

Exploring Land Use Change with Combined Remote Sensing Techniques in the Upper Pennaiyar Catchment, South India

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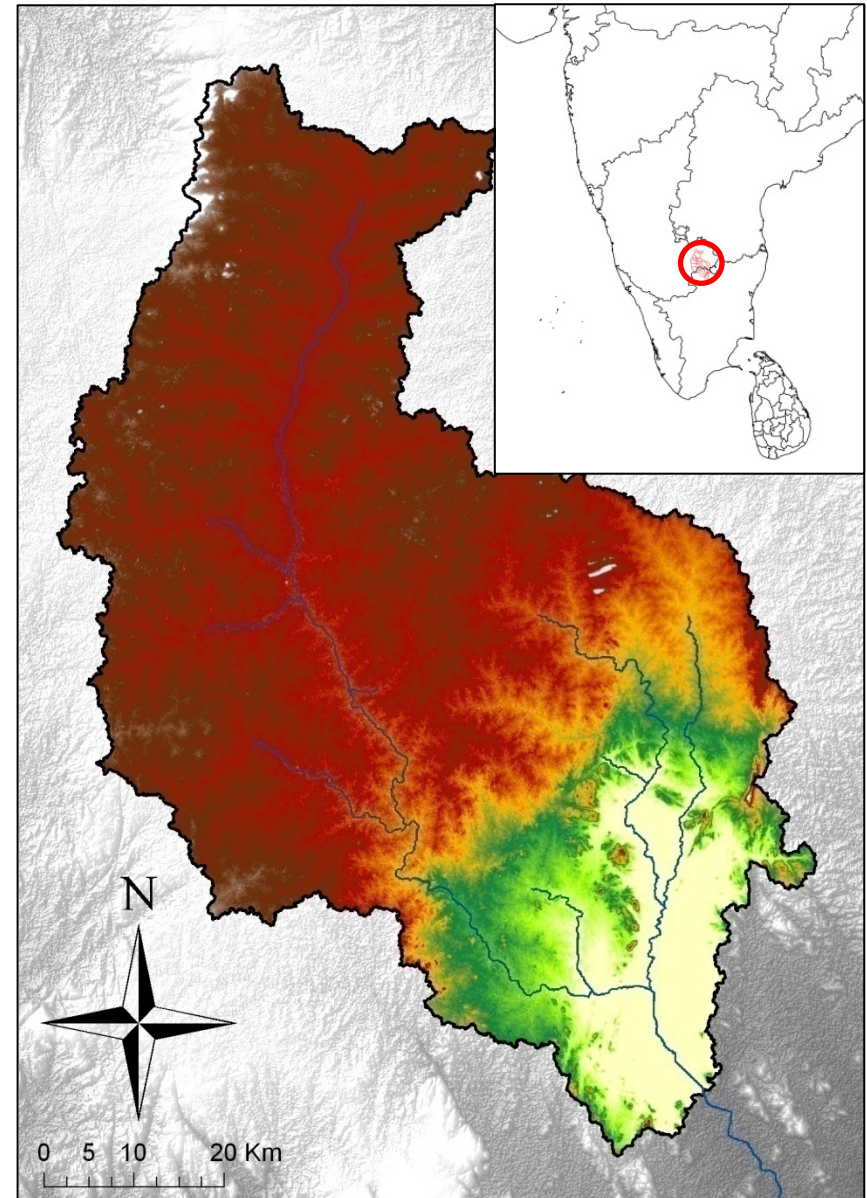
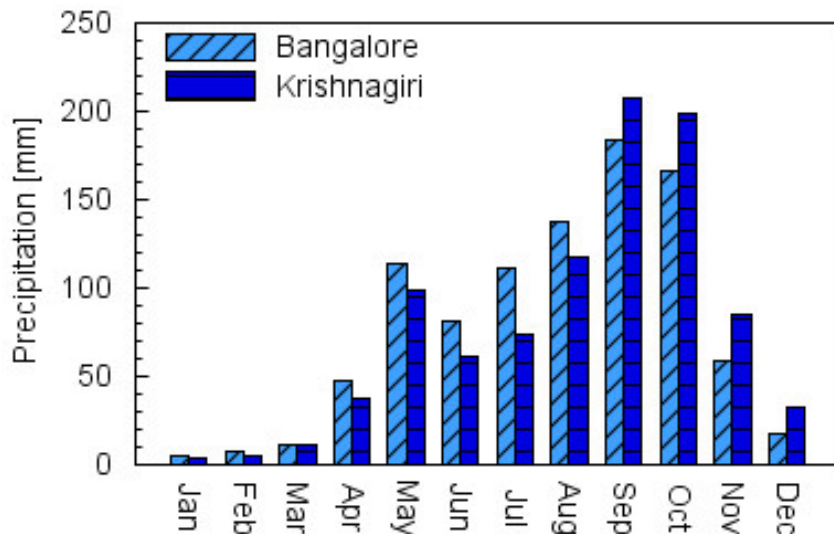
International SWAT Conference – New Delhi, India

19 July 2012

Test site

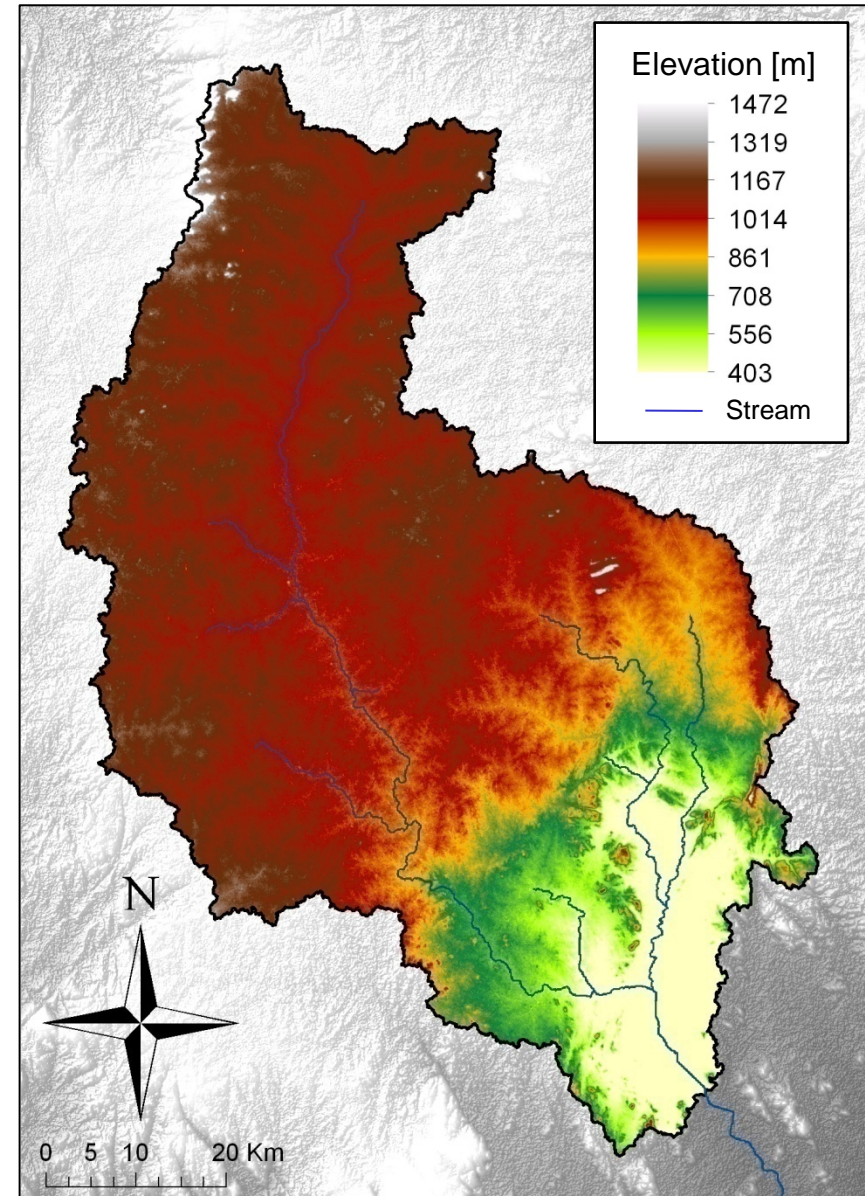
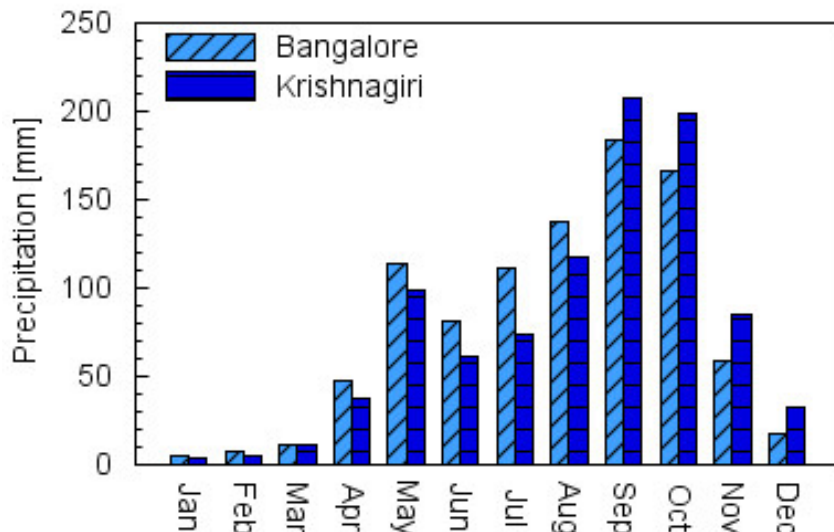
Upper Pennaiyar Catchment

- Area: 5300 km²
- Precipitation: 930 mm yr⁻¹
- Terrain: slightly undulated ; single inselbergs
- Intensive water management based on network of water harvesting ponds (tanks)



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Digital Elevation Model

- Shuttle Radar Topography Mission (SRTM)
- Interpolated to 10 m resolution

Satellite Images

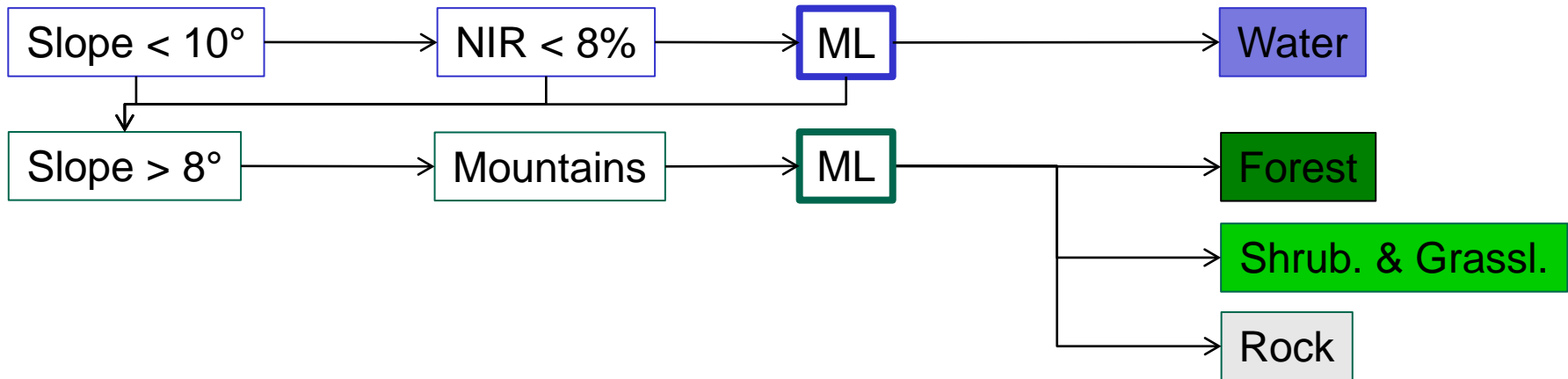
- 2000/2001: Landsat 7 ETM+
 - Atmospherically corrected
- 2011: ResourceSat 1 (IRS-P6) LISS-III
 - Atmospherically corrected
 - Georeferenced (based on ETM+)

Ground truth mapping Dec./Mar./Jun. 2011-12

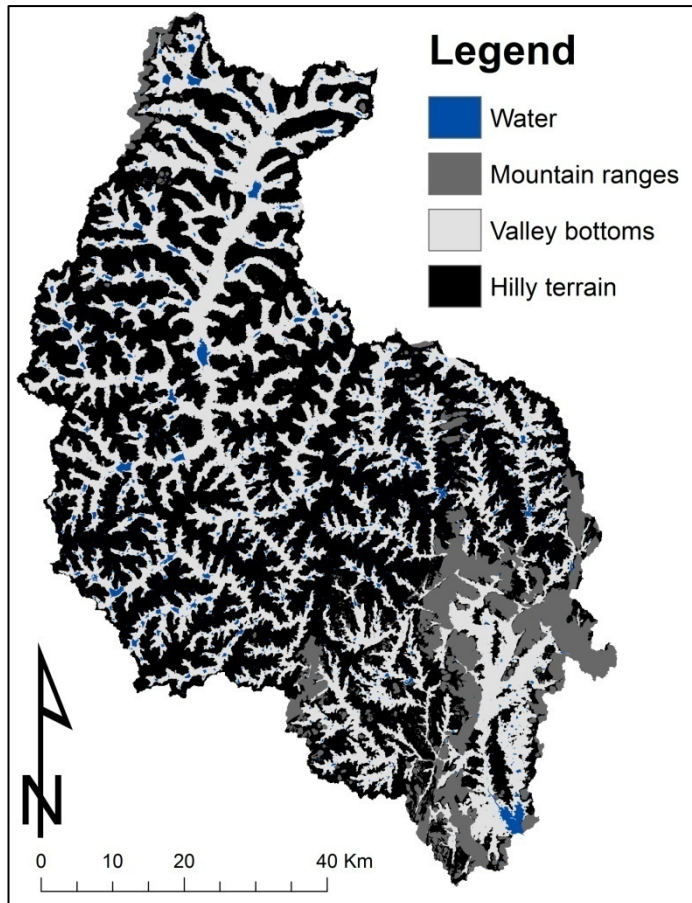
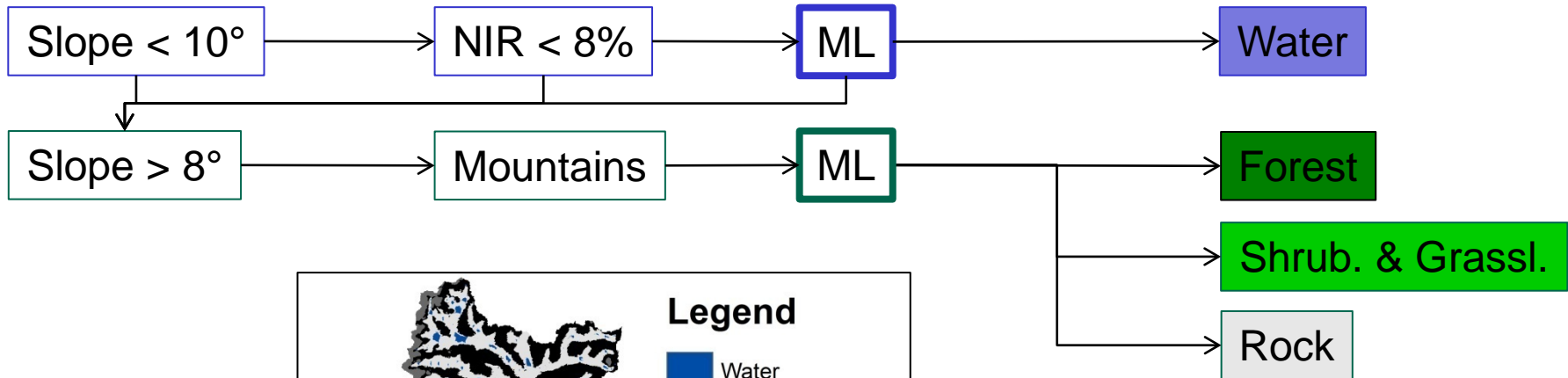
Areal Photographs

Agricultural statistics

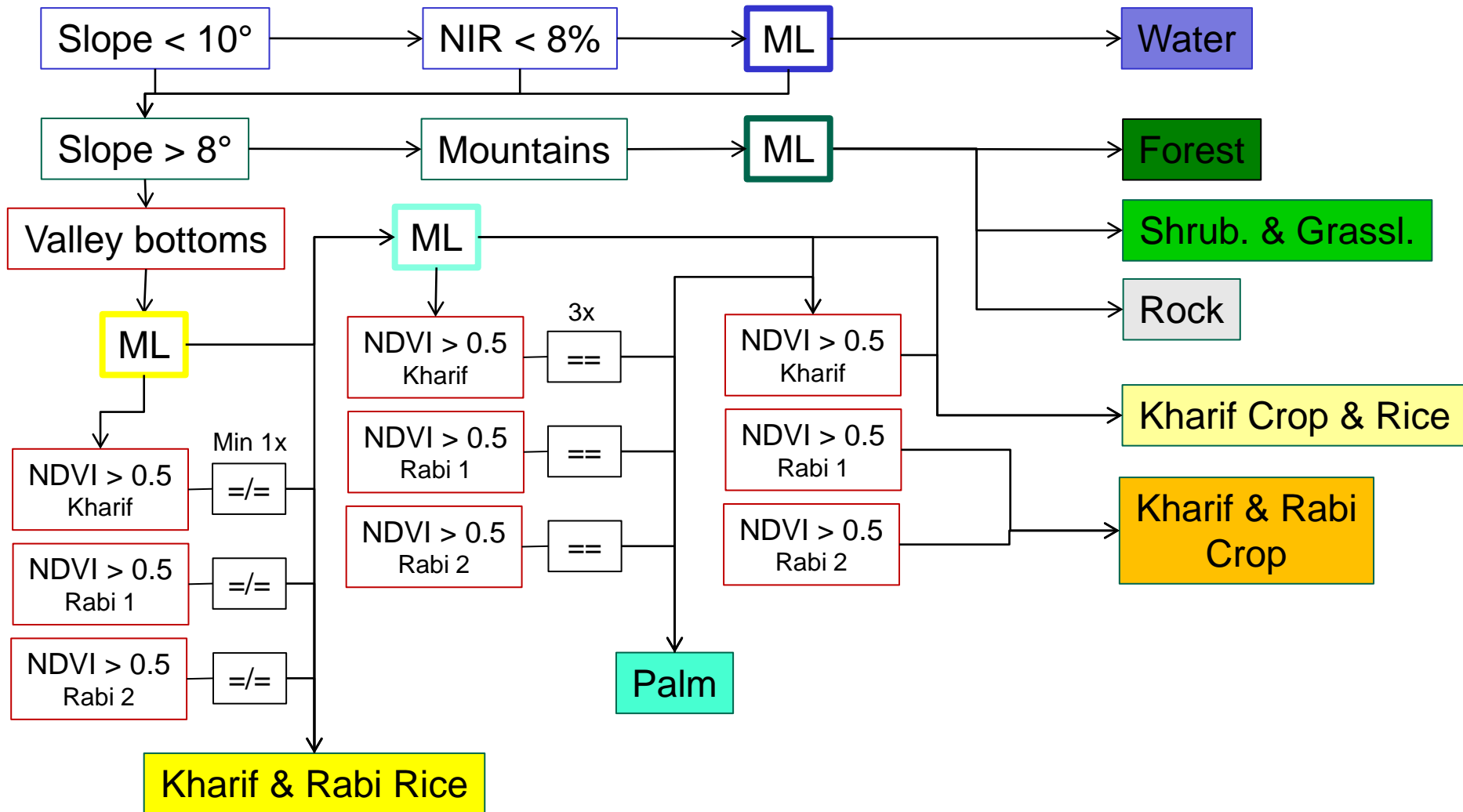
Classification tree



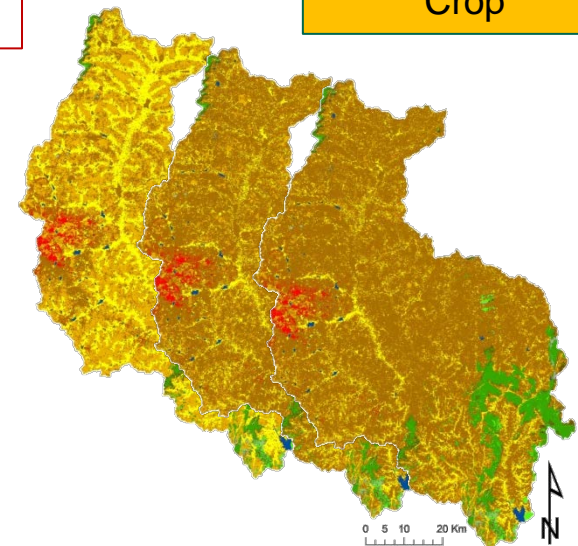
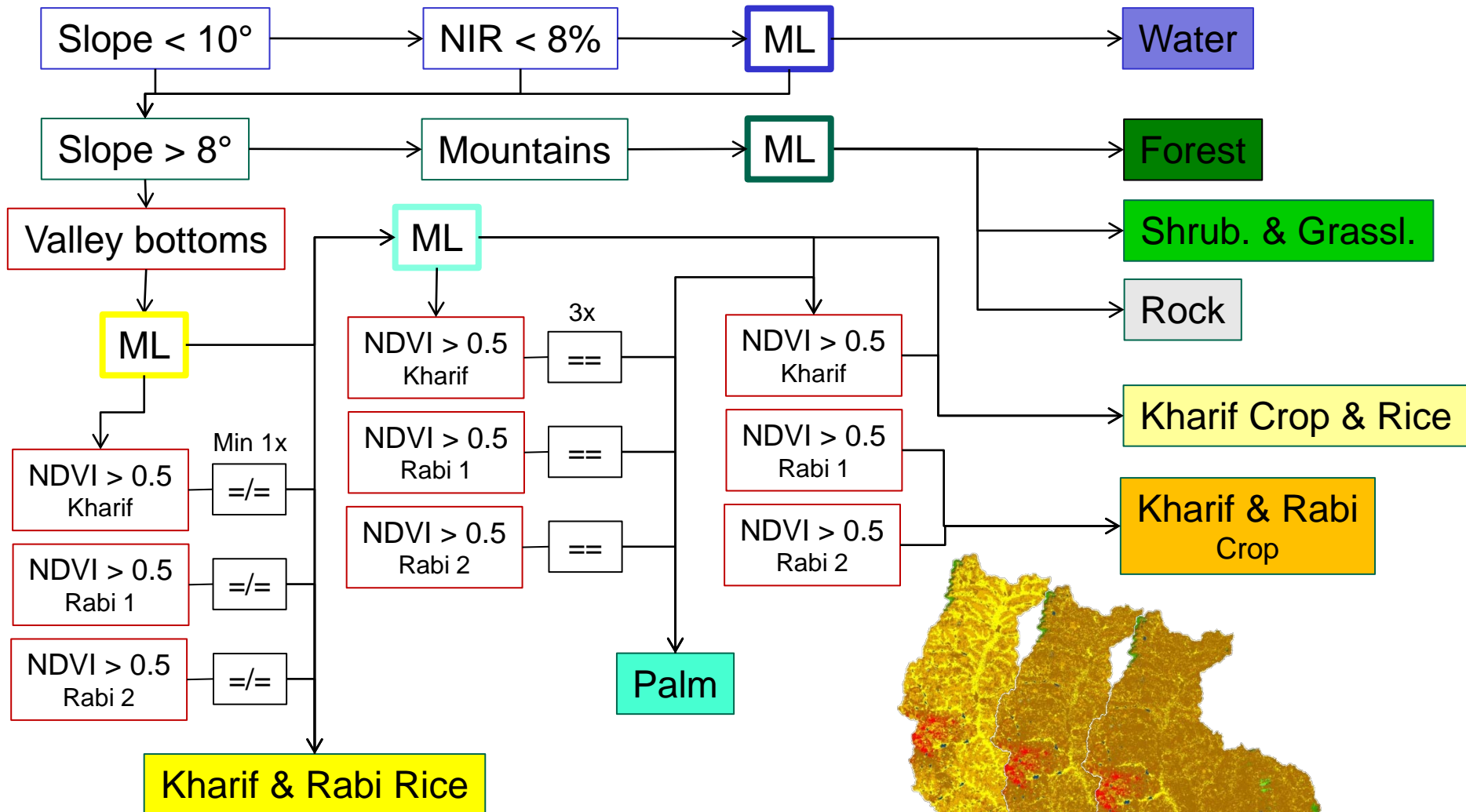
Classification tree



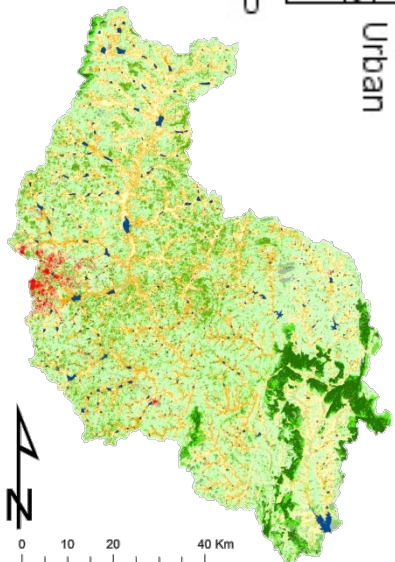
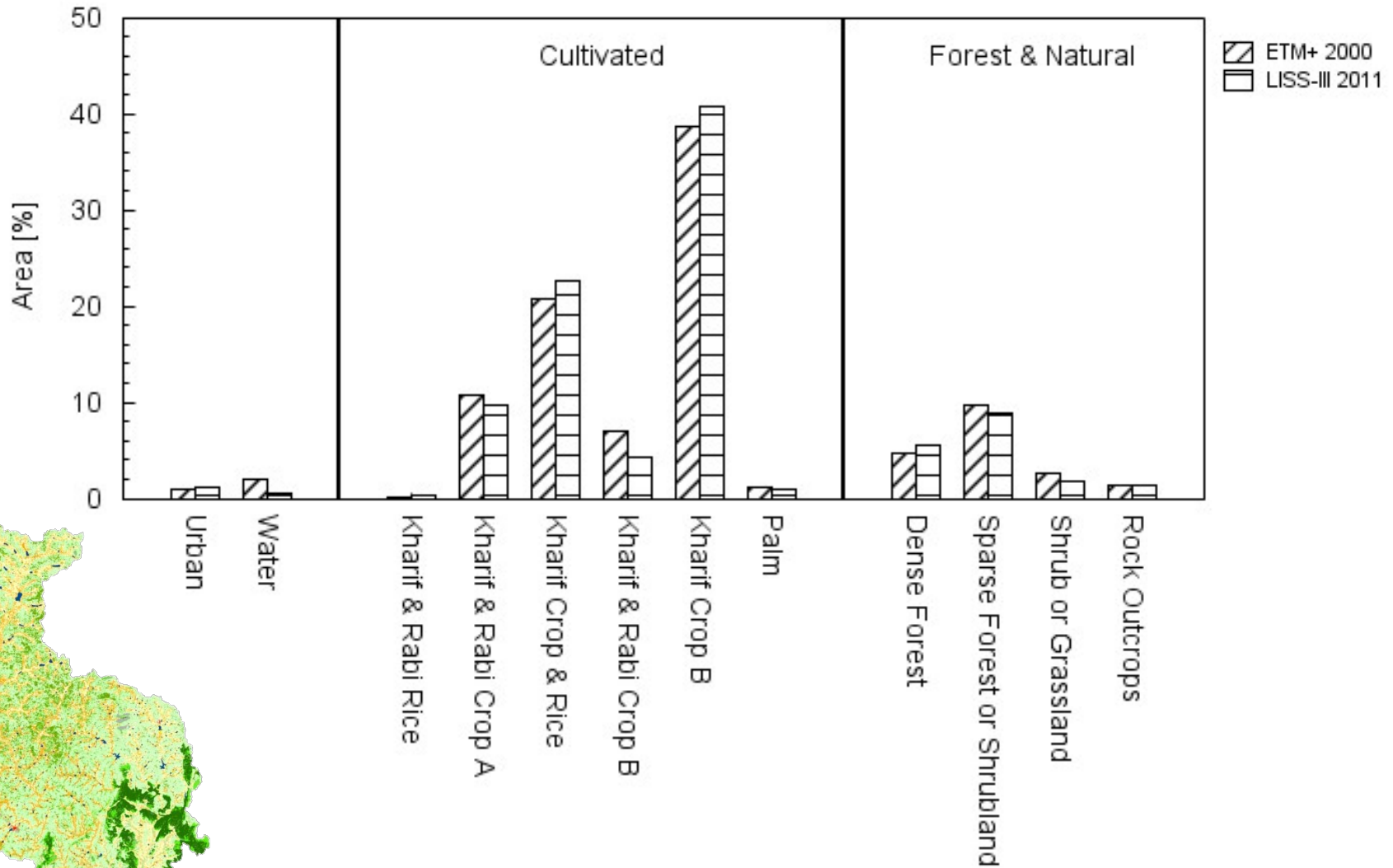
Classification tree



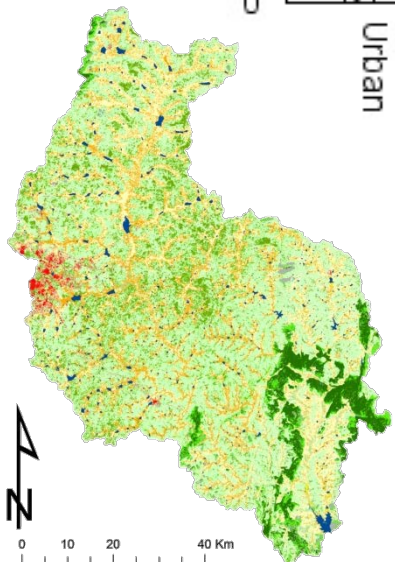
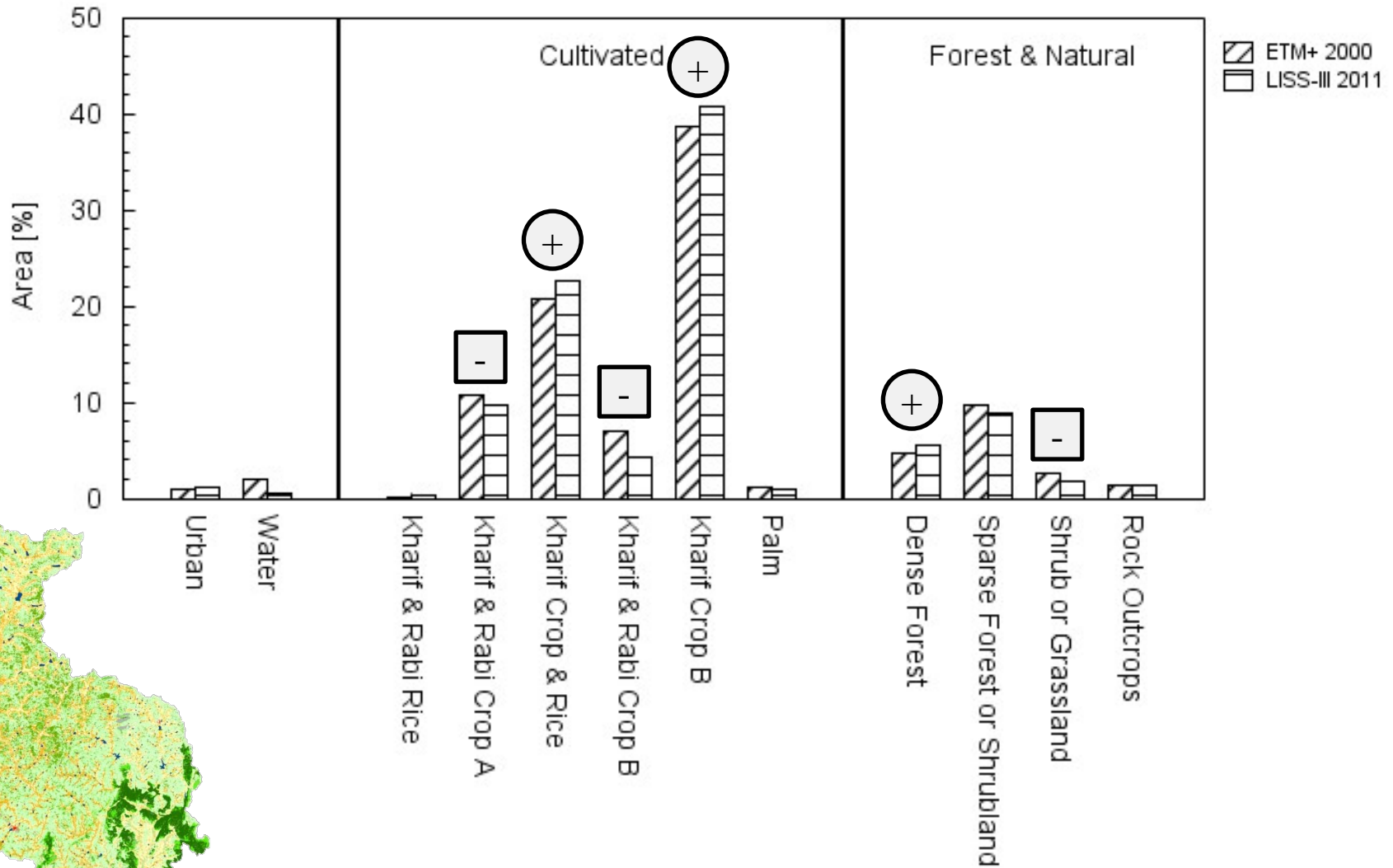
Classification tree



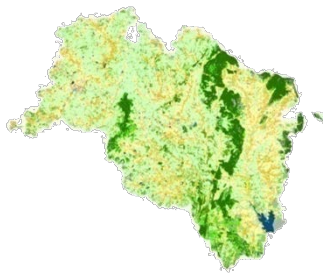
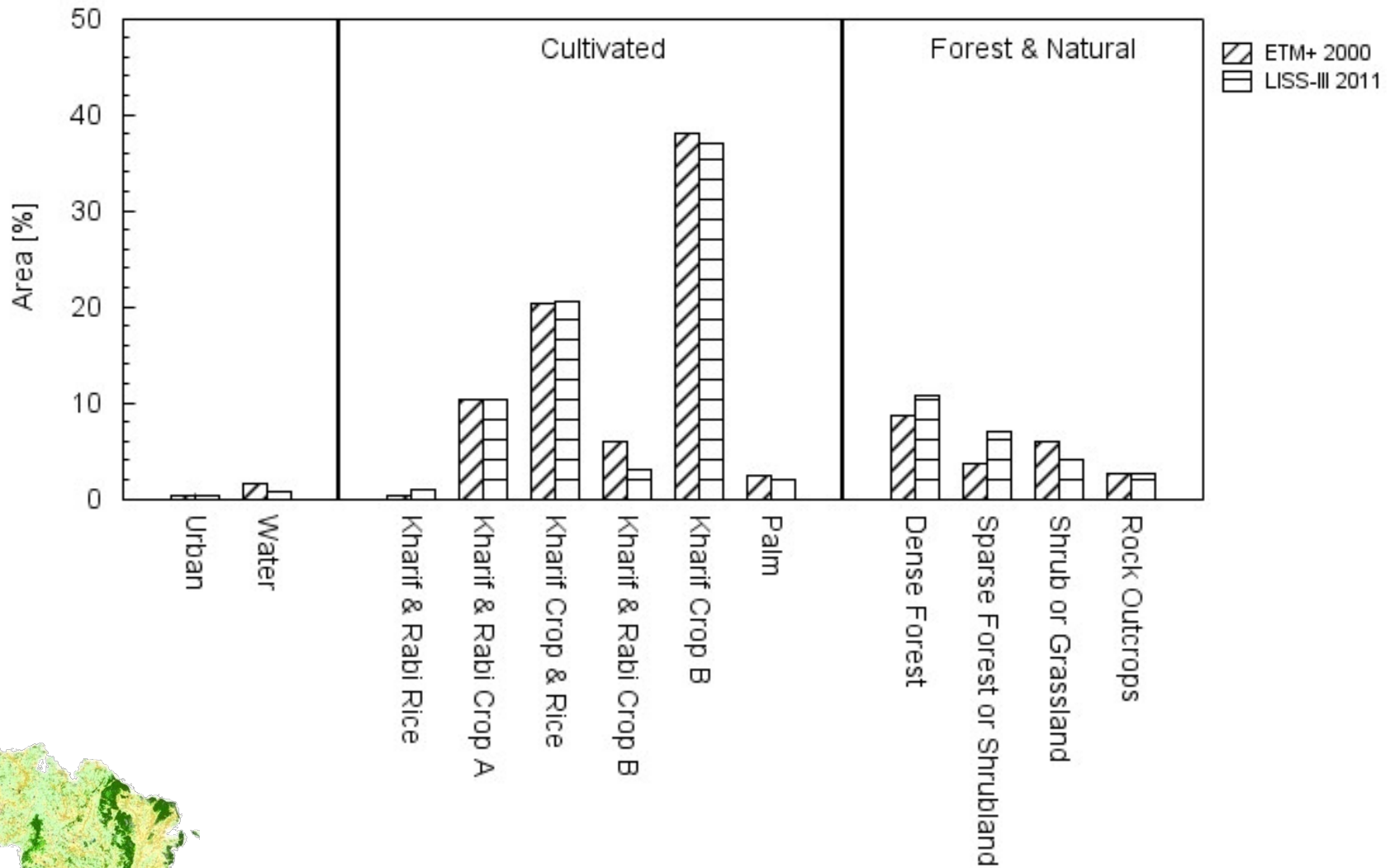
Land uses 2001 & 2011 – whole catchment



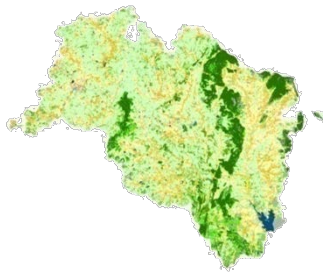
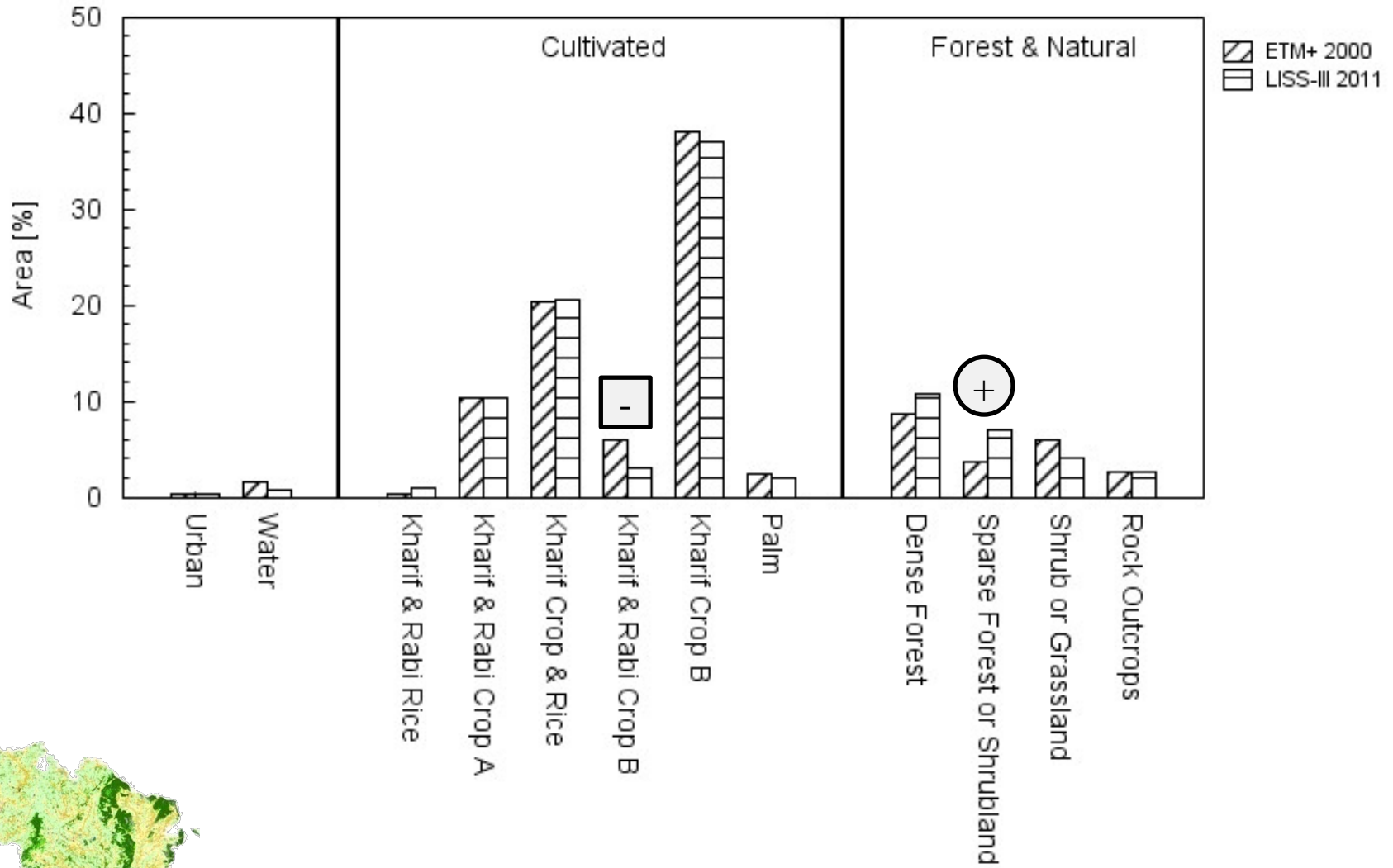
Land uses 2001 & 2011 – whole catchment



Land uses 2001 & 2011 – Krishnagiri district
















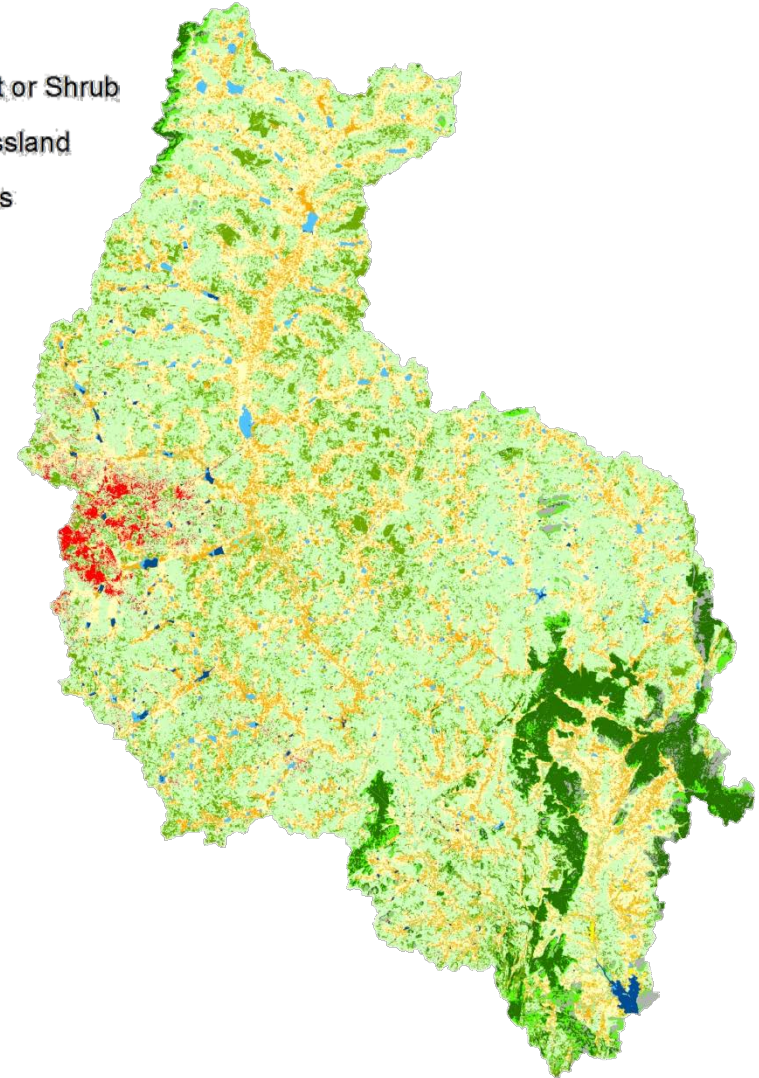
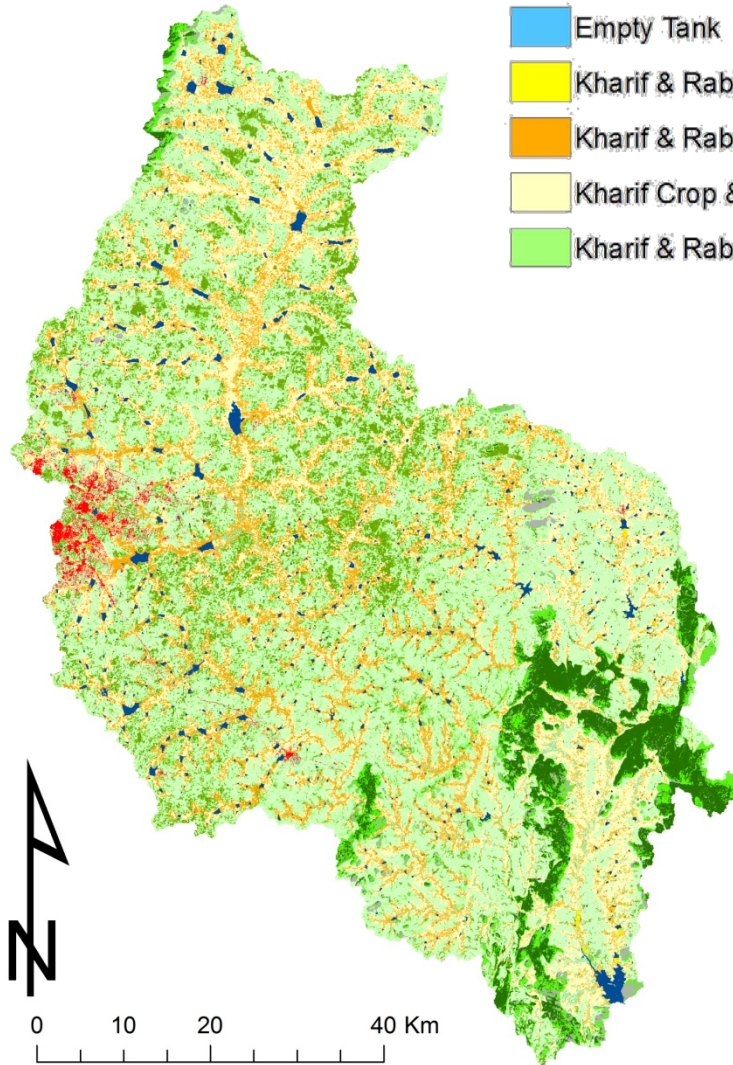
Land uses 2001 & 2011 – Krishnagiri district



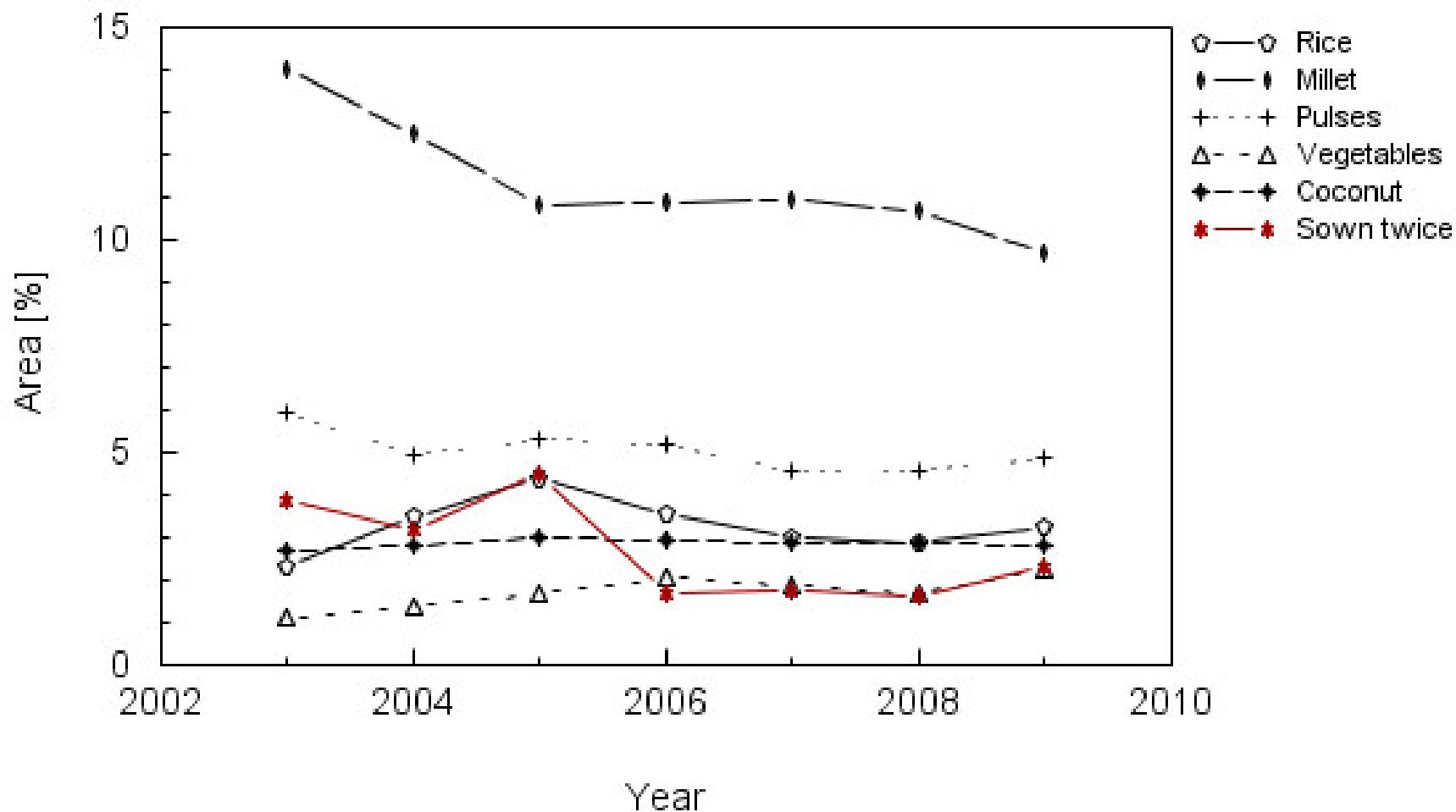
Land uses 2001 & 2011

Legend

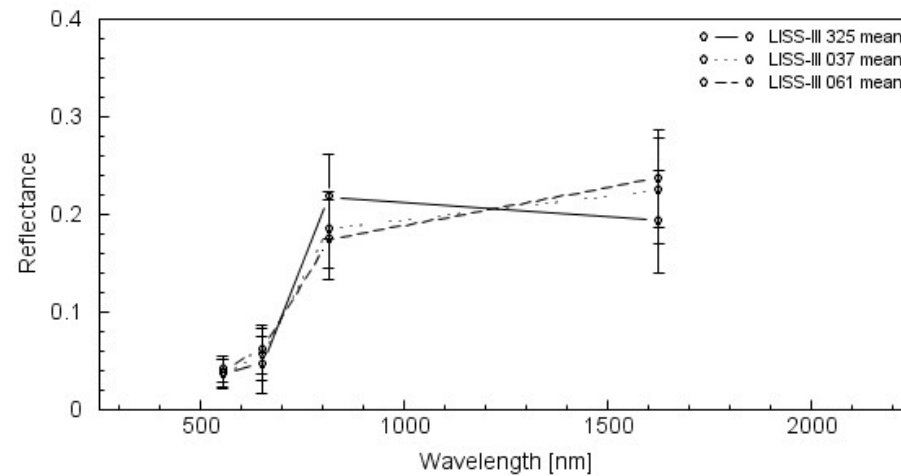
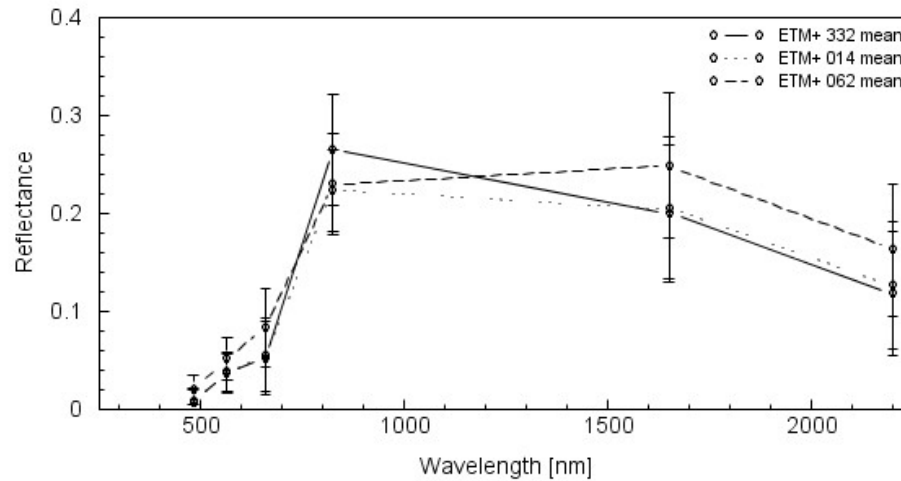
 Urban	 Kharif Crop
 Tank	 Palm
 Empty Tank	 Dense Forest
 Kharif & Rabi Rice	 Sparse Forest or Shrub
 Kharif & Rabi Crop A	 Shrub or Grassland
 Kharif Crop & Rice	 Rock Outcrops
 Kharif & Rabi Crop B	



Agricultural statistics – Krishnagiri district



Quality of spectral classification

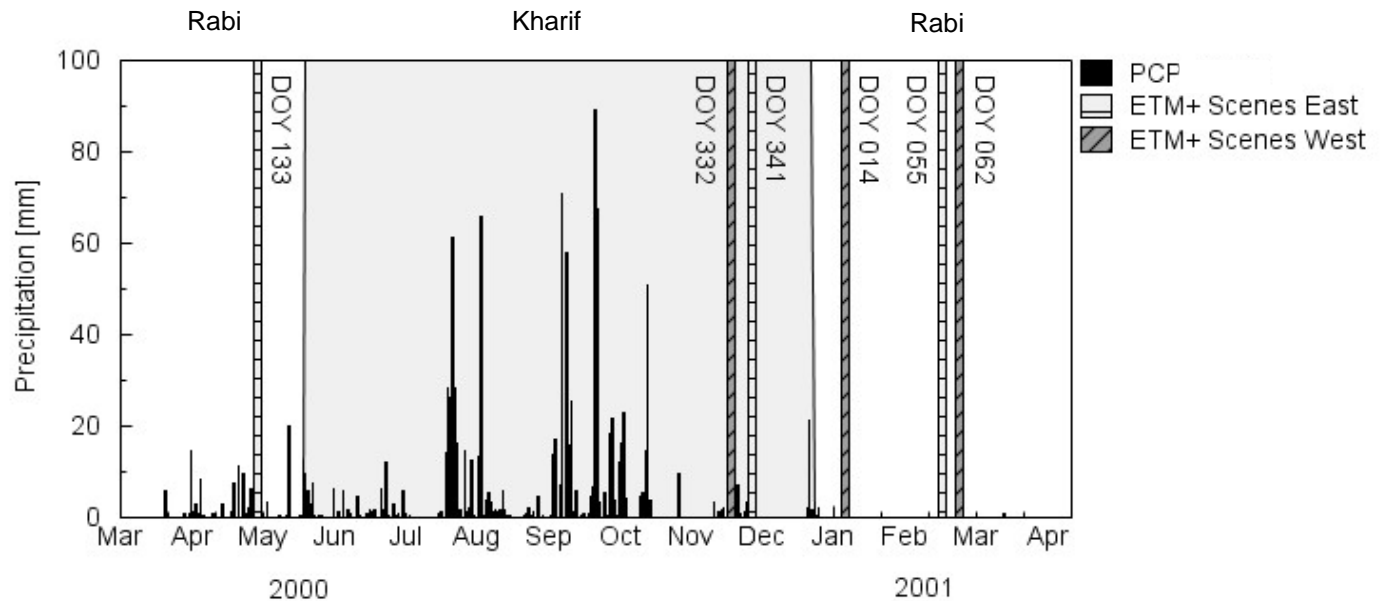


	LISS-III true	LISS-III false	ETM+ West true	ETM+ West false	ETM+ East true	ETM+ East false
Sparse Forest & Shrub.	61.0	0.7	61.6	1.3	53.0	0.3
Palm	70.4	0.9	79.5	0.9	76.6	0.0

Rainfall differences between 2001 & 2011

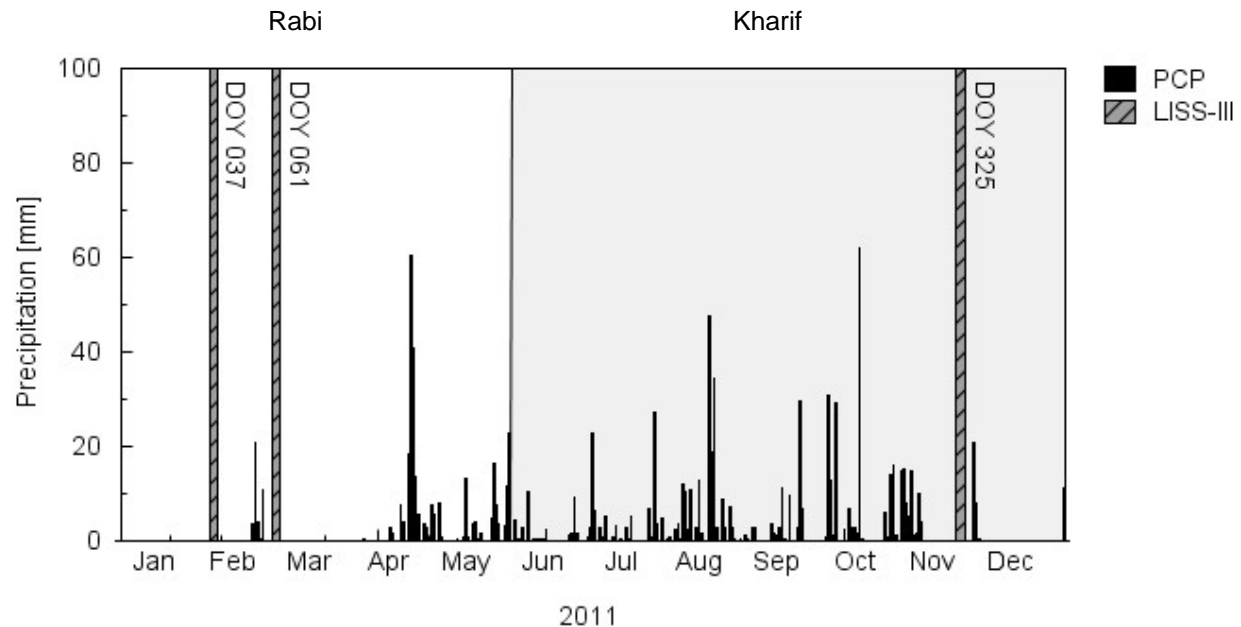
Rainfall

Aug – Nov = 870 mm
DOY 300-340 = 28 mm



Rainfall

Aug – Nov = 545 mm
DOY 284-324 = 176 mm



Findings

- Decrease of areas sown twice
- Land management change in the upper catchment (Karnataka)
- Land use pressure on forest decreased

General

- Patchiness of land use complicates classification
- Geometric problem of LISS-III scenes

Thank you for the attention!



Preseperation

- Separation of relevant regions
- Valley buffer
 - ~8 m height distance of the stream network
- Hills
 - Slope $> 8^\circ$
 - Filling of plateaus
- Water
 - Radiance < 30 [W/(m²*sr* μ m)]
 - Parallepiped classification of shallow lakes

