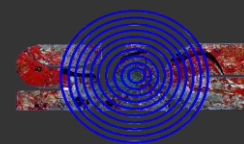


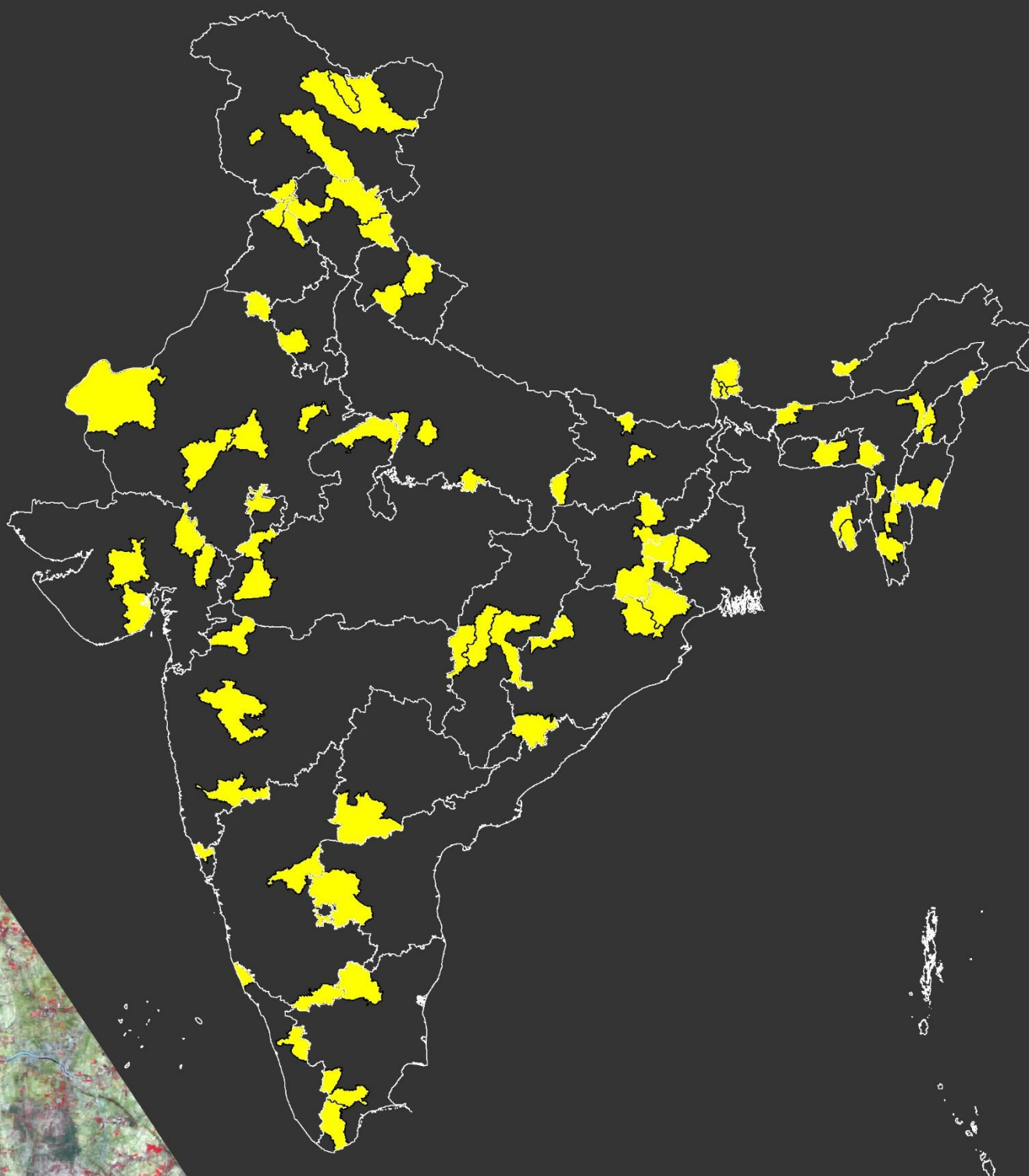


Desertification and Land Degradation Atlas of Selected Districts of India

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



Volume - 1



Space Applications Centre
Indian Space Research Organisation
Government of India
Ahmedabad

Desertification and Land Degradation

Atlas of Selected Districts of India

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

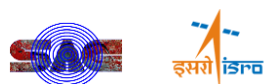
Volume - 1

Sponsored by

Ministry of Environment, Forest and Climate Change
Government of India

Space Applications Centre
Indian Space Research Organisation
Department of Space, Government of India
Ahmedabad – 380 015, India

June 2018



Published by: Space Applications Centre, ISRO, Ahmedabad, India
www.sac.gov.in

Copyright: © Space Applications Centre, ISRO, 2018

This publication may be produced in whole or in part and in any form for education or non-profit uses, without special permission from the copyright holder, provided acknowledgement of source is made. SAC will appreciate a copy of any publication which uses this publication as a source.

Citation: Desertification and Land Degradation Atlas of Selected Districts of India (Based on IRS LISS III data of 2011-13 and 2003-05), Volume-1, Space Applications Centre, ISRO, Ahmedabad, India, 148 pages

ISBN: ISBN: 978 - 93 - 82760 - 31 - 3



Available from: Space Applications Centre, ISRO, Ahmedabad - 380015, India

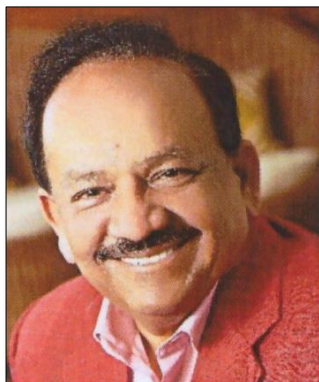
Publications: SAC carried out the work in collaboration with State Remote Sensing Applications Centers, Academic Institutes and Government Organisations. This project is sponsored by Ministry of Environment, Forest and Climate Change, Government of India.

Printed by: Chandrika Corporation, Ahmedabad

डॉ. हर्ष वर्धन
Dr. Harsh Vardhan



भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्री
GOVERNMENT OF INDIA
MINISTER OF ENVIRONMENT, FOREST &
CLIMATE CHANGE



Message

There is an urgent need to halt and reverse land degradation for ensuring food, water, environment and livelihood security in the country. Global efforts are being made to combat desertification and land degradation by more than 195 countries working together, including India through United Nations Convention to Combat Desertification (UNCCD). Overall goal is to improve the living conditions of people in drylands, maintain and restore land and soil productivity and mitigate the effects of drought.

Ministry of Environment, Forest & Climate Change (MoEF&CC) is the nodal agency interacting with UNCCD and I am happy to note that Desertification Cell of the Ministry is actively coordinating with all concerned Central and State Government Departments engaged in various scientific and technical issues related to desertification and land degradation. These efforts help in preparing national action plans for combating desertification and land degradation.

I am glad to note that in this endeavor, inventory and monitoring of the land under various processes of desertification and land degradation in our country is being carried out using data from Indian Remote Sensing Satellites. The current report-cum-atlas "Desertification and Land Degradation Atlas of Selected Districts of India (Based on IRS LISS-III data of 2011-13 and 2003-05)", provides spatial information on various land degradation processes and their severity.

I appreciate 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 Atlas and am sure that it shall be extremely useful to planners in combating land degradation.

Date: 01.06.2018

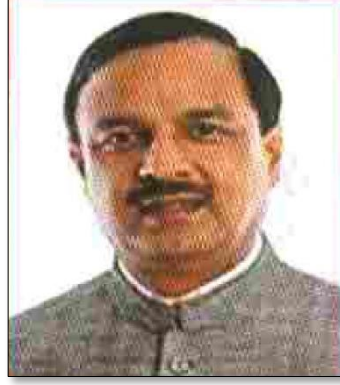

(Dr. Harsh Vardhan)



डॉ. महेश शर्मा
Dr. Mahesh Sharma



संस्कृति राज्य मंत्री (स्वतंत्र प्रभार)
पर्यावरण, वन एवं जलवायु परिवर्तन राज्य मंत्री
भारत सरकार
MINISTER OF STATE (I/C) OF CULTURE
MINISTER OF STATE FOR
ENVIRONMENT, FOREST AND CLIMATE CHANGE
GOVERNMENT OF INDIA



Message

There are global concerns on reduction of limited fertile land due to desertification and land degradation processes. Increasing population is putting pressure on our finite land resources. Inappropriate land use and agricultural practices viz., over-cultivation, overgrazing, deforestation, poor irrigation practices, indiscriminate mining, increasing urbanization are some of the major causes leading to loss of fertile agricultural and forest covered land.

There is an urgent need for sustainable land management along with preparation and implementation of suitable action plans for combating desertification and land degradation.

I am happy to note that Desertification Cell of the Ministry of Environment, Forest & Climate Change (MoEF&CC) is representing India in United Nations Convention on Combating Desertification (UNCCD) and is actively coordinating with all concerned Central and State Government Departments engaged in various scientific and technical issues related to combating desertification and land degradation. I am sure that these efforts shall help us in achieving land degradation neutral status by 2030.

I am glad that at the behest of MoEF&CC, Space Applications Centre (SAC), Indian Space Research organization (ISRO), Ahmedabad along with twenty partner institutes has taken up the task of inventory and monitoring desertification and land degradation status using data from Indian Remote Sensing Satellites. It would facilitate in prioritizing areas to be taken up for combating desertification and land degradation and help in halting and reversing land degradation.

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.

(Dr. Mahesh Sharma)

पंचम तल, आकाश विंग, इंदिरा पर्यावरण भवन, जोर बाग रोड, नई दिल्ली-110 003. फोन : 011-24621921, 24621922 फैक्स : 011-24695313
कैम्प कार्यालय : एच-33, सेक्टर-27, नोएडा-201301 (उ.प्र.) दूरभाष : 0120-2444444, 2466666 फैक्स : 0120-2544488

5th Floor, Aakash Wing, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110 003, Ph. : 011-24621921, 24621922 Fax : 011-24695313
Camp Office : H-33, Sector-27, Noida - 201301 (U.P.) Tel. : 0120-2444444, 2466666, Fax : 0120-2544488
E-mail : dr.mahesh@sansad.nic.in, drmahesh3333@gmail.com

भारतीय अन्तरिक्ष अनुसंधान संगठन
अन्तरिक्ष विभाग
भारत सरकार
अन्तरिक्ष भवन
न्यू बी ई एल रोड, बेंगलूर - 560 231, भारत
दूरभाष : +91-80-2341 5241 / 2217 2333
फैक्स : +91-80-2341 5328



Indian Space Research Organisation
Department of Space
Government of India
Antariksh Bhavan
New BEL Road, Bangalore - 560 231, India
Telephone: +91-80-2341 5241 / 2217 2333
Fax : +91-80-2341 5328
e-mail : chairman@isro.gov.in

डॉ. कै. शिवन / Dr K. SIVAN
अध्यक्ष / Chairman



Preamble

Harnessing space technology for national development is the motto of Indian Space Program. Various Ministries, Central and State Government Departments are utilizing space technology. Currently, Indian Space Research Organisation is working with different ministries for enhanced utilization of space technology in governance and development through various projects.

Increase in desertification/land degradation affected areas, reduction in fertile lands and resultant migration of people and cattle, as well as poverty, are issues of global concern. Space technology can be effectively utilised not only for rapid inventory and monitoring but also for action plan preparation to combat land degradation. In this direction, Space Applications Centre (SAC), ISRO, Ahmedabad, has brought out an Atlas titled "Desertification and Land Degradation Atlas of Selected Districts of India (Based on IRS LISS III data of 2011-13 and 2003-05)". This joint activity, involving twenty concerned partner institutes of the country, has resulted in 1:50,000 scale maps of desertification/ land degradation for 76 districts and 2 sub-basins in Leh district of Jammu & Kashmir. It is extremely useful for prioritising areas needing immediate action to combat land degradation.

I am sure that this atlas would be extremely useful to the Ministry of Environment, Forest & Climate Change (MoEF&CC) for India's reporting to United Nations Convention to Combat Desertification (UNCCD), taking effective actions to combat land degradation and would help to achieve land degradation neutrality status by 2030. I hope that with current rapid improvements in earth observation satellites, analytical tools and techniques, space technology would play a major role in above endeavors.

I congratulate the Project team for bringing out this Atlas for easy reference and use by policy makers, planners, managers and researchers.

कै. शिवन / K. Sivan
12/6/2018

(कै. शिवन / K. Sivan)

Dated: June 12, 2018



सी.के.मिश्रा
C.K.Mishra



सचिव
भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
SECRETARY
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE



Foreword

There are increasing global concerns regarding loss of valuable fertile land due to natural processes of land degradation, overexploitation and unplanned developmental activities. Moreover, increasing human and cattle population is putting pressure on finite land resources. Land is a precious and limited natural resource and needs to be used cautiously. There is need for sustainable land management.

India is signatory to the United Nations Convention on Combating Desertification (UNCCD) and is committed to combat desertification/land degradation and achieving land degradation neutral status by 2030. The Ministry of Environment, Forest and Climate Change (MoEF&CC) is the nodal Ministry for India's periodic reporting on status of desertification/land degradation to UNCCD. In order to combat land degradation, Government of India has launched large number of National Level Programmes and Schemes.

These programmes/schemes require baseline data on inventory and monitoring of desertification/land degradation status of entire country using Earth observation satellites. I am happy to note that Space Applications Centre, Ahmedabad at the behest of Ministry has taken a lead in this direction and has developed process based desertification/land degradation classification and methodology for analyzing satellite data along with concerned academic/Central/State government Departments at National level. Desertification and Land Degradation Atlas of India (Based on IRS AWiFS data of 2011-13 and 2003-05) has been already published. These maps were prepared on 1:500, 000 scale.

In continuation, similar work has been completed for selected 76 districts and two sub-basins in Leh district of Jammu & Kashmir State on 1:50, 000 scale for 2011-13 and 2003-05 time frame using IRS LISS-III data. The present Atlas provides the maps, area estimates and change analysis.

The outcome in the form of desertification/land degradation maps prepared using multi-temporal Indian remote sensing satellite data in GIS environment and change detection area estimates are extremely useful for prioritizing areas requiring efforts for combating land degradation and also India's reporting status of desertification/land degradation to UNCCD.

I congratulate the national team for their efforts and am sure that this Atlas would be useful as a ready reference for concerned policy makers, researchers and all others concerned with combating desertification and land degradation in the country.

Dated: 31st May 2018
Place: New Delhi


(C.K. Mishra)

इंदिरा पर्यावरण भवन, जोर बाग रोड़, नई दिल्ली-110 003 फोन : (011) 24695262, 24695265, फैक्स : (011) 24695270

INDIRA PARYAVARAN BHAWAN, JOR BAGH ROAD, NEW DELHI-110 003 Ph. : (011) 24695262, 2465265, Fax : (011) 24695270

E-mail : secy-moef@nic.in, Website : moef.gov.in



तपन मिश्रा

निदेशक

Tapan Misra
Director



भारत सरकार GOVERNMENT OF INDIA
अंतरिक्ष विभाग DEPARTMENT OF SPACE

अंतरिक्ष उपयोग केंद्र
SPACE APPLICATIONS CENTRE

अहमदाबाद AHMEDABAD - 380 015

(भारत) (INDIA)

दूरभाष PHONE : +91-79-26913344, 26928401

फैक्स /FAX : +91-79-26915843

ई-मेल E-mail : director@sac.isro.gov.in



Preface

Recognizing the significant role of Earth Observation Satellites and geospatial techniques in desertification and land degradation studies, Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India, New Delhi has entrusted a National level project on "Desertification Status Mapping of India" to Space Applications Centre (SAC), ISRO, Ahmedabad. As part of this project, Desertification and Land Degradation Status Mapping on 1:500 K for entire country using digital IRS AWiFS data for two time frames 2011-13 and 2003-05 was completed and the outcome was published in the form of an atlas. The atlas has been found to be extremely useful by MoEF&CC as well United Nations Convention to Combat Desertification (UNCCD). Further, it has been widely utilised by concerned policy makers, planners, managers and researchers through its availability on SAC web portal VEDAS and MoEF&CC website.

In continuation, work has been completed for selected districts using digital IRS LISS III data of 2011-13 and 2003-05 time frames on larger scale (1:50K) and the outcome has been brought out in the form of "Desertification and Land Degradation Atlas of Selected Districts of India (Based on IRS LISS III data of 2011-13 and 2003-05)".

This atlas contains district wise Desertification/ Land Degradation status maps for two time frames, along with area statistics and changes. It is extremely useful for understanding various land degradation processes in different parts of the country and prioritizing areas to combat land degradation. The geospatial database created for two timeframes along with satellite images has been put on SAC Web Portal VEDAS. The geospatial database can be easily updated in future.

I am happy to note that this work is further continuing and efforts are there to develop automated techniques for monitoring land degradation using current and planned earth observation satellites. In addition, it is also envisaged to develop techniques for early warning and prepare action plans for combating land degradation on 1:10K scale.

I appreciate the efforts made by the national project team and congratulate them for their valuable contributions.

Tapan Misra

(तपन मिश्रा)

(Tapan Misra)

भारत सरकार
अंतरिक्ष विभाग
अंतरिक्ष उपयोग केन्द्र
आंबावाडी विस्तार डाक घर,
अहमदाबाद-380 015. (भारत)
दूरभाष : +91-79-26913050, 26913060
वेबसाईट : www.sac.isro.gov.in/www.sac.gov.in



Government of India
Department of Space
SPACE APPLICATIONS CENTRE
Ambawadi Vistar P.O.
Ahmedabad - 380 015. (INDIA)
Telephone : +91-79-26913050, 26913060
website : www.sac.isro.gov.in/www.sac.gov.in



Acknowledgements

The project entitled “Desertification Status Mapping of India”, has been taken up by the Space Applications Centre (SAC), Ahmedabad, based on the recommendation of National Natural Resources Management System (NNRMS) Standing Committee on Bio-resources and Environment (NNRMS SC-B). We are thankful to the Ministry of Environment, Forest & Climate Change (MoEF&CC) for entrusting the task to SAC through NNRMS and funding the project.

We would like to place on record our deep sense of gratitude to Shri K. Sivan, Chairman, Indian Space Research Organisation (ISRO) and Secretary, Department of Space (DOS), Shri A.S. Kiran Kumar, former Chairman, ISRO and Secretary, DOS and Shri Tapan Misra, Director, SAC for their encouragement and guidance.

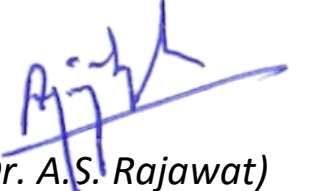
We are thankful to Shri Ravi Shankar Prasad and Shri Jigmet Takpa, Joint Secretaries, Dr. Satish C. Garkoti, Dr. T. Chandni, Dr. G.V. Subrahmanyam, Shri Lalit Kapur, Ms. Madhumita Biswas, Scientists G and Advisers and Ms. Bharati, Director(IFS-II), MoEF&CC for their keen interest and guidance.

We are also thankful to Dr. Harendra Kharkwal, Shri Pankaj Verma, Scientists-D, and Dr. Rajesh Prasad Rastogi, Scientist B, MoEF&CC for their support.

We express our thanks to Dr. Raj Kumar, Deputy Director, EPSA, Dr. B.S. Gohil, Dr. P.K. Pal, Dr. J.S. Parihar former Deputy Directors, EPSA and Dr. M. Chakraborty, former Group Director, GSAG, SAC for providing technical guidance, suggestions and necessary support. Shri Shashikant A. Sharma, Group Head, VRG, SAC is acknowledged for facilitating hosting of entire geospatial database and Atlas in SAC Web Portal VEDAS for wider dissemination and usage. We are thankful to Dr. S. Bandyopadhyay, Scientist, ISRO HQ, and Shri J.G. Patel, Scientist, SAC for their support.

Contributions made by Shri Manish Parmar, Scientist, SAC in the analysis and presentation of the outcome including design conceptualization of the Atlas are significant and noteworthy. Contributions and efforts of Ms. Koyel Sur, former SRF, SAC are appreciable. We are thankful to the SAC Committee on, ‘Space Applications: Projects Monitoring and review, Outsourcing and Inter Agency Document Review Committee’, for their comments and suggestions.

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


(Dr. A.S. Rajawat)
Project Director

Project Team

Space Applications Centre, ISRO, Ahmedabad

Core Team

Dr. A. S. Rajawat, Project Director
Dr. A. S. Arya, Deputy Project Director
Shri Manish Parmar
Ms. Koyel Sur
Shri K. L. N. Sastry
Mrs. Arunima Dasgupta
Shri R. J. Bhandari

Quality Checking Team

Shri A. K. Sharma
Shri R. L. Mehta
Dr. H. B. Chauhan
Shri J. G. Patel
Shri C. P. Singh

CRDF, CEPT University, Ahmedabad

Prof. Anjana Vyas
Shri Hardik Panchal
Mr. Farhan Patel
Ms. Rutul Parekh

Haryana Remote Sensing Applications Centre, Hisar

Dr. R. S. Hooda
Dr. K. E. Mothi Kumar
Shri Rupesh Kumar
Shri Vikas Sihag
Shri Kaptan Singh

ICAR - Central Arid Zone Research Institution, Jodhpur

Dr. Pratap Chandra Moharana
Dr. Mahesh Kumar Gaur
Dr. Mahesh Kumar
Shri R. S. Rajpurohit

Institute of Remote Sensing, Anna University, Chennai

Dr. S. S. Ramakrishnan
Mr. B. Balaguru

Jawaharlal Nehru University, Delhi

Prof. Milap C. Sharma
Dr. S. Sreekesh
Shri Satya Prakash
Ms. Priyanka Kanna

Maharashtra Remote Sensing Applications Centre, Nagpur

Dr. Subrata N. Das
Dr. Prashant B. Rajankar
Shri Indal K. Ramteke

Mizoram Remote Sensing Application Centre, Aizawl

Dr. R.K. Lallianthanga
Dr. Lalnunsiam Colney
Mrs. Hmingthanpuii
Mr. Robert Lalchhanhima Sailo
Mr. H. Lalhmachhuana

MP Council of Science and Technology, Bhopal

Dr. Anil Khare
Shri Asheesh Datt Pandey
Ms. Anjali Gupta
Shri Suneel Chaudhary

Nagaland GIS & RS Centre, Kohima

Er. Mhathung Kithan
Shri. Merenwapang
Dr. Supongtemjen
Shri. Imtiwati

National Bureau of Soil Survey & Land Use Planning, Bangalore

Dr. S. Dharumarajan
Dr. M. Lalitha
Shri B. Somashekar
Dr. Rajendra Hegde
Dr. S. K. Singh

North Eastern Hill University, Shillong

Prof. B. S. Mipun
Ms. Amritee Bora

Orissa Remote Sensing Applications Centre, Bhubaneswar

Dr. P. Kumar
Shri S. R. Giri
Shri P. K. Pagoda
Dr. S. Tripathi

Remote Sensing Applications Centre, Uttar Pradesh, Lucknow

Shri Rajiv Mohan
Dr. M. S. Yadav
Ms. Shama Parveen
Ms. Kanchan Verma

Sikkim State Centre of Space Technology, Sikkim

Shri D.G. Shrestha
Shri Narpati Sharma
Shri Benoy Kr. Pradhan
Shri Baichung Lepcha

Soil and Land Use Survey of India, Delhi

Dr. V.S. Arya
Dr. Ramesh Kumar
Shri S. D. Dhargawe

State Remote Sensing Applications Centre, Itanagar

Shri Harekrishna Dutta
Shri S. Deb
Er. J. Katang

University of Calcutta, Kolkata

Prof. Jyotisankar Ray
Ms. Madhuparna Paul
Ms. Payel Dey
Ms. Debaleena Sarkar
Ms. Moumita Chowdhury

University of Jammu, Jammu

Prof. M. N. Koul
Prof. V. S. Manhas
Dr. Inderjit Singh
Shri Sadiq Ali

University of Kashmir, Srinagar

Prof. Shakil Ahmed Romshoo
Ms. Muzamil Amin
Ms. Shaheena Akhtar

University of Rajasthan, Jaipur

Prof. H.S. Sharma
Dr. P.R. Binda

Executive Summary

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 National Natural Resources Management System - Standing Committee on Bio-resources and Environment (NNRMS SC-B), Chaired by Secretary, MoEF&CC. NNRMS SC-B provides broad guidelines about the requirements of MoEF&CC and approves relevant projects using satellite data catering to its needs.

A project entitled, "Desertification Status Mapping of India", under NNRMS Scheme, funded by MoEF&CC has been completed by Space Applications Centre (SAC), Indian Space Research Organisation (ISRO), Ahmedabad as a nodal Centre along with 20 concerned Central/State government departments and academic institutes of the country. Indian Remote Sensing satellite (IRS) data has been utilised to prepare Desertification /Land Degradation Status Maps in Geographical Information System (GIS) environment depicting Land Use, Process of Desertification/Land Degradation and Severity Level for entire country based on interpretation of Advanced Wide Field Sensor (AWiFS) data with 56 m spatial resolution on 1:500K and for selected districts of the country by interpreting Linear Imaging Self Scanner (LISS) – III data with 23 m spatial resolution on 1:50K for 2011-13 and 2003-05 time frame and reports the changes. These maps are helpful in identifying early signals of land degradation in good agriculture/forest land as well improvement in existing degraded land due to various reclamation measures.

The project has generated baseline geospatial database along with corresponding satellite data on status of desertification/land degradation which is helpful in prioritizing areas for regional planning and to the ongoing National Action Plans (NAP) and Sustainable Land and Ecosystem Management (SLEM) program for combating desertification/land degradation. It can be further used for monitoring changes in future. The status of India's desertification and land degradation along with the changes can be used for India's reporting to UNCCD.

Based on the above mentioned work, an Atlas entitled, "Desertification and Land Degradation Atlas of India (Based on IRS AWiFS data of 2011-13 and 2003-05)", was prepared and released on June 17, 2016 on the occasion of "World Day to Combat Desertification", in a programme jointly organized by MoEF&CC and AFRI at Jodhpur. It is put on web portal of MoEF&CC as well web portal of SAC for wider dissemination and usage. The copies were also made available to UNCCD through Desertification Cell of the Ministry and the work was appreciated. 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 IRS AWiFS data are also included for reference purpose.

The analysis revealed 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 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 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 present atlas entitled, "Desertification and Land Degradation Atlas of Selected Districts of India (Based on IRS LISS – III data of 2011-13 and 2003-05)", depicts above mentioned work carried out on 1:50, 000 scale for 76 districts and 2 sub-basins in Leh district of the country (List given in table below).

These districts/sub-basins have been selected from each state based on list of districts identified as drought prone under Drought Prone Areas Programme (DPAP) of Department of Land Resources, Ministry of Rural Development, Government of India and/or chosen by the concerned

state department/academic institute based on their priority. This Atlas presents Desertification /Land Degradation Status Maps depicting Land Use, Process of Degradation and Severity Level along with area statistics and reports the changes.

Table: List of districts mapped on 1:50, 000 scale using IRS, LISS-III data of 2011-13 and 2003-05

S. No.	State	District (s)
1	Andhra Pradesh	Anantapur
2	Arunachal Pradesh	Tawang, Tirap
3	Assam	Golaghat, Hailakandi, Kokrajhar
4	Bihar	Bhabua, Samastipur, Sitamarhi
5	Chhattisgarh	Durg, Raipur, Rajnandgaon
6	Goa	North Goa
7	Gujarat	Bhavnagar, Panch Mahals, Sabar Kantha, Surendranagar
8	Haryana	Bhiwani, Sirsa
9	Himachal Pradesh	Kangra, Kinnaur, Lahul & Spiti
10	Jammu & Kashmir	Badgam, Kargil, Kathua, Nubra Sub-Basin & Shyok Sub-Basin, Leh
11	Jharkhand	Bokaro, Giridih, Pashchimi Singhbhum
12	Karnataka	Bellary, Chamarajanagar
13	Kerala	Kasaragod, Palakkad
14	Madhya Pradesh	Dhar, Morena, Neemuch, Ratlam
15	Maharashtra	Ahmadnagar, Dhule, Sangli
16	Manipur	Chandel, Churachandpur
17	Meghalaya	Jaintia Hills, West Khasi Hills
18	Mizoram	Aizawl, Lunglei
19	Nagaland	Kohima, Wokha
20	Odisha	Bargarh, Kendujhar, Koraput, Mayurbhanj
21	Punjab	Hoshiarpur, Pathankot
22	Rajasthan	Ajmer, Dausa, Jaisalmer, Pali
23	Sikkim	North Sikkim, South Sikkim, East Sikkim, West Sikkim
24	Telangana	Mahabubnagar
25	Tamil Nadu	Dharmapuri, Krishnagiri, Theni, Tirunelveli, Virudhunagar
26	Tripura	South Tripura, West Tripura
27	Uttar Pradesh	Chitrakoot, Etawah, Kanpur Dehat
28	Uttarakhand	Chamoli, Pauri Garhwal
29	West Bengal	Bankura, Purulia

On-screen visual interpretation of IRS LISS – III data (three season i.e., rabi, summer and kharif) in GIS environment on 1:50, 000 scale has been carried out. Geo-database was created using ArcGIS software package based on National Spatial Frame work on 1:50K 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 > 2.25 ha, topology checking, seamless mosaic, codification, cartographic elements) etc.

Mapping has been carried out for 49.66 million ha, which is ~ 15.10 % of country's total geographical area. The analysis reveals that out of 49.66 million ha area, 22.80 million ha area (45.92%) in undergoing land degradation during time frame 2011-13. The area under degradation during time frame 2003-05 is 22.94 million ha (46.20%). A cumulative decrease of 0.14 million ha area (0.28%) in the area undergoing land degradation is observed.

Top three districts with highest area undergoing desertification/land degradation are Jaisalmer, Rajasthan (92.96% during 2011-13 and 98.13% during 2003-05), Lahul & Spiti, Himachal Pradesh (80.54% during 2011-13 and 80.57% during 2003-05) and Kargil, Jammu & Kashmir (78.23% during 2011-13 and 78.22% during 2003-05).

Districts with more than 50% area under desertification/land degradation in descending order are Shyok sub-basin (Jammu & Kashmir), Giridih (Jharkhand), Kinnaur (Himachal Pradesh), Bokaro (Jharkhand), Anantapur (Andhra Pradesh), Dhule (Maharashtra), Kohima (Nagaland), Bargarh (Odisha), Purulia (West Bengal), Ahmadnagar (Maharashtra), Koraput (Odisha), West Khasi Hills (Meghalaya), Kendujhar (Odisha), Aizawl (Mizoram), Panch Mahals (Gujarat), Surendranagar (Gujarat), Theni (Tamil Nadu) and North Goa (Goa).

Bottom three districts with least area under desertification/land degradation are Sitamarhi, Bihar (2.01% during 2011-13 and 3.25% during 2003-05), Hoshiarpur, Punjab (3.32% during 2011-13 and 2.61% during 2003-05) and Samastipur, Bihar (3.16% during 2011-13 and 3.97% during 2003-05).

Highest increase in land degradation is observed in Lunglei district of Mizoram (5.81% increase from 2003-05 to 2011-13). Other districts with more than 2% increase in land degradation in descending order are Aizawl (Mizoram), South Tripura (Tripura), Kathua (Jammu Kashmir), Bhiwani (Haryana), Kokrajhar (Assam), Hailakandi (Assam) and Tirap (Arunachal Pradesh).

Jaisalmer district of Rajasthan is observed with highest decrease (5.17% decrease from 2003-05 to 2011-13) in area undergoing land degradation indicating improvement in land reclamation. Other districts indicating decrease in land degradation area with more than 2% in descending order are Kohima (Nagaland), Etawah (Uttar Pradesh), Badgam (Jammu Kashmir), Bhavnagar (Gujarat), Wokha (Nagaland) and Ahmadnagar (Maharashtra). All of these districts show improvement due to land reclamation measures.

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 maps prepared on 1:500K for entire country and 1:50K for selected districts have been uploaded on SAC Web portal VEDAS (www.vedas.sac.gov.in) for wider usage.

Table of Contents

Introduction.....	1
Objective.....	3
Study Area.....	3
Data Used.....	5
Classification System.....	5
Processes of Desertification/ Land Degradation.....	6
Participating Organisations.....	11
Methodology.....	12
Summary of Analysis.....	13
Andhra Pradesh.....	28
Anantapur.....	28
Arunachal Pradesh.....	31
Tawang.....	31
Tirap.....	34
Assam.....	37
Golaghat.....	37
Hailakandi.....	40
Kokrajhar.....	43
Bihar.....	46
Bhabua.....	46
Samastipur.....	49
Sitamarhi.....	52
Chhattisgarh.....	55
Durg.....	55
Raipur.....	58
Rajnandgaon.....	61
Goa.....	64
North Goa.....	64
Gujarat.....	67
Bhavnagar.....	67
Panch Mahals.....	70
Sabar Kantha.....	73
Surendranagar.....	76
Haryana.....	79
Bhiwani.....	79
Sirsa.....	82
Himachal Pradesh.....	85
Kangra	85
Kinnaur	88
Lahul & Spiti.....	91

Jammu & Kashmir.....	94
Budgam.....	94
Kargil.....	97
Kathua.....	100
Nubra Sub-basin, Leh.....	103
Shyok Sub-basin, Leh.....	106
Jharkhand.....	109
Bokaro	109
Giridih	112
Pashchimi Singhbhum.....	115
Karnataka.....	118
Bellary.....	118
Chamarajanagar.....	121
Kerala.....	124
Kasaragod.....	124
Palakkad.....	127
Madhya Pradesh.....	130
Dhar.....	130
Morena.....	133
Neemuch.....	136
Ratlam.....	139
Field Photos.....	142
References.....	148

Introduction

It is a known fact that Desertification/land degradation is a major economic, social and environmental problem of global concern. In general, land degradation is reduction in productivity of soil. Loss of soil productivity means loss of ecology and economy. Land degradation in drylands (arid, semi-arid and dry sub-humid zones) is defined as Desertification (UNCCD, 1994). Land is a precious limited natural resource and needs to be properly utilised for the sustenance of current and future generations of mankind. Increasing loss of fertile soil or reduction in productivity of soil leading to loss of crop land or forest cover are alarming scenarios.

The main causes of land degradation are natural processes such as water erosion/wind erosion, man-made such as mining/quarrying/urbanization or a mix of natural and human induced such as vegetation degradation, water logging, salinity/alkalinity etc. Increasing population (both human and cattle), over exploitation of natural resources, un-sustainable land use practices, frequent natural hazards, extreme weather conditions and climate changes are accelerating the processes of land degradation. The physical status of the land is also a critical factor towards its vulnerability to land degradation, e.g., a land without vegetation cover and loose soil is more susceptible to erosion by water or wind. Actions are required for preventing productive land getting transformed to degraded land.

There are global efforts to combat desertification/land degradation. 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.

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

Accordingly, Space Applications Centre (SAC), Indian Space Research Organisation (ISRO), Ahmedabad has been entrusted with a project entitled, "Desertification Status Mapping of India", under NNRMS, funded by MoEF&CC. SAC has completed the project along with 20 concerned Central/State government departments and academic institutes of the country. Indian Remote Sensing satellite (IRS) data has been utilised to prepare Desertification /Land Degradation Status Maps in Geographical Information System (GIS) environment depicting Land Use, Process of Desertification/Land Degradation and Severity Level for entire country based on interpretation of Advanced Wide Field Sensor (AWiFS) data with 56 m spatial resolution on 1:500K and for selected districts of the country by interpreting Linear Imaging Self Scanner (LISS) – III data with 23 m spatial resolution on 1:50K for 2011-13 and 2003-05 time frame and reports the changes. These maps are helpful in identifying early signals of land degradation in good agriculture/forest land as well improvement in existing degraded land due to various reclamation measures.

The project has generated baseline geospatial database along with corresponding satellite data on status of desertification/land degradation which is helpful in prioritizing areas for regional planning and to the ongoing National Action Plans (NAP) and Sustainable Land and Ecosystem Management (SLEM) program for combating desertification/land degradation. It can be further used for monitoring changes in future. The status of India's desertification and land degradation along with the changes can be used for India's reporting to UNCCD.

Based on the above mentioned work, an Atlas entitled, "Desertification and Land Degradation Atlas of India (Based on IRS AWiFS data of 2011-13 and 2003-05)", was prepared (SAC, 2016). This Atlas presents Desertification /Land Degradation Status Maps prepared on 1:500K 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 IRS AWiFS data are also included for reference purpose.

The Atlas has been put on web portal of MoEF&CC as well web portal of SAC for wider dissemination and usage. The copies were also made available to UNCCD through Desertification Cell of the Ministry and the work was appreciated. Figure-1 is a consolidated Desertification/Land Degradation Status Map of India based on 2011-13 AWiFS data.

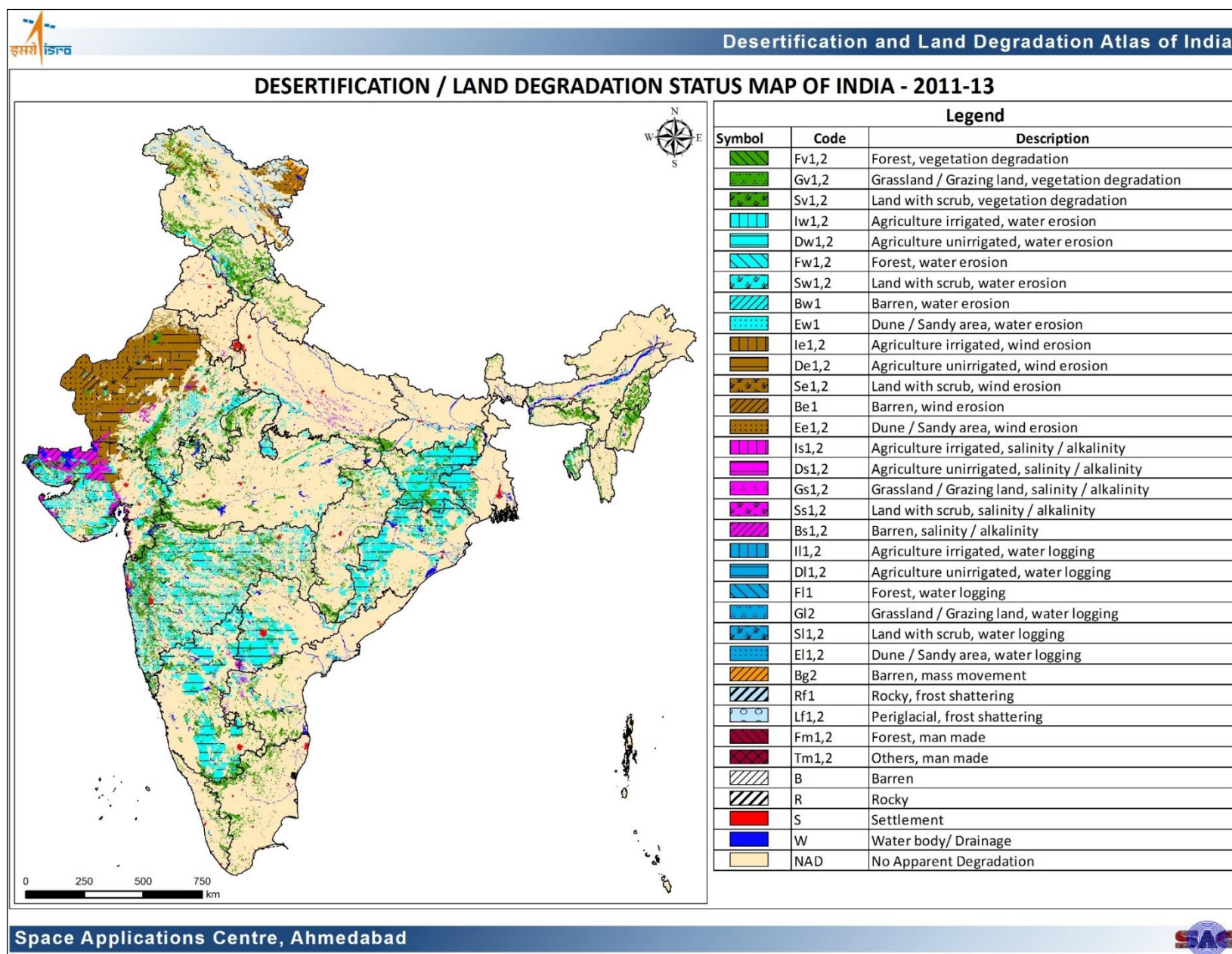


Figure-1: Desertification/ Land Degradation Status Map of India for time frame 2011-13 (SAC, 2016)

The analysis revealed 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 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 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

In continuance, the present atlas entitled, "Desertification and Land Degradation Atlas of Selected Districts of India (Based on IRS LISS – III data of 2011-13 and 2003-05)", depicts maps prepared on 1:50, 000 scale for 76 districts and 2 sub-basins in Leh district of the country.

These districts/sub-basins have been selected from each state based on list of districts identified as drought prone under Drought Prone Areas Programme (DPAP) of Department of Land Resources, Ministry of Rural Development, Government of India and/or chosen by the concerned state department/academic institute based on their priority. This Atlas presents Desertification /Land Degradation Status Maps depicting Land Use, Process of Degradation and Severity Level along with area statistics and reports the changes.

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 maps prepared on 1:500K for entire country and 1:50K for selected districts have been uploaded on SAC Web portal VEDAS (www.vedas.sac.gov.in) for wider usage.

Objective

1. Desertification and land degradation status mapping using IRS LISS III data at 1:50,000 scale for 2011-13 and 2003-05 time frames for selected districts.
2. To carry out change analysis of desertification and land degradation status between 2011-13 and 2003-05 time frame.

Study area

Desertification and Land Degradation Status Mapping at 1:50,000 scale is carried out for 76 district and 2 sub-basins in Leh district, as per the list given below. These districts/sub-basins have been selected from each state based on list of districts identified as drought prone under Drought Prone Areas Programme (DPAP) of Department of Land Resources, Ministry of Rural Development, Government of India and/or chosen by the concerned state department/academic institute based on their priority. The atlas is printed in two volumes, as per the list given below.

Table-1: List of districts under Volume-1

Volume - 1					
S.No.	State	District	S.No.	State	District
1	Andhra Pradesh	Anantapur	20	Himachal Pradesh	Kangra
2	Arunachal Pradesh	Tawang	21		Kinnaur
3		Tirap	22		Lahul & Spiti
4	Assam	Golaghat	23	Jammu Kashmir	Badgam
5		Hailakandi	24		Kargil
6		Kokrajhar	25		Kathua
7	Bihar	Bhabua	26		Nubra Sub-Basin, Leh
8		Samastipur	27		Shyok Sub-Basin, Leh
9		Sitamarhi	28	Jharkhand	Bokaro
10	Chhattisgarh	Durg	29		Giridih
11		Raipur	30		Pashchimi Singhbhum
12		Rajnandgaon	31	Karnataka	Bellary
13	Goa	North Goa	32		Chamarajanagar
14	Gujarat	Bhavnagar	33	Kerala	Kasaragod
15		Panch Mahals	34		Palakkad
16		Sabar Kantha	35	Madhya Pradesh	Dhar
17		Surendranagar	36		Morena
18	Haryana	Bhiwani	37		Neemuch
19		Sirsa	38		Ratlam

Table-2: List of districts under Volume-2

Volume - 2						
S.No.	State	District		S.No.	State	District
39	Maharashtra	Ahmadnagar		60	Sikkim	North Sikkim
40		Dhule		61		South Sikkim
41		Sangli		62		East Sikkim
42	Manipur	Chandel		63		West Sikkim
43		Churachandpur		64	Dharmapuri	
44	Meghalaya	Jaintia Hills		65	Krishnagiri	
45		West Khasi Hills		66	Theni	
46	Mizoram	Aizawl		67	Tirunelveli	
47		Lunglei		68	Virudhunagar	
48	Nagaland	Kohima		69	Telangana	Maha`bubnagar
49		Wokha		70	Tripura	South Tripura
50	Odisha	Bargarh		71		West Tripura
51		Kendujhar		72	Chitrakoot	
52		Koraput		73	Uttar Pradesh	Etawah
53		Mayurbhanj		74	Kanpur Dehat	
54	Punjab	Hoshiarpur		75	Uttarakhand	Chamoli
55		Pathankot		76		Pauri Garhwal
56	Rajasthan	Ajmer		77	West Bengal	Bankura
57		Dausa		78		Purulia
58		Jaisalmer				
59		Pali				

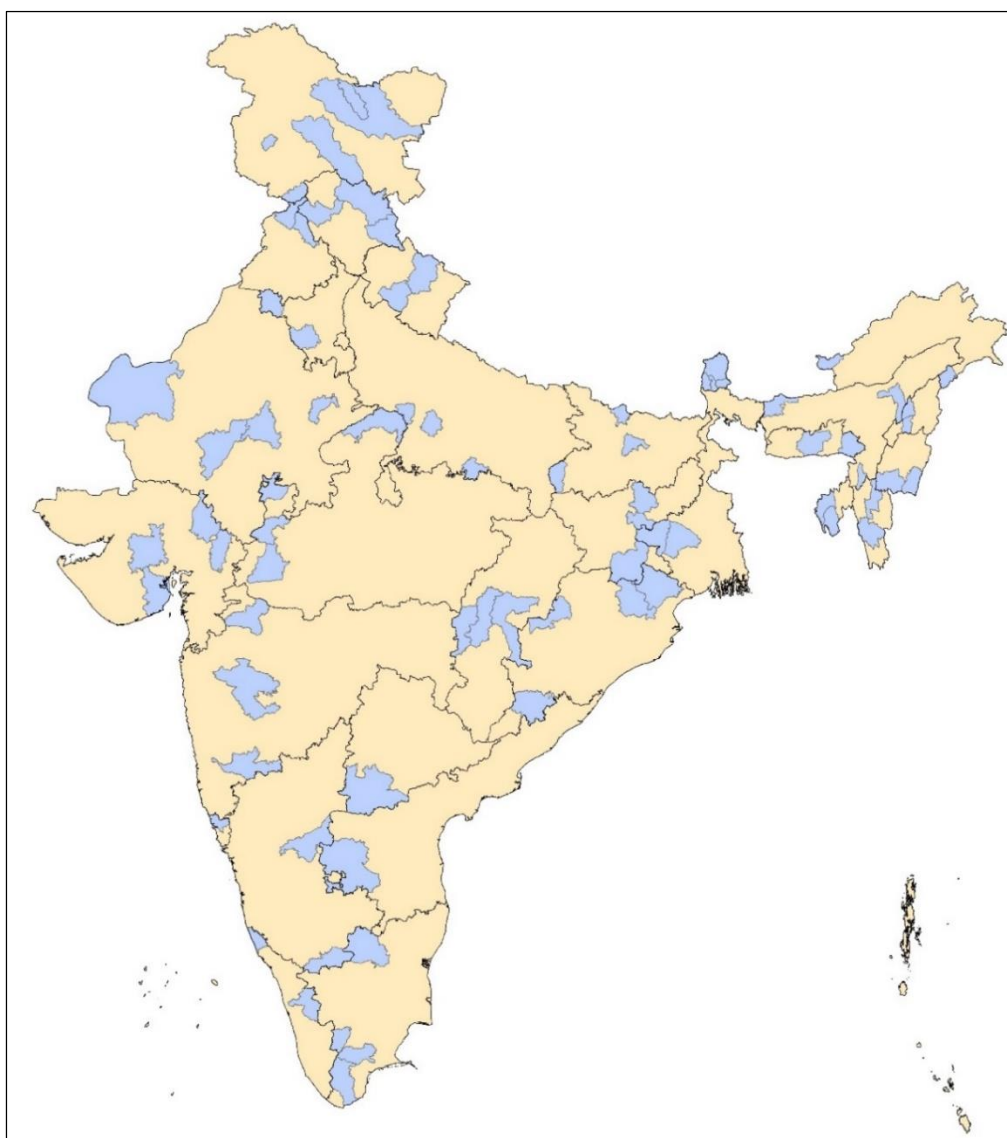


Figure-2: Districts selected for Desertification and Land Degradation Status Mapping at 1:50,000 scale

Data Used

Multi-temporal digital IRS LISS III data, ancillary information, collateral data and forest cover layer of Forest Survey of India (FSI) were used. IRS LISS III is 10 bits data with 23.5 meters spatial resolution, 24 day repeativity, swath of 141 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 bands. Base layers of water bodies, rivers and administrative boundaries were taken from Natural Resources Data Base (NRDB) and road and railway networks were taken from SAC National Wetland Inventory & Assessment (NWIA) project. Limited field data was also utilised to support image interpretation.

Table-3: List of data used

Satellite Data (2011-2013 and 2003-2005)		Ancillary Data	
Season	Timeframe	Layer	Source
Kharif	October - December	Forest Boundary	Forest Survey of India
Rabi	January - March	Water body, Rivers	Natural Resources Data Base
Summer	April - June	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, Ajai et al., 2009 and SAC, 2016) 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:

Table-4: Desertification/land degradation classification system

Level-1: Land Use		Level-2: Process of Desertification		Level-3: Severity	
Agriculture irrigated	I	vegetation degradation	v	Slight	1
Agriculture unirrigated	D	water erosion	w	Moderate	2
Forest / Plantation	F	wind erosion	e	Severe	3
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, Severe → Fv3

Processes of Desertification/ Land Degradation

Vegetation degradation:

Vegetation degradation is referred as reduction in the biomass and/or decline in the vegetative ground cover, as a result of deforestation and/or overgrazing. Such degradation is a major contributory factor to soil degradation particularly with regard to soil erosion and loss of soil organic matter. Vegetation is an important factor in the protection of soil and soil fertility. Destruction of vegetation accelerates soil degradation leading to its degradation. 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. Agriculture observed within forest lands has also been classified under vegetation degradation. Figure-3 shows vegetation degradation as seen in LISS III image and corresponding field photograph.

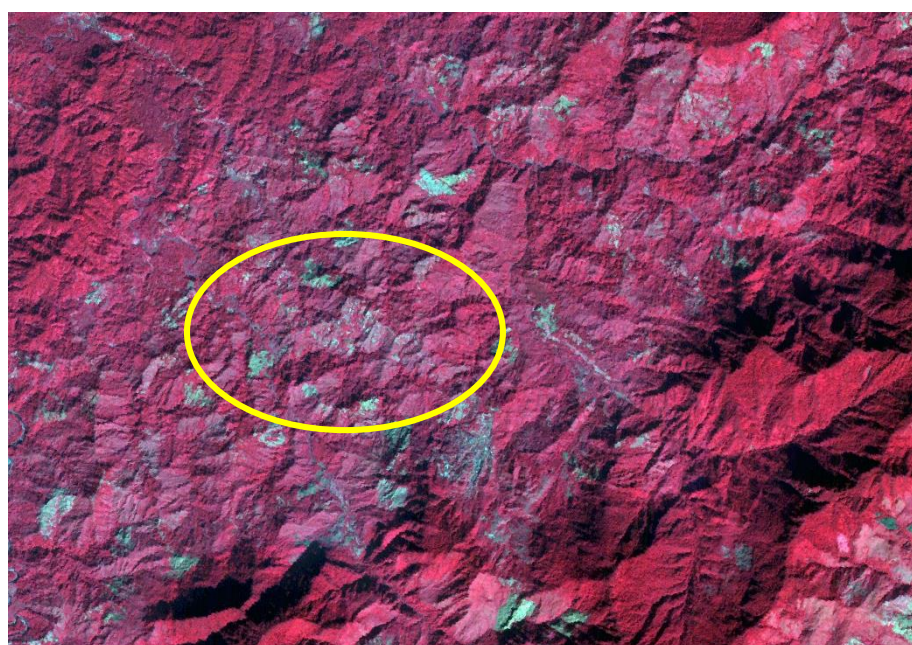


Figure-3: Vegetation degradation within forest as visible in LISS III image covering parts of Tirap district, Arunachal Pradesh with corresponding field photograph

Water erosion:

Water Erosion is referred as loss of soil cover mainly due to rainfall and/or surface runoff water. Water erosion can be categorised in three types, based on severity level, viz. sheet / rill erosion, gully erosion and ravine erosion. 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 to the river erosion. Figure-4 shows water erosion in LISS III image and corresponding field photograph.

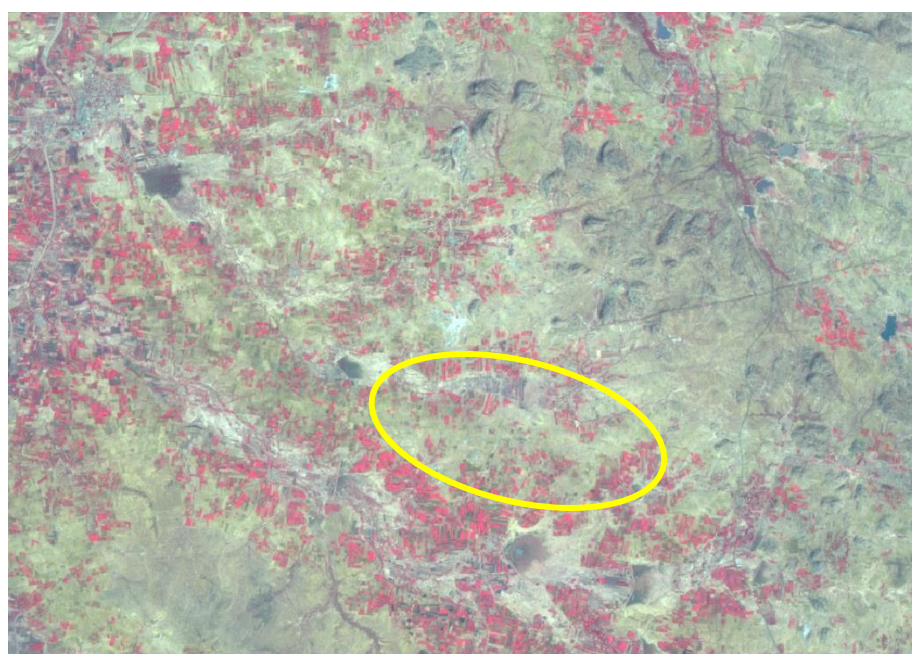


Figure-4: Gully erosion as visible in LISS III image covering parts of Bellary district, Karnataka with corresponding field photograph

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. Soil is more vulnerable to 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-5 shows the satellite image and field photograph of wind erosion.



Figure-5: Sand dunes as visible in LISS III image covering parts of Jaisalmer district, Rajasthan with corresponding field photograph

Water logging:

Water logging refers to the saturation of soil with water. The undrained land parcels tend to accumulate standing water for longer durations of time on the surface, this condition is called water logging. Soil may be regarded as waterlogged when it is nearly saturated with water much of the time such that its air phase is restricted. This results in reduction of productivity as in agriculture, various crops need air to a greater or lesser depth in the soil. 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. Water logging may also lead to salinization. Figure-6 shows water logging in LISS III image and in corresponding field photograph.

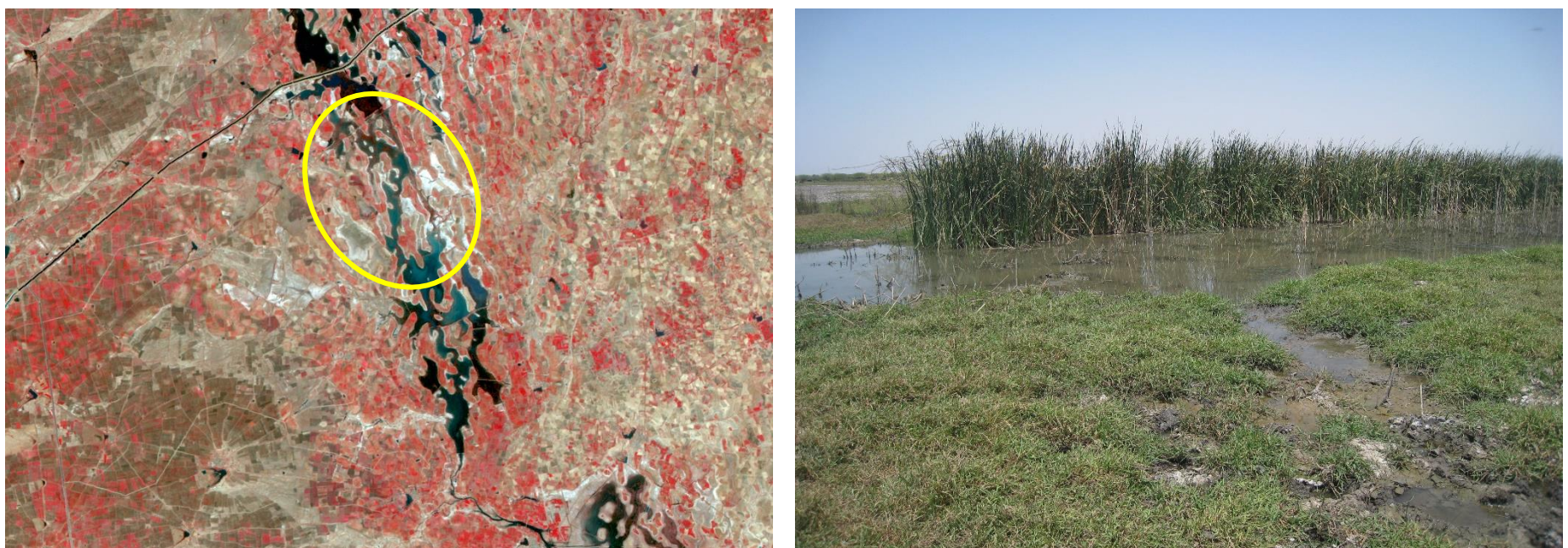


Figure-6: Water logging as visible in LISS III image covering parts of Surendranagar district, Gujarat with corresponding field photograph

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 alkalization 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 by human-induced factors. The main causes of salinity are excess evapotranspiration, drought, excess irrigation, increase in toxicity, and rise in ground water table. The salts from the groundwater are raised by capillary action to the surface of the soil and 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-7 shows LISS III image and field photograph of salinity.

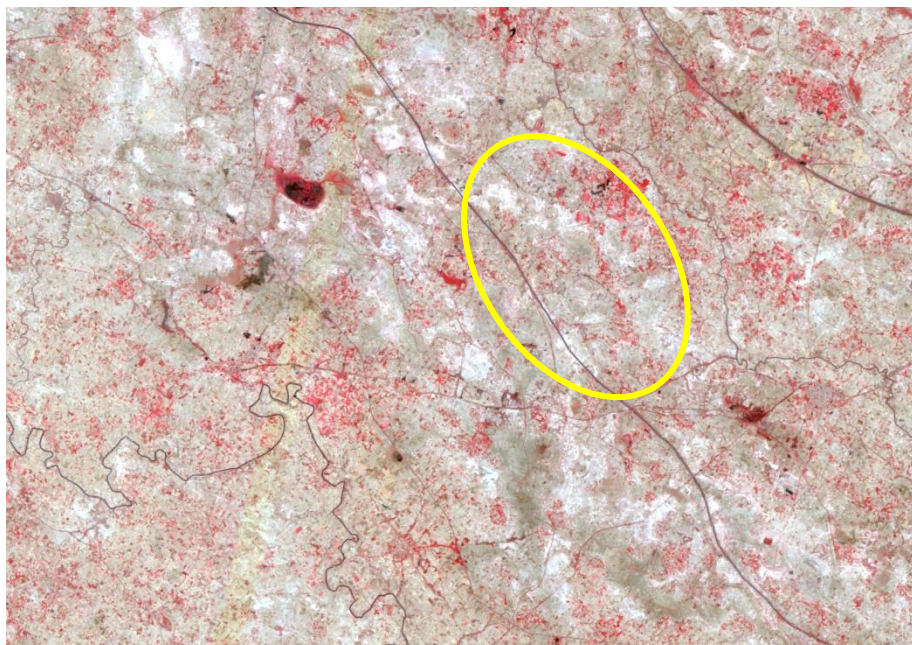


Figure-7: Salinity in agricultural field as visible in LISS III image covering parts of Kanpur Dehat district, Uttar Pradesh with corresponding field photograph

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 (mass wasting). 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-8 shows the LISS III image of mass movement as visible in satellite image and corresponding field photograph.

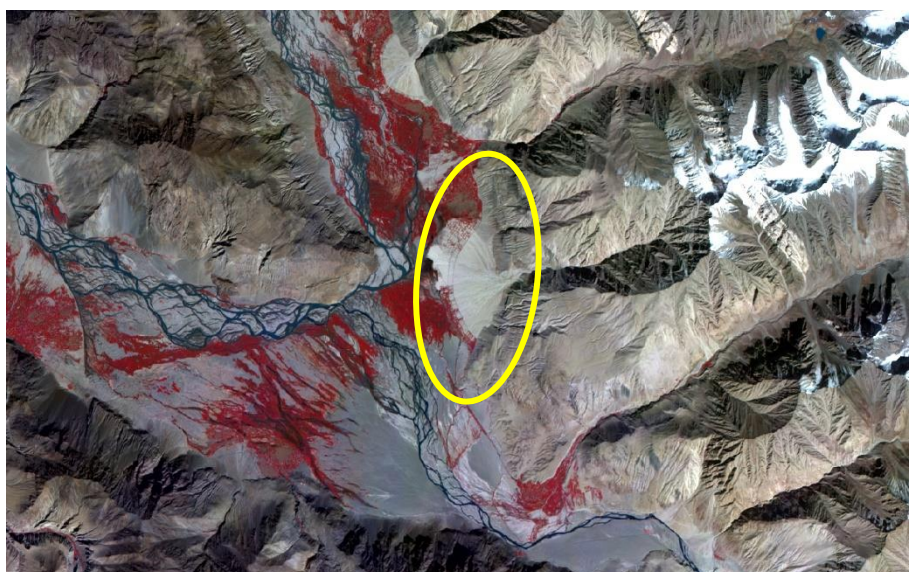


Figure-8: Mass movement as visible in LISS III image covering parts of Jammu & Kashmir with representative field photograph

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. The LISS III image and corresponding field photograph of frost heaving is shown in figure-9.



Figure-9: Frost heaving as visible in LISS III 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°C, in joints or cracks in rocks. At times water enters into the cracks of rock and it freezes to ice and results in increases in its 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-10 shows LISS III image and field photograph of frost shattering process.

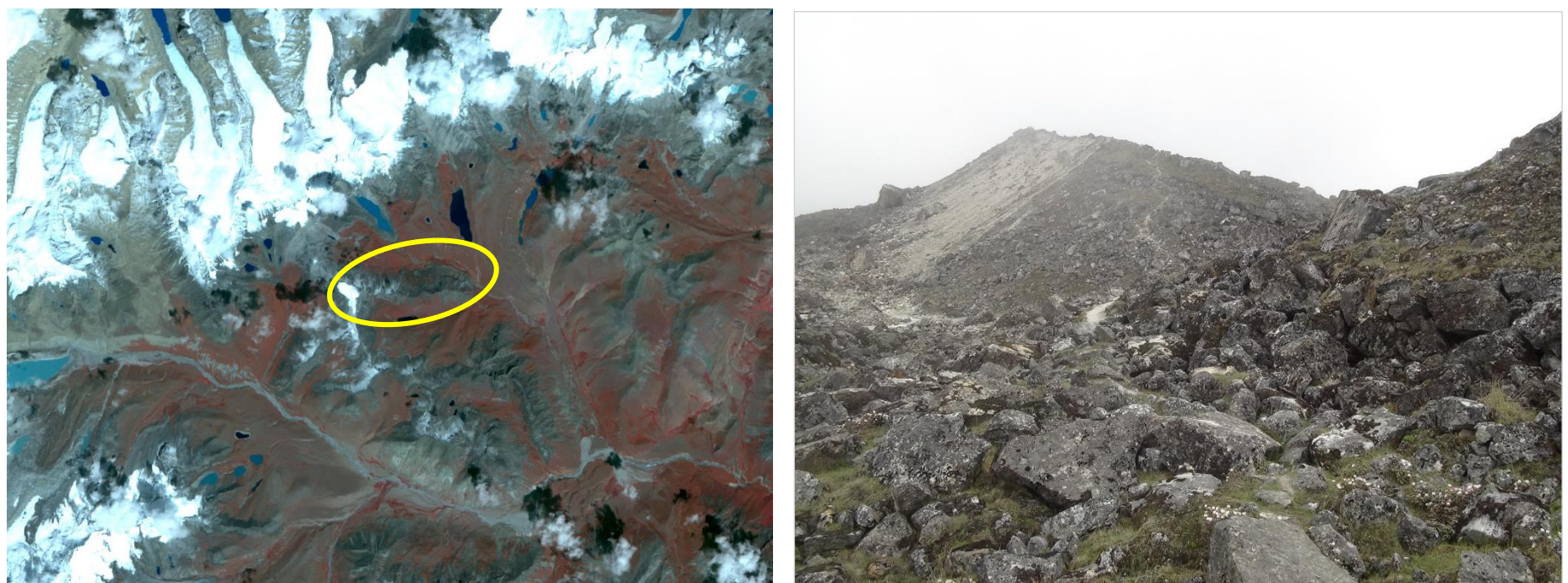


Figure-10: Frost shattering as visible in LISS III image covering parts of North Sikkim district, Sikkim with corresponding field photograph

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-11 shows mining area in LISS III image and corresponding field photograph.



Figure-11: Open cast mining as visible in LISS III image covering parts of Bokaro district, 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 12 shows LISS III image and field photograph of rocky area.

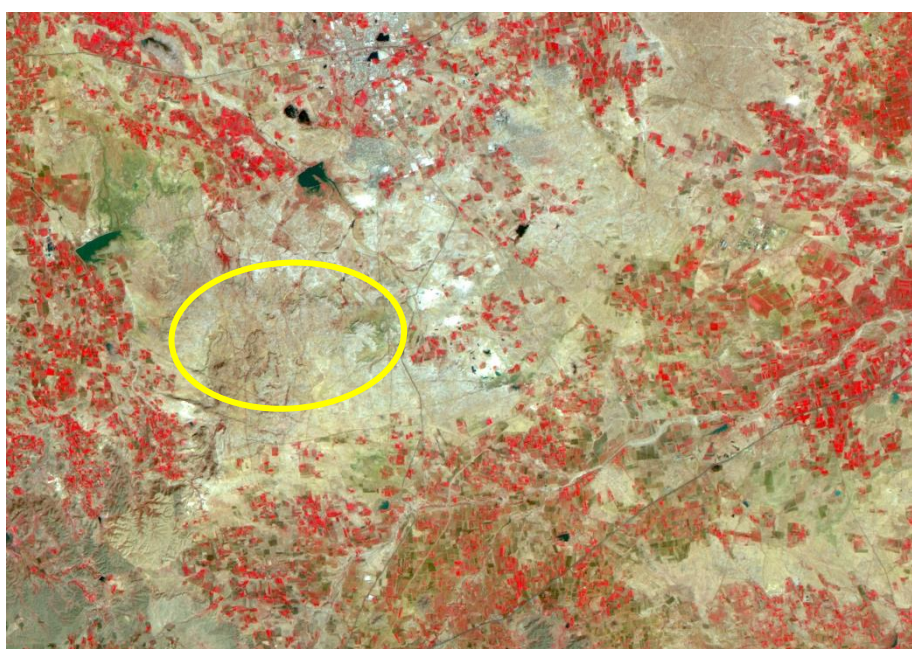


Figure-12: Rock outcrop as visible in LISS III image covering parts of Surendranagar district, Gujarat with corresponding field photograph

Participating Organisations

S. No.	Name of Participating Organisations	Mapping Area/ Work Responsibility
1	CRDF, Centre for Environment and planning Technology (CEPT), Ahmedabad	Bhavnagar, Panch Mahals, Sabar Kantha and Surendranagar districts, Gujarat
2	Haryana Remote Sensing Applications Centre (HARSAC), Hisar	Bhiwani and Sirsa districts, Haryana
3	ICAR - Central Arid Zone Research Institution (CAZRI), Jodhpur	Jaisalmer and Pali districts, Rajasthan
4	Institute of Remote sensing (IRS), Chennai	Dharmapuri, Krishnagiri, Theni, Tirunelveli and Virudhunagar districts, Tamil Nadu Kasaragod and Palakkad districts, Kerala
5	Jawaharlal Nehru University, (JNU), Delhi	Kangra, Kinnaur and Lahul & Spiti districts, Himachal Pradesh Shyok and Nubra sub-basins, Leh district, Jammu & Kashmir
6	Maharashtra Remote Sensing Applications Centre, (MRSAC), Nagpur	Ahmadnagar, Dhule, and Sangli districts, Maharashtra, North Goa district, Goa
7	Mizoram Remote Sensing Application Centre (MIRSAC), Aizawl	Aizawl and Lunglei districts, Mizoram South Tripura and North Tripura districts, Tripura
8	MP Council of Science and Technology (MPCST), Bhopal	Dhar, Morena, Neemuch and Ratlam districts, Madhya Pradesh Durg, Raipur and Rajnandgaon districts, Chhattisgarh
9	Nagaland GIS & RS Centre, Kohima	Kohima and Wokha districts, Nagaland Chandel and Churachandpur districts, Manipur
10	National Bureau of Soil Survey and Land Use Planning, (NBSSLUP), Bangalore	Anantapur district, Andhra Pradesh, Mahabubnagar district, Telangana Bellary and Chamrajanagar districts, Karnataka
11	North eastern Hill University, (NEHU), Shillong	Golaghat, Hailakandi and Kokrajhar districts, Assam Jaintia Hills and West Khasi Hills districts, Meghalaya
12	Orissa Remote Sensing Applications Centre, (ORSAC), Bhubaneswar	Bargarh, Kendujhar, Koraput and Mayurbhanj districts, Odisha
13	Remote Sensing Applications Centre, Uttar Pradesh, (RSACUP), Lucknow	Chitrakoot, Etawah and Kanpur Dehat districts, Uttar Pradesh
14	Sikkim State Centre of Space Technology (SSCST), Sikkim	North Sikkim, South Sikkim, East Sikkim and West Sikkim districts, Sikkim
15	Soil and Land Use Survey of India, (SLUSI), Delhi	Chamoli and Pauri Garhwal districts, Uttarakhand Hoshiarpur and Pathankot districts, Punjab
16	State Remote Sensing Applications Centre (SRSAC AP), Itanagar	Tawang and Tirap districts, Arunachal Pradesh
17	University of Calcutta, Kolkata	Bankura and Purulia districts, West Bengal
18	University of Jammu, Jammu	Kargil district, Jammu & Kashmir
19	University of Kashmir, Srinagar	Badgam and Kathua districts, Jammu & Kashmir
20	University of Rajasthan, Jaipur	Ajmer and Dausa districts, Rajasthan
21	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: Bhabua, Samastipur and Sitamarhi districts, Bihar Bokaro, Giridih and Pashchimi Singhbhum districts, Jharkhand; Krishnagiri district, Tamil Nadu

Methodology

Geo-coded LISS III digital data were analysed using onscreen visual interpretation techniques along with ancillary information to interpret Desertification and land degradation classes. District wise preliminary Desertification Status Maps (DSM) at 1:50,000 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 1:50K 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 > 2.25 ha, topology checking, seamless mosaic, codification, cartographic elements, etc). Necessary corrections were incorporated.

District 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.

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 13.

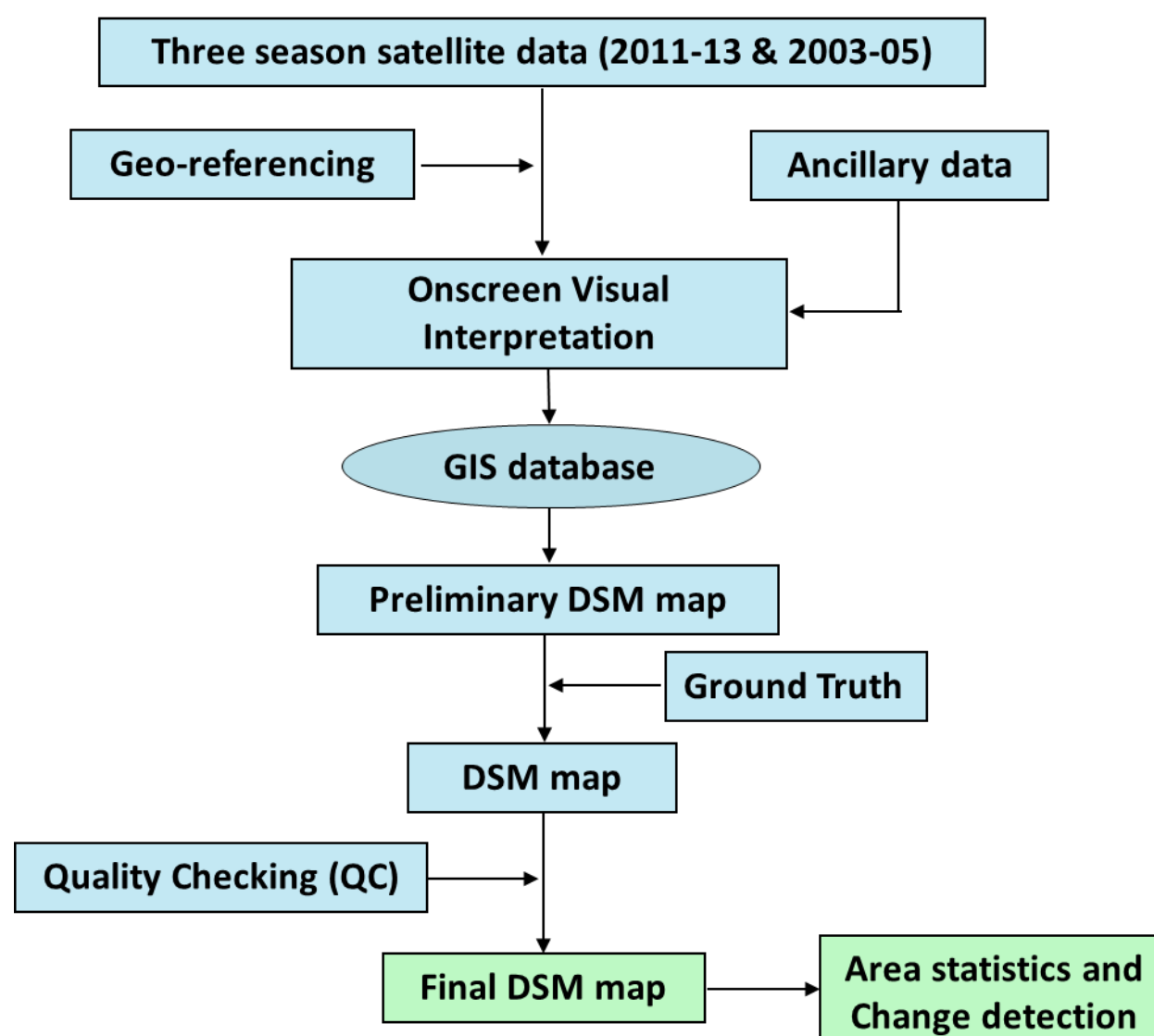


Figure-13: Schematic representation of Methodology

Summary of Analysis

Desertification/ Land degradation status mapping is carried out for selected districts for two time frames (2011-13 and 2003-05). In this project, a total of 76 districts and 2 sub-basins were mapped. The selected area covers 49.66 million ha, which is ~ 15.10 % of country's total geographical area (Census 2011).

The analysis reveals that out of selected/ mapped 49.66 million ha area, 22.80 million ha area (45.92%) is undergoing degradation during timeframe 2011-13. The area under degradation during time frame 2003-05 is 22.94 million ha (46.20%). A cumulative decrease of 0.14 million ha area (0.28%) in the area undergoing land degradation is observed (Figure 14).

Top three districts with highest area undergoing desertification/land degradation are Jaisalmer, Rajasthan (92.96% during 2011-13 and 98.13% during 2003-05), Lahul & Spiti, Himachal Pradesh (80.54% during 2011-13 and 80.57% during 2003-05) and Kargil, Jammu & Kashmir (78.23% during 2011-13 and 78.22% during 2003-05) as shown in Table-5.

Districts with more than 50% area under desertification/land degradation in descending order are Shyok sub-basin (Jammu & Kashmir), Giridih (Jharkhand), Kinnaur (Himachal Pradesh), Bokaro (Jharkhand), Anantapur (Andhra Pradesh), Dhule (Maharashtra), Kohima (Nagaland), Bargarh (Odisha), Purulia (West Bengal), Ahmadnagar (Maharashtra), Koraput (Odisha), West Khasi Hills (Meghalaya), Kendujhar (Odisha), Aizawl (Mizoram), Panch Mahals (Gujarat), Surendranagar (Gujarat), Theni (Tamil Nadu) and North Goa (Goa) as shown in Table-5.

Bottom three districts with least area under desertification/land degradation are Sitamarhi, Bihar (2.01% during 2011-13 and 3.25% during 2003-05), Hoshiarpur, Punjab (3.32% during 2011-13 and 2.61% during 2003-05) and Samastipur, Bihar (3.16% during 2011-13 and 3.97% during 2003-05) as shown in Table-6.

Highest increase in land degradation is observed in Lunglei district of Mizoram (5.81% increase from 2003-05 to 2011-13) as shown in Table-7. Other districts with more than 2% increase in land degradation in descending order are Aizawl (Mizoram), South Tripura (Tripura), Kathua (Jammu Kashmir), Bhiwani (Haryana), Kokrajhar (Assam), Hailakandi (Assam) and Tirap (Arunachal Pradesh).

Jaisalmer district of Rajasthan is observed with highest decrease (5.17% decrease from 2003-05 to 2011-13) in area undergoing land degradation indicating improvement in land reclamation (Table-7). Other districts indicating decrease in land degradation area with more than 2% in descending order are Kohima (Nagaland), Etawah (Uttar Pradesh), Badgam (Jammu Kashmir), Bhavnagar (Gujarat), Wokha (Nagaland) and Ahmadnagar (Maharashtra). All of these districts show improvement due to land reclamation measures.

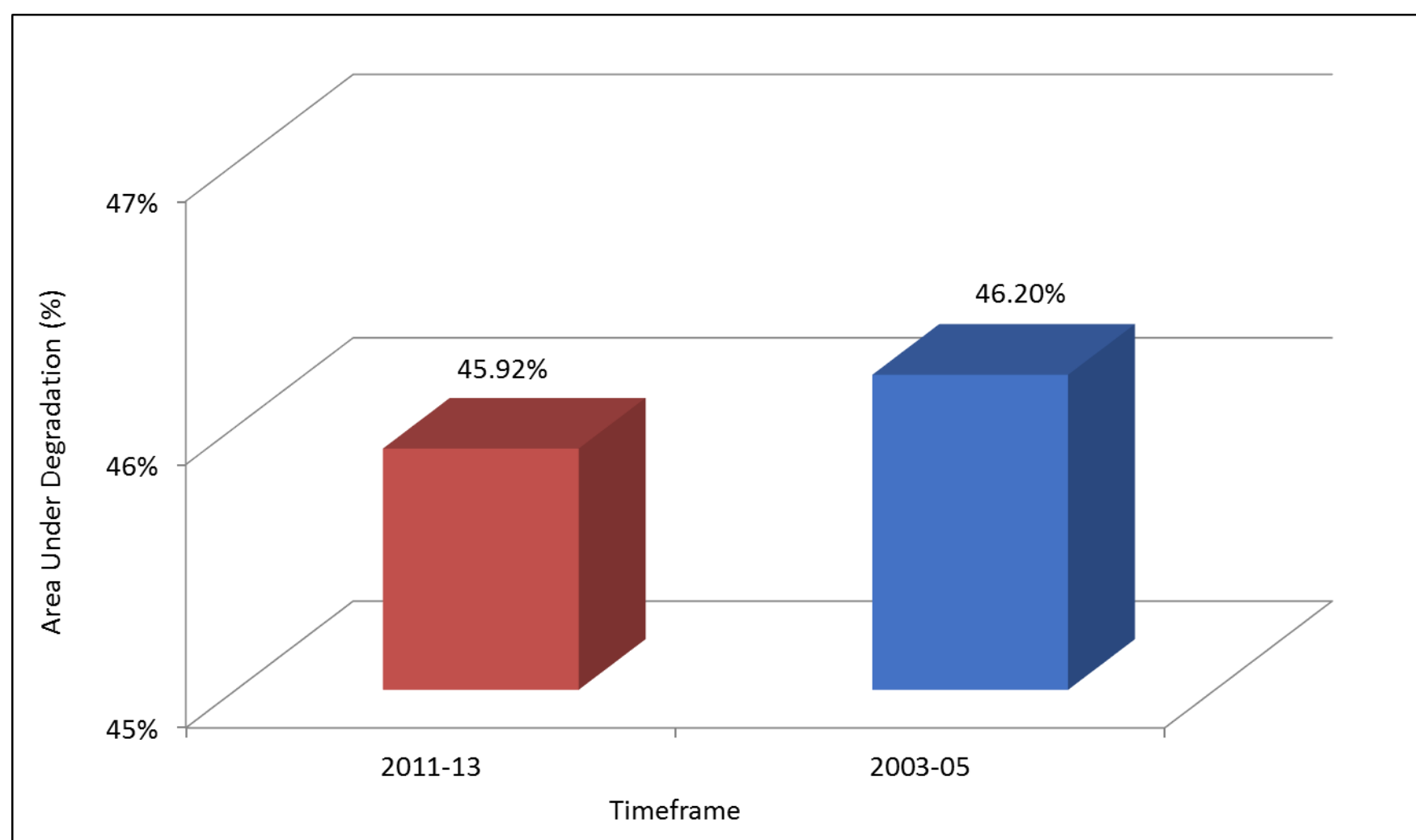


Figure 14: Area undergoing land degradation (as percentage of total area selected for mapping)

The tables below show the list of (a) districts observed with more than 50% area undergoing land degradation, (b) districts observed with less than 10 % area undergoing degradation, and (c) districts observed with more than 2% of changes between 2011-13 and 2003-05 timeframes.

Table-5: List of districts observed with more than 50% area undergoing land degradation

S.No.	District	State	2011-13		2003-05	
			Area (ha)	Area (%)	Area (ha)	Area (%)
1	Jaisalmer	Rajasthan	3569583	92.96	3768402	98.13
2	Lahul & Spiti	Himachal Pradesh	1114727	80.54	1115115	80.57
3	Kargil	Jammu Kashmir	1098082	78.23	1097904	78.22
4	Shyok	Jammu Kashmir	1967814	73.89	1968791	73.93
5	Giridih	Jharkhand	358183	73.79	358295	73.81
6	Kinnaur	Himachal Pradesh	462977	72.33	462880	72.31
7	Bokaro	Jharkhand	193892	67.25	193717	67.19
8	Anantapur	Andhra Pradesh	1232136	64.41	1231397	64.37
9	Dhule	Maharashtra	461902	64.20	456688	63.47
10	Kohima	Nagaland	91338	62.43	98466	67.30
11	Bargarh	Odisha	358162	61.36	365375	62.60
12	Purulia	West Bengal	357330	57.09	353639	56.50
13	Ahmadnagar	Maharashtra	963233	56.50	1007057	59.07
14	Koraput	Odisha	487504	55.35	486896	55.29
15	West Khasi Hills	Meghalaya	278159	53.01	275035	52.42
16	Kendujhar	Odisha	439848	52.97	437684	52.71
17	Aizawl	Mizoram	188976	52.83	171767	48.02
18	Panch Mahals	Gujarat	272387	52.07	273518	52.29
19	Surendranagar	Gujarat	536493	51.47	534534	51.28
20	Theni	Tamil Nadu	146450	51.06	146689	51.15
21	North Goa	Goa	87239	50.25	86434	49.79

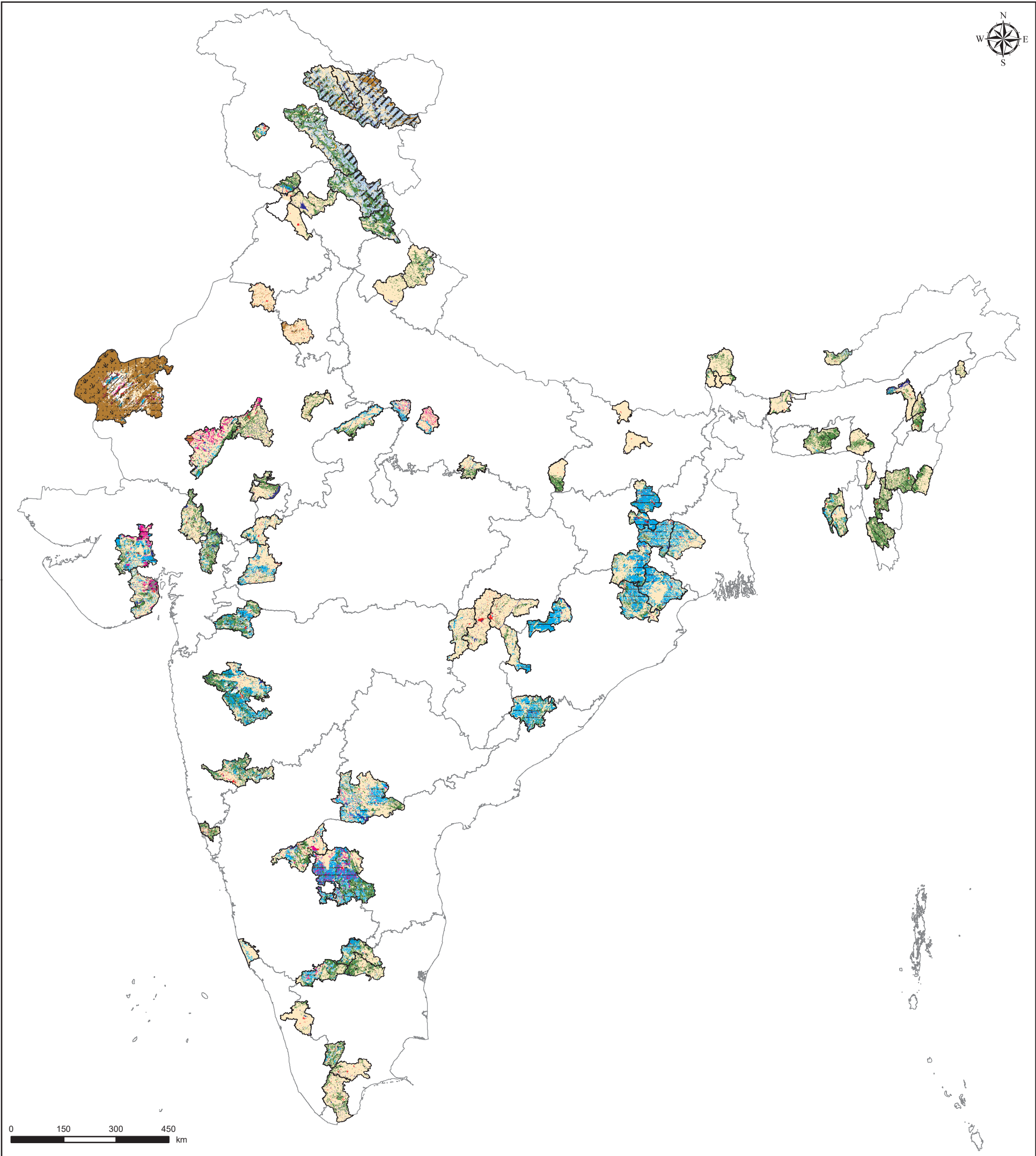
Table-6: List of districts observed with less than 10 % area undergoing degradation

S.No.	District	State	2011-13		2003-05	
			Area (ha)	Area (%)	Area (ha)	Area (%)
1	Sitamarhi	Bihar	4419	2.01	7153	3.25
2	Hoshiarpur	Punjab	11233	3.32	8827	2.61
3	Samastipur	Bihar	9165	3.16	11518	3.97
4	Pauri Garhwal	Uttarakhand	27067	5.08	25873	4.86
5	Palakkad	Kerala	33581	7.50	32384	7.23
6	Durg	Chhattisgarh	68363	8.01	66214	7.76
7	Kokrajhar	Assam	34946	10.60	26048	7.90
8	Pathankot	Punjab	9534	10.26	8728	9.39

Table-7: List of districts observed with more than 2% of changes between 2011-13 and 2003-05 timeframes

S.No.	District	State	2011-13		2003-05		Change (%) (2011-13) - (2003-05)
			Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Lunglei	Mizoram	146673	32.32	120324	26.51	5.81
2	Jaisalmer	Rajasthan	3569583	92.96	3768402	98.13	-5.17
3	Kohima	Nagaland	91338	62.43	98466	67.30	-4.87
4	Aizawl	Mizoram	188976	52.83	171767	48.02	4.81
5	South Tripura	Tripura	97443	31.88	85506	27.97	3.90
6	Etawah	Uttar Pradesh	97202	42.06	105988	45.86	-3.80
7	Kathua	Jammu Kashmir	121819	48.69	113167	45.23	3.46
8	Badgam	Jammu Kashmir	50946	37.16	55447	40.44	-3.28
9	Wokha	Nagaland	59574	36.59	64597	39.68	-3.09
10	Bhavnagar	Gujarat	297044	35.64	322623	38.71	-3.07
11	Bhiwani	Haryana	75750	15.85	61696	12.91	2.94
12	Kokrajhar	Assam	34946	10.60	26048	7.90	2.70
13	Ahmadnagar	Maharashtra	963233	56.50	1007057	59.07	-2.57
14	Hailakandi	Assam	23543	17.74	20718	15.61	2.13
15	Mahabubnagar	Telangana	475430	25.79	436653	23.69	2.10
16	Tirap	Arunachal Pradesh	17401	14.97	15016	12.92	2.05

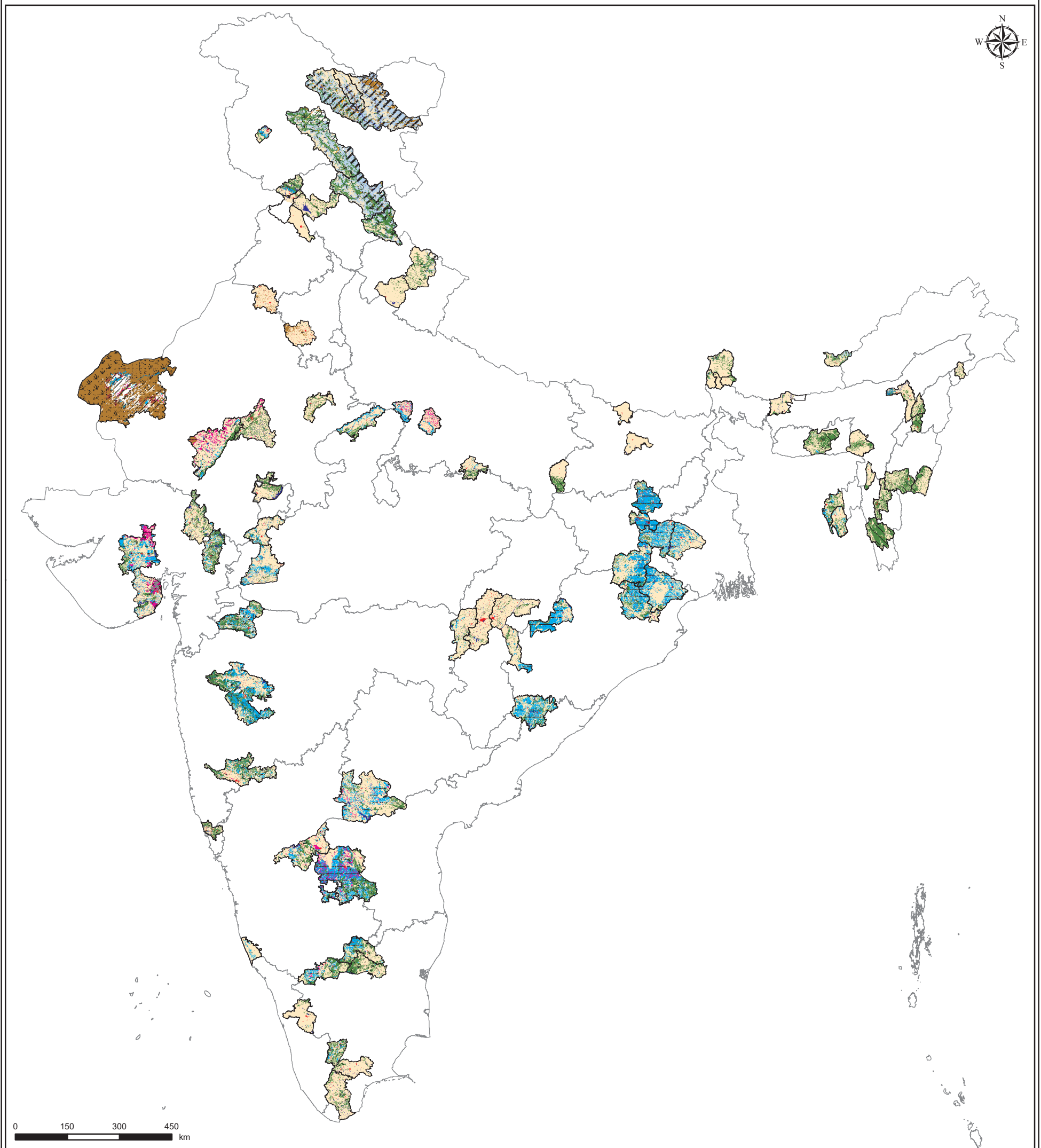
DESERTIFICATION / LAND DEGRADATION STATUS MAP OF SELECTED DISTRICTS - 2011-13



Legend

Symbol	Code	Description	Symbol	Code	Description	Symbol	Code	Description
	Fv1,2,3	Forest, vegetation degradation		Ee1,2,3	Dune / Sandy area, wind erosion		Lh1	Periglacial, frost heaving
	Gv1,2,3	Grassland / Grazing land, vegetation degradation		Is1,2,3	Agriculture irrigated, salinity / alkalinity		Lf1,2,3	Periglacial, frost shattering
	Sv1,2,3	Land with scrub, vegetation degradation		Ds1,2,3	Agriculture unirrigated, salinity / alkalinity		Rf1,2,3	Rocky, frost shattering
	Iw1,2,3	Agriculture irrigated, water erosion		Fs1,2,3	Forest, salinity / alkalinity		Fm1,2,3	Forest, man made
	Dw1,2,3	Agriculture unirrigated, water erosion		Ss1,2,3	Land with scrub, salinity / alkalinity		Tm1,2,3	Others, man made
	Fw1,2,3	Forest, water erosion		Bs1,2,3	Barren, salinity / alkalinity		B	Barren
	Sw1,2,3	Land with scrub, water erosion		Il1,2,3	Agriculture irrigated, water logging		R	Rocky
	Bw1,2	Barren, water erosion		DI1,2	Agriculture unirrigated, water logging		S	Settlement
	Ew1,2	Dune / Sandy area, water erosion		FI1,2,3	Forest, water logging		W	Water body/ Drainage
	Ie1,2	Agriculture irrigated, wind erosion		GI1,2,3	Grassland / Grazing land, water logging		NAD	No Apparent Degradation
	De1,2	Agriculture unirrigated, wind erosion		SI1	Land with scrub, water logging	Prepared by: Space Applications Centre, ISRO, Ahmedabad		
	Fe1	Forest, wind erosion		EI1,2	Dune / Sandy area, water logging			
	Se1,2,3	Land with scrub, wind erosion		Sg3	Land with scrub, mass movement			
	Be1,2,3	Barren, wind erosion		Bg1,2,3	Barren, mass movement			

DESERTIFICATION / LAND DEGRADATION STATUS MAP OF SELECTED DISTRICTS - 2003-05



Legend

Symbol	Code	Description	Symbol	Code	Description	Symbol	Code	Description
	Fv1,2,3	Forest, vegetation degradation		Ee1,2,3	Dune / Sandy area, wind erosion		Lh1	Periglacial, frost heaving
	Gv1,2,3	Grassland / Grazing land, vegetation degradation		Is1,2,3	Agriculture irrigated, salinity / alkalinity		Lf1,2,3	Periglacial, frost shattering
	Sv1,2,3	Land with scrub, vegetation degradation		Ds1,2,3	Agriculture unirrigated, salinity / alkalinity		Rf1,2,3	Rocky, frost shattering
	Iw1,2,3	Agriculture irrigated, water erosion		Fs1,2,3	Forest, salinity / alkalinity		Fm1,2,3	Forest, man made
	Dw1,2,3	Agriculture unirrigated, water erosion		Ss1,2,3	Land with scrub, salinity / alkalinity		Tm1,2,3	Others, man made
	Fw1,2,3	Forest, water erosion		Bs1,2,3	Barren, salinity / alkalinity		B	Barren
	Sw1,2,3	Land with scrub, water erosion		Il1,2,3	Agriculture irrigated, water logging		R	Rocky
	Bw1,2	Barren, water erosion		DI1,2	Agriculture unirrigated, water logging		S	Settlement
	Ew1,2	Dune / Sandy area, water erosion		Fl1,2,3	Forest, water logging		W	Water body/ Drainage
	Ie1,2	Agriculture irrigated, wind erosion		Gl1,2,3	Grassland / Grazing land, water logging		NAD	No Apparent Degradation
	De1,2	Agriculture unirrigated, wind erosion		Sl1	Land with scrub, water logging	Prepared by: Space Applications Centre, ISRO, Ahmedabad		
	Fe1	Forest, wind erosion		El1,2	Dune / Sandy area, water logging			
	Se1,2,3	Land with scrub, wind erosion		Sg3	Land with scrub, mass movement			
	Be1,2,3	Barren, wind erosion		Bg1,2,3	Barren, mass movement			

District wise status of Desertification/ Land Degradation for 2011-13 (area in ha)

S.N.	State	District	Vegetation Degradation	Water Erosion	Wind Erosion	Salinity / Alkalinity	Water Logging	Mass Movement	Frost Heaving	Frost Shattering	Man Made	Barren/ Rocky	Settlement	Total Area under Desertification		No Apparent Degradation	Total Geographical Area
														ha	%		
1	Andhra Pradesh	Anantapur	418203	656794	-	140077	-	-	-	-	2502	1369	13190	1232136	64.41	650251	1913000
2	Arunachal Pradesh	Tawang	63222	-	-	-	-	-	-	34638	-	-	942	98802	45.49	117768	217200
3		Tirap	16904	-	-	-	-	-	-	-	-	-	496	17401	14.97	97775	116200
4	Assam	Golaghat	37728	-	-	-	14789	-	-	-	-	-	2808	55325	15.80	257127	350200
5		Hailakandi	21966	-	-	-	1305	-	-	-	-	-	273	23543	17.74	107680	132700
6		Kokrajhar	33212	-	-	-	-	-	-	-	-	-	1734	34946	10.60	278820	329600
7	Bihar	Bhabua	102494	2128	-	0	-	-	-	-	-	-	1009	105630	31.70	227290	333200
8		Samastipur	-	-	-	-	8007	-	-	-	-	-	1157	9165	3.16	275465	290400
9		Sitamarhi	-	-	-	-	3252	-	-	-	-	-	1167	4419	2.01	214891	220000
10	Chhattisgarh	Durg	34954	3439	-	-	1396	-	-	-	4568	160	23847	68363	8.01	761286	853525
11		Raipur	98299	72722	-	-	749	-	-	-	6504	7046	21427	206747	16.70	1002109	1238300
12		Rajnandgaon	44363	31995	-	-	1470	-	-	-	1443	1475	5864	86611	10.73	702118	807025
13	Goa	North Goa	75181	-	-	-	1632	-	-	-	81	760	9586	87239	50.25	78603	173600
14	Gujarat	Bhavnagar	95507	90512	-	74599	-	-	-	-	14147	7598	14680	297044	35.64	505720	833400
15		Panch Mahals	211440	57702	-	-	-	-	-	-	305	-	2940	272387	52.07	223461	523100
16		Sabar Kantha	197931	28266	-	-	-	-	-	-	1375	-	6285	233857	31.63	476704	739400
17		Surendranagar	130569	253663	-	143696	1570	-	-	-	850	-	6145	536493	51.47	482604	1042300
18	Haryana	Bhiwani	3865	-	52536	-	748	-	-	-	759	926	16915	75750	15.85	402034	477800
19		Sirsa	306	-	26481	-	404	-	-	-	532	-	16519	44242	10.34	382732	427700
20	Himachal Pradesh	Kangra	101570	-	-	-	-	191	-	9755	-	-	1075	112592	19.62	425329	573900
21		Kinnaur	280687	-	3742	-	-	416	-	178132	-	-	-	462977	72.33	174419	640100
22		Lahul & Spiti	346332	-	14332	-	-	13240	-	740823	-	-	-	1114727	80.54	255636	1384100
23	Jammu & Kashmir	Badgam	21467	17399	-	-	3694	-	-	-	0	-	8386	50946	37.16	81518	137100
24		Kargil	435157	-	7180	-	-	20524	9	526860	-	107574	779	1098082	78.23	305518	1403600
25		Kathua	103983	14476	-	-	118	38	-	-	-	-	3203	121819	48.69	108887	250200
26		Nubra sub-basin	13037	-	23807	-	-	7446	-	155051	-	-	-	199340	46.55	218981	428200
27		Shyok sub-basin	192831	-	196369	-	-	114251	-	1464024	-	-	341	1967814	73.89	650068	2663200

S.N.	State	District	Vegetation Degradation	Water Erosion	Wind Erosion	Salinity / Alkalinity	Water Logging	Mass Movement	Frost Heaving	Frost Shattering	Man Made	Barren/ Rocky	Settlement	Total Area under Desertification		No Apparent Degradation	Total Geographical Area
														ha	%		
28	Jharkhand	Bokaro	25417	153672	-	-	-	-	-	-	11108	-	3695	193892	67.25	84267	288300
29		Giridih	40639	297024	-	-	-	-	-	-	2874	238	17409	358183	73.79	123082	485400
30		Pashchimi Singhbhum	90487	339902	-	-	-	-	-	-	2326	4267	11523	448505	46.49	503548	964800
31	Karnataka	Bellary	154864	151805	837	21384	-	-	-	-	14553	240	10690	354372	41.88	458519	846100
32		Chamarajanagar	161587	95401	-	5142	-	-	-	-	966	-	2913	266009	47.10	291092	564800
33	Kerala	Kasaragod	2053	19376	866	-	-	-	-	-	-	-	716	23011	11.57	169373	198900
34		Palakkad	28237	306	-	-	-	-	-	-	60	-	4978	33581	7.50	408733	448000
35	Madhya Pradesh	Dhar	45329	145765	-	2414	64	-	-	-	4124	4559	6160	208415	25.56	585472	815300
36		Morena	78402	90432	-	756	-	-	-	-	698	2341	5644	178273	35.73	308153	498900
37		Neemuch	130930	1837	-	4966	-	-	-	-	816	4435	4411	147395	34.63	251125	425600
38		Ratlam	43667	50110	-	352	285	-	-	-	665	1746	5703	102527	21.09	374384	486100
39	Maharashtra	Ahmadnagar	421757	458476	-	-	-	-	-	-	495	59606	22898	963233	56.50	703587	1704800
40		Dhule	251501	170913	-	-	-	-	-	-	88	28245	11155	461902	64.20	238168	719500
41		Sangli	256590	78516	-	2954	-	-	-	-	-	35045	19600	392705	45.81	452586	857200
42	Manipur	Chandel	109585	-	-	-	-	-	-	-	-	-	2975	112560	33.98	218335	331300
43		Churachandpur	220495	-	-	-	-	-	-	-	-	-	3907	224402	49.10	229581	457000
44	Meghalaya	Jaintia Hills	84127	-	-	-	-	-	-	-	3637	-	695	88458	23.16	291874	381900
45		West Khasi Hills	268221	-	-	-	-	-	-	-	9617	-	320	278159	53.01	244947	524700
46	Mizoram	Aizawl	184638	-	-	-	-	-	-	-	-	-	4338	188976	52.83	166939	357700
47		Lunglei	143821	-	-	-	-	-	-	-	-	-	2852	146673	32.32	305058	453800
48	Nagaland	Kohima	87617	-	-	-	-	-	-	-	-	-	3721	91338	62.43	54531	146300
49		Wokha	57451	-	-	-	-	-	-	-	-	-	2123	59574	36.59	101116	162800
50	Odisha	Bargarh	46437	304160	-	-	-	-	-	-	668	4247	2649	358162	61.36	200544	583700
51		Kendujhar	139159	280150	-	-	-	-	-	-	9512	-	11027	439848	52.97	373305	830300
52		Koraput	139479	340265	-	-	-	-	-	-	1128	621	6011	487504	55.35	368557	880700
53		Mayurbhanj	35454	401997	-	-	-	-	-	-	729	-	12045	450224	43.22	575619	1041800
54	Punjab	Hoshiarpur	7455	-	-	-	-	-	-	-	-	-	3778	11233	3.32	325976	338600
55		Pathankot	6960	-	-	-	-	-	-	-	251	-	2322	9534	10.26	77791	92900

S.N.	State	District	Vegetation Degradation	Water Erosion	Wind Erosion	Salinity / Alkalinity	Water Logging	Mass Movement	Frost Heaving	Frost Shattering	Man Made	Barren/ Rocky	Settlement	Total Area under Desertification		No Apparent Degradation	Total Geographical Area
														ha	%		
56	Rajasthan	Ajmer	223256	125	-	30447	-	-	-	-	2785	-	12204	268817	31.70	543710	848100
57		Dausa	71521	2646	5257	-	-	-	-	-	107	150	2438	82120	23.93	251547	343200
58		Jaisalmer	4082	51406	2950456	21880	4449	-	-	-	61894	468566	6850	3569583	92.96	257513	3840100
59		Pali	156384	63228	30231	155332	-	-	-	-	2889	49419	7189	464673	37.51	743161	1238700
60-63	Sikkim (all four districts)	Sikkim	104225	1074	-	-	-	-	-	7262	93	-	505	113159	15.95	594034	709600
64	Tamil Nadu	Dharmapuri	188854	7327	-	-	-	-	-	-	28	52	1593	197853	44.00	248553	449700
65		Krishnagiri	131606	107014	-	-	-	-	-	-	1323	2550	3930	246424	48.05	264232	512900
66		Theni	115866	25993	-	-	-	-	-	-	70	-	4521	146450	51.06	137486	286800
67		Tirunelveli	113947	-	-	-	-	-	-	-	1915	-	6522	122384	18.29	527444	669300
68		Virudhunagar	36225	-	-	-	-	-	-	-	654	36	5786	42702	10.07	371416	424100
69	Telangana	Mahabubnagar	169129	252055	-	36921	-	-	-	-	2937	-	14389	475430	25.79	1301792	1843200
70	Tripura	South Tripura	59867	34595	-	-	-	-	-	-	75	-	2905	97443	31.88	207149	305700
71		West Tripura	97826	41817	-	-	-	-	-	-	-	-	2056	141699	47.34	156572	299300
72	Uttar Pradesh	Chitrakoot	72183	12660	-	1096	192	-	-	-	-	-	2852	88982	27.67	224061	321600
73		Etawah	-	73544	-	17267	473	-	-	-	-	-	5917	97202	42.06	127961	231100
74		Kanpur Dehat	287	31439	-	38073	1665	-	-	-	32	-	6371	77867	25.78	221052	302100
75	Uttarakhand	Chamoli	182094	16	-	-	-	1263	-	33058	-	42279	224	258935	32.25	542541	803000
76		Pauri Garhwal	24953	133	-	-	-	63	-	-	-	-	1918	27067	5.08	495995	532900
77	West Bengal	Bankura	31907	183990	-	-	-	-	-	-	2323	-	11270	229490	33.35	438376	688200
78		Purulia	49987	299403	-	-	-	-	-	-	1935	-	6004	357330	57.09	254092	625900

District wise status of Desertification/ Land Degradation for 2003-05 (area in ha)

S.N.	State	District	Vegetation Degradation	Water Erosion	Wind Erosion	Salinity / Alkalinity	Water Logging	Mass Movement	Frost Heaving	Frost Shattering	Man Made	Barren/ Rocky	Settlement	Total Area under Desertification		No Apparent Degradation	Total Geographical Area
														ha	%		
1	Andhra Pradesh	Anantapur	416955	661225	-	137216	-	-	-	-	2204	1369	12428	1231397	64.37	651304	1913000
2	Arunachal Pradesh	Tawang	62583	-	-	-	-	-	-	34638	-	-	815	98036	45.14	118534	217200
3		Tirap	14546	-	-	-	-	-	-	-	-	-	469	15016	12.92	100160	116200
4	Assam	Golaghat	38252	-	-	-	15024	-	-	-	-	-	2400	55676	15.90	258870	350200
5		Hailakandi	19265	-	-	-	1274	-	-	-	-	-	179	20718	15.61	110540	132700
6		Kokrajhar	24774	-	-	-	-	-	-	-	-	-	1274	26048	7.90	287613	329600
7	Bihar	Bhabua	101674	942	-	209	-	-	-	-	-	-	634	103459	31.05	229676	333200
8		Samastipur	-	-	-	-	10541	-	-	-	-	-	977	11518	3.97	272524	290400
9		Sitamarhi	-	-	-	-	6184	-	-	-	-	-	969	7153	3.25	211699	220000
10	Chhattisgarh	Durg	35222	3439	-	-	1361	-	-	-	3692	160	22340	66214	7.76	763550	853525
11		Raipur	98014	72722	-	-	749	-	-	-	3866	7046	19647	202045	16.32	1006762	1238300
12		Rajnandgaon	49352	31645	-	-	1470	-	-	-	1071	1514	5422	90473	11.21	699810	807025
13	Goa	North Goa	75012	-	-	-	1573	-	-	-	11	640	9198	86434	49.79	79219	173600
14	Gujarat	Bhavnagar	95755	89907	-	100912	-	-	-	-	14147	7878	14022	322623	38.71	478146	833400
15		Panch Mahals	215926	55139	-	-	-	-	-	-	143	-	2311	273518	52.29	222747	523100
16		Sabar Kantha	194401	22887	-	-	-	-	-	-	1174	-	5945	224408	30.35	485707	739400
17		Surendranagar	130434	252734	-	143302	1648	-	-	-	648	-	5767	534534	51.28	482054	1042300
18	Haryana	Bhiwani	4313	-	38316	-	939	-	-	-	644	940	16544	61696	12.91	416088	477800
19		Sirsa	306	-	35879	-	428	-	-	-	532	-	15534	52679	12.32	374296	427700
20	Himachal Pradesh	Kangra	101021	-	-	-	-	191	-	9755	-	-	939	111906	19.50	426015	573900
21		Kinnaur	280590	-	3742	-	-	416	-	178132	-	-	-	462880	72.31	174516	640100
22		Lahul & Spiti	346720	-	14332	-	-	13240	-	740823	-	-	-	1115115	80.57	255249	1384100
23	Jammu & Kashmir	Badgam	17326	24880	-	-	5022	-	-	-	81	-	8138	55447	40.44	76973	137100
24		Kargil	434388	-	7180	-	-	21323	9	526863	-	107741	400	1097904	78.22	305696	1403600
25		Kathua	95570	15620	-	-	47	38	-	-	-	-	1892	113167	45.23	117334	250200
26		Nubra sub-basin	13027	-	23746	-	-	7964	-	155051	-	-	-	199788	46.66	218569	428200
27		Shyok sub-basin	193241	-	196633	-	-	114663	-	1464024	-	-	230	1968791	73.93	649092	2663200

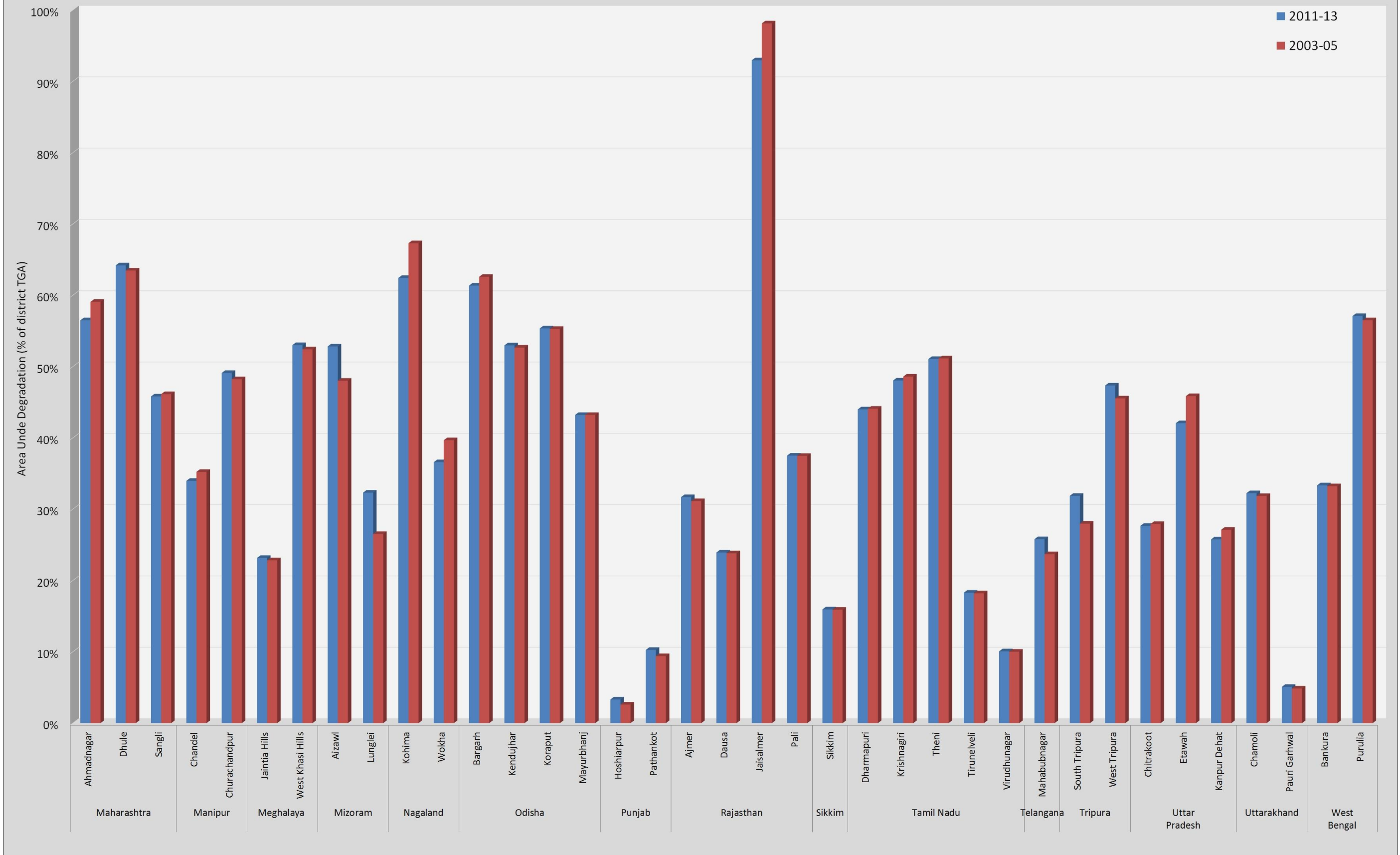
S.N.	State	District	Vegetation Degradation	Water Erosion	Wind Erosion	Salinity / Alkalinity	Water Logging	Mass Movement	Frost Heaving	Frost Shattering	Man Made	Barren/ Rocky	Settlement	Total Area under Desertification		No Apparent Degradation	Total Geographical Area
														ha	%		
28	Jharkhand	Bokaro	25380	155066	-	-	-	-	-	-	9928	-	3343	193717	67.19	84441	288300
29		Giridih	41425	299606	-	-	-	-	-	-	373	238	16653	358295	73.81	123004	485400
30		Pashchimi Singhbhum	90366	340229	-	-	-	-	-	-	1837	4267	11345	448044	46.44	504064	964800
31	Karnataka	Bellary	157340	157612	837	21237	-	-	-	-	7099	240	9473	353838	41.82	459054	846100
32		Chamarajanagar	161587	98325	-	4829	-	-	-	-	875	-	2652	268268	47.50	288833	564800
33	Kerala	Kasaragod	1966	18583	866	-	-	-	-	-	-	-	667	22082	11.10	170302	198900
34		Palakkad	27709	306	-	-	-	-	-	-	60	-	4309	32384	7.23	409930	448000
35	Madhya Pradesh	Dhar	45795	145573	-	2414	64	-	-	-	3118	4530	5790	207283	25.42	587915	815300
36		Morena	78414	90432	-	756	-	-	-	-	553	2341	4939	177436	35.57	308991	498900
37		Neemuch	131087	1837	-	4968	-	-	-	-	632	4512	4262	147296	34.61	251511	425600
38		Ratlam	43688	50043	-	347	270	-	-	-	510	1671	5155	101685	20.92	376262	486100
39	Maharashtra	Ahmadnagar	422800	503574	-	-	-	-	-	-	157	59606	20920	1007057	59.07	659801	1704800
40		Dhule	251927	166294	-	-	-	-	-	-	0	28245	10221	456688	63.47	243716	719500
41		Sangli	256982	82033	-	2622	-	-	-	-	-	35045	18765	395447	46.13	450122	857200
42	Manipur	Chandel	113996	-	-	-	-	-	-	-	-	-	2733	116730	35.23	214165	331300
43		Churachandpur	216841	-	-	-	-	-	-	-	-	-	3544	220385	48.22	233598	457000
44	Meghalaya	Jaintia Hills	84702	-	-	-	-	-	-	-	1935	-	587	87224	22.84	293108	381900
45		West Khasi Hills	266276	-	-	-	-	-	-	-	8500	-	259	275035	52.42	248071	524700
46	Mizoram	Aizawl	167471	-	-	-	-	-	-	-	-	-	4296	171767	48.02	184148	357700
47		Lunglei	117584	-	-	-	-	-	-	-	-	-	2740	120324	26.51	331431	453800
48	Nagaland	Kohima	94889	-	-	-	-	-	-	-	-	-	3578	98466	67.30	47402	146300
49		Wokha	63019	-	-	-	-	-	-	-	-	-	1578	64597	39.68	97244	162800
50	Odisha	Bargarh	46523	311697	-	-	-	-	-	-	611	4247	2296	365375	62.60	193331	583700
51		Kendujhar	138602	282285	-	-	-	-	-	-	7020	-	9778	437684	52.71	375469	830300
52		Koraput	139286	340291	-	-	-	-	-	-	757	621	5942	486896	55.29	369164	880700
53		Mayurbhanj	35454	402067	-	-	-	-	-	-	729	-	11975	450224	43.22	575619	1041800
54	Punjab	Hoshiarpur	5280	-	-	-	-	-	-	-	-	-	3547	8827	2.61	328386	338600
55		Pathankot	6689	-	-	-	-	-	-	-	29	-	2010	8728	9.39	78269	92900

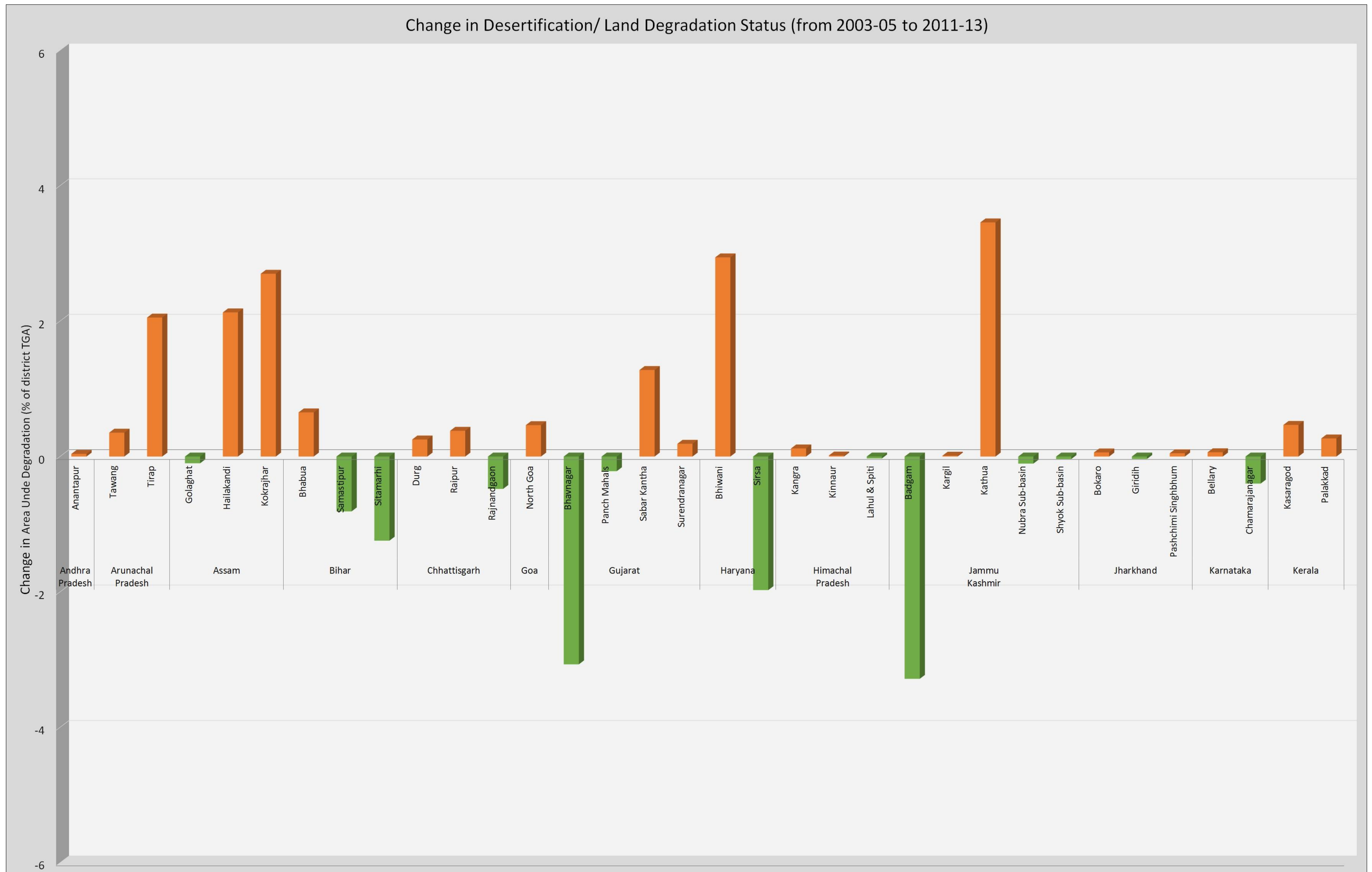
S.N.	State	District	Vegetation Degradation	Water Erosion	Wind Erosion	Salinity / Alkalinity	Water Logging	Mass Movement	Frost Heaving	Frost Shattering	Man Made	Barren/ Rocky	Settlement	Total Area under Desertification		No Apparent Degradation	Total Geographical Area
														ha	%		
56	Rajasthan	Ajmer	225416	125	-	25512	-	-	-	-	2235	-	10800	264088	31.14	552554	848100
57		Dausa	71692	2646	5257	-	-	-	-	-	107	150	1868	81721	23.81	251946	343200
58		Jaisalmer	3487	57732	3077452	22127	5137	-	-	-	67366	530256	4845	3768402	98.13	60845	3840100
59		Pali	156100	63395	32230	154741	-	-	-	-	2816	49419	5484	464184	37.47	743851	1238700
60-63	Sikkim (all four districts)	Sikkim	103959	1074	-	-	-	-	-	7262	93	-	434	112822	15.90	594371	709600
64	Tamil Nadu	Dharmapuri	189658	7327	-	-	-	-	-	-	28	52	1235	198299	44.10	248032	449700
65		Krishnagiri	132616	109949	-	-	-	-	-	-	1132	2550	2986	249234	48.59	261421	512900
66		Theni	116027	26355	-	-	-	-	-	-	70	-	4237	146689	51.15	137247	286800
67		Tirunelveli	113947	-	-	-	-	-	-	-	1629	-	6282	121858	18.21	527970	669300
68		Virudhunagar	36225	-	-	-	-	-	-	-	603	36	5621	42485	10.02	371633	424100
69	Telangana	Mahabubnagar	167027	222200	-	34004	-	-	-	-	1177	-	12245	436653	23.69	1343601	1843200
70	Tripura	South Tripura	50233	32507	-	-	-	-	-	-	0	-	2766	85506	27.97	219044	305700
71		West Tripura	93492	40738	-	-	-	-	-	-	-	-	2056	136286	45.54	161985	299300
72	Uttar Pradesh	Chitrakoot	72616	13102	-	1095	192	-	-	-	-	-	2812	89817	27.93	222667	321600
73		Etawah	-	78000	-	21210	937	-	-	-	-	-	5842	105988	45.86	119330	231100
74		Kanpur Dehat	282	31740	-	39384	4167	-	-	-	25	-	6351	81948	27.13	217025	302100
75	Uttarakhand	Chamoli	178916	16	-	-	-	1263	-	33058	-	42279	224	255757	31.85	545719	803000
76		Pauri Garhwal	23985	194	-	-	-	25	-	-	-	-	1670	25873	4.86	497198	532900
77	West Bengal	Bankura	30610	185925	-	-	-	-	-	-	929	-	11189	228653	33.22	439213	688200
78		Purulia	49549	298064	-	-	-	-	-	-	236	-	5790	353639	56.50	258063	625900

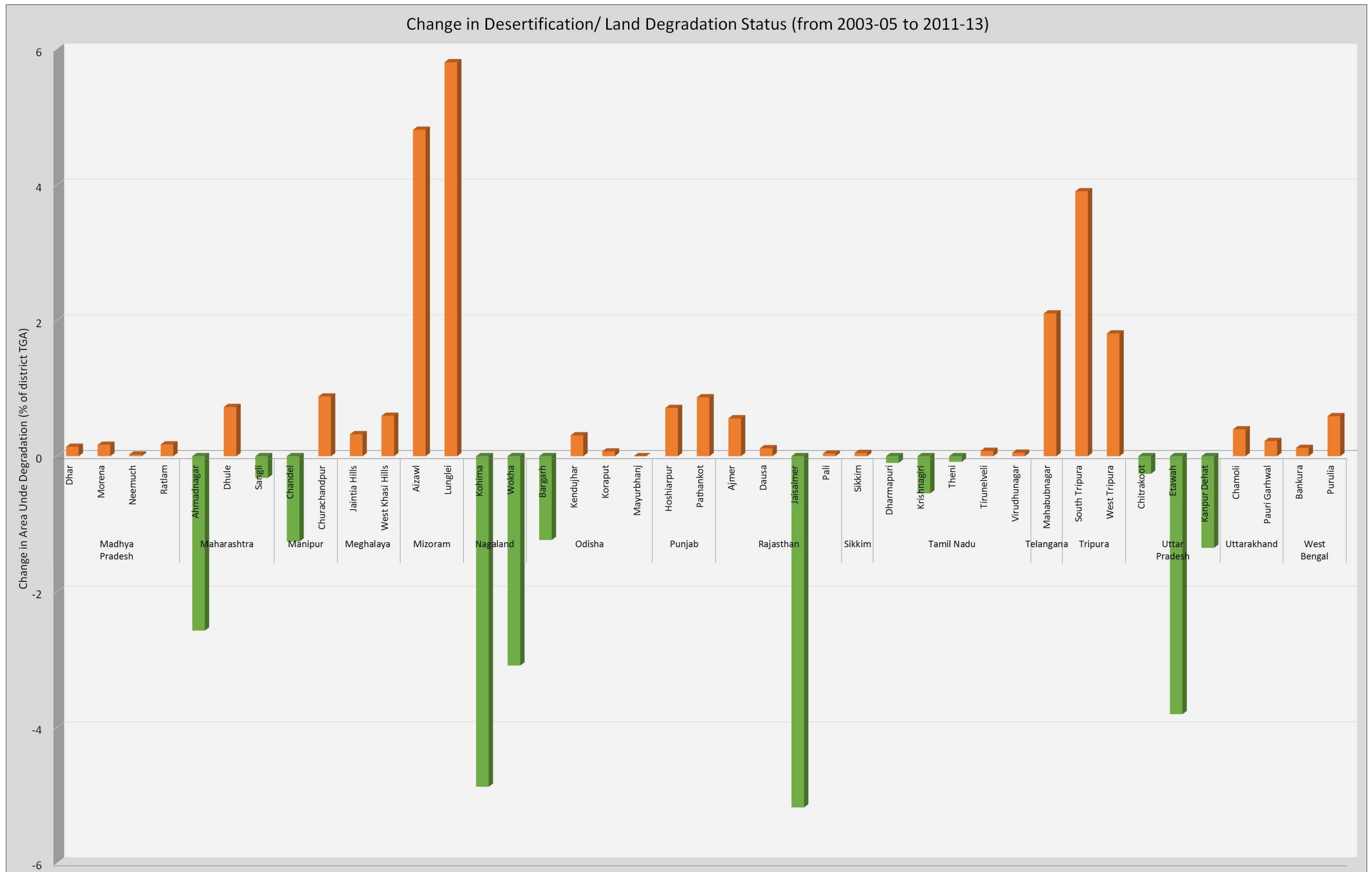
Comparison of two timeframe Desertification/ Land Degradation Status (wrt district TGA)



Comparison of two timeframe Desertification/ Land Degradation Status (wrt district TGA)







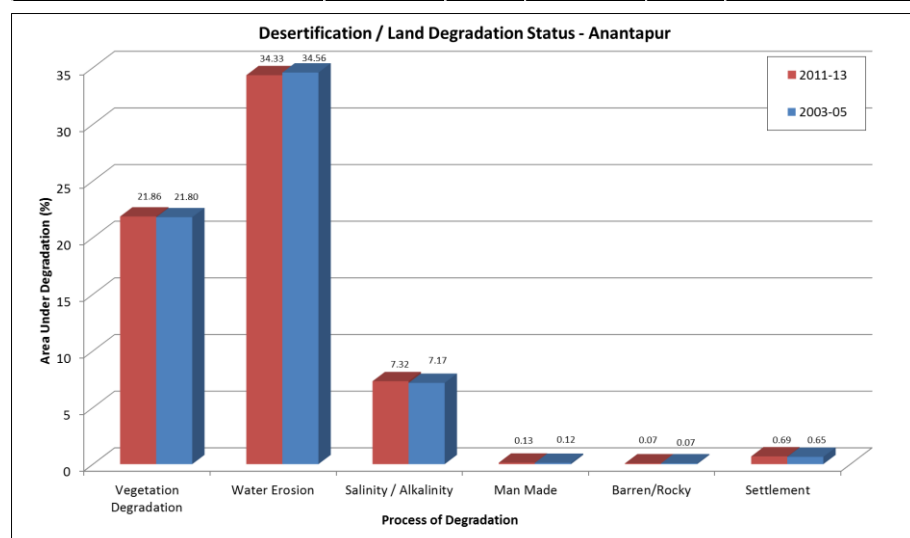
Anantapur District, Andhra Pradesh

Anantapur district lies in the south-western part of Andhra Pradesh state. It is bounded by Karnataka state on west and south sides, Chittoor district on south-east side, YSR district on east side and Kurnool district on north side. It covers an area of 19,130 sq. km. The district has a population of 4,081,148 with 213 population density, 977 sex ratio and a literacy rate of 63.57%. (Census 2011)

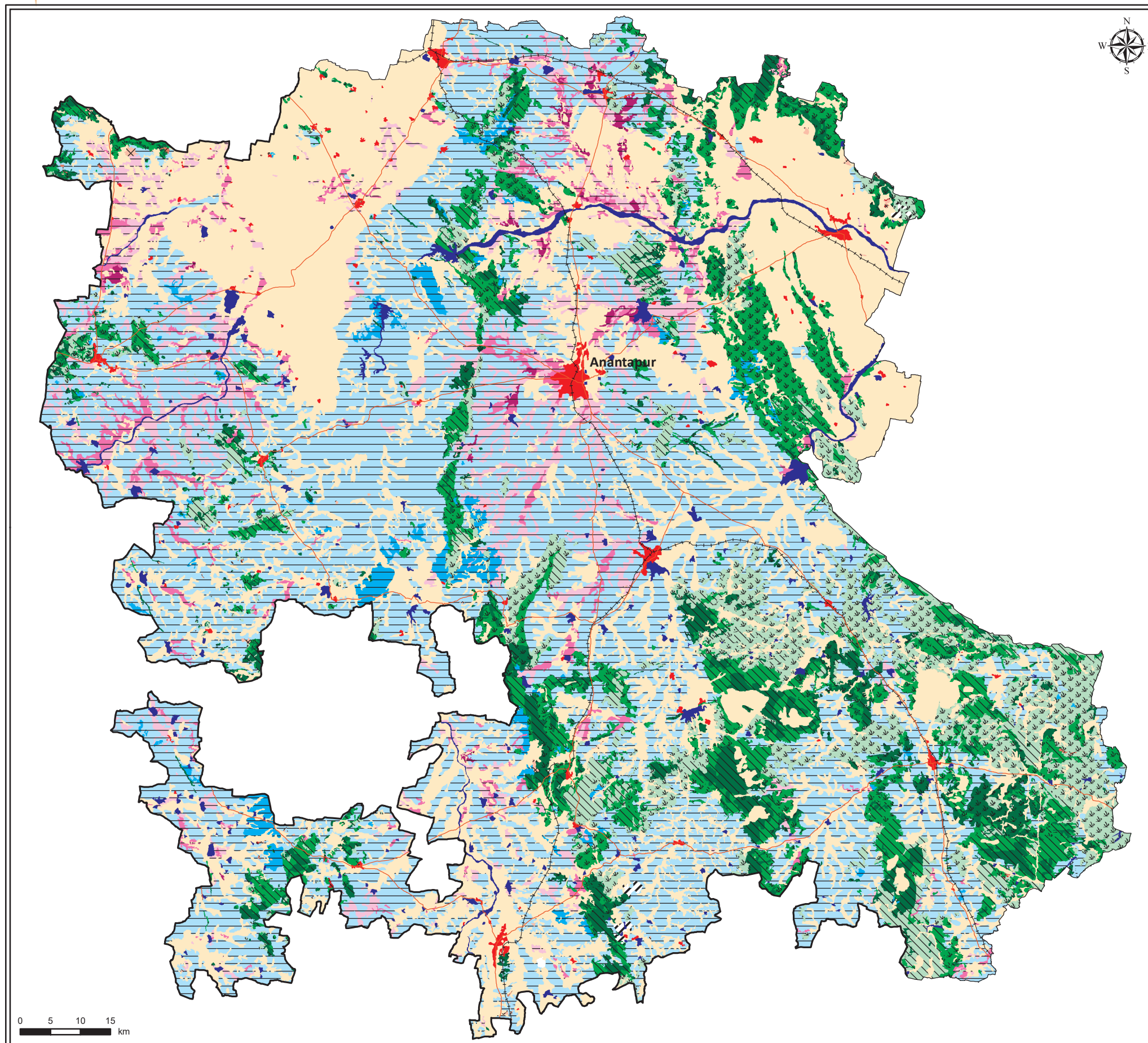
It is the largest district in terms of area in Andhra Pradesh and 7th largest district in India. Physiographic personality of the district altogether reflects in the form of basins, uplands and hilly terrain. Its northern and central portions are a high plateau, generally undulating, with large granite rocks or low hill ranges rising occasionally above its surface. In the southern portion of the district the surface is more hilly, the plateau there rising to 600 m above the sea. With a consequent slope towards the North, the district is drained by rivers Vedavati, Pennar, Chitravati, Papagni etc., along with their tributaries.

Anantapur is observed with 64.41% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.04% since 2003-05. The most significant process of land degradation/ desertification in the district is Water Erosion (34.33% during 2011-13 and 34.56% during 2003-05) followed by Vegetation Degradation (21.86% during 2011-13 and 21.80% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	418203.41	21.86	416955.12	21.80	1248.29
Water Erosion	656794.21	34.33	661224.83	34.56	-4430.62
Salinity / Alkalinity	140077.07	7.32	137215.77	7.17	2861.30
Man Made	2501.61	0.13	2204.19	0.12	297.41
Barren/Rocky	1369.39	0.07	1369.39	0.07	0.00
Settlement	13190.35	0.69	12427.78	0.65	762.57
Total Area under Desertification	1232136.03	64.41	1231397.07	64.37	738.96
No Apparent Degradation	650251.32	33.99	651303.94	34.05	-1052.62
Total Geographical Area (ha)	1913000.00				

























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, Slight	48482.08	2.53	47381.01	2.48	1101.07
2	Fv2	Forest, vegetation degradation, Moderate	67688.78	3.54	67541.56	3.53	147.22
3	Fv3	Forest, vegetation degradation, Severe	39307.28	2.05	39307.28	2.05	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	37568.84	1.96	37568.84	1.96	0.00
5	Sv2	Land with scrub, vegetation degradation, Moderate	107330.03	5.61	107330.03	5.61	0.00
6	Sv3	Land with scrub, vegetation degradation, Severe	117826.40	6.16	117826.40	6.16	0.00
7	Dw1	Agriculture unirrigated, water erosion, Slight	630567.57	32.96	634998.19	33.19	-4430.62
8	Dw2	Agriculture unirrigated, water erosion, Moderate	25888.13	1.35	25888.13	1.35	0.00
9	Sw1	Land with scrub, water erosion, Slight	281.48	0.01	281.48	0.01	0.00
10	Sw2	Land with scrub, water erosion, Moderate	57.03	0.00	57.03	0.00	0.00
11	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight	91593.69	4.79	90755.27	4.74	838.41
12	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate	42818.46	2.24	40795.57	2.13	2022.89
13	Ds3	Agriculture unirrigated, salinity / alkalinity, Severe	5217.66	0.27	5217.66	0.27	0.00
14	Ss1	Land with scrub, salinity / alkalinity, Slight	107.61	0.01	107.61	0.01	0.00
15	Ss2	Land with scrub, salinity / alkalinity, Moderate	339.66	0.02	339.66	0.02	0.00
16	Tm1	Others, man made, Slight	1933.66	0.10	1754.03	0.09	179.63
17	Tm2	Others, man made, Moderate	354.96	0.02	237.18	0.01	117.78
18	Tm3	Others, man made, Severe	212.99	0.01	212.99	0.01	0.00
19	R	Rocky	1369.39	0.07	1369.39	0.07	0.00
20	S	Settlement	13190.35	0.69	12427.78	0.65	762.57
Total Area Under Desertification/ Land Degradation			1232136.03	64.41	1231397.07	64.37	738.96
21	W	Water body/ Drainage	30612.65	1.60	30298.99	1.58	313.66
22	NAD	No Apparent Degradation	650251.32	33.99	651303.94	34.05	-1052.62
Total Geographical Area (ha)			1913000.00	100.00	1913000.00	100.00	



DESERTIFICATION / LAND DEGRADATION STATUS MAP

Anantapur District, Andhra Pradesh

Timeframe - 2011-13

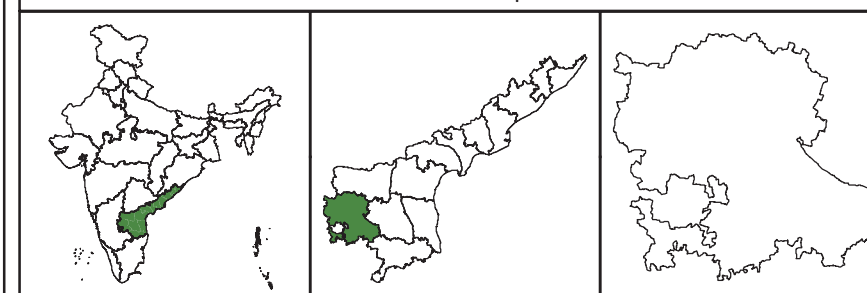
Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight
	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate
	Ds3	Agriculture unirrigated, salinity / alkalinity, Severe
	Ss1	Land with scrub, salinity / alkalinity, Slight
	Ss2	Land with scrub, salinity / alkalinity, Moderate
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:
 - IRS LISS3 (2011-2013)
 - Ancillary Information
 - Ground Truth Data

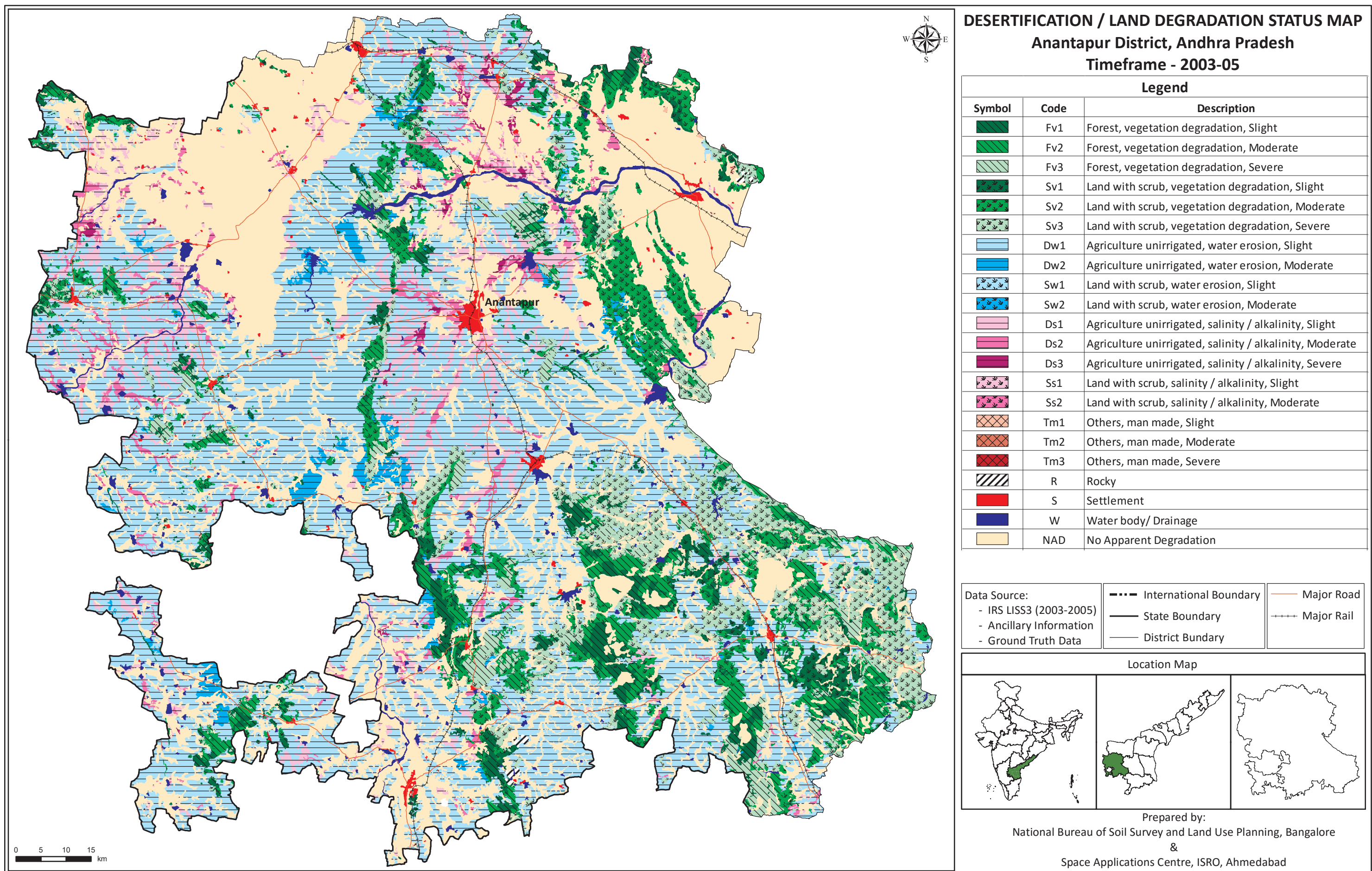
--- International Boundary
 — State Boundary
 — District Boundary

— Major Road
 +---+ Major Rail

Location Map



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



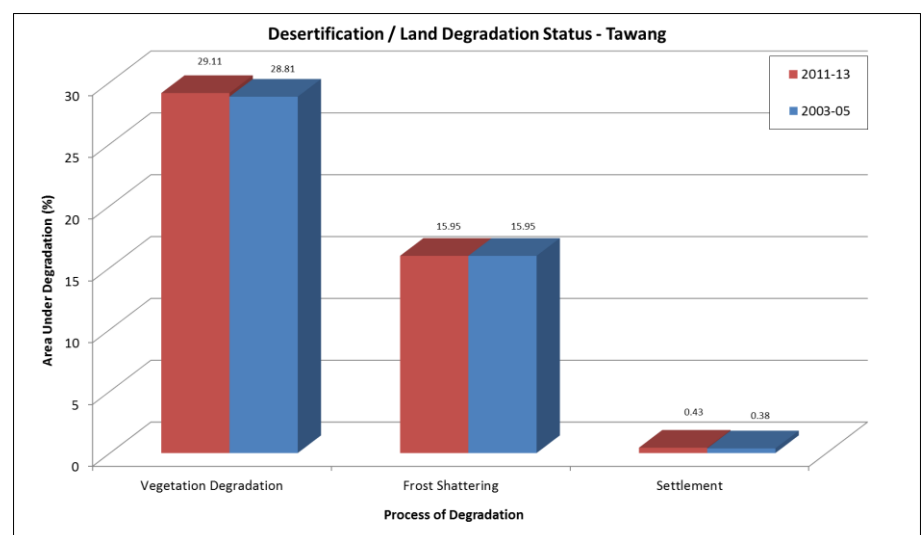
Tawang District, Arunachal Pradesh

Tawang district is located in the western most part of Arunachal Pradesh state. It shares international border with Bhutan on west and part of south sides and China on north side. It is bounded by West Kameng district on south-east and east sides and East Kameng district on east side. It covers an area of 2,172 sq. km. The district has a population of 49,977 with 23 population density, 714 sex ratio and a literacy rate of 49.05%. (Census 2011)

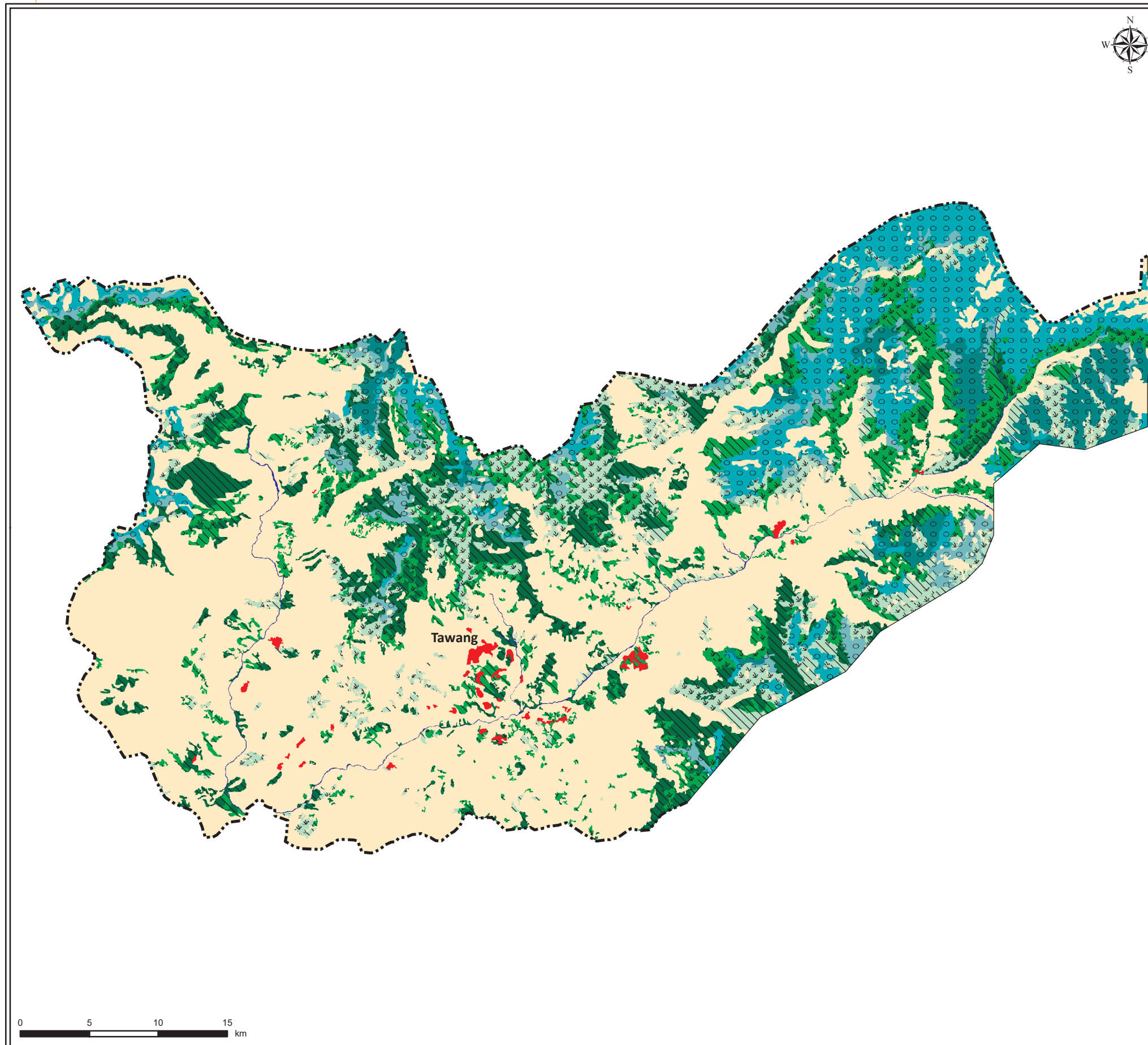
The district consists of continuous chain of hills and mountains, the altitude of which rises from 3500 feet to 22,500 feet approximately. The highest mountain peak in the district is known as Gourichen which is approximately at 22,500 feet from mean sea level. The high hills and mountains are snow bounded in winter season where no habitation exists. The area is covered by dense forest of East Himalaya. Tawang Chuu and Nyamjang Chuu are the two main rivers in Tawang District.

Tawang is observed with 45.49% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.35% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (29.11% during 2011-13 and 28.81% during 2003-05) followed by Frost Shattering (15.95% during 2011-13 and 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	63221.99	29.11	62583.21	28.81	638.78
Frost Shattering	34638.10	15.95	34638.10	15.95	0.00
Settlement	941.87	0.43	814.75	0.38	127.12
Total Area under Desertification	98801.96	45.49	98036.06	45.14	765.90
No Apparent Degradation	117768.44	54.22	118534.34	54.57	-765.90
Total Geographical Area (ha)	217200.00				















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, Slight	17794.08	8.19	17850.77	8.22	-56.68
2	Fv2	Forest, vegetation degradation, Moderate	8869.93	4.08	8421.14	3.88	448.79
3	Fv3	Forest, vegetation degradation, Severe	3459.41	1.59	3212.74	1.48	246.67
4	Sv1	Land with scrub, vegetation degradation, Slight	3151.60	1.45	3408.95	1.57	-257.34
5	Sv2	Land with scrub, vegetation degradation, Moderate	14208.32	6.54	14146.52	6.51	61.80
6	Sv3	Land with scrub, vegetation degradation, Severe	15738.65	7.25	15543.11	7.16	195.54
7	Lf1	Periglacial, frost shattering, Slight	7504.31	3.46	7504.31	3.46	0.00
8	Lf2	Periglacial, frost shattering, Moderate	19674.91	9.06	19674.91	9.06	0.00
9	Lf3	Periglacial, frost shattering, Severe	7458.87	3.43	7458.87	3.43	0.00
10	S	Settlement	941.87	0.43	814.75	0.38	127.12
Total Area Under Desertification/ Land Degradation			98801.96	45.49	98036.06	45.14	765.90
11	W	Water body/ Drainage	629.61	0.29	629.61	0.29	0.00
12	NAD	No Apparent Degradation	117768.44	54.22	118534.34	54.57	-765.90
Total Geographical Area (ha)			217200.00	100.00	217200.00	100.00	



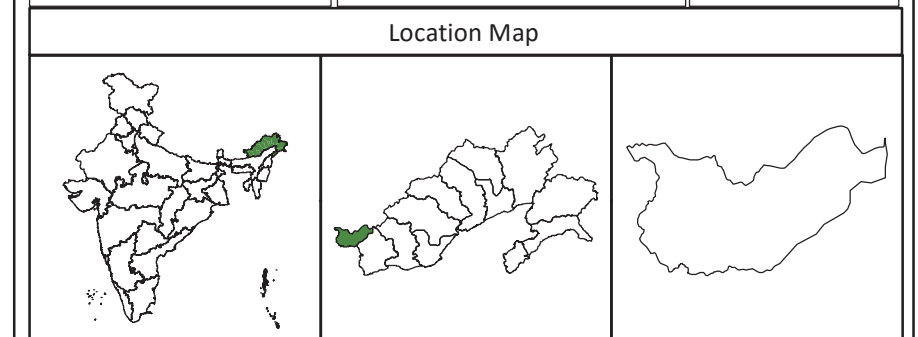
DESERTIFICATION / LAND DEGRADATION STATUS MAP

Tawang District, Arunachal Pradesh

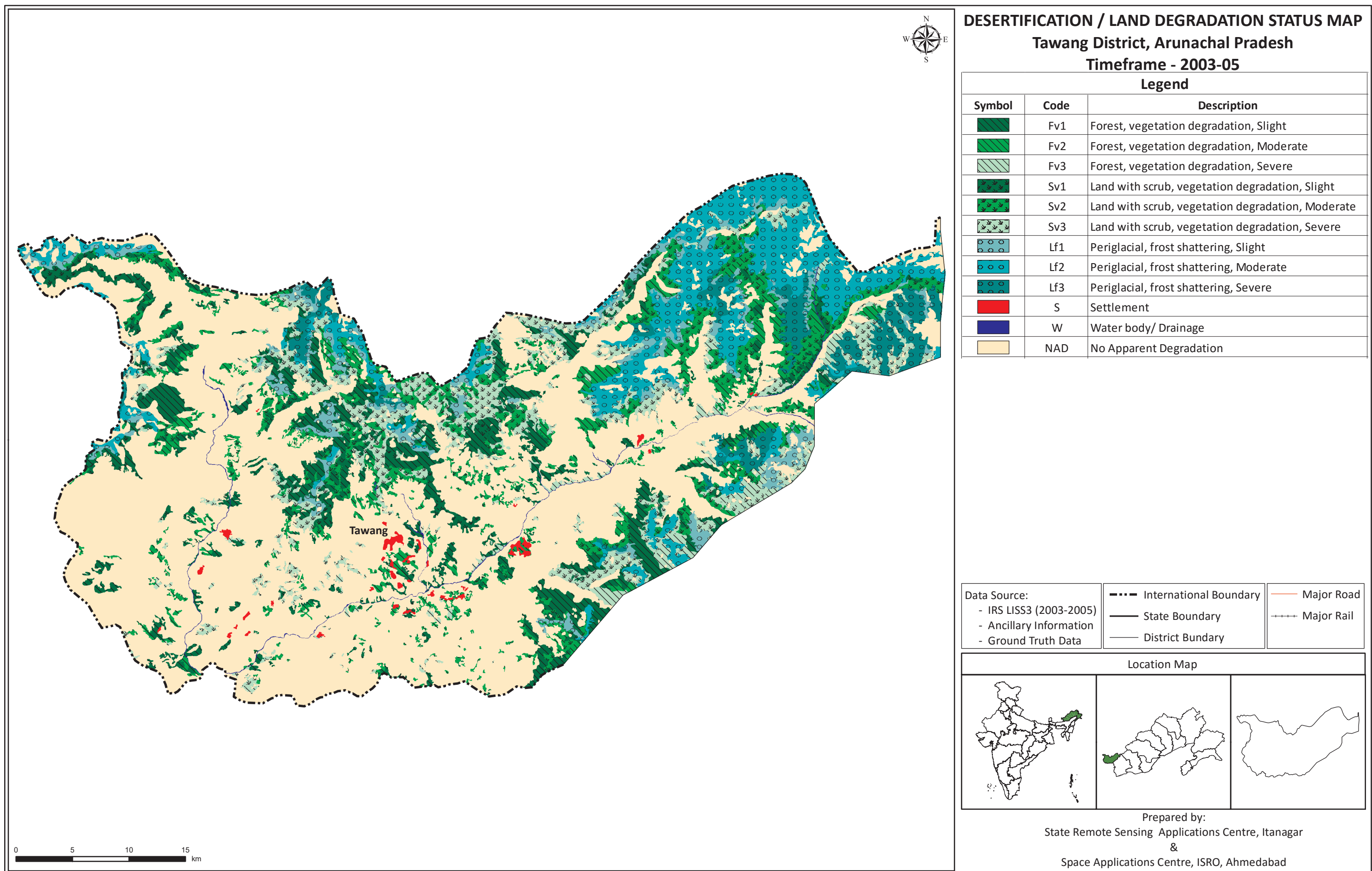
Timeframe - 2011-13

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Lf1	Periglacial, frost shattering, Slight
	Lf2	Periglacial, frost shattering, Moderate
	Lf3	Periglacial, frost shattering, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:	--- International Boundary	— Major Road
	— State Boundary	++++ Major Rail
	— District Boundary	



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



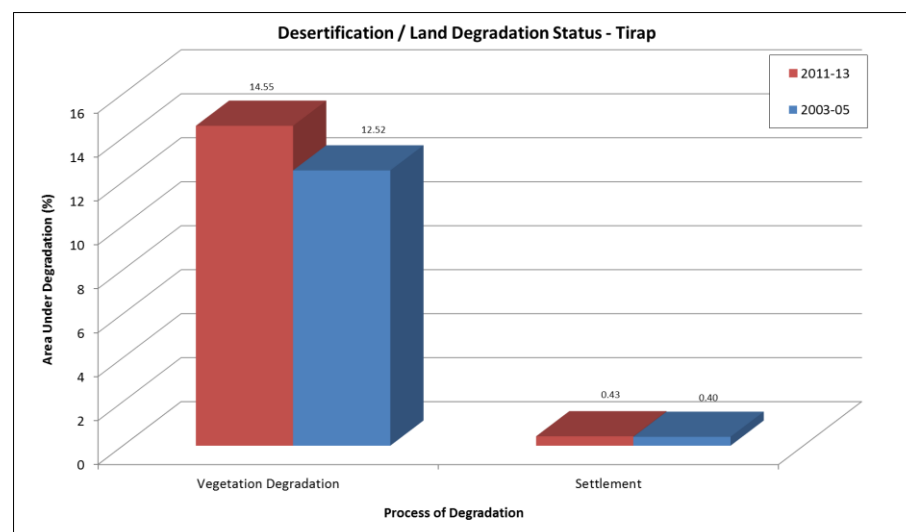
Tirap District, Arunachal Pradesh

The Tirap district is located in the southeastern part of the state of Arunachal Pradesh. It shares international border with Myanmar on south, south-east side. It is bounded by Assam state on north side, Longding district on west side and Changlang district on east side. It occupies an area of 1,162 sq km. The district has population of 1,11,975 with 47 population density, 944 sex ratio and a literacy rate of 52.2 %. (Census 2011)

The district is predominantly hilly and the elevation ranges from 200 meters in the northwest to 4,000 meters in the Patkai Hills. It shares a state border with Assam and an international border with Myanmar. Main rivers flowing in the district are Tirap, Tissa, Tissing and Chatju. The topography of the district ranges from gentle slopes in the lower elevations to difficult and steep slopes in the upper reaches with almost no extensive rolling plains. The foothills are adjacent to the plains of Assam state and Changlang district, comprising paddy growing area. The middle range comprises of thick forest areas and has low stretches of plains and valleys.

Tirap is observed with 14.97% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 2.05% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (14.55% during 2011-13 and 12.52% during 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	16904.34	14.55	14546.32	12.52	2358.03
Settlement	496.30	0.43	469.48	0.40	26.82
Total Area under Desertification	17400.64	14.97	15015.80	12.92	2384.85
No Apparent Degradation	97774.95	84.14	100159.80	86.20	-2384.85
Total Geographical Area (ha)	116200.00				

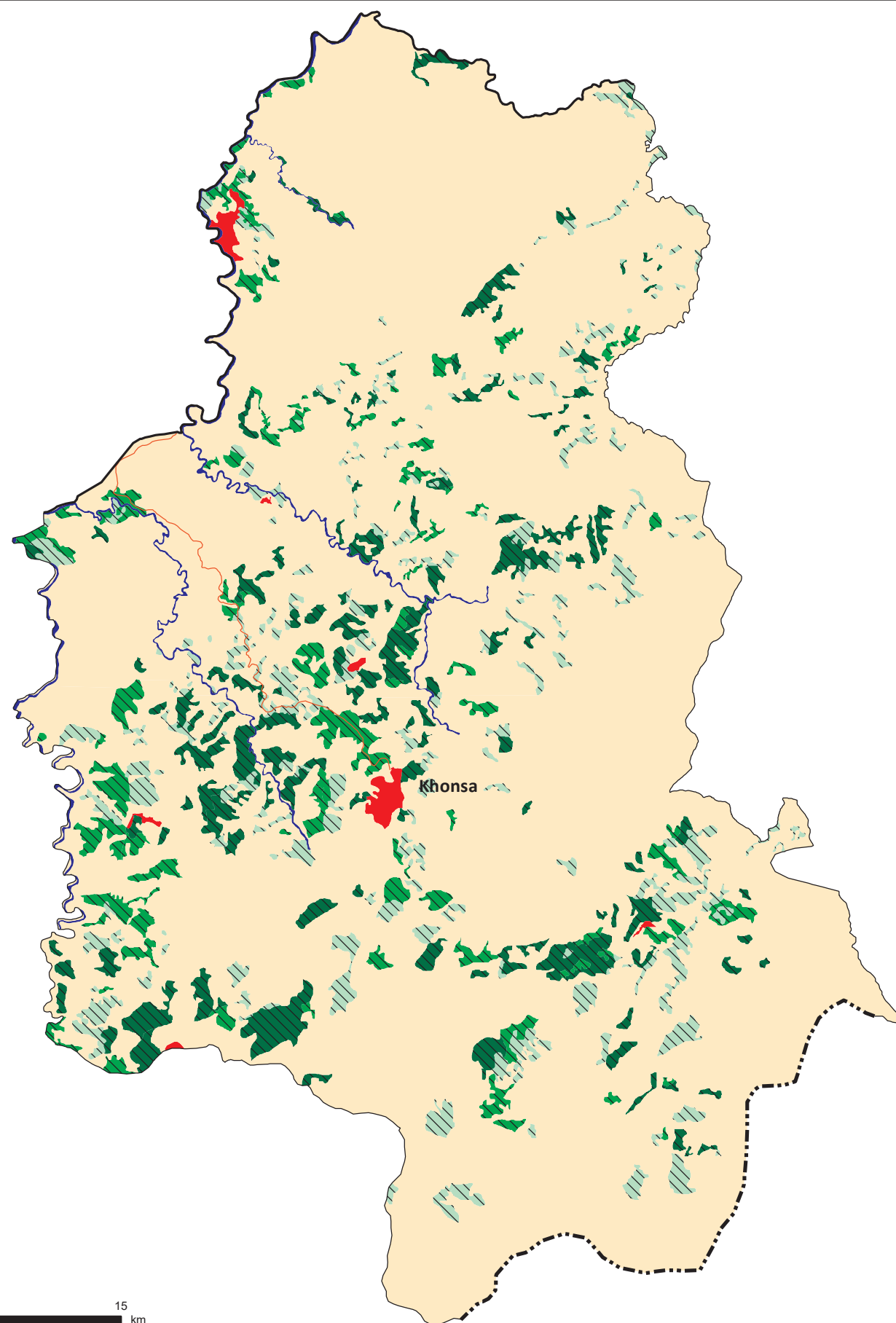


SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Slight	6464.47	5.56	7239.71	6.23	-775.24
2	Fv2	Forest, vegetation degradation, Moderate	4297.38	3.70	2833.90	2.44	1463.48
3	Fv3	Forest, vegetation degradation, Severe	6142.49	5.29	4472.70	3.85	1669.79
4	S	Settlement	496.30	0.43	469.48	0.40	26.82
Total Area Under Desertification/ Land Degradation			17400.64	14.97	15015.80	12.92	2384.85
5	W	Water body/ Drainage	1024.41	0.88	1024.41	0.88	0.00
6	NAD	No Apparent Degradation	97774.95	84.14	100159.80	86.20	-2384.85
Total Geographical Area (ha)			116200.00	100.00	116200.00	100.00	

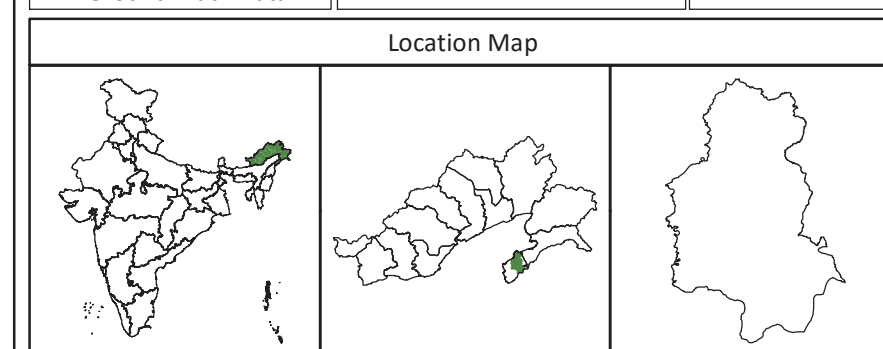


DESERTIFICATION / LAND DEGRADATION STATUS MAP Tirap District, Arunachal Pradesh Timeframe - 2011-13

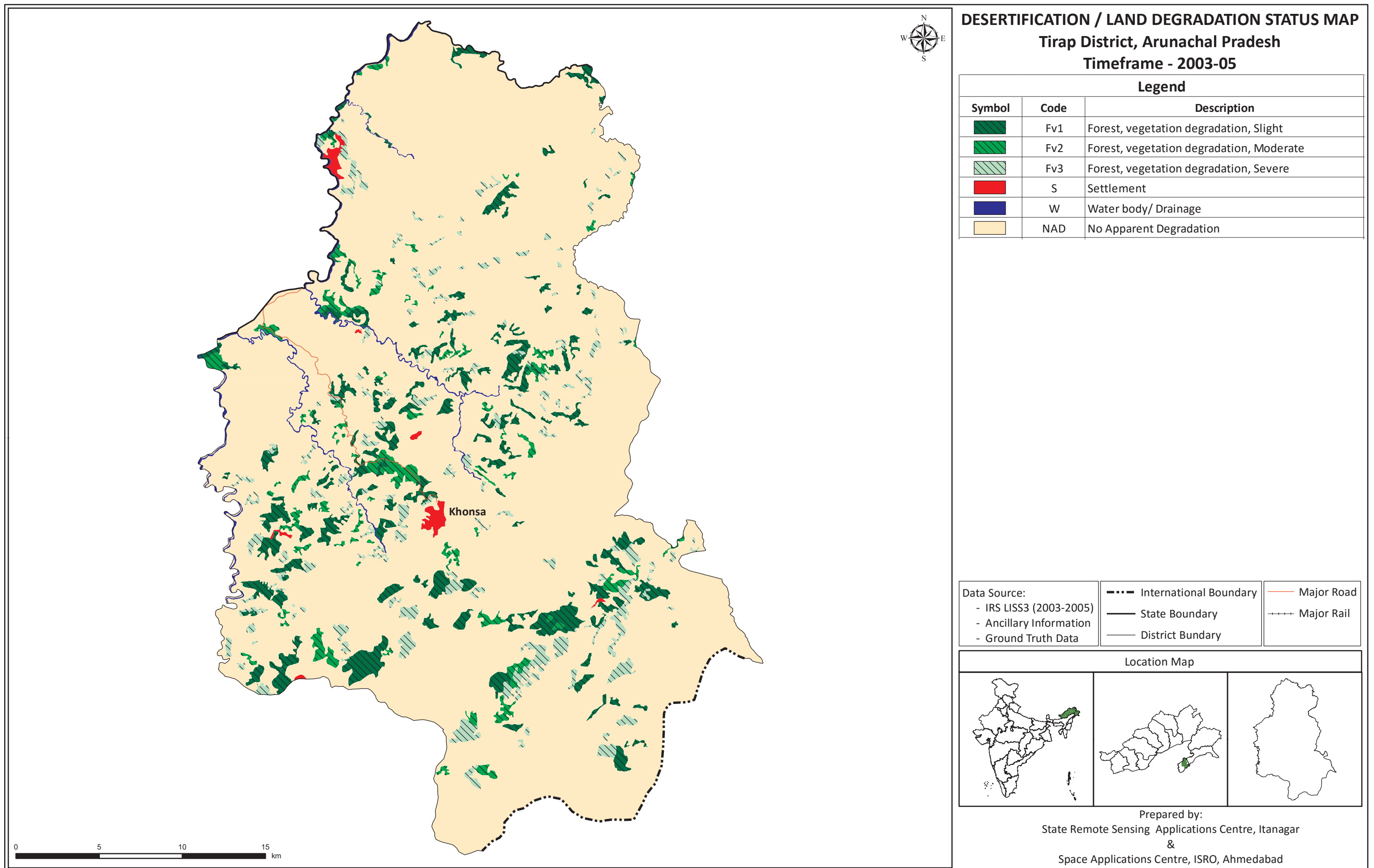
Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation



Data Source: - IRS LISS3 (2011-2013) - Ancillary Information - Ground Truth Data	--- International Boundary	— Major Road
	— State Boundary	++++ Major Rail
	— District Boundary	



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



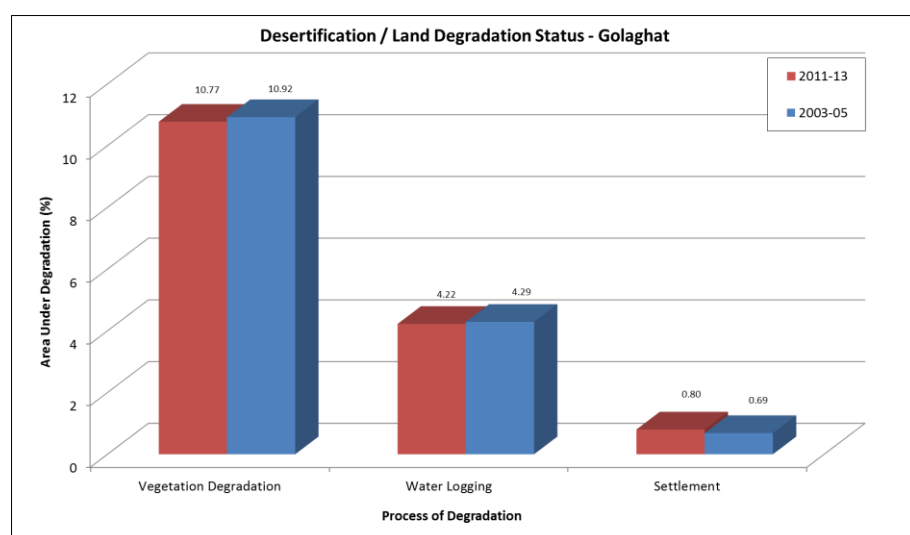
Golaghat District, Assam

Golaghat district is located in central part of Assam State. It is bounded by the river Brahmaputra to the north, Nagaland state to the south and east sides, Jorhat district to the east and Karbi Anglong and Nagaon districts to the west. It occupies an area of 3,502 sq. km. The district has a population of 10,66,888 with 304 population density, 964 sex ratio and a literacy rate of 75.94%. (Census 2011)

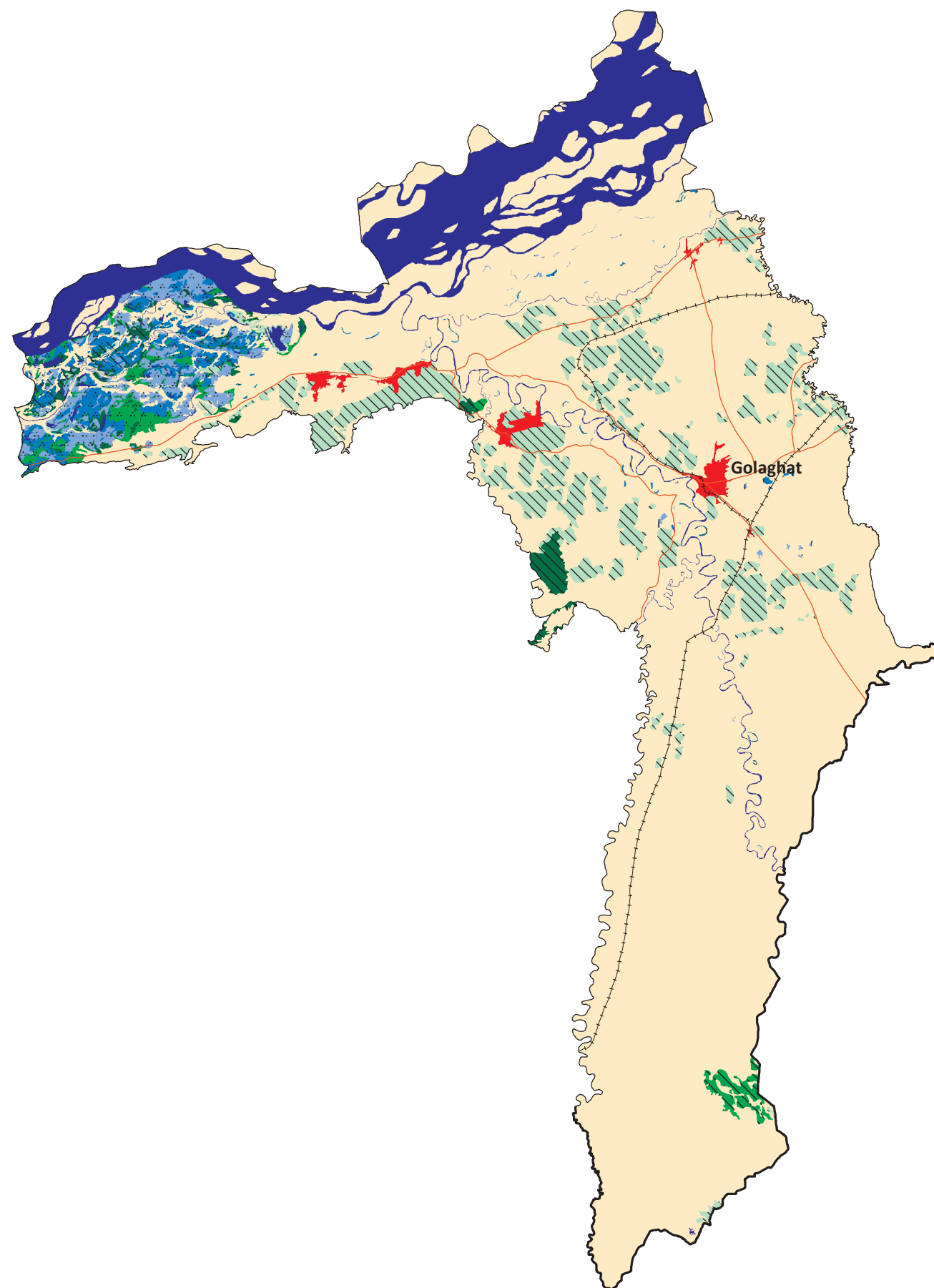
The natural topography of the district is a belt of flooded land. The whole of the district is a level plain. On the lower land, the staple crop is rice, and the higher levels have been planted out with tea. The economy of Golaghat district is agriculture-based. Tea, rice and sugar cane are the main agricultural crops grown in the district, with tea being the largest agricultural industry. Golaghat is home to Kaziranga National Park and Nambor - Doigrung Wildlife Sanctuary. Dhansiri is the principal river.

Golaghat is observed with 15.80 % of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has decreased about 0.10% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (10.77% during 2011-13 and 10.92% during 2003-05) followed by Water Logging (4.22 % during 2011-13 and 4.29 % during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	37728.08	10.77	38251.64	10.92	-523.56
Water Logging	14789.17	4.22	15024.07	4.29	-234.90
Settlement	2808.15	0.80	2399.91	0.69	408.24
Total Area under Desertification	55325.40	15.80	55675.62	15.90	-350.21
No Apparent Degradation	257126.63	73.42	258869.68	73.92	-1743.05
Total Geographical Area (ha)	350200.00				



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, Slight	2775.88	0.79	2705.05	0.77	70.83
2	Fv2	Forest, vegetation degradation, Moderate	1766.15	0.50	1799.02	0.51	-32.87
3	Fv3	Forest, vegetation degradation, Severe	28178.64	8.05	28142.05	8.04	36.59
4	Gv1	Grassland / Grazing land, vegetation degradation, Slight	1465.53	0.42	3374.01	0.96	-1908.48
5	Gv2	Grassland / Grazing land, vegetation degradation, Moderate	3037.93	0.87	1886.38	0.54	1151.55
6	Gv3	Grassland / Grazing land, vegetation degradation, Severe	503.95	0.14	345.14	0.10	158.82
7	Il1	Agriculture irrigated, water logging, Slight	329.82	0.09	404.61	0.12	-74.79
8	Il2	Agriculture irrigated, water logging, Moderate	304.91	0.09	210.02	0.06	94.90
9	Il3	Agriculture irrigated, water logging, Severe	120.13	0.03	101.01	0.03	19.12
10	Fl1	Forest, water logging, Slight	463.51	0.13	697.05	0.20	-233.54
11	Fl2	Forest, water logging, Moderate	612.02	0.17	340.96	0.10	271.06
12	Fl3	Forest, water logging, Severe	120.61	0.03	66.39	0.02	54.22
13	Gl1	Grassland / Grazing land, water logging, Slight	7128.80	2.04	10672.50	3.05	-3543.69
14	Gl2	Grassland / Grazing land, water logging, Moderate	5649.81	1.61	2471.98	0.71	3177.83
15	Gl3	Grassland / Grazing land, water logging, Severe	59.56	0.02	59.56	0.02	0.00
16	S	Settlement	2808.15	0.80	2399.91	0.69	408.24
Total Area Under Desertification/ Land Degradation			55325.40	15.80	55675.62	15.90	-350.21
17	W	Water body/ Drainage	37747.96	10.78	35654.64	10.18	2093.32
18	NAD	No Apparent Degradation	257126.63	73.42	258869.68	73.92	-1743.05
Total Geographical Area (ha)			350200.00	100.00	350200.00	100.00	





















0 5 10 15 km

DESERTIFICATION / LAND DEGRADATION STATUS MAP

Golaghat District, Assam

Timeframe - 2011-13

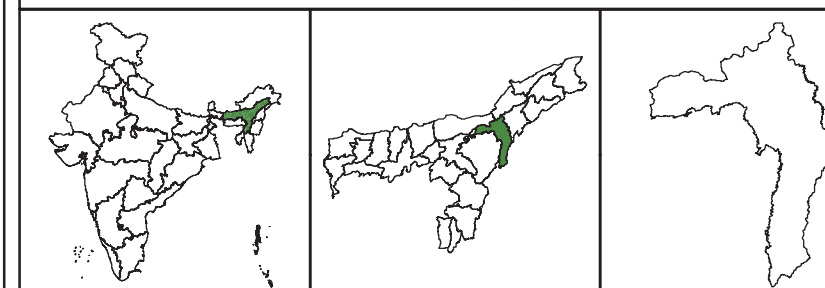
Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Gv1	Grassland / Grazing land, vegetation degradation, Slight
	Gv2	Grassland / Grazing land, vegetation degradation, Moderate
	Gv3	Grassland / Grazing land, vegetation degradation, Severe
	Il1	Agriculture irrigated, water logging, Slight
	Il2	Agriculture irrigated, water logging, Moderate
	Il3	Agriculture irrigated, water logging, Severe
	Fl1	Forest, water logging, Slight
	Fl2	Forest, water logging, Moderate
	Fl3	Forest, water logging, Severe
	Gl1	Grassland / Grazing land, water logging, Slight
	Gl2	Grassland / Grazing land, water logging, Moderate
	Gl3	Grassland / Grazing land, water logging, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:
 - IRS LISS3 (2011-2013)
 - Ancillary Information
 - Ground Truth Data

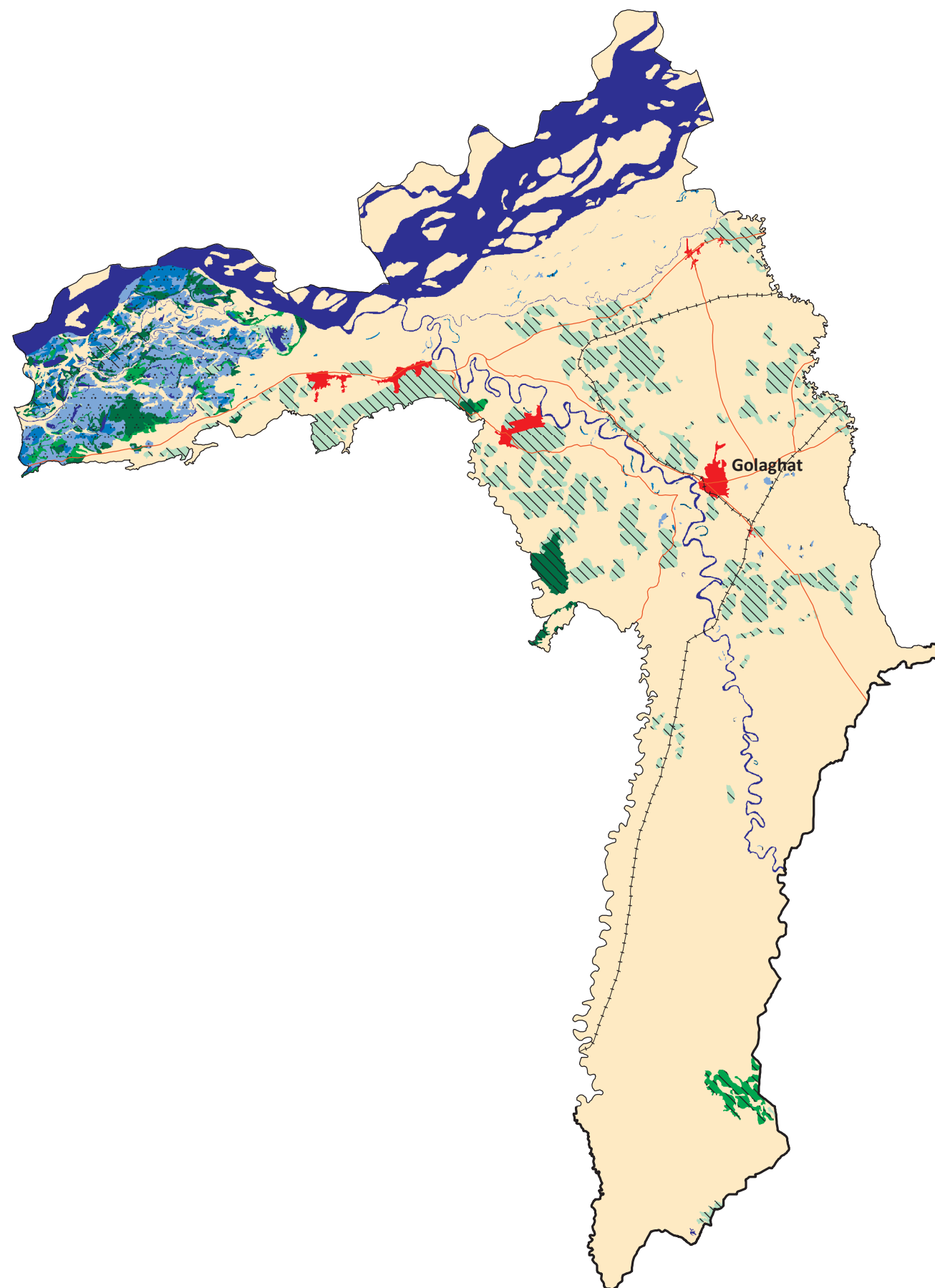
--- International Boundary
 — State Boundary
 — District Boundary

— Major Road
 +---+ Major Rail

Location Map



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



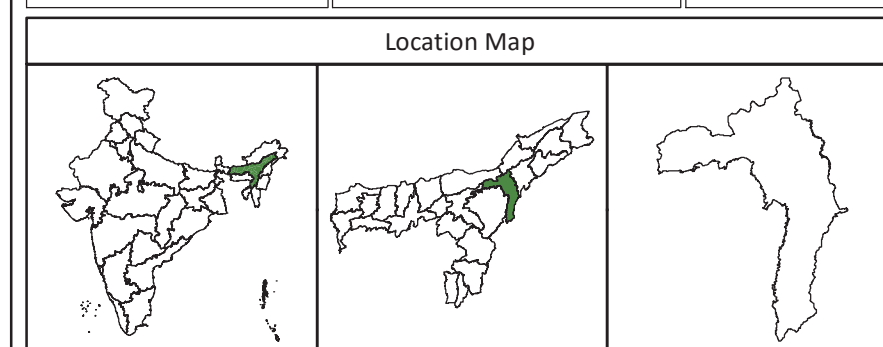
DESERTIFICATION / LAND DEGRADATION STATUS MAP **Golaghat District, Assam** **Timeframe - 2003-05**

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Gv1	Grassland / Grazing land, vegetation degradation, Slight
	Gv2	Grassland / Grazing land, vegetation degradation, Moderate
	Gv3	Grassland / Grazing land, vegetation degradation, Severe
	Il1	Agriculture irrigated, water logging, Slight
	Il2	Agriculture irrigated, water logging, Moderate
	Il3	Agriculture irrigated, water logging, Severe
	Fl1	Forest, water logging, Slight
	Fl2	Forest, water logging, Moderate
	Fl3	Forest, water logging, Severe
	Gl1	Grassland / Grazing land, water logging, Slight
	Gl2	Grassland / Grazing land, water logging, Moderate
	Gl3	Grassland / Grazing land, water logging, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:
 - IRS LISS3 (2003-2005)
 - Ancillary Information
 - Ground Truth Data

----- International Boundary
 ——— State Boundary
 ——— District Boundary

— Major Road
 +---+ Major Rail



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

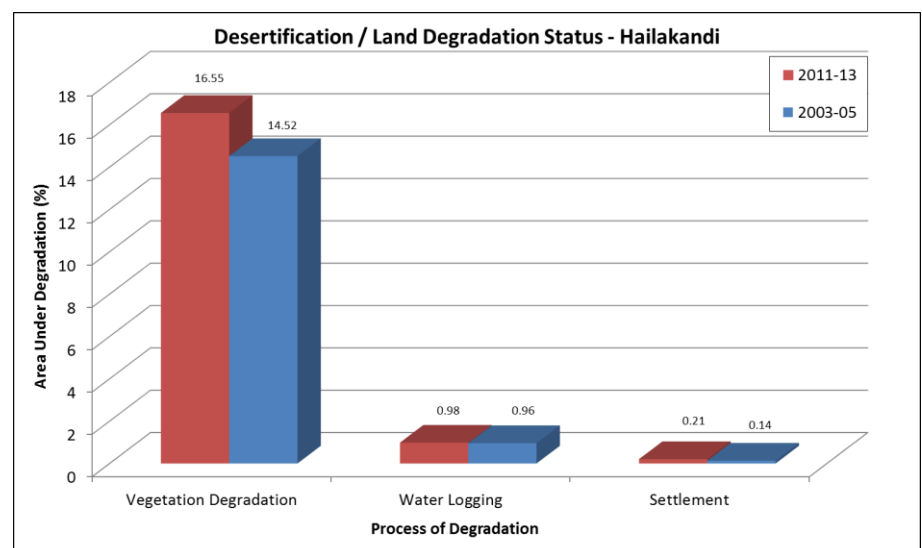
Hailakandi District, Assam

Hailakandi district is located in southernmost part of Assam state and lies in Barak valley region. It is bounded by Mizoram state in the south and east, Cachar district in the east and north sides and Karimganj district in the west. It occupies an area of 1,327 sq. km. The district has a population of 6,59,296 with 480 population density, 951 sex ratio and a literacy rate of 74.33%. (Census 2011)

Topographically, the valley to the south of Barak is known as Hailakandi Valley. North side of the district is more or less plain with small hillocks here and there. To the extreme south, the district is covered with deep forests bordering the Mizo Hills same is the case with the south-eastern side. The entire area of the plain land is of old alluvium soil. More than 50% area of the Hailakandi district consists of forests. There are two reserve forests in Hailakandi district viz. Inner line reserve forest and Katakhal reserve forest. Around 34% are of the district is under cultivation, rice being the main crop. The district also has got 17 tea gardens. The principal rivers in the district are the Dhaleswari and the Sonai.

Hailakandi is observed with 17.74% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 2.13 % since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (16.55% during 2011-13 and 14.52% during 2003-05) followed by Water Logging (0.98% during 2011-13 and 0.96% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	21965.84	16.55	19265.17	14.52	2700.67
Water Logging	1304.57	0.98	1273.74	0.96	30.83
Settlement	272.55	0.21	179.28	0.14	93.27
Total Area under Desertification	23542.96	17.74	20718.19	15.61	2824.76
No Apparent Degradation	107679.64	81.15	110540.28	83.30	-2860.64
Total Geographical Area (ha)	132700.00				










SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Fv1	Forest, vegetation degradation, Slight	18694.00	14.09	15426.74	11.63	3267.25
2	Fv2	Forest, vegetation degradation, Moderate	2117.11	1.60	2092.47	1.58	24.64
3	Fv3	Forest, vegetation degradation, Severe	1154.73	0.87	1745.96	1.32	-591.22
4	Il1	Agriculture irrigated, water logging, Slight	1304.57	0.98	1273.74	0.96	30.83
5	S	Settlement	272.55	0.21	179.28	0.14	93.27
Total Area Under Desertification/ Land Degradation			23542.96	17.74	20718.19	15.61	2824.76
6	W	Water body/ Drainage	1477.40	1.11	1441.53	1.09	35.87
7	NAD	No Apparent Degradation	107679.64	81.15	110540.28	83.30	-2860.64
Total Geographical Area (ha)			132700.00	100.00	132700.00	100.00	



DESERTIFICATION / LAND DEGRADATION STATUS MAP Hailakandi District, Assam Timeframe - 2011-13

Legend

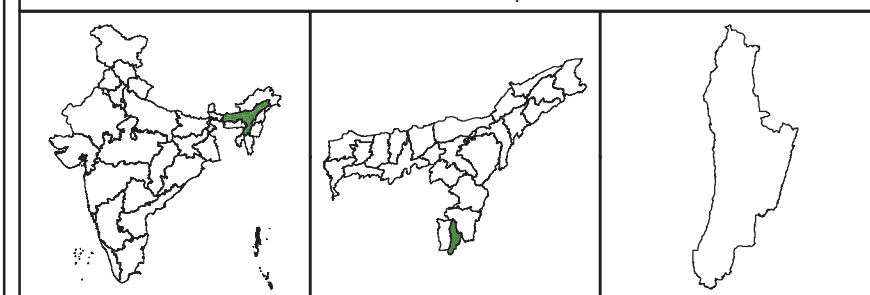
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Il1	Agriculture irrigated, water logging, Slight
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:
- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

--- International Boundary
— State Boundary
— District Boundary

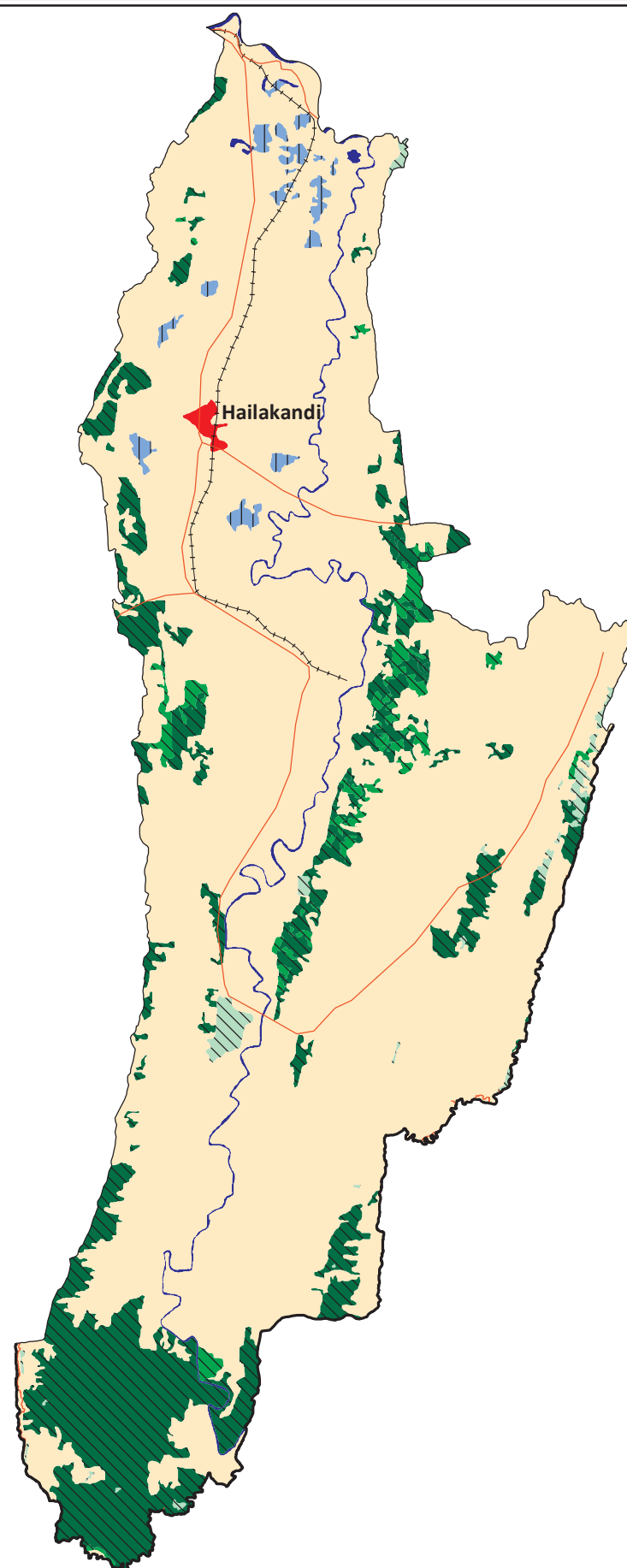
— Major Road
++++ Major Rail

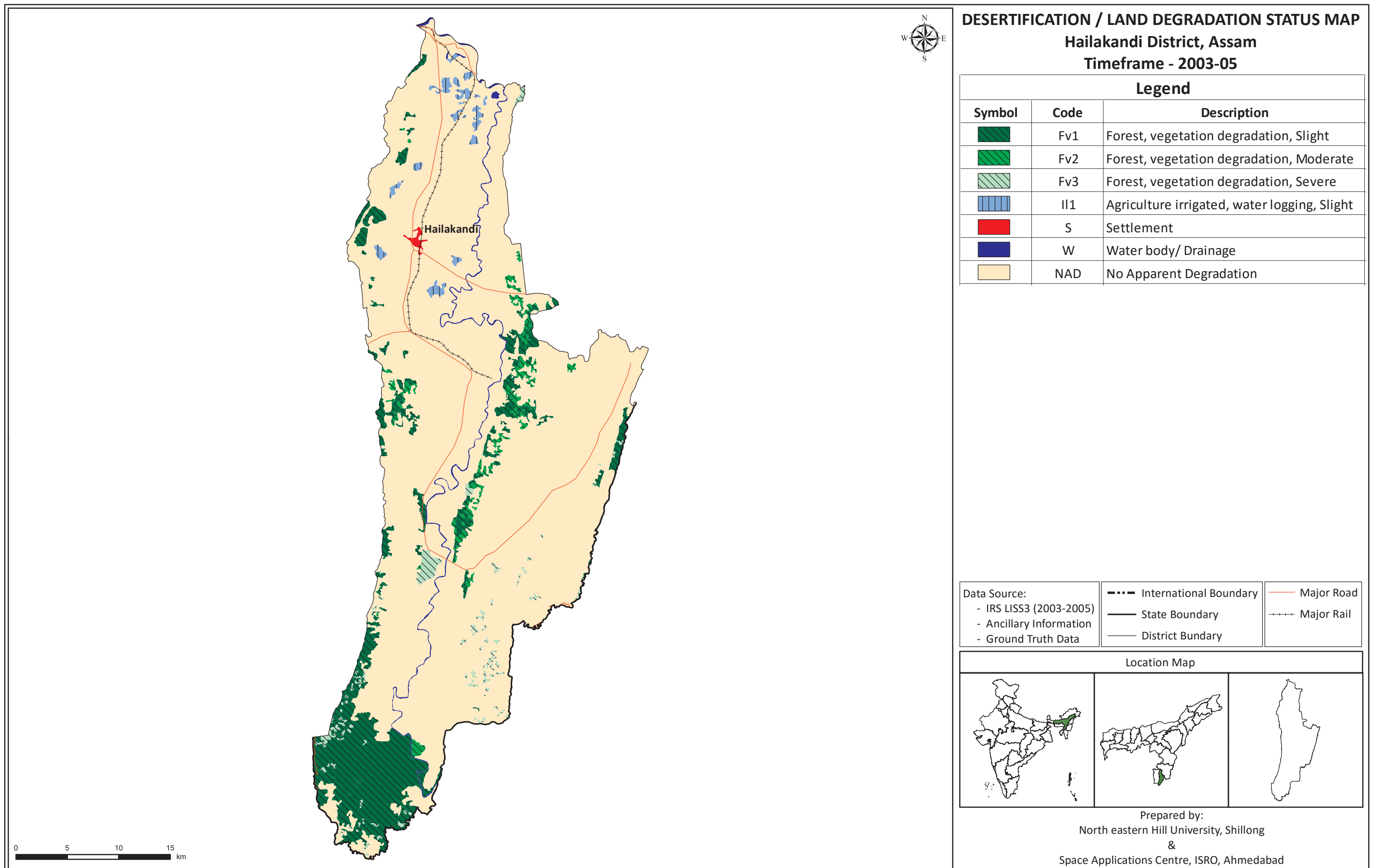
Location Map



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

0 5 10 15 km





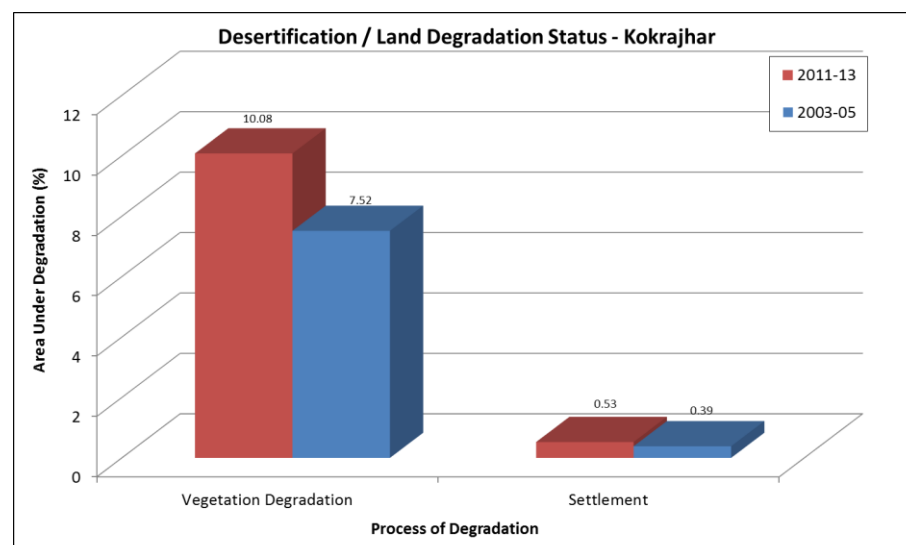
Kokrajhar District, Assam

Kokrajhar district is located on the northern bank of Brahmaputra river in Assam state. It shares international border with Bhutan to the north. It is bounded by West Bengal to the west, Dhubri district to the south and Chirang district to the east. It covers an area of 3,296 sq. km. The district has a population of 8,87,142 with 269 population density, 959 sex ratio and a literacy rate of 65.22%. (Census 2011)

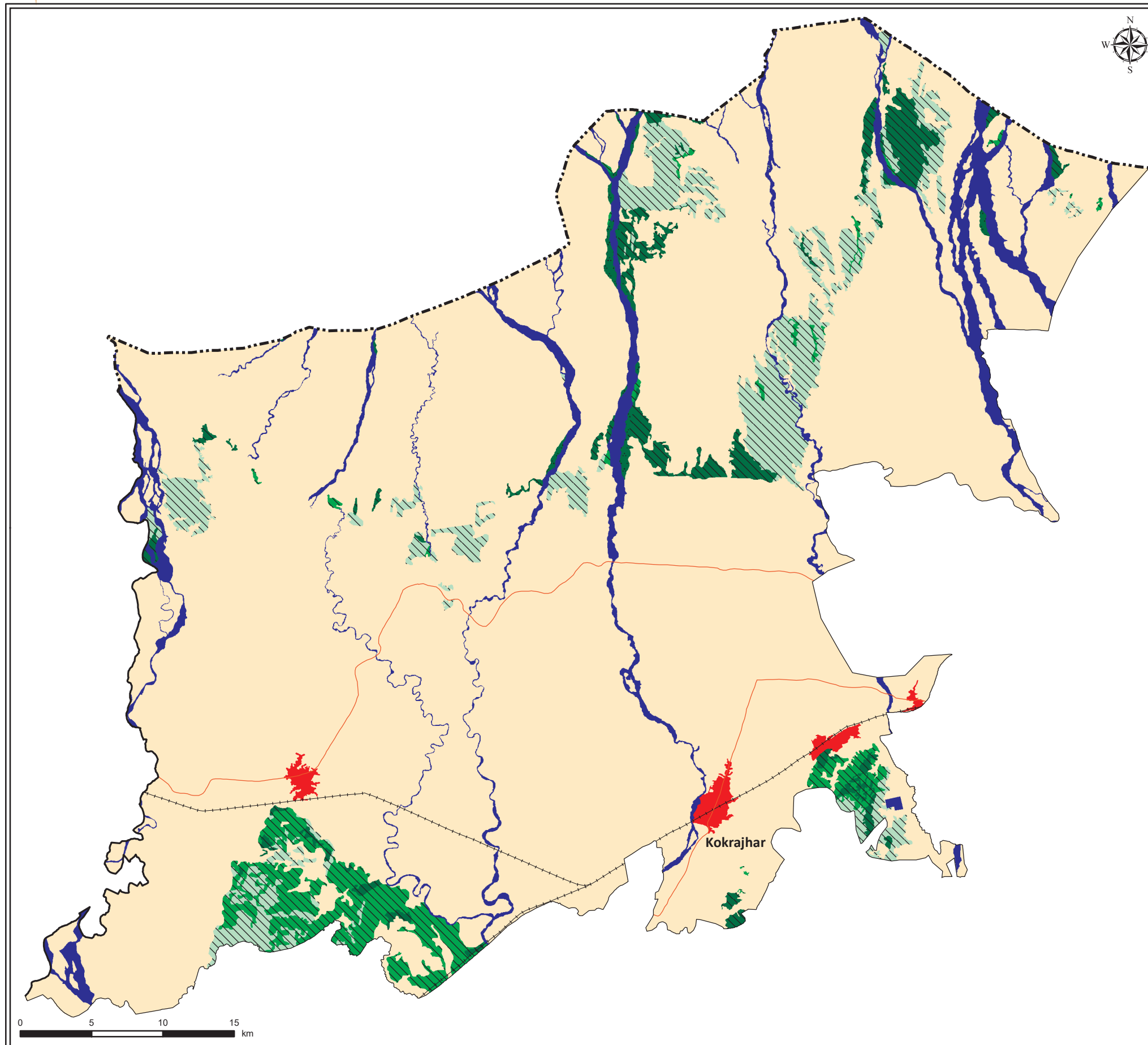
The district forms the gateway to the Seven Sister States. It shares its boundary with Bongaigaon (Chirang), Dhubri, West Bengal, Barpeta and Bhutan. The major portion of the district is a flat plain and characterized by its configuration, drainage pattern and geological structure. The northern part forms the foothill topography of the Bhutan range. Except a few small hillocks in the south, the entire district exhibits an even topography with a gradual lift towards the valley down to south where Bau-kumari cheera (458m), the highest point of the district is located. Many important south flowing tributaries of the Brahmaputra are flowing down this district, among them are Sankosh, Hel, Saralbhangra, Bhur, Ai, Kanamakra and Manas.

Kokrajhar is observed with 10.60% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 2.70% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (10.08 % during 2011-13 and 7.52 % during 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	33212.06	10.08	24774.04	7.52	8438.02
Settlement	1733.63	0.53	1273.80	0.39	459.83
Total Area under Desertification	34945.69	10.60	26047.84	7.90	8897.85
No Apparent Degradation	278820.46	84.59	287612.57	87.26	-8792.11
Total Geographical Area (ha)	329600.00				








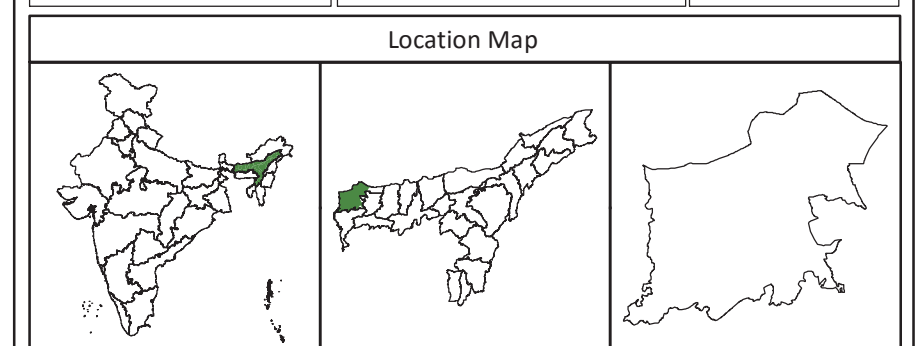
SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Slight	7051.37	2.14	17807.83	5.40	-10756.46
2	Fv2	Forest, vegetation degradation, Moderate	8556.24	2.60	1923.81	0.58	6632.43
3	Fv3	Forest, vegetation degradation, Severe	16685.23	5.06	4411.44	1.34	12273.78
4	Gv1	Grassland / Grazing land, vegetation degradation, Slight	919.22	0.28	630.95	0.19	288.27
5	S	Settlement	1733.63	0.53	1273.80	0.39	459.83
Total Area Under Desertification/ Land Degradation			34945.69	10.60	26047.84	7.90	8897.85
6	W	Water body/ Drainage	15833.85	4.80	15939.59	4.84	-105.74
7	NAD	No Apparent Degradation	278820.46	84.59	287612.57	87.26	-8792.11
Total Geographical Area (ha)			329600.00	100.00	329600.00	100.00	



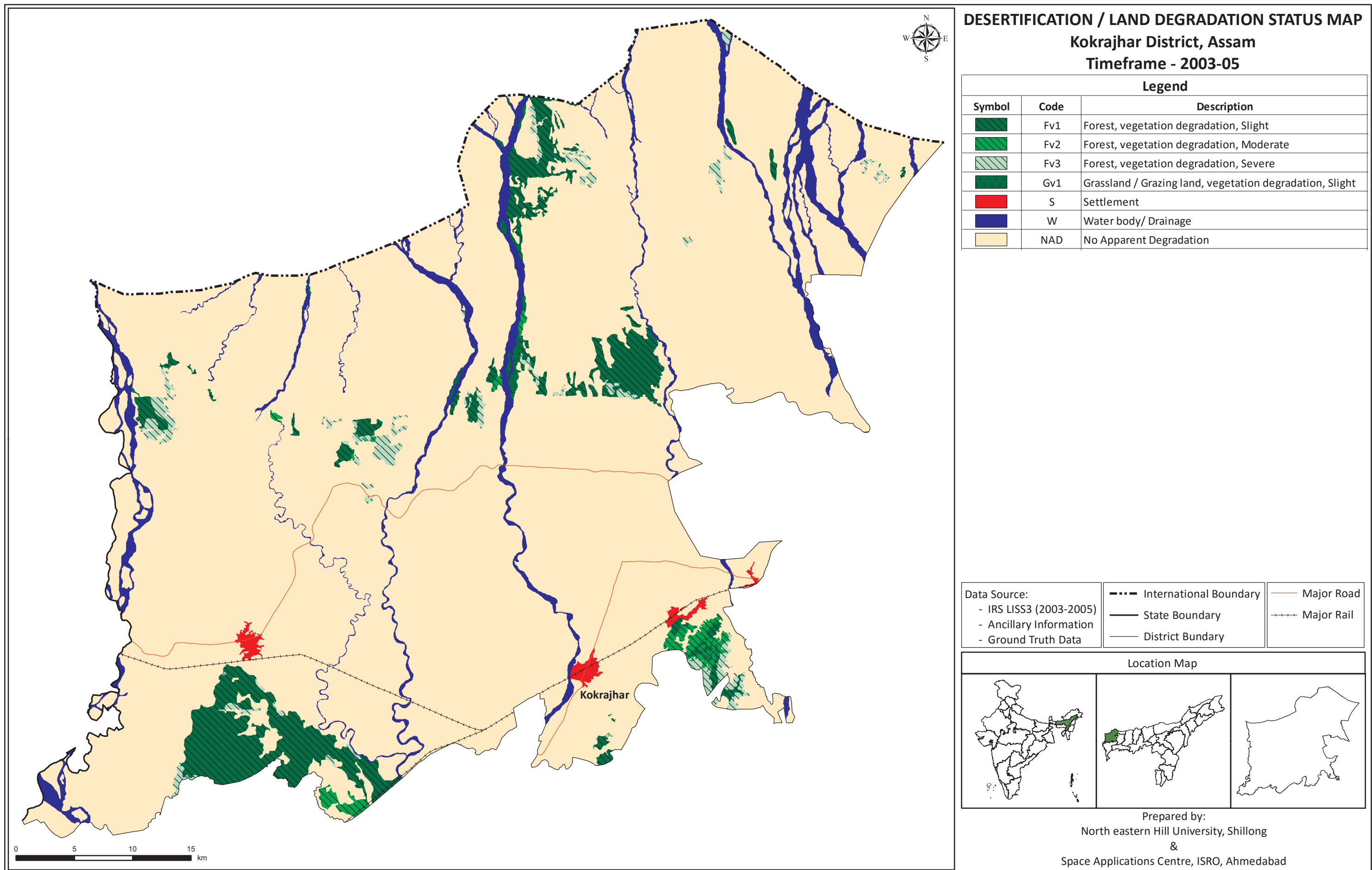
DESERTIFICATION / LAND DEGRADATION STATUS MAP Kokrajhar District, Assam Timeframe - 2011-13

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Gv1	Grassland / Grazing land, vegetation degradation, Slight
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source: - IRS LISS3 (2011-2013) - Ancillary Information - Ground Truth Data	 International Boundary	 Major Road
	 State Boundary	 Major Rail
	 District Boundary	



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



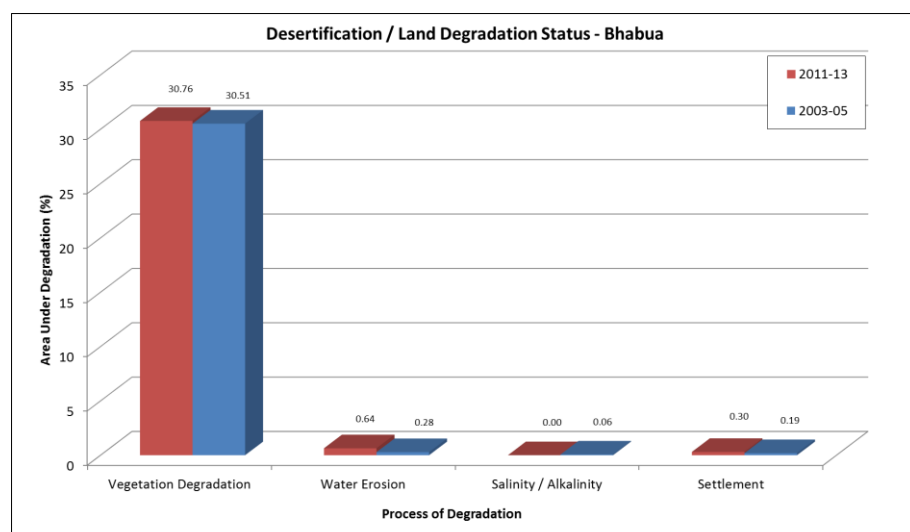
Bhabua District, Bihar

Bhabua district lies in the westernmost part of Bihar State. The district is bounded Buxar district and Uttar Pradesh on north, Rohtas district on south and east and Uttar Pradesh on the west side. It covers an area of 3332 sq km. The district has a population of 1,626,384 with 324 population density, 931 sex ratio and a literacy rate of 69.34%. (Census 2011)

Geographically, the district can be divided into two parts, hilly area and plain area. The hilly area comprises of Kaimur plateau, which covers southern part of the district, is an undulated tableland having thin shrubby jungles, spreading about 1200 sq. km. The plain area consists of fertile alluvial lands, which become rocky as one proceeds southwards. As one approaches the Kaimur foothills, the soil becomes stony and poor in fertility. The main rivers of the district are Karmanasha and Durgawati.

Bhabua is observed with 31.70 % of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.65% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (30.76% during 2011-13 and 30.51% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	102494.17	30.76	101674.35	30.51	819.82
Water Erosion	2127.71	0.64	941.79	0.28	1185.92
Salinity / Alkalinity	0.00	0.00	208.79	0.06	-208.79
Settlement	1008.51	0.30	634.14	0.19	374.36
Total Area under Desertification	105630.39	31.70	103459.07	31.05	2171.31
No Apparent Degradation	227289.58	68.21	229675.89	68.93	-2386.31
Total Geographical Area (ha)	333200.00				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Fv1	Forest, vegetation degradation, Slight	17213.75	5.17	17330.40	5.20	-116.65
2	Fv2	Forest, vegetation degradation, Moderate	51718.51	15.52	51507.36	15.46	211.16
3	Fv3	Forest, vegetation degradation, Severe	21090.27	6.33	20906.39	6.27	183.87
4	Sv1	Land with scrub, vegetation degradation, Slight	361.48	0.11	361.48	0.11	0.00
5	Sv2	Land with scrub, vegetation degradation, Moderate	8900.60	2.67	8688.56	2.61	212.04
6	Sv3	Land with scrub, vegetation degradation, Severe	3209.56	0.96	2880.16	0.86	329.40
7	Dw1	Agriculture unirrigated, water erosion, Slight	2127.71	0.64	941.79	0.28	1185.92
8	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight	0.00	0.00	208.79	0.06	-208.79
9	S	Settlement	1008.51	0.30	634.14	0.19	374.36
Total Area Under Desertification/ Land Degradation			105630.39	31.70	103459.07	31.05	2171.31
10	W	Water body/ Drainage	280.04	0.08	65.04	0.02	215.00
11	NAD	No Apparent Degradation	227289.58	68.21	229675.89	68.93	-2386.31
Total Geographical Area (ha)			333200.00	100.00	333200.00	100.00	













DESERTIFICATION / LAND DEGRADATION STATUS MAP

Bhabua District, Bihar

Timeframe - 2011-13

Legend

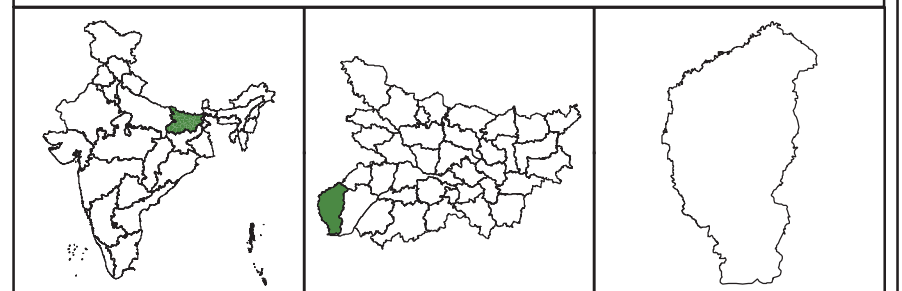
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Dw1	Agriculture unirrigated, water erosion, Slight
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:
- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

--- International Boundary
— State Boundary
— District Boundary

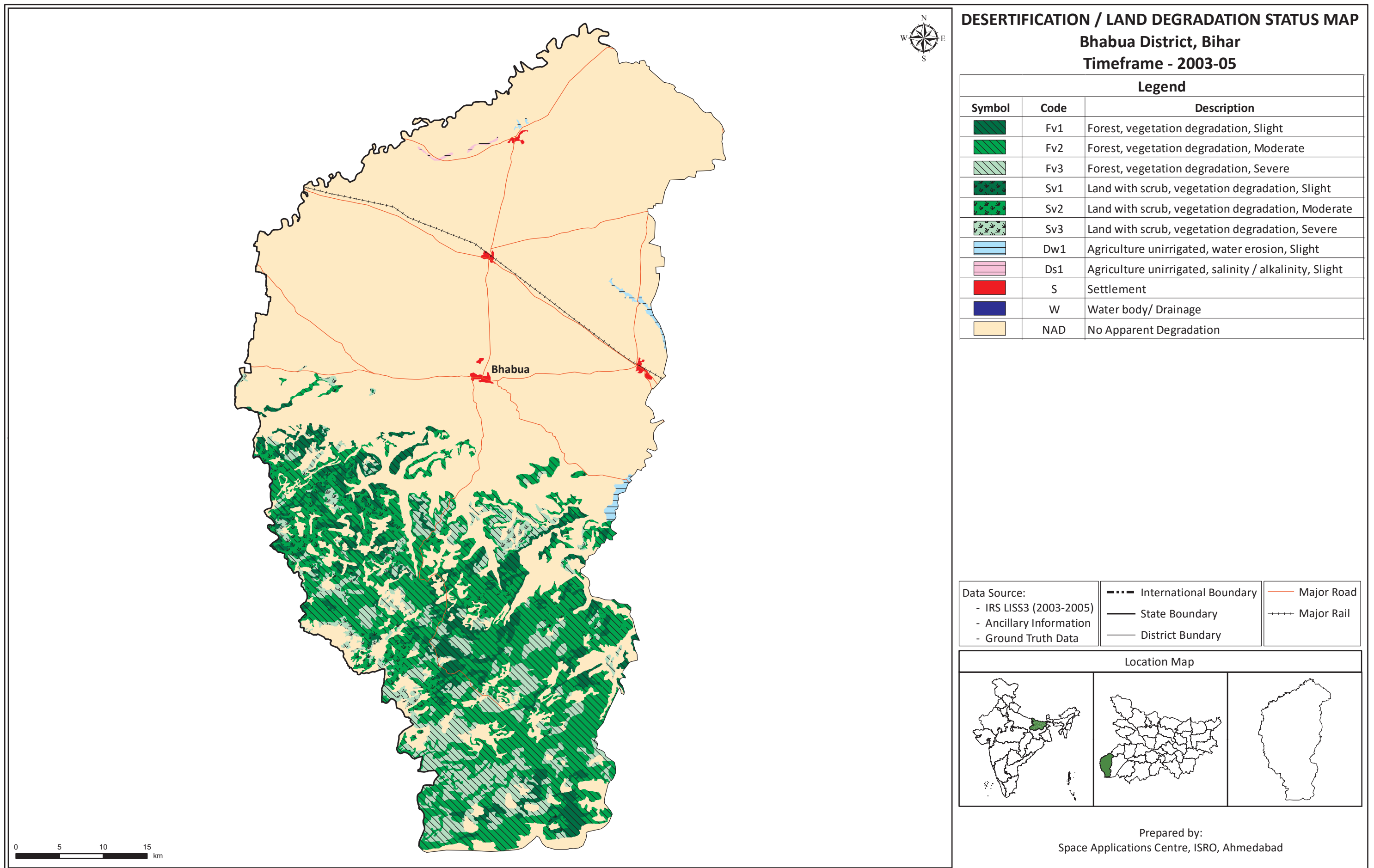
— Major Road
+ + + + Major Rail

Location Map



Prepared by:
Space Applications Centre, ISRO, Ahmedabad

0 5 10 15 km



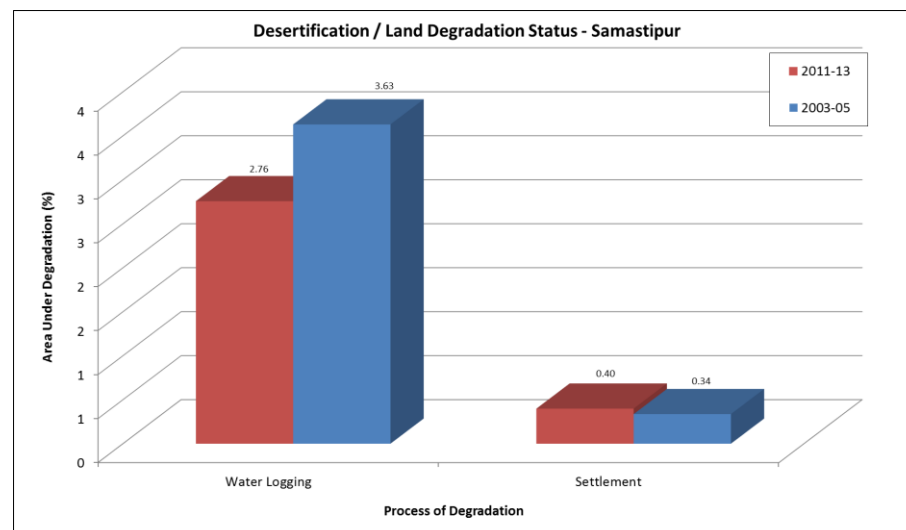
Samastipur District, Bihar

Samastipur district lies in the central part of Bihar state. It is bounded on the north by the Bagmati River which separates it from Darbhanga district. On the west it is bordered by Vaishali and some part of Muzaffarpur district, on the south by the Ganges, while on its east it has Begusarai and some part of Khagaria district. It covers an area of 2904 sq. km. The district has a population of 4,261,566 with 1467 population density, 911 sex ratio and a literacy rate of 72.32%. (Census 2011)

Samastipur district's entire tract is formed of rich alluvial, noted for the fertility of its soil and for the excellence of its rabi crops. The river banks are made of new alluvium formed by continuous deposit of soil and clay. The important rivers traversing the district are Burhi Gandak, the Baya, Kosi, Kamla, Kareh and Jhamwari and Balan.

Samastipur is observed with 3.16 % of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has decreased about 0.81% since 2003-05. The most significant process of land degradation/ desertification in the district is Water Logging (2.76% during 2011-13 and 3.63% during 2003-05).






Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Water Logging	8007.42	2.76	10541.18	3.63	-2533.77
Settlement	1157.18	0.40	976.77	0.34	180.42
Total Area under Desertification	9164.60	3.16	11517.95	3.97	-2353.35
No Apparent Degradation	275464.62	94.86	272524.22	93.84	2940.39
Total Geographical Area (ha)	290400.00				








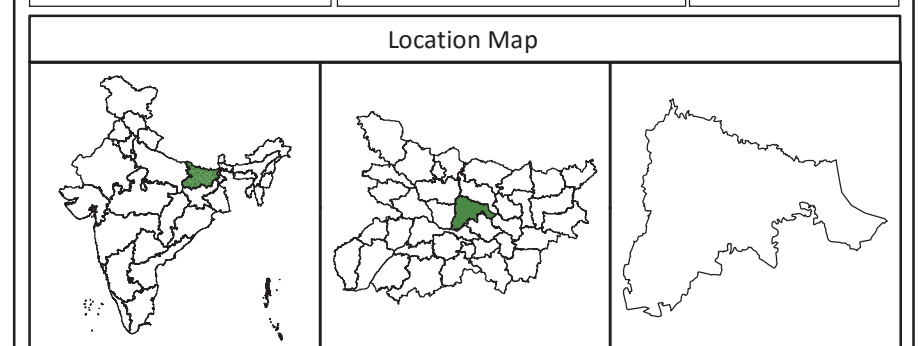
SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	DI1	Agriculture unirrigated, water logging, Slight	6732.44	2.32	6651.20	2.29	81.23
2	DI2	Agriculture unirrigated, water logging, Moderate	1274.98	0.44	3889.98	1.34	-2615.00
3	S	Settlement	1157.18	0.40	976.77	0.34	180.42
Total Area Under Desertification/ Land Degradation			9164.60	3.16	11517.95	3.97	-2353.35
4	W	Water body/ Drainage	5770.78	1.99	6357.83	2.19	-587.04
5	NAD	No Apparent Degradation	275464.62	94.86	272524.22	93.84	2940.39
Total Geographical Area (ha)			290400.00	100.00	290400.00	100.00	



DESERTIFICATION / LAND DEGRADATION STATUS MAP Samastipur District, Bihar Timeframe - 2011-13

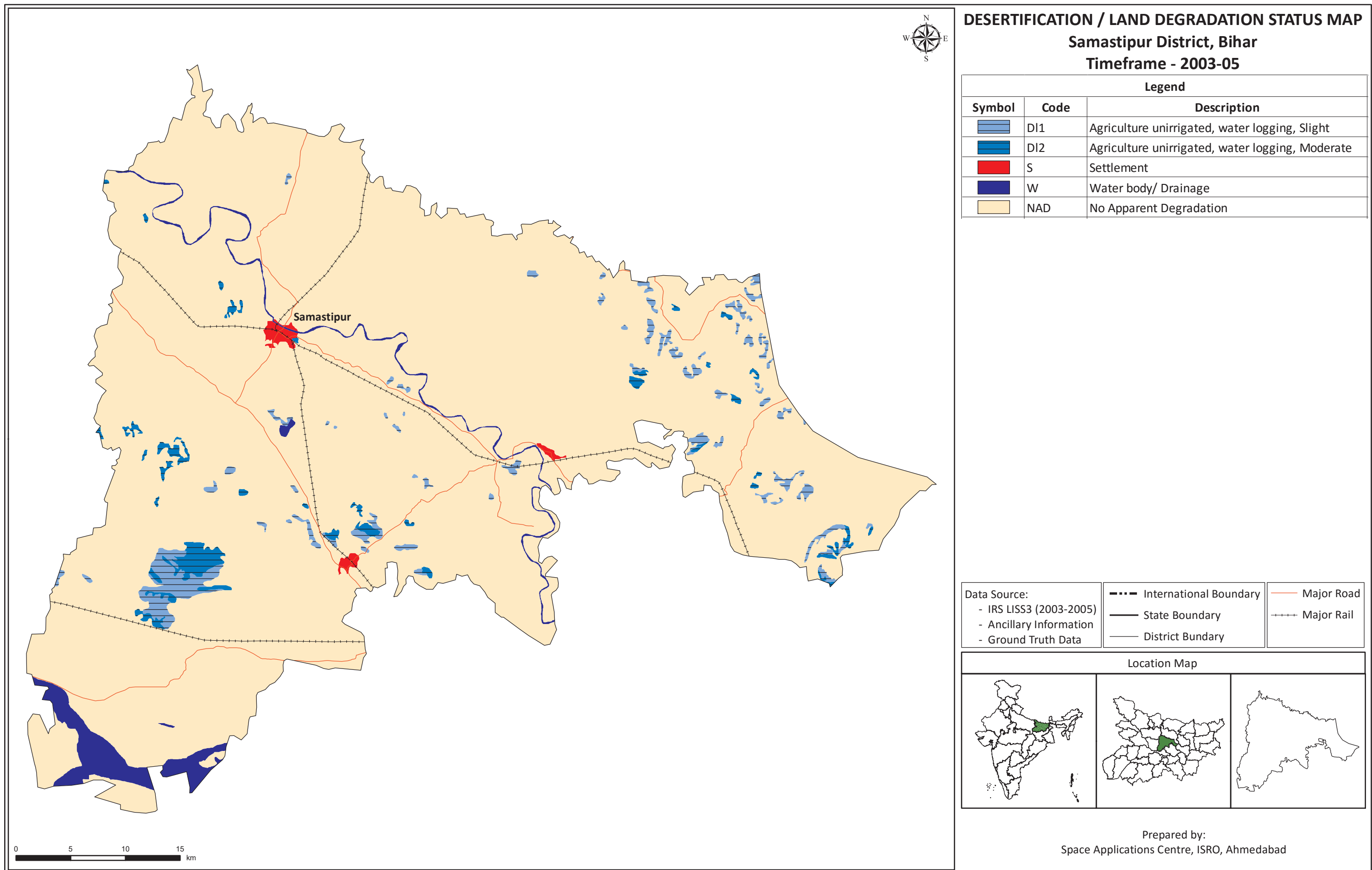
Legend		
Symbol	Code	Description
	DI1	Agriculture unirrigated, water logging, Slight
	DI2	Agriculture unirrigated, water logging, Moderate
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source: - IRS LISS3 (2011-2013) - Ancillary Information - Ground Truth Data	 International Boundary	 Major Road
	 State Boundary	 Major Rail
	 District Boundary	



Prepared by:
Space Applications Centre, ISRO, Ahmedabad

0 5 10 15 km



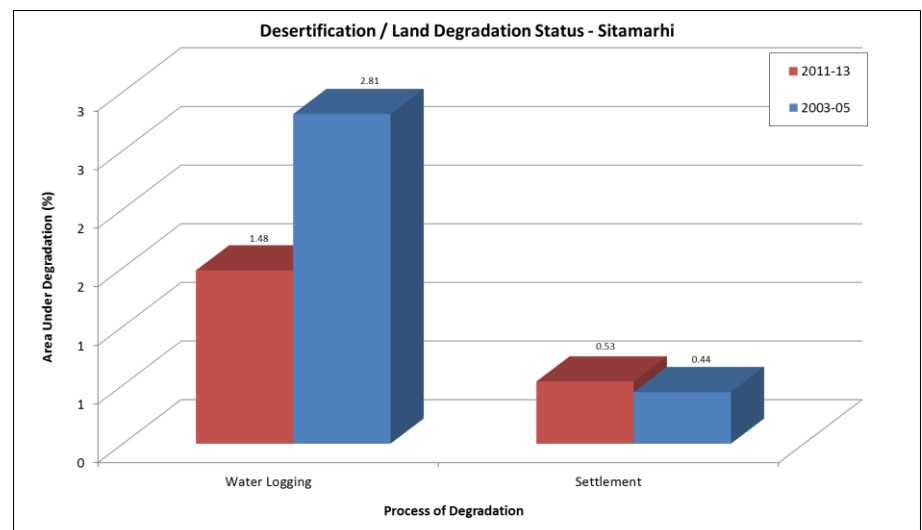
Sitamarhi District, Bihar

Sitamarhi district lies in the northern portion of Bihar state, located on the Indo-Nepal border. It is surrounded on the north by Nepal, on the east by the districts of Darbhanga and Madhubani on the west by the districts of Sheohar and Purba Champaran and on the south by the district of Muzaffarpur. It occupies an area of 2,200 sq. km. The district has a population of 3,423,574 with 1556 population density, 899 sex ratio and a literacy rate of 52%. (Census 2011)

The district has been divided into two sub-micro regions, namely Sitamarhi Plain-west and Sitamarhi Plain-east on the basis of relief, drainage, geology, soil, climate and natural vegetation. The entire region is plain with a gentle slope from north to south. River Baghmata along with its tributaries flows through the western part of the region. Adhwara, Gorha and Saghor rivulets flow through the district.

Sitamarhi is observed with 2.01 % of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has decreased about 1.24% since 2003-05. The most significant process of land degradation/ desertification in the district is Water Logging (1.48% during 2011-13 and 2.81% during 2003-05).








Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha)
	Area(ha)	Area(%)	Area(ha)	Area(%)	(2011-13) - (2003-05)
Water Logging	3251.58	1.48	6184.02	2.81	-2932.44
Settlement	1167.25	0.53	968.52	0.44	198.73
Total Area under Desertification	4418.83	2.01	7152.54	3.25	-2733.71
No Apparent Degradation	214891.15	97.68	211698.78	96.23	3192.37
Total Geographical Area (ha)	220000.00				

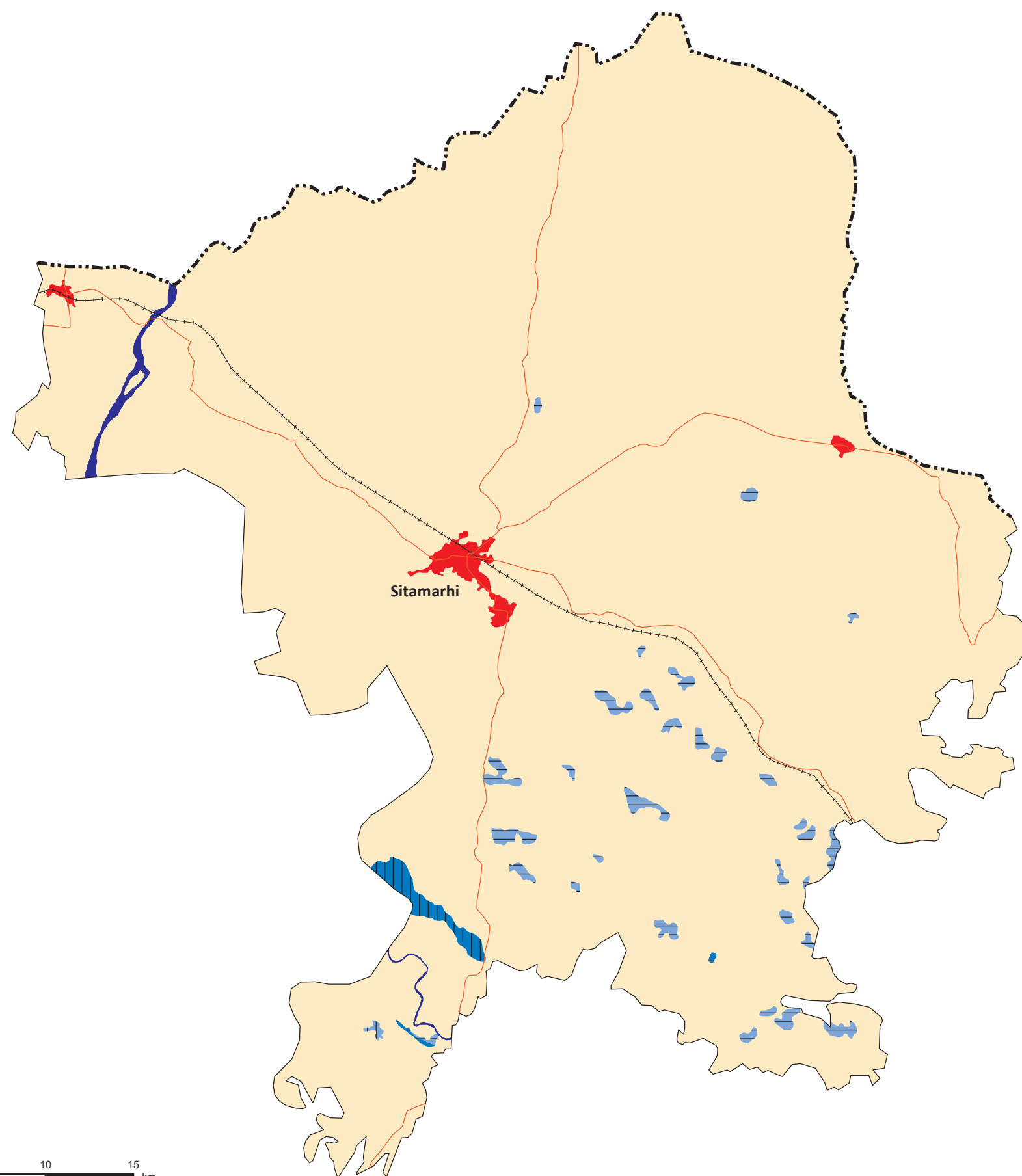







SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	II1	Agriculture irrigated, water logging, Slight	57.69	0.03	2011.28	0.91	-1953.60
2	II2	Agriculture irrigated, water logging, Moderate	826.99	0.38	444.92	0.20	382.07
3	DI1	Agriculture unirrigated, water logging, Slight	2296.00	1.04	3625.84	1.65	-1329.84
4	DI2	Agriculture unirrigated, water logging, Moderate	70.91	0.03	101.97	0.05	-31.07
5	S	Settlement	1167.25	0.53	968.52	0.44	198.73
Total Area Under Desertification/ Land Degradation			4418.83	2.01	7152.54	3.25	-2733.71
6	W	Water body/ Drainage	690.02	0.31	1148.68	0.52	-458.66
7	NAD	No Apparent Degradation	214891.15	97.68	211698.78	96.23	3192.37
Total Geographical Area (ha)			220000.00	100.00	220000.00	100.00	

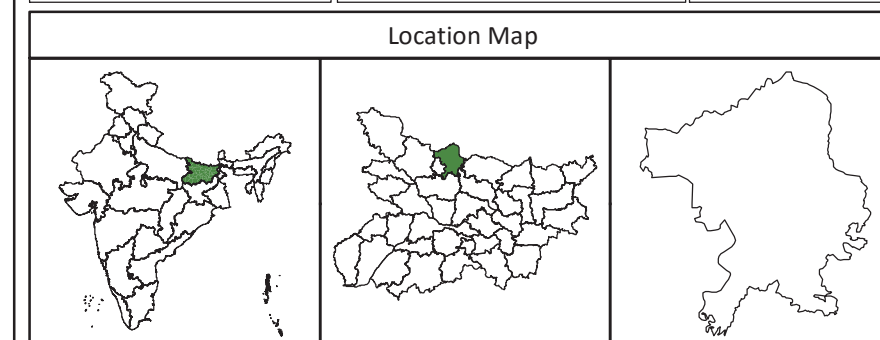


DESERTIFICATION / LAND DEGRADATION STATUS MAP Sitamarhi District, Bihar Timeframe - 2011-13

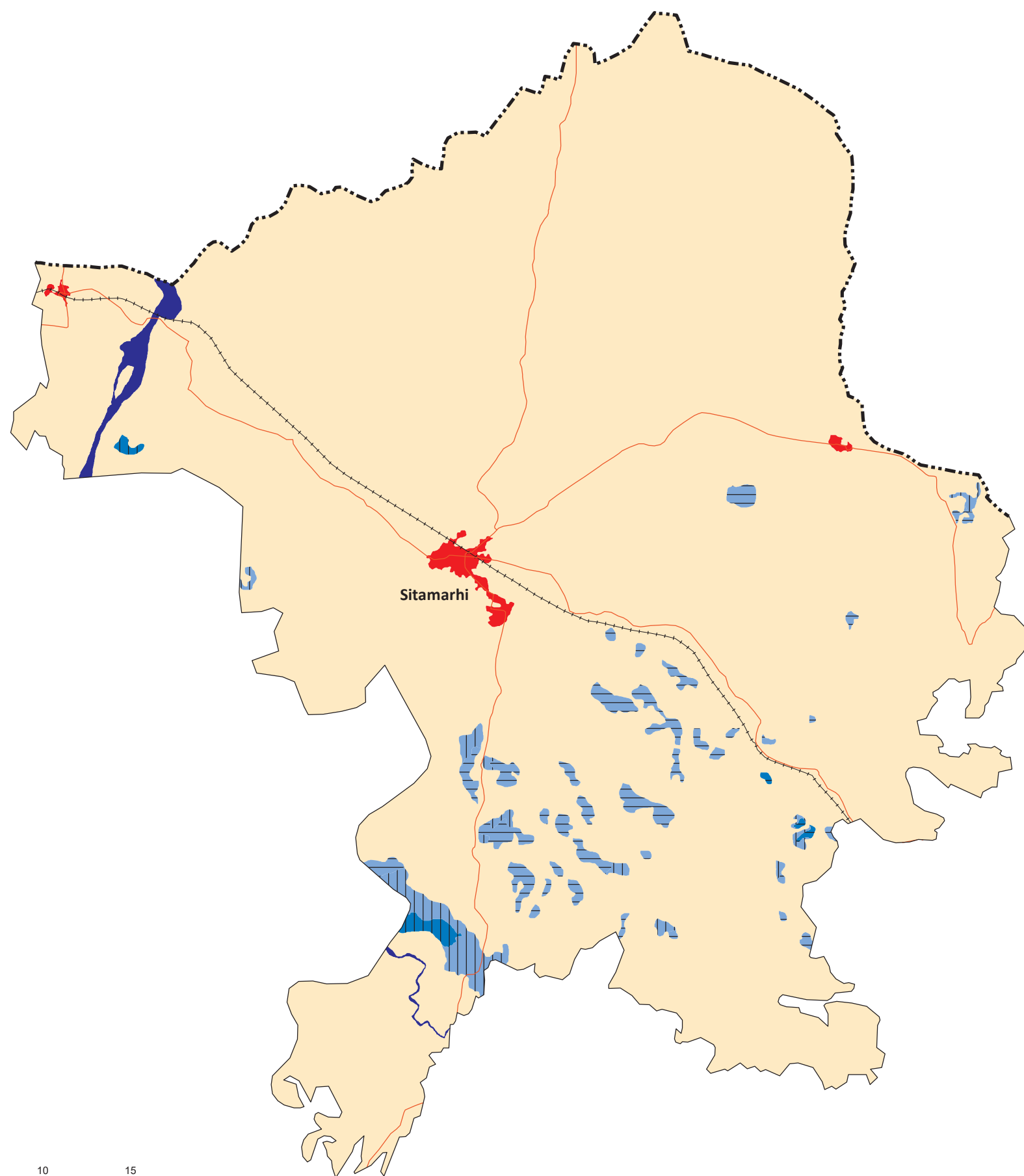
Legend		
Symbol	Code	Description
	II1	Agriculture irrigated, water logging, Slight
	II2	Agriculture irrigated, water logging, Moderate
	DI1	Agriculture unirrigated, water logging, Slight
	DI2	Agriculture unirrigated, water logging, Moderate
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation



Data Source: - IRS LISS3 (2011-2013) - Ancillary Information - Ground Truth Data	 International Boundary	 Major Road
	 State Boundary	 Major Rail
	 District Boundary	



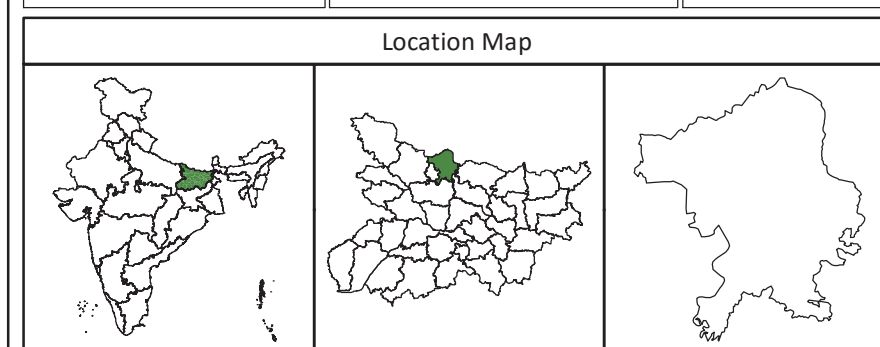
Prepared by:
Space Applications Centre, ISRO, Ahmedabad



DESERTIFICATION / LAND DEGRADATION STATUS MAP **Sitamarhi District, Bihar** **Timeframe - 2003-05**

Legend		
Symbol	Code	Description
	II1	Agriculture irrigated, water logging, Slight
	II2	Agriculture irrigated, water logging, Moderate
	DI1	Agriculture unirrigated, water logging, Slight
	DI2	Agriculture unirrigated, water logging, Moderate
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source: - IRS LISS3 (2003-2005) - Ancillary Information - Ground Truth Data		International Boundary		Major Road
		State Boundary		Major Rail
		District Boundary		



Prepared by:
 Space Applications Centre, ISRO, Ahmedabad

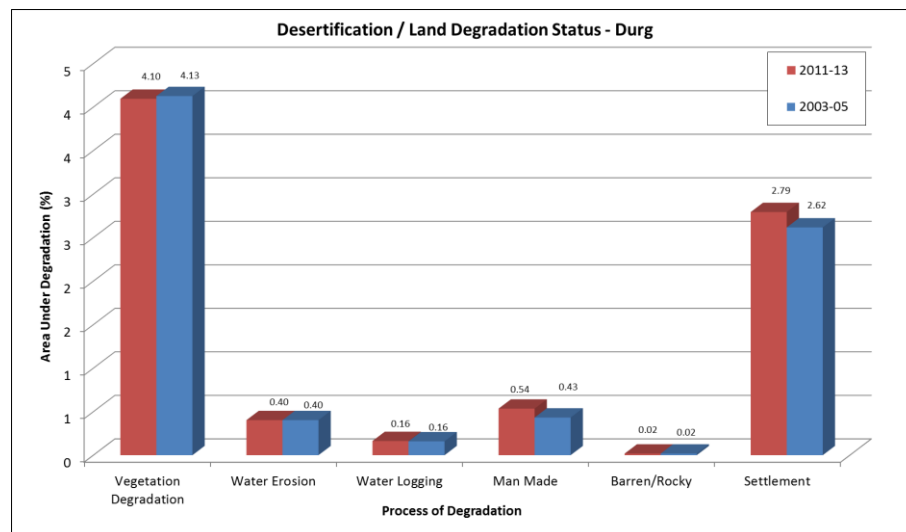
Durg District, Chhattisgarh

Durg district lies in the central portion of Chhattisgarh State. it is bounded by Raipur and Dhamtari districts in the East, Rajnandgaon district in the West, Kabeerdham and Bilaspur districts in the North and Uttar Bastar Kanker in the South. The district covers an area of with 8535.25 sq. km area. The district has a population of 3,343,872 with 458 population density, 391 sex ratio and a literacy rate of 87.82%. (Census 2011)

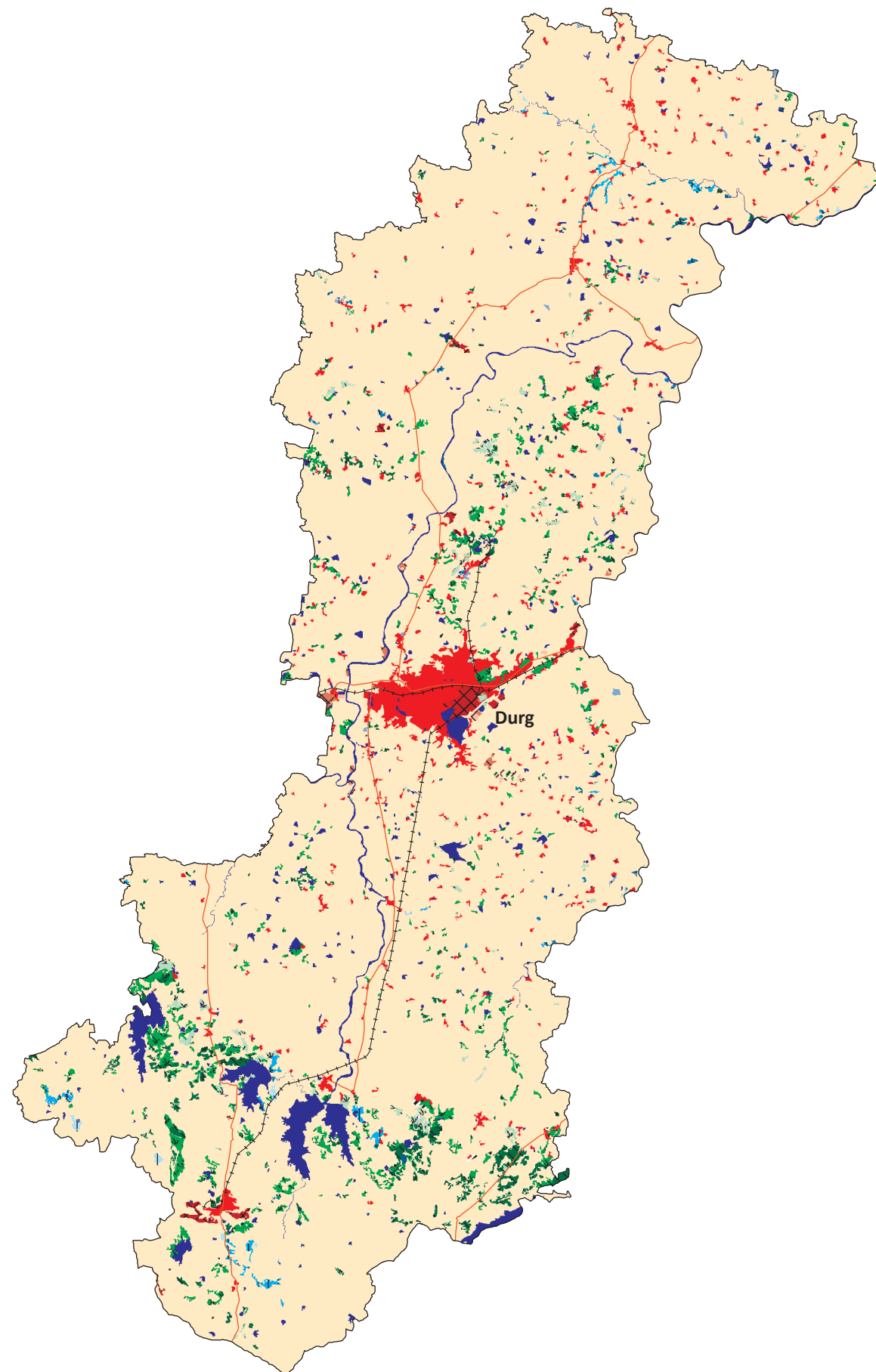
The general slope of the district comes under Mahanadi river slope and is towards north and north east and at some places the slope is towards east direction. The main tributaries of Mahanadi are Sheonath, Kharun, Tandula, Kharkhara and Aamner. The district is rich in minerals, there are vast deposits of iron, limestone, dolomite, quartz and sand.

Durg is observed with 8.01% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.25% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (4.10% during 2011-13 and 4.13% during 2003-05) followed by Manmade activities (0.54% during 2011-13 and 0.43% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	34953.59	4.10	35222.44	4.13	-268.85
Water Erosion	3438.76	0.40	3438.76	0.40	0.00
Water Logging	1395.61	0.16	1361.23	0.16	34.39
Man Made	4567.75	0.54	3692.12	0.43	875.63
Barren/Rocky	160.02	0.02	160.02	0.02	0.00
Settlement	23847.09	2.79	22339.74	2.62	1507.35
Total Area under Desertification	68362.84	8.01	66214.32	7.76	2148.52
No Apparent Degradation	761286.41	89.19	763549.77	89.46	-2263.37
Total Geographical Area (ha)	853525.00				

























SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Fv1	Forest, vegetation degradation, Slight	5535.89	0.65	5535.89	0.65	0.00
2	Fv2	Forest, vegetation degradation, Moderate	3219.46	0.38	3219.46	0.38	0.00
3	Fv3	Forest, vegetation degradation, Severe	116.07	0.01	116.07	0.01	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	4331.64	0.51	4364.67	0.51	-33.04
5	Sv2	Land with scrub, vegetation degradation, Moderate	16122.91	1.89	16468.89	1.93	-345.98
6	Sv3	Land with scrub, vegetation degradation, Severe	5627.62	0.66	5517.45	0.65	110.17
7	Iw1	Agriculture irrigated, water erosion, Slight	590.15	0.07	929.09	0.11	-338.94
8	Iw2	Agriculture irrigated, water erosion, Moderate	1027.26	0.12	688.32	0.08	338.94
9	Iw3	Agriculture irrigated, water erosion, Severe	40.84	0.00	40.84	0.00	0.00
10	Sw1	Land with scrub, water erosion, Slight	80.61	0.01	80.61	0.01	0.00
11	Sw2	Land with scrub, water erosion, Moderate	1545.73	0.18	1545.73	0.18	0.00
12	Sw3	Land with scrub, water erosion, Severe	154.18	0.02	154.18	0.02	0.00
13	Il1	Agriculture irrigated, water logging, Slight	576.45	0.07	542.06	0.06	34.39
14	Il2	Agriculture irrigated, water logging, Moderate	568.83	0.07	568.83	0.07	0.00
15	Il3	Agriculture irrigated, water logging, Severe	250.34	0.03	250.34	0.03	0.00
16	Tm1	Others, man made, Slight	685.97	0.08	493.00	0.06	192.98
17	Tm2	Others, man made, Moderate	1053.78	0.12	729.93	0.09	323.85
18	Tm3	Others, man made, Severe	2828.00	0.33	2469.20	0.29	358.80
19	R	Rocky	160.02	0.02	160.02	0.02	0.00
20	S	Settlement	23847.09	2.79	22339.74	2.62	1507.35
Total Area Under Desertification/ Land Degradation			68362.84	8.01	66214.32	7.76	2148.52
21	W	Water body/ Drainage	23875.75	2.80	23760.90	2.78	114.85
22	NAD	No Apparent Degradation	761286.41	89.19	763549.77	89.46	-2263.37
Total Geographical Area (ha)			853525.00	100.00	853525.00	100.00	



DESERTIFICATION / LAND DEGRADATION STATUS MAP




Durg District, Chhattisgarh



Timeframe - 2011-13

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Iw2	Agriculture irrigated, water erosion, Moderate
	Iw3	Agriculture irrigated, water erosion, Severe
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	Il1	Agriculture irrigated, water logging, Slight
	Il2	Agriculture irrigated, water logging, Moderate
	Il3	Agriculture irrigated, water logging, Severe
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

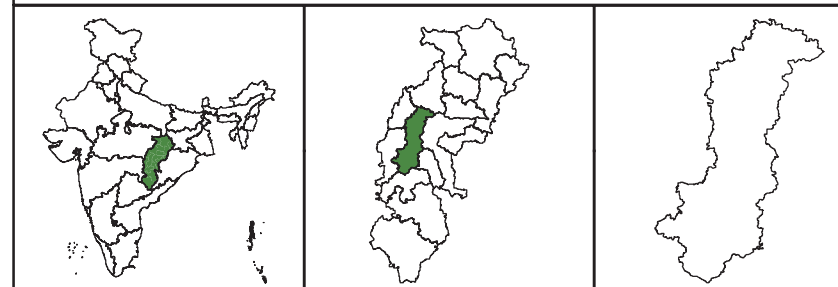
Data Source:

- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

 International Boundary
 State Boundary
 District Boundary

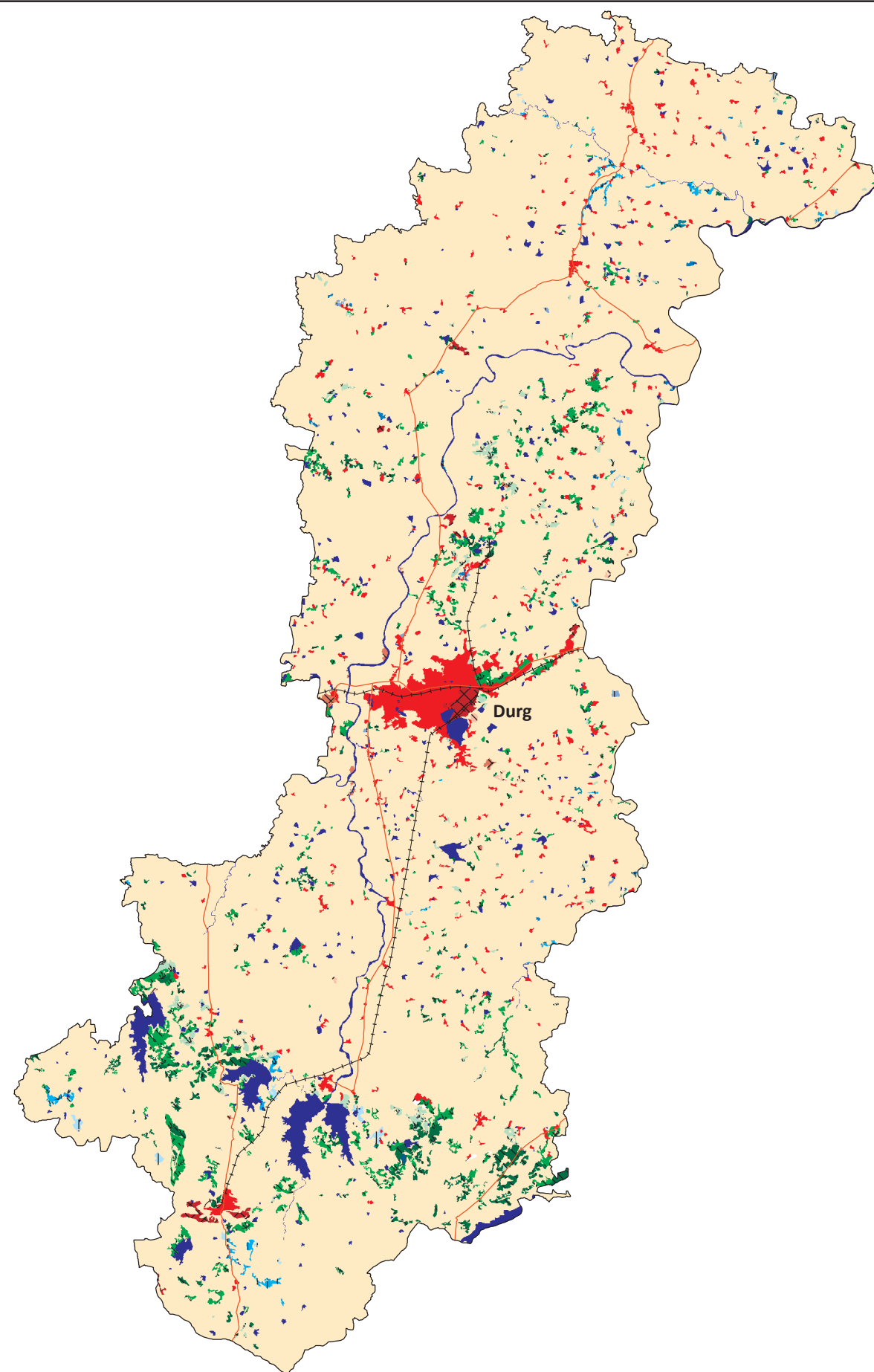
 Major Road
 Major Rail

Location Map



Prepared by:

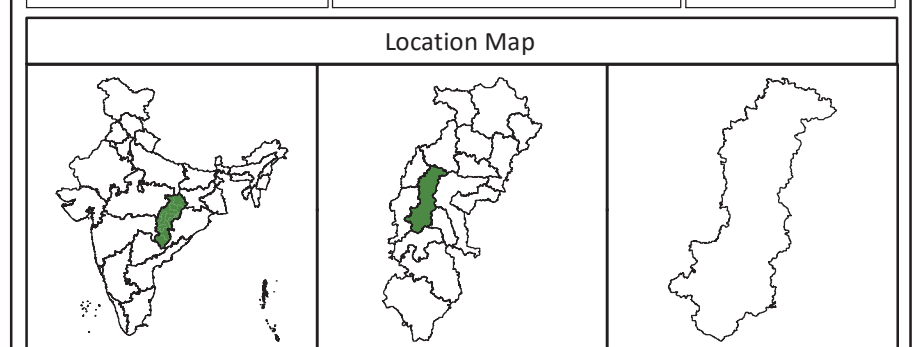
MP Council of Science and Technology, Bhopal
&
Space Applications Centre, ISRO, Ahmedabad



DESERTIFICATION / LAND DEGRADATION STATUS MAP **Durg District, Chhattisgarh** **Timeframe - 2003-05**

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Iw2	Agriculture irrigated, water erosion, Moderate
	Iw3	Agriculture irrigated, water erosion, Severe
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	Il1	Agriculture irrigated, water logging, Slight
	Il2	Agriculture irrigated, water logging, Moderate
	Il3	Agriculture irrigated, water logging, Severe
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source: - IRS LISS3 (2003-2005) - Ancillary Information - Ground Truth Data		International Boundary		Major Road
		State Boundary		Major Rail
		District Boundary		



Prepared by:
MP Council of Science and Technology, Bhopal
&
Space Applications Centre, ISRO, Ahmedabad

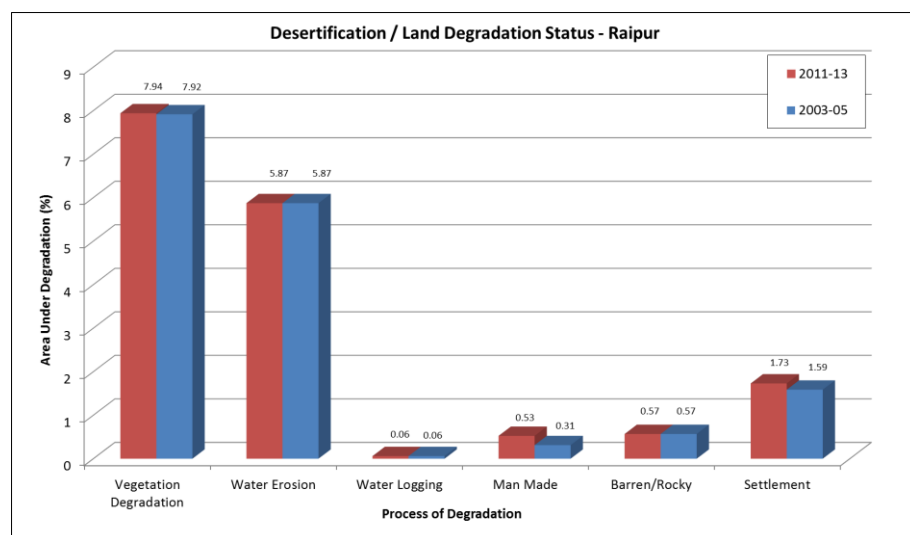
Raipur District, Chhattisgarh

Raipur district lies in the central portion of Chhattisgarh State. It is surrounded by Bilaspur and Janjgir-Champa in the North, Nabarangpur district of Odisha State in the South, Durg and Dhamtari in the West, Mahasamund and Nuapara district of Odisha State in the East. It covers an area of 12383 sq. km. The district has a population of 40,63,872 with 328 population density, 984 sex ratio and a literacy rate of 75.56%. (Census 2011)

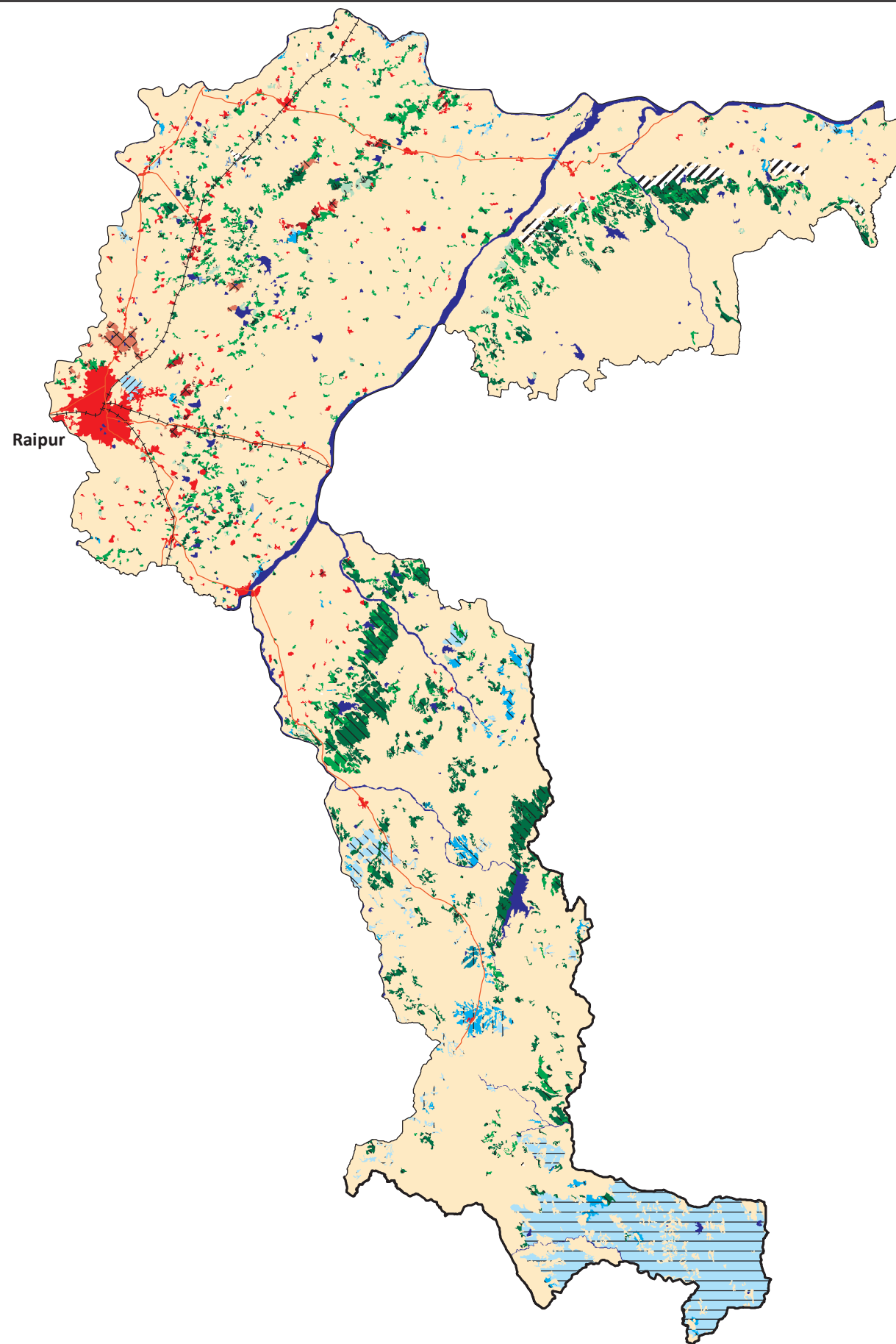
Raipur district occupies the south-eastern part of the upper Mahanadi valley and is bordered by hills in south and east sides. The district is divided into two major physical divisions, the Chhattisgarh plain and the Hilly Areas. Mahanadi is the principal river of this district. Its tributaries being Sendur, Pairi, Sondur, Jonk, Kharun and Shivnath. The fertility of lands of Raipur district can be attributed to the presence of these rivers.

Raipur is observed with 16.70 % of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.38% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (7.94% during 2011-13 and 7.92% during 2003-05) followed by Water Erosion (5.87% during 2011-13 and 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	98298.74	7.94	98013.58	7.92	285.15
Water Erosion	72722.30	5.87	72722.30	5.87	0.00
Water Logging	749.13	0.06	749.13	0.06	0.00
Man Made	6504.17	0.53	3866.22	0.31	2637.95
Barren/Rocky	7046.17	0.57	7046.17	0.57	0.00
Settlement	21426.58	1.73	19647.26	1.59	1779.33
Total Area under Desertification	206747.10	16.70	202044.67	16.32	4702.43
No Apparent Degradation	1002109.44	80.93	1006761.87	81.30	-4652.43
Total Geographical Area (ha)	1238300.00				



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, Slight	40029.51	3.23	39876.05	3.22	153.46
2	Fv2	Forest, vegetation degradation, Moderate	8124.96	0.66	7836.77	0.63	288.20
3	Fv3	Forest, vegetation degradation, Severe	341.13	0.03	341.13	0.03	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	14205.85	1.15	14224.13	1.15	-18.28
5	Sv2	Land with scrub, vegetation degradation, Moderate	30975.74	2.50	31138.02	2.51	-162.28
6	Sv3	Land with scrub, vegetation degradation, Severe	4621.55	0.37	4597.49	0.37	24.06
7	Iw1	Agriculture irrigated, water erosion, Slight	1576.83	0.13	1576.83	0.13	0.00
8	Iw2	Agriculture irrigated, water erosion, Moderate	3389.89	0.27	3389.89	0.27	0.00
9	Iw3	Agriculture irrigated, water erosion, Severe	683.65	0.06	683.65	0.06	0.00
10	Dw1	Agriculture unirrigated, water erosion, Slight	54176.90	4.38	54176.90	4.38	0.00
11	Dw2	Agriculture unirrigated, water erosion, Moderate	1430.62	0.12	1430.62	0.12	0.00
12	Fw1	Forest, water erosion, Slight	4235.64	0.34	4235.64	0.34	0.00
13	Fw2	Forest, water erosion, Moderate	2536.82	0.20	2536.82	0.20	0.00
14	Sw1	Land with scrub, water erosion, Slight	1874.31	0.15	1874.31	0.15	0.00
15	Sw2	Land with scrub, water erosion, Moderate	1564.67	0.13	1564.67	0.13	0.00
16	Sw3	Land with scrub, water erosion, Severe	90.32	0.01	90.32	0.01	0.00
17	Bw1	Barren, water erosion, Slight	1013.29	0.08	1013.29	0.08	0.00
18	Bw2	Barren, water erosion, Moderate	149.37	0.01	149.37	0.01	0.00
19	Il1	Agriculture irrigated, water logging, Slight	404.13	0.03	404.13	0.03	0.00
20	Il2	Agriculture irrigated, water logging, Moderate	183.49	0.01	183.49	0.01	0.00
21	Il3	Agriculture irrigated, water logging, Severe	90.70	0.01	90.70	0.01	0.00
22	DI1	Agriculture unirrigated, water logging, Slight	21.56	0.00	21.56	0.00	0.00
23	DI2	Agriculture unirrigated, water logging, Moderate	49.24	0.00	49.24	0.00	0.00
24	Fm3	Forest, man made, Severe	27.21	0.00	27.21	0.00	0.00
25	Tm1	Others, man made, Slight	756.61	0.06	391.68	0.03	364.93
26	Tm2	Others, man made, Moderate	3482.65	0.28	1242.48	0.10	2240.17
27	Tm3	Others, man made, Severe	2237.71	0.18	2204.86	0.18	32.85
28	B	Barren	470.64	0.04	470.64	0.04	0.00
29	R	Rocky	6575.53	0.53	6575.53	0.53	0.00
30	S	Settlement	21426.58	1.73	19647.26	1.59	1779.33
Total Area Under Desertification/ Land Degradation			206747.10	16.70	202044.67	16.32	4702.43
31	W	Water body/ Drainage	29443.46	2.38	29493.46	2.38	-50.00
32	NAD	No Apparent Degradation	1002109.44	80.93	1006761.87	81.30	-4652.43
Total Geographical Area (ha)			1238300.00	100.00	1238300.00	100.00	



































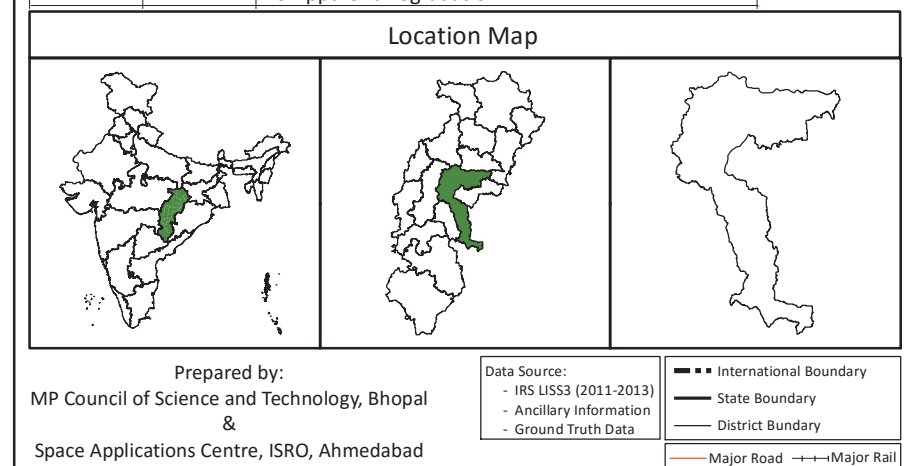
0 5 10 15 km

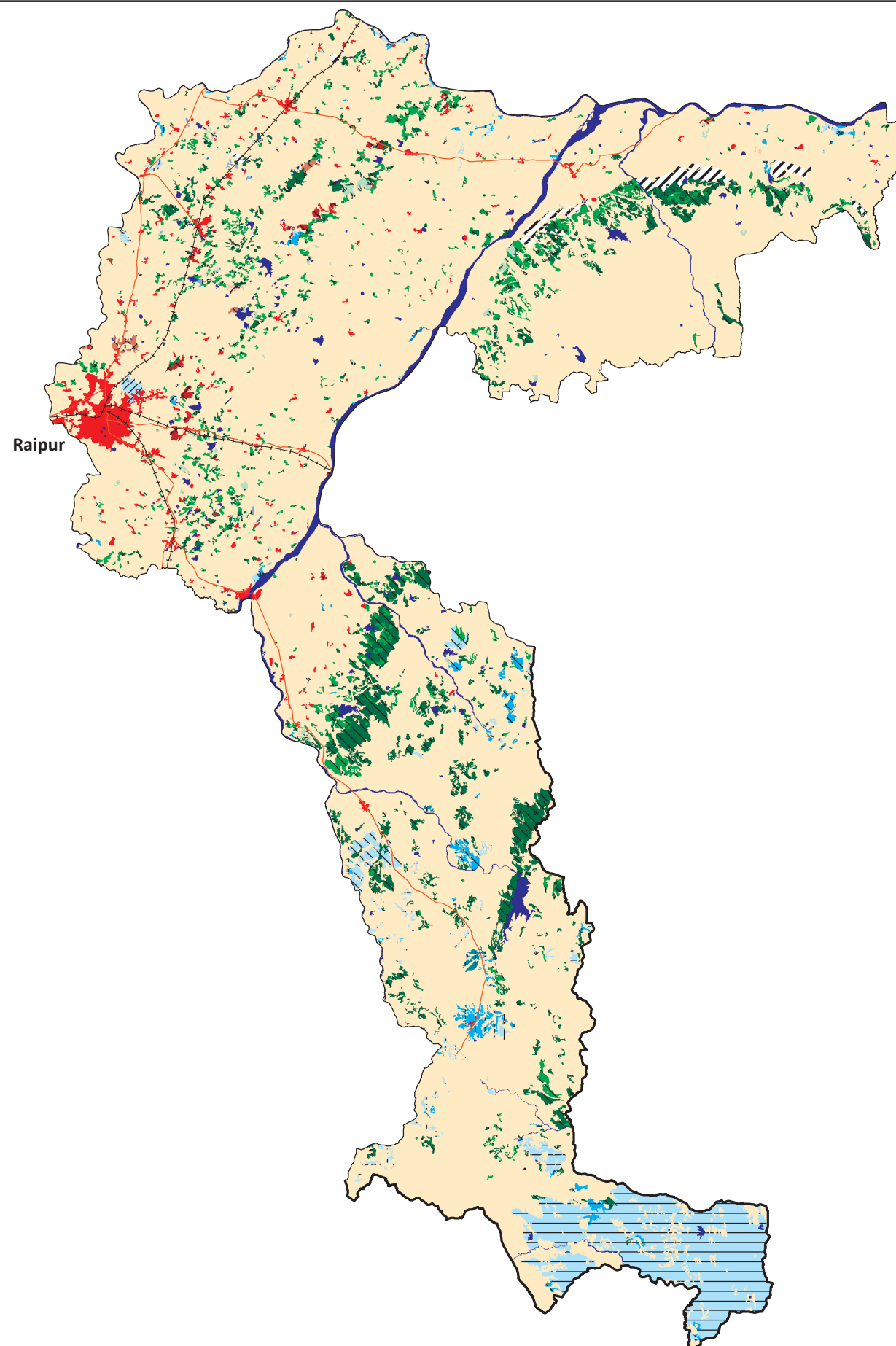
DESERTIFICATION / LAND DEGRADATION STATUS MAP

Raipur District, Chhattisgarh

Timeframe - 2011-13

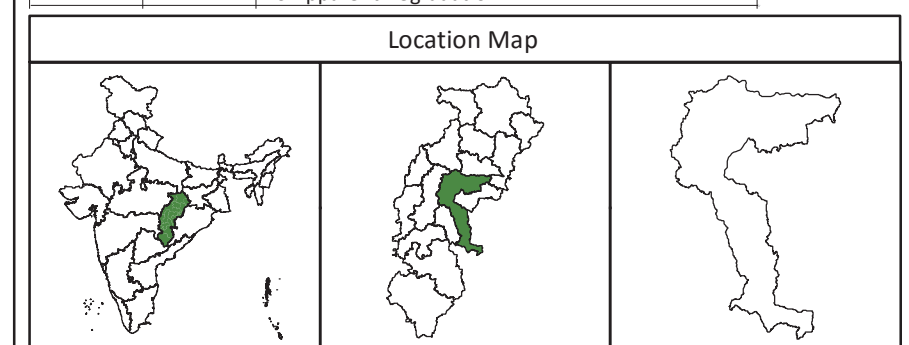
Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Iw2	Agriculture irrigated, water erosion, Moderate
	Iw3	Agriculture irrigated, water erosion, Severe
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Fw1	Forest, water erosion, Slight
	Fw2	Forest, water erosion, Moderate
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	Bw1	Barren, water erosion, Slight
	Bw2	Barren, water erosion, Moderate
	Il1	Agriculture irrigated, water logging, Slight
	Il2	Agriculture irrigated, water logging, Moderate
	Il3	Agriculture irrigated, water logging, Severe
	DI1	Agriculture unirrigated, water logging, Slight
	DI2	Agriculture unirrigated, water logging, Moderate
	Fm3	Forest, man made, Severe
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	B	Barren
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation





DESERTIFICATION / LAND DEGRADATION STATUS MAP **Raipur District, Chhattisgarh** **Timeframe - 2003-05**

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Iw2	Agriculture irrigated, water erosion, Moderate
	Iw3	Agriculture irrigated, water erosion, Severe
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Dw3	Agriculture unirrigated, water erosion, Severe
	Fw1	Forest, water erosion, Slight
	Fw2	Forest, water erosion, Moderate
	Fw3	Forest, water erosion, Severe
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	Bw1	Barren, water erosion, Slight
	Bw2	Barren, water erosion, Moderate
	Bw3	Barren, water erosion, Severe
	Il1	Agriculture irrigated, water logging, Slight
	Il2	Agriculture irrigated, water logging, Moderate
	Il3	Agriculture irrigated, water logging, Severe
	Di1	Agriculture unirrigated, water logging, Slight
	Di2	Agriculture unirrigated, water logging, Moderate
	Di3	Agriculture unirrigated, water logging, Severe
	Fm3	Forest, man made, Severe
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	B	Barren
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation



Prepared by:
 MP Council of Science and Technology, Bhopal
 &
 Space Applications Centre, ISRO, Ahmedabad

Data Source:
 - IRS LISS3 (2003-2005)
 - Ancillary Information
 - Ground Truth Data

--- International Boundary
 --- State Boundary
 --- District Boundary
 --- Major Road --- Major Rail

0 5 10 15 km

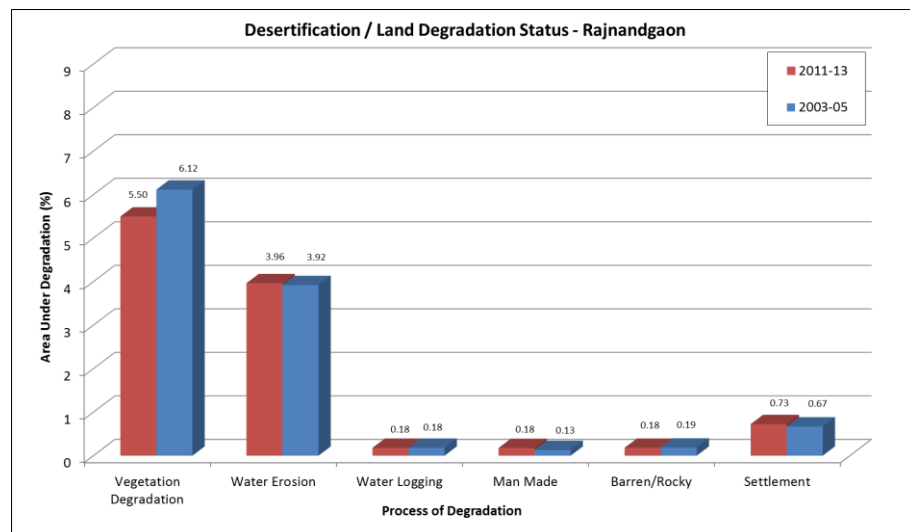
Rajnandgaon District, Chhattisgarh

Rajnandgaon district lies in the western portion of Chhattisgarh, surrounded by Kabeerdham district in north, Durg district in east; Uttar Bastar Kanker district is in the south and Garchiroli, Bhandara (Maharashtra) and Balaghat (Madhya Pradesh) districts in the west. it covers an area of 8070.25 sq. km. The district has a population of 1,537,133 with 190 population density, 1015 sex ratio and a literacy rate of 75.96%. (Census 2011)

Rajnandgaon district has been divided geographically into three parts, western hilly area, southern plateau and the plain area of eastern part which is extended between Maikal mountain ranges. Generally, the slope of the district is towards east. The major river of the district is Sheonath which is a tributary of Mahanadi river. In addition, there are Amner, Ponk, Ghumaria, Karra, Pari, Tairi and Hump rivers which are tributaries of Sheonath and they flow towards east. Bargaon, Andhi, Salebara etc. are the main tanks in the district.

Rajnandgaon is observed with 10.73% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has decreased about 0.48% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (5.50% during 2011-13 and 6.12% during 2003-05) followed by Water Erosion (3.96 % during 2011-13 and 3.92 % during 2003-05).






























Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	44363.26	5.50	49352.06	6.12	-4988.80
Water Erosion	31995.47	3.96	31645.13	3.92	350.34
Water Logging	1469.88	0.18	1469.88	0.18	0.00
Man Made	1443.00	0.18	1070.55	0.13	372.45
Barren/Rocky	1474.77	0.18	1513.77	0.19	-39.00
Settlement	5864.32	0.73	5421.90	0.67	442.43
Total Area under Desertification	86610.70	10.73	90473.28	11.21	-3862.58
No Apparent Degradation	702117.52	87.00	699809.76	86.71	2307.76
Total Geographical Area (ha)	807025.00				



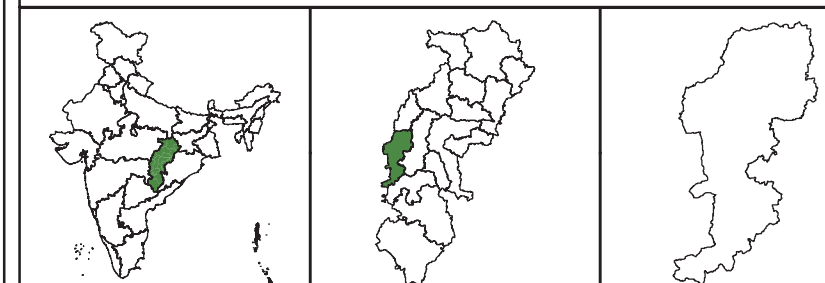
SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Fv1	Forest, vegetation degradation, Slight	13348.78	1.65	18042.50	2.24	-4693.72
2	Fv2	Forest, vegetation degradation, Moderate	6125.61	0.76	6046.04	0.75	79.57
3	Fv3	Forest, vegetation degradation, Severe	387.75	0.05	387.75	0.05	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	8467.10	1.05	8941.25	1.11	-474.14
5	Sv2	Land with scrub, vegetation degradation, Moderate	11785.39	1.46	11737.19	1.45	48.20
6	Sv3	Land with scrub, vegetation degradation, Severe	4248.62	0.53	4197.33	0.52	51.29
7	Iw1	Agriculture irrigated, water erosion, Slight	684.25	0.08	684.25	0.08	0.00
8	Iw2	Agriculture irrigated, water erosion, Moderate	4912.56	0.61	4912.56	0.61	0.00
9	Iw3	Agriculture irrigated, water erosion, Severe	105.50	0.01	105.50	0.01	0.00
10	Dw1	Agriculture unirrigated, water erosion, Slight	3355.66	0.42	3355.66	0.42	0.00
11	Dw2	Agriculture unirrigated, water erosion, Moderate	1936.11	0.24	1936.11	0.24	0.00
12	Fw1	Forest, water erosion, Slight	16604.81	2.06	16604.81	2.06	0.00
13	Fw2	Forest, water erosion, Moderate	1046.77	0.13	1046.77	0.13	0.00
14	Sw1	Land with scrub, water erosion, Slight	2000.68	0.25	1650.34	0.20	350.34
15	Sw2	Land with scrub, water erosion, Moderate	1252.27	0.16	1252.27	0.16	0.00
16	Sw3	Land with scrub, water erosion, Severe	96.86	0.01	96.86	0.01	0.00
17	Il1	Agriculture irrigated, water logging, Slight	561.94	0.07	561.94	0.07	0.00
18	Il2	Agriculture irrigated, water logging, Moderate	289.32	0.04	289.32	0.04	0.00
19	Il3	Agriculture irrigated, water logging, Severe	63.76	0.01	63.76	0.01	0.00
20	DI1	Agriculture unirrigated, water logging, Slight	480.62	0.06	480.62	0.06	0.00
21	DI2	Agriculture unirrigated, water logging, Moderate	74.23	0.01	74.23	0.01	0.00
22	Fm1	Forest, man made, Slight	12.72	0.00	12.72	0.00	0.00
23	Tm1	Others, man made, Slight	432.57	0.05	284.01	0.04	148.56
24	Tm2	Others, man made, Moderate	965.91	0.12	773.82	0.10	192.09
25	Tm3	Others, man made, Severe	31.80	0.00	0.00	0.00	31.80
26	R	Rocky	1474.77	0.18	1513.77	0.19	-39.00
27	S	Settlement	5864.32	0.73	5421.90	0.67	442.43
Total Area Under Desertification/ Land Degradation			86610.70	10.73	90473.28	11.21	-3862.58
28	W	Water body/ Drainage	18296.78	2.27	16741.96	2.07	1554.82
29	NAD	No Apparent Degradation	702117.52	87.00	699809.76	86.71	2307.76
Total Geographical Area (ha)			807025.00	100.00	807025.00	100.00	



DESERTIFICATION / LAND DEGRADATION STATUS MAP Rajnandgaon District, Chhattisgarh Timeframe - 2011-13






Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Iw2	Agriculture irrigated, water erosion, Moderate
	Iw3	Agriculture irrigated, water erosion, Severe
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Fw1	Forest, water erosion, Slight
	Fw2	Forest, water erosion, Moderate
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	II1	Agriculture irrigated, water logging, Slight
	II2	Agriculture irrigated, water logging, Moderate
	II3	Agriculture irrigated, water logging, Severe
	DI1	Agriculture unirrigated, water logging, Slight
	DI2	Agriculture unirrigated, water logging, Moderate
	Fm1	Forest, man made, Slight
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Location Map



Prepared by:
MP Council of Science and Technology, Bhopal
&
Space Applications Centre, ISRO, Ahmedabad

Data Source:
- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

 International Boundary
 State Boundary
 District Boundary
 Major Road
  Major Rail

0 5 10 15 km

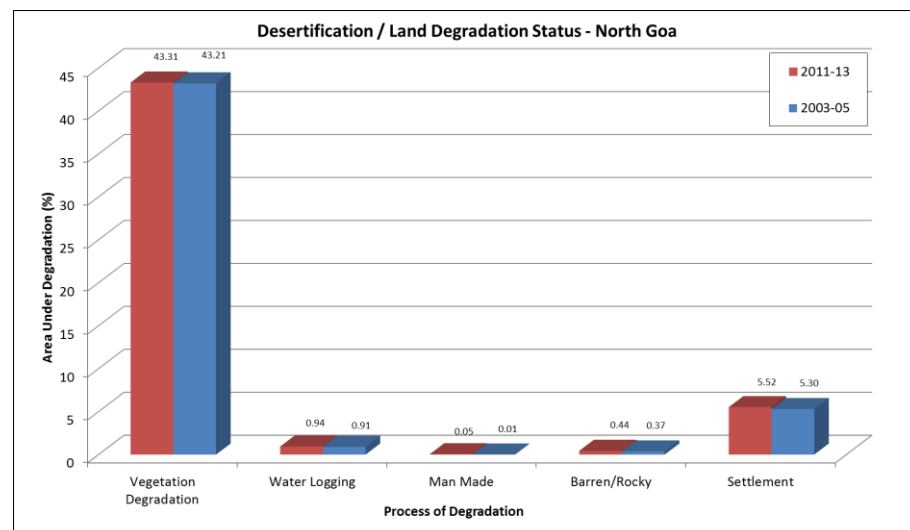
North Goa District, Goa

North Goa is one of the two districts that make up the state of Goa. It is bounded by Sindhudurg district of Maharashtra state to the north and by Belgaum district of Karnataka to the east, by South Goa District to the south, and by the Arabian Sea to the west. It covers an area of 1736 sq km. The district has a population of 818,008 with 471 population density, 963 sex ratio and a literacy rate of 89.57 %. (Census 2011)

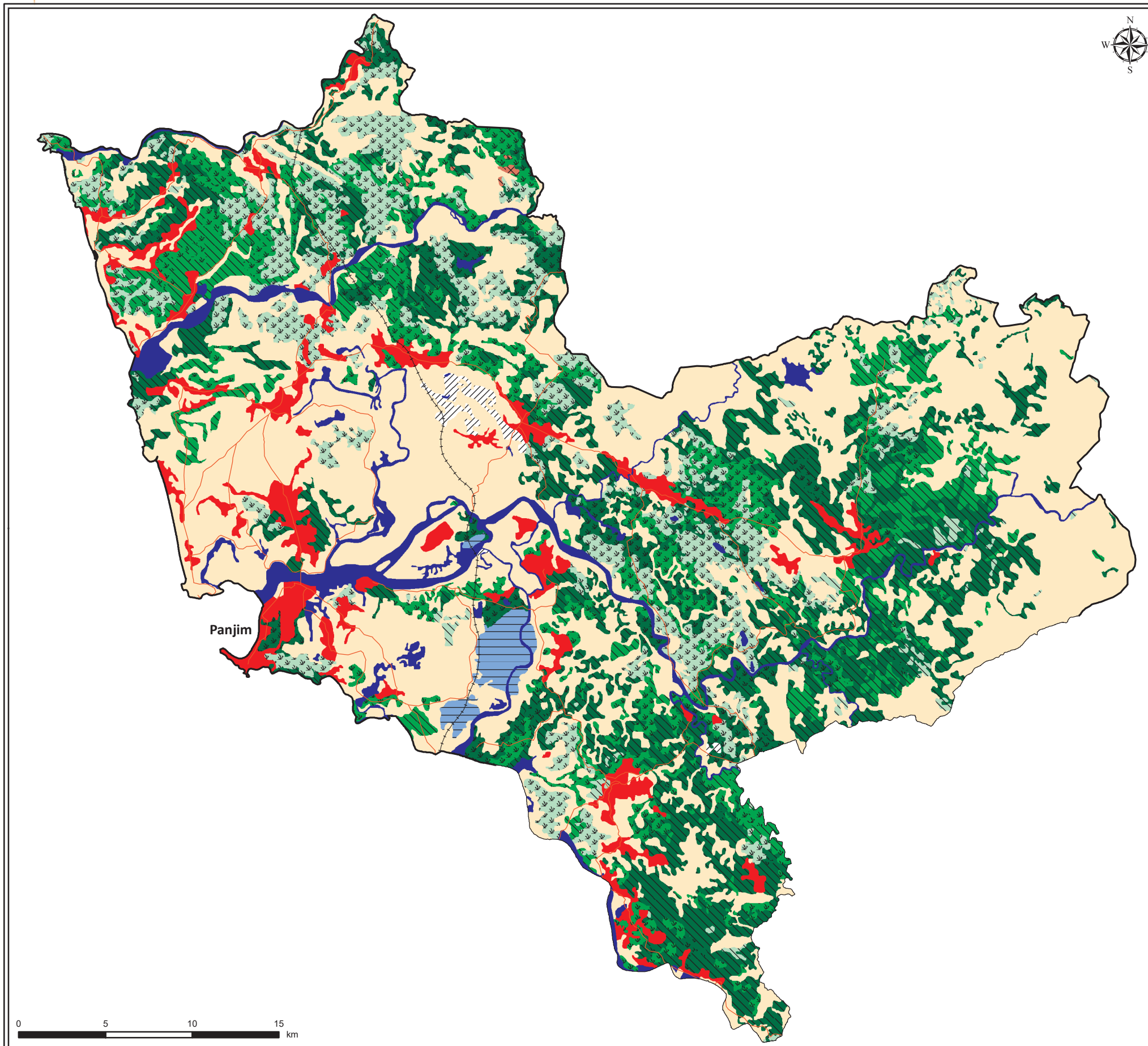
Goa being a part of the Western Coast region of India can be divided into three main physical divisions namely mountainous region of the Sahyadris in the east, the middle level plateau in the center and the low-lying basins and the coastal plains. Rivers, rivulets and brooks bathe the Goan soil before discharging into the sea. The important rivers of the district are Mandovi and Tiracol.

Goa is observed with 50.25% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.46% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (43.31% during 2011-13 and 43.21% during 2003-05).














Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	75180.59	43.31	75012.46	43.21	168.13
Water Logging	1631.67	0.94	1572.70	0.91	58.97
Man Made	80.83	0.05	10.62	0.01	70.21
Barren/Rocky	760.06	0.44	640.29	0.37	119.76
Settlement	9585.76	5.52	9197.74	5.30	388.02
Total Area under Desertification	87238.90	50.25	86433.81	49.79	805.09
No Apparent Degradation	78603.07	45.28	79218.77	45.63	-615.70
Total Geographical Area (ha)	173600.00				



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, Slight	26879.89	15.48	26752.37	15.41	127.52
2	Fv2	Forest, vegetation degradation, Moderate	10163.84	5.85	10018.95	5.77	144.88
3	Fv3	Forest, vegetation degradation, Severe	1274.91	0.73	1085.54	0.63	189.37
4	Sv1	Land with scrub, vegetation degradation, Slight	7971.49	4.59	8168.47	4.71	-196.98
5	Sv2	Land with scrub, vegetation degradation, Moderate	12142.10	6.99	12384.99	7.13	-242.89
6	Sv3	Land with scrub, vegetation degradation, Severe	16748.36	9.65	16602.13	9.56	146.23
7	DI1	Agriculture unirrigated, water logging, Slight	1631.67	0.94	1572.70	0.91	58.97
8	Fm2	Forest, man made, Moderate	37.89	0.02	10.62	0.01	27.27
9	Tm2	Others, man made, Moderate	42.94	0.02	0.00	0.00	42.94
10	B	Barren	760.06	0.44	640.29	0.37	119.76
11	S	Settlement	9585.76	5.52	9197.74	5.30	388.02
Total Area Under Desertification/ Land Degradation			87238.90	50.25	86433.81	49.79	805.09
12	W	Water body/ Drainage	7758.03	4.47	7947.43	4.58	-189.40
13	NAD	No Apparent Degradation	78603.07	45.28	79218.77	45.63	-615.70
Total Geographical Area (ha)			173600.00	100.00	173600.00	100.00	



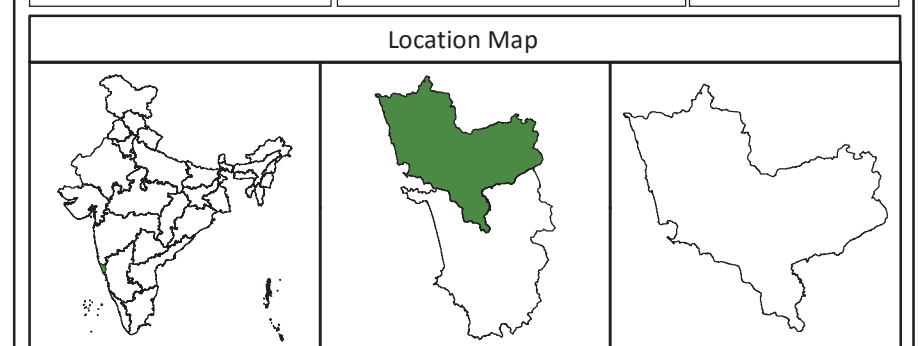
DESERTIFICATION / LAND DEGRADATION STATUS MAP North Goa District, Goa Timeframe - 2011-13

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	DI1	Agriculture unirrigated, water logging, Slight
	Fm2	Forest, man made, Moderate
	Tm2	Others, man made, Moderate
	B	Barren
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:
- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

--- International Boundary
— State Boundary
— District Boundary

— Major Road
+ + + + Major Rail



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

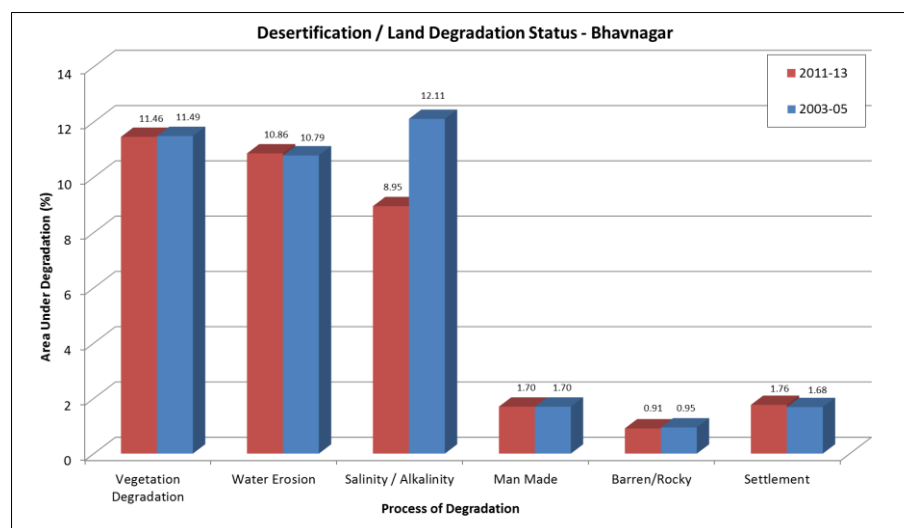
Bhavnagar District, Gujarat

Bhavnagar district lies in the south-east corner of the Gujarat state. It is bounded in the north by Surendranagar and Ahmadabad districts, in the west by Rajkot and Amreli districts and in the south by the Arabian Sea and part of Amreli district and in the east by the Gulf of Khambhat. It occupies an area of 8334 sq. km. Bhavnagar district has a population of 2,880,365 with 574 population density, 933 sex ratio and a literacy rate of 75.5%. (Census 2011)

Bhavnagar district forms a part of Kathiawar Peninsula and is sub-divided into four sub-micro regions, namely, Bhavnagar Coastal Plain, Palitana Savarkundla upland, Songadh Forested Plain and Keri, Kalubhar and Ghelo Plain on the basis of topography, climate, geology, soils and natural vegetation. The main rivers which drain this district are Kalubhar river, Bagad river, Gomati river.

Bhavnagar is observed with 35.64% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has decreased about 3.07% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (11.46% during 2011-13 and 11.49% during 2003-05) followed by Water Erosion (10.86% during 2011-13 and 10.79% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	95507.31	11.46	95755.39	11.49	-248.08
Water Erosion	90511.80	10.86	89907.16	10.79	604.64
Salinity / Alkalinity	74599.03	8.95	100912.49	12.11	-26313.47
Man Made	14147.44	1.70	14147.44	1.70	0.00
Barren/Rocky	7598.34	0.91	7878.33	0.95	-279.98
Settlement	14680.48	1.76	14021.74	1.68	658.74
Total Area under Desertification	297044.41	35.64	322622.55	38.71	-25578.14
No Apparent Degradation	505719.59	60.68	478145.86	57.37	27573.73
Total Geographical Area (ha)	833400.00				




































SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Fv1	Forest, vegetation degradation, Slight	6816.28	0.82	12117.56	1.45	-5301.29
2	Fv2	Forest, vegetation degradation, Moderate	23997.71	2.88	18350.30	2.20	5647.41
3	Fv3	Forest, vegetation degradation, Severe	4427.32	0.53	4994.55	0.60	-567.23
4	Sv1	Land with scrub, vegetation degradation, Slight	30604.68	3.67	31092.26	3.73	-487.58
5	Sv2	Land with scrub, vegetation degradation, Moderate	24845.76	2.98	24249.71	2.91	596.05
6	Sv3	Land with scrub, vegetation degradation, Severe	4815.56	0.58	4951.01	0.59	-135.44
7	Iw1	Agriculture irrigated, water erosion, Slight	31969.74	3.84	31142.54	3.74	827.20
8	Iw2	Agriculture irrigated, water erosion, Moderate	6953.02	0.83	6999.65	0.84	-46.63
9	Iw3	Agriculture irrigated, water erosion, Severe	2590.30	0.31	2571.89	0.31	18.41
10	Dw1	Agriculture unirrigated, water erosion, Slight	2103.43	0.25	2106.55	0.25	-3.12
11	Fw1	Forest, water erosion, Slight	1497.70	0.18	1470.31	0.18	27.39
12	Fw2	Forest, water erosion, Moderate	506.96	0.06	506.96	0.06	0.00
13	Sw1	Land with scrub, water erosion, Slight	34571.54	4.15	34945.54	4.19	-374.01
14	Sw2	Land with scrub, water erosion, Moderate	10319.11	1.24	10163.72	1.22	155.40
15	Is1	Agriculture irrigated, salinity / alkalinity, Slight	19065.53	2.29	19297.85	2.32	-232.32
16	Is2	Agriculture irrigated, salinity / alkalinity, Moderate	1505.30	0.18	1611.64	0.19	-106.34
17	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight	3204.35	0.38	3598.24	0.43	-393.88
18	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate	498.14	0.06	104.26	0.01	393.88
19	Fs1	Forest, salinity / alkalinity, Slight	757.96	0.09	682.09	0.08	75.87
20	Fs2	Forest, salinity / alkalinity, Moderate	419.17	0.05	419.17	0.05	0.00
21	Ss1	Land with scrub, salinity / alkalinity, Slight	1288.48	0.15	1204.39	0.14	84.10
22	Ss2	Land with scrub, salinity / alkalinity, Moderate	603.95	0.07	583.85	0.07	20.10
23	Ss3	Land with scrub, salinity / alkalinity, Severe	2312.18	0.28	2312.18	0.28	0.00
24	Bs1	Barren, salinity / alkalinity, Slight	3776.92	0.45	32805.30	3.94	-29028.38
25	Bs2	Barren, salinity / alkalinity, Moderate	22449.16	2.69	20774.83	2.49	1674.33
26	Bs3	Barren, salinity / alkalinity, Severe	18717.89	2.25	17518.71	2.10	1199.18
27	Tm1	Others, man made, Slight	4115.81	0.49	4629.25	0.56	-513.44
28	Tm2	Others, man made, Moderate	9993.02	1.20	9479.57	1.14	513.44
29	Tm3	Others, man made, Severe	38.61	0.00	38.61	0.00	0.00
30	B	Barren	7598.34	0.91	7878.33	0.95	-279.98
31	S	Settlement	14680.48	1.76	14021.74	1.68	658.74
Total Area Under Desertification/ Land Degradation			297044.41	35.64	322622.55	38.71	-25578.14
32	W	Water body/ Drainage	30635.99	3.68	32631.59	3.92	-1995.59
33	NAD	No Apparent Degradation	505719.59	60.68	478145.86	57.37	27573.73
Total Geographical Area (ha)			833400.00	100.00	833400.00	100.00	



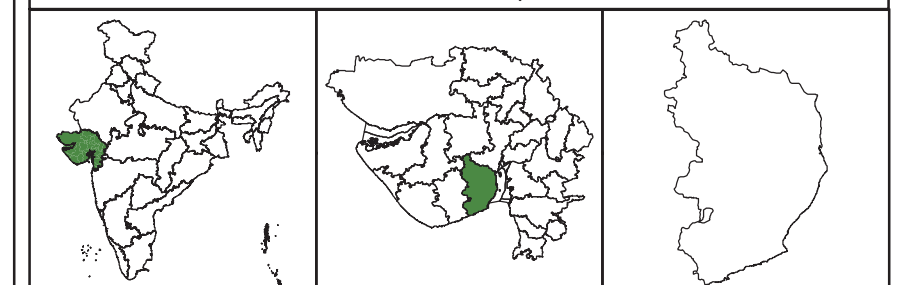
DESERTIFICATION / LAND DEGRADATION STATUS MAP

Bhavnagar District, Gujarat

Timeframe - 2011-13






Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Iw2	Agriculture irrigated, water erosion, Moderate
	Iw3	Agriculture irrigated, water erosion, Severe
	Dw1	Agriculture unirrigated, water erosion, Slight
	Fw1	Forest, water erosion, Slight
	Fw2	Forest, water erosion, Moderate
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Is1	Agriculture irrigated, salinity / alkalinity, Slight
	Is2	Agriculture irrigated, salinity / alkalinity, Moderate
	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight
	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate
	Fs1	Forest, salinity / alkalinity, Slight
	Fs2	Forest, salinity / alkalinity, Moderate
	Ss1	Land with scrub, salinity / alkalinity, Slight
	Ss2	Land with scrub, salinity / alkalinity, Moderate
	Ss3	Land with scrub, salinity / alkalinity, Severe
	Bs1	Barren, salinity / alkalinity, Slight
	Bs2	Barren, salinity / alkalinity, Moderate
	Bs3	Barren, salinity / alkalinity, Severe
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	B	Barren
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Location Map

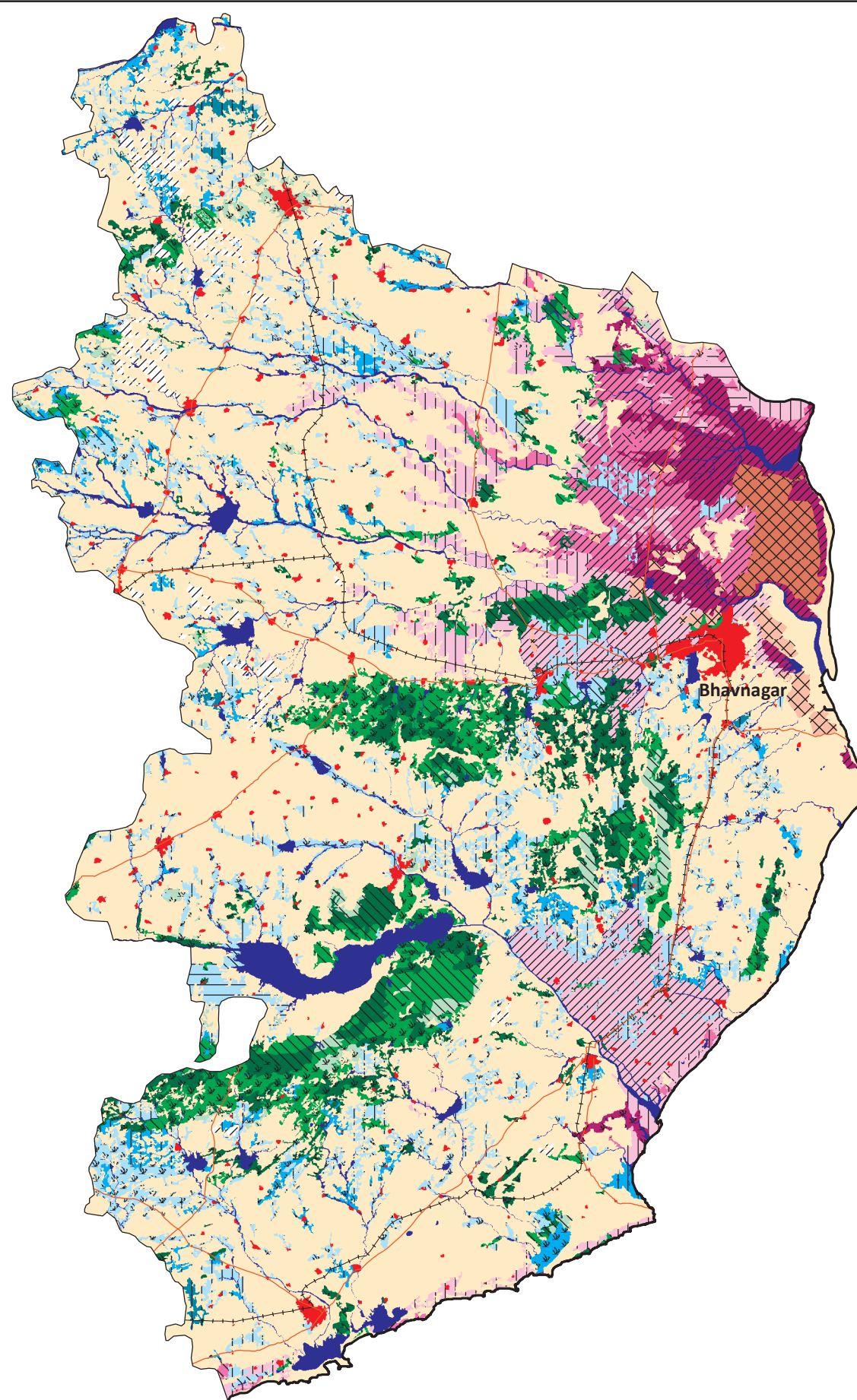


Prepared by:
Centre for Environment and planning Technology,
Ahmedabad
&
Space Applications Centre, ISRO, Ahmedabad

Data Source:
- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

 International Boundary
 State Boundary
 District Boundary
 Major Road
  Major Rail

0 5 10 15 km



DESERTIFICATION / LAND DEGRADATION STATUS MAP **Bhavnagar District, Gujarat** **Timeframe - 2003-05**

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Iw2	Agriculture irrigated, water erosion, Moderate
	Iw3	Agriculture irrigated, water erosion, Severe
	Dw1	Agriculture unirrigated, water erosion, Slight
	Fw1	Forest, water erosion, Slight
	Fw2	Forest, water erosion, Moderate
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Is1	Agriculture irrigated, salinity / alkalinity, Slight
	Is2	Agriculture irrigated, salinity / alkalinity, Moderate
	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight
	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate
	Fs1	Forest, salinity / alkalinity, Slight
	Fs2	Forest, salinity / alkalinity, Moderate
	Ss1	Land with scrub, salinity / alkalinity, Slight
	Ss2	Land with scrub, salinity / alkalinity, Moderate
	Ss3	Land with scrub, salinity / alkalinity, Severe
	Bs1	Barren, salinity / alkalinity, Slight
	Bs2	Barren, salinity / alkalinity, Moderate
	Bs3	Barren, salinity / alkalinity, Severe
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	B	Barren
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Location Map

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

Data Source:
- IRS LISS3 (2003-2005)
- Ancillary Information
- Ground Truth Data

International Boundary
 State Boundary
 District Boundary
 Major Road Major Rail

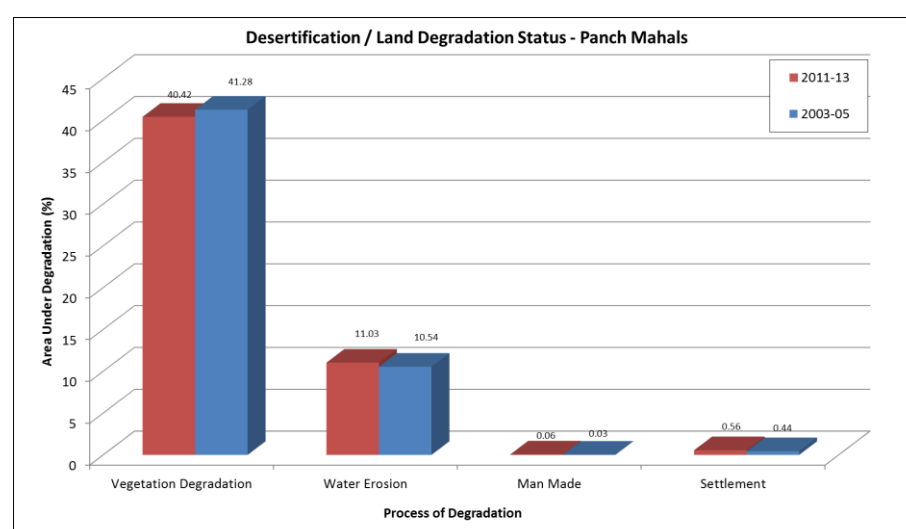
Panch Mahals District, Gujarat

Panch Mahals district falls in the eastern portion of Gujarat State. It is bounded on the north by the Sabarkantha district and Rajasthan State, on the east by Dohad district, Vadodara district to the south and on the west by Kheda and Anand districts. It covers an area of 5231 sq. km area. The district has a population of 2,390,776 with 457 population density, 949 sex ratio and a literacy rate of 70.99%. (Census 2011)

Topographically, the district is divided into two major zones hills and plain. The northern and eastern parts of the district are hilly whereas the southern and western areas of the district are plain. The general elevation of the district is between 100 meters and 400 meters from mean sea level. The district is rich in water resources. It is drained by several rivers like Mahi, Goma, Kun, Panam, Karad, Kali and Meshri. Mahi is the longest river.

Panch Mahals is observed with 52.07% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has decreased about 0.22% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (40.42% during 2011-13 and 41.28% during 2003-05) followed by Water Erosion (11.03% during 2011-13 and 10.54% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	211439.87	40.42	215926.00	41.28	-4486.12
Water Erosion	57701.52	11.03	55138.58	10.54	2562.94
Man Made	305.47	0.06	143.28	0.03	162.19
Settlement	2939.92	0.56	2310.54	0.44	629.38
Total Area under Desertification	272386.79	52.07	273518.40	52.29	-1131.61
No Apparent Degradation	223460.91	42.72	222746.73	42.58	714.18
Total Geographical Area (ha)	523100.00				



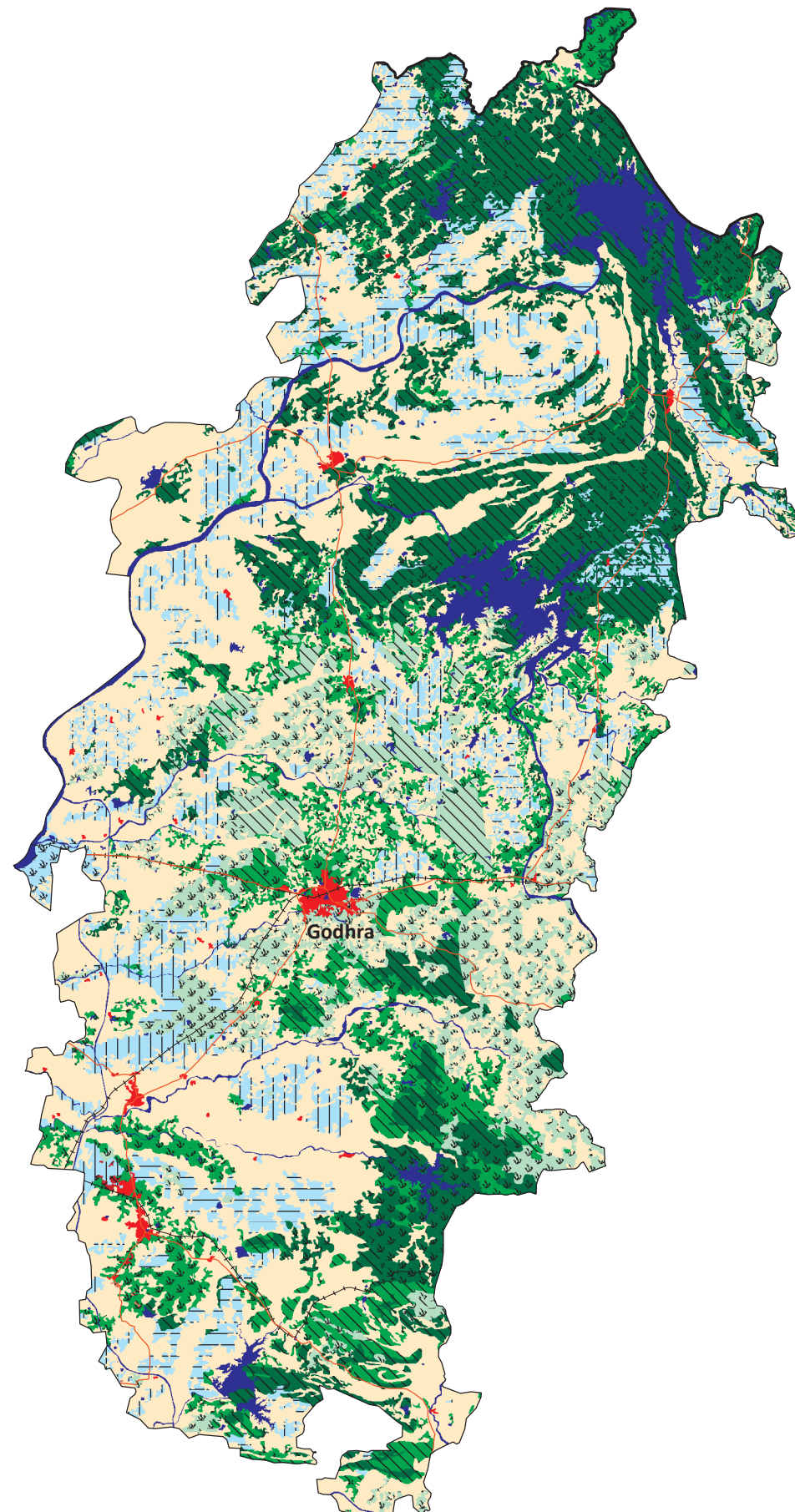
SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Slight	66648.82	12.74	66737.88	12.76	-89.06
2	Fv2	Forest, vegetation degradation, Moderate	16930.66	3.24	16990.79	3.25	-60.13
3	Fv3	Forest, vegetation degradation, Severe	10295.69	1.97	10295.69	1.97	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	39701.33	7.59	41736.10	7.98	-2034.77
5	Sv2	Land with scrub, vegetation degradation, Moderate	41123.11	7.86	43253.29	8.27	-2130.18
6	Sv3	Land with scrub, vegetation degradation, Severe	36740.27	7.02	36912.25	7.06	-171.98
7	Iw1	Agriculture irrigated, water erosion, Slight	29968.44	5.73	28351.37	5.42	1617.06
8	Dw1	Agriculture unirrigated, water erosion, Slight	26242.42	5.02	25296.54	4.84	945.88
9	Sw1	Land with scrub, water erosion, Slight	1490.67	0.28	1490.67	0.28	0.00
10	Fm1	Forest, man made, Slight	29.48	0.01	29.48	0.01	0.00
11	Tm1	Others, man made, Slight	30.55	0.01	30.55	0.01	0.00
12	Tm2	Others, man made, Moderate	69.01	0.01	63.14	0.01	5.88
13	Tm3	Others, man made, Severe	176.43	0.03	20.12	0.00	156.31
14	S	Settlement	2939.92	0.56	2310.54	0.44	629.38
Total Area Under Desertification/ Land Degradation			272386.79	52.07	273518.40	52.29	-1131.61
15	W	Water body/ Drainage	27252.30	5.21	26834.87	5.13	417.43
16	NAD	No Apparent Degradation	223460.91	42.72	222746.73	42.58	714.18
Total Geographical Area (ha)			523100.00	100.00	523100.00	100.00	



















DESERTIFICATION / LAND DEGRADATION STATUS MAP

Panch Mahals District, Gujarat

Timeframe - 2011-13



Legend

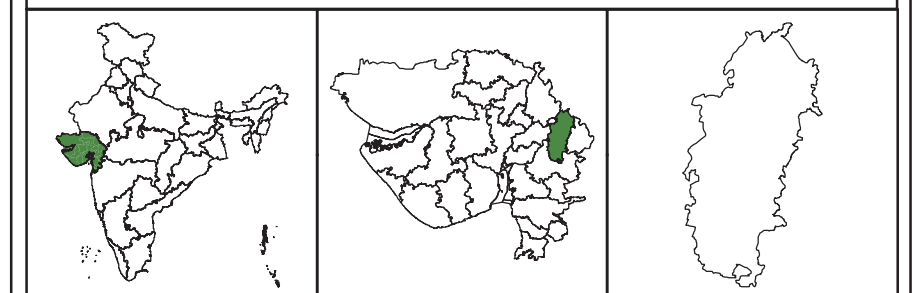
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Dw1	Agriculture unirrigated, water erosion, Slight
	Sw1	Land with scrub, water erosion, Slight
	Fm1	Forest, man made, Slight
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:
 - IRS LISS3 (2011-2013)
 - Ancillary Information
 - Ground Truth Data

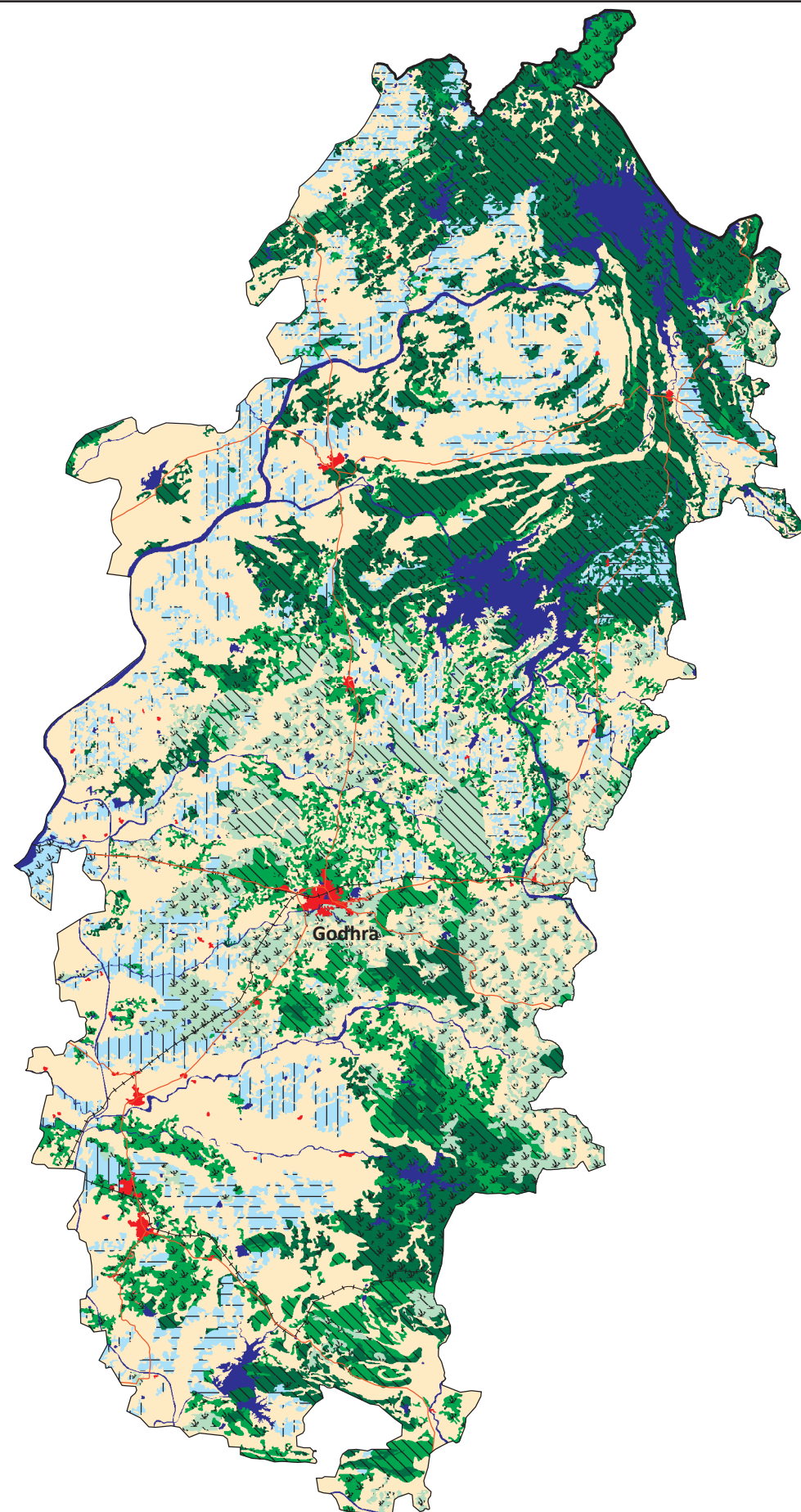
--- International Boundary
 — State Boundary
 — District Boundary

— Major Road
 +++ Major Rail

Location Map



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



DESERTIFICATION / LAND DEGRADATION STATUS MAP **Panch Mahals District, Gujarat** **Timeframe - 2003-05**

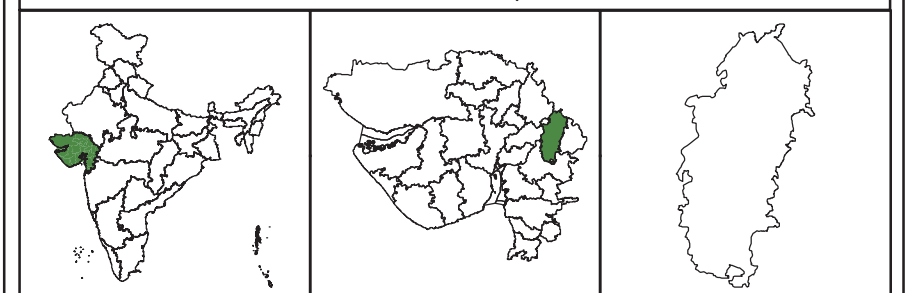
Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Dw1	Agriculture unirrigated, water erosion, Slight
	Sw1	Land with scrub, water erosion, Slight
	Fm1	Forest, man made, Slight
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:
 - IRS LISS3 (2003-2005)
 - Ancillary Information
 - Ground Truth Data

--- International Boundary
 — State Boundary
 — District Boundary

— Major Road
 +---+ Major Rail

Location Map



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

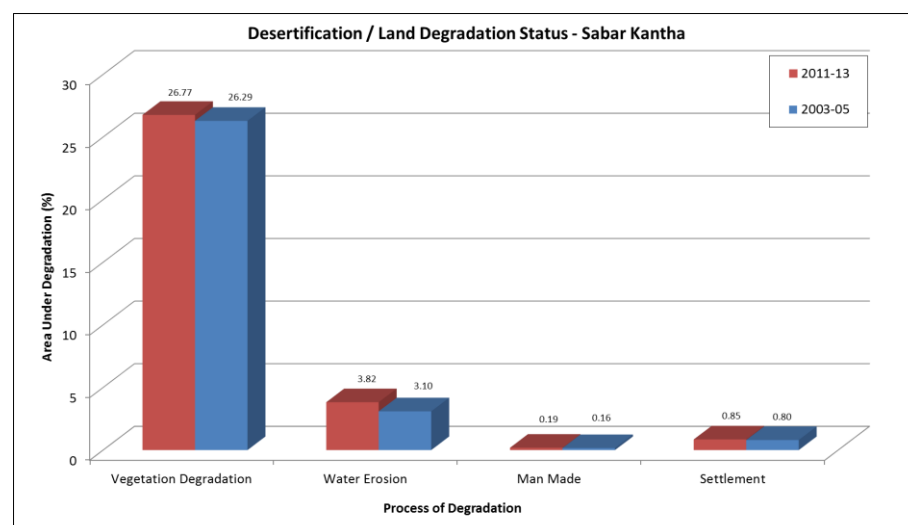
Sabar Kantha District, Gujarat

Sabar Kantha district falls in the northern portion of Gujarat State. It is bounded on the east and northeast by Rajasthan State, on the west by the Banaskantha and Mahesana districts, on the south by Gandhinagar, Kheda and Panch Mahals districts. The western side of this district is bounded by the river Sabarmati, whereas the Aravalli hills form a natural boundary on the northern and eastern sides. Total area covered is 7394 sq. km area. Sabarkantha district has a population of 2,428,589 with 328 population density, 952 sex ratio and a literacy rate of 75.8 %. (Census 2011)

Sabar Kantha district is a part of Gujarat Plain and is subdivided in to 5 sub regions, namely Idar Upland, Sabarkantha Aravalli, Sabarmati Plain, Vatrak Meshwa and Majham Plain and lastly Khari Plain on the basis of physiography, climate, geology, soils and natural vegetation. The main rivers in the district are Sabarmati, Hathmati, Meshvo, Mazum, Vatrak, Harnav and Khari. The Tropic of Cancer passes through Sabarkantha district.

Sabar Kantha is observed with 31.63% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 1.28 % since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (26.77% during 2011-13 and 26.29% during 2003-05) followed by Water Erosion (3.82% during 2011-13 and 3.10% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	197931.17	26.77	194401.49	26.29	3529.68
Water Erosion	28266.11	3.82	22887.23	3.10	5378.88
Man Made	1374.53	0.19	1174.07	0.16	200.47
Settlement	6284.76	0.85	5944.98	0.80	339.78
Total Area under Desertification	233856.57	31.63	224407.77	30.35	9448.80
No Apparent Degradation	476704.44	64.47	485706.92	65.69	-9002.48
Total Geographical Area (ha)	739400.00				



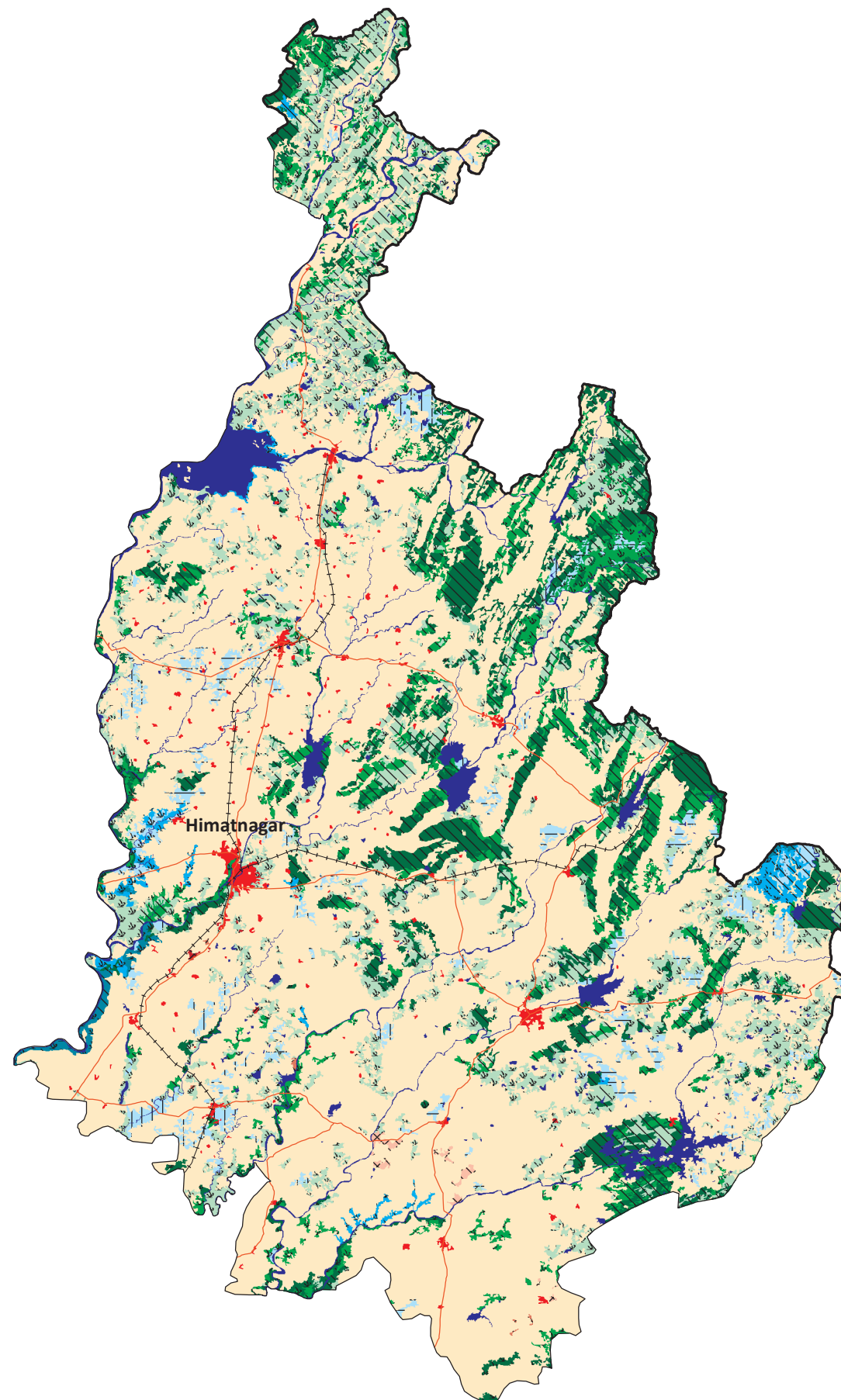
SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Slight	51686.50	6.99	52428.89	7.09	-742.39
2	Fv2	Forest, vegetation degradation, Moderate	25744.03	3.48	25376.74	3.43	367.29
3	Fv3	Forest, vegetation degradation, Severe	22299.38	3.02	21142.36	2.86	1157.02
4	Sv1	Land with scrub, vegetation degradation, Slight	6292.58	0.85	8440.82	1.14	-2148.24
5	Sv2	Land with scrub, vegetation degradation, Moderate	21611.96	2.92	21920.59	2.96	-308.63
6	Sv3	Land with scrub, vegetation degradation, Severe	70296.73	9.51	65092.09	8.80	5204.64
7	Iw1	Agriculture irrigated, water erosion, Slight	8727.81	1.18	7159.65	0.97	1568.16
8	Dw1	Agriculture unirrigated, water erosion, Slight	9011.51	1.22	5528.14	0.75	3483.37
9	Dw2	Agriculture unirrigated, water erosion, Moderate	127.92	0.02	127.92	0.02	0.00
10	Fw1	Forest, water erosion, Slight	898.52	0.12	898.52	0.12	0.00
11	Fw2	Forest, water erosion, Moderate	1367.46	0.18	1319.98	0.18	47.48
12	Fw3	Forest, water erosion, Severe	683.65	0.09	683.65	0.09	0.00
13	Sw1	Land with scrub, water erosion, Slight	1382.78	0.19	1341.98	0.18	40.80
14	Sw2	Land with scrub, water erosion, Moderate	4586.58	0.62	4347.52	0.59	239.07
15	Sw3	Land with scrub, water erosion, Severe	1479.87	0.20	1479.87	0.20	0.00
16	Tm1	Others, man made, Slight	971.42	0.13	883.20	0.12	88.22
17	Tm2	Others, man made, Moderate	185.19	0.03	92.98	0.01	92.21
18	Tm3	Others, man made, Severe	217.92	0.03	197.89	0.03	20.03
19	S	Settlement	6284.76	0.85	5944.98	0.80	339.78
Total Area Under Desertification/ Land Degradation			233856.57	31.63	224407.77	30.35	9448.80
20	W	Water body/ Drainage	28838.99	3.90	29285.31	3.96	-446.32
21	NAD	No Apparent Degradation	476704.44	64.47	485706.92	65.69	-9002.48
Total Geographical Area (ha)			739400.00	100.00	739400.00	100.00	
























DESERTIFICATION / LAND DEGRADATION STATUS MAP

Sabar Kantha District, Gujarat

Timeframe - 2011-13



0 5 10 15 km

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Fw1	Forest, water erosion, Slight
	Fw2	Forest, water erosion, Moderate
	Fw3	Forest, water erosion, Severe
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:

- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

--- International Boundary

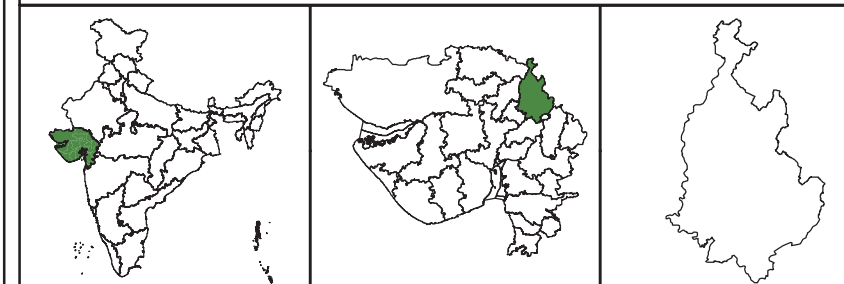
— State Boundary

— District Boundary

— Major Road

++++ Major Rail

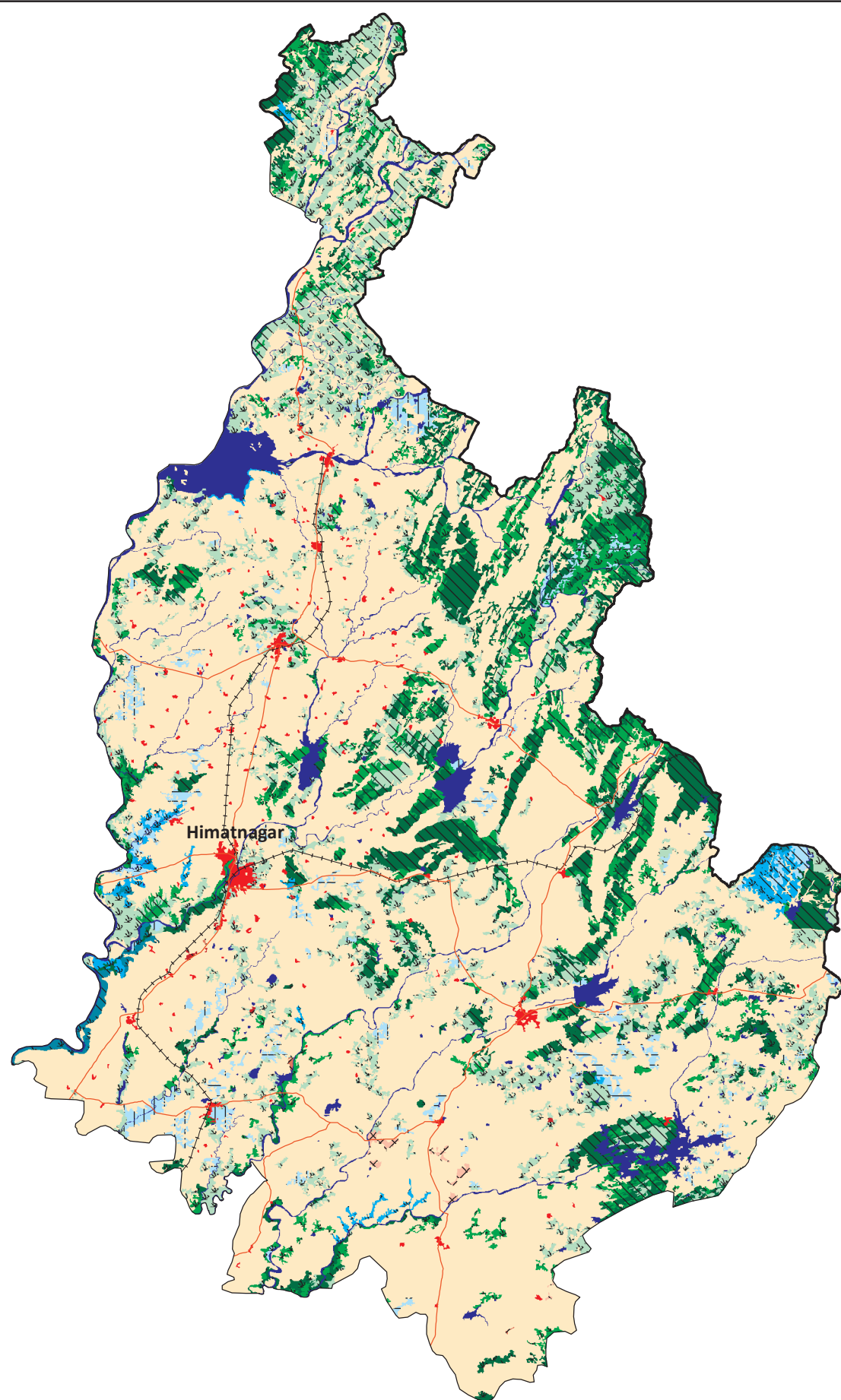
Location Map



Prepared by:

Centre for Environment and planning Technology, Ahmedabad
&

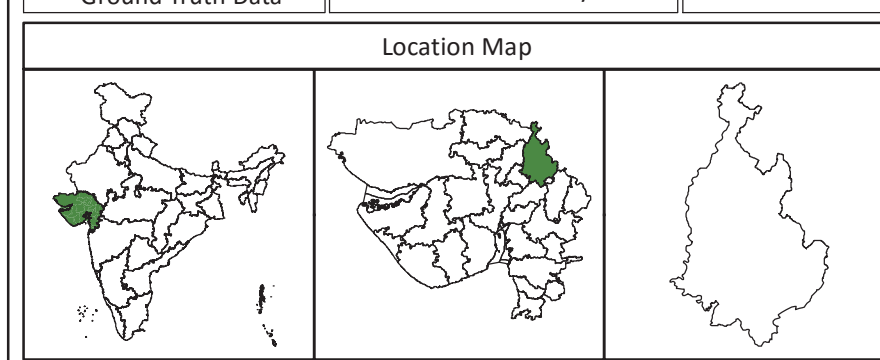
Space Applications Centre, ISRO, Ahmedabad



DESERTIFICATION / LAND DEGRADATION STATUS MAP **Sabar Kantha District, Gujarat** **Timeframe - 2003-05**

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Fw1	Forest, water erosion, Slight
	Fw2	Forest, water erosion, Moderate
	Fw3	Forest, water erosion, Severe
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source: - IRS LISS3 (2003-2005) - Ancillary Information - Ground Truth Data		International Boundary		Major Road
		State Boundary		Major Rail
		District Boundary		



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

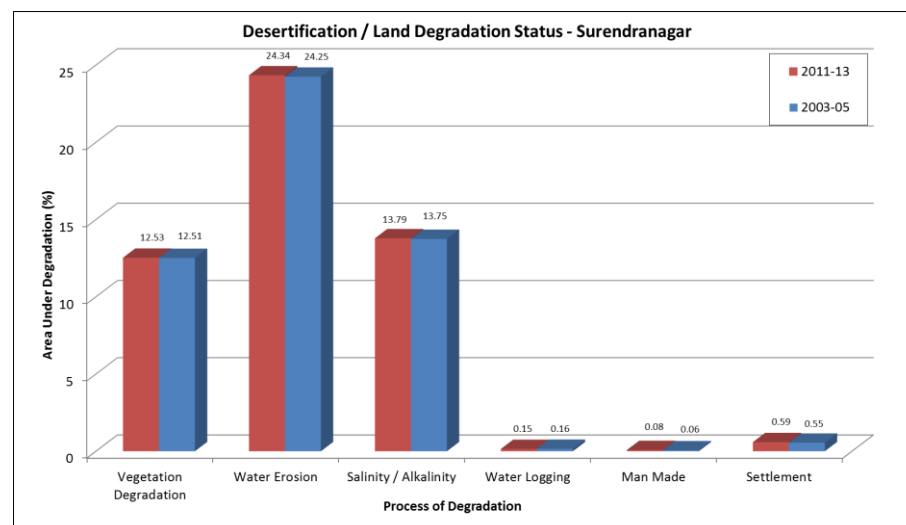
Surendranagar District, Gujarat

Surendranagar is a district in the North Saurashtra part of Gujarat State with 10423 sq. km area. It is bounded on the north by the little Rann of Kachchh and the Patan district and in south by parts of Ahmadabad and Bhavnagar districts, on the west it is bounded by the Rajkot district and on the east again by the Ahmadabad district. Surendranagar district has a population of 1,756,268 with 168 population density, 919 sex ratio and a literacy rate of 72.1%. (Census 2011)

Surendranagar forms a part of Kathiawar Peninsula and is further subdivided into four sub-micro regions, namely, Halvad, Dhrangadhra and Dasada Plain, Surendranagar Plain, Bhadar river Plain and Thangadh Upland on the basis of topography, climate, geology, soils and natural vegetation. The principal rivers of this district are the Wadhwan Bhogavo, the Limbdi Bhogavo, the Sukhbhadar, the Falku, the Umia, the Chandrabhaga, the Kankavati, the Brahmani and the Vansal etc.

Surendranagar is observed with 51.47% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.19 % since 2003-05. The most significant process of land degradation/ desertification in the district is Water Erosion (24.34 % during 2011-13 and 24.25 % during 2003-05) followed by Salinity/ Alkalinity (13.79% during 2011-13 and 13.75% during 2003-05).



































Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	130568.79	12.53	130434.35	12.51	134.44
Water Erosion	253662.56	24.34	252733.66	24.25	928.90
Salinity / Alkalinity	143696.45	13.79	143302.19	13.75	394.26
Water Logging	1569.84	0.15	1648.30	0.16	-78.46
Man Made	849.98	0.08	647.57	0.06	202.42
Settlement	6145.45	0.59	5767.50	0.55	377.95
Total Area under Desertification	536493.08	51.47	534533.57	51.28	1959.51
No Apparent Degradation	482604.12	46.30	482053.81	46.25	550.31
Total Geographical Area (ha)	1042300.00				



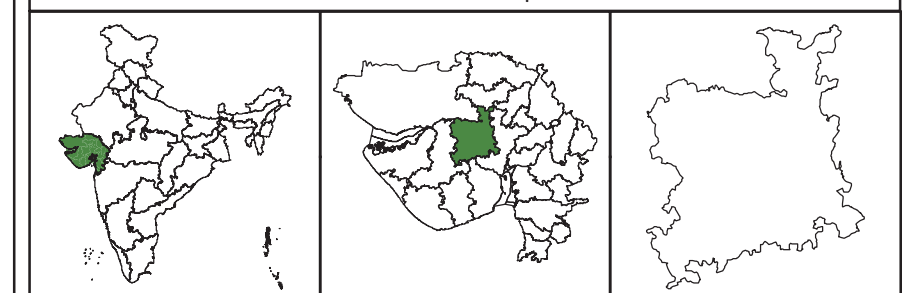
SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Slight	4033.66	0.39	0.00	0.00	4033.66
2	Fv2	Forest, vegetation degradation, Moderate	5564.78	0.53	9631.73	0.92	-4066.95
3	Fv3	Forest, vegetation degradation, Severe	16167.50	1.55	16134.21	1.55	33.30
4	Sv1	Land with scrub, vegetation degradation, Slight	2856.60	0.27	2967.59	0.28	-110.99
5	Sv2	Land with scrub, vegetation degradation, Moderate	10789.69	1.04	10820.99	1.04	-31.30
6	Sv3	Land with scrub, vegetation degradation, Severe	91156.57	8.75	90879.83	8.72	276.74
7	Iw1	Agriculture irrigated, water erosion, Slight	38.09	0.00	38.09	0.00	0.00
8	Dw1	Agriculture unirrigated, water erosion, Slight	220941.43	21.20	207988.24	19.95	12953.18
9	Dw2	Agriculture unirrigated, water erosion, Moderate	0.00	0.00	12850.65	1.23	-12850.65
10	Fw1	Forest, water erosion, Slight	206.42	0.02	206.42	0.02	0.00
11	Fw2	Forest, water erosion, Moderate	82.54	0.01	82.54	0.01	0.00
12	Fw3	Forest, water erosion, Severe	1152.34	0.11	1152.34	0.11	0.00
13	Sw1	Land with scrub, water erosion, Slight	2960.74	0.28	2943.41	0.28	17.33
14	Sw2	Land with scrub, water erosion, Moderate	7753.34	0.74	6923.58	0.66	829.76
15	Sw3	Land with scrub, water erosion, Severe	20527.65	1.97	20548.38	1.97	-20.72
16	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight	71793.93	6.89	71716.48	6.88	77.44
17	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate	27917.30	2.68	27924.30	2.68	-7.00
18	Ds3	Agriculture unirrigated, salinity / alkalinity, Severe	5124.26	0.49	5025.33	0.48	98.93
19	Fs1	Forest, salinity / alkalinity, Slight	1281.97	0.12	1281.97	0.12	0.00
20	Fs2	Forest, salinity / alkalinity, Moderate	1656.45	0.16	1656.45	0.16	0.00
21	Fs3	Forest, salinity / alkalinity, Severe	1378.92	0.13	1378.92	0.13	0.00
22	Ss1	Land with scrub, salinity / alkalinity, Slight	1277.66	0.12	1277.66	0.12	0.00
23	Ss2	Land with scrub, salinity / alkalinity, Moderate	7419.18	0.71	7419.18	0.71	0.00
24	Ss3	Land with scrub, salinity / alkalinity, Severe	9054.13	0.87	9028.58	0.87	25.55
25	Bs1	Barren, salinity / alkalinity, Slight	439.27	0.04	418.32	0.04	20.95
26	Bs2	Barren, salinity / alkalinity, Moderate	16353.41	1.57	2202.71	0.21	14150.70
27	Bs3	Barren, salinity / alkalinity, Severe	0.00	0.00	13972.31	1.34	-13972.31
28	DI1	Agriculture unirrigated, water logging, Slight	1569.84	0.15	1648.30	0.16	-78.46
29	Fm1	Forest, man made, Slight	17.44	0.00	17.44	0.00	0.00
30	Fm2	Forest, man made, Moderate	12.24	0.00	12.24	0.00	0.00
31	Tm1	Others, man made, Slight	522.45	0.05	358.63	0.03	163.82
32	Tm2	Others, man made, Moderate	178.00	0.02	139.40	0.01	38.60
33	Tm3	Others, man made, Severe	119.86	0.01	119.86	0.01	0.00
34	S	Settlement	6145.45	0.59	5767.50	0.55	377.95
Total Area Under Desertification/ Land Degradation			536493.08	51.47	534533.57	51.28	1959.51
35	W	Water body/ Drainage	23202.80	2.23	25712.62	2.47	-2509.82
36	NAD	No Apparent Degradation	482604.12	46.30	482053.81	46.25	550.31
Total Geographical Area (ha)			1042300.00	100.00	1042300.00	100.00	

DESERTIFICATION / LAND DEGRADATION STATUS MAP Surendranagar District, Gujarat Timeframe - 2011-13








Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Dw1	Agriculture unirrigated, water erosion, Slight
	Fw1	Forest, water erosion, Slight
	Fw2	Forest, water erosion, Moderate
	Fw3	Forest, water erosion, Severe
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight
	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate
	Ds3	Agriculture unirrigated, salinity / alkalinity, Severe
	Fs1	Forest, salinity / alkalinity, Slight
	Fs2	Forest, salinity / alkalinity, Moderate
	Fs3	Forest, salinity / alkalinity, Severe
	Ss1	Land with scrub, salinity / alkalinity, Slight
	Ss2	Land with scrub, salinity / alkalinity, Moderate
	Ss3	Land with scrub, salinity / alkalinity, Severe
	Bs1	Barren, salinity / alkalinity, Slight
	Bs2	Barren, salinity / alkalinity, Moderate
	DI1	Agriculture unirrigated, water logging, Slight
	Fm1	Forest, man made, Slight
	Fm2	Forest, man made, Moderate
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Location Map

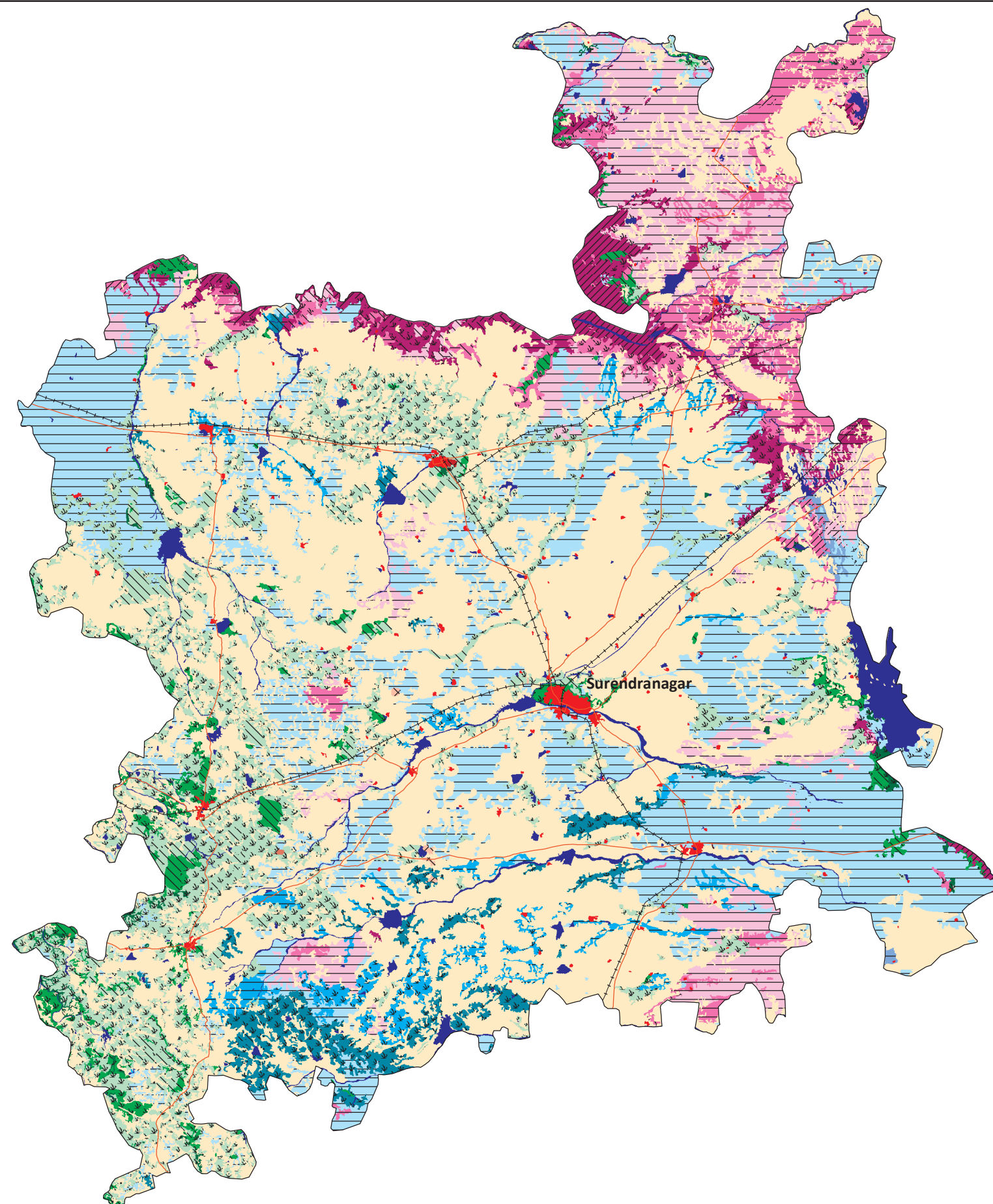


Prepared by:
Centre for Environment and planning Technology,
Ahmedabad
&
Space Applications Centre, ISRO, Ahmedabad

Data Source:
- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

 International Boundary
 State Boundary
 District Boundary
 Major Road
 Major Rail

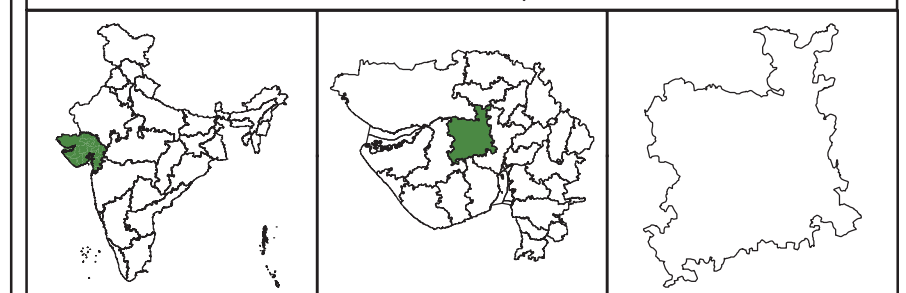
0 5 10 15 km



DESERTIFICATION / LAND DEGRADATION STATUS MAP **Surendranagar District, Gujarat** **Timeframe - 2003-05**

Legend		
Symbol	Code	Description
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Fw1	Forest, water erosion, Slight
	Fw2	Forest, water erosion, Moderate
	Fw3	Forest, water erosion, Severe
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight
	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate
	Ds3	Agriculture unirrigated, salinity / alkalinity, Severe
	Fs1	Forest, salinity / alkalinity, Slight
	Fs2	Forest, salinity / alkalinity, Moderate
	Fs3	Forest, salinity / alkalinity, Severe
	Ss1	Land with scrub, salinity / alkalinity, Slight
	Ss2	Land with scrub, salinity / alkalinity, Moderate
	Ss3	Land with scrub, salinity / alkalinity, Severe
	Bs1	Barren, salinity / alkalinity, Slight
	Bs2	Barren, salinity / alkalinity, Moderate
	Bs3	Barren, salinity / alkalinity, Severe
	DI1	Agriculture unirrigated, water logging, Slight
	Fm1	Forest, man made, Slight
	Fm2	Forest, man made, Moderate
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Location Map



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

Data Source:
 - IRS LISS3 (2003-2005)
 - Ancillary Information
 - Ground Truth Data

--- International Boundary
 --- State Boundary
 --- District Boundary
 --- Major Road --- Major Rail

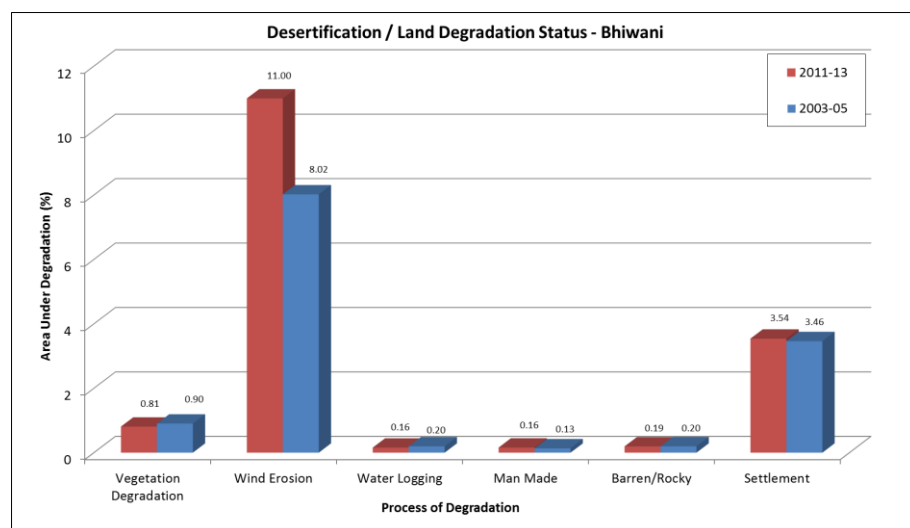
Bhiwani District, Haryana

Bhiwani district situated in the southern portion of Haryana State. It is bounded by Hisar district in the north, Mahendragarh district in the south, eastern boundary is made with Rohtak and Jhajjar districts and to its west and south-west lies Rajasthan state. It covers an area of 4778 sq. km area. The district has a population of 1,634,445 with 325 population density, 886 sex ratio and a literacy rate of 75.2%. (Census 2011)

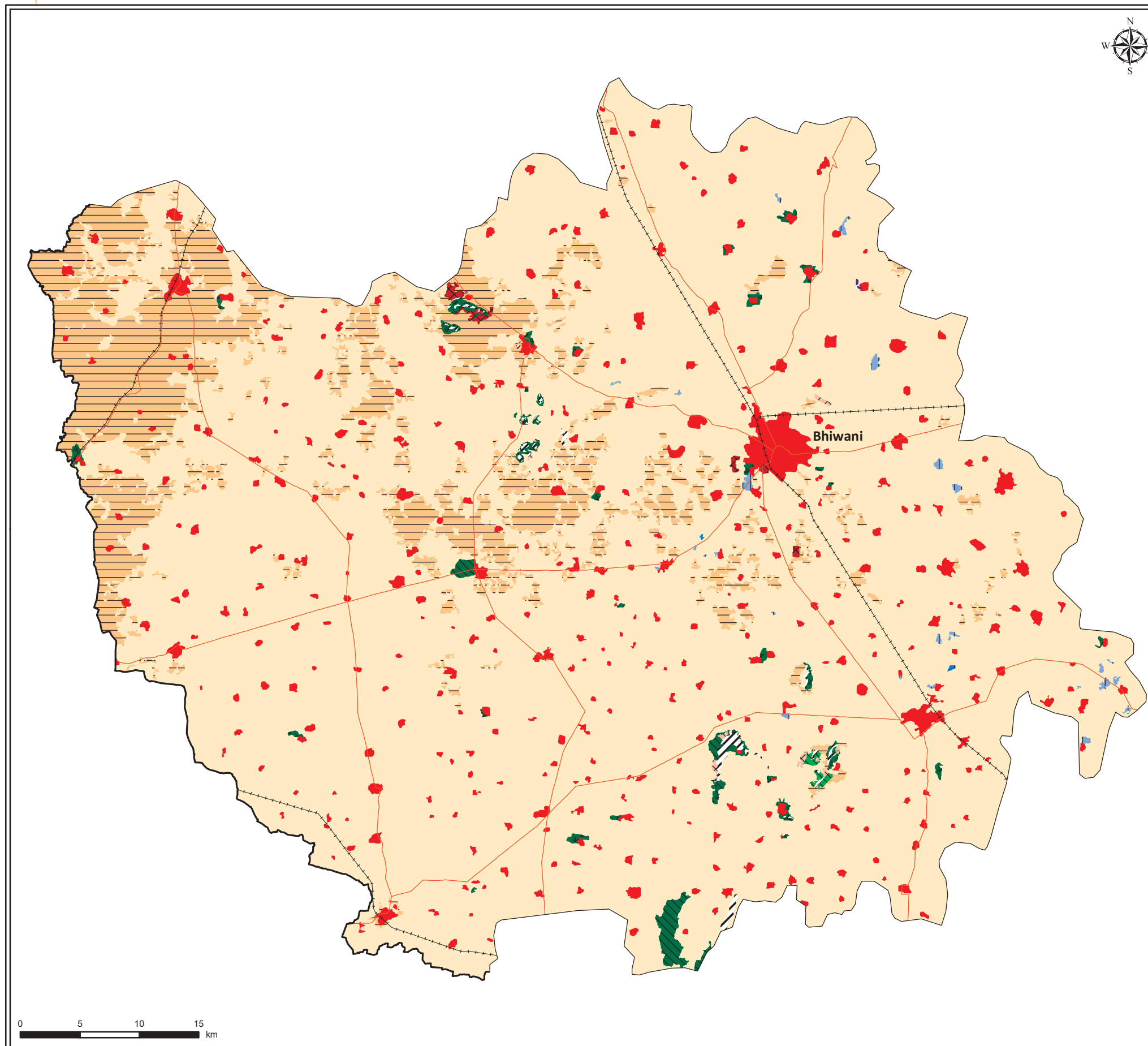
Physiographically, the district can be divided into three regions, Siwani Undulating Plain with sand dunes, Bhiwani Plain with Aravalli offshoots and Loharu Bagar. Siwani undulating plain with sand dunes extends over north western part, making western boundary with Rajasthan state. Due to severe aridity scattered scrubs like kikar and babool grow in this area. Southern part of the district is upland due to the Aravalli offshoots. Large heaps of sand dunes with varied nature are found here. Mostly the sand dunes are latitudinal in their extent. There is neither perennial nor seasonal river /stream in the district.

Bhiwani is observed with 15.85% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 2.94% since 2003-05. The most significant process of land degradation/ desertification in the district is Wind erosion (11% during 2011-13 and 8.02 % during 2003-05) followed by Vegetation Degradation (0.81% during 2011-13 and 0.90% during 2003-05).














Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	3865.10	0.81	4313.46	0.90	-448.36
Wind Erosion	52536.18	11.00	38315.74	8.02	14220.44
Water Logging	748.11	0.16	938.82	0.20	-190.71
Man Made	758.60	0.16	643.94	0.13	114.66
Barren/Rocky	926.22	0.19	940.05	0.20	-13.83
Settlement	16915.38	3.54	16543.71	3.46	371.66
Total Area under Desertification	75749.59	15.85	61695.72	12.91	14053.87
No Apparent Degradation	402034.34	84.14	416088.21	87.08	-14053.87
Total Geographical Area (ha)	477800.00				








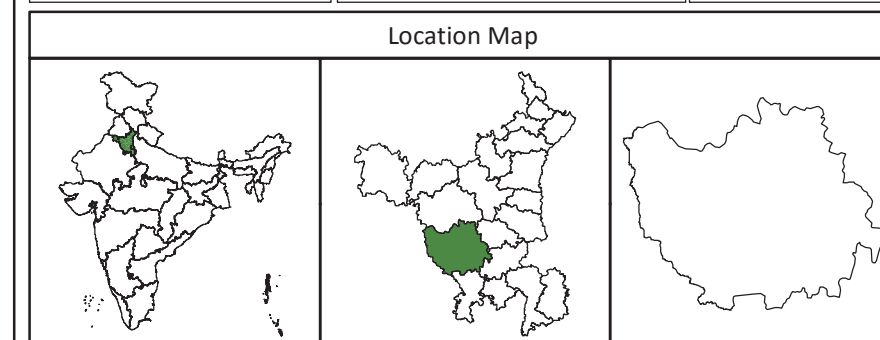
SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Fv1	Forest, vegetation degradation, Slight	1565.17	0.33	1601.58	0.34	-36.41
2	Fv2	Forest, vegetation degradation, Moderate	230.19	0.05	230.19	0.05	0.00
3	Sv1	Land with scrub, vegetation degradation, Slight	2069.74	0.43	2481.70	0.52	-411.95
4	De1	Agriculture unirrigated, wind erosion, Slight	47745.85	9.99	35356.06	7.40	12389.79
5	De2	Agriculture unirrigated, wind erosion, Moderate	0.00	0.00	2909.77	0.61	-2909.77
6	Ee1	Dune / Sandy area, wind erosion, Slight	4790.33	1.00	49.91	0.01	4740.41
7	Il1	Agriculture irrigated, water logging, Slight	715.25	0.15	905.96	0.19	-190.71
8	Il2	Agriculture irrigated, water logging, Moderate	32.86	0.01	32.86	0.01	0.00
9	Tm1	Others, man made, Slight	258.03	0.05	245.21	0.05	12.82
10	Tm2	Others, man made, Moderate	0.00	0.00	398.73	0.08	-398.73
11	Tm3	Others, man made, Severe	500.56	0.10	0.00	0.00	500.56
12	R	Rocky	926.22	0.19	940.05	0.20	-13.83
13	S	Settlement	16915.38	3.54	16543.71	3.46	371.66
Total Area Under Desertification/ Land Degradation			75749.59	15.85	61695.72	12.91	14053.87
14	W	Water body/ Drainage	16.07	0.00	16.07	0.00	0.00
15	NAD	No Apparent Degradation	402034.34	84.14	416088.21	87.08	-14053.87
Total Geographical Area (ha)			477800.00	100.00	477800.00	100.00	



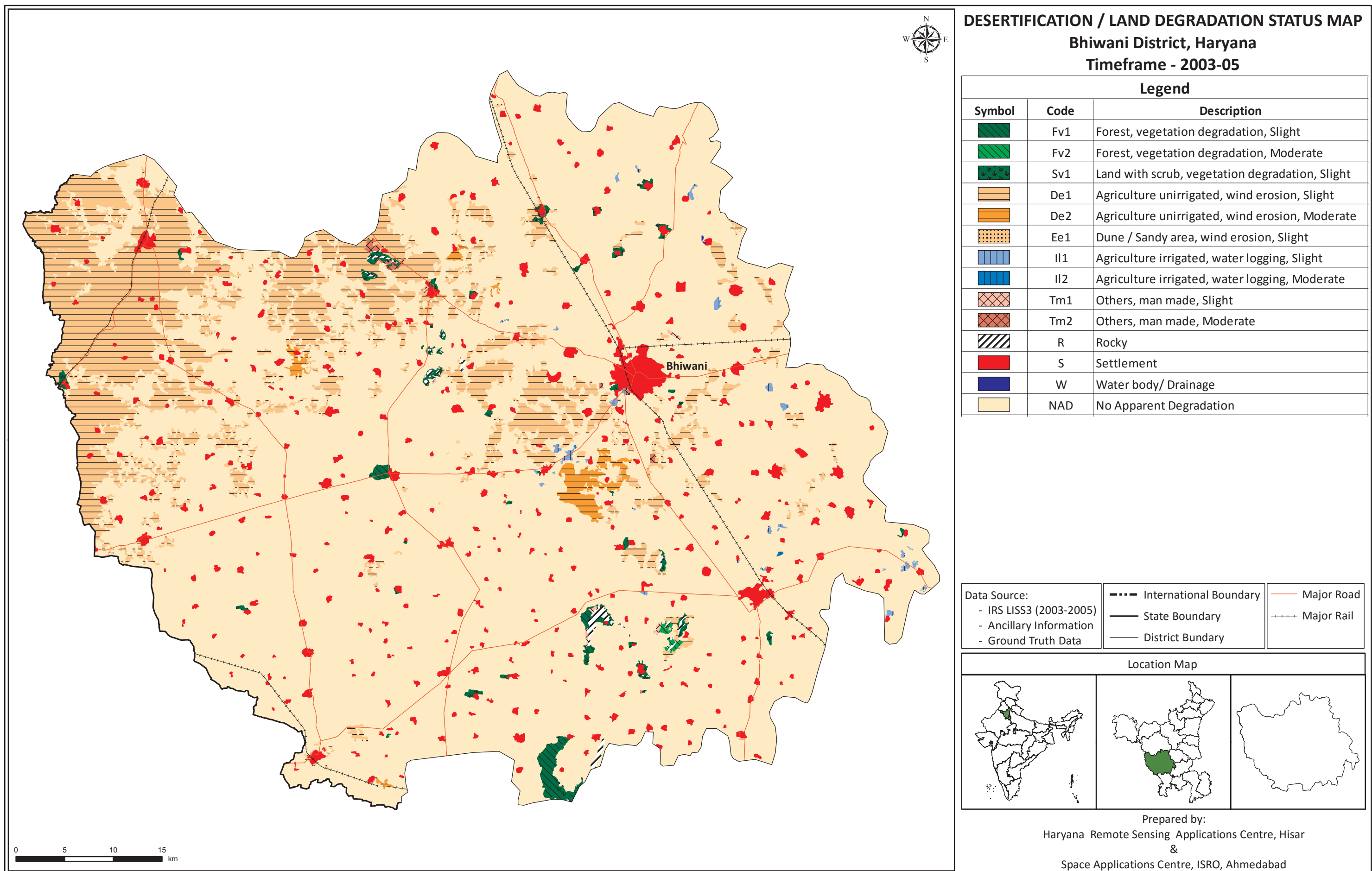
DESERTIFICATION / LAND DEGRADATION STATUS MAP Bhiwani District, Haryana Timeframe - 2011-13

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Sv1	Land with scrub, vegetation degradation, Slight
	De1	Agriculture unirrigated, wind erosion, Slight
	Ee1	Dune / Sandy area, wind erosion, Slight
	Il1	Agriculture irrigated, water logging, Slight
	Il2	Agriculture irrigated, water logging, Moderate
	Tm1	Others, man made, Slight
	Tm3	Others, man made, Severe
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source: - IRS LISS3 (2011-2013) - Ancillary Information - Ground Truth Data	 International Boundary	 Major Road
	 State Boundary	 Major Rail
	 District Boundary	



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



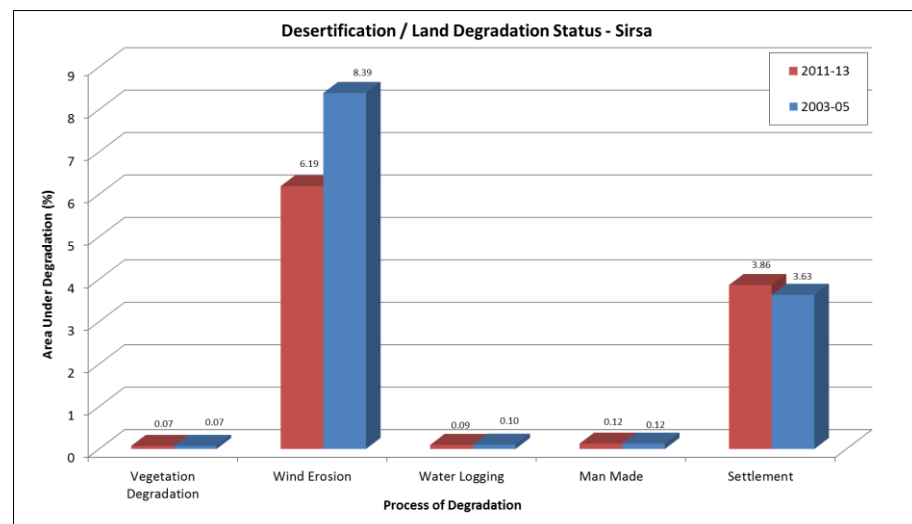
Sirsa District, Haryana

Sirsa district is situated in the western portion of Haryana state. It is bounded in the north by Punjab state, in the west and south by Rajasthan state and in the east by Fatehabad district. It covers an area of 4277 sq. km area. The district has a population of 1,295,189 with 302 population density, 879 sex ratio and a literacy rate of 68.8%. (Census 2011)

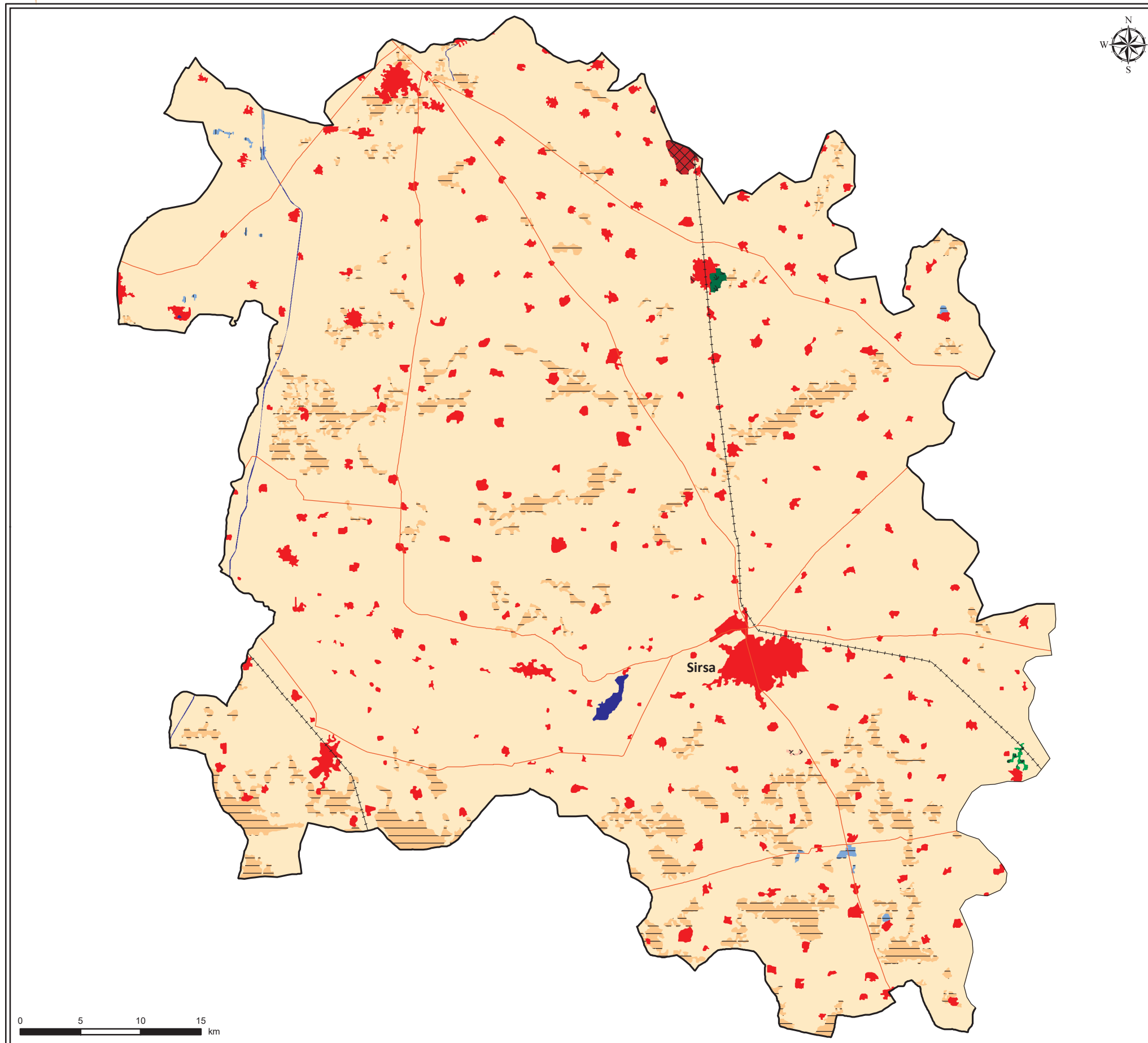
The district is part of Western Haryana Plain. The Ghaggar is the only river in the district. There is a lake at Ottu which is filled by the overflow of the Ghaggar River. Many Palaeo channels most likely to be of the Ghaggar river are noted in many parts of the western plain in Sirsa district. Sand dunes are mostly latitudinal in extent in the south-western part of the region. The concentration of sand dunes and undulations in topography are relatively higher in southern and south-western part.

Sirsa is observed with 10.34% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has decreased about 1.98% since 2003-05. The most significant process of land degradation/ desertification in the district is Wind Erosion (6.19% during 2011-13 and 8.39% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	305.86	0.07	305.86	0.07	0.00
Wind Erosion	26481.46	6.19	35878.89	8.39	-9397.42
Water Logging	404.03	0.09	428.18	0.10	-24.15
Man Made	532.17	0.12	532.17	0.12	0.00
Settlement	16518.78	3.86	15533.91	3.63	984.87
Total Area under Desertification	44242.30	10.34	52679.00	12.32	-8436.70
No Apparent Degradation	382732.42	89.49	374295.71	87.51	8436.70
Total Geographical Area (ha)	427700.00				













SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Sv1	Land with scrub, vegetation degradation, Slight	185.25	0.04	185.25	0.04	0.00
2	Sv2	Land with scrub, vegetation degradation, Moderate	120.60	0.03	120.60	0.03	0.00
3	De1	Agriculture unirrigated, wind erosion, Slight	26481.46	6.19	35878.89	8.39	-9397.42
4	Il1	Agriculture irrigated, water logging, Slight	172.04	0.04	135.45	0.03	36.58
5	DI1	Agriculture unirrigated, water logging, Slight	231.99	0.05	292.72	0.07	-60.73
6	Tm1	Others, man made, Slight	37.81	0.01	37.81	0.01	0.00
7	Tm3	Others, man made, Severe	494.35	0.12	494.35	0.12	0.00
8	S	Settlement	16518.78	3.86	15533.91	3.63	984.87
Total Area Under Desertification/ Land Degradation			44242.30	10.34	52679.00	12.32	-8436.70
9	W	Water body/ Drainage	725.28	0.17	725.29	0.17	0.00
10	NAD	No Apparent Degradation	382732.42	89.49	374295.71	87.51	8436.70
Total Geographical Area (ha)			427700.00	100.00	427700.00	100.00	



DESERTIFICATION / LAND DEGRADATION STATUS MAP

Sirsa District, Haryana

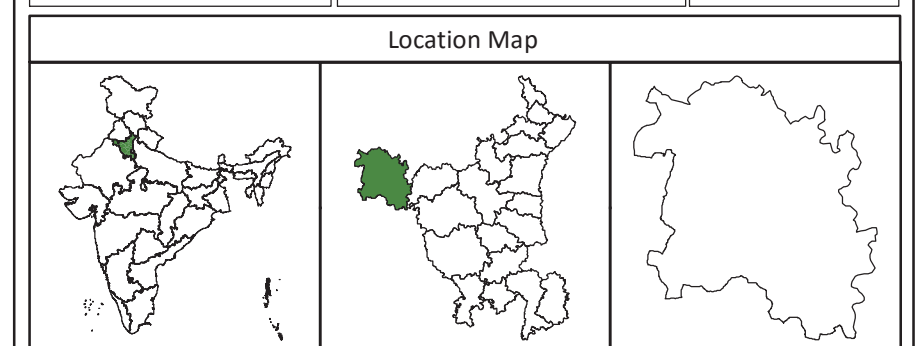
Timeframe - 2011-13

Legend		
Symbol	Code	Description
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	De1	Agriculture unirrigated, wind erosion, Slight
	Il1	Agriculture irrigated, water logging, Slight
	DI1	Agriculture unirrigated, water logging, Slight
	Tm1	Others, man made, Slight
	Tm3	Others, man made, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

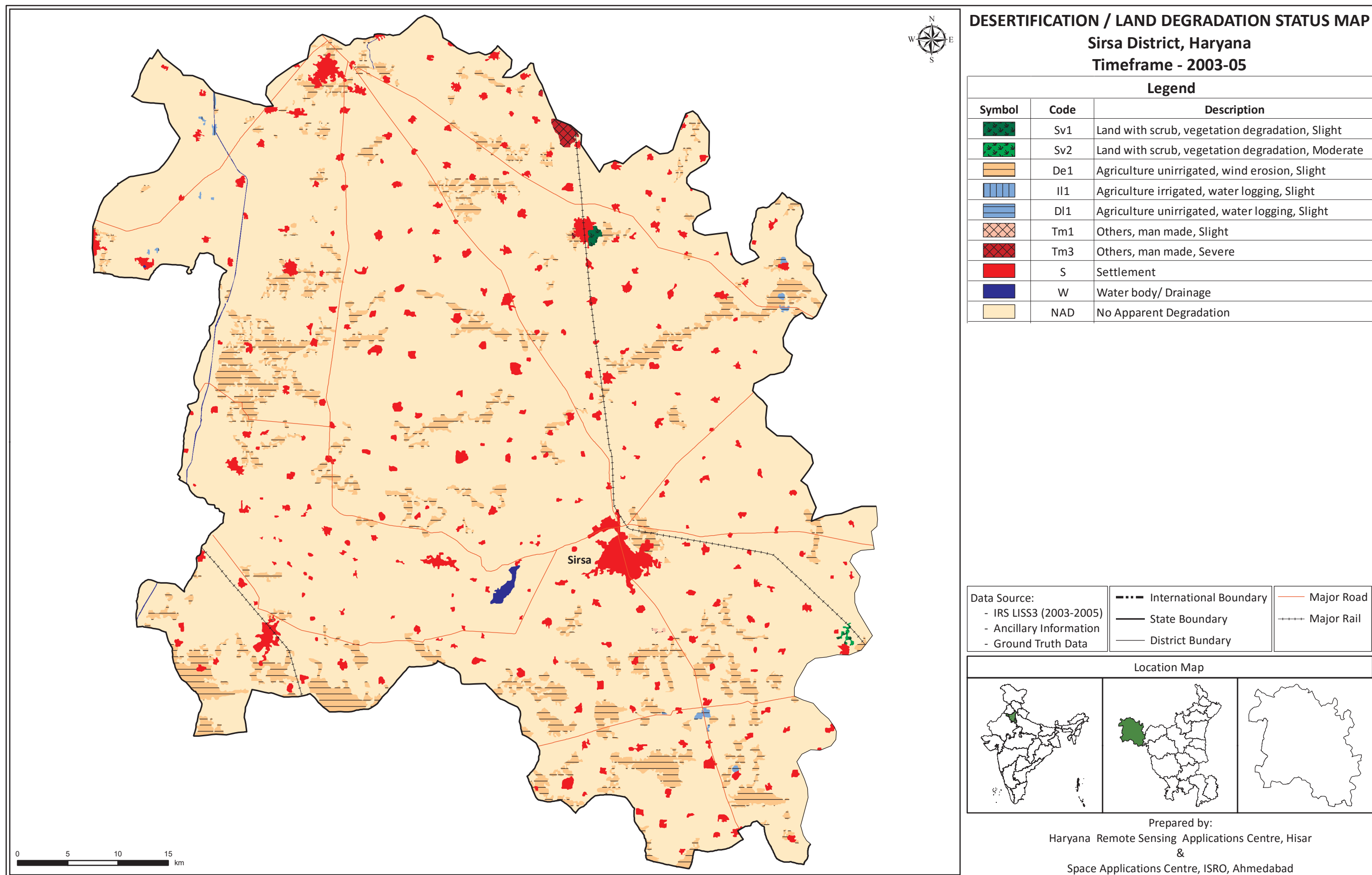
Data Source:
 - IRS LISS3 (2011-2013)
 - Ancillary Information
 - Ground Truth Data

--- International Boundary
 — State Boundary
 — District Boundary

— Major Road
 +++ Major Rail



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



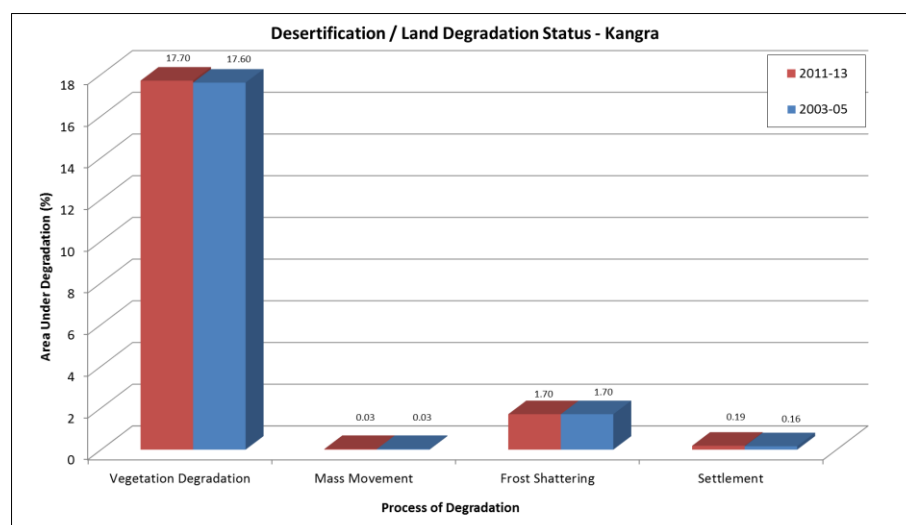
Kangra District, Himachal Pradesh

Kangra district lies in the western part of Himachal Pradesh state. It is bounded in the north by Chamba district, on the north-east by Lahul & Spiti district, on the east it is bounded by Kullu district, on the South by Mandi, Hamirpur and Una district and on the west it is bounded by Punjab state. Kangra districts covers an area of 5,739 sq. km. It has a population of 1,510,075 with 263 population density, 1012 sex ratio and a literacy rate of 85.67 %. (Census 2011)

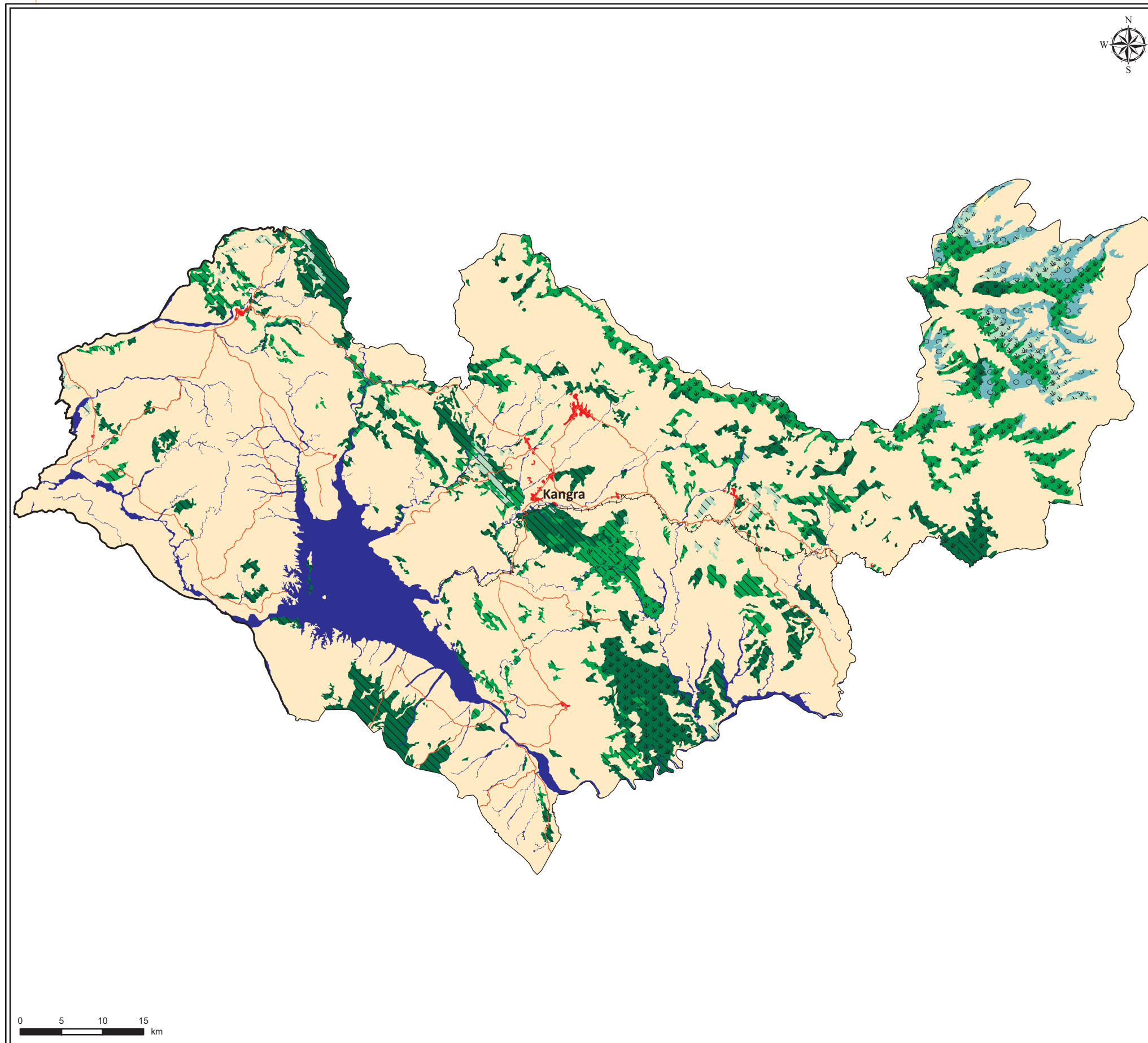
The district lies in the Siwalik, Lesser Himalayan zone and its topography is well defined by a series of almost parallel hill ranges which rise in height towards northeast. The elevation above mean sea level (a.m.s.l) generally varies from 300 m to 6,000 m. Dhauladhar is the most important mountain range of the district which stretches out beautifully facing the fertile valleys of Palampur and Kangra. Beas is the principal river of the district.

Kangra is observed with 19.62% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.12% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (17.70% during 2011-13 and 17.60% during 2003-05) followed by Frost Shattering (1.70% during 2011-13 and 2003-05).












Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	101569.96	17.70	101020.75	17.60	549.21
Mass Movement	191.34	0.03	191.34	0.03	0.00
Frost Shattering	9754.88	1.70	9754.88	1.70	0.00
Settlement	1075.33	0.19	938.89	0.16	136.45
Total Area under Desertification	112591.52	19.62	111905.86	19.50	685.66
No Apparent Degradation	425329.16	74.11	426014.82	74.23	-685.66
Total Geographical Area (ha)	573900.00				








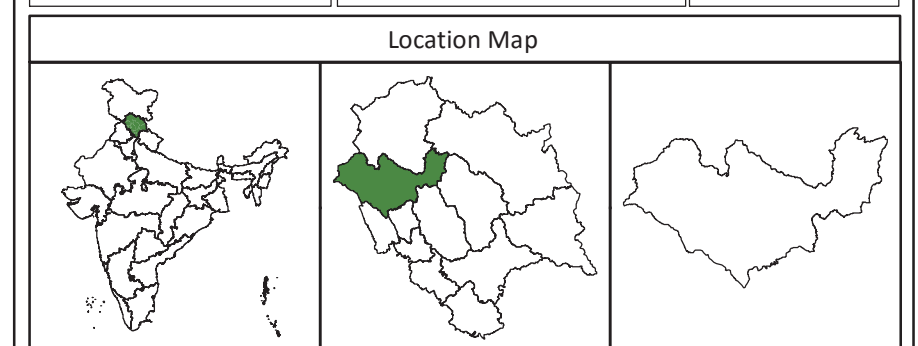
SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Slight	33687.71	5.87	33313.09	5.80	374.62
2	Fv2	Forest, vegetation degradation, Moderate	17955.99	3.13	17781.40	3.10	174.59
3	Fv3	Forest, vegetation degradation, Severe	3338.50	0.58	3338.50	0.58	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	18298.79	3.19	18298.79	3.19	0.00
5	Sv2	Land with scrub, vegetation degradation, Moderate	23381.36	4.07	23381.36	4.07	0.00
6	Sv3	Land with scrub, vegetation degradation, Severe	4907.60	0.86	4907.60	0.86	0.00
7	Bg1	Barren, mass movement, Slight	191.34	0.03	191.34	0.03	0.00
8	Lf1	Periglacial, frost shattering, Slight	9754.88	1.70	9754.88	1.70	0.00
9	S	Settlement	1075.33	0.19	938.89	0.16	136.45
Total Area Under Desertification/ Land Degradation			112591.52	19.62	111905.86	19.50	685.66
10	W	Water body/ Drainage	35979.33	6.27	35979.33	6.27	0.00
11	NAD	No Apparent Degradation	425329.16	74.11	426014.82	74.23	-685.66
Total Geographical Area (ha)			573900.00	100.00	573900.00	100.00	



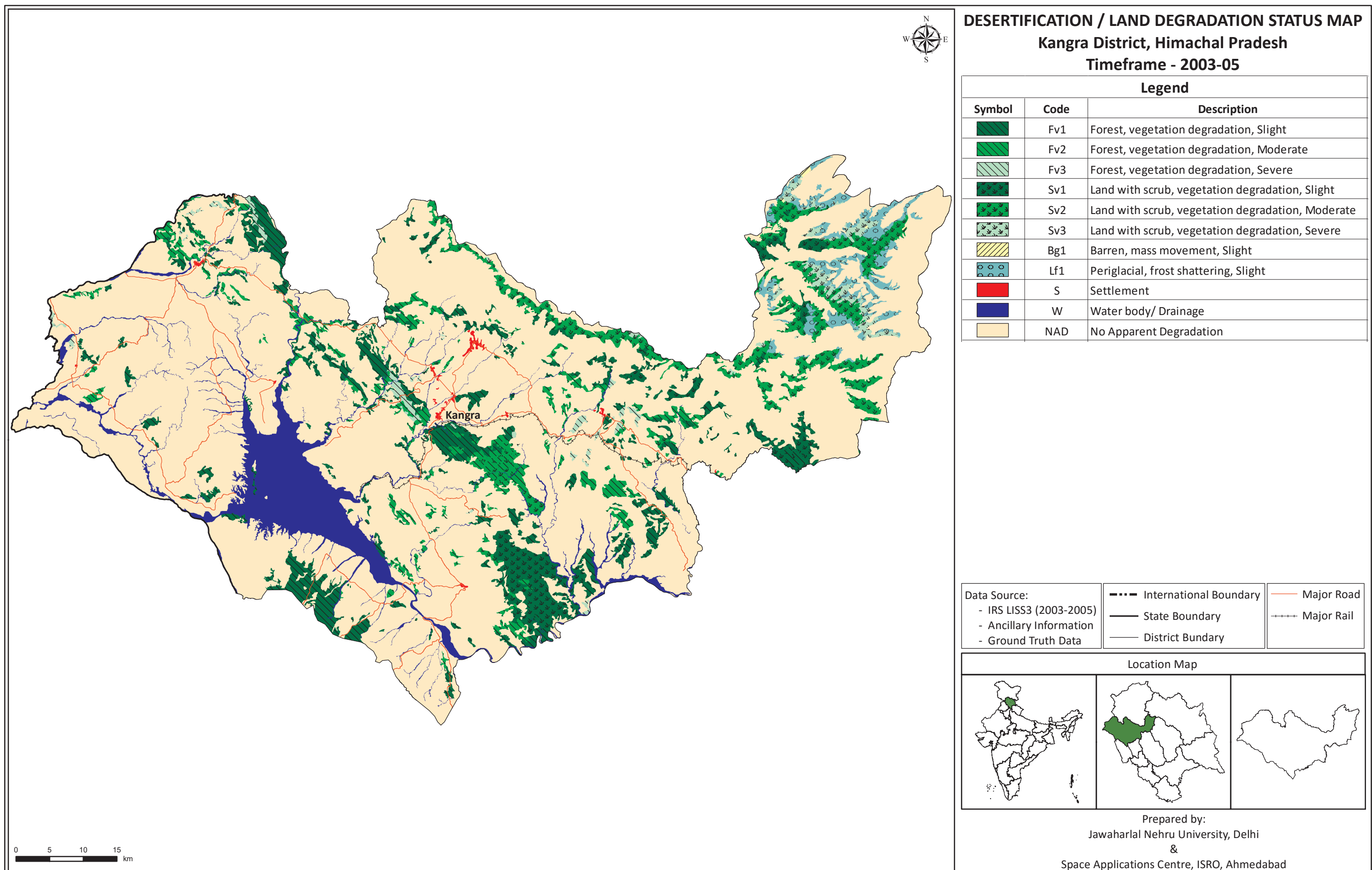
DESERTIFICATION / LAND DEGRADATION STATUS MAP Kangra District, Himachal Pradesh Timeframe - 2011-13

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Bg1	Barren, mass movement, Slight
	Lf1	Periglacial, frost shattering, Slight
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source: - IRS LISS3 (2011-2013) - Ancillary Information - Ground Truth Data	 International Boundary	 Major Road
	 State Boundary	 Major Rail
	 District Boundary	



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



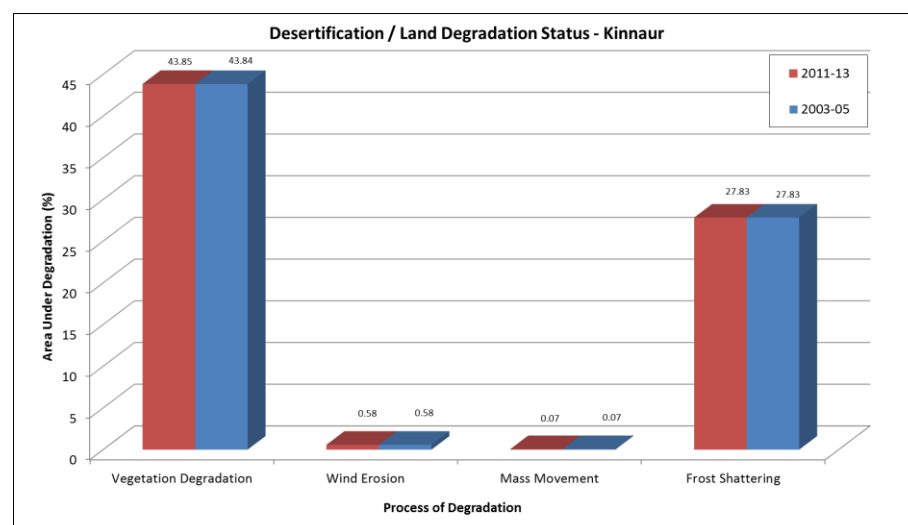
Kinnaur District, Himachal Pradesh

Kinnaur district lies in the southern part of Trans Himalayan Zone of Himachal Pradesh state. It is surrounded by the Tibet to the east, bounded by Lahul & Spiti in the north, Kullu district in the north-west, Shimla district in the west and state of Uttarakhand in the south. Kinnaur district occupies an area of 6401 sq. km. It has a population of 84,121 with 13 population density, 819 sex ratio and a literacy rate of 80%. (Census 2011)

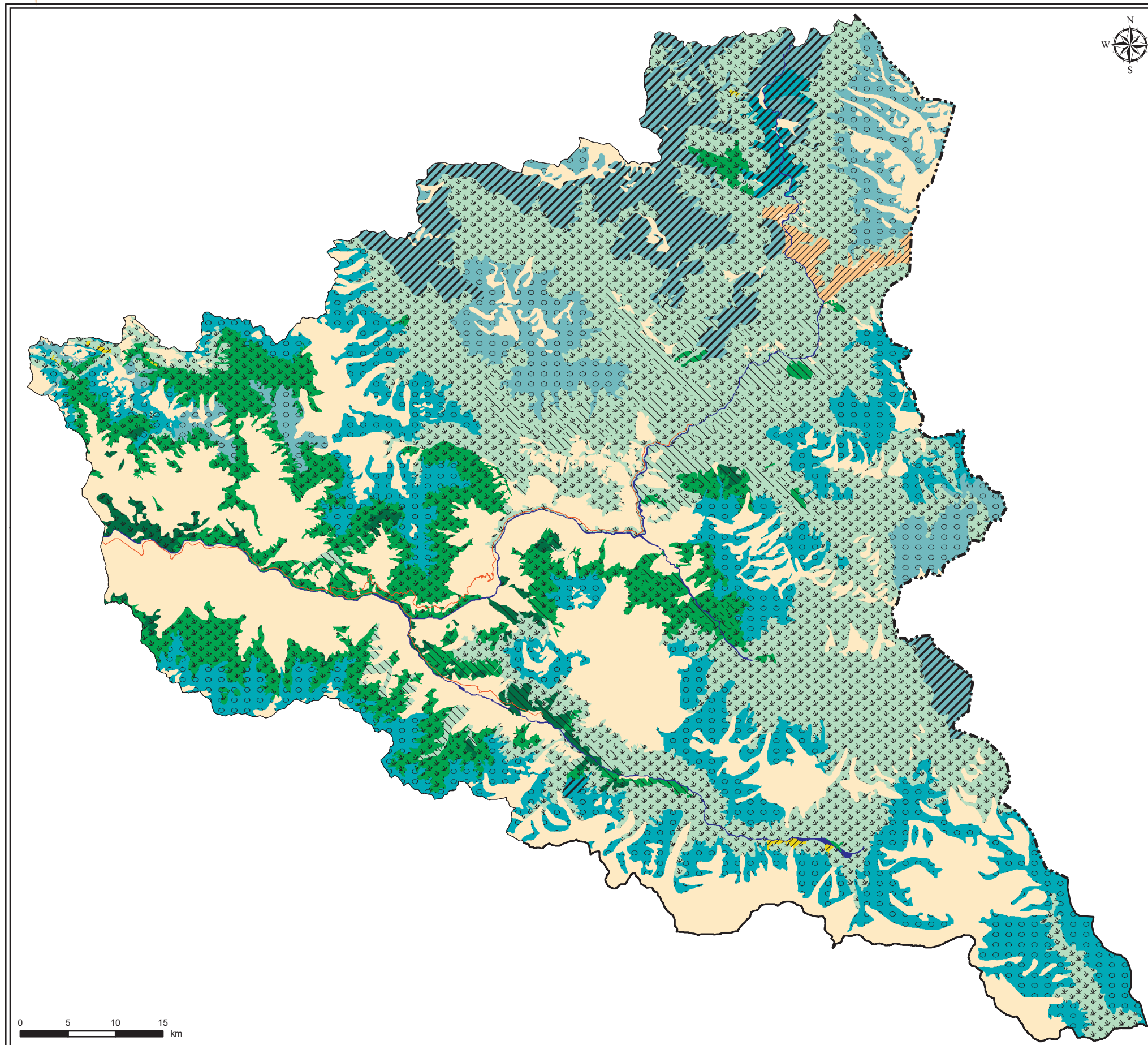
The physiography of the district is characterized by a series of high mountain ranges, deep and narrow valley and river basins. There are three parallel mountain ranges viz., Zaskar, Great Himalaya and Dhaula Dhar. The mountain peaks are covered with perpetual snow. The altitude ranges from 2350m to 6815m above mean sea level. Satluj, Spiti and Baspa are the major rivers in the district.

Kinnaur is observed with 72.33 % of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.02% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (43.85% during 2011-13 and 43.84% during 2003-05) followed by Frost Shattering (27.83% during 2011-13 and 2003-05).















Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	280686.87	43.85	280590.06	43.84	96.81
Wind Erosion	3742.10	0.58	3742.10	0.58	0.00
Mass Movement	416.20	0.07	416.20	0.07	0.00
Frost Shattering	178131.91	27.83	178131.91	27.83	0.00
Total Area under Desertification	462977.07	72.33	462880.26	72.31	96.81
No Apparent Degradation	174419.15	27.25	174515.97	27.26	-96.81
Total Geographical Area (ha)	640100.00				



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, Slight	3488.98	0.55	3472.99	0.54	15.99
2	Fv2	Forest, vegetation degradation, Moderate	5933.70	0.93	5852.88	0.91	80.82
3	Fv3	Forest, vegetation degradation, Severe	16209.65	2.53	16209.65	2.53	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	4321.53	0.68	4771.94	0.75	-450.42
5	Sv2	Land with scrub, vegetation degradation, Moderate	60325.24	9.42	59874.82	9.35	450.42
6	Sv3	Land with scrub, vegetation degradation, Severe	190407.77	29.75	190407.77	29.75	0.00
7	Be1	Barren, wind erosion, Slight	3742.10	0.58	3742.10	0.58	0.00
8	Bg2	Barren, mass movement, Moderate	416.20	0.07	416.20	0.07	0.00
9	Lf1	Periglacial, frost shattering, Slight	35477.73	5.54	35477.73	5.54	0.00
10	Lf2	Periglacial, frost shattering, Moderate	98105.18	15.33	98105.18	15.33	0.00
11	Rf1	Rocky, frost shattering, Slight	40057.69	6.26	40057.69	6.26	0.00
12	Rf2	Rocky, frost shattering, Moderate	4491.31	0.70	4491.31	0.70	0.00
Total Area Under Desertification/ Land Degradation			462977.07	72.33	462880.26	72.31	96.81
13	W	Water body/ Drainage	2703.78	0.42	2703.78	0.42	0.00
14	NAD	No Apparent Degradation	174419.15	27.25	174515.97	27.26	-96.81
Total Geographical Area (ha)			640100.00	100.00	640100.00	100.00	



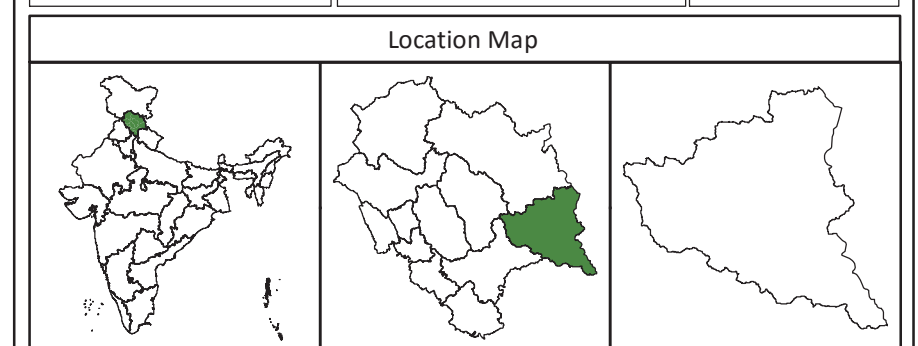
DESERTIFICATION / LAND DEGRADATION STATUS MAP Kinnaur District, Himachal Pradesh Timeframe - 2011-13

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Be1	Barren, wind erosion, Slight
	Bg2	Barren, mass movement, Moderate
	Lf1	Periglacial, frost shattering, Slight
	Lf2	Periglacial, frost shattering, Moderate
	Rf1	Rocky, frost shattering, Slight
	Rf2	Rocky, frost shattering, Moderate
	W	Water body/ Drainage
	NAD	No Apparent Degradation

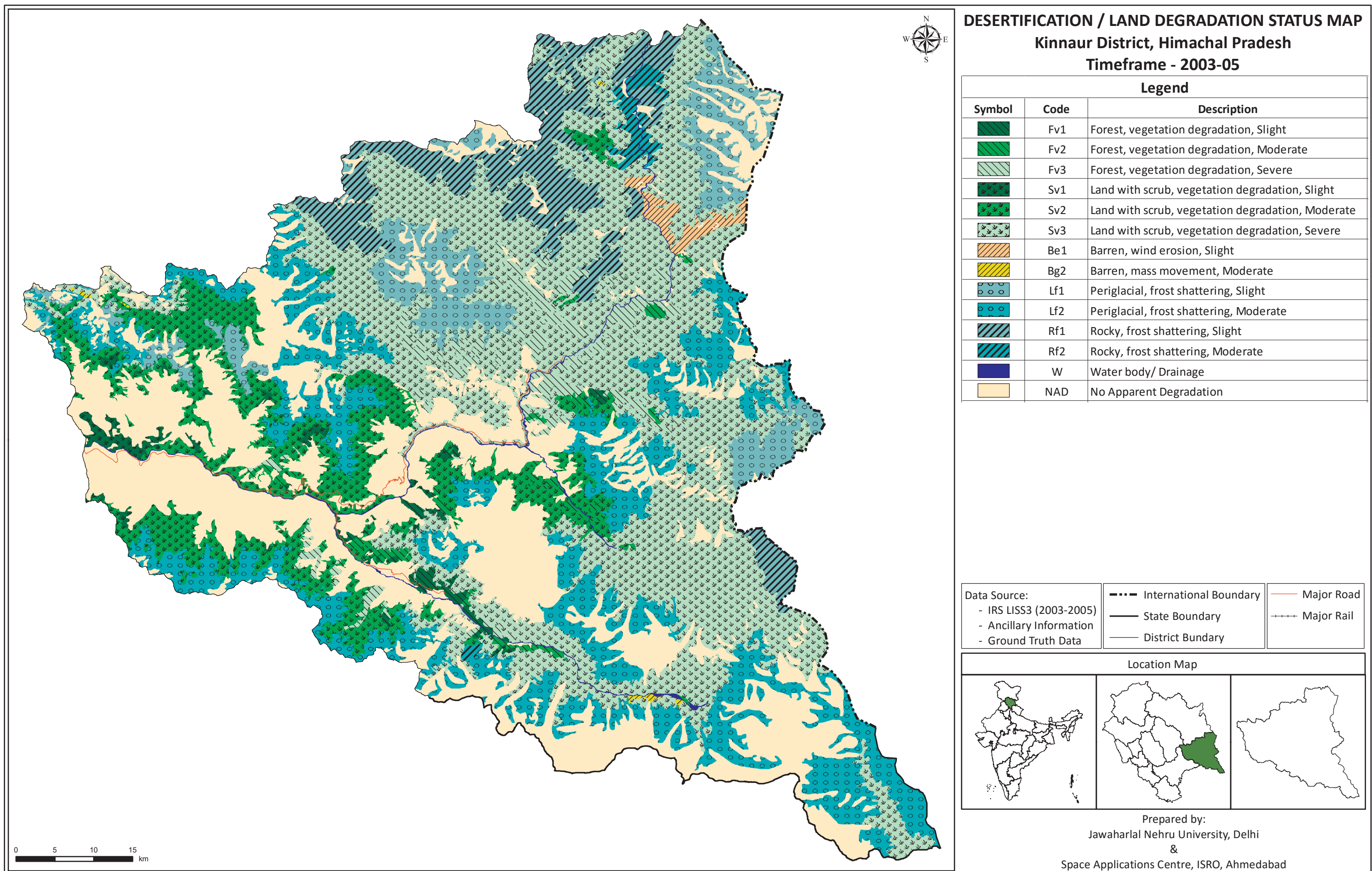
Data Source:
- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

--- International Boundary
— State Boundary
— District Boundary

— Major Road
+ + + + Major Rail



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



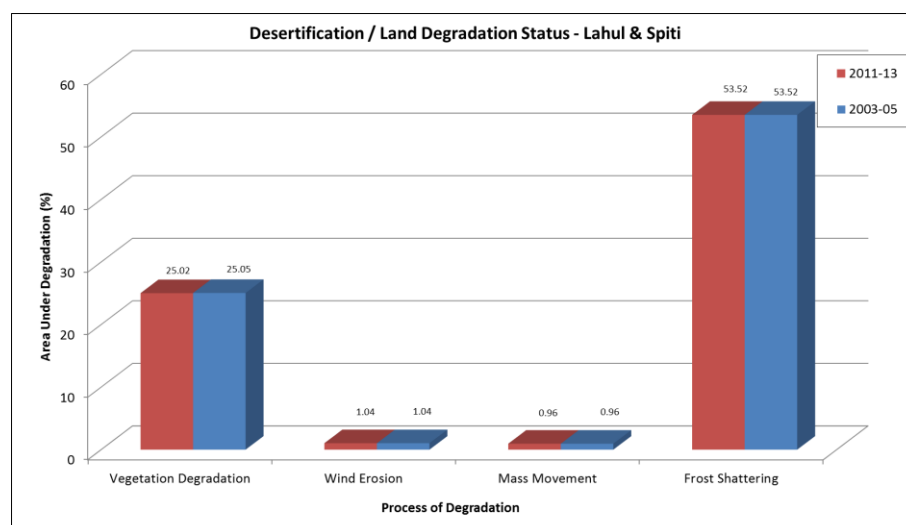
Lahul & Spiti District, Himachal Pradesh

Lahul & Spiti district lies in the north and north eastern part of Himachal Pradesh state. It touches Tibet on its eastern border and Ladakh on the north side, on the western and southern side it borders with Chamba, Kangra and Kullu districts. The district covers an area of 13,841 sq. km. It has a population of 31,564 with 2 population density, 903 sex ratio and a literacy rate of 76.81%. (Census 2011)

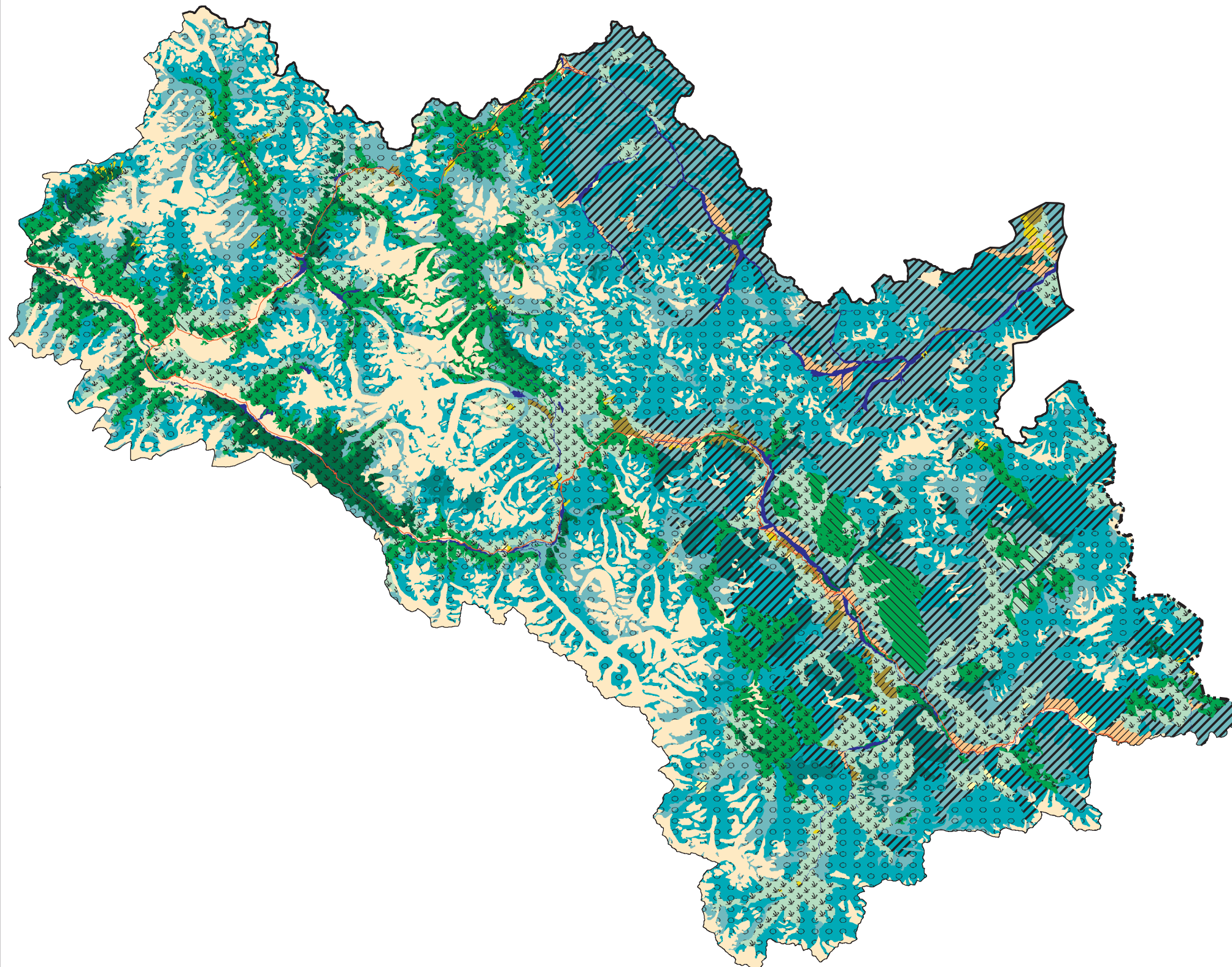
The district of Lahul & Spiti is totally rural and has lowest density of population. The district is characterized with high mountains, snow-covered peaks and deep valleys. Two valleys of Lahul & Spiti form the district. Spiti valley, which is formed by Spiti river, covers southern and south-eastern part of the district, is broad and has tough terrain. While, Lahul valley, covering northern part of the district, is formed by Chandra Bhaga river is narrow. The whole water of the district is drained by these two rivers and their tributaries. The special feature of this district is the existence of glaciers and the high snowy mountain ranges.

Lahul & Spiti is observed with 80.54% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has decreased about 0.03% since 2003-05. The most significant process of land degradation/ desertification in the district is Frost Shattering (53.52% during 2011-13 and 2003-05) followed by Vegetation Degradation (25.02% during 2011-13 and 25.05% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	346332.10	25.02	346719.57	25.05	-387.47
Wind Erosion	14332.42	1.04	14332.42	1.04	0.00
Mass Movement	13239.92	0.96	13239.92	0.96	0.00
Frost Shattering	740822.82	53.52	740822.82	53.52	0.00
Total Area under Desertification	1114727.26	80.54	1115114.73	80.57	-387.47
No Apparent Degradation	255636.17	18.47	255248.71	18.44	387.46
Total Geographical Area (ha)	1384100.00				



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, Slight	1278.91	0.09	1278.91	0.09	0.00
2	Fv2	Forest, vegetation degradation, Moderate	14899.79	1.08	14899.79	1.08	0.00
3	Fv3	Forest, vegetation degradation, Severe	4086.37	0.30	4086.37	0.30	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	32231.44	2.33	33135.23	2.39	-903.79
5	Sv2	Land with scrub, vegetation degradation, Moderate	142096.62	10.27	141654.25	10.23	442.37
6	Sv3	Land with scrub, vegetation degradation, Severe	151738.97	10.96	151665.02	10.96	73.95
7	Be1	Barren, wind erosion, Slight	14332.42	1.04	14332.42	1.04	0.00
8	Bg1	Barren, mass movement, Slight	2757.80	0.20	2757.80	0.20	0.00
9	Bg2	Barren, mass movement, Moderate	3968.49	0.29	3968.49	0.29	0.00
10	Bg3	Barren, mass movement, Severe	6513.63	0.47	6513.63	0.47	0.00
11	Lf1	Periglacial, frost shattering, Slight	105247.22	7.60	105247.22	7.60	0.00
12	Lf2	Periglacial, frost shattering, Moderate	333184.29	24.07	333184.29	24.07	0.00
13	Lf3	Periglacial, frost shattering, Severe	7364.43	0.53	7364.43	0.53	0.00
14	Rf1	Rocky, frost shattering, Slight	149371.17	10.79	149371.17	10.79	0.00
15	Rf2	Rocky, frost shattering, Moderate	115746.42	8.36	115746.42	8.36	0.00
16	Rf3	Rocky, frost shattering, Severe	29909.29	2.16	29909.29	2.16	0.00
Total Area Under Desertification/ Land Degradation			1114727.26	80.54	1115114.73	80.57	-387.47
17	W	Water body/ Drainage	13736.57	0.99	13736.56	0.99	0.01
18	NAD	No Apparent Degradation	255636.17	18.47	255248.71	18.44	387.46
Total Geographical Area (ha)			1384100.00	100.00	1384100.00	100.00	





















0 5 10 15 km

DESERTIFICATION / LAND DEGRADATION STATUS MAP




Lahul & Spiti District, Himachal Pradesh



Timeframe - 2011-13

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Be1	Barren, wind erosion, Slight
	Bg1	Barren, mass movement, Slight
	Bg2	Barren, mass movement, Moderate
	Bg3	Barren, mass movement, Severe
	Lf1	Periglacial, frost shattering, Slight
	Lf2	Periglacial, frost shattering, Moderate
	Lf3	Periglacial, frost shattering, Severe
	Rf1	Rocky, frost shattering, Slight
	Rf2	Rocky, frost shattering, Moderate
	Rf3	Rocky, frost shattering, Severe
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:

- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

 International Boundary
 State Boundary
 District Boundary

 Major Road
 Major Rail

Location Map



Prepared by:

Jawaharlal Nehru University, Delhi

&

Space Applications Centre, ISRO, Ahmedabad

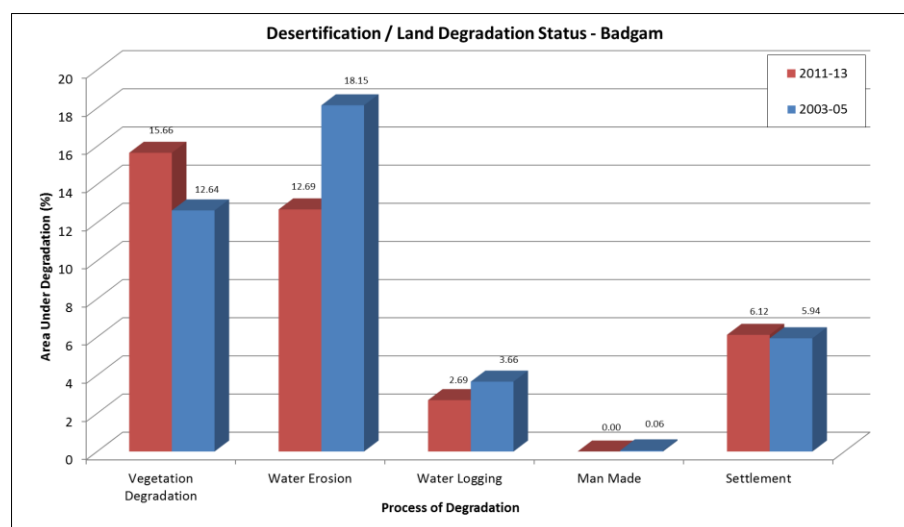
Badgam District, Jammu & Kashmir

Badgam district is situated in the central part of Jammu and Kashmir state. It is bounded in the northwest by Baramulla district and in the northeast by Srinagar district and in southeast by district of Pulwama of Kashmir Province. Badgam district covers an area of 1,371 sq.km. It has a population of 7,53,745 with 544 population density, 894 sex ratio and a literacy rate of 56.1%. (Census 2011)

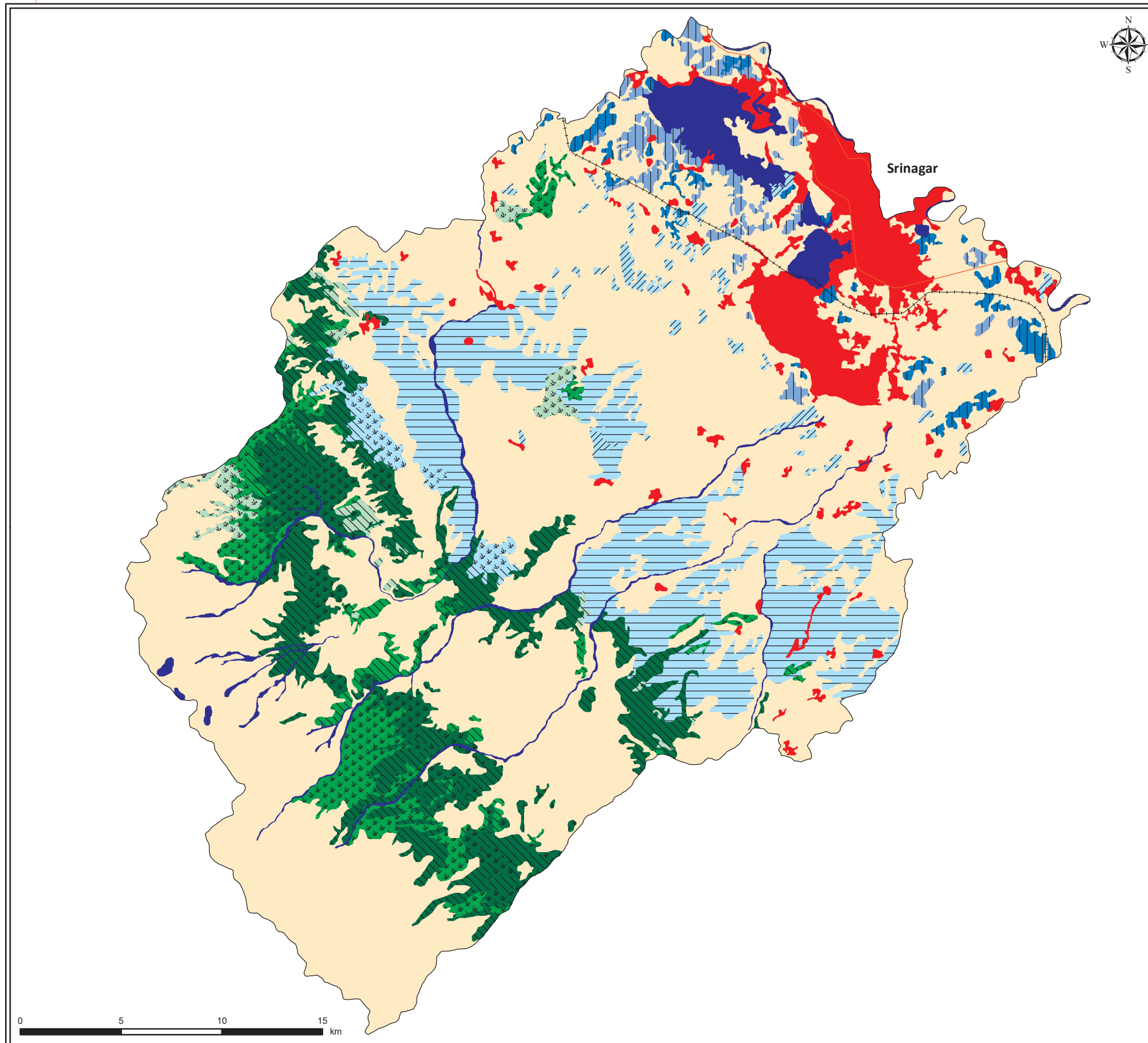
The topography of the area is both mountainous and plain. While the southern and south-western parts are mostly hilly, the eastern and northern parts of the district are plain. The district has sediment deposition of water over-flowing the river banks during floods. These plains are formed on both sides of river Jhelum. These plateaus are separated from one another by deep and narrow valleys. The plateaus have little moisture retaining capacity and are poor in organic matter. While the southern and south-western parts are mostly hilly, the eastern and northern parts are relatively plain. The average height of the mountains is 1,610 meters.

Badgam is observed with 37.16% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has decreased about 3.28% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (15.66 % during 2011-13 and 12.64 % during 2003-05) followed by Water Erosion (12.69% during 2011-13 and 18.15% during 2003-05).
















Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	21467.35	15.66	17326.16	12.64	4141.19
Water Erosion	17398.55	12.69	24880.10	18.15	-7481.55
Water Logging	3694.03	2.69	5022.34	3.66	-1328.31
Man Made	0.00	0.00	81.31	0.06	-81.31
Settlement	8386.28	6.12	8137.57	5.94	248.72
Total Area under Desertification	50946.22	37.16	55447.47	40.44	-4501.26
No Apparent Degradation	81518.06	59.46	76973.27	56.14	4544.79
Total Geographical Area (ha)	137100.00				



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, Slight	9494.80	6.93	8465.76	6.17	1029.04
2	Fv2	Forest, vegetation degradation, Moderate	1654.28	1.21	1496.83	1.09	157.45
3	Fv3	Forest, vegetation degradation, Severe	573.26	0.42	344.99	0.25	228.27
4	Sv1	Land with scrub, vegetation degradation, Slight	4463.69	3.26	3722.54	2.72	741.15
5	Sv2	Land with scrub, vegetation degradation, Moderate	4249.22	3.10	2936.81	2.14	1312.41
6	Sv3	Land with scrub, vegetation degradation, Severe	1032.10	0.75	359.23	0.26	672.87
7	Dw1	Agriculture unirrigated, water erosion, Slight	14777.62	10.78	22165.61	16.17	-7387.99
8	Dw2	Agriculture unirrigated, water erosion, Moderate	0.00	0.00	106.16	0.08	-106.16
9	Fw1	Forest, water erosion, Slight	306.91	0.22	305.37	0.22	1.54
10	Sw1	Land with scrub, water erosion, Slight	946.80	0.69	809.18	0.59	137.63
11	Bw1	Barren, water erosion, Slight	1367.22	1.00	1003.51	0.73	363.72
12	Bw2	Barren, water erosion, Moderate	0.00	0.00	490.28	0.36	-490.28
13	Il1	Agriculture irrigated, water logging, Slight	2096.68	1.53	2144.91	1.56	-48.23
14	Il2	Agriculture irrigated, water logging, Moderate	1597.35	1.17	2877.43	2.10	-1280.08
15	Tm1	Others, man made, Slight	0.00	0.00	81.31	0.06	-81.31
16	S	Settlement	8386.28	6.12	8137.57	5.94	248.72
Total Area Under Desertification/ Land Degradation			50946.22	37.16	55447.47	40.44	-4501.26
17	W	Water body/ Drainage	4635.73	3.38	4679.26	3.41	-43.53
18	NAD	No Apparent Degradation	81518.06	59.46	76973.27	56.14	4544.79
Total Geographical Area (ha)			137100.00	100.00	137100.00	100.00	



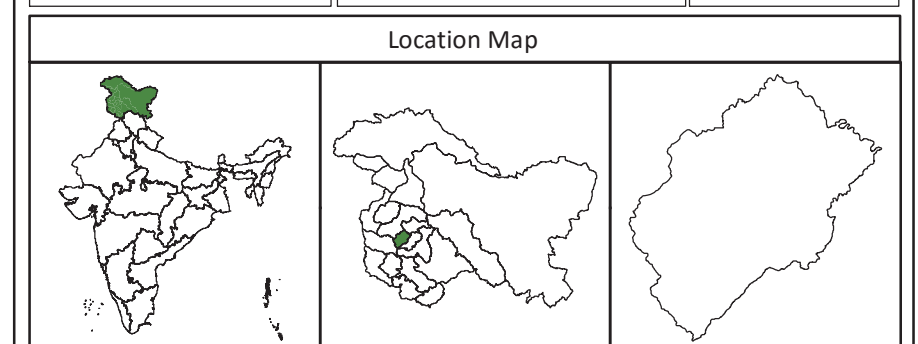
DESERTIFICATION / LAND DEGRADATION STATUS MAP Badgam District, Jammu & Kashmir Timeframe - 2011-13

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Dw1	Agriculture unirrigated, water erosion, Slight
	Fw1	Forest, water erosion, Slight
	Sw1	Land with scrub, water erosion, Slight
	Bw1	Barren, water erosion, Slight
	Il1	Agriculture irrigated, water logging, Slight
	Il2	Agriculture irrigated, water logging, Moderate
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:
- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

--- International Boundary
— State Boundary
— District Boundary

— Major Road
++++ Major Rail



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

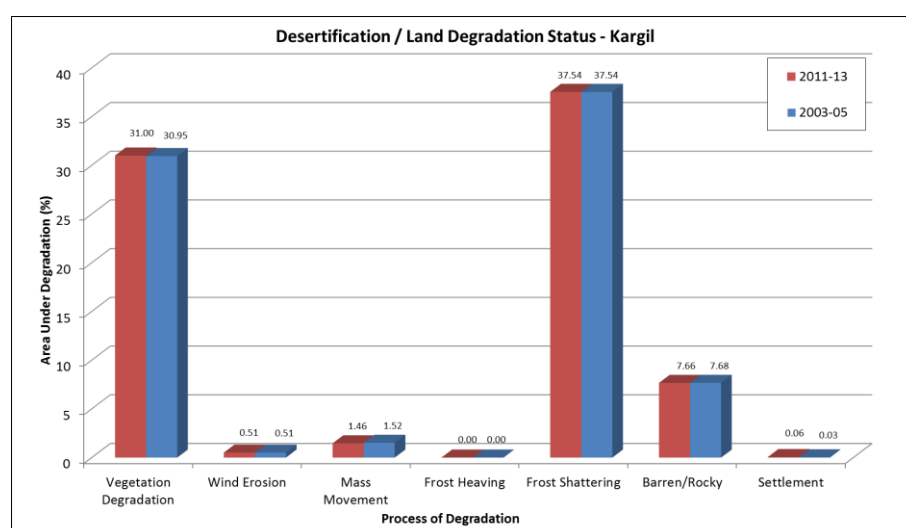
Kargil District, Jammu & Kashmir

Kargil district lies in the north-east portion of Kashmir valley with 14036 sq. km area. Kargil district has a population of 1,40,802 with 10 population density, 810 sex ratio and a literacy rate of 81%. (Census 2011)

The district has high mountain ranges, elevated plateau and rocky gorges. On the whole, the territory is a vast desert of rocks, sands and characterized by its rugged topography. The altitude of the region increases towards the north and the Kashmir valley as the table lands in it also goes higher. Drass, Wakha, Suru are a streams which unite their water near Kargil. At the narrow gorge called Wolf's leap, these river cuts the Trans Himalayan range to form the Indus. Zaskar river winds down the steep slopes of the watershed to the head of the Stod valley, one of the Zaskar's main tributary valley's the majestic 'Drang-Drung' glacier looms into full view.


















Kargil is observed with 78.23% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.01% since 2003-05. The most significant process of land degradation/ desertification in the district is Frost Shattering (37.54% during 2011-13 and 2003-05) followed by Vegetation Degradation (31.00% during 2011-13 and 30.95% during 2003-05).






Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	435156.87	31.00	434388.35	30.95	768.51
Wind Erosion	7179.58	0.51	7179.98	0.51	-0.40
Mass Movement	20523.93	1.46	21322.67	1.52	-798.74
Frost Heaving	9.11	0.00	9.11	0.00	0.00
Frost Shattering	526860.20	37.54	526862.73	37.54	-2.54
Barren/Rocky	107573.56	7.66	107741.18	7.68	-167.61
Settlement	778.76	0.06	400.25	0.03	378.51
Total Area under Desertification	1098082.02	78.23	1097904.29	78.22	177.73
No Apparent Degradation	305517.98	21.77	305695.71	21.78	-177.73
Total Geographical Area (ha)	1403600.00				

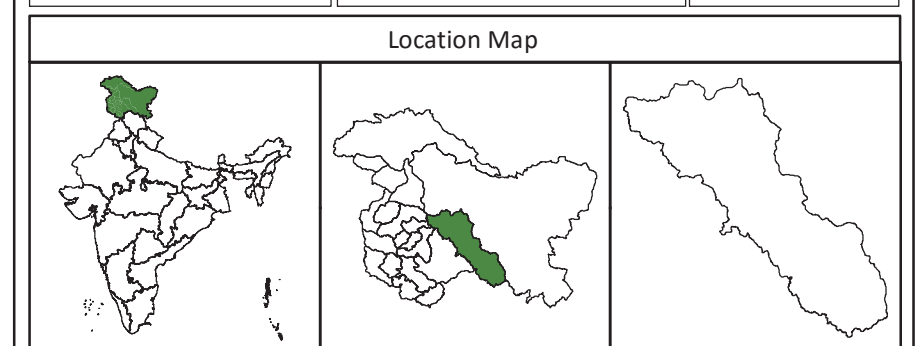


SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Slight	7290.16	0.52	7290.16	0.52	0.00
2	Fv2	Forest, vegetation degradation, Moderate	6818.13	0.49	6818.13	0.49	0.00
3	Fv3	Forest, vegetation degradation, Severe	2569.63	0.18	2569.63	0.18	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	9428.64	0.67	9418.91	0.67	9.73
5	Sv2	Land with scrub, vegetation degradation, Moderate	69015.53	4.92	68968.31	4.91	47.22
6	Sv3	Land with scrub, vegetation degradation, Severe	340034.78	24.23	339323.21	24.18	711.57
7	Be1	Barren, wind erosion, Slight	7179.58	0.51	7179.98	0.51	-0.40
8	Bg1	Barren, mass movement, Slight	17335.23	1.24	17941.86	1.28	-606.63
9	Bg2	Barren, mass movement, Moderate	3188.70	0.23	3380.81	0.24	-192.11
10	Lh1	Periglacial, frost heaving, Slight	9.11	0.00	9.11	0.00	0.00
11	Lf1	Periglacial, frost shattering, Slight	297365.37	21.19	297367.62	21.19	-2.25
12	Lf2	Periglacial, frost shattering, Moderate	90453.76	6.44	90453.76	6.44	0.00
13	Rf1	Rocky, frost shattering, Slight	139041.07	9.91	139041.36	9.91	-0.29
14	B	Barren	101279.25	7.22	101446.87	7.23	-167.61
15	R	Rocky	6294.31	0.45	6294.31	0.45	0.00
16	S	Settlement	778.76	0.06	400.25	0.03	378.51
Total Area Under Desertification/ Land Degradation			1098082.02	78.23	1097904.29	78.22	177.73
17	NAD	No Apparent Degradation	305517.98	21.77	305695.71	21.78	-177.73
Total Geographical Area (ha)			1403600.00	100.00	1403600.00	100.00	

DESERTIFICATION / LAND DEGRADATION STATUS MAP Kargil District, Jammu & Kashmir Timeframe - 2011-13

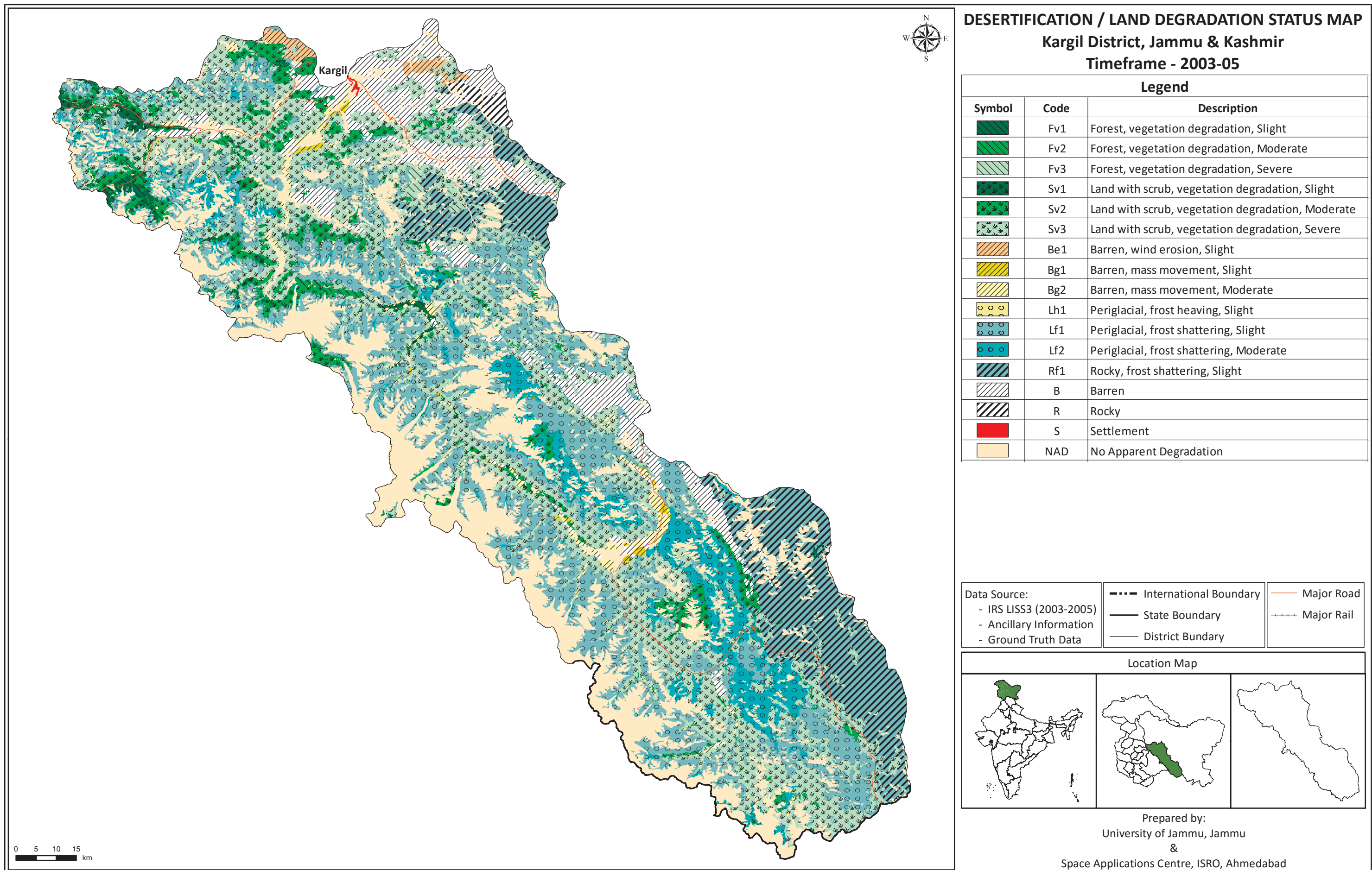
Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Be1	Barren, wind erosion, Slight
	Bg1	Barren, mass movement, Slight
	Bg2	Barren, mass movement, Moderate
	Lh1	Periglacial, frost heaving, Slight
	Lf1	Periglacial, frost shattering, Slight
	Lf2	Periglacial, frost shattering, Moderate
	Rf1	Rocky, frost shattering, Slight
	B	Barren
	R	Rocky
	S	Settlement
	NAD	No Apparent Degradation

Data Source: - IRS LISS3 (2011-2013) - Ancillary Information - Ground Truth Data	 International Boundary	 Major Road
	 State Boundary	 Major Rail
	 District Boundary	



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

0 5 10 15 km



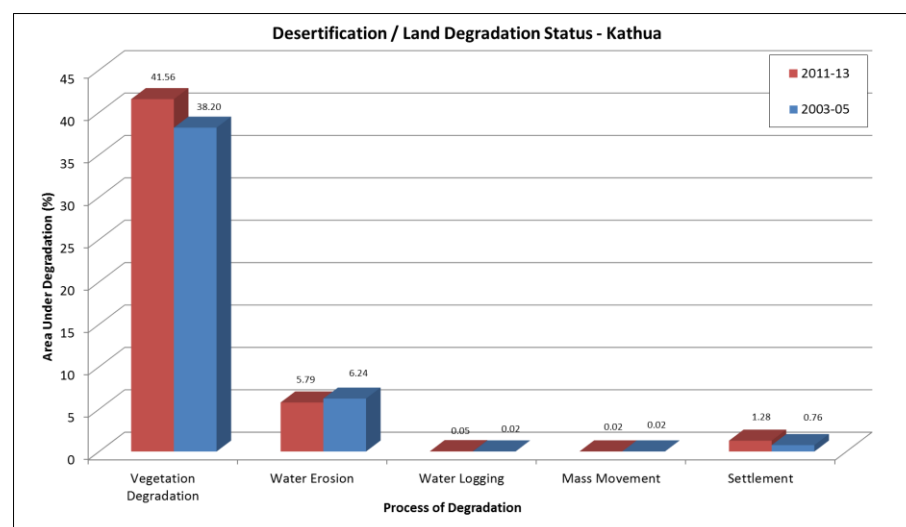
Kathua District, Jammu & Kashmir

Kathua district lies in the south-west corner of Jammu and Kashmir state. It borders in north by Doda district, in the north-west by Udhampur and Samba districts, in the east by Himachal Pradesh, in the south-east by Punjab and in the south-west by Pakistan. The district covers an area of 2,502 sq. km. It has a population of 6,16,435 with 246 population density, 890 sex ratio and a literacy rate of 73.09%. (Census 2011)

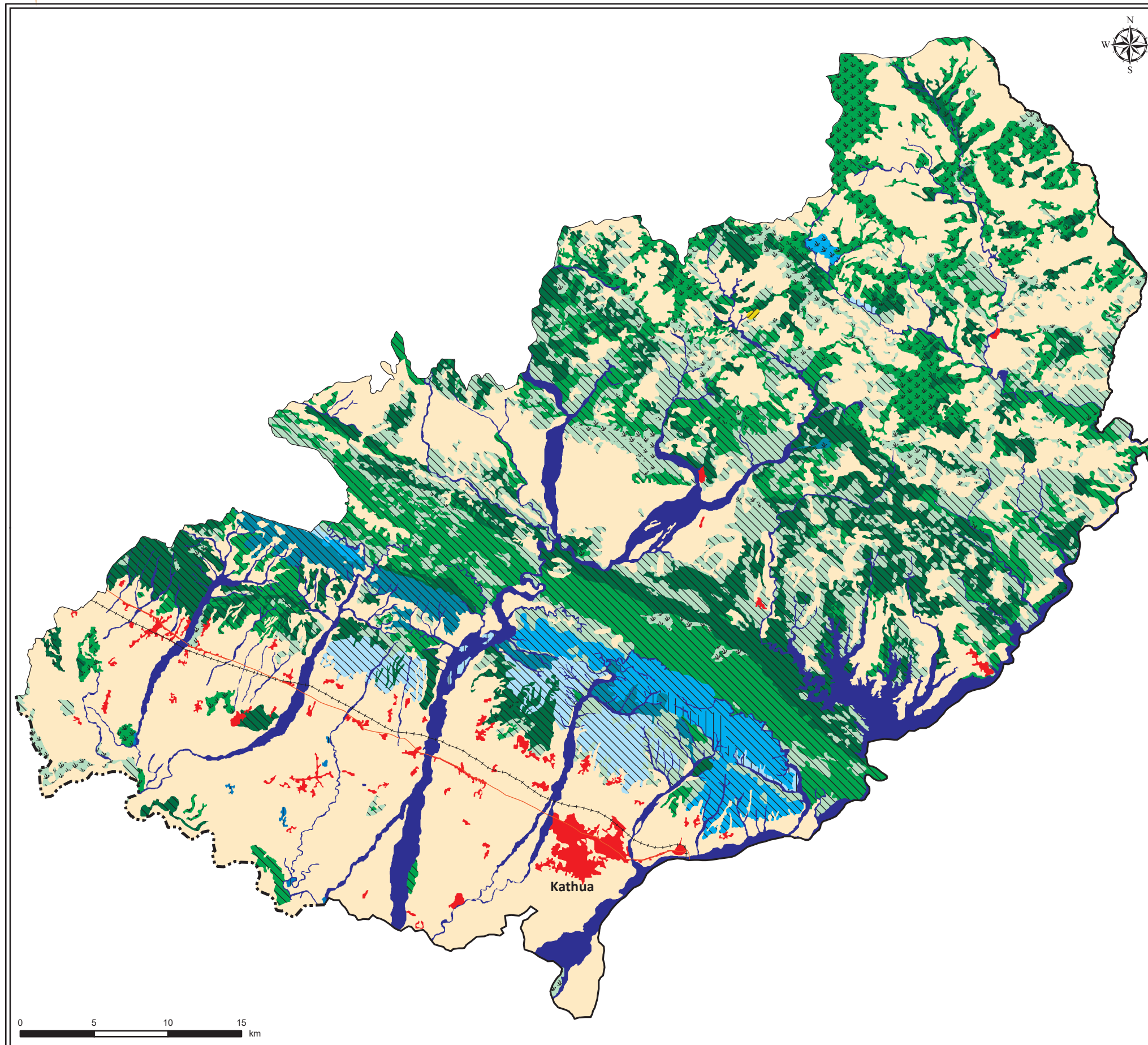
The people of this district are mainly dependent on rain water for cultivation as the irrigation potential developed so far is very limited. The district has subtropical climatic condition. It is hot during summer and cold in winter. It receives rains 1000mm to 1072mm during the year. Since the agriculture depends on rains water it faces drought in alternate year. Thus the crop suffers to great extent and people move for livelihood from one place to another in search of work. The district has significant minerals wealth. The important minerals are Manganese Ore, limestone, Quartz Silica Sand, Black Trap Gravel etc.

Kathua is observed with 48.69% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 3.46% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (41.56% during 2011-13 and 38.20% during 2003-05) followed by Water Erosion (5.79% during 2011-13 and 6.24% during 2003-05).



















Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	103982.82	41.56	95569.96	38.20	8412.87
Water Erosion	14476.13	5.79	15619.63	6.24	-1143.50
Water Logging	118.32	0.05	46.88	0.02	71.45
Mass Movement	38.42	0.02	38.42	0.02	0.00
Settlement	3202.93	1.28	1892.29	0.76	1310.64
Total Area under Desertification	121818.62	48.69	113167.17	45.23	8651.46
No Apparent Degradation	108886.75	43.52	117333.83	46.90	-8447.08
Total Geographical Area (ha)	250200.00				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Fv1	Forest, vegetation degradation, Slight	27742.50	11.09	28558.57	11.41	-816.07
2	Fv2	Forest, vegetation degradation, Moderate	27281.53	10.90	21308.82	8.52	5972.71
3	Fv3	Forest, vegetation degradation, Severe	31684.49	12.66	30150.65	12.05	1533.84
4	Sv1	Land with scrub, vegetation degradation, Slight	1370.84	0.55	2741.87	1.10	-1371.03
5	Sv2	Land with scrub, vegetation degradation, Moderate	11448.68	4.58	10086.62	4.03	1362.06
6	Sv3	Land with scrub, vegetation degradation, Severe	4454.79	1.78	2723.43	1.09	1731.36
7	Iw1	Agriculture irrigated, water erosion, Slight	338.79	0.14	57.72	0.02	281.07
8	Iw2	Agriculture irrigated, water erosion, Moderate	595.58	0.24	140.83	0.06	454.76
9	Iw3	Agriculture irrigated, water erosion, Severe	0.00	0.00	90.90	0.04	-90.90
10	Fw1	Forest, water erosion, Slight	4389.39	1.75	5278.67	2.11	-889.28
11	Fw2	Forest, water erosion, Moderate	5447.90	2.18	4377.09	1.75	1070.81
12	Fw3	Forest, water erosion, Severe	3412.35	1.36	5204.72	2.08	-1792.37
13	Sw2	Land with scrub, water erosion, Moderate	229.70	0.09	343.62	0.14	-113.93
14	Sw3	Land with scrub, water erosion, Severe	62.43	0.02	126.08	0.05	-63.65
15	Il1	Agriculture irrigated, water logging, Slight	0.00	0.00	17.94	0.01	-17.94
16	Il2	Agriculture irrigated, water logging, Moderate	118.32	0.05	28.94	0.01	89.38
17	Bg2	Barren, mass movement, Moderate	38.42	0.02	38.42	0.02	0.00
18	S	Settlement	3202.93	1.28	1892.29	0.76	1310.64
Total Area Under Desertification/ Land Degradation			121818.62	48.69	113167.17	45.23	8651.46
19	W	Water body/ Drainage	19494.63	7.79	19699.00	7.87	-204.37
20	NAD	No Apparent Degradation	108886.75	43.52	117333.83	46.90	-8447.08
Total Geographical Area (ha)			250200.00	100.00	250200.00	100.00	



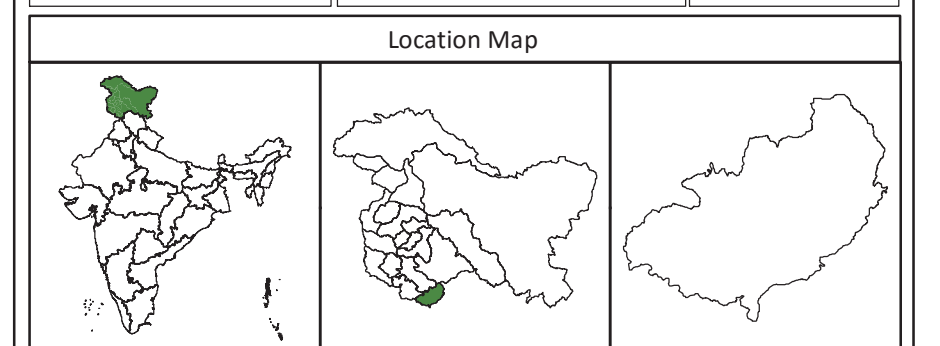
DESERTIFICATION / LAND DEGRADATION STATUS MAP Kathua District, Jammu & Kashmir Timeframe - 2011-13

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Iw2	Agriculture irrigated, water erosion, Moderate
	Fw1	Forest, water erosion, Slight
	Fw2	Forest, water erosion, Moderate
	Fw3	Forest, water erosion, Severe
	Sw2	Land with scrub, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	Il2	Agriculture irrigated, water logging, Moderate
	Bg2	Barren, mass movement, Moderate
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

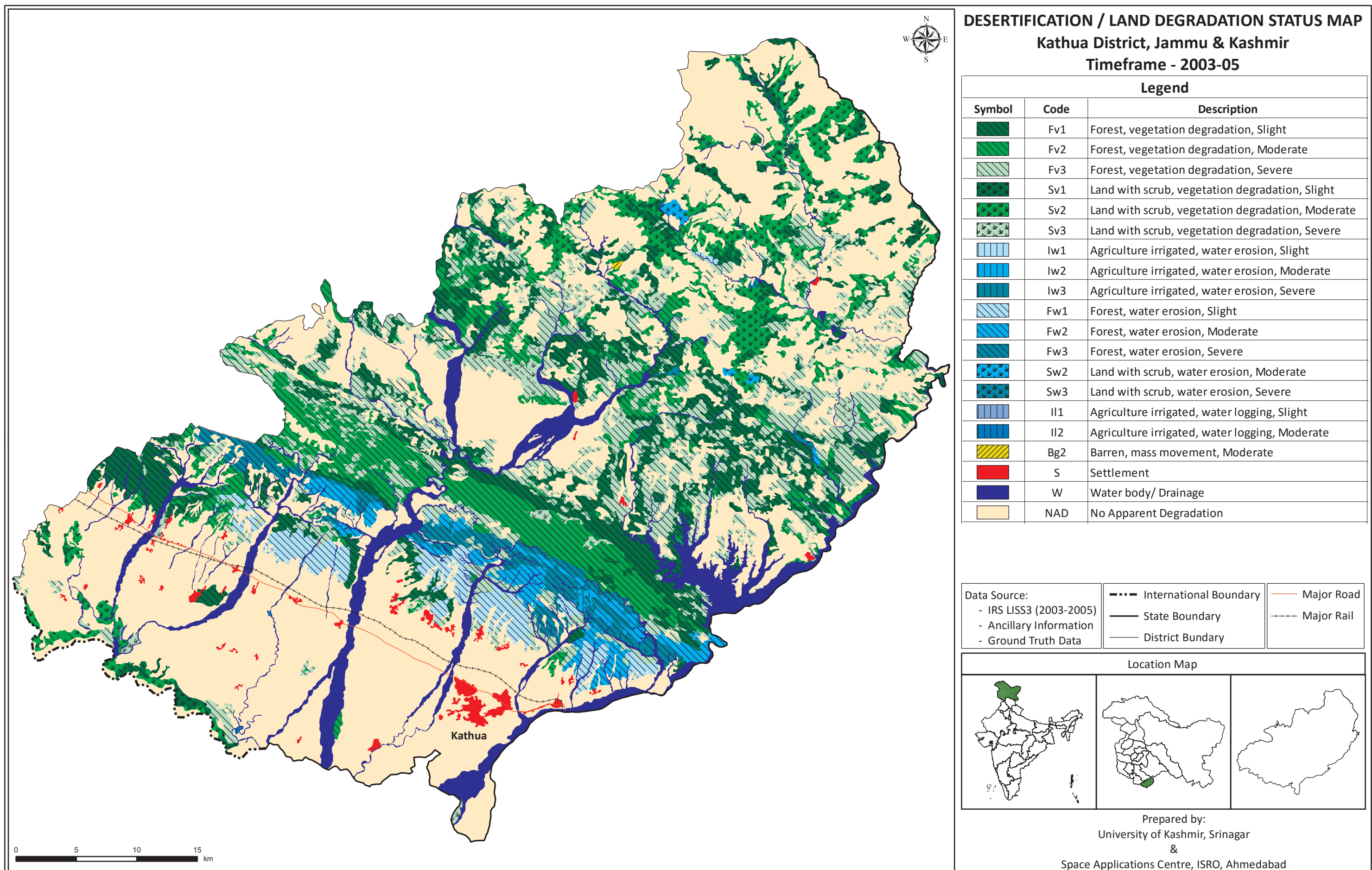
Data Source:
- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

--- International Boundary
— State Boundary
— District Boundary

— Major Road
+ + + + Major Rail



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



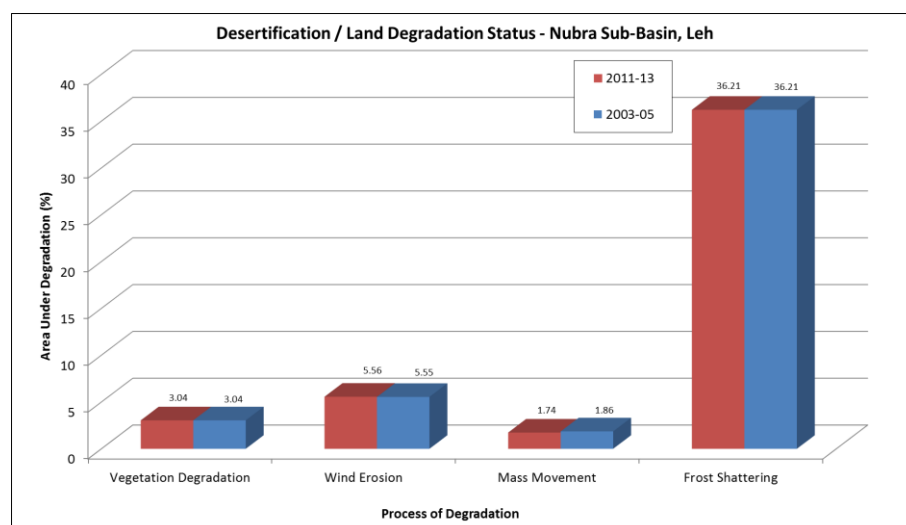
Nubra Sub-basin, Leh District, Jammu & Kashmir

Nubra sub-basin falls in Leh district of Jammu & Kashmir state. It occupies an area of 4,282 sq km (GIS area).

The geography of the area is mountainous. It is a high altitude cold desert with rare precipitation and scant vegetation except along river beds. It is home to Siachen glacier. The villages within Nubra Valley are irrigated and fertile, producing wheat, barley, peas, mustard and a variety of fruits and nuts, including blood apples, walnuts, apricots and even a few almond trees. The valley is famous for its forest of Hippophae shrub, popularly known as Leh Berry. The Valley is also famous for the sand dunes.

Nubra sub-basin is observed with 46.55% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has decreased about 0.11% since 2003-05. The most significant process of land degradation/ desertification in the district is Frost Shattering (36.21% during 2011-13 and 2003-05) followed by Vegetation Degradation (3.04% during 2011-13 and 2003-05).

















Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	13036.97	3.04	13027.12	3.04	9.86
Wind Erosion	23806.50	5.56	23745.60	5.55	60.90
Mass Movement	7445.99	1.74	7964.27	1.86	-518.29
Frost Shattering	155050.58	36.21	155050.58	36.21	0.00
Total Area under Desertification	199340.04	46.55	199787.56	46.66	-447.52
No Apparent Degradation	218981.25	51.14	218568.76	51.04	412.49
Total Geographical Area (ha)	428200.00				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Sv1	Land with scrub, vegetation degradation, Slight	528.85	0.12	528.85	0.12	0.00
2	Sv2	Land with scrub, vegetation degradation, Moderate	5337.90	1.25	5337.90	1.25	0.00
3	Sv3	Land with scrub, vegetation degradation, Severe	7170.23	1.67	7160.37	1.67	9.86
4	Be1	Barren, wind erosion, Slight	18841.04	4.40	18803.63	4.39	37.41
5	Be2	Barren, wind erosion, Moderate	4965.46	1.16	4941.96	1.15	23.50
6	Bg1	Barren, mass movement, Slight	2107.20	0.49	2107.20	0.49	0.00
7	Bg2	Barren, mass movement, Moderate	3642.60	0.85	4041.15	0.94	-398.55
8	Bg3	Barren, mass movement, Severe	1696.19	0.40	1815.92	0.42	-119.73
9	Lf1	Periglacial, frost shattering, Slight	40936.65	9.56	40936.65	9.56	0.00
10	Lf2	Periglacial, frost shattering, Moderate	77472.11	18.09	77472.11	18.09	0.00
11	Lf3	Periglacial, frost shattering, Severe	7005.09	1.64	7005.09	1.64	0.00
12	Rf1	Rocky, frost shattering, Slight	9713.83	2.27	9713.83	2.27	0.00
13	Rf2	Rocky, frost shattering, Moderate	19330.99	4.51	19330.99	4.51	0.00
14	Rf3	Rocky, frost shattering, Severe	591.91	0.14	591.91	0.14	0.00
Total Area Under Desertification/ Land Degradation			199340.04	46.55	199787.56	46.66	-447.52
15	W	Water body/ Drainage	9878.71	2.31	9843.68	2.30	35.03
16	NAD	No Apparent Degradation	218981.25	51.14	218568.76	51.04	412.49
Total Geographical Area (ha)			428200.00	100.00	428200.00	100.00	



DESERTIFICATION / LAND DEGRADATION STATUS MAP Nubra Sub-basin, Leh District, Jammu & Kashmir Timeframe - 2011-13

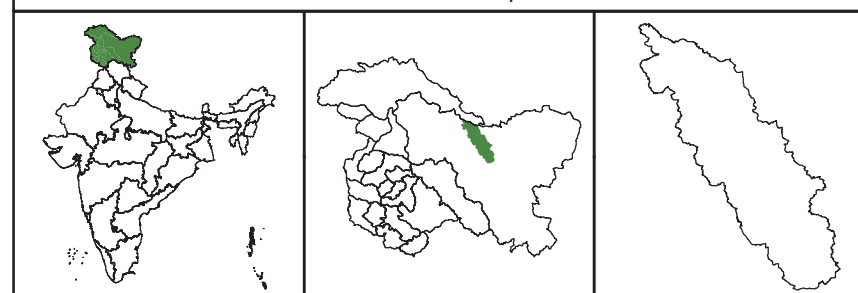
Legend		
Symbol	Code	Description
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Be1	Barren, wind erosion, Slight
	Be2	Barren, wind erosion, Moderate
	Bg1	Barren, mass movement, Slight
	Bg2	Barren, mass movement, Moderate
	Bg3	Barren, mass movement, Severe
	Lf1	Periglacial, frost shattering, Slight
	Lf2	Periglacial, frost shattering, Moderate
	Lf3	Periglacial, frost shattering, Severe
	Rf1	Rocky, frost shattering, Slight
	Rf2	Rocky, frost shattering, Moderate
	Rf3	Rocky, frost shattering, Severe
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:
- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

--- International Boundary
— State Boundary
— District Boundary

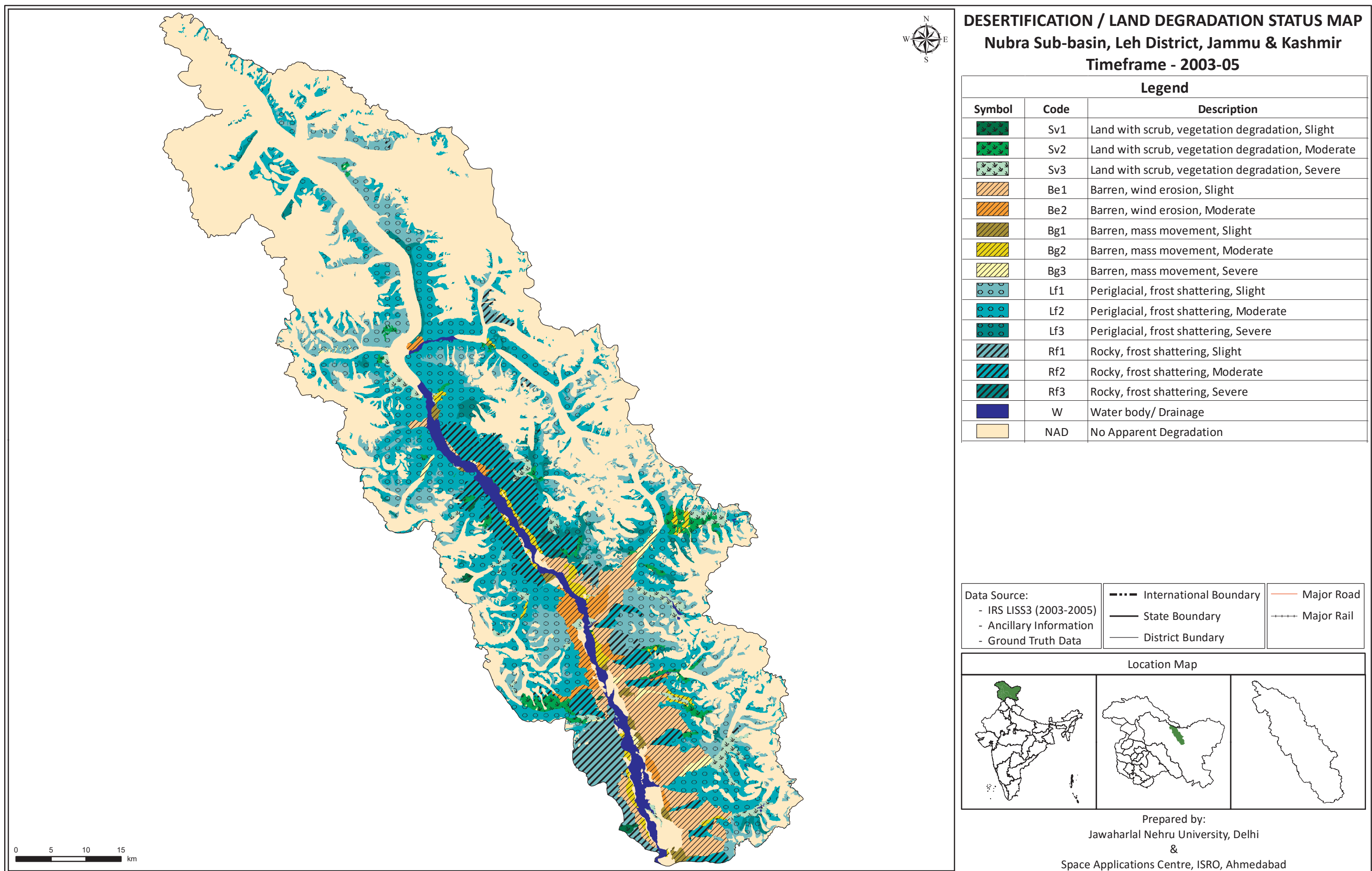
— Major Road
+ + + + Major Rail

Location Map



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

0 5 10 15 km



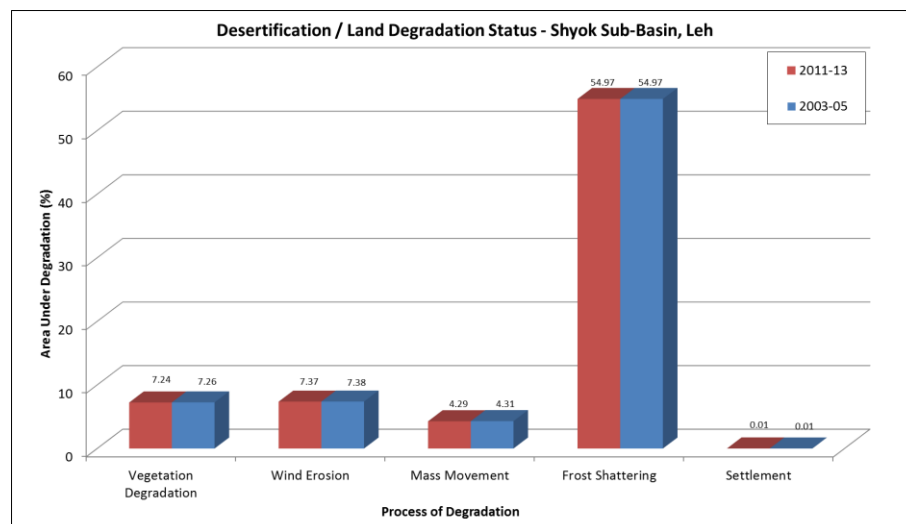
Shyok Sub-basin, Leh District, Jammu & Kashmir

Shyok sub-basin falls in Leh district of Jammu & Kashmir state. It occupies an area of 26,632 sq km (GIS area).

The geography of the area is mountainous. It is a high altitude cold desert with rare precipitation and scant vegetation except along river beds. Shyok river originates from Rimo glaciers, one of the tongues of Siachen Glacier. Shyok river is also known as the river of death, because of its difficult route. The river widens at the confluence with the Nubra River, passes through this area. This river is a tributary of the river Indus. The Khardung La pass, highest motorable road in the world, is the gateway to the Shyok and Nubra valley.

Shyok sub-basin is observed with 73.89% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has decreased about 0.04% since 2003-05. The most significant process of land degradation/ desertification in the district is Frost Shattering (54.97% during 2011-13 and 2003-05) followed by Wind Erosion (7.37% during 2011-13 and 7.38% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	192830.55	7.24	193241.24	7.26	-410.68
Wind Erosion	196368.53	7.37	196632.61	7.38	-264.08
Mass Movement	114250.57	4.29	114663.10	4.31	-412.53
Frost Shattering	1464024.04	54.97	1464024.04	54.97	0.00
Settlement	340.54	0.01	229.65	0.01	110.90
Total Area under Desertification	1967814.24	73.89	1968790.63	73.93	-976.39
No Apparent Degradation	650068.28	24.41	649091.88	24.37	976.39
Total Geographical Area (ha)	2663200.00				



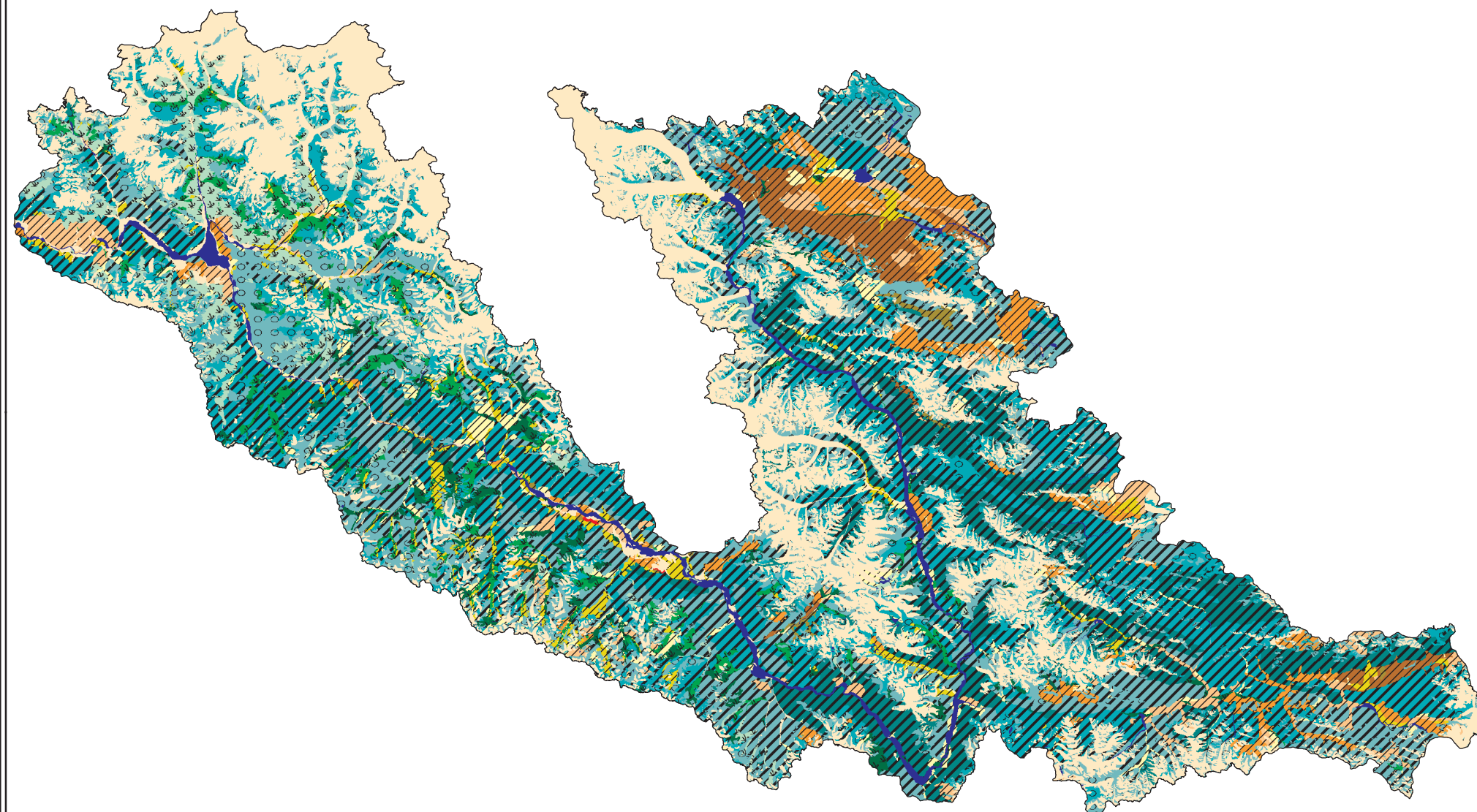
SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Sv1	Land with scrub, vegetation degradation, Slight	45589.17	1.71	45849.38	1.72	-260.20
2	Sv2	Land with scrub, vegetation degradation, Moderate	62172.02	2.33	62211.61	2.34	-39.58
3	Sv3	Land with scrub, vegetation degradation, Severe	85069.35	3.19	85180.25	3.20	-110.90
4	Be1	Barren, wind erosion, Slight	66124.51	2.48	66268.81	2.49	-144.30
5	Be2	Barren, wind erosion, Moderate	81360.48	3.05	81480.26	3.06	-119.78
6	Be3	Barren, wind erosion, Severe	48883.54	1.84	48883.54	1.84	0.00
7	Bg1	Barren, mass movement, Slight	58341.74	2.19	58479.39	2.20	-137.66
8	Bg2	Barren, mass movement, Moderate	49715.39	1.87	49958.94	1.88	-243.55
9	Bg3	Barren, mass movement, Severe	6193.44	0.23	6224.76	0.23	-31.32
10	Lf1	Periglacial, frost shattering, Slight	268307.92	10.07	268307.92	10.07	0.00
11	Lf2	Periglacial, frost shattering, Moderate	187883.89	7.05	187883.89	7.05	0.00
12	Lf3	Periglacial, frost shattering, Severe	19447.96	0.73	19447.96	0.73	0.00
13	Rf1	Rocky, frost shattering, Slight	328954.22	12.35	328954.22	12.35	0.00
14	Rf2	Rocky, frost shattering, Moderate	455588.84	17.11	455588.84	17.11	0.00
15	Rf3	Rocky, frost shattering, Severe	203841.22	7.65	203841.22	7.65	0.00
16	S	Settlement	340.54	0.01	229.65	0.01	110.90
Total Area Under Desertification/ Land Degradation			1967814.24	73.89	1968790.63	73.93	-976.39
17	W	Water body/ Drainage	45317.48	1.70	45317.48	1.70	0.00
18	NAD	No Apparent Degradation	650068.28	24.41	649091.88	24.37	976.39
Total Geographical Area (ha)			2663200.00	100.00	2663200.00	100.00	





















DESERTIFICATION / LAND DEGRADATION STATUS MAP

Shyok Sub-basin, Leh District, Jammu & Kashmir

Timeframe - 2011-13



0 5 10 15
km

Legend		
Symbol	Code	Description
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Be1	Barren, wind erosion, Slight
	Be2	Barren, wind erosion, Moderate
	Be3	Barren, wind erosion, Severe
	Bg1	Barren, mass movement, Slight
	Bg2	Barren, mass movement, Moderate
	Bg3	Barren, mass movement, Severe
	Lf1	Periglacial, frost shattering, Slight
	Lf2	Periglacial, frost shattering, Moderate
	Lf3	Periglacial, frost shattering, Severe
	Rf1	Rocky, frost shattering, Slight
	Rf2	Rocky, frost shattering, Moderate
	Rf3	Rocky, frost shattering, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:

- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

--- International Boundary

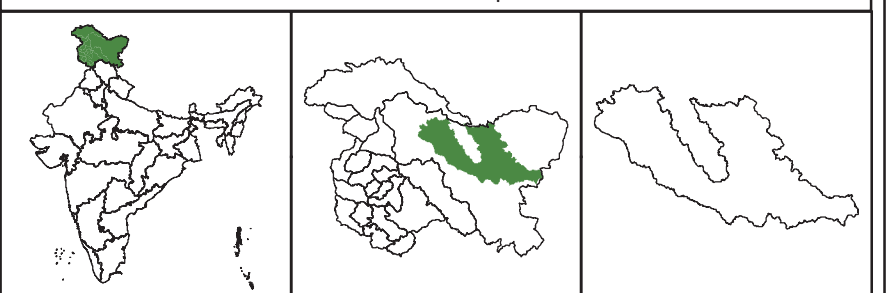
— State Boundary

— District Boundary

— Major Road

++++ Major Rail

Location Map

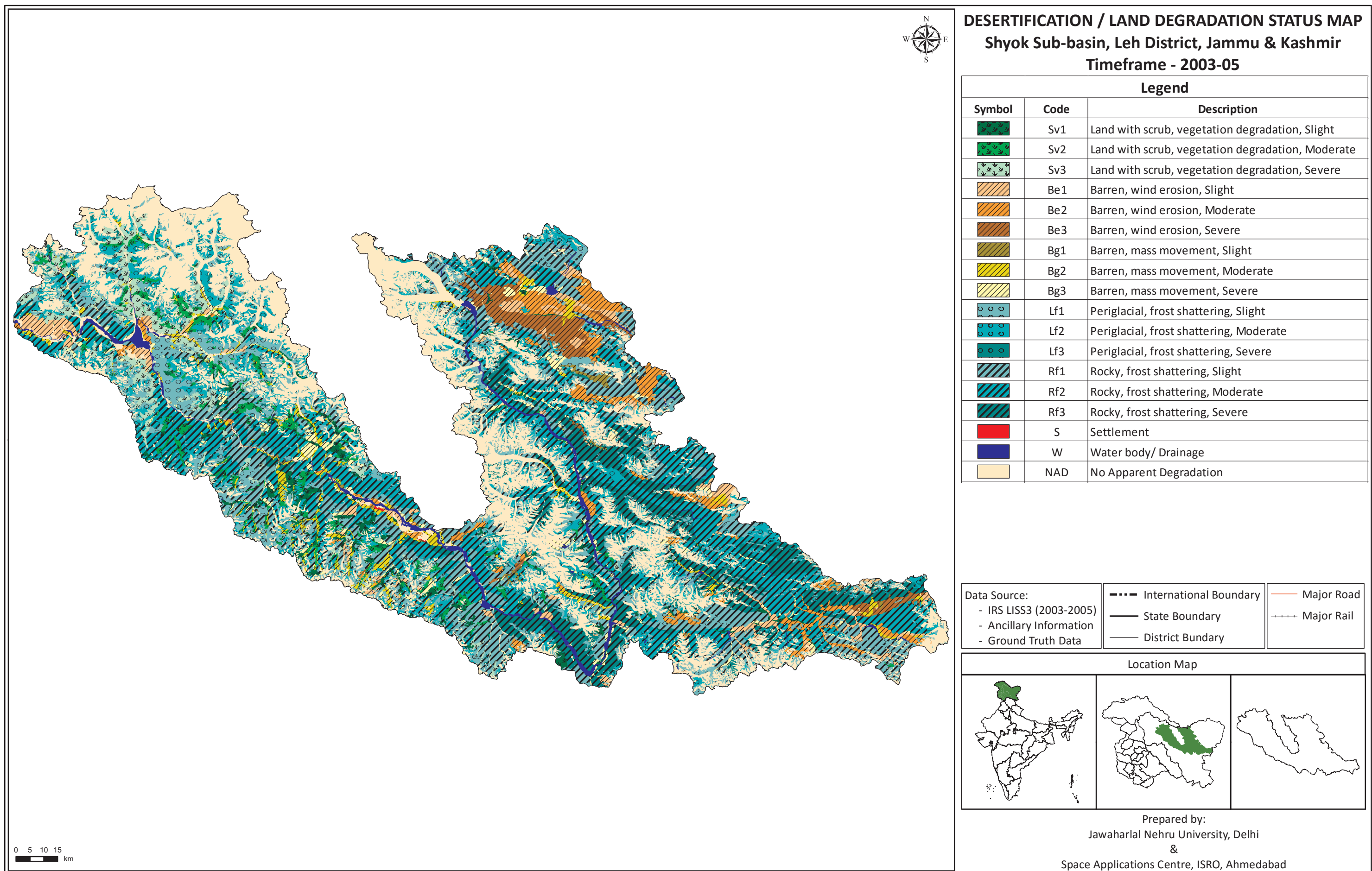


Prepared by:

Jawaharlal Nehru University, Delhi

&

Space Applications Centre, ISRO, Ahmedabad



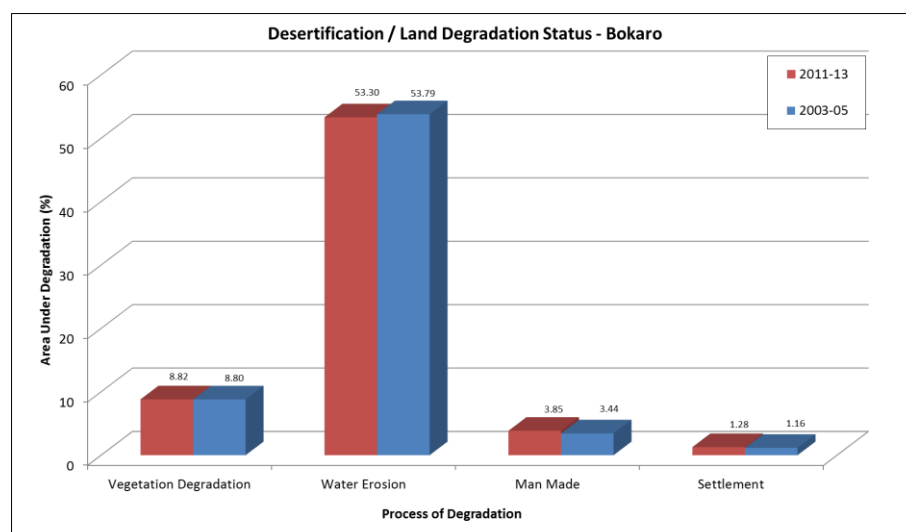
Bokaro District, Jharkhand

Bokaro district of Jharkhand borders West Bengal in the south, Dhanbad district in the east, Ranchi district in the west. River Damodar forms its northern boundary with Giridih and Hazaribagh districts. It occupies an area of 2883 sq. km. The district has a population of 20,62,330 with 720 population density, 916 sex ratio and a literacy rate of 73.48%. (Census 2011)

The entire district region has undulating surface. The height varies between 200 m to 282 m. The general slope of the region is from the west to the east. Damodar is the main river which flows along with its tributaries like Garga and Parga in this tract. Minor rivers which flow in the district are Bokaro, Kunar, Khusa and Uri. Scattered patches of forest are found all over the region. Its geology is related to Chotanagpur gneiss. Western part of the district having rugged topography. Paddy, millets and pulses are the main crops of the region.

Bokaro is observed with 67.25% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.06% since 2003-05. The most significant process of land degradation/ desertification in the district is Water Erosion (53.30% during 2011-13 and 53.79% during 2003-05) followed by Vegetation Degradation (8.82% during 2011-13 and 8.80% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	25416.77	8.82	25380.47	8.80	36.30
Water Erosion	153672.23	53.30	155065.75	53.79	-1393.51
Man Made	11107.90	3.85	9928.43	3.44	1179.47
Settlement	3694.97	1.28	3342.77	1.16	352.20
Total Area under Desertification	193891.87	67.25	193717.42	67.19	174.45
No Apparent Degradation	84266.84	29.23	84441.29	29.29	-174.45
Total Geographical Area (ha)	288300.00				



















SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Fv1	Forest, vegetation degradation, Slight	7683.21	2.67	7630.13	2.65	53.07
2	Fv2	Forest, vegetation degradation, Moderate	14053.34	4.87	14070.11	4.88	-16.77
3	Fv3	Forest, vegetation degradation, Severe	2914.31	1.01	2914.31	1.01	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	540.39	0.19	540.39	0.19	0.00
5	Sv2	Land with scrub, vegetation degradation, Moderate	225.53	0.08	225.53	0.08	0.00
6	Dw1	Agriculture unirrigated, water erosion, Slight	150189.17	52.09	151582.68	52.58	-1393.51
7	Dw2	Agriculture unirrigated, water erosion, Moderate	3483.06	1.21	3483.06	1.21	0.00
8	Fm1	Forest, man made, Slight	315.50	0.11	348.07	0.12	-32.57
9	Fm2	Forest, man made, Moderate	748.74	0.26	773.30	0.27	-24.56
10	Fm3	Forest, man made, Severe	767.69	0.27	632.67	0.22	135.02
11	Tm1	Others, man made, Slight	4920.39	1.71	5045.92	1.75	-125.54
12	Tm2	Others, man made, Moderate	841.04	0.29	880.61	0.31	-39.57
13	Tm3	Others, man made, Severe	3514.55	1.22	2247.87	0.78	1266.69
14	S	Settlement	3694.97	1.28	3342.77	1.16	352.20
Total Area Under Desertification/ Land Degradation			193891.87	67.25	193717.42	67.19	174.45
15	W	Water body/ Drainage	10141.29	3.52	10141.29	3.52	0.00
16	NAD	No Apparent Degradation	84266.84	29.23	84441.29	29.29	-174.45
Total Geographical Area (ha)			288300.00	100.00	288300.00	100.00	








DESERTIFICATION / LAND DEGRADATION STATUS MAP

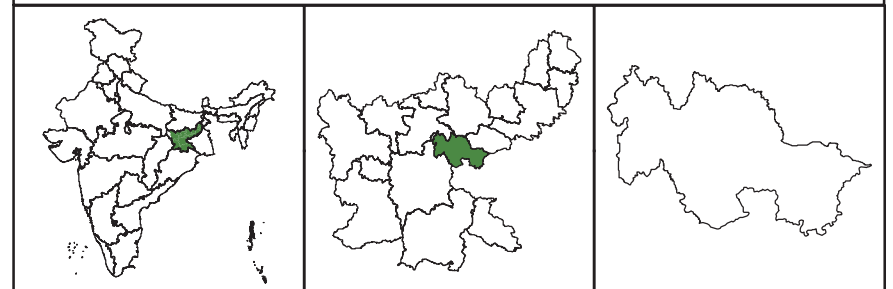
Bokaro District, Jharkhand

Timeframe - 2011-13

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Fm1	Forest, man made, Slight
	Fm2	Forest, man made, Moderate
	Fm3	Forest, man made, Severe
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source: - IRS LISS3 (2011-2013) - Ancillary Information - Ground Truth Data	 International Boundary	 Major Road
	 State Boundary	 Major Rail
	 District Boundary	

Location Map



Prepared by:
Space Applications Centre, ISRO, Ahmedabad

0 5 10 15 km

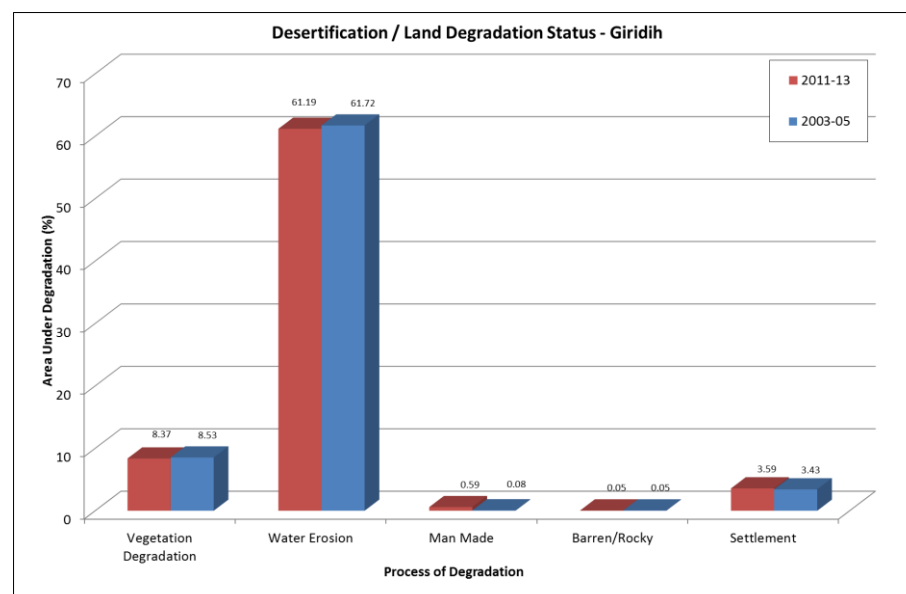
Giridih District, Jharkhand

Giridih district lies in the eastern portion of Jharkhand State. It is bounded on the north by Bihar state, on the east by Deoghar, Jamtara and Dhanbad districts, on the south by Bokaro district and on the west by Kodarma and Hazaribag districts. It covers an area on 4854 sq. km. The district has a population of 24,45,474 with 493 population density, 944 sex ratio and a literacy rate of 63.14%. (Census 2011)

The district may be divided broadly into two natural divisions, namely the central plateau and lower plateau. Around the central plateau are the lower plateaus on all sides except the west on which side a ridge connects the central plateau to the Palamu district. The lower plateau's average height is 1300 feet with undulating surface. The district contains the famous Parasnath hill which has the highest peak in the state with an altitude of 4,479 feet. The district comprises vast forests which are uniformly distributed. The district is rich in mineral resources, particularly in mica and coal and has several large coal fields with one of the best qualities of metallurgical coal in India. Baraker and the Sakri are the major rivers in the district.


















Giridih is observed with 73.79% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has decreased about 0.02% since 2003-05. The most significant process of land degradation/ desertification in the district is Water Erosion (61.19% during 2011-13 and 61.72% during 2003-05) followed by Vegetation Degradation (8.37% during 2011-13 and 8.53% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	40638.54	8.37	41424.57	8.53	-786.03
Water Erosion	297023.80	61.19	299606.07	61.72	-2582.27
Man Made	2874.17	0.59	373.43	0.08	2500.74
Barren/Rocky	237.63	0.05	237.63	0.05	0.00
Settlement	17409.27	3.59	16653.39	3.43	755.87
Total Area under Desertification	358183.41	73.79	358295.09	73.81	-111.69
No Apparent Degradation	123082.21	25.36	123004.09	25.34	78.12
Total Geographical Area (ha)	485400.00				

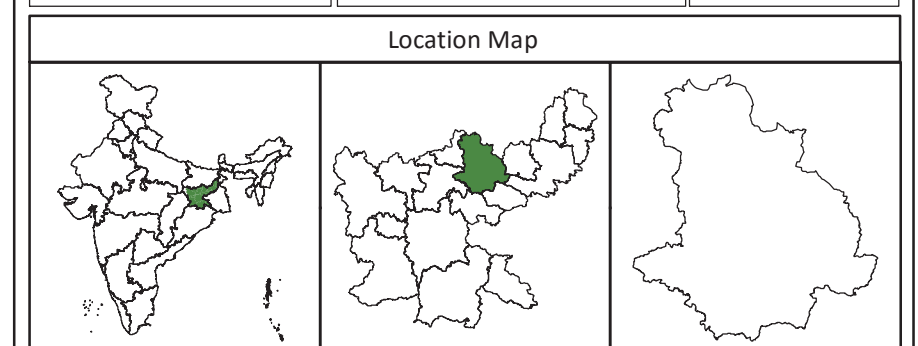


SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Slight	10695.29	2.20	10956.08	2.26	-260.80
2	Fv2	Forest, vegetation degradation, Moderate	12526.13	2.58	14068.20	2.90	-1542.07
3	Fv3	Forest, vegetation degradation, Severe	8949.35	1.84	7793.46	1.61	1155.89
4	Sv1	Land with scrub, vegetation degradation, Slight	820.64	0.17	751.82	0.15	68.82
5	Sv2	Land with scrub, vegetation degradation, Moderate	4914.40	1.01	4948.13	1.02	-33.72
6	Sv3	Land with scrub, vegetation degradation, Severe	2732.73	0.56	2906.88	0.60	-174.15
7	Dw1	Agriculture unirrigated, water erosion, Slight	217162.70	44.74	220615.14	45.45	-3452.44
8	Dw2	Agriculture unirrigated, water erosion, Moderate	72167.61	14.87	71297.44	14.69	870.17
9	Sw1	Land with scrub, water erosion, Slight	4851.87	1.00	4851.87	1.00	0.00
10	Sw2	Land with scrub, water erosion, Moderate	2821.95	0.58	2821.95	0.58	0.00
11	Sw3	Land with scrub, water erosion, Severe	19.67	0.00	19.67	0.00	0.00
12	Fm1	Forest, man made, Slight	288.04	0.06	0.00	0.00	288.04
13	Fm2	Forest, man made, Moderate	402.51	0.08	0.00	0.00	402.51
14	Fm3	Forest, man made, Severe	58.07	0.01	0.00	0.00	58.07
15	Tm1	Others, man made, Slight	913.11	0.19	113.23	0.02	799.89
16	Tm2	Others, man made, Moderate	369.34	0.08	248.59	0.05	120.75
17	Tm3	Others, man made, Severe	843.10	0.17	11.61	0.00	831.49
18	R	Rocky	237.63	0.05	237.63	0.05	0.00
19	S	Settlement	17409.27	3.59	16653.39	3.43	755.87
Total Area Under Desertification/ Land Degradation			358183.41	73.79	358295.09	73.81	-111.69
20	W	Water body/ Drainage	4134.38	0.85	4100.81	0.84	33.57
21	NAD	No Apparent Degradation	123082.21	25.36	123004.09	25.34	78.12
Total Geographical Area (ha)			485400.00	100.00	485400.00	100.00	

DESERTIFICATION / LAND DEGRADATION STATUS MAP Giridih District, Jharkhand Timeframe - 2011-13

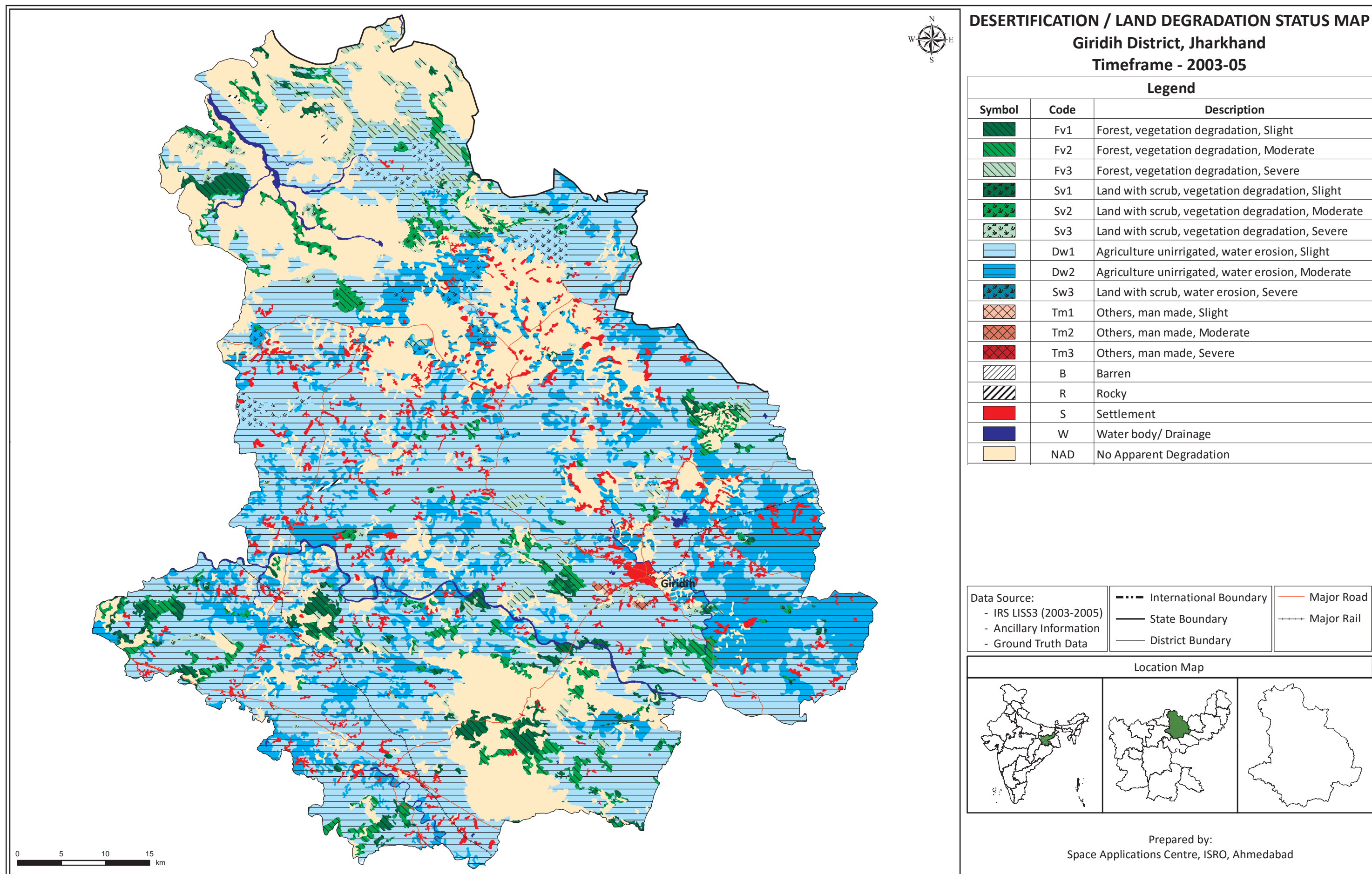
Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	B	Barren
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source: - IRS LISS3 (2011-2013) - Ancillary Information - Ground Truth Data	--- International Boundary	— Major Road
	— State Boundary	++++ Major Rail
	— District Boundary	



Prepared by:
Space Applications Centre, ISRO, Ahmedabad

0 5 10 15 km



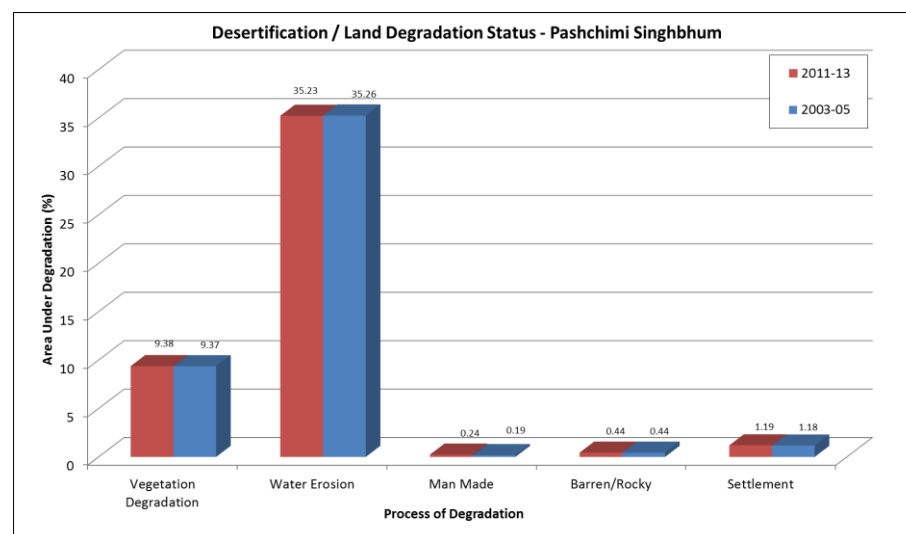
Pashchimi Singhbhum, Jharkhand

Pashchimi Singhbhum district of Jharkhand is bounded on the north by Ranchi and Khunti districts, on the south by the state of Orissa, and on the west by Gumla district and Orissa state. It covers an area of 9,648 sq. km. The district has a population of 15,02,338 with 210 population density, 1005 sex ratio and a literacy rate of 58.6%. (Census 2011)

The district forms part of the southern fringe of the Chotanagpur plateau and is a hilly upland tract. The south-west portion of the district consists of a group of hills known as the Suranda or seven hundred hills. The district is situated at an average height of 244 meters above sea level. The district is covered with hills alternating with valleys, steep mountains, and deep forests on the mountain slopes. It contains some of the best Sal tree forests and the famous Saranda forest. There are plenty of waterfalls and a large variety of wild life. Main rivers which flow in the district are Koel and Karo Kharkai, Subarnarekha and Sanjai.




















Pashchimi Singhbhum is observed with 46.49% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.05% since 2003-05. The most significant process of land degradation/ desertification in the district is Water erosion (35.23% during 2011-13 and 35.26% during 2003-05) followed by Vegetation Degradation (9.38% during 2011-13 and 9.37% during 2003-05).






Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	90486.93	9.38	90365.88	9.37	121.05
Water Erosion	339901.94	35.23	340229.41	35.26	-327.47
Man Made	2326.21	0.24	1836.51	0.19	489.69
Barren/Rocky	4267.18	0.44	4267.18	0.44	0.00
Settlement	11522.63	1.19	11345.12	1.18	177.51
Total Area under Desertification	448504.88	46.49	448044.09	46.44	460.79
No Apparent Degradation	503547.82	52.19	504064.08	52.25	-516.25
Total Geographical Area (ha)	964800.00				

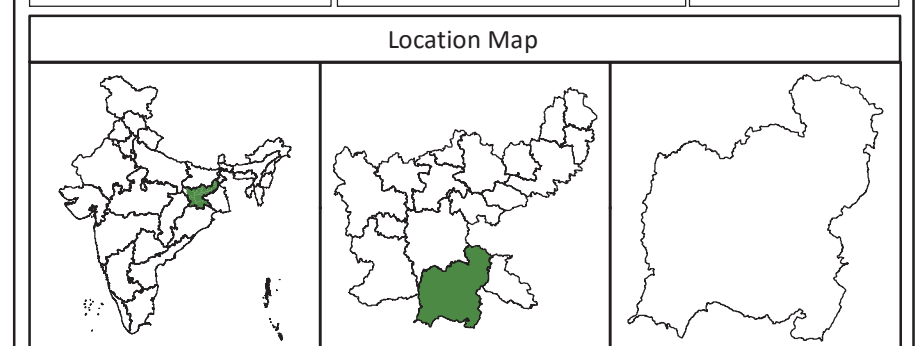


SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Slight	37134.08	3.85	37134.08	3.85	0.00
2	Fv2	Forest, vegetation degradation, Moderate	762.13	0.08	762.13	0.08	0.00
3	Fv3	Forest, vegetation degradation, Severe	32935.04	3.41	32781.16	3.40	153.88
4	Sv1	Land with scrub, vegetation degradation, Slight	2571.25	0.27	2571.25	0.27	0.00
5	Sv2	Land with scrub, vegetation degradation, Moderate	9735.09	1.01	9735.09	1.01	0.00
6	Sv3	Land with scrub, vegetation degradation, Severe	7349.34	0.76	7382.16	0.77	-32.83
7	Dw1	Agriculture unirrigated, water erosion, Slight	257512.84	26.69	257840.30	26.72	-327.47
8	Dw2	Agriculture unirrigated, water erosion, Moderate	77773.01	8.06	77773.01	8.06	0.00
9	Dw3	Agriculture unirrigated, water erosion, Severe	66.52	0.01	66.52	0.01	0.00
10	Sw2	Land with scrub, water erosion, Moderate	885.97	0.09	885.97	0.09	0.00
11	Sw3	Land with scrub, water erosion, Severe	3435.49	0.36	3435.49	0.36	0.00
12	Bw2	Barren, water erosion, Moderate	228.11	0.02	228.11	0.02	0.00
13	Tm2	Others, man made, Moderate	855.55	0.09	768.08	0.08	87.47
14	Tm3	Others, man made, Severe	1470.66	0.15	1068.43	0.11	402.23
15	B	Barren	3678.27	0.38	3678.27	0.38	0.00
16	R	Rocky	588.91	0.06	588.91	0.06	0.00
17	S	Settlement	11522.63	1.19	11345.12	1.18	177.51
Total Area Under Desertification/ Land Degradation			448504.88	46.49	448044.09	46.44	460.79
18	W	Water body/ Drainage	12747.30	1.32	12691.83	1.32	55.47
19	NAD	No Apparent Degradation	503547.82	52.19	504064.08	52.25	-516.25
Total Geographical Area (ha)			964800.00	100.00	964800.00	100.00	

DESERTIFICATION / LAND DEGRADATION STATUS MAP Pashchimi Singhbhum District, Jharkhand Timeframe - 2011-13

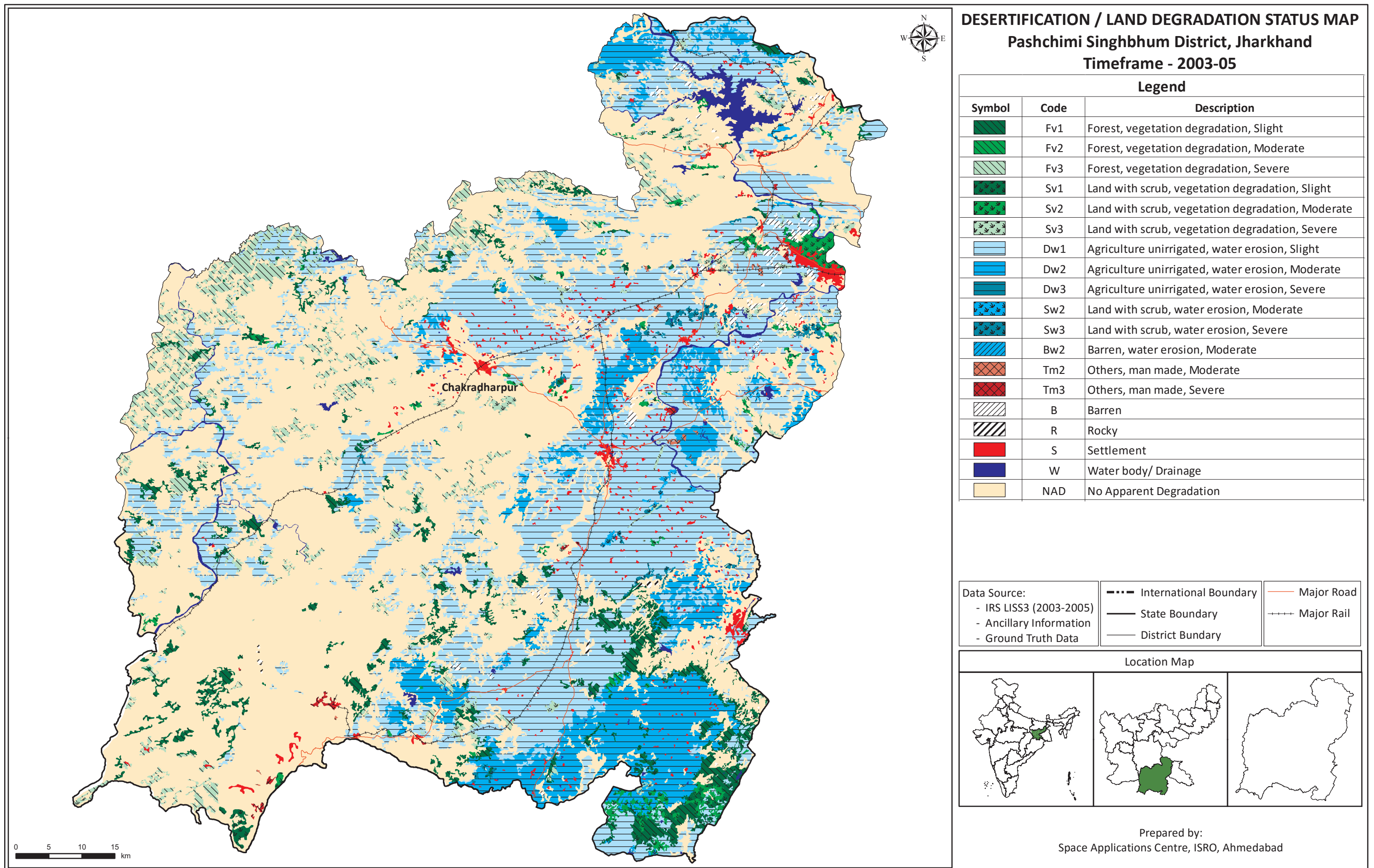
Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Dw3	Agriculture unirrigated, water erosion, Severe
	Sw2	Land with scrub, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	Bw2	Barren, water erosion, Moderate
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	B	Barren
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source: - IRS LISS3 (2011-2013) - Ancillary Information - Ground Truth Data	 International Boundary	 Major Road
	 State Boundary	 Major Rail
	 District Boundary	



Prepared by:
Space Applications Centre, ISRO, Ahmedabad

0 5 10 15 km



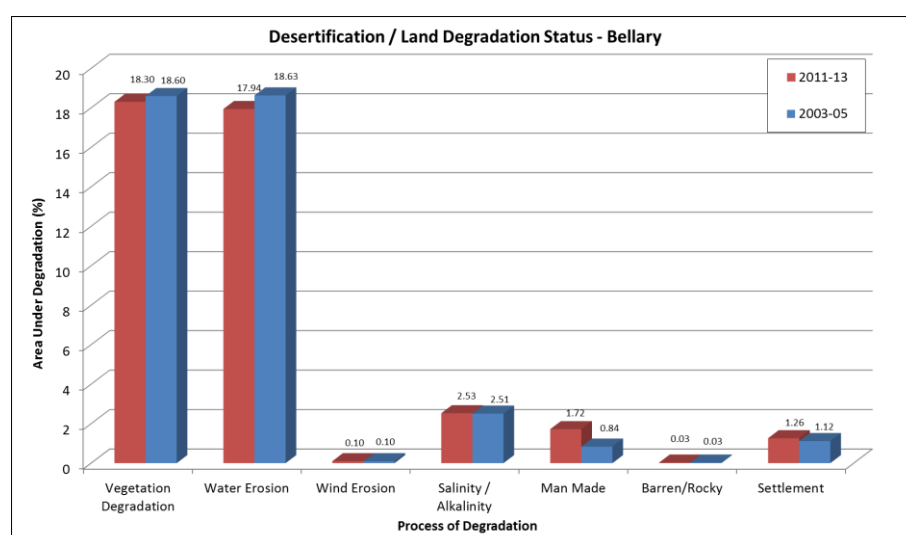
Bellary District, Karnataka

Bellary district is elongated from south-west to north-east and is situated on the eastern side, almost in the vertical center of Karnataka state. The district is bound on north by Koppal and Raichur districts, on the west by Gadag and Haveri districts, on the south by Davanagere district, on the south-east by Chitradurga district and on the east by districts of Andhra Pradesh State. It covers an area of 8,461 sq. km. The district has a population of 24,52,595 with 290 population density, 983 sex ratio and a literacy rate of 67.43%. (Census 2011)

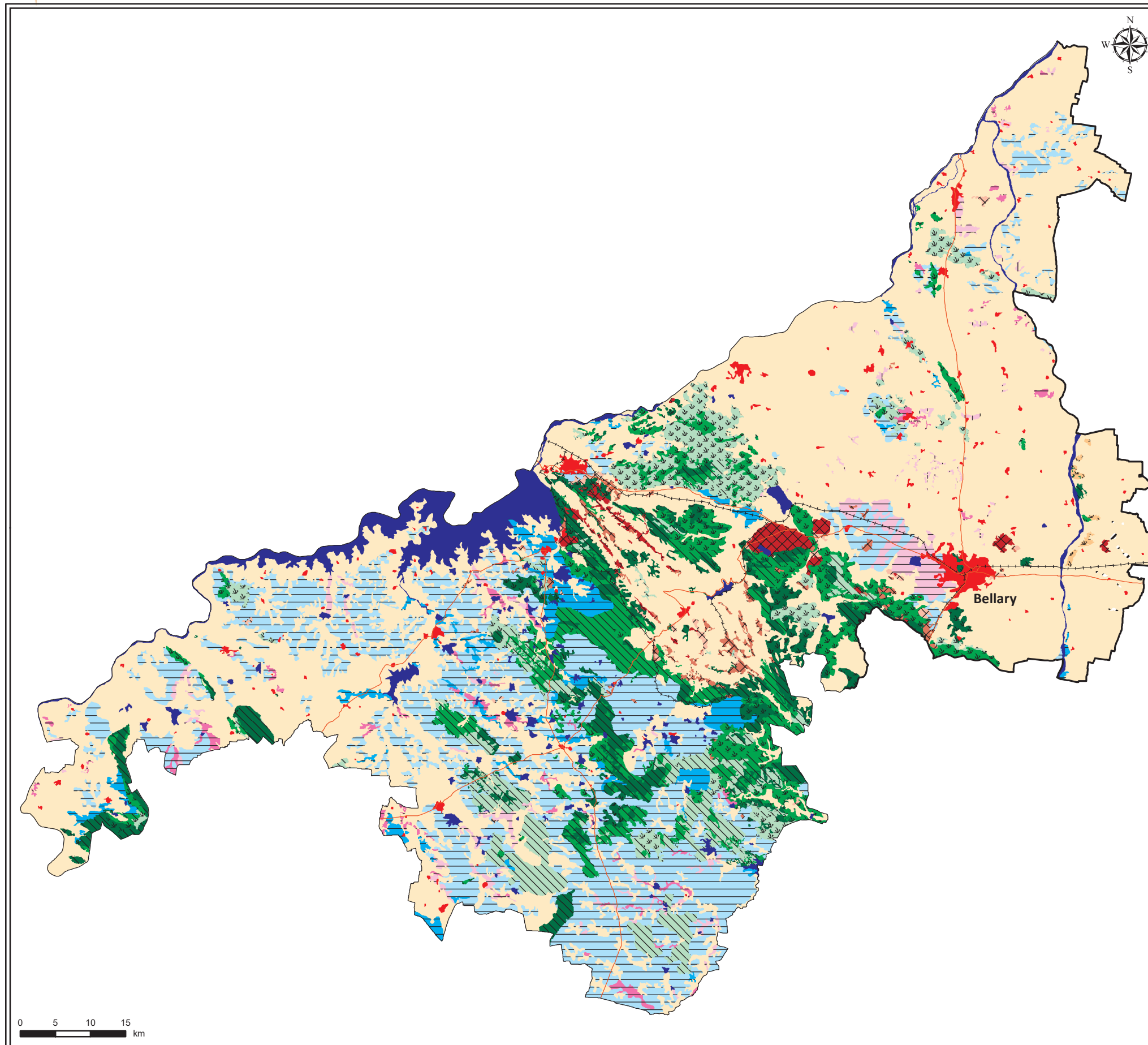
The district consists of two widely differing natural divisions, an eastern and western separated by the Sandur hills which run right across the district from north-west to south-east. The eastern division which is smaller in size, is a flat, almost tree-less, expanse covered mainly with black cotton soil is diversified here and there by the rocky hills. The western division, though containing scattered patches of black cotton soil is for the most part covered with mixed and red ferruginous soil. It is broken up by a constant succession of wild and rugged hills and lies at a greater elevation than eastern part. The main river in the district is Tungabhadra.

Bellary is observed with 41.88% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.06% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (18.30% during 2011-13 and 18.60% during 2003-05) followed by Water erosion (17.94% during 2011-13 and 18.63% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	154864.19	18.30	157339.70	18.60	-2475.51
Water Erosion	151804.82	17.94	157612.30	18.63	-5807.48
Wind Erosion	836.90	0.10	836.90	0.10	0.00
Salinity / Alkalinity	21383.54	2.53	21236.92	2.51	146.62
Man Made	14552.92	1.72	7099.20	0.84	7453.72
Barren/Rocky	239.96	0.03	239.96	0.03	0.00
Settlement	10690.02	1.26	9472.92	1.12	1217.10
Total Area under Desertification	354372.35	41.88	353837.90	41.82	534.45
No Apparent Degradation	458519.26	54.19	459053.71	54.26	-534.45
Total Geographical Area (ha)	846100.00				

























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, Slight	28562.47	3.38	28735.04	3.40	-172.57
2	Fv2	Forest, vegetation degradation, Moderate	27723.64	3.28	27767.17	3.28	-43.53
3	Fv3	Forest, vegetation degradation, Severe	27161.65	3.21	27161.65	3.21	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	14481.89	1.71	15401.50	1.82	-919.60
5	Sv2	Land with scrub, vegetation degradation, Moderate	30891.71	3.65	32231.52	3.81	-1339.80
6	Sv3	Land with scrub, vegetation degradation, Severe	26042.82	3.08	26042.82	3.08	0.00
7	Dw1	Agriculture unirrigated, water erosion, Slight	133983.96	15.84	140190.43	16.57	-6206.46
8	Dw2	Agriculture unirrigated, water erosion, Moderate	17820.86	2.11	17421.87	2.06	398.99
9	Se1	Land with scrub, wind erosion, Slight	836.90	0.10	836.90	0.10	0.00
10	Is1	Agriculture irrigated, salinity / alkalinity, Slight	1504.15	0.18	1504.15	0.18	0.00
11	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight	12924.91	1.53	13067.56	1.54	-142.65
12	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate	6954.47	0.82	6665.21	0.79	289.26
13	Fm1	Forest, man made, Slight	106.31	0.01	158.22	0.02	-51.91
14	Fm2	Forest, man made, Moderate	474.90	0.06	217.22	0.03	257.68
15	Fm3	Forest, man made, Severe	711.45	0.08	326.14	0.04	385.31
16	Tm1	Others, man made, Slight	2375.49	0.28	1474.37	0.17	901.12
17	Tm2	Others, man made, Moderate	4990.78	0.59	2896.35	0.34	2094.42
18	Tm3	Others, man made, Severe	5894.00	0.70	2026.90	0.24	3867.11
19	R	Rocky	239.96	0.03	239.96	0.03	0.00
20	S	Settlement	10690.02	1.26	9472.92	1.12	1217.10
Total Area Under Desertification/ Land Degradation			354372.35	41.88	353837.90	41.82	534.45
21	W	Water body/ Drainage	33208.39	3.92	33208.39	3.92	0.00
22	NAD	No Apparent Degradation	458519.26	54.19	459053.71	54.26	-534.45
Total Geographical Area (ha)			846100.00	100.00	846100.00	100.00	



DESERTIFICATION / LAND DEGRADATION STATUS MAP




Bellary District, Karnataka



Timeframe - 2011-13

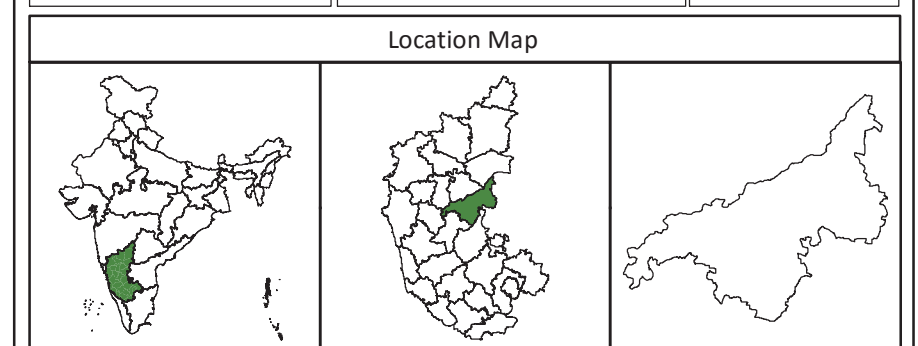
Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Se1	Land with scrub, wind erosion, Slight
	Is1	Agriculture irrigated, salinity / alkalinity, Slight
	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight
	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate
	Fm1	Forest, man made, Slight
	Fm2	Forest, man made, Moderate
	Fm3	Forest, man made, Severe
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:

- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

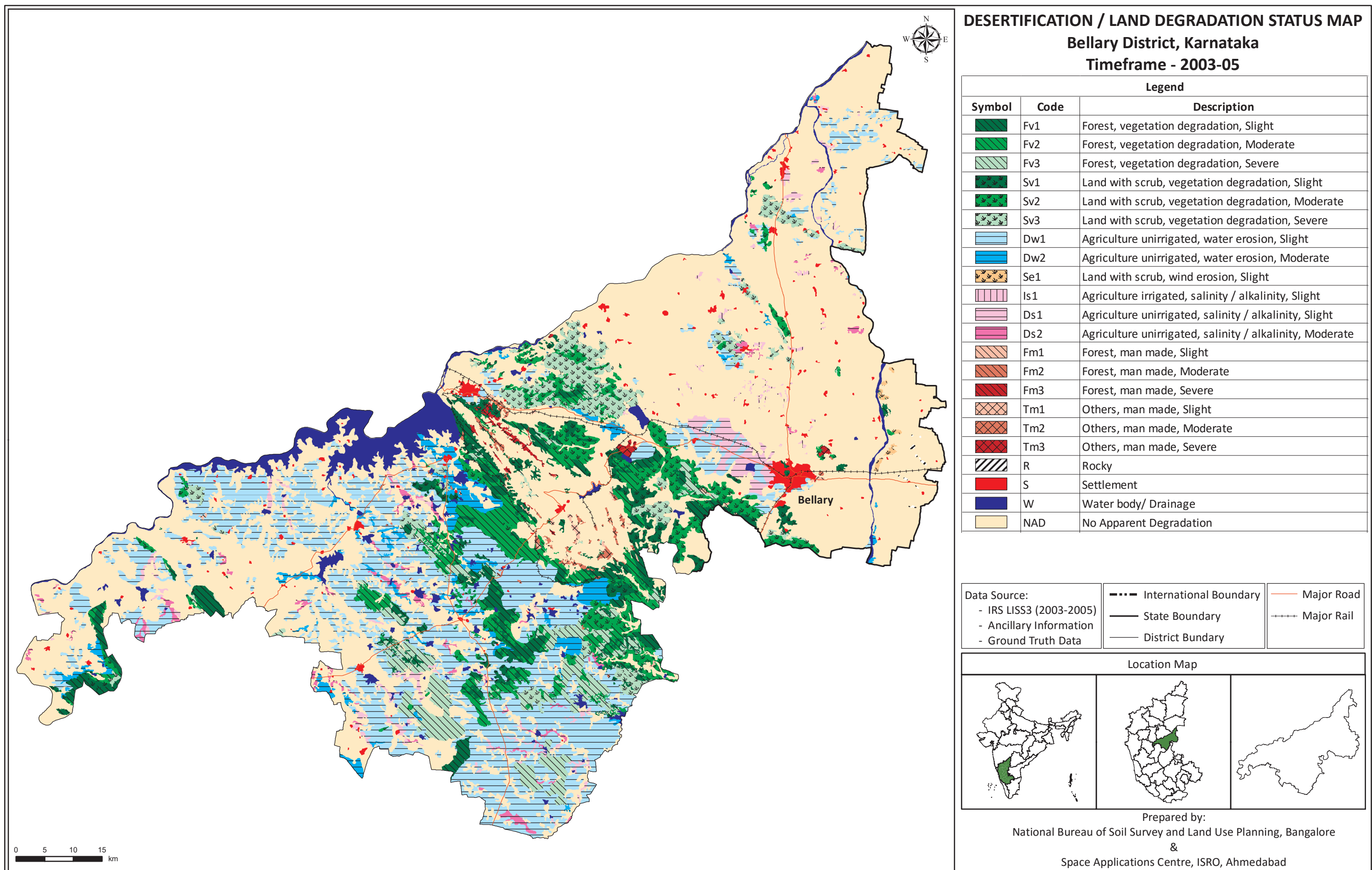
 International Boundary
 State Boundary
 District Boundary

 Major Road
 Major Rail



Prepared by:

National Bureau of Soil Survey and Land Use Planning, Bangalore
&
Space Applications Centre, ISRO, Ahmedabad



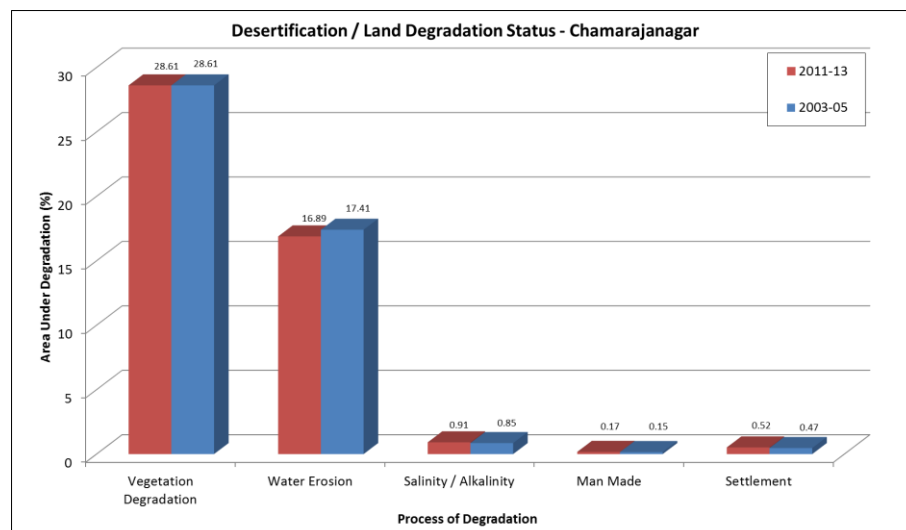
Chamarajanagar District, Karnataka

Chamarajanagar is located at the southernmost part of the Karnataka state. The district is bound on north by Mysore, Mandya, Ramanagara districts, on the east and south by Tamil Nadu state, on the west by Kerala state. It covers an area of 5,648 sq.km. The district has a population of 10,20,791 with 181 population density, 993 sex ratio and a literacy rate of 61.43%. (Census 2011)

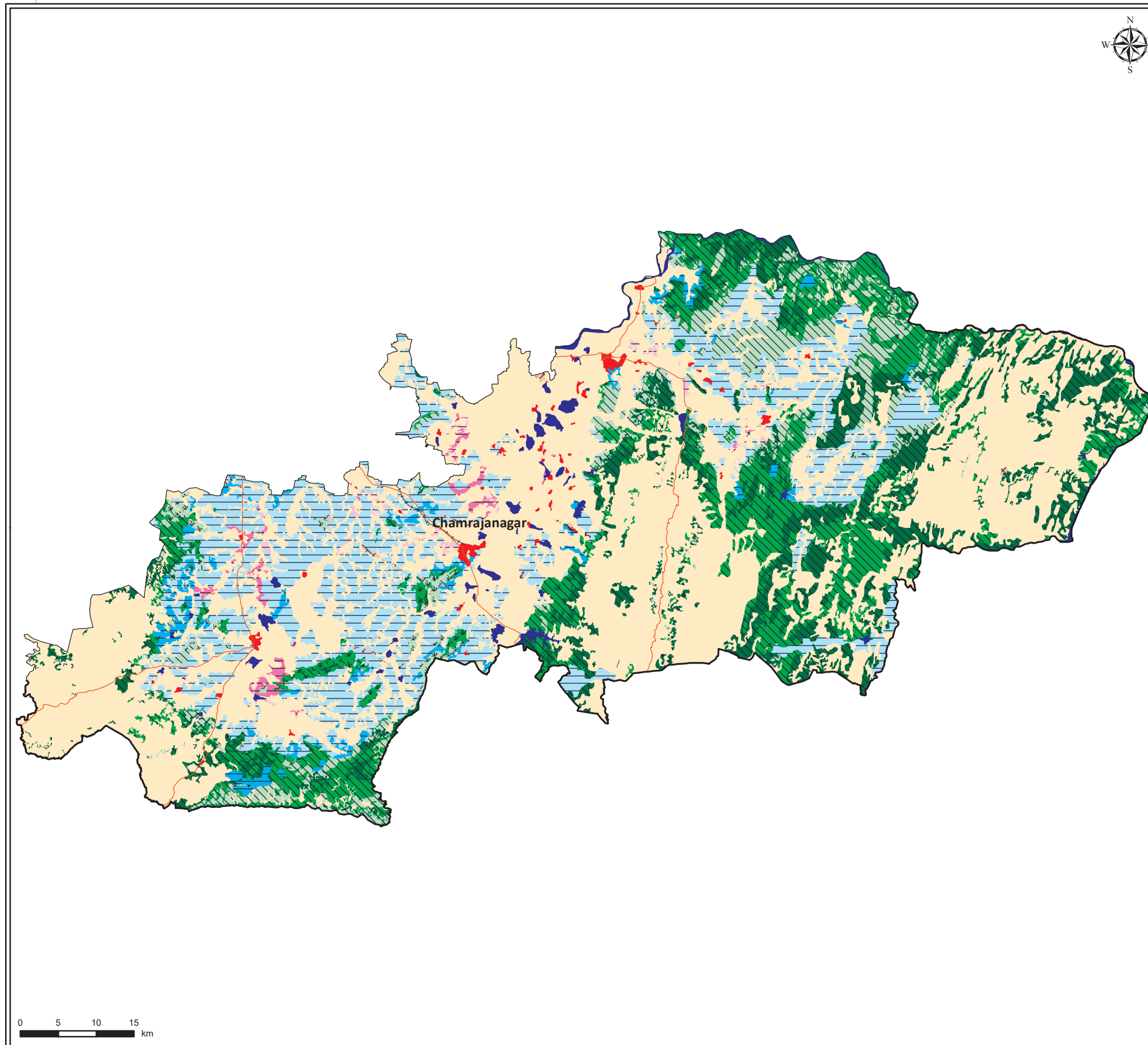
Chamarajanagar falls within the region of Southern Deccan Plateau. The region in general represents an extension of both the Western Ghats and the Eastern Ghats. Some parts of the region also represent the landscape of a plain with a few residual knolls cropping at few places. The entire area is fully covered with close reserve forests. The famous Biligiri Rangana Hills are largely spread in the regions covering Chamarajanagar, Kollegal and Yelandur taluks. Generally, the drainage is towards east and comprises mainly to the Cauvery river basin. The river Suvarnavati also called as Honnuhole is another important river of the district.

Chamarajanagar is observed with 47.10% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has decreased about 0.40% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (28.61% during 2011-13 and 2003-05) followed by Water erosion (16.89% during 2011-13 and 17.41% during 2003-05).
















Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	161587.26	28.61	161587.26	28.61	0.00
Water Erosion	95400.64	16.89	98324.66	17.41	-2924.01
Salinity / Alkalinity	5142.44	0.91	4828.76	0.85	313.68
Man Made	965.98	0.17	875.37	0.15	90.61
Settlement	2912.77	0.52	2652.38	0.47	260.38
Total Area under Desertification	266009.08	47.10	268268.43	47.50	-2259.35
No Apparent Degradation	291092.27	51.54	288832.92	51.14	2259.35
Total Geographical Area (ha)	564800.00				








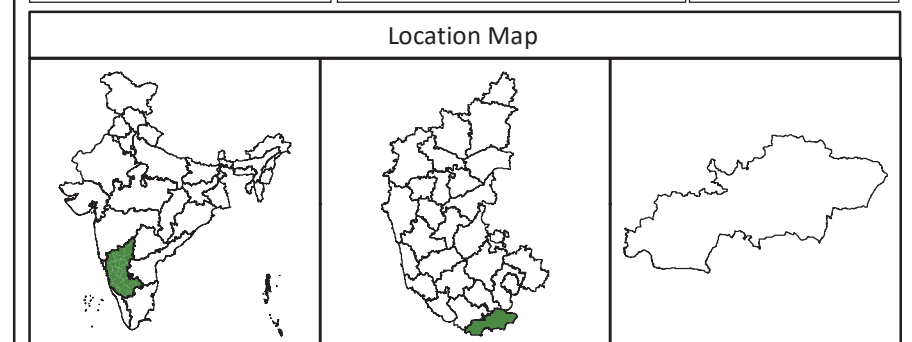
SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Fv1	Forest, vegetation degradation, Slight	58891.97	10.43	58891.97	10.43	0.00
2	Fv2	Forest, vegetation degradation, Moderate	62744.08	11.11	62744.08	11.11	0.00
3	Fv3	Forest, vegetation degradation, Severe	27326.49	4.84	27326.49	4.84	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	2160.54	0.38	2160.54	0.38	0.00
5	Sv2	Land with scrub, vegetation degradation, Moderate	5718.84	1.01	5718.84	1.01	0.00
6	Sv3	Land with scrub, vegetation degradation, Severe	4745.35	0.84	4745.35	0.84	0.00
7	Dw1	Agriculture unirrigated, water erosion, Slight	85736.40	15.18	88486.31	15.67	-2749.91
8	Dw2	Agriculture unirrigated, water erosion, Moderate	9664.24	1.71	9838.35	1.74	-174.10
9	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight	1970.59	0.35	1970.59	0.35	0.00
10	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate	3171.84	0.56	2858.17	0.51	313.68
11	Tm1	Others, man made, Slight	878.37	0.16	787.77	0.14	90.61
12	Tm3	Others, man made, Severe	87.60	0.02	87.60	0.02	0.00
13	S	Settlement	2912.77	0.52	2652.38	0.47	260.38
Total Area Under Desertification/ Land Degradation			266009.08	47.10	268268.43	47.50	-2259.35
14	W	Water body/ Drainage	7698.65	1.36	7698.65	1.36	0.00
15	NAD	No Apparent Degradation	291092.27	51.54	288832.92	51.14	2259.35
Total Geographical Area (ha)			564800.00	100.00	564800.00	100.00	



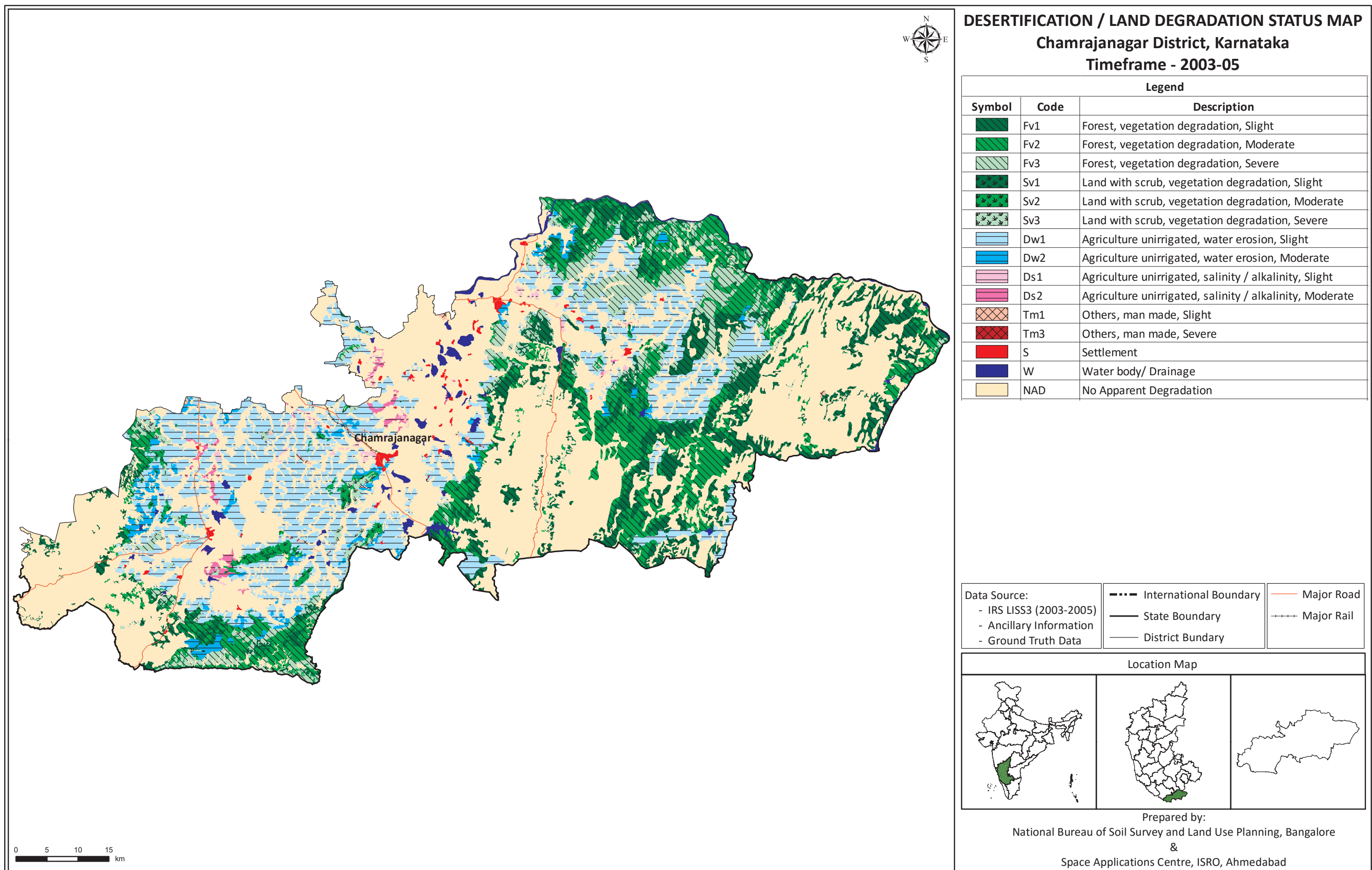
DESERTIFICATION / LAND DEGRADATION STATUS MAP Chamrajanagar District, Karnataka Timeframe - 2011-13

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight
	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate
	Tm1	Others, man made, Slight
	Tm3	Others, man made, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source: - IRS LISS3 (2011-2013) - Ancillary Information - Ground Truth Data	 International Boundary	 Major Road
	 State Boundary	 Major Rail
	 District Boundary	



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



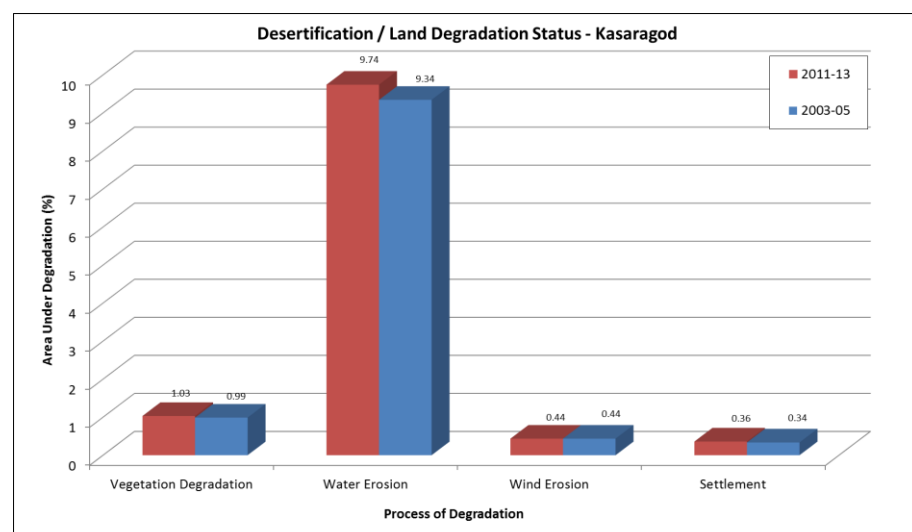
Kasaragod District, Kerala

Kasaragod district is the northern most district of Kerala State. The district is borders Karnataka state on east side, Arabian sea on west side and it shares boundary with Kannur district on south side. It covers an area of about 1989 sq. km. The district has a population of 13,07,375 with 657 population density, 1080 sex ratio and a literacy rate of 90.1%. (Census 2011)

Geographically, Kasaragod lies between Western Ghats and the Arabian sea. The Western Ghats run parallel to the sea and constitute an almost continuous mountain wall on the eastern side. Based on physical features, the district falls in to three natural divisions; the low land, bordering the sea, the mid land consisting of the undulating country and the forest, clad high land on the extreme east. There are 12 west flowing rivers besides backwaters and canals in this coastal tract, of which Chandragiri and Kariangote are the major ones.

Kasaragod is observed with 11.57% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.47% since 2003-05. The most significant process of land degradation/ desertification in the district is Water Erosion (9.74% during 2011-13 and 9.34% during 2003-05) followed by Vegetation Degradation (1.03% during 2011-13 and 0.99% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	2052.70	1.03	1966.08	0.99	86.62
Water Erosion	19375.75	9.74	18582.90	9.34	792.86
Wind Erosion	866.31	0.44	866.31	0.44	0.00
Settlement	716.18	0.36	666.74	0.34	49.44
Total Area under Desertification	23010.94	11.57	22082.02	11.10	928.92
No Apparent Degradation	169373.19	85.15	170302.11	85.62	-928.92
Total Geographical Area (ha)	198900.00				



SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Fv1	Forest, vegetation degradation, Slight	632.96	0.32	613.97	0.31	18.99
2	Fv2	Forest, vegetation degradation, Moderate	89.03	0.04	89.03	0.04	0.00
3	Sv1	Land with scrub, vegetation degradation, Slight	494.96	0.25	427.33	0.21	67.64
4	Sv2	Land with scrub, vegetation degradation, Moderate	835.75	0.42	835.75	0.42	0.00
5	Dw1	Agriculture unirrigated, water erosion, Slight	19367.13	9.74	18574.27	9.34	792.86
6	Sw2	Land with scrub, water erosion, Moderate	8.63	0.00	8.63	0.00	0.00
7	Se1	Land with scrub, wind erosion, Slight	451.08	0.23	451.08	0.23	0.00
8	Ee1	Dune / Sandy area, wind erosion, Slight	415.23	0.21	415.23	0.21	0.00
9	S	Settlement	716.18	0.36	666.74	0.34	49.44
Total Area Under Desertification/ Land Degradation			23010.94	11.57	22082.02	11.10	928.92
10	W	Water body/ Drainage	6515.88	3.28	6515.88	3.28	0.00
11	NAD	No Apparent Degradation	169373.19	85.15	170302.11	85.62	-928.92
Total Geographical Area (ha)			198900.00	100.00	198900.00	100.00	














DESERTIFICATION / LAND DEGRADATION STATUS MAP

Kasaragod District, Kerala

Timeframe - 2011-13

Legend

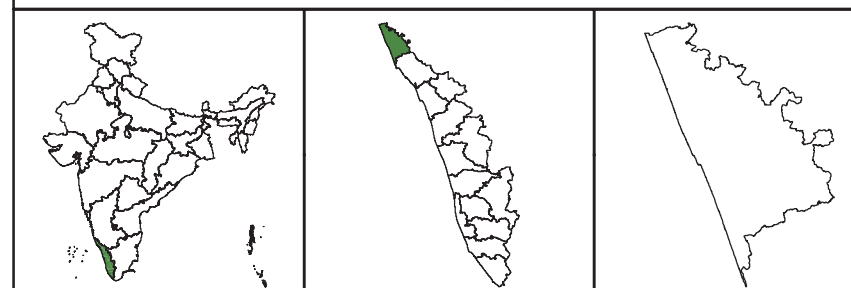
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Dw1	Agriculture unirrigated, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Se1	Land with scrub, wind erosion, Slight
	Ee1	Dune / Sandy area, wind erosion, Slight
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source:
- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

--- International Boundary
— State Boundary
— District Boundary

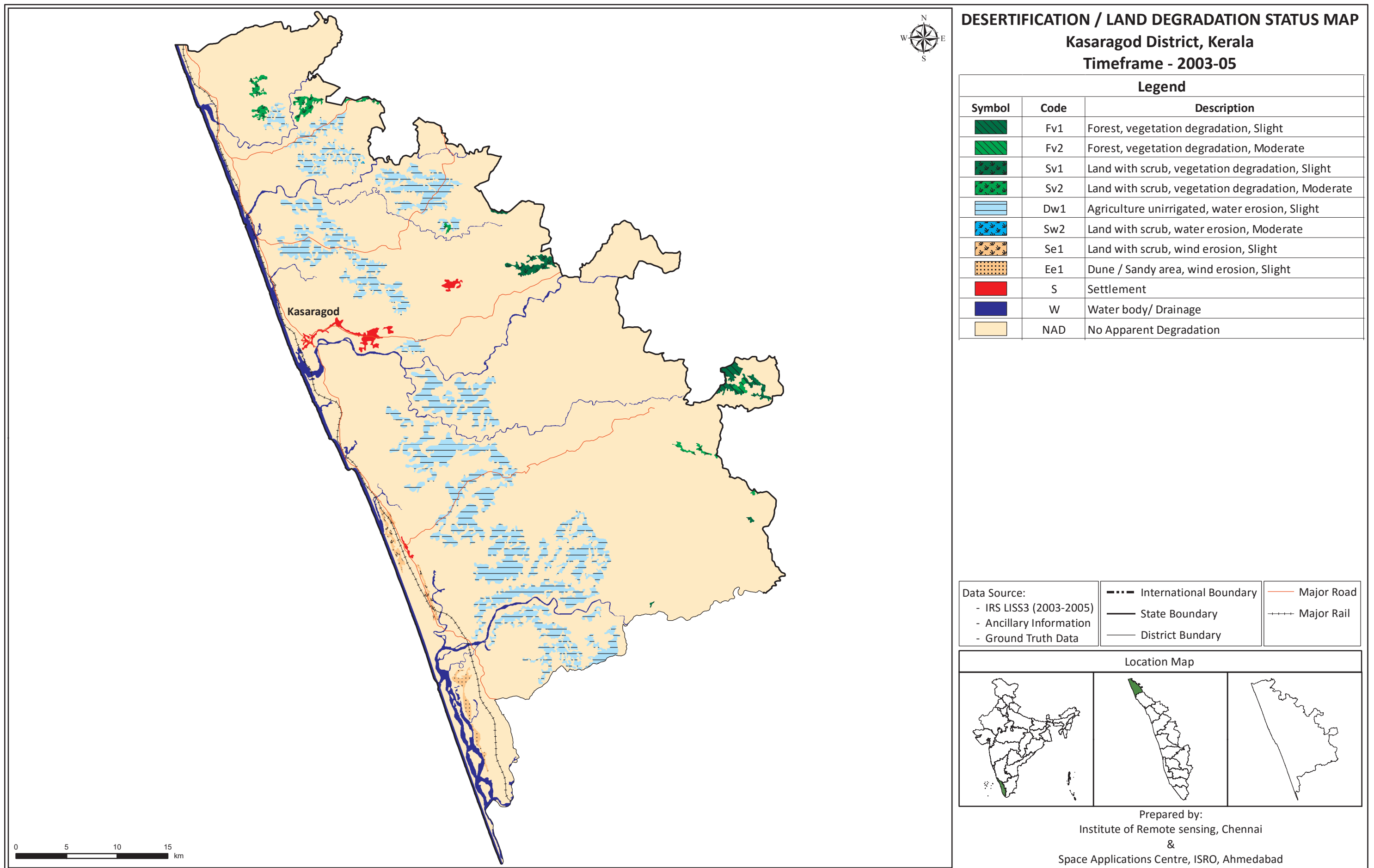
— Major Road
+ + + + Major Rail

Location Map



Prepared by:
Institute of Remote sensing, Chennai
&
Space Applications Centre, ISRO, Ahmedabad

0 5 10 15 km



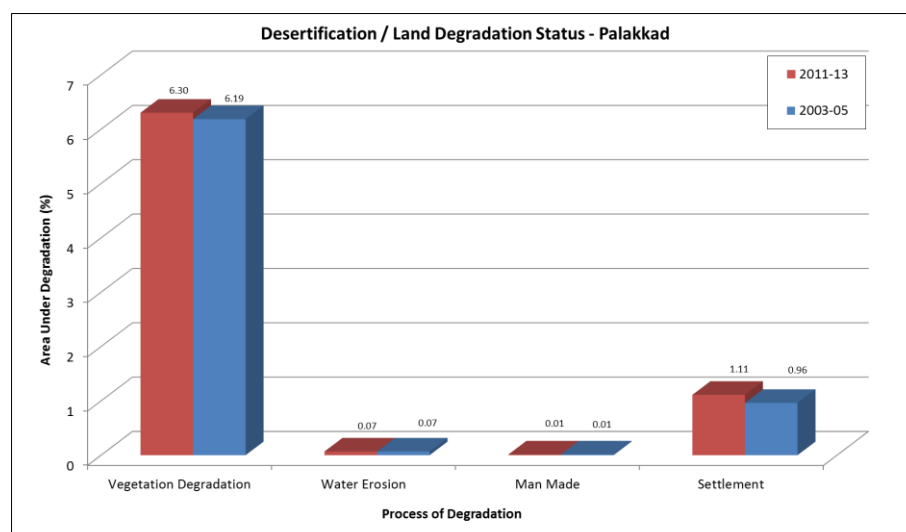
Palakkad District, Kerala

Palakkad is the largest district, falls in the central part of Kerala state. It is bounded on the east by Tamil Nadu state, on the north and north-west by Malappuram district and on the south and south-west by Thrissur district. It covers an area of 4,480 sq. km. The district has a population of 28,09,934 with 627 population density, 1,067 sex ratio and a literacy rate of 89.3%. (Census 2011)

Palakkad is divided into two divisions, Midland and Highland. The Midland region consists of valleys and plains. The eastern region of this district has high mountains, extensive ravines and dense forests. The continuity of the majestic Western Ghats stretching over 100 km is broken at Palakkad, known as Palakkad gap. On the two sides of the gap, giant Nilgiris and Anamala are situated. The plains are so fertile and productive that the district is considered the granary of Kerala. Rivers flowing in the district are Bharathapuzha, Kannadi, Gayathripuzha, Thoothapuzha, Bhavani and Siruvani.

Palakkad is observed with 7.50 % of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.27% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (6.30% during 2011-13 and 6.19% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	28237.05	6.30	27709.08	6.19	527.96
Water Erosion	305.75	0.07	305.75	0.07	0.00
Man Made	60.23	0.01	60.23	0.01	0.00
Settlement	4977.61	1.11	4309.06	0.96	668.55
Total Area under Desertification	33580.63	7.50	32384.12	7.23	1196.51
No Apparent Degradation	408733.44	91.24	409929.95	91.50	-1196.51
Total Geographical Area (ha)	448000.00				













SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Fv1	Forest, vegetation degradation, Slight	14224.04	3.18	16447.07	3.67	-2223.03
2	Fv2	Forest, vegetation degradation, Moderate	7801.40	1.74	5068.93	1.13	2732.47
3	Sv1	Land with scrub, vegetation degradation, Slight	1022.40	0.23	1011.88	0.23	10.52
4	Sv2	Land with scrub, vegetation degradation, Moderate	5189.22	1.16	5181.22	1.16	8.00
5	Dw1	Agriculture unirrigated, water erosion, Slight	305.75	0.07	305.75	0.07	0.00
6	Tm2	Others, man made, Moderate	22.98	0.01	22.98	0.01	0.00
7	Tm3	Others, man made, Severe	37.25	0.01	37.25	0.01	0.00
8	S	Settlement	4977.61	1.11	4309.06	0.96	668.55
Total Area Under Desertification/ Land Degradation			33580.63	7.50	32384.12	7.23	1196.51
9	W	Water body/ Drainage	5685.93	1.27	5685.93	1.27	0.00
10	NAD	No Apparent Degradation	408733.44	91.24	409929.95	91.50	-1196.51
Total Geographical Area (ha)			448000.00	100.00	448000.00	100.00	

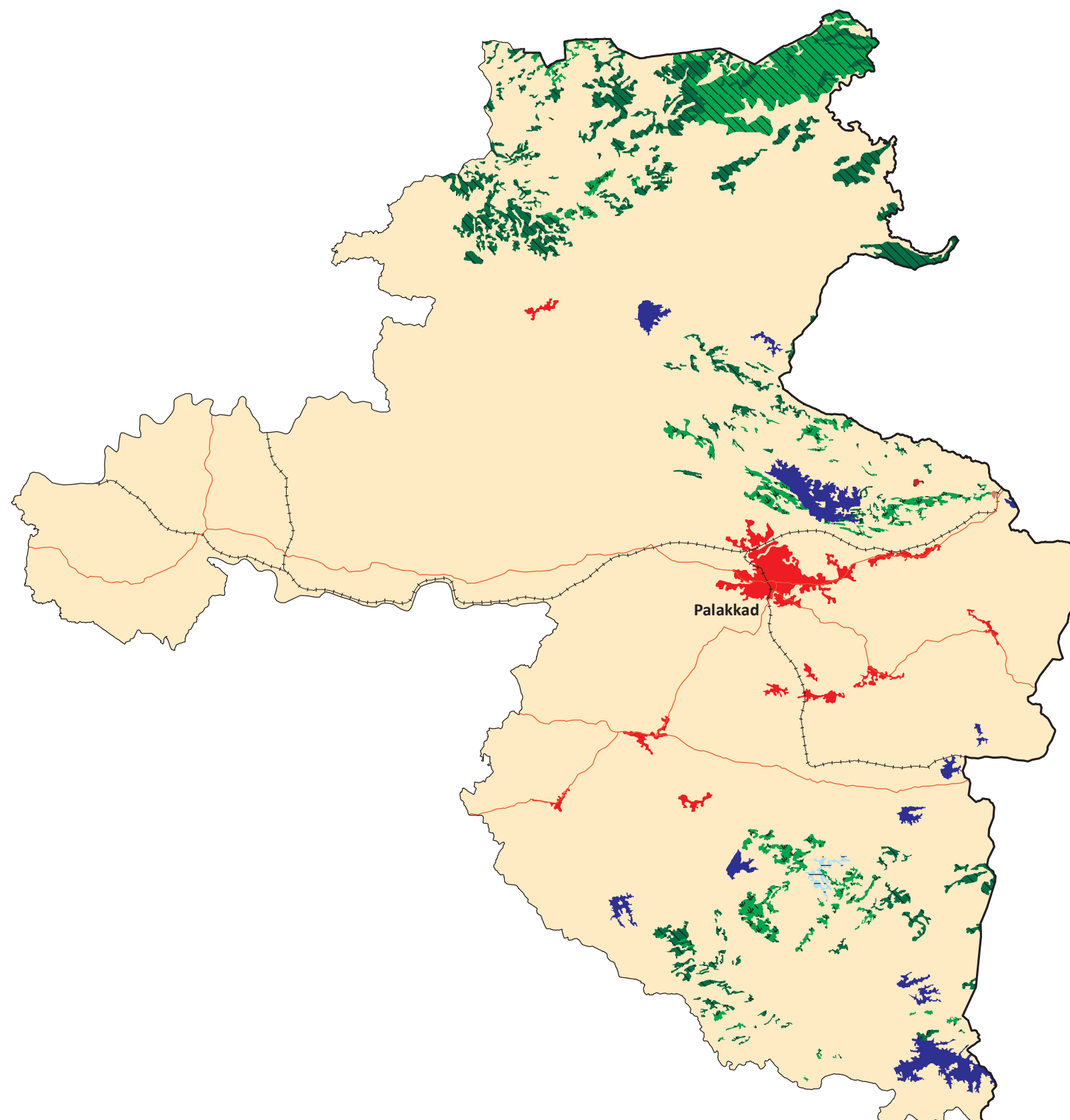


DESERTIFICATION / LAND DEGRADATION STATUS MAP

Palakkad District, Kerala

Timeframe - 2011-13

Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Dw1	Agriculture unirrigated, water erosion, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

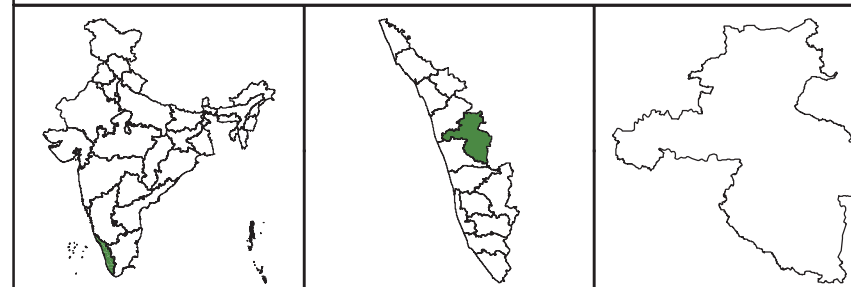


Data Source:
 - IRS LISS3 (2011-2013)
 - Ancillary Information
 - Ground Truth Data

--- International Boundary
 — State Boundary
 — District Boundary

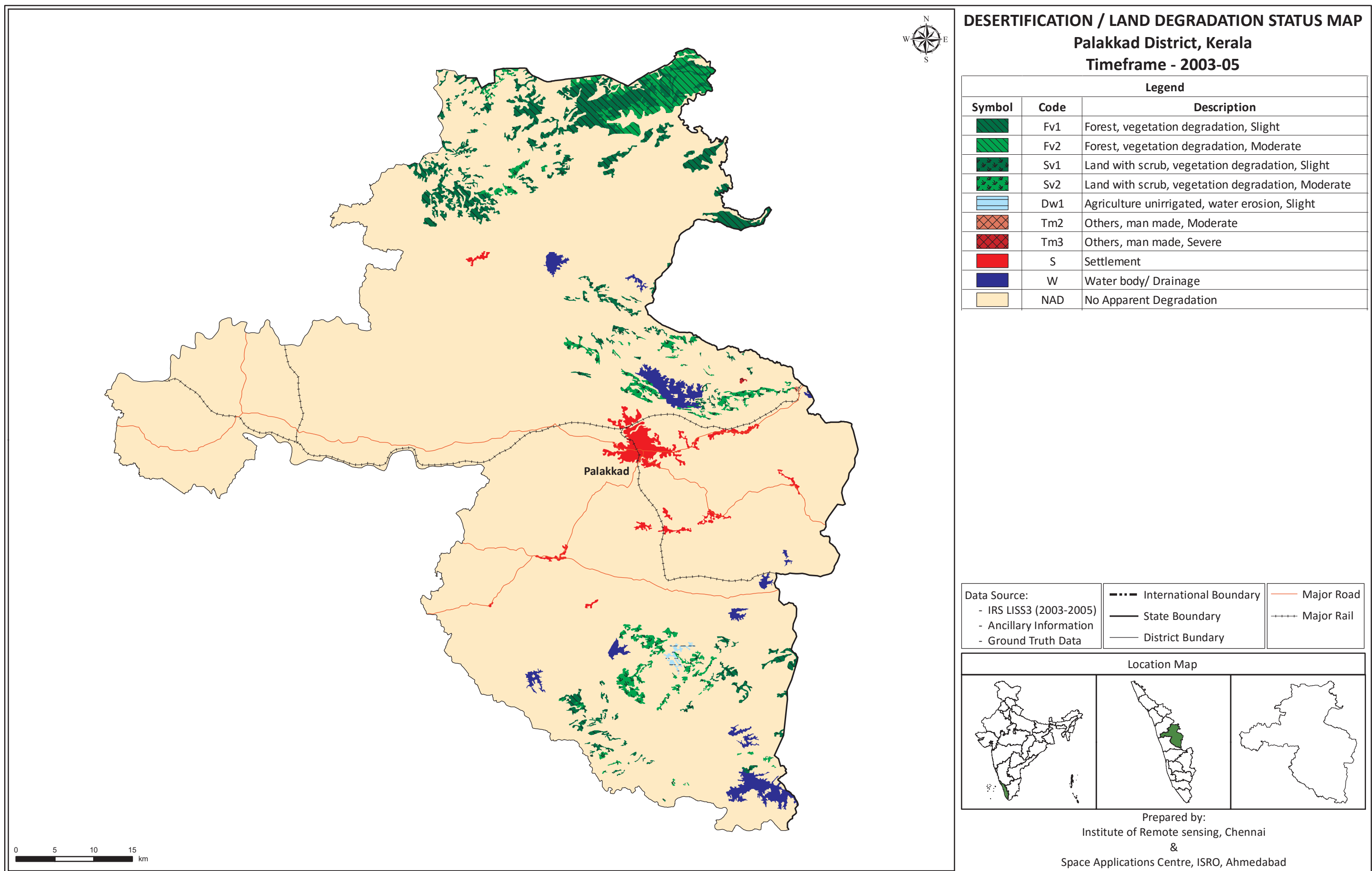
— Major Road
 +++ Major Rail

Location Map



Prepared by:
 Institute of Remote sensing, Chennai
 &
 Space Applications Centre, ISRO, Ahmedabad

0 5 10 15 km



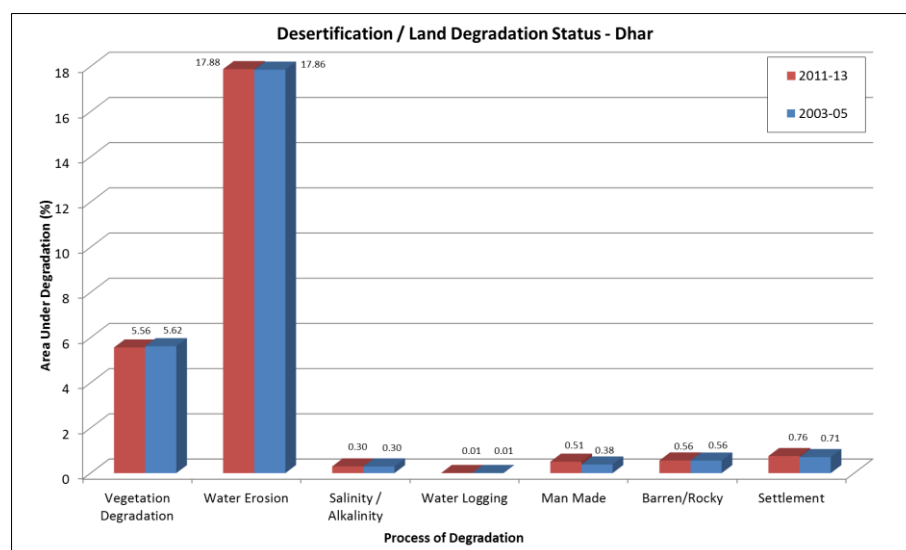
Dhar District, Madhya Pradesh

Dhar district lies in the south-eastern portion of Madhya Pradesh state. It is bounded in the north by Ratlam and Ujjain districts, on the east by Indore, on the south by Khargone (West-Nimar) and Barwani and on the west by Jhabua and Alirajpur district. It covers an area of 8153 sq. km. The district has a population of 21,85,793 with 268 population density, 964 sex ratio and 59% literacy rate. (Census 2011)

The district extends over three physiographic divisions, these are the Malwa plateau in the north, the Vindhya range in central zone and the Narmada valley along the southern boundary. The Vindhya Range runs east and west through the district. The northwestern portion of the district lies in the watershed of the Mahi River and its tributaries, while the northeastern part of the district lies in the watershed of the Chambal River, which drains into the Ganges via the Yamuna River. The portion of the district south of the ridge of the Vindhyas lies in the watershed of the Narmada River, which forms the southern boundary of the district.






































Dhar is observed with 25.56% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.14% since 2003-05. The most significant process of land degradation/ desertification in the district is Water erosion (17.88% during 2011-13 and 17.86% during 2003-05) followed by Vegetation Degradation (5.56% during 2011-13 and 5.62% during 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	45328.53	5.56	45794.56	5.62	-466.04
Water Erosion	145765.12	17.88	145572.52	17.86	192.60
Salinity / Alkalinity	2414.48	0.30	2414.48	0.30	0.00
Water Logging	63.91	0.01	63.91	0.01	0.00
Man Made	4124.03	0.51	3117.86	0.38	1006.17
Barren/Rocky	4559.14	0.56	4529.64	0.56	29.50
Settlement	6160.23	0.76	5790.07	0.71	370.16
Total Area under Desertification	208415.44	25.56	207283.05	25.42	1132.40
No Apparent Degradation	585472.05	71.81	587915.39	72.11	-2443.34
Total Geographical Area (ha)	815300.00				

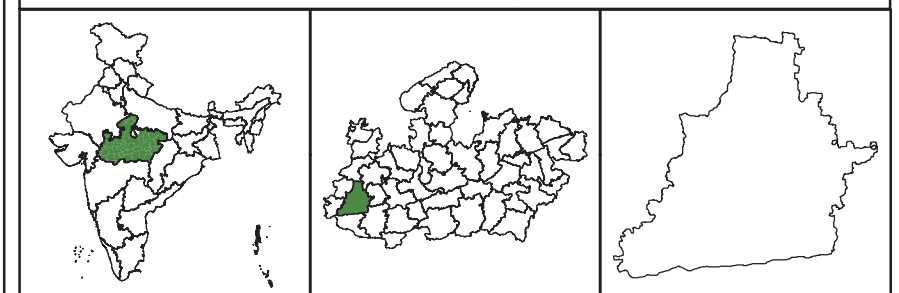


SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Fv1	Forest, vegetation degradation, Slight	4362.92	0.54	4563.49	0.56	-200.57
2	Fv2	Forest, vegetation degradation, Moderate	1840.23	0.23	1840.23	0.23	0.00
3	Fv3	Forest, vegetation degradation, Severe	944.10	0.12	944.10	0.12	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	5231.39	0.64	5409.18	0.66	-177.79
5	Sv2	Land with scrub, vegetation degradation, Moderate	27940.49	3.43	28028.16	3.44	-87.67
6	Sv3	Land with scrub, vegetation degradation, Severe	5009.40	0.61	5009.40	0.61	0.00
7	Iw1	Agriculture irrigated, water erosion, Slight	355.30	0.04	355.30	0.04	0.00
8	Iw2	Agriculture irrigated, water erosion, Moderate	1058.50	0.13	1058.50	0.13	0.00
9	Dw1	Agriculture unirrigated, water erosion, Slight	9624.85	1.18	9624.85	1.18	0.00
10	Dw2	Agriculture unirrigated, water erosion, Moderate	9974.93	1.22	9974.93	1.22	0.00
11	Dw3	Agriculture unirrigated, water erosion, Severe	4213.70	0.52	4213.70	0.52	0.00
12	Fw1	Forest, water erosion, Slight	33160.36	4.07	33160.36	4.07	0.00
13	Fw2	Forest, water erosion, Moderate	13545.27	1.66	13477.01	1.65	68.26
14	Fw3	Forest, water erosion, Severe	7819.48	0.96	7819.48	0.96	0.00
15	Sw1	Land with scrub, water erosion, Slight	16386.38	2.01	16409.02	2.01	-22.64
16	Sw2	Land with scrub, water erosion, Moderate	23654.39	2.90	23675.12	2.90	-20.73
17	Sw3	Land with scrub, water erosion, Severe	21768.83	2.67	21768.83	2.67	0.00
18	Bw1	Barren, water erosion, Slight	1173.43	0.14	1173.43	0.14	0.00
19	Bw2	Barren, water erosion, Moderate	1276.45	0.16	1108.74	0.14	167.71
20	Bw3	Barren, water erosion, Severe	1753.24	0.22	1753.24	0.22	0.00
21	Is1	Agriculture irrigated, salinity / alkalinity, Slight	161.69	0.02	161.69	0.02	0.00
22	Is2	Agriculture irrigated, salinity / alkalinity, Moderate	4.81	0.00	4.81	0.00	0.00
23	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight	924.86	0.11	924.86	0.11	0.00
24	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate	411.49	0.05	411.49	0.05	0.00
25	Bs1	Barren, salinity / alkalinity, Slight	426.42	0.05	426.42	0.05	0.00
26	Bs2	Barren, salinity / alkalinity, Moderate	354.50	0.04	354.50	0.04	0.00
27	Bs3	Barren, salinity / alkalinity, Severe	130.71	0.02	130.71	0.02	0.00
28	Il2	Agriculture irrigated, water logging, Moderate	63.91	0.01	63.91	0.01	0.00
29	Fm1	Forest, man made, Slight	14.86	0.00	14.86	0.00	0.00
30	Fm2	Forest, man made, Moderate	32.54	0.00	26.54	0.00	5.99
31	Tm1	Others, man made, Slight	1750.42	0.21	966.48	0.12	783.94
32	Tm2	Others, man made, Moderate	2173.89	0.27	1924.04	0.24	249.85
33	Tm3	Others, man made, Severe	152.32	0.02	185.94	0.02	-33.61
34	R	Rocky	4559.14	0.56	4529.64	0.56	29.50
35	S	Settlement	6160.23	0.76	5790.07	0.71	370.16
Total Area Under Desertification/ Land Degradation			208415.44	25.56	207283.05	25.42	1132.40
36	W	Water body/ Drainage	21412.50	2.63	20101.56	2.47	1310.94
37	NAD	No Apparent Degradation	585472.05	71.81	587915.39	72.11	-2443.34
Total Geographical Area (ha)			815300.00	100.00	815300.00	100.00	

DESERTIFICATION / LAND DEGRADATION STATUS MAP Dhar District, Madhya Pradesh Timeframe - 2011-13






Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Iw2	Agriculture irrigated, water erosion, Moderate
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Dw3	Agriculture unirrigated, water erosion, Severe
	Fw1	Forest, water erosion, Slight
	Fw2	Forest, water erosion, Moderate
	Fw3	Forest, water erosion, Severe
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	Bw1	Barren, water erosion, Slight
	Bw2	Barren, water erosion, Moderate
	Bw3	Barren, water erosion, Severe
	Is1	Agriculture irrigated, salinity / alkalinity, Slight
	Is2	Agriculture irrigated, salinity / alkalinity, Moderate
	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight
	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate
	Bs1	Barren, salinity / alkalinity, Slight
	Bs2	Barren, salinity / alkalinity, Moderate
	Bs3	Barren, salinity / alkalinity, Severe
	Ii2	Agriculture irrigated, water logging, Moderate
	Fm1	Forest, man made, Slight
	Fm2	Forest, man made, Moderate
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Location Map



Prepared by:
MP Council of Science and Technology, Bhopal
&
Space Applications Centre, ISRO, Ahmedabad

Data Source:
- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

 International Boundary
 State Boundary
 District Boundary
 Major Road
 Major Rail

0 5 10 15 km

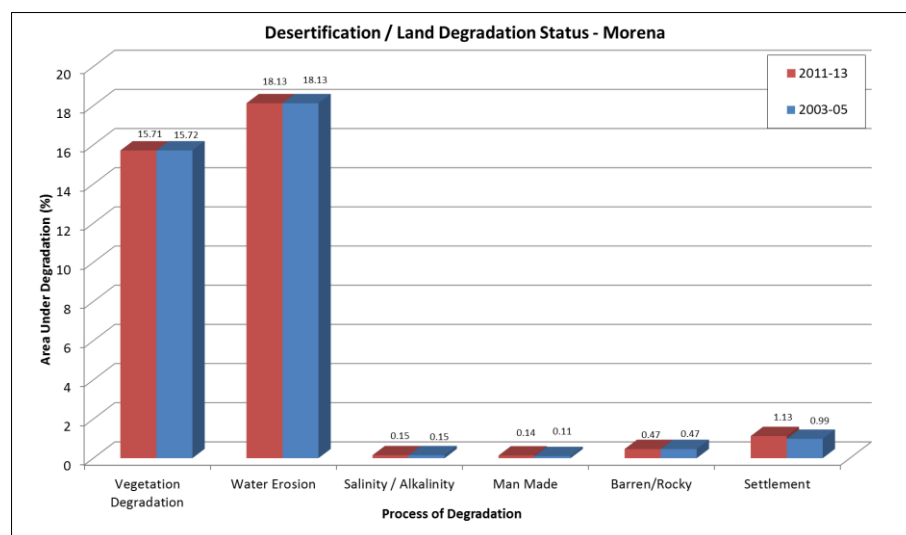
Morena District, Madhya Pradesh

Morena district lies in the northern west part of Madhya Pradesh state. Chambal river forms the northern boundary of the district, separating it from Rajasthan and Uttar Pradesh states. It is bounded by Gwalior district in south, Sheopur district in south-west and Bhind district in east. The district covers an area of 4989 sq. km. It has a population of 19,65,970 with 394 population density, 840 sex ratio and a literacy rate of 71%. (Census 2011)

The district lies on the meeting point of the Vindhyan Plateau and the low lying zone of Chambal Valley. The district falls in drainage area of Ganges system. The whole water of the district drained out through Chambal river which joins the Yamuna. Generally, the flow of the water is towards north-east. Chambal is the main river of the district. Asan and Kunwari are the tributaries of Chambal river which flows in this district.

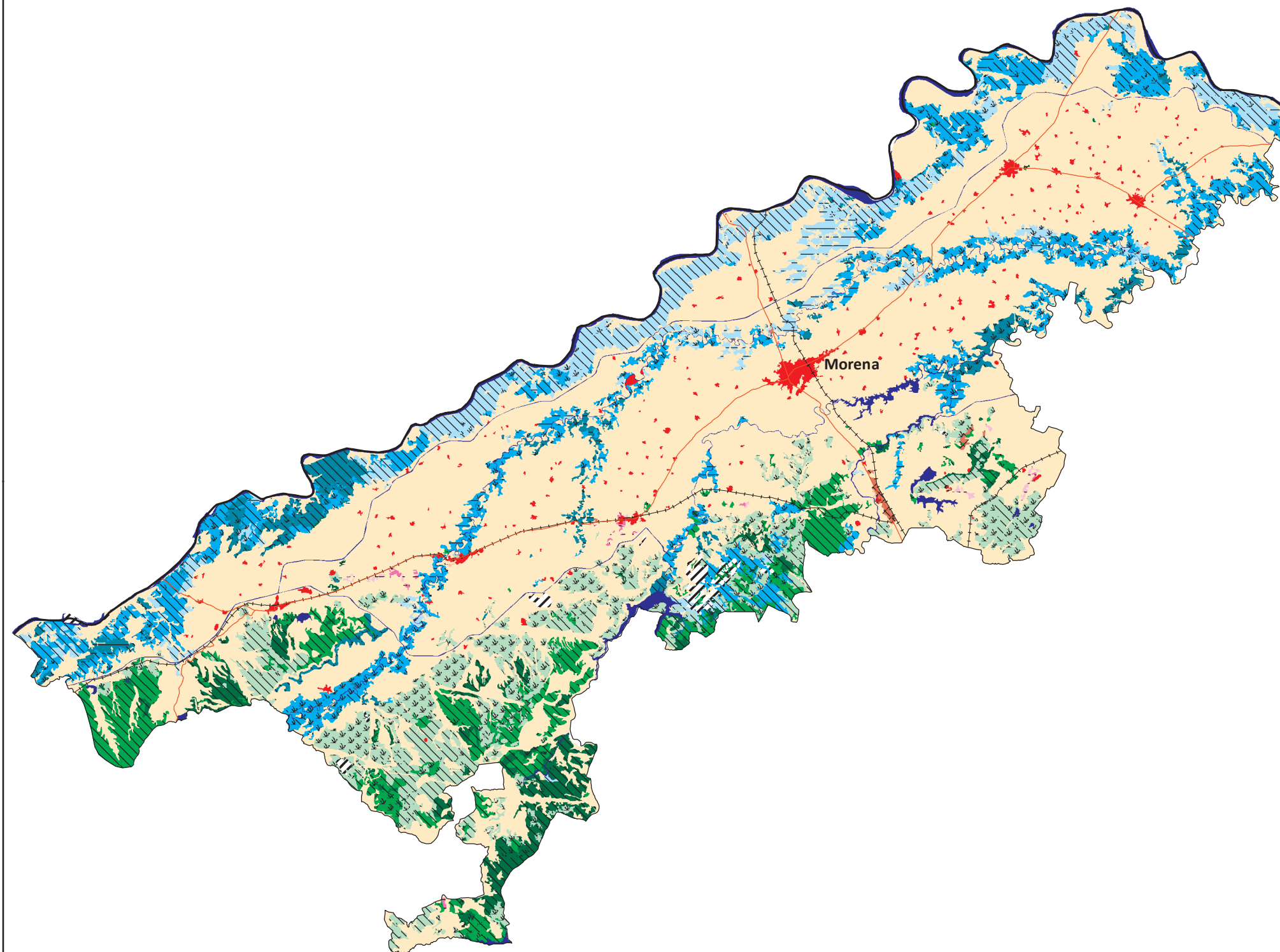
Morena is observed with 35.73% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.16% since 2003-05. The most significant process of land degradation/ desertification in the district is Water Erosion (18.13% during 2011-13 and 2003-05) followed by Vegetation Degradation (15.71% during 2011-13 and 15.72% during 2003-05).

























Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	78401.76	15.71	78414.37	15.72	-12.61
Water Erosion	90432.22	18.13	90432.22	18.13	0.00
Salinity / Alkalinity	756.44	0.15	756.44	0.15	0.00
Man Made	697.66	0.14	552.69	0.11	144.97
Barren/Rocky	2340.71	0.47	2340.71	0.47	0.00
Settlement	5644.41	1.13	4939.32	0.99	705.09
Total Area under Desertification	178273.20	35.73	177435.76	35.57	837.45
No Apparent Degradation	308153.15	61.77	308990.60	61.93	-837.45
Total Geographical Area (ha)	498900.00				

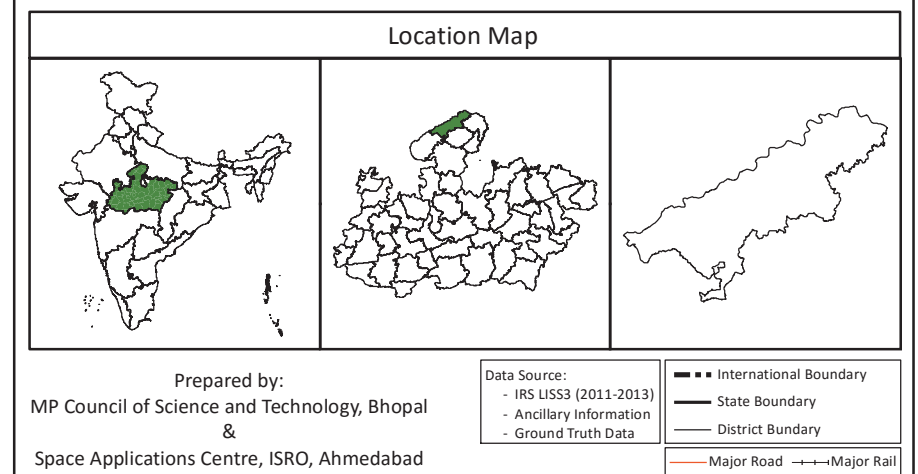


SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Fv1	Forest, vegetation degradation, Slight	11815.93	2.37	11815.93	2.37	0.00
2	Fv2	Forest, vegetation degradation, Moderate	21115.41	4.23	21115.41	4.23	0.00
3	Fv3	Forest, vegetation degradation, Severe	14165.85	2.84	14165.85	2.84	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	1431.35	0.29	1431.35	0.29	0.00
5	Sv2	Land with scrub, vegetation degradation, Moderate	3764.76	0.75	3777.37	0.76	-12.61
6	Sv3	Land with scrub, vegetation degradation, Severe	26108.46	5.23	26108.46	5.23	0.00
7	Dw1	Agriculture unirrigated, water erosion, Slight	4398.84	0.88	4398.84	0.88	0.00
8	Dw2	Agriculture unirrigated, water erosion, Moderate	4934.90	0.99	4934.90	0.99	0.00
9	Dw3	Agriculture unirrigated, water erosion, Severe	2672.48	0.54	2672.48	0.54	0.00
10	Fw1	Forest, water erosion, Slight	21027.47	4.21	21027.47	4.21	0.00
11	Fw2	Forest, water erosion, Moderate	16989.62	3.41	16989.62	3.41	0.00
12	Fw3	Forest, water erosion, Severe	5908.74	1.18	5908.74	1.18	0.00
13	Sw1	Land with scrub, water erosion, Slight	5816.37	1.17	5816.37	1.17	0.00
14	Sw2	Land with scrub, water erosion, Moderate	24233.14	4.86	24233.14	4.86	0.00
15	Sw3	Land with scrub, water erosion, Severe	4450.66	0.89	4450.66	0.89	0.00
16	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight	424.18	0.09	424.18	0.09	0.00
17	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate	332.26	0.07	332.26	0.07	0.00
18	Tm1	Others, man made, Slight	67.97	0.01	144.85	0.03	-76.88
19	Tm2	Others, man made, Moderate	564.96	0.11	377.03	0.08	187.92
20	Tm3	Others, man made, Severe	64.73	0.01	30.80	0.01	33.92
21	R	Rocky	2340.71	0.47	2340.71	0.47	0.00
22	S	Settlement	5644.41	1.13	4939.32	0.99	705.09
Total Area Under Desertification/ Land Degradation			178273.20	35.73	177435.76	35.57	837.45
23	W	Water body/ Drainage	12473.64	2.50	12473.64	2.50	0.00
24	NAD	No Apparent Degradation	308153.15	61.77	308990.60	61.93	-837.45
Total Geographical Area (ha)			498900.00	100.00	498900.00	100.00	

DESERTIFICATION / LAND DEGRADATION STATUS MAP Morena District, Madhya Pradesh Timeframe - 2011-13



Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Dw3	Agriculture unirrigated, water erosion, Severe
	Fw1	Forest, water erosion, Slight
	Fw2	Forest, water erosion, Moderate
	Fw3	Forest, water erosion, Severe
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight
	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation



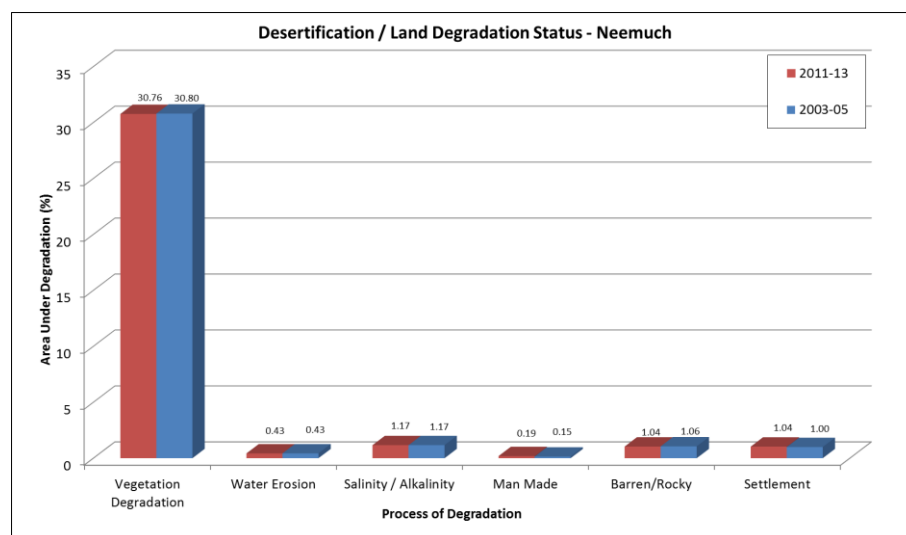
Neemuch District, Madhya Pradesh

Neemuch district lies in west most part of Madhya Pradesh state. It is bounded by Rajasthan state in the north, north-west and north-east directions, while in the south and south-east directions, it is bounded by Mandsaur district. It covers an area of 4256 sq. km. The district has a population of 8,26,067 with 194 population density, 954 sex ratio and a literacy rate of 70.8%. (Census 2011)

The district can be divided into two natural divisions, the area spread over northern hilly towns and the lower side of Malwa Plateau. Almost entire area of the district falls in the Ganga drainage system. Chambal is the main river of the district. Kalisindh, Retam and Sivna, Idar, Tilesar and Gujal are the other rivers flowing through the district. Gandhisagar is a major dam supporting irrigation and production of Hydroelectricity. Neemuch is one of the largest producers of Opium in the world.






















Neemuch is observed with 34.63% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.02% since 2003-05. The most significant process of land degradation/ desertification in the district is Vegetation Degradation (30.76% during 2011-13 and 30.80% during 2003-05) followed by Salinity/Alkalinity (1.17% during 2011-13 and 2003-05).

Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	130930.12	30.76	131086.64	30.80	-156.51
Water Erosion	1836.69	0.43	1836.69	0.43	0.00
Salinity / Alkalinity	4965.72	1.17	4967.69	1.17	-1.97
Man Made	816.05	0.19	631.70	0.15	184.35
Barren/Rocky	4435.29	1.04	4511.99	1.06	-76.70
Settlement	4411.15	1.04	4261.66	1.00	149.49
Total Area under Desertification	147395.03	34.63	147296.37	34.61	98.66
No Apparent Degradation	251124.63	59.00	251511.28	59.10	-386.65
Total Geographical Area (ha)	425600.00				

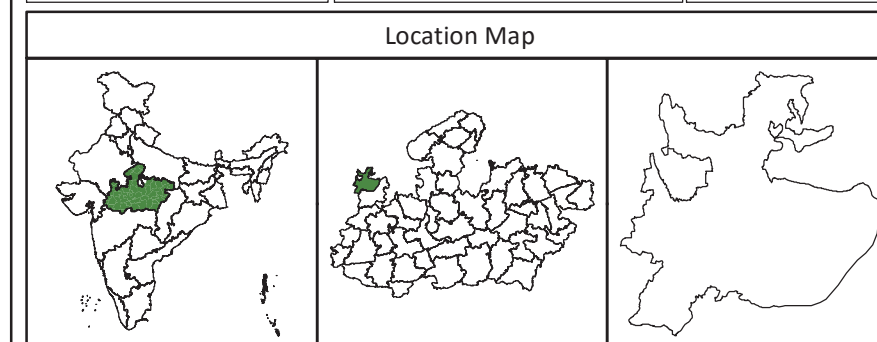


SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	(2011-13) - (2003-05)
1	Fv1	Forest, vegetation degradation, Slight	34250.37	8.05	34250.37	8.05	0.00
2	Fv2	Forest, vegetation degradation, Moderate	35792.98	8.41	35792.98	8.41	0.00
3	Fv3	Forest, vegetation degradation, Severe	4241.53	1.00	4241.53	1.00	0.00
4	Sv1	Land with scrub, vegetation degradation, Slight	9754.26	2.29	9870.96	2.32	-116.70
5	Sv2	Land with scrub, vegetation degradation, Moderate	24475.46	5.75	24517.13	5.76	-41.67
6	Sv3	Land with scrub, vegetation degradation, Severe	22415.52	5.27	22413.67	5.27	1.85
7	Dw1	Agriculture unirrigated, water erosion, Slight	129.48	0.03	129.48	0.03	0.00
8	Sw1	Land with scrub, water erosion, Slight	1521.12	0.36	1521.12	0.36	0.00
9	Sw2	Land with scrub, water erosion, Moderate	186.09	0.04	186.09	0.04	0.00
10	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight	27.91	0.01	27.91	0.01	0.00
11	Bs1	Barren, salinity / alkalinity, Slight	624.20	0.15	624.20	0.15	0.00
12	Bs2	Barren, salinity / alkalinity, Moderate	2292.70	0.54	2292.68	0.54	0.02
13	Bs3	Barren, salinity / alkalinity, Severe	2020.90	0.47	2022.89	0.48	-1.99
14	Tm1	Others, man made, Slight	103.06	0.02	64.01	0.02	39.05
15	Tm2	Others, man made, Moderate	461.22	0.11	392.62	0.09	68.60
16	Tm3	Others, man made, Severe	251.77	0.06	175.07	0.04	76.70
17	B	Barren	761.74	0.18	761.74	0.18	0.00
18	R	Rocky	3673.55	0.86	3750.25	0.88	-76.70
19	S	Settlement	4411.15	1.04	4261.66	1.00	149.49
Total Area Under Desertification/ Land Degradation			147395.03	34.63	147296.37	34.61	98.66
20	W	Water body/ Drainage	27080.34	6.36	26792.35	6.30	287.99
21	NAD	No Apparent Degradation	251124.63	59.00	251511.28	59.10	-386.65
Total Geographical Area (ha)			425600.00	100.00	425600.00	100.00	

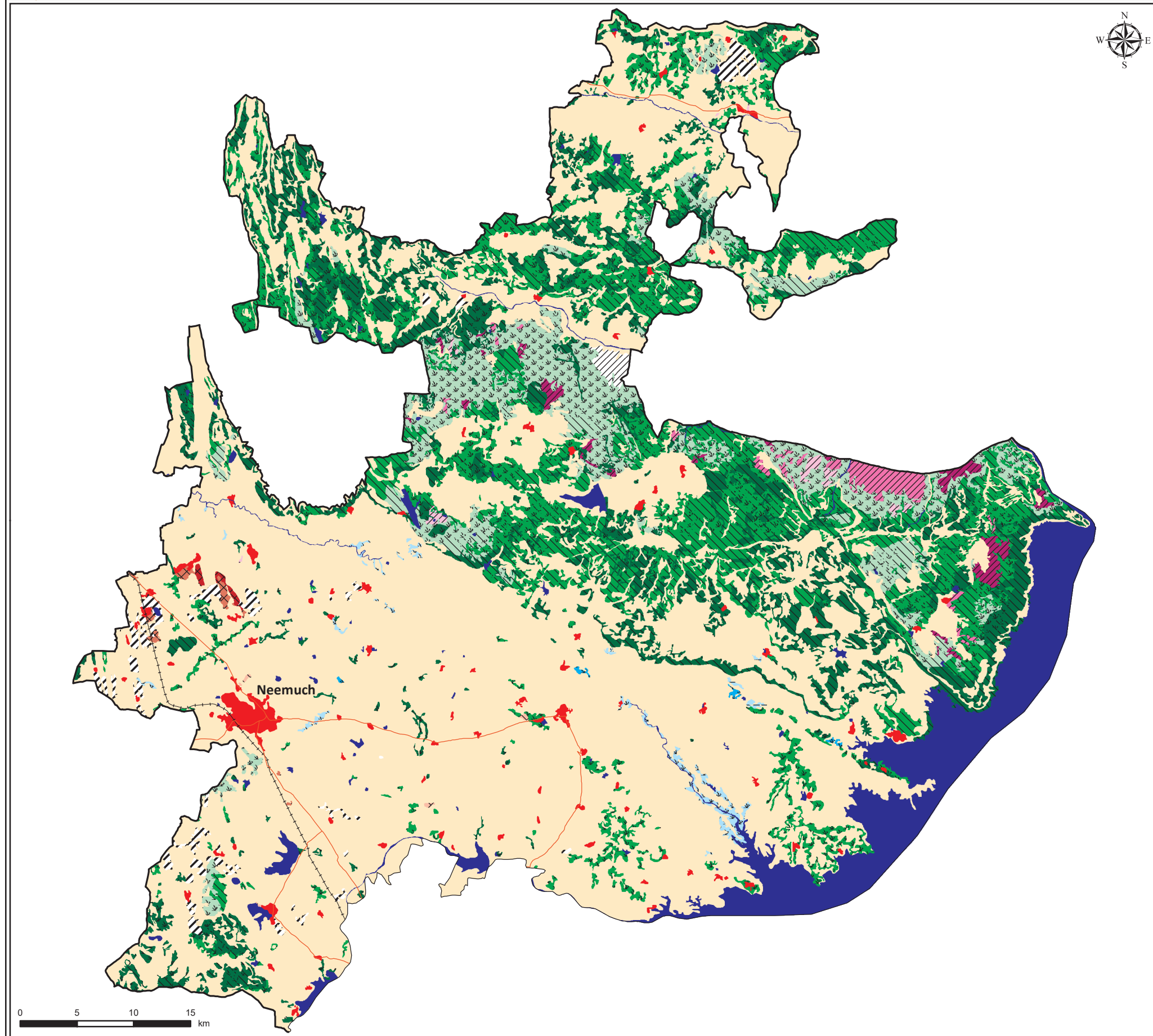
DESERTIFICATION / LAND DEGRADATION STATUS MAP Neemuch District, Madhya Pradesh Timeframe - 2011-13

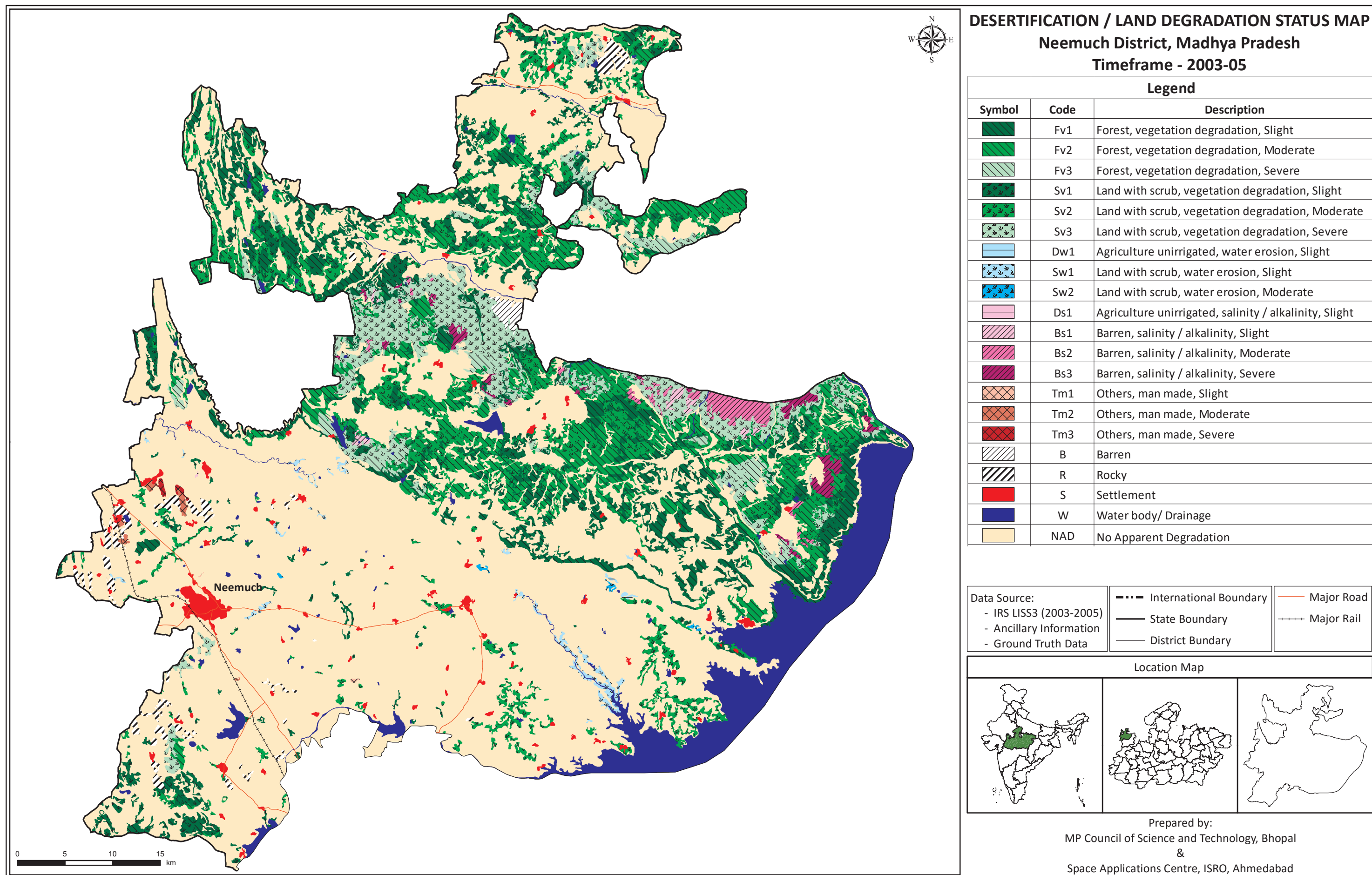
Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Dw1	Agriculture unirrigated, water erosion, Slight
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight
	Bs1	Barren, salinity / alkalinity, Slight
	Bs2	Barren, salinity / alkalinity, Moderate
	Bs3	Barren, salinity / alkalinity, Severe
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	B	Barren
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Data Source: - IRS LISS3 (2011-2013) - Ancillary Information - Ground Truth Data	--- International Boundary	— Major Road
	— State Boundary	++++ Major Rail
	— District Boundary	



Prepared by:
MP Council of Science and Technology, Bhopal
&
Space Applications Centre, ISRO, Ahmedabad





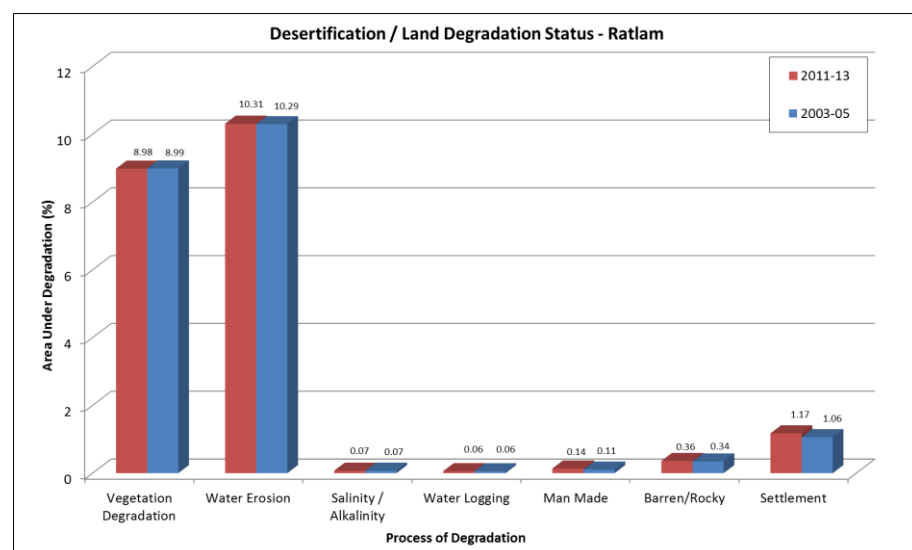
Ratlam District, Madhya Pradesh

Ratlam district falls in the western portion of Madhya Pradesh. It is bounded by Mandsaur district in north, Jhabua and Dhar districts on the south, Rajasthan state on the west and Ujjain district on the east. It covers an area of 4861 sq. km. The district has a population of 14,55,069 with 299 population density, 971 sex ratio and a literacy rate of 66.8%. (Census 2011)

Geographically, Ratlam district can be divided into five regions, Malwa plateau in the east; plateau of Sailana; Western hills of Sailana; Chambal valley; and Mahi valley. The entire district lies on the Malwa plateau, along its western margins. Two major rivers flows through the district, Chambal flowing to north along with its tributaries and Mahi flowing to the north-west. Among the subsidiary water divides between the streams, there are isolated hills or low hill ranges running for short distances. These hills attain prominence in the south-east of the district and near the western margins of the plateau. In the west they are dissected and slope is to the narrow valleys of seasonal streams.

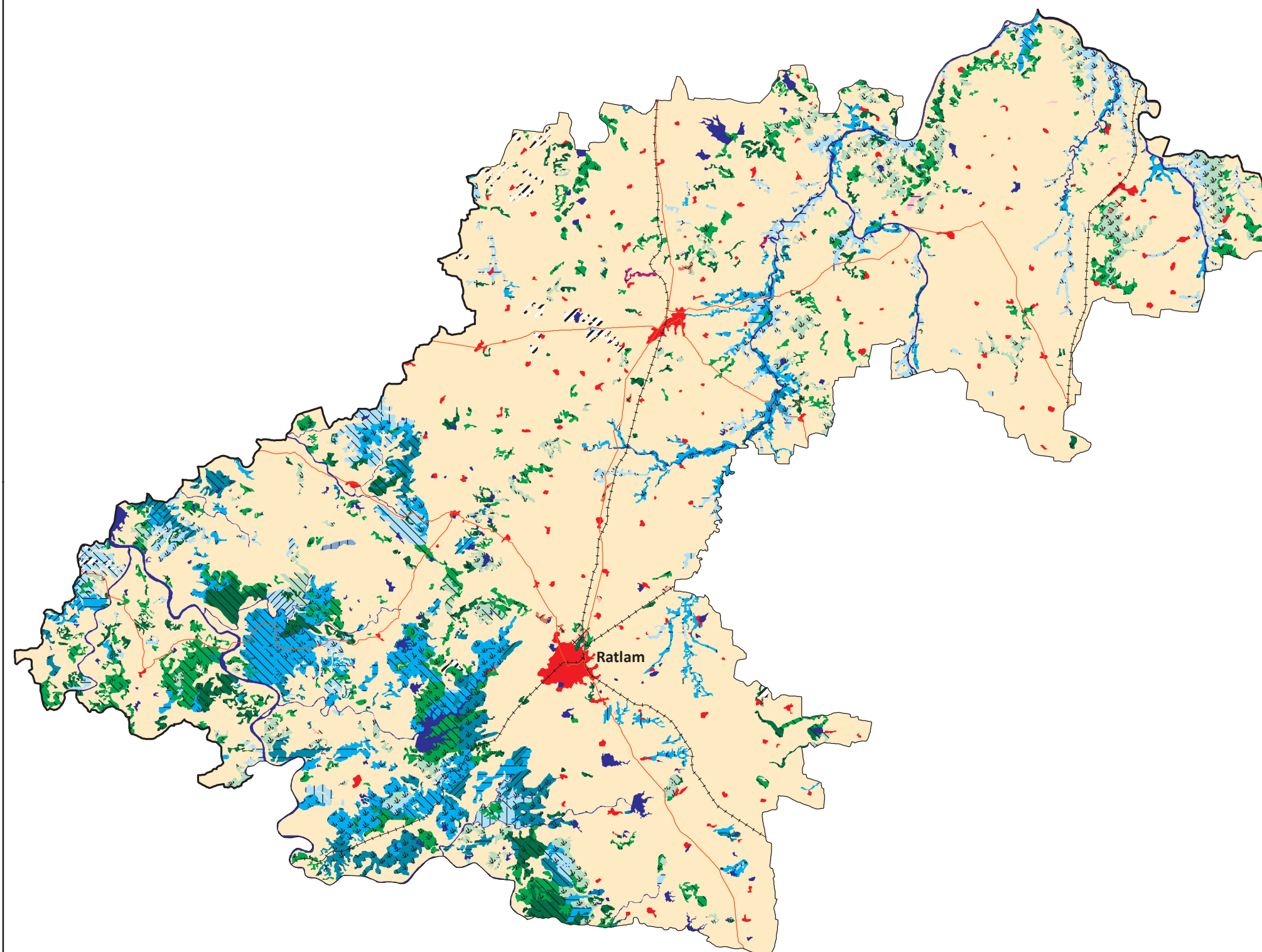
Ratlam is observed with 21.09% of total geographical area under land degradation/ desertification for the period 2011-13. The area under land degradation/ desertification in the district has increased about 0.17% since 2003-05. The most significant process of land degradation/ desertification in the district is Water erosion (10.31% during 2011-13 and 10.29% during 2003-05) followed by Vegetation Degradation (8.98% during 2011-13 and 8.99% during 2003-05).

































Process of Desertification / Land Degradation	2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Area(ha)	Area(%)	Area(ha)	Area(%)	
Vegetation Degradation	43666.70	8.98	43688.14	8.99	-21.44
Water Erosion	50110.01	10.31	50042.75	10.29	67.26
Salinity / Alkalinity	352.08	0.07	347.43	0.07	4.64
Water Logging	284.53	0.06	269.86	0.06	14.67
Man Made	665.02	0.14	510.43	0.11	154.59
Barren/Rocky	1745.67	0.36	1671.43	0.34	74.24
Settlement	5702.98	1.17	5154.66	1.06	548.32
Total Area under Desertification	102526.99	21.09	101684.71	20.92	842.28
No Apparent Degradation	374384.02	77.02	376262.07	77.40	-1878.05
Total Geographical Area (ha)	486100.00				



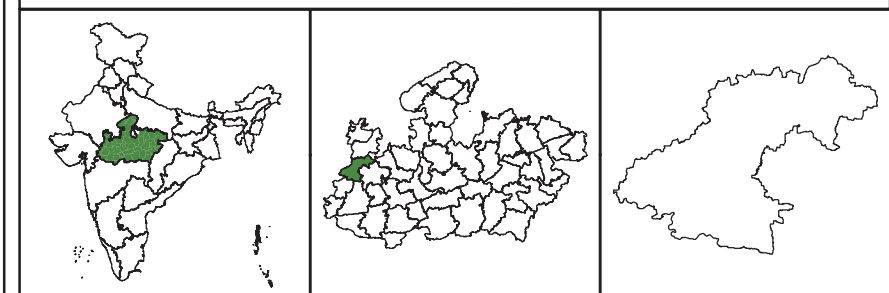
SN	Desertification / Land degradation Classes		2011-13		2003-05		Change (ha) (2011-13) - (2003-05)
	Code	Description (Land Cover, Process, Severity)	Area (ha)	Area (%)	Area (ha)	Area (%)	
1	Fv1	Forest, vegetation degradation, Slight	5815.98	1.20	5552.79	1.14	263.18
2	Fv2	Forest, vegetation degradation, Moderate	6125.54	1.26	6125.54	1.26	0.00
3	Fv3	Forest, vegetation degradation, Severe	1569.65	0.32	1643.65	0.34	-74.01
4	Sv1	Land with scrub, vegetation degradation, Slight	4531.06	0.93	4664.86	0.96	-133.80
5	Sv2	Land with scrub, vegetation degradation, Moderate	15029.91	3.09	15077.52	3.10	-47.60
6	Sv3	Land with scrub, vegetation degradation, Severe	10594.56	2.18	10623.78	2.19	-29.22
7	Iw1	Agriculture irrigated, water erosion, Slight	1680.24	0.35	1541.79	0.32	138.45
8	Iw2	Agriculture irrigated, water erosion, Moderate	1183.22	0.24	1183.22	0.24	0.00
9	Dw1	Agriculture unirrigated, water erosion, Slight	2101.38	0.43	2029.48	0.42	71.91
10	Dw2	Agriculture unirrigated, water erosion, Moderate	2938.50	0.60	2938.50	0.60	0.00
11	Dw3	Agriculture unirrigated, water erosion, Severe	1133.85	0.23	1133.85	0.23	0.00
12	Fw1	Forest, water erosion, Slight	3646.70	0.75	3646.70	0.75	0.00
13	Fw2	Forest, water erosion, Moderate	5780.13	1.19	5780.13	1.19	0.00
14	Fw3	Forest, water erosion, Severe	1638.27	0.34	1638.27	0.34	0.00
15	Sw1	Land with scrub, water erosion, Slight	8286.70	1.70	7923.11	1.63	363.59
16	Sw2	Land with scrub, water erosion, Moderate	13354.95	2.75	13309.66	2.74	45.29
17	Sw3	Land with scrub, water erosion, Severe	5537.11	1.14	6089.08	1.25	-551.97
18	Bw1	Barren, water erosion, Slight	479.75	0.10	479.75	0.10	0.00
19	Bw2	Barren, water erosion, Moderate	822.72	0.17	822.72	0.17	0.00
20	Bw3	Barren, water erosion, Severe	1526.50	0.31	1526.50	0.31	0.00
21	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight	177.24	0.04	177.24	0.04	0.00
22	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate	15.65	0.00	11.01	0.00	4.64
23	Ds3	Agriculture unirrigated, salinity / alkalinity, Severe	159.18	0.03	159.18	0.03	0.00
24	Il1	Agriculture irrigated, water logging, Slight	159.45	0.03	159.45	0.03	0.00
25	Il2	Agriculture irrigated, water logging, Moderate	125.08	0.03	110.41	0.02	14.67
26	Tm1	Others, man made, Slight	323.81	0.07	268.94	0.06	54.87
27	Tm2	Others, man made, Moderate	322.91	0.07	238.54	0.05	84.37
28	Tm3	Others, man made, Severe	18.30	0.00	2.96	0.00	15.34
29	R	Rocky	1745.67	0.36	1671.43	0.34	74.24
30	S	Settlement	5702.98	1.17	5154.66	1.06	548.32
Total Area Under Desertification/ Land Degradation			102526.99	21.09	101684.71	20.92	842.28
31	W	Water body/ Drainage	9188.99	1.89	8153.22	1.68	1035.77
32	NAD	No Apparent Degradation	374384.02	77.02	376262.07	77.40	-1878.05
Total Geographical Area (ha)			486100.00	100.00	486100.00	100.00	

DESERTIFICATION / LAND DEGRADATION STATUS MAP Ratlam District, Madhya Pradesh Timeframe - 2011-13








Legend		
Symbol	Code	Description
	Fv1	Forest, vegetation degradation, Slight
	Fv2	Forest, vegetation degradation, Moderate
	Fv3	Forest, vegetation degradation, Severe
	Sv1	Land with scrub, vegetation degradation, Slight
	Sv2	Land with scrub, vegetation degradation, Moderate
	Sv3	Land with scrub, vegetation degradation, Severe
	Iw1	Agriculture irrigated, water erosion, Slight
	Iw2	Agriculture irrigated, water erosion, Moderate
	Dw1	Agriculture unirrigated, water erosion, Slight
	Dw2	Agriculture unirrigated, water erosion, Moderate
	Dw3	Agriculture unirrigated, water erosion, Severe
	Fw1	Forest, water erosion, Slight
	Fw2	Forest, water erosion, Moderate
	Fw3	Forest, water erosion, Severe
	Sw1	Land with scrub, water erosion, Slight
	Sw2	Land with scrub, water erosion, Moderate
	Sw3	Land with scrub, water erosion, Severe
	Bw1	Barren, water erosion, Slight
	Bw2	Barren, water erosion, Moderate
	Bw3	Barren, water erosion, Severe
	Ds1	Agriculture unirrigated, salinity / alkalinity, Slight
	Ds2	Agriculture unirrigated, salinity / alkalinity, Moderate
	Ds3	Agriculture unirrigated, salinity / alkalinity, Severe
	Il1	Agriculture irrigated, water logging, Slight
	Il2	Agriculture irrigated, water logging, Moderate
	Tm1	Others, man made, Slight
	Tm2	Others, man made, Moderate
	Tm3	Others, man made, Severe
	R	Rocky
	S	Settlement
	W	Water body/ Drainage
	NAD	No Apparent Degradation

Location Map



Prepared by:
MP Council of Science and Technology, Bhopal
&
Space Applications Centre, ISRO, Ahmedabad

Data Source:
- IRS LISS3 (2011-2013)
- Ancillary Information
- Ground Truth Data

 International Boundary
 State Boundary
 District Boundary
 Major Road
 Major Rail

0 5 10 15 km

REFERENCES

1. SAC, 2016, Desertification and Land Degradation Atlas of India (Based on IRS AWiFS data of 2011-13 and 2003-05), Space Applications Centre, ISRO, Ahmedabad, India. ISBN:978-93-82760-207, June, 2016, 219 p.
2. Census 2011, www.census2011.co.in
3. Ajai, Arya, A. S., Dhinwa, P. S., Pathan, S. K. and Ganesh Raj, K., 2009, Desertification/Land Degradation Status Mapping of India, Current Science, vol 97, no 10, pt 1479 to 1483
4. SAC, 2007a, Desertification Monitoring and Assessment using Remote Sensing and GIS: A Pilot Project under TPN-1 UNCCD, Scientific Report, SAC/RESIPA/MESG/DMA/2007/01, 93 p
5. SAC, 2007b, Desertification & Land Degradation Atlas of India, Space Applications Centre, 74 p
6. UNCCD, 1994, Elaboration of an international convention to combat desertification in countries experiencing serious drought and /or desertification, particularly in Africa, (Paris: General Assembly of the United Nations), 58p.

Field Photos



Vegetation Degradation in forest area, Tirap district, Arunachal Pradesh



Vegetation Degradation, Bellary district, Karnataka



Vegetation degradation due to Jhum Cultivation, Lunglei district, Mizoram



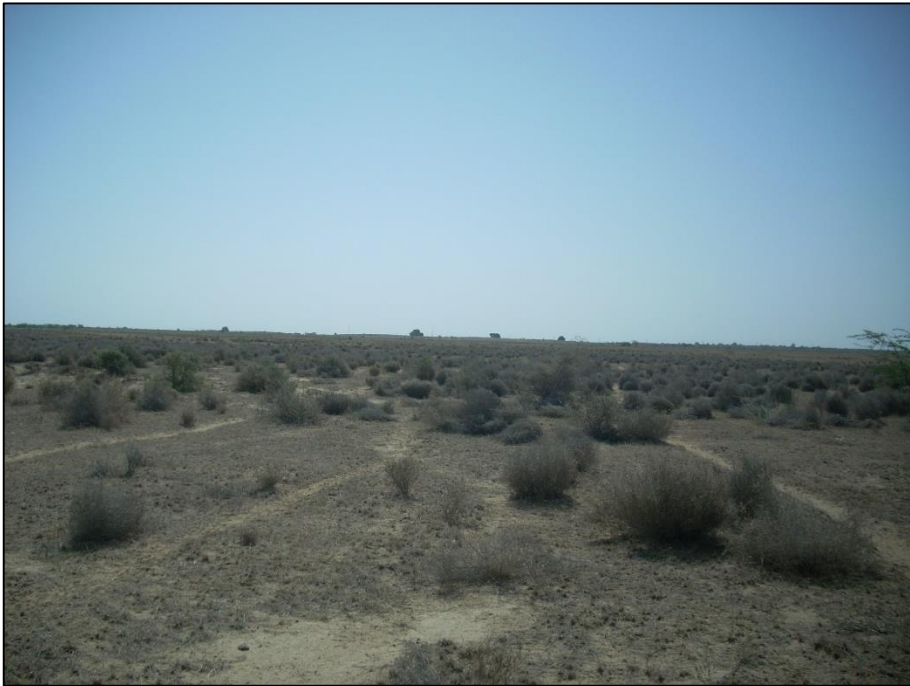
Land without scrub, Anantapur district, Andhra Pradesh



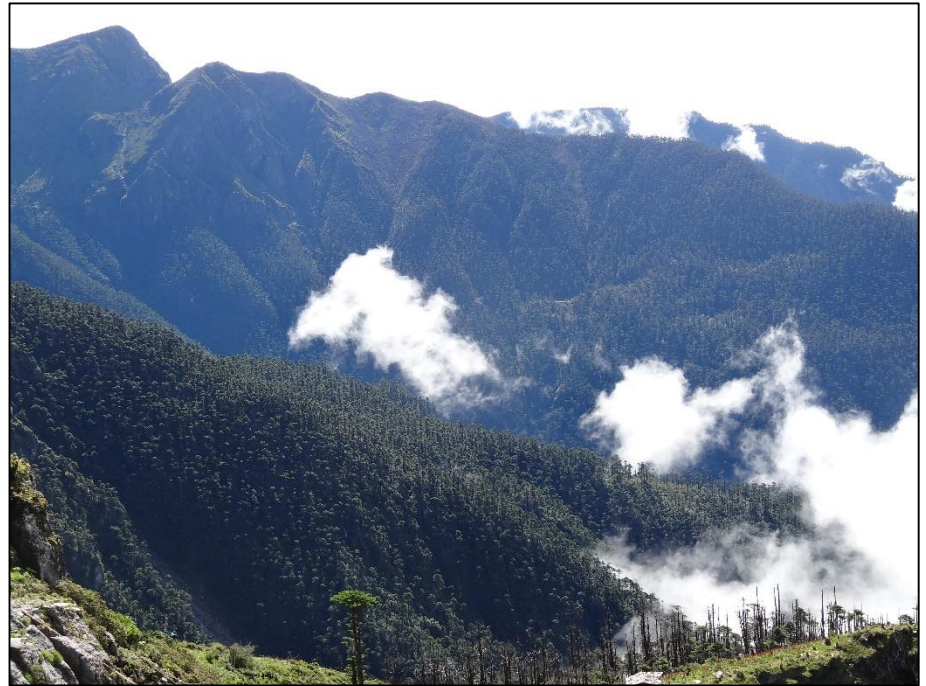
Vegetation degradation in Scrub land area, Anantapur district, AP



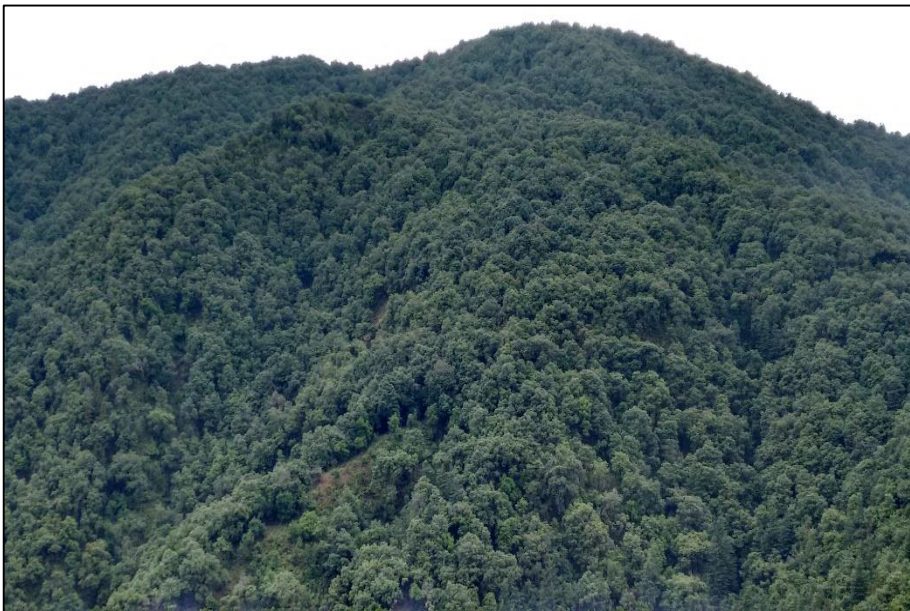
Land with scrub, North Sikkim district, Sikkim



Land with scrub, Jaisalmer district, Rajasthan



Dense forest area, Twang district, Arunachal Pradesh



Dense forest area, Chamoli district, Uttarakhand



Water erosion (Gulleys), Nubra valley, Leh district, Jammu & Kashmir



Water erosion (Sheet), Anantapur district, Andhra Pradesh



Water erosion (Gulleys), Bellary district, Karnataka



Agro plantation, Anantapur district, Andhra Pradesh



Afforestation, Anantapur district, Andhra Pradesh



Wind erosion, Pali district, Rajasthan



Wind erosion (sheet), Jaisalmer district, Rajasthan



Sand dune stabilisation, Jaisalmer district, Rajasthan



Sand in agriculture field, Bhiwani district, Haryana



Sand dunes in cold desert, Nubra valley, Ladakh region



Wind erosion, Nubra Valley, Ladakh region



Salinity, Kanpur Dehat district, Uttar Pradesh



Salinity, Surendranagar district, Gujarat



Salinity, Pali district, Rajasthan



Salinity, Surendranagar district, Gujarat



Salinity, Mahabubnagar district, Telangana



Water logging, Anantapur district, Andhra Pradesh



Water logging, Surendranagar district, Gujarat



Agriculture practice in valley area, Kargil district, Jammu & Kashmir



Frost Shattering, North Sikkim district, Sikkim



Frost shattering, Kargil district, Kashmir



Mining, Bokaro district, Jharkhand



Mining, Kendujhar district, Odisha



Mass movement (alluvial fans), Kargil district, Jammu & Kashmir



Land slide (mass movement), Pauri Garhwal district, Uttarakhand



Rocky area, Surendranagar district, Gujarat



Rocky area, Pali district, Rajasthan

Front and back cover shows land degradation in parts of Anantapur district of Andhra Pradesh and Chitradurga district of Karnataka, as seen on IRS LISS III FCC image of 21 January 2013. Front cover also shows the map highlighting districts selected for Desertification/ Land Degradation mapping on 1:50,000 scale.



Printed by:
Chandrika Corporations, Ahmedabad