant process of desertification/ land degradation in the state is Vegetation Degradation (11.34% in 2011-13 and 10.20% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	606616	11.34	545610	10.20	61007
Water Erosion	11943	0.22	11943	0.22	0
Frost Shattering	13786	0.26	13786	0.26	0
Settlement	15908	0.30	9903	0.19	6004
Total Area under Desertification	**648253**	**12.12**	**581241**	**10.87**	**67011**
No Apparent Degradation	**4667750**	**87.28**	**4738936**	**88.61**	**-71185**
Total Geographical Area (ha)	**5348300**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	145903	2.73	138613	2.59	7290
2	Sv1	Land with scrub, vegetation degradation, Low	432038	8.08	392530	7.34	39508
3	Sv2	Land with scrub, vegetation degradation, High	28675	0.54	14467	0.27	14208
4	Dw1	Agriculture unirrigated, water erosion, Low	11943	0.22	11943	0.22	0
5	Lf2	Periglacial, frost shattering, High	13786	0.26	13786	0.26	0
6	S	Settlement	15908	0.30	9903	0.19	6004
Total Area Under Desertification/ Land Degradation			**648253**	**12.12**	**581241**	**10.87**	**67011**
13	W	Water body/ Drainage	32297	0.60	28123	0.53	4174
14	NAD	No Apparent Degradation	4667750	87.28	4738936	88.61	-71185
Total Geographical Area (ha)			**5348300**	**100**	**5348300**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS
UTTARAKHAND (2011-13)



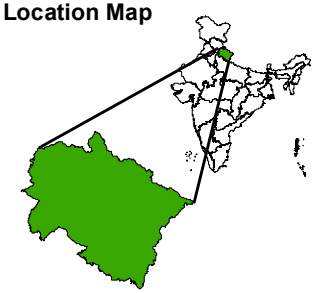
Legend

Symbol	Code	Description
	Fv1	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Lf2	Periglacial, frost shattering
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
	I	Agriculture irrigated		v	vegetation degradation	1	Low
	D	Agriculture unirrigated		w	water erosion	2	High
	F/P	Forest / Plantation		e	wind erosion		
	G	Grassland / Grazing land		s/a	salinity / alkalinity		
	S	Land with scrub		l	water logging		
	B	Barren		g	mass movement		
	R	Rocky area		h	frost heaving		
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

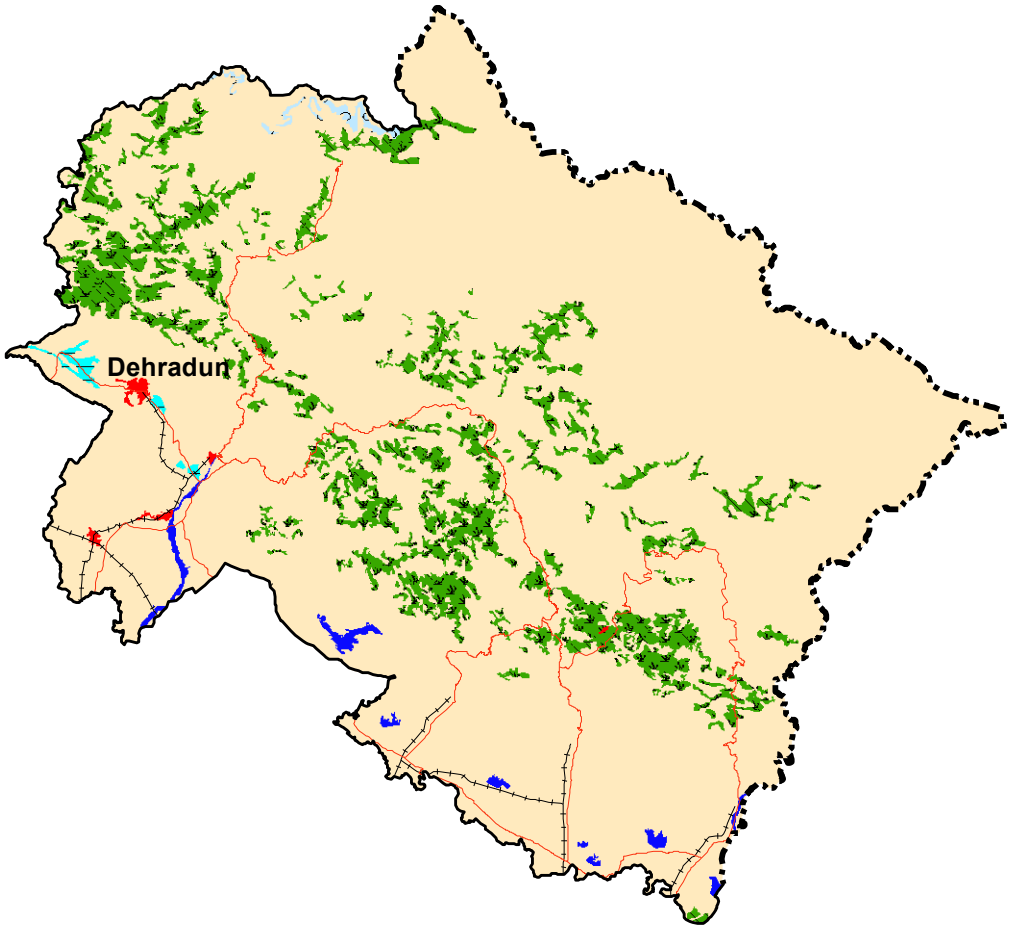


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
Soil and Land Use Survey of India, New Delhi
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS
UTTARAKHAND (2003-05)



Legend

Symbol	Code	Description
	Fv1	Forest, vegetation degradation
	Sv1,2	Land with scrub, vegetation degradation
	Dw1	Agriculture unirrigated, water erosion
	Lf2	Periglacial, frost shattering
	S	Settlement
	W	Water body / Drainage
	NAD	No Apparent Degradation

Classification System

Land use / Land cover			Process of Degradation			Severity	
Symbol	Code	Description	Symbol	Code	Description	Code	Description
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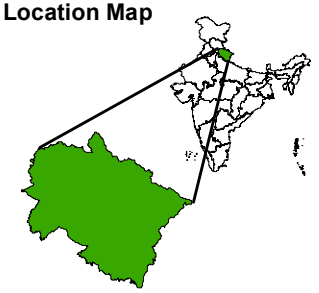
	E	Dune / Sandy area		f	frost shattering		
	C	Glacial		m	man made		
	L	Periglacial					
	T	Others					

Location Map

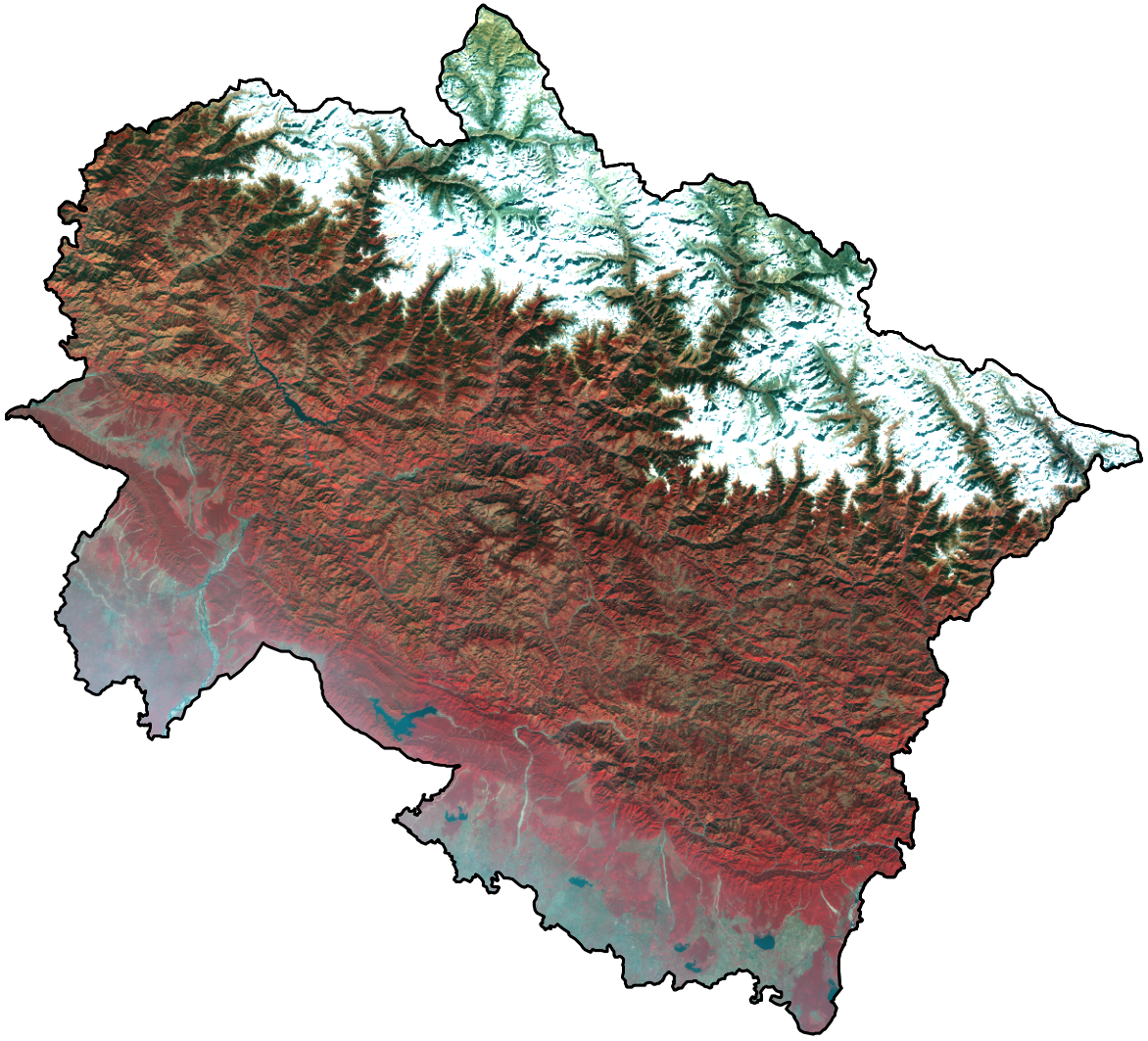


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2003 - 2005)
- Ancillary Information

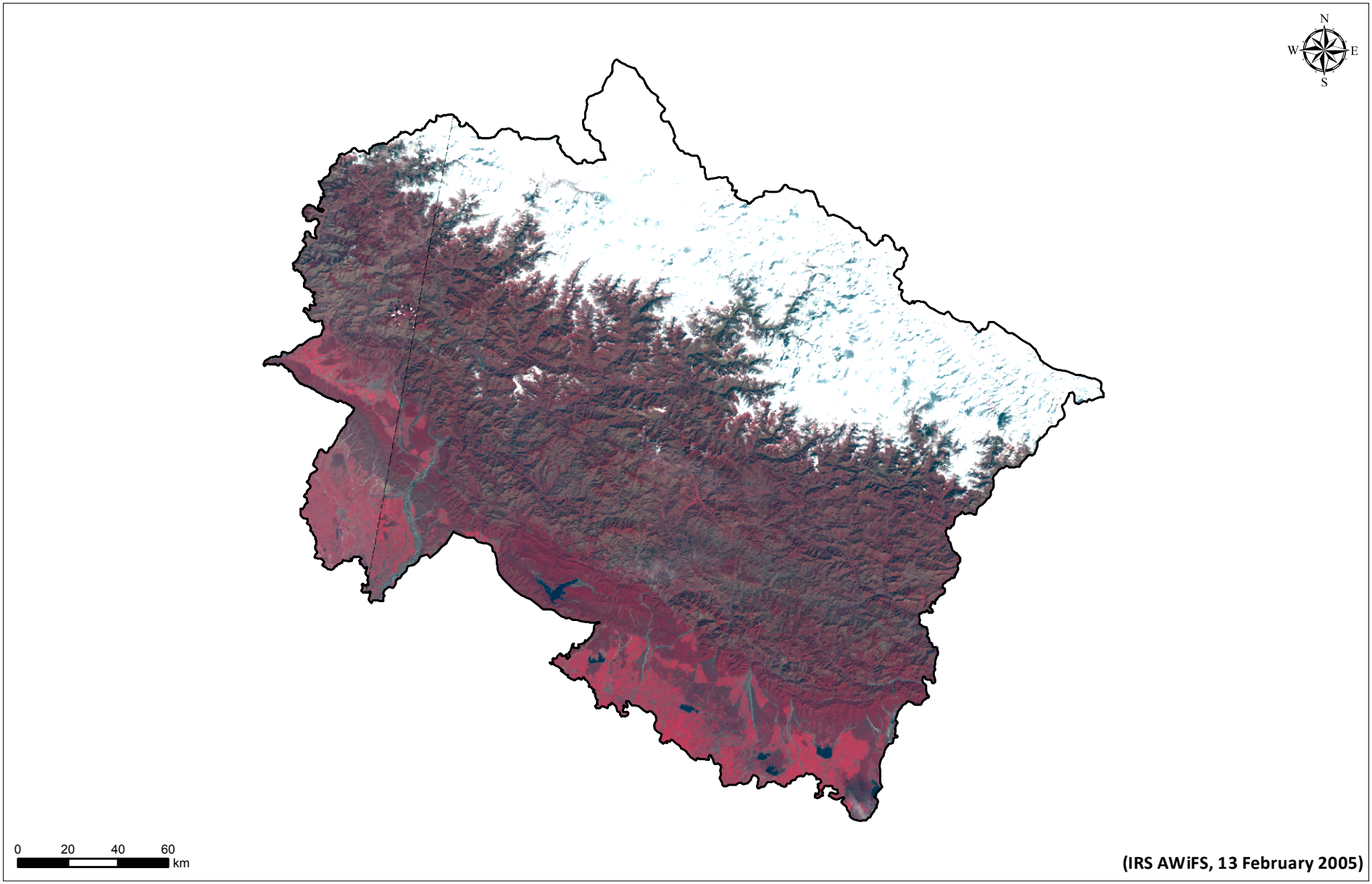
Prepared by:
Soil and Land Use Survey of India, New Delhi
&
Space Applications Centre,ISRO, Ahmedabad

UTTARAKHAND - IRS AWiFS 2012



(IRS AWiFS, 12 November 2012)

UTTARAKHAND - IRS AWiFS 2005



(IRS AWiFS, 13 February 2005)

West Bengal

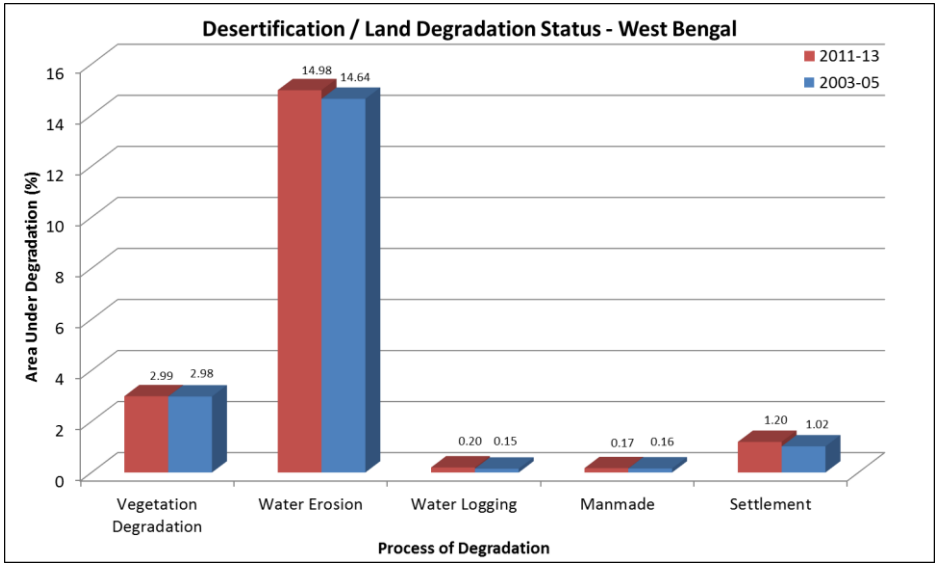
West Bengal is situated in eastern part of India with 88,752 sq km area. The state has population of 9,12,76,115; with 1028 population density, 950 sex ratio and 76.26% literacy (Census 2011). Kolkata is the capital of West Bengal.

The geography of West Bengal includes the Darjeeling Himalayan hill region, Terai, undulating plateau, fertile alluvial plain and Sundarbans delta. Ganges, Damodar, Kangsabati and Bhagirathi-Hooghly are the major rivers. The Gangetic plain is rich in alluvial soil and thus is very fertile and suitable for agriculture. The state experiences a tropical-monsoon climate, exhibiting six diverse seasons distinctly. The temperature varies between 15°C - 45°C with rainfall of about 1000 mm and sudden western disturbances in hot summer.

West Bengal is observed with 19.54% of the total geographical area under desertification/ land degradation for the period of 2011-13. The desertification/ land degradation area in West Bengal has increased about 0.59% since 2003-05.

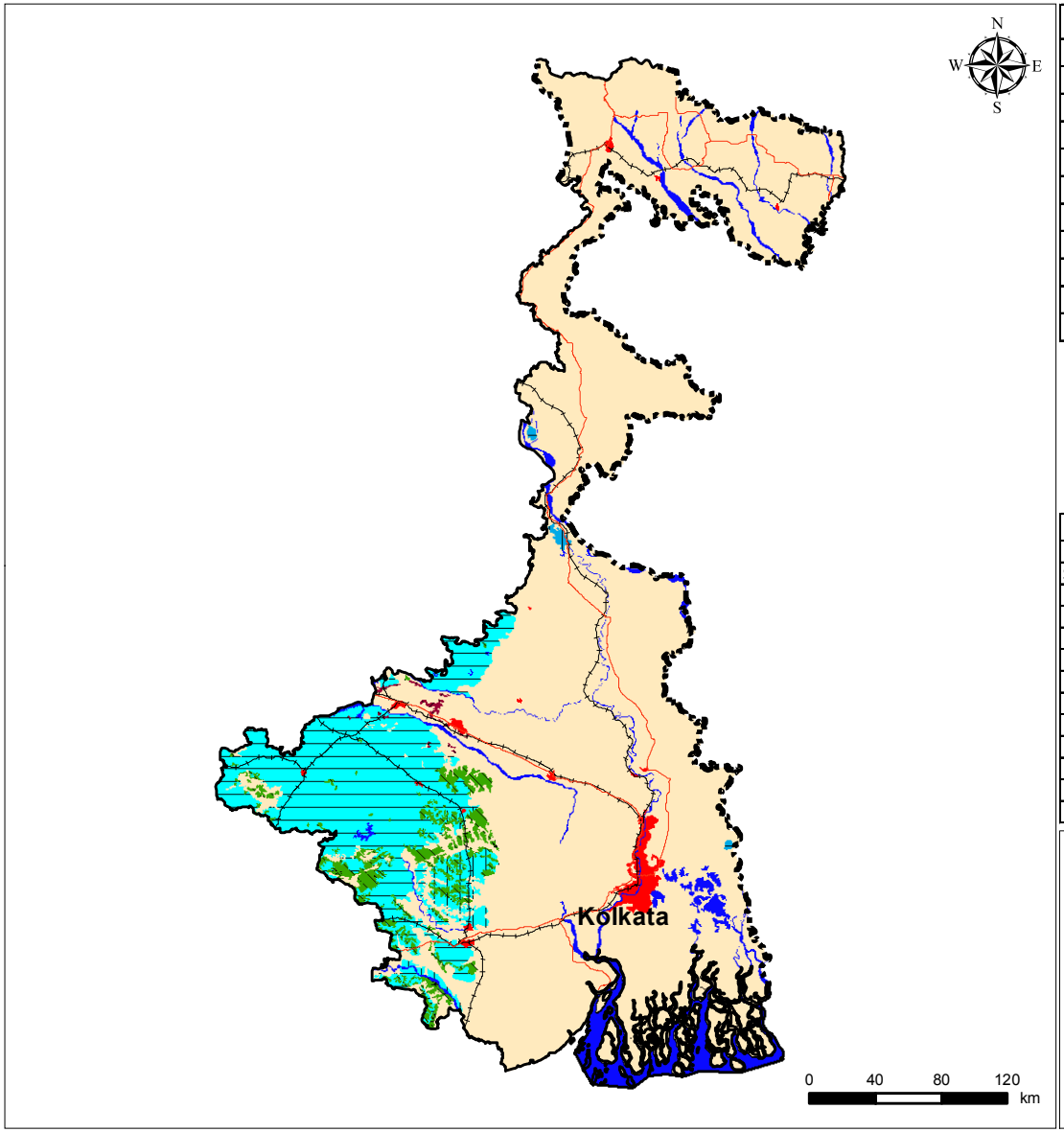
The most significant process of desertification/ land degradation in the state is Water Erosion (14.98% in 2011-13 and 14.64% in 2003-05) followed by Vegetation Degradation (2.99% in 2011-13 and 2.98% in 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Vegetation Degradation	265277	2.99	264325	2.98	951
Water Erosion	1329539	14.98	1299542	14.64	29997
Water Logging	17627	0.20	13261	0.15	4366
Manmade	15102	0.17	14112	0.16	991
Settlement	106386	1.20	90941	1.02	15444
Total Area under Desertification	**1733931**	**19.54**	**1682181**	**18.95**	**51749**
No Apparent Degradation	**6884910**	**77.57**	**6926022**	**78.04**	**-41112**
Total Geographical Area (ha)	**8875200**				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Low	247422	2.79	246470	2.78	951
2	Fv2	Forest, vegetation degradation, High	1466	0.02	1466	0.02	0
3	Sv1	Land with scrub, vegetation degradation, Low	16389	0.18	16389	0.18	0
4	Iw1	Agriculture irrigated, water erosion, Low	109606	1.23	109606	1.23	0
5	Dw1	Agriculture unirrigated, water erosion, Low	1219933	13.75	1189936	13.41	29997
6	Il1	Agriculture irrigated, water logging, Low	10203	0.11	10203	0.11	0
7	Dl1	Agriculture unirrigated, water logging, Low	7425	0.08	3058	0.03	4366
8	Tm1	Others, man made, Low	15102	0.17	14112	0.16	991
9	S	Settlement	106386	1.20	90941	1.02	15444
Total Area Under Desertification/ Land Degradation			**1733931**	**19.54**	**1682181**	**18.95**	**51749**
21	W	Water body/ Drainage	256359	2.89	266997	3.01	-10638
22	NAD	No Apparent Degradation	6884910	77.57	6926022	78.04	-41112
Total Geographical Area (ha)			**8875200**	**100**	**8875200**	**100**	

DESERTIFICATION / LAND DEGRADATION STATUS MAP
WEST BENGAL (2011-13)



Legend

Symbol	Code	Description
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Classification System

Land use / Land cover			Process of Degradation			Severity	
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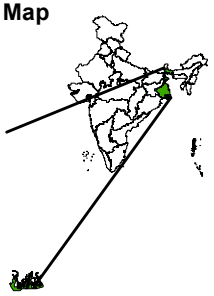
	T	Others					

Location Map

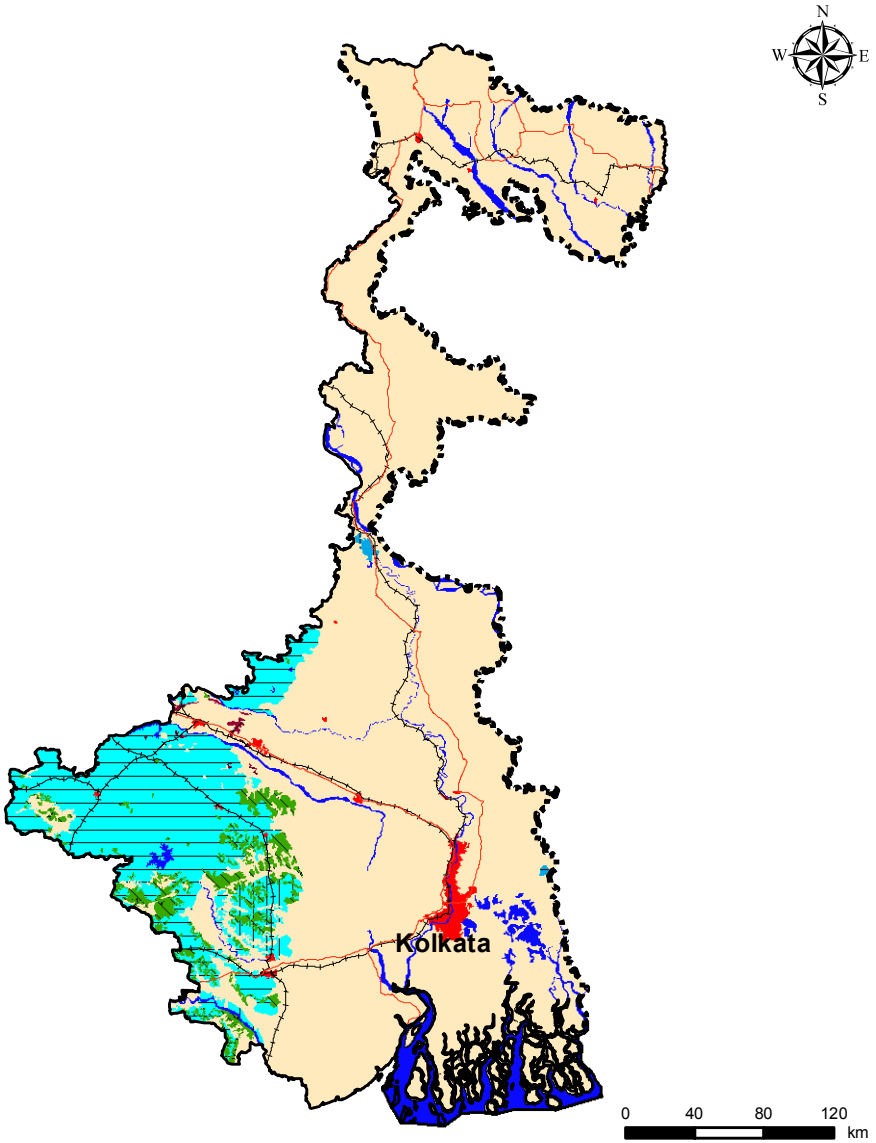


	International boundary
	State boundary
	Major roads
	Rail

Data Source:
- IRS AWiFS (2011 - 2013)
- Ancillary Information

Prepared by:
University of Calcutta, Kolkata
&
Space Applications Centre,ISRO, Ahmedabad

DESERTIFICATION / LAND DEGRADATION STATUS MAP
WEST BENGAL (2003-05)



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	Tm1	Others, man made
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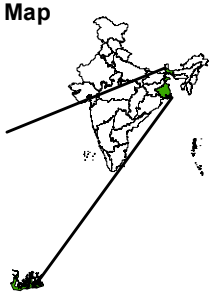

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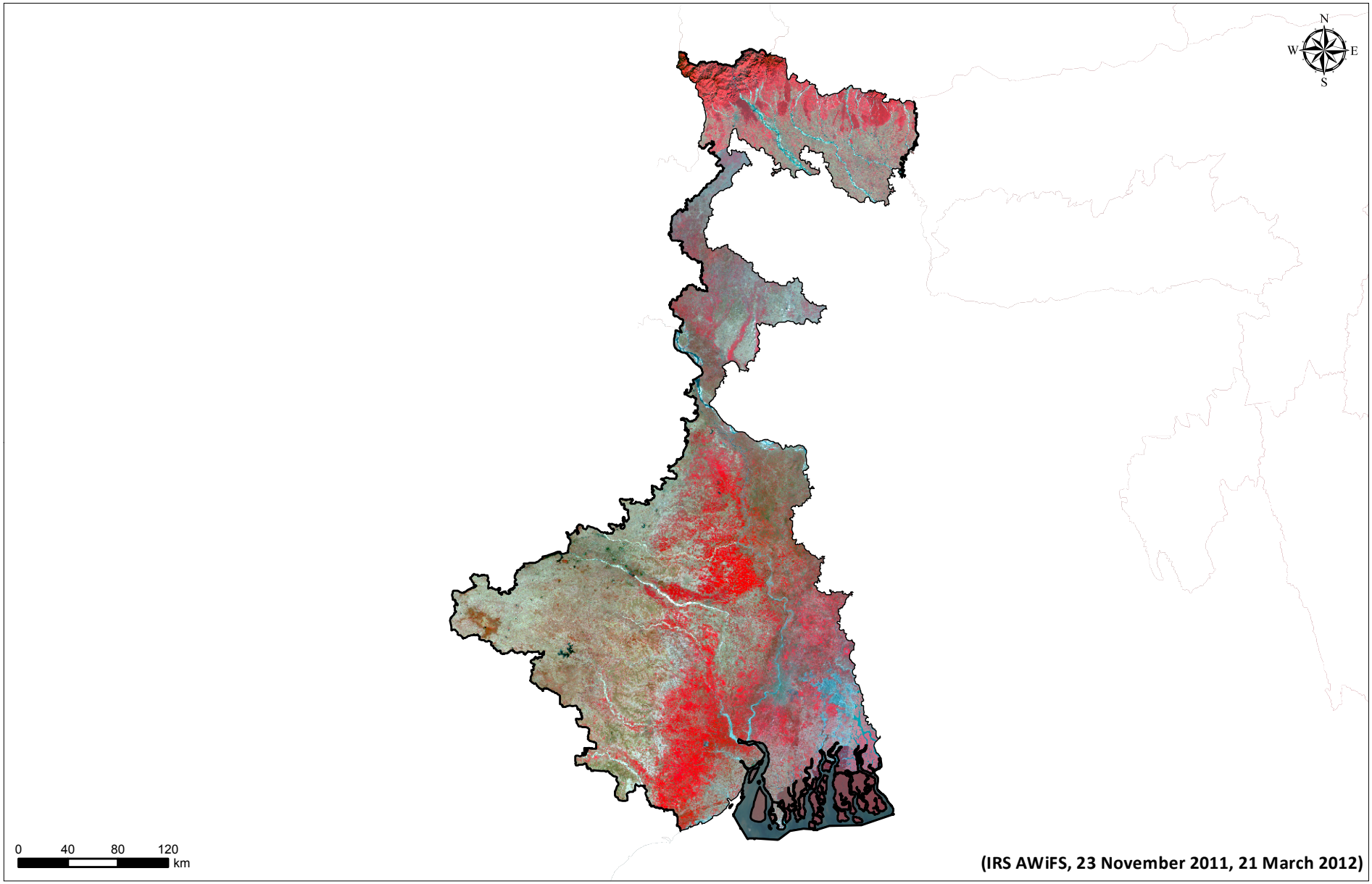
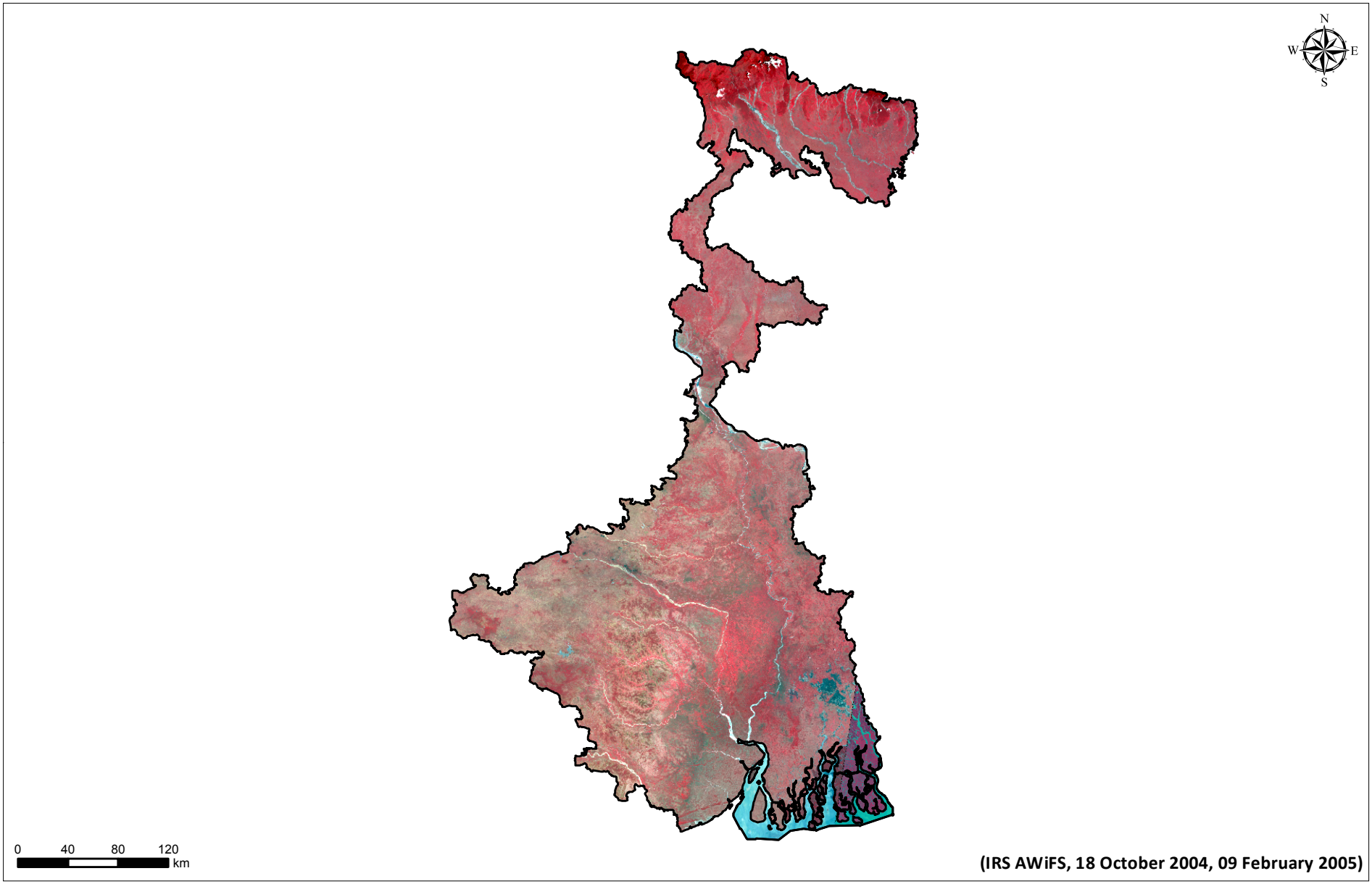
Space Applications Centre,ISRO, Ahmedabad

WEST BENGAL - IRS AWiFS 2011-2012



(IRS AWiFS, 23 November 2011, 21 March 2012)

WEST BENGAL - IRS AWiFS 2004-2005



(IRS AWiFS, 18 October 2004, 09 February 2005)

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Field Photographs

Water erosion (Gulleys), Nubra valley, Ladakh region

Water erosion (Rills), Bellary, Karnataka

Water erosion (Sheet erosion), Anantpur, Andhra Pradesh

Water erosion, Chhindwara dist., Madhya Pradesh

Vegetation degradation in forest, Tripura

Vegetation degradation in forest, Manipur

Vegetation degradation due to Jhum Cultivation, Lunglei dist., Mizoram

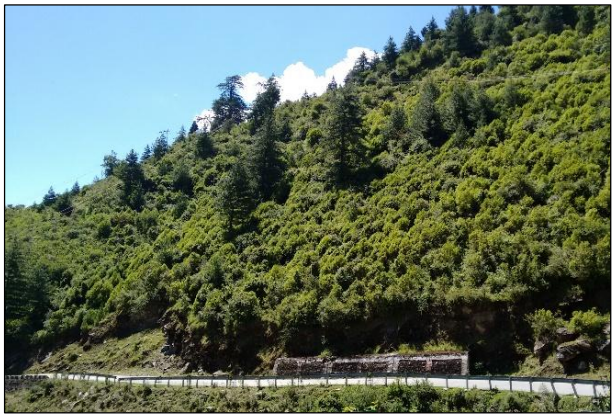
Land with scrub, Jaisalmer dist., Rajasthan

Land without scrub, Anantpur dist., Andhra Pradesh

Vegetation degradation in Scrub land area, Anantpur dist., AP

Rocky area, Mehboobnagar dist., Telangana

Rocky area Anantpur dist., Andhra Pradesh



Dense forest, No Apparent Degradation, Uttarakhand

Agro plantation, Anantpur dist., Andhra Pradesh

Afforestation, Anantpur dist., Andhra Pradesh

Step cultivation, Uttarakhand

Salinity, Mehboobnagar dist., Telangana

Water logging, Anantpur dist., Andhra Pradesh

Water logging and salinity, Bikaner dist., Rajasthan

Sand dunes in hot desert, Jaisalmer dist., Rajasthan

Sand dunes in cold desert, Nubra valley, Ladakh region

Wind erosion, Nubra Valley, Ladakh region

Frost shattering, Kargil dist., Kashmir

Mass movement, Srinagar dist., Kashmir

Alluvial fans, Ladakh region

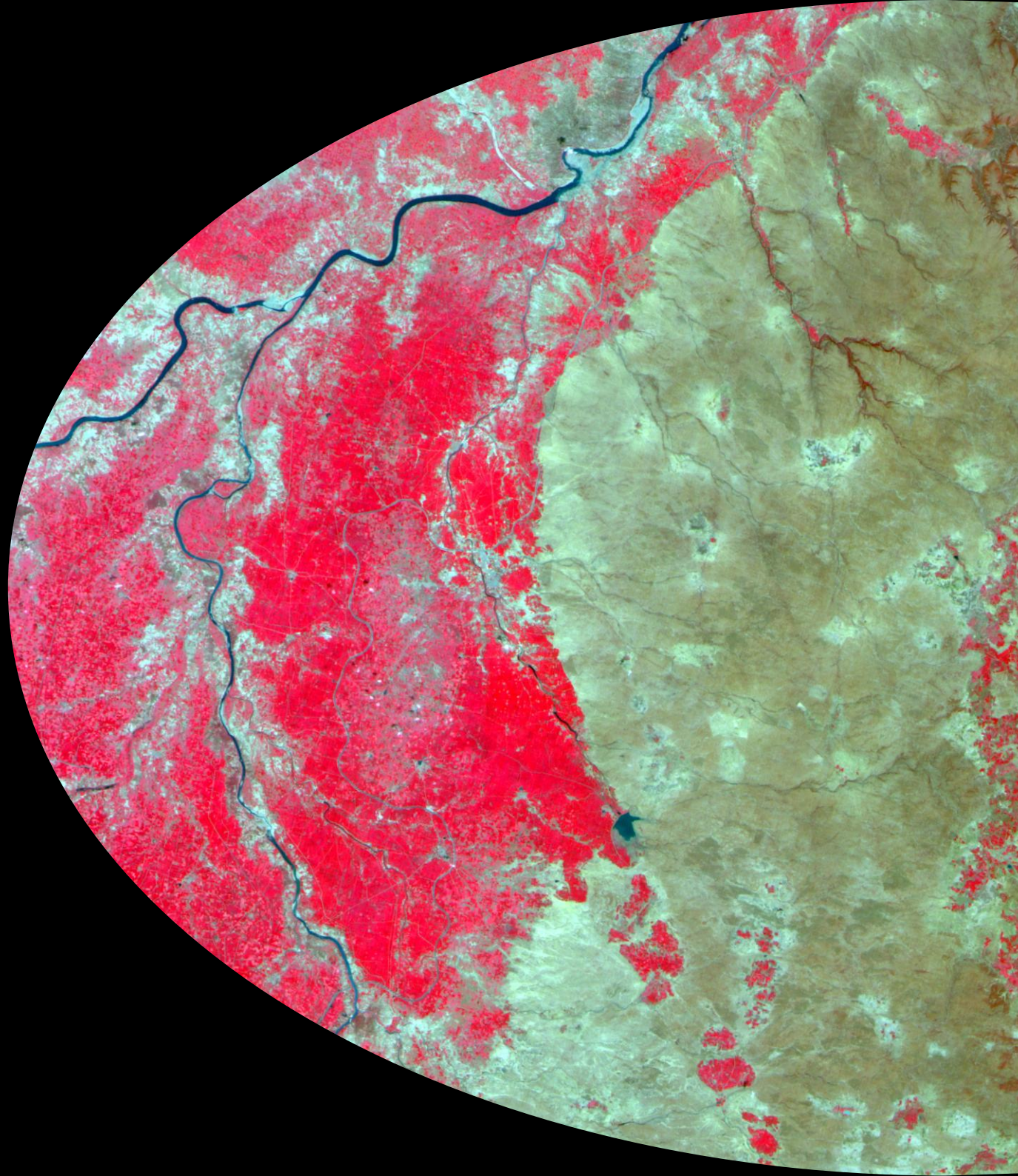
Frost Shattering and mass movement, Ladakh region

Frost Heaving near Tso Murari, Ladakh region

Mining activities, Jaisalmer dist., Rajasthan

Mining, Anantpur dist., Andhra Pradesh

Mining, Trichirapalli dist., Tamilnadu



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