



RS and GIS Applications in Forest Resources & Ecosystem Analysis



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Content

- Background
- Forest Resources-
Phytodiversity and Biomass Assessment
- Ecological Analysis-
Habitat Fragmentation, Fire, Invasive and Carbon Fluxes
- Summary

Forest Ecosystem Studies with Geospatial Technologies



- Synoptic coverage
- Systematic revisit
- See things invisible to humans
- Multiple scale observations
- Cost effective

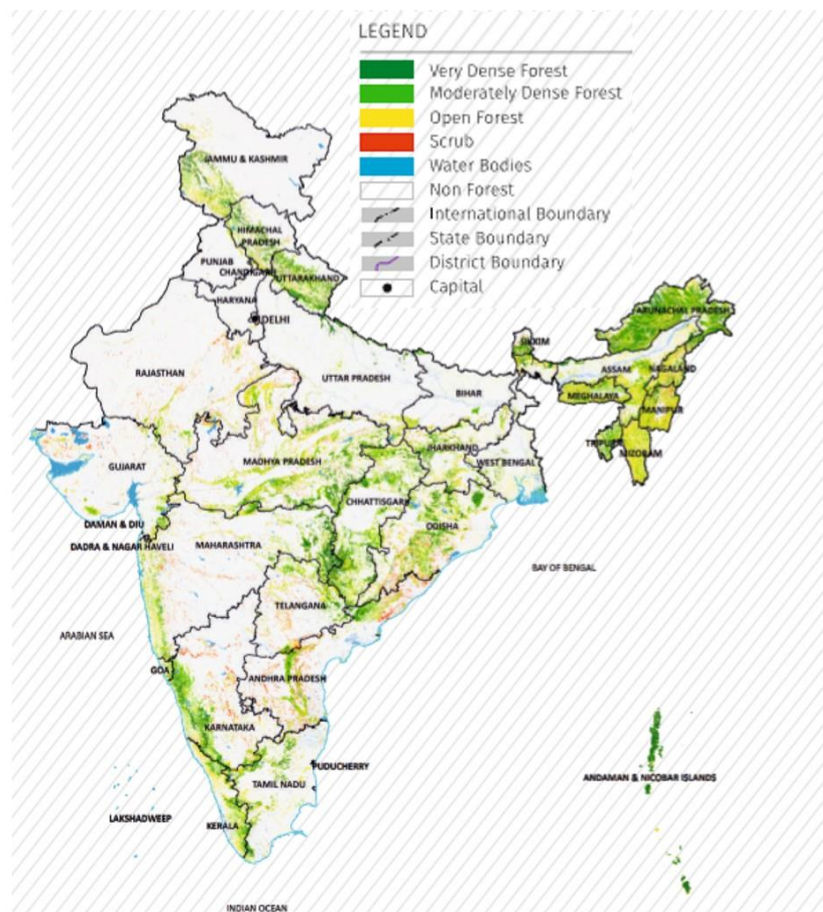


- Location information
- Navigation
- Time information
- Communication
- Observations

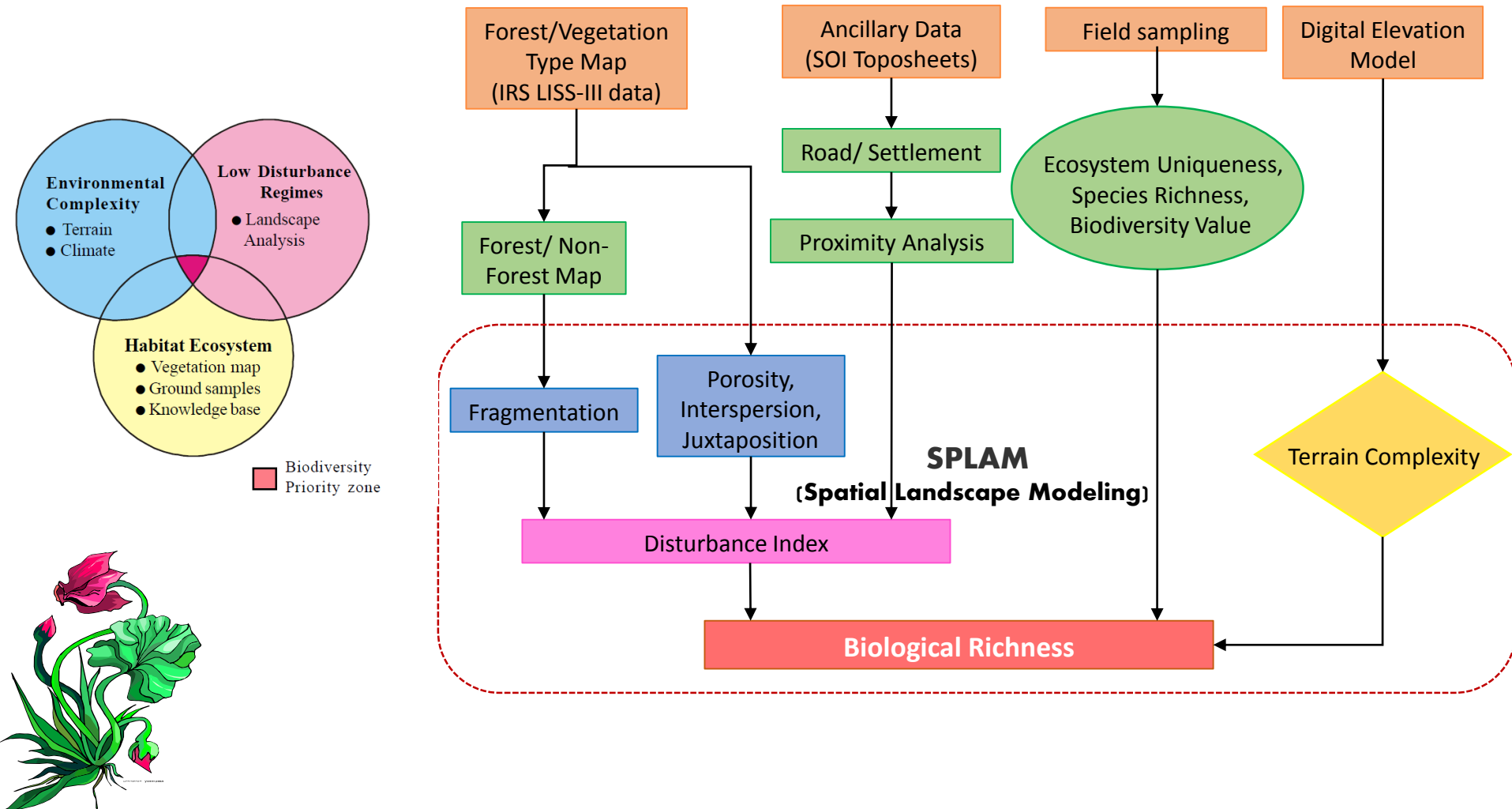
- Visualization, archival, retrieval and analysis data
- Linking of spatial to non-spatial data
- Integrated analysis

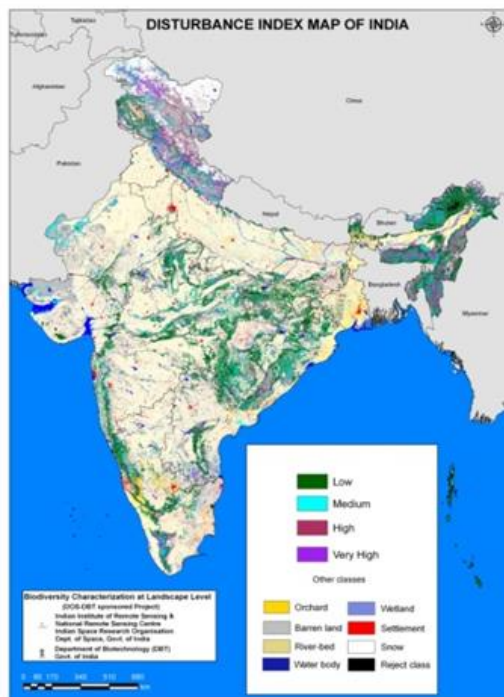
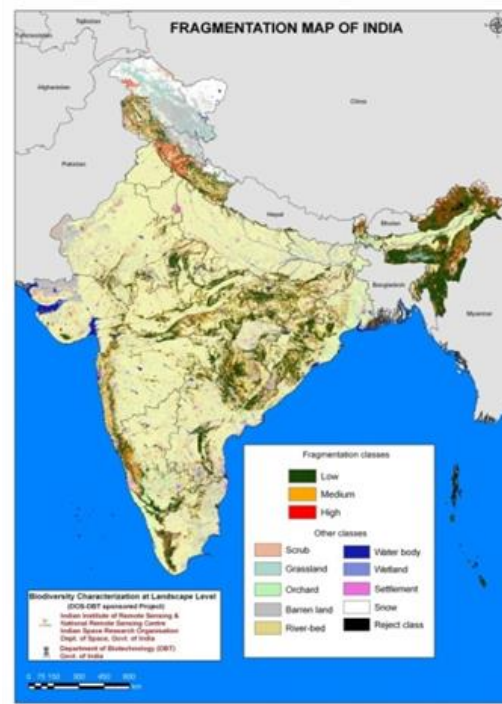
Periodic Assessment of Forest Cover

- Indian State of Forest Report
- Biennial report
- At 1:50,000 scale
- 15 cycle completed
- Forest loss/gain
- Estimate of TOFs
- Forest density change
(indicate degradation & improvement)
- Forest growing stock/carbon



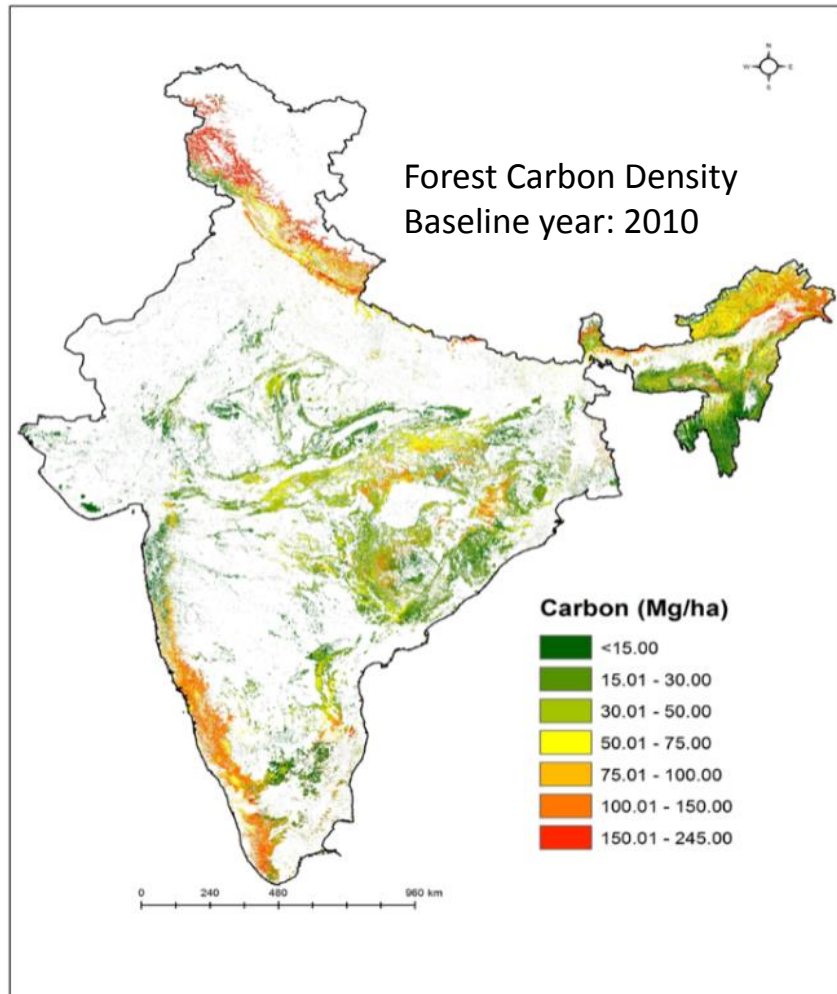
Biodiversity Characterization at Landscape Level Project (1997-2012)



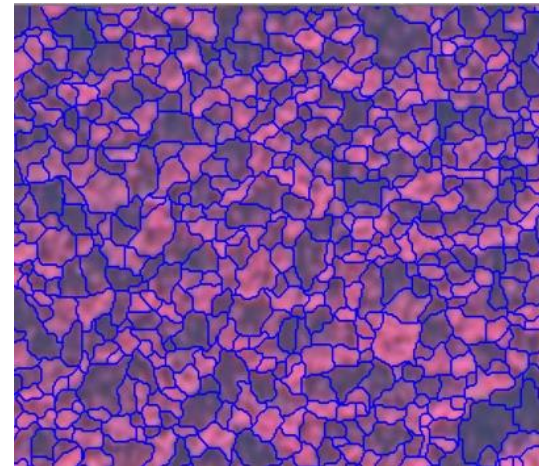


Forest Biomass/Carbon Stock Mapping

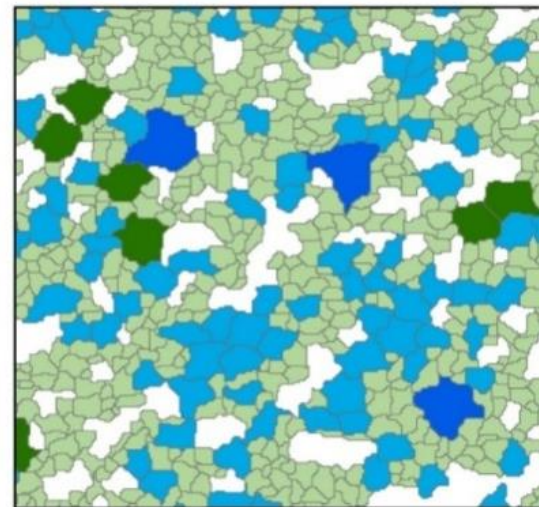
Medium resolution biomass/carbon stock mapping



High resolution biomass/carbon stock mapping



Individual tree
crown delineation
on VHR satellite
image



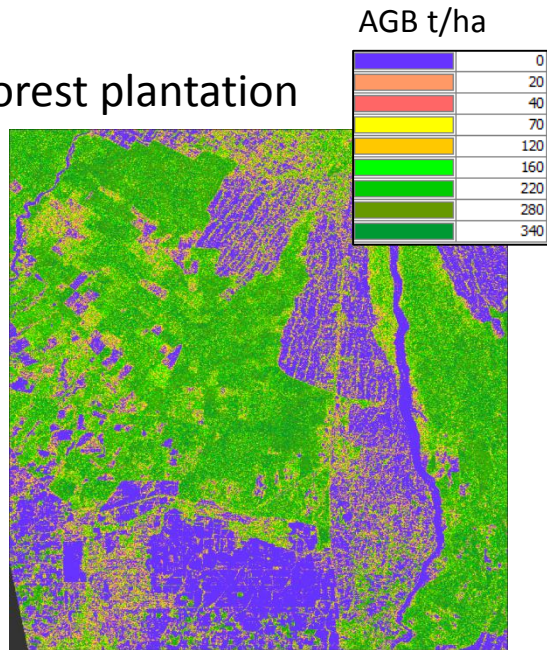
Sal Carbon stock (kg/tree)



ISRO-GBP National Carbon Project

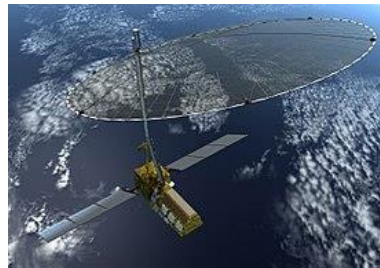
Forest Biomass Assessment using Radar Remote Sensing

Terai forest plantation

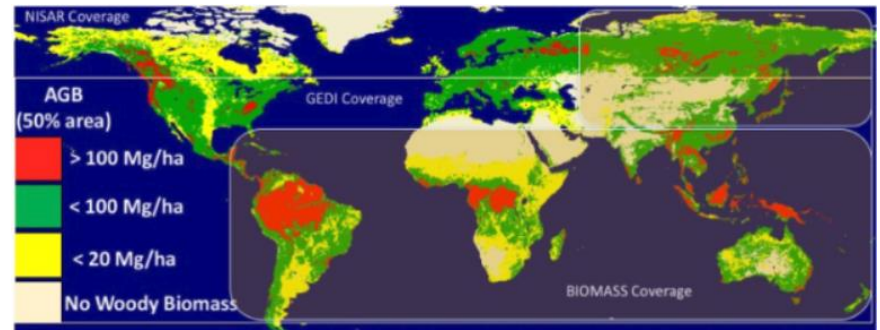
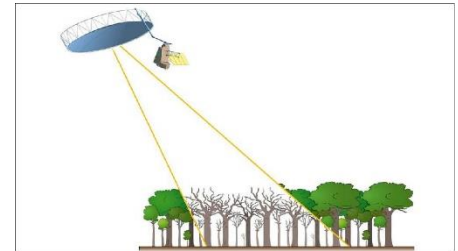


AGB from ALOS-2 PALSAR
RMSE= 35.00 tons/ha

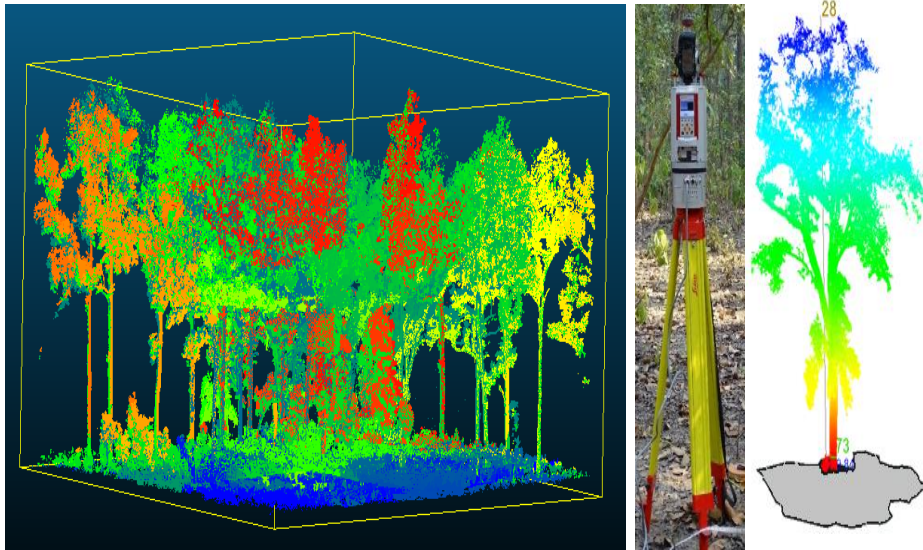
NISAR Satellite (L & S band)



Biomass Satellite (P band)

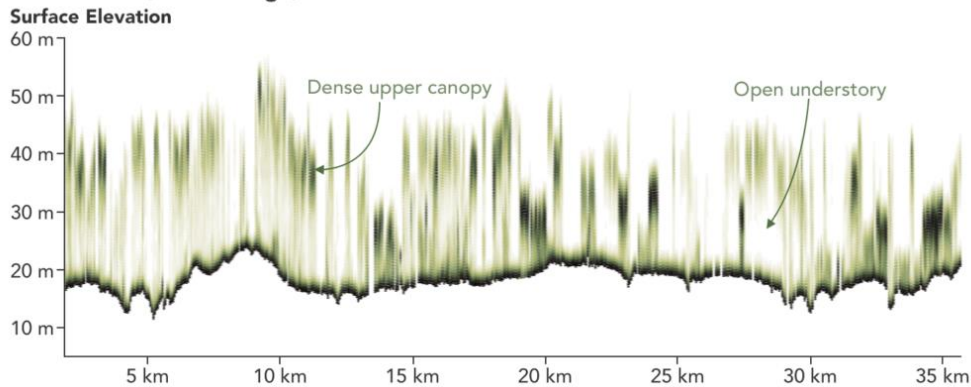


Forest Biomass/Carbon Stock Inventory using LiDAR



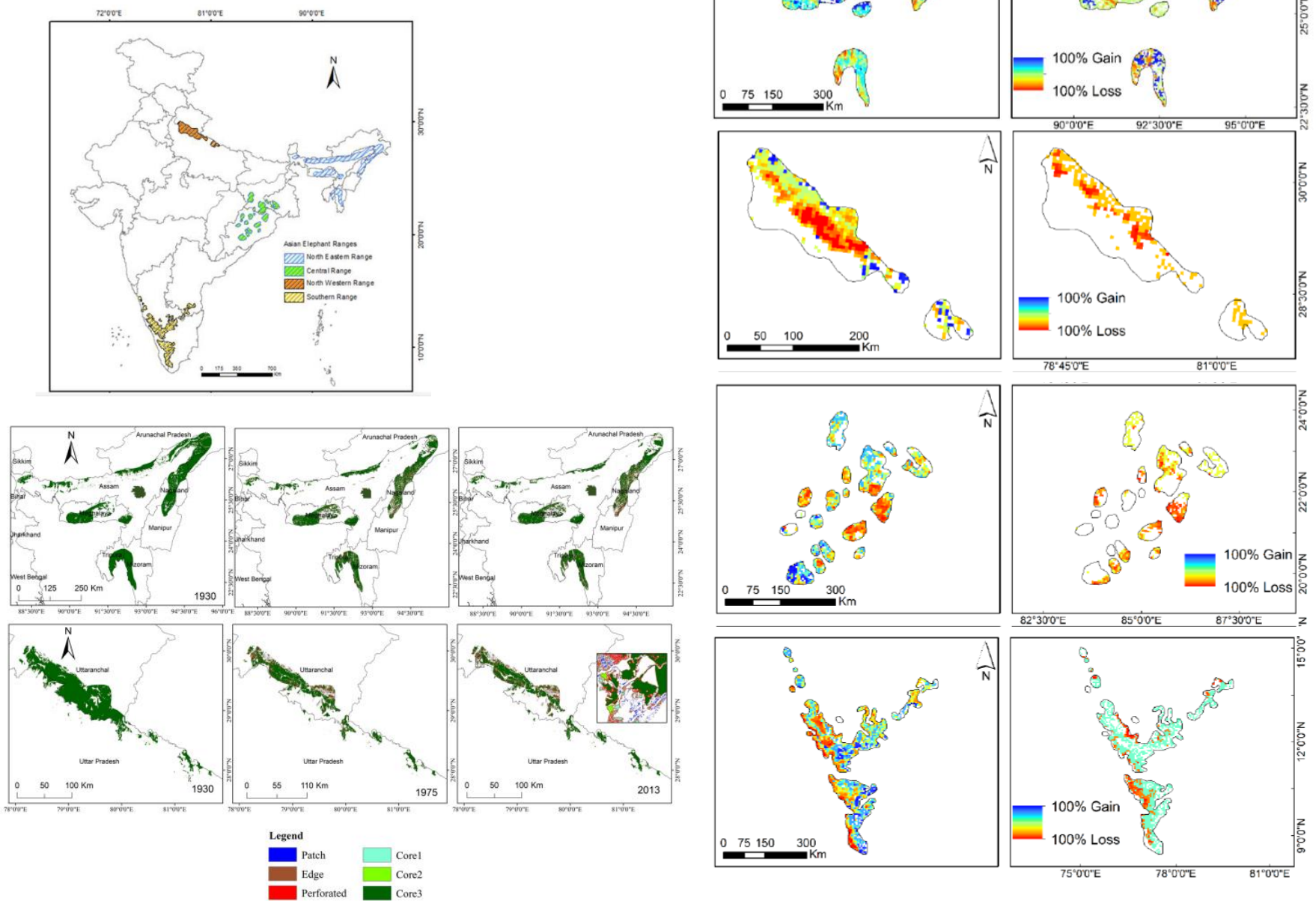
- Space borne LiDAR Observations from ICESAT-2 and GEDI (on board ISS) would provide global LiDAR footprints for forest height and biomass studies.

GED I sees to, and through, the trees in South Carolina



- Terrestrial Laser scanner (TLS) use for intensive site characterisation and validation of Space based LiDAR outputs.

Forest Loss in Elephant Ranging Areas (1930 to 2013)



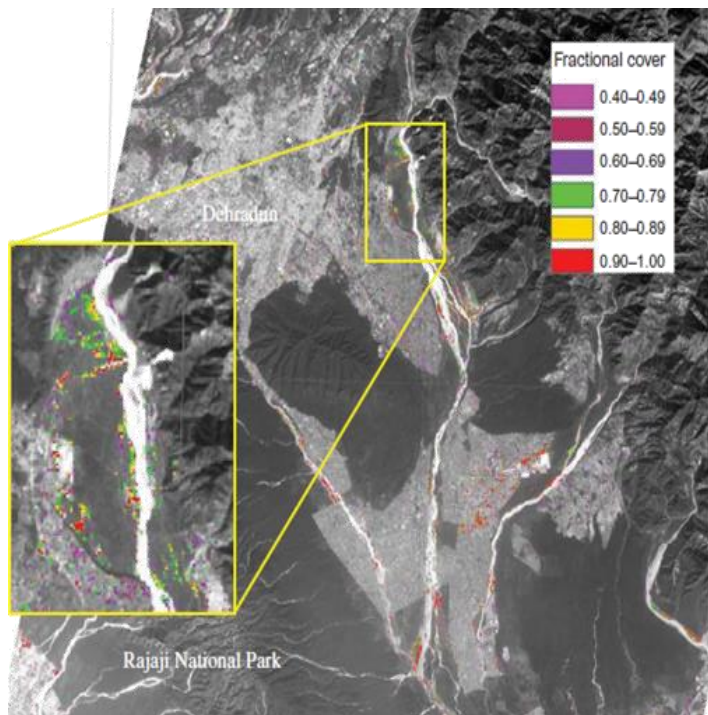
Alien Invasive Plants Mapping & Risk Assessment



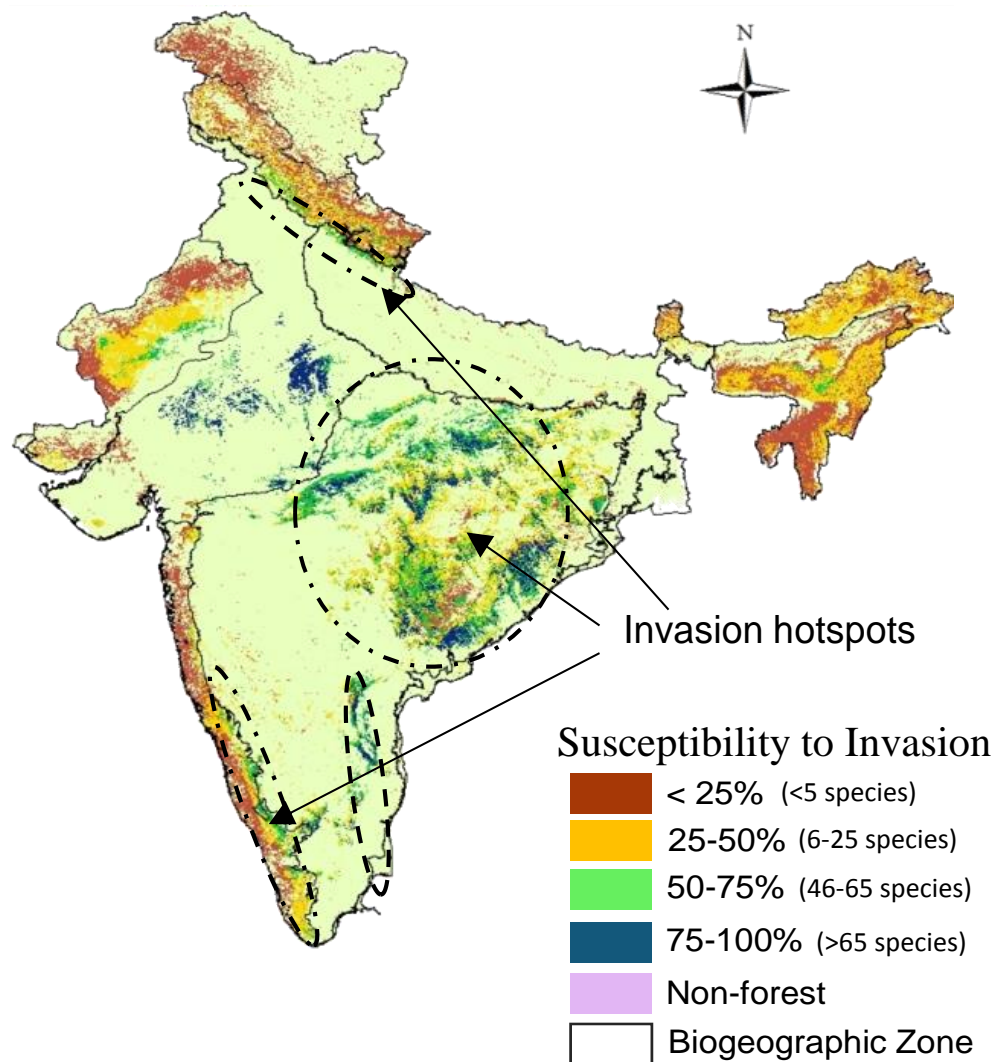
Vilayati Tulsi
In flowering



Phenology during monsoon (left) and early winter (right)



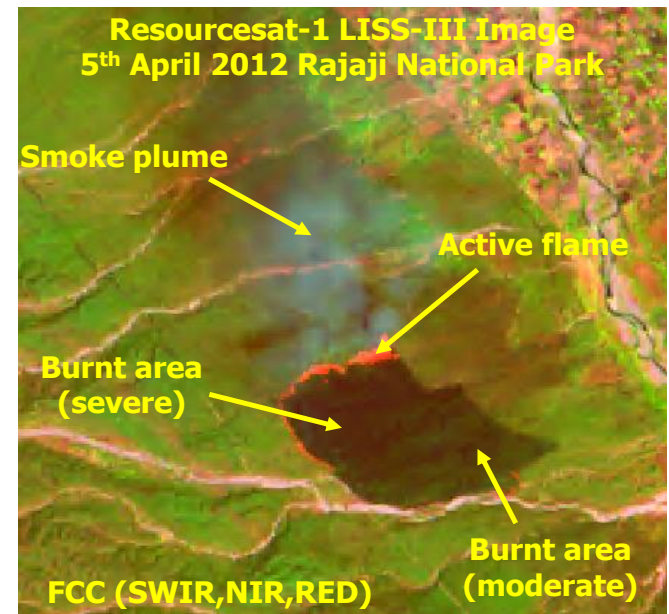
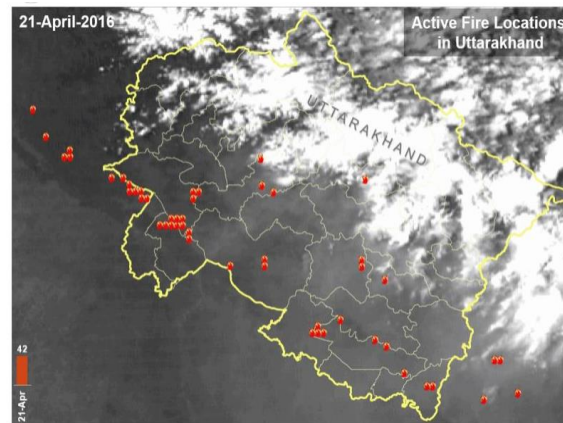
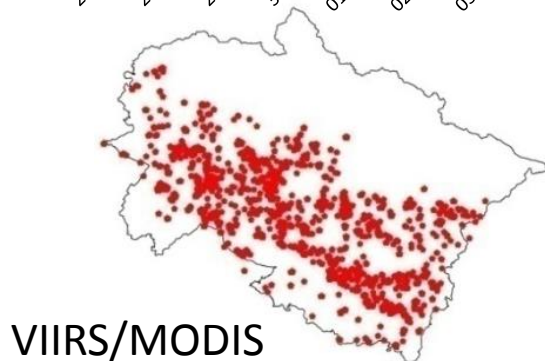
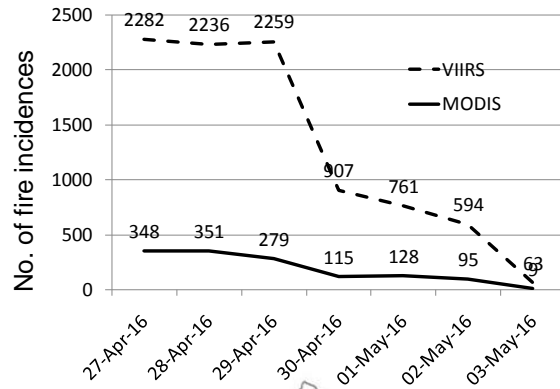
Vilayati Tulsi's fractional cover (colored pixels)
mapped in Doon Valley using ALI satellite data
(Superimposed on grey scale ALI red band)



Forest Fire Prevention & Management

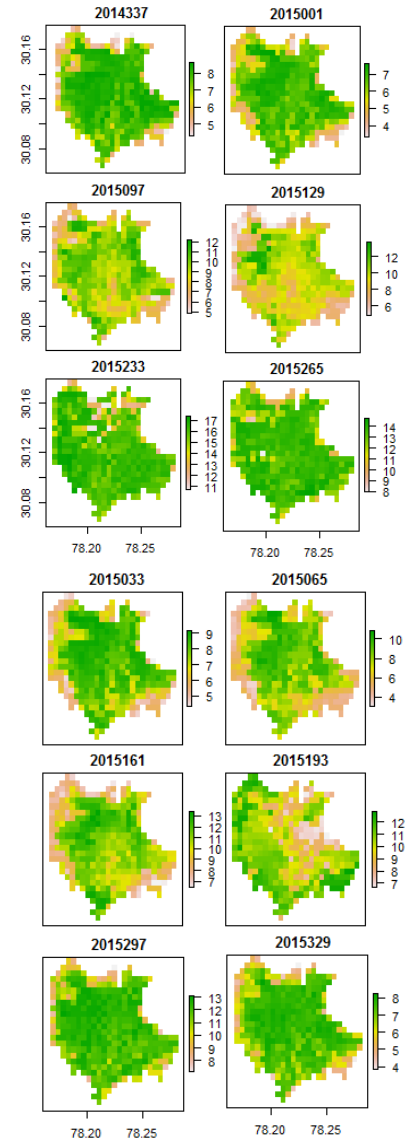
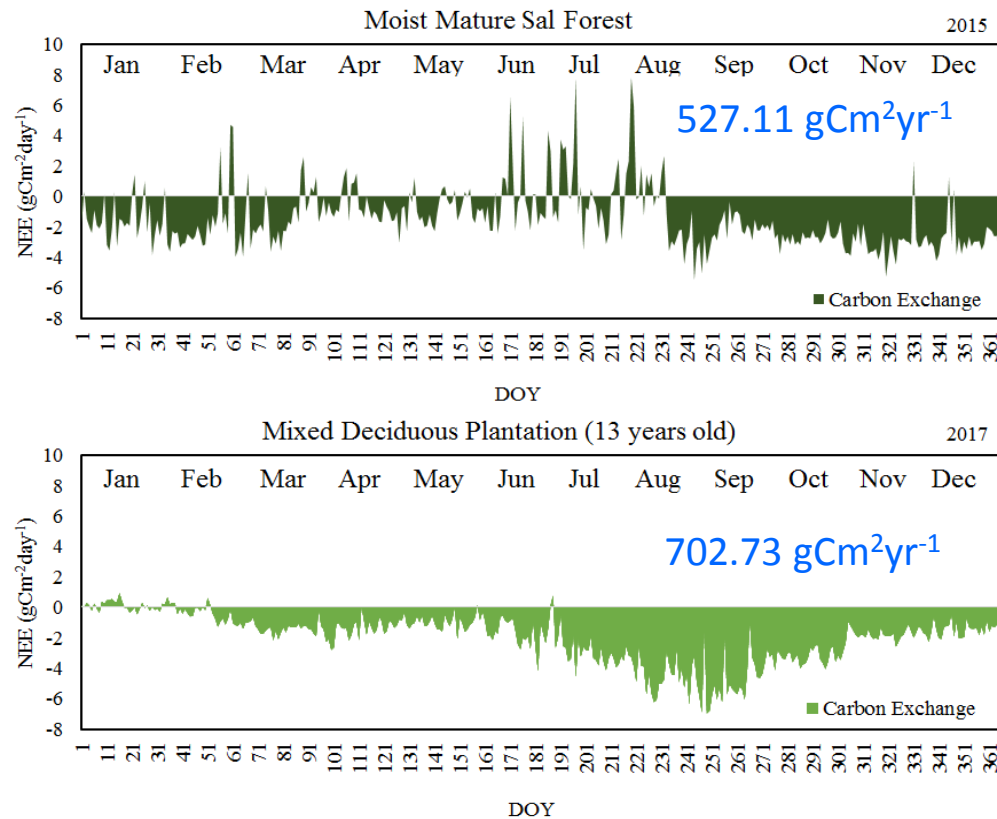
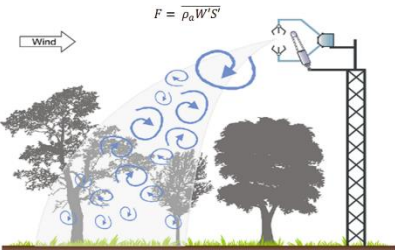


- Forest fire risk assessment & danger rating
- Active fire detection and monitoring
- Burnt area assessment
- Recovery assessment
- Quantification of emissions from forest fires
- Ecological Impacts of forest fires



Forest Carbon Sequestration Studies

- Under ISRO-GBP National Carbon Project a network of 5 forest flux towers has been established.



Biodiversity Portals



Biodiversity Information System (BIS) (www.bis.iirs.gov.in)

- Centralised repository of biodiversity database generated under DOS-DBT project entitled “Biodiversity Characterization at landscape level using Remote Sensing and GIS” for the entire country.

Indian Bio-Resource Information Network (IBIN) (www.ibin.gov.in)

- Decentralised distributed databases from two Core Data System nodes (IIRS-Spatial & UAS-Species), and 5 BRIC'S (Bio-resource Information Centre's)



Thank you