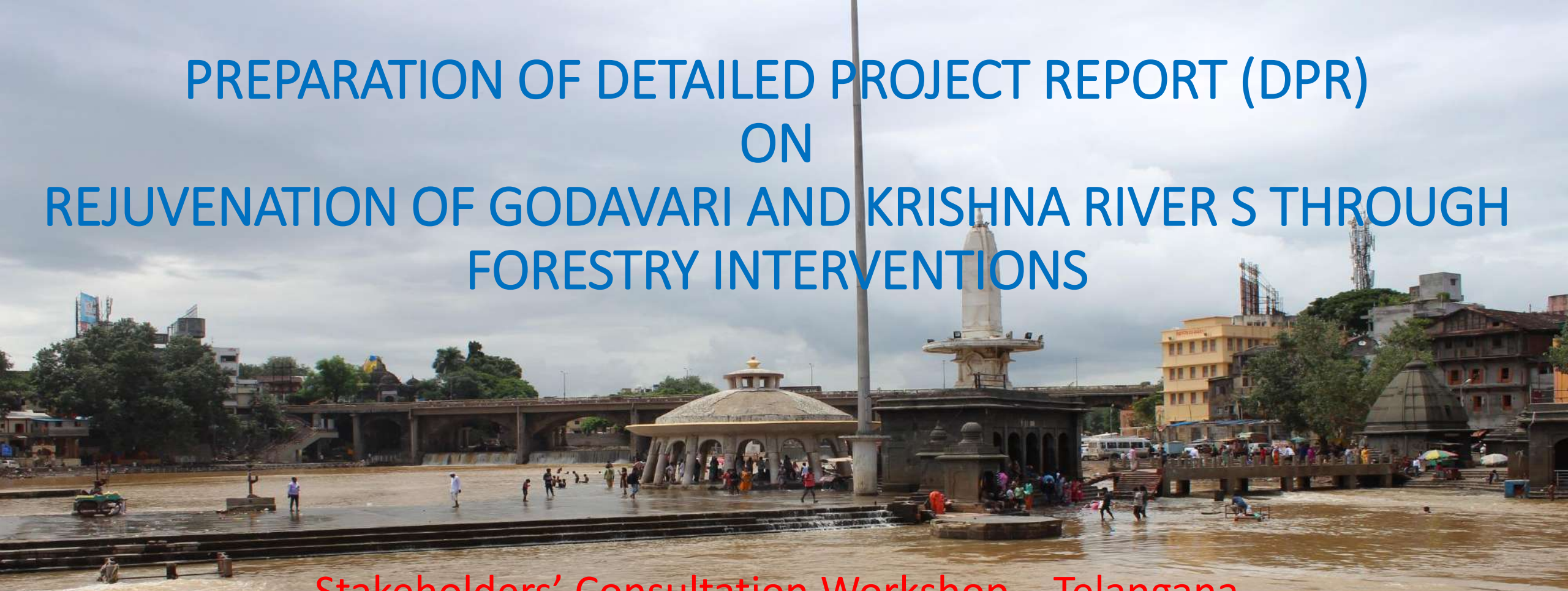
PREPARATION OF DETAILED PROJECT REPORT (DPR) ON REJUVENATION OF GODAVARI AND KRISHNA RIVER S THROUGH FORESTRY INTERVENTIONS



Stakeholders' Consultation Workshop – Telangana State

Institute of Forest Biodiversity

(*Indian Council of Forestry Research and Education*)

Hyderabad

BACKGROUND

- Recognizing the vital importance of forestry interventions –
  - Afforestation, Reforestation and ANR
  - Catchment treatment
  - Habitat protection
  - Soil & moisture conservation works
  - Role of riparian forests in biofiltration and bioremediation
  - Improved livelihood of forest dependent communities, alternate income generation activities etc.
- The Ministry of Water Resources, River Development and Ganga Rejuvenation – entrusted the task of DPR preparation for rejuvenation of Ganga to FRI, Dehradun.
- DPR Ganga – appreciated by MoEF&CC, being implemented by various Forest Departments and other agencies.

Continue--

PRESENTATION STRUCTURE

Slides 3-5	• Background • Rejuvenation of Major Rivers by Forestry Interventions -Objectives
Slides 6-10	• Role of Forestry in River Rejuvenation
Slides 11-21	• Godavari river, Basin and Sub-basins • Godavari in Telangana
Slides 22-38	• Godavari DPR – the Approach

- Following the successful completion of DPR Ganga – Ministry of Environment, Forest and Climate Change has given responsibility to ICFRE, Dehradun for preparation of DPR for nine (9) major river systems in India *viz.,*

    1. Yamuna
    2. Godavari
    3. Krishna
    4. Narmada
    5. Mahanadi
    6. Kauvery
    7. Brahmaputra
    8. Sutlej
    9. Luni

OBJECTIVES

1. Review and assess the existing situation of river basin, past river management implications and lessons learnt.
2. **Identify and involve stakeholders , build consensus for design and development of strategies and approaches.**
3. Assess ongoing forestry activities of the states engaged in the river management programmes.
4. Assess potential and possibilities for regeneration, improvement and restoration of forest catchments.
5. *Assess the conditions of riparian forests and potential of biological filters.*
6. *Examine the possibility of allied and other income generation activities*.
7. *Assess the potential of cultivation of medicinal plants, restoration of conservation areas and identify appropriate species for suitable sites.*
8. *Identify research, monitoring needs, develop strategy for future research and monitoring.*
9. *Formulate strategies, develop approaches and plan activities for project implementation.*

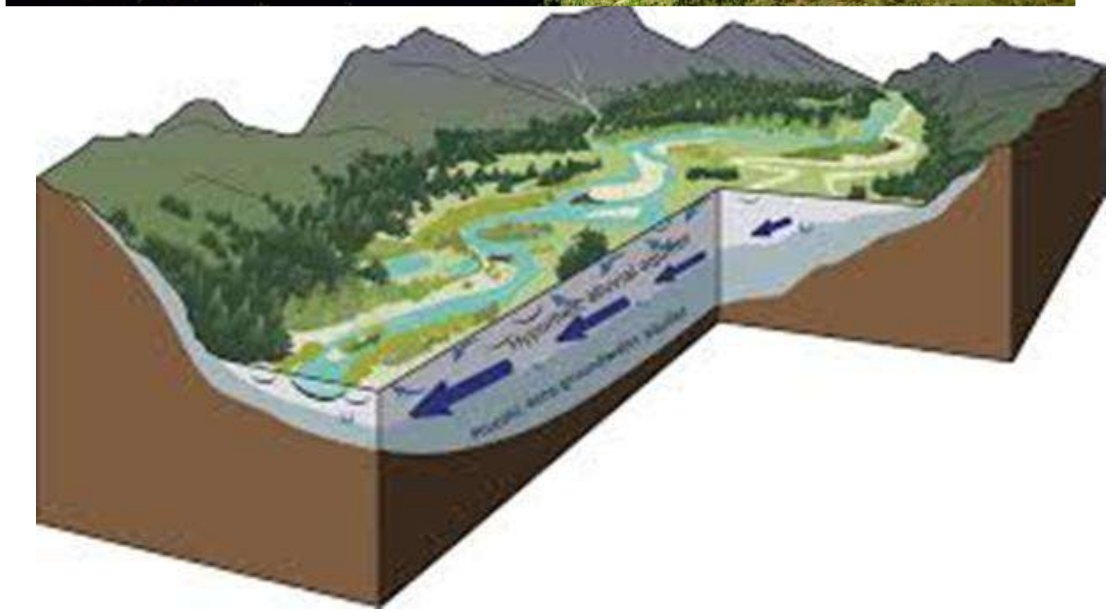
RIVERS – LIFELINE OF HUMAN CIVILIZATION

- Historically human settlements Worldwide concentrated chiefly along rivers. Over half of the World's population lives within 20 km area of rivers.
- Man has exploited and used rivers more than any other type of ecosystems. Most of the World's 79 large river-floodplain ecosystems have been altered by human activities.

Human activities include:

- Physical barriers
- Water extraction
- Pollution of waterways
- Destructive land use

RIVER – A COMPLEX AND DYNAMIC ECOSYSTEM



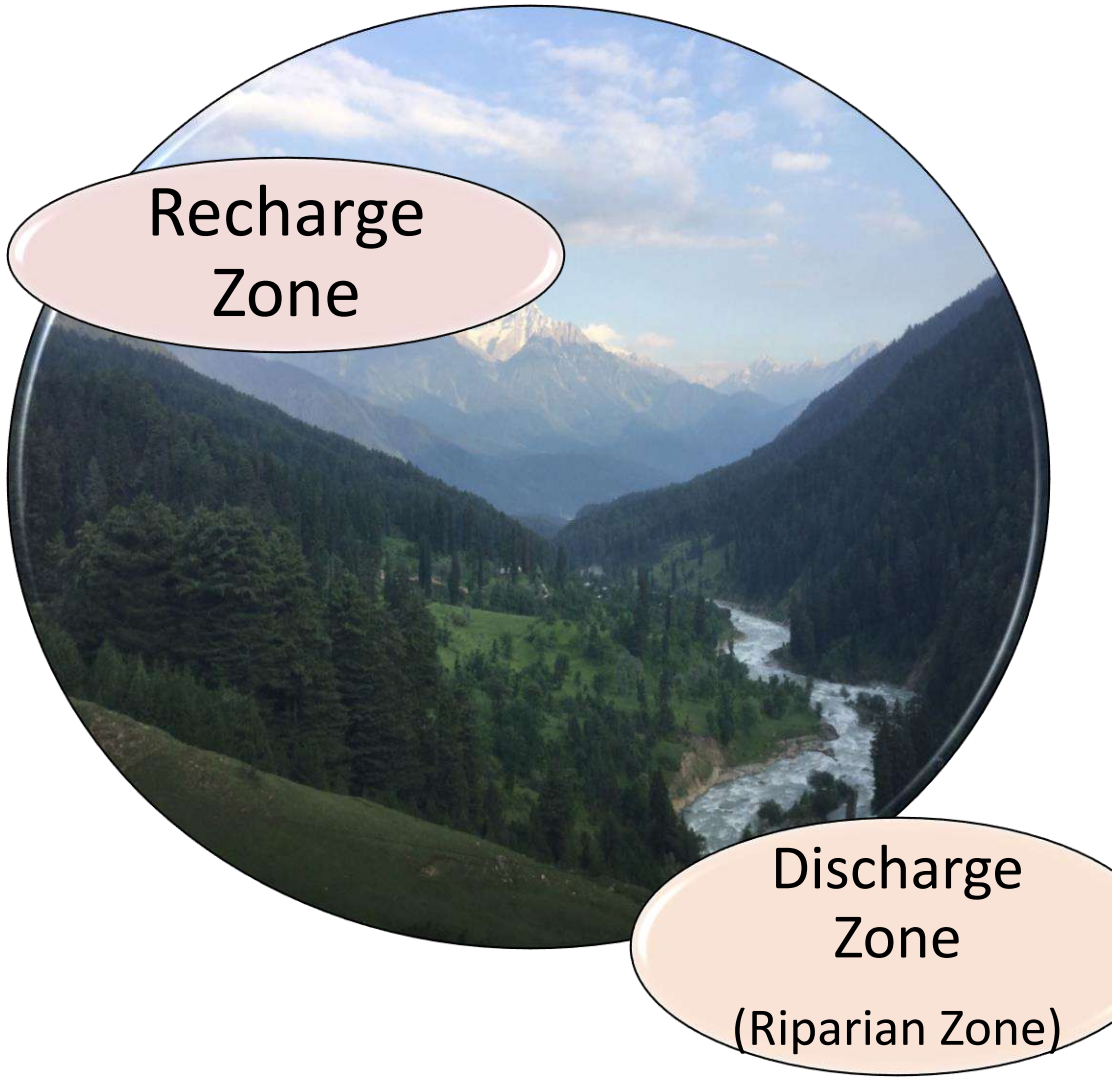
- River exhibits high degrees of connectivity between various systems longitudinally, laterally and vertically.
- River integrates all that happens in the landscape, reflect the biological state, and reveals about the consequences of human actions.
- Rivers have been recognized as ‘sentinels’ as they give early warning of the risks of human activities.

ISSUES AFFECTING RIVER DISCHARGE

- Rainfall is concentrated mainly during the 4-5 months of monsoon (75-80%).
- Marked change in the flow pattern of streams and rivers in last 20-25 yrs.
- Many perennial rivers are dry for long period of time.
  - Due to over extraction of groundwater.
  - Cultivation of wrong crop in the basin area.
  - No buffer for lean period.
- Stream discharge is dependent on groundwater supplement during lean period.
- Dramatic reduction in lean flow discharge.

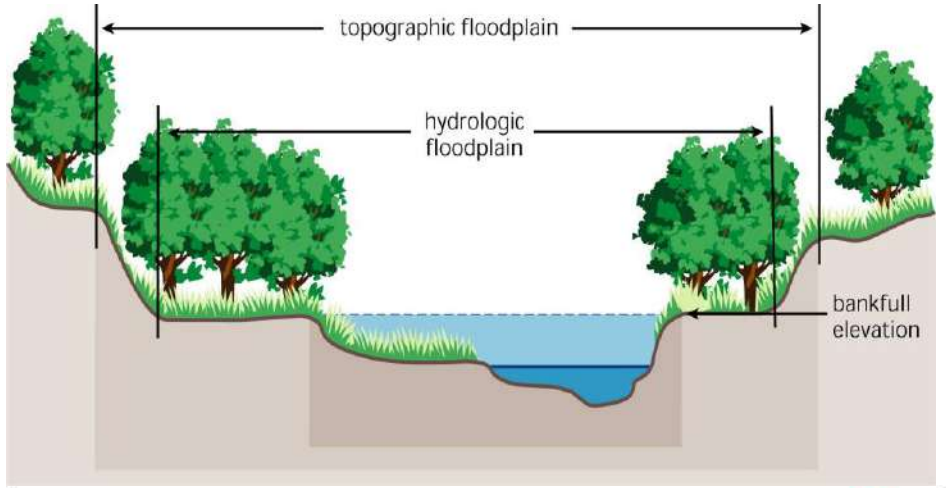
ROLE OF FORESTS IN RECHARGE ZONE

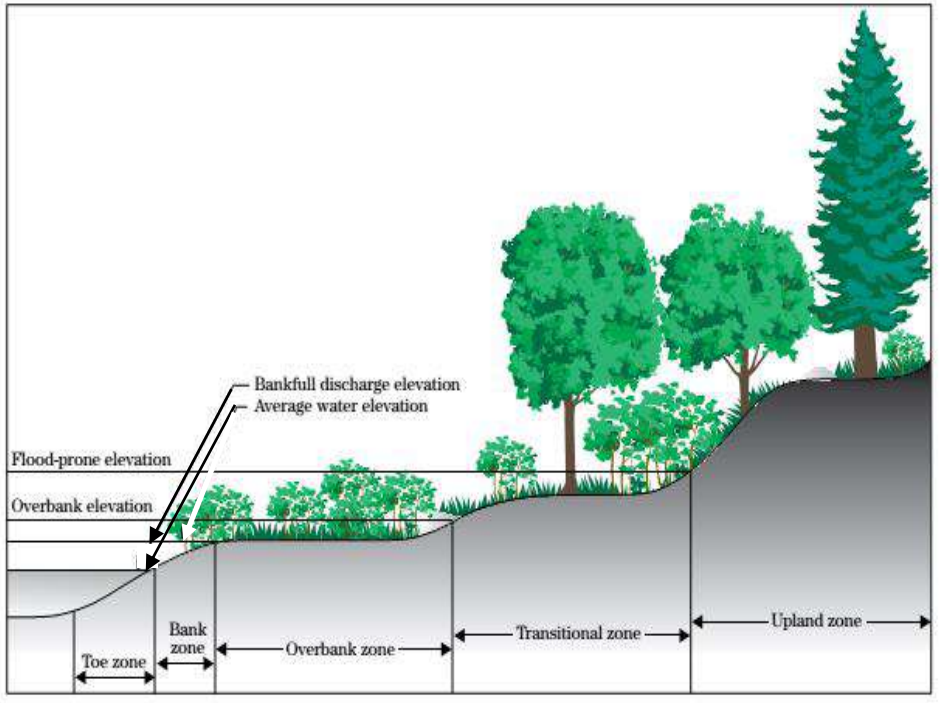
- The Forests are the major land use in upper catchments.
  - Receives in general higher rainfall.
  - Source of major river systems in the country.
- Absorb rainfall and snow melt - Improve water infiltration rates and recharge aquifers - Affect volume and timing of water flow - ‘sponge effect’.
- Forests slow runoff and reduce soil erosion - affect the rates of soil formation.
- Forests decrease in peak flow and increase in lean flow – *Aviral Dhara*.



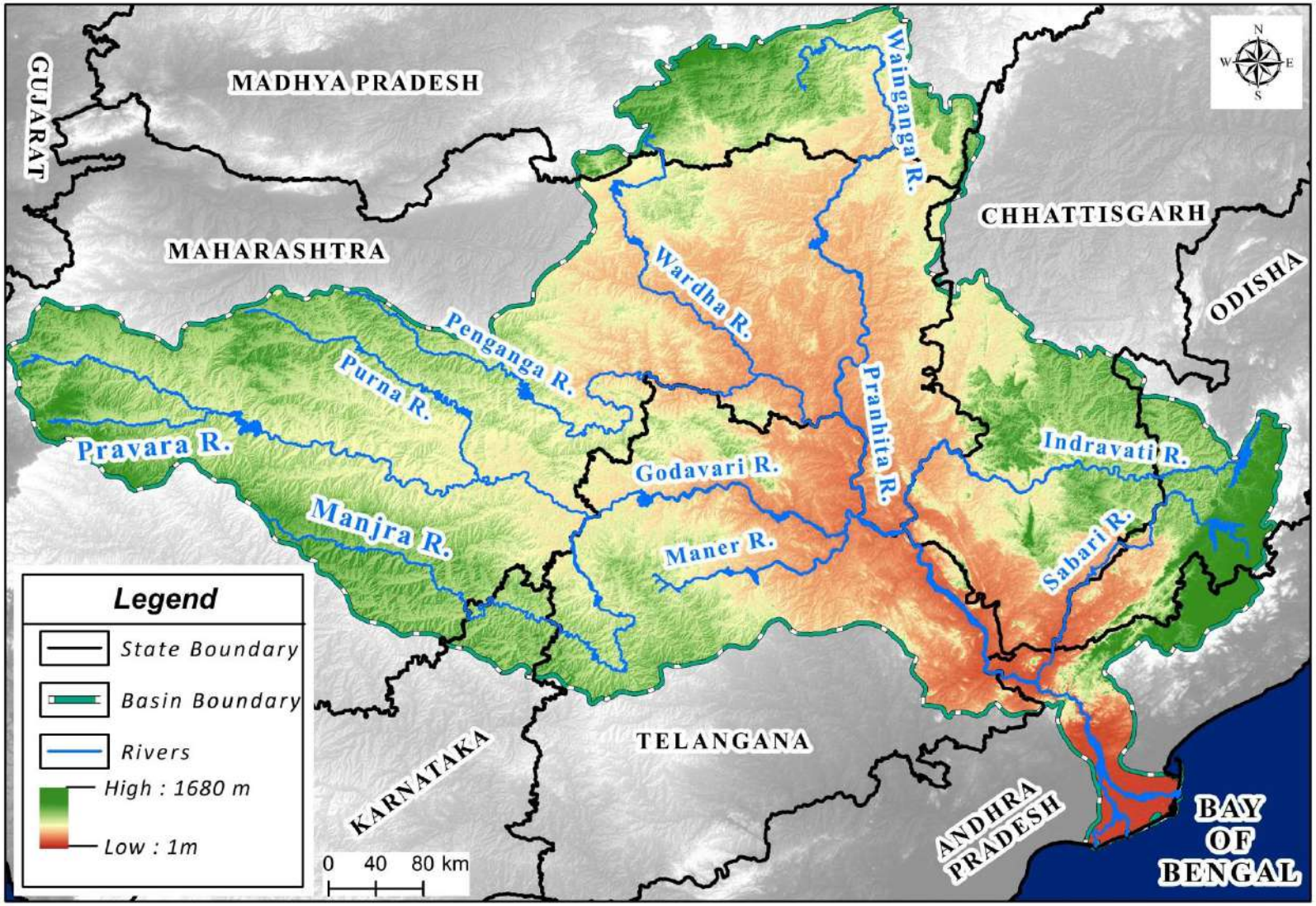
ROLE OF FORESTS IN DISCHARGE (RIPARIAN) ZONE

- Riparian forests act as buffers reducing impact of anthropogenic disturbances on rivers.
- Serve as 'biological filters'- Absorb heavy metal , reduce sludge, oil, grease and degrade organic matter
- Provide stable water course
- Trap sediment from runoff, reduce channel erosion and provide clean water – *Nirmal Dhara*
- Control temperature of river water
- Sink for Nitrogen and Phosphorous
- Provide organic matter for aquatic fauna
- Provide habitat for terrestrial animals





GODAVARI BASIN AND RIVER SYSTEM



Godavari – Interstate river system

Length – 1465.0 km

Basin area – 3,12,812 sq. km

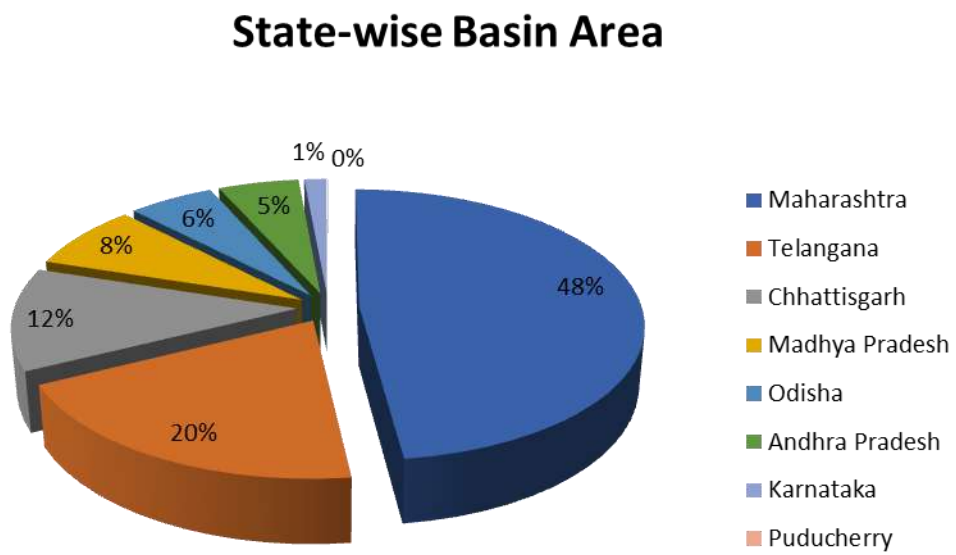
Spread across – 7 states, 1 union territory

Average water resource potential (MCM)- 1,10,540

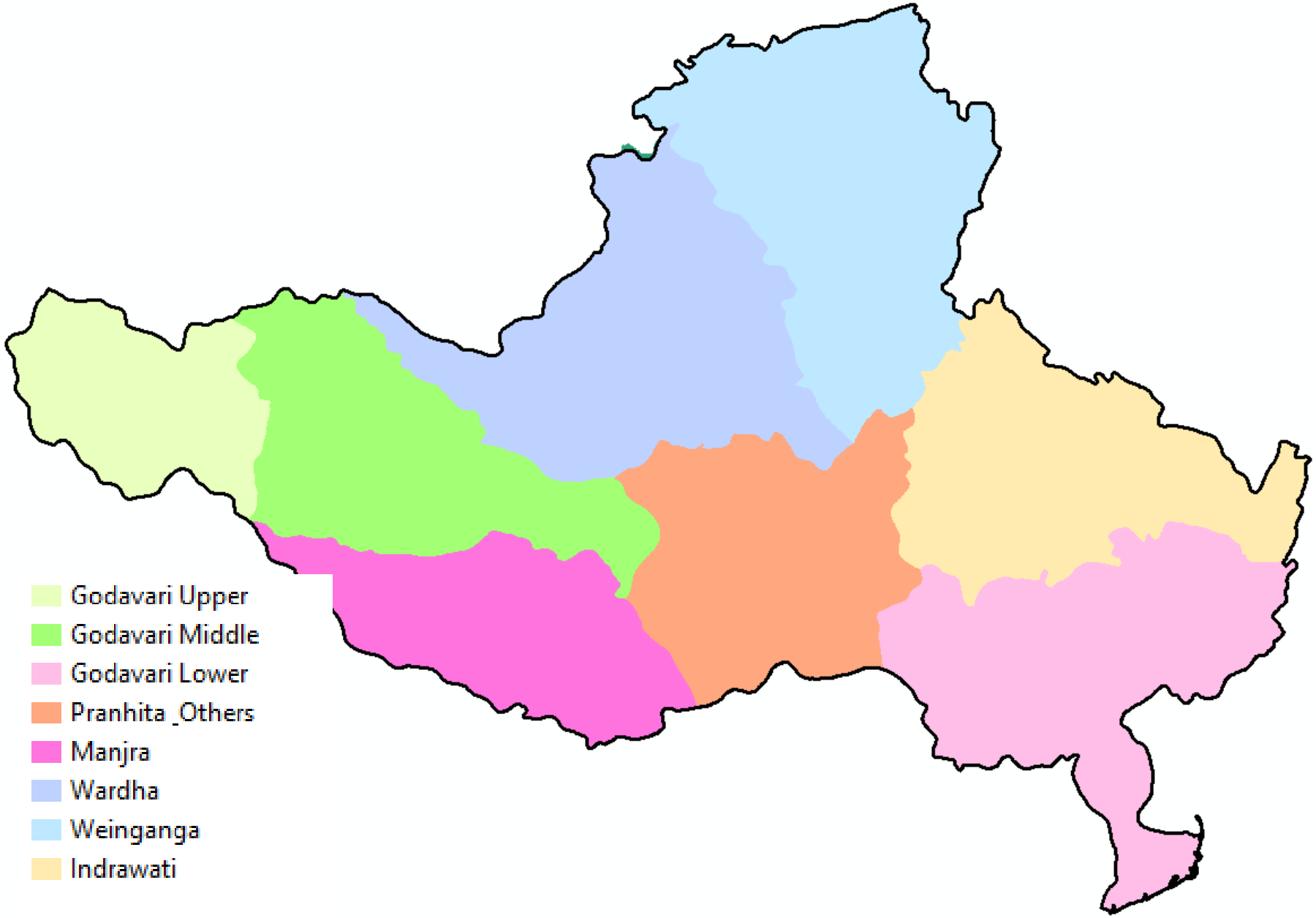
Utilizable surface water resource (MCM) – 76,300

GODAVARI – STATE-WISE BASIN AREA

Sl. No.	Name of the state	Basin area (Sq.Km.)	Percent of total Godavari basin (%)	Revenue districts within basin area	Forest Divisions in Riverscape
1	Maharashtra	1,47,320.65	48.77	21	34
2	Telangana	60,270.95	19.65	24	27
3	Chhattisgarh	37,463.28	12.40	10	-
4	Madhya Pradesh	23,767.44	07.87	05	07
5	Odisha	17,213.97	05.70	05	06
6	Andhra Pradesh	16,171.74	05.27	04	04
7	Karnataka	4,469.3	01.48	02	01
8	Puducherry	36.94	00.01	01	-

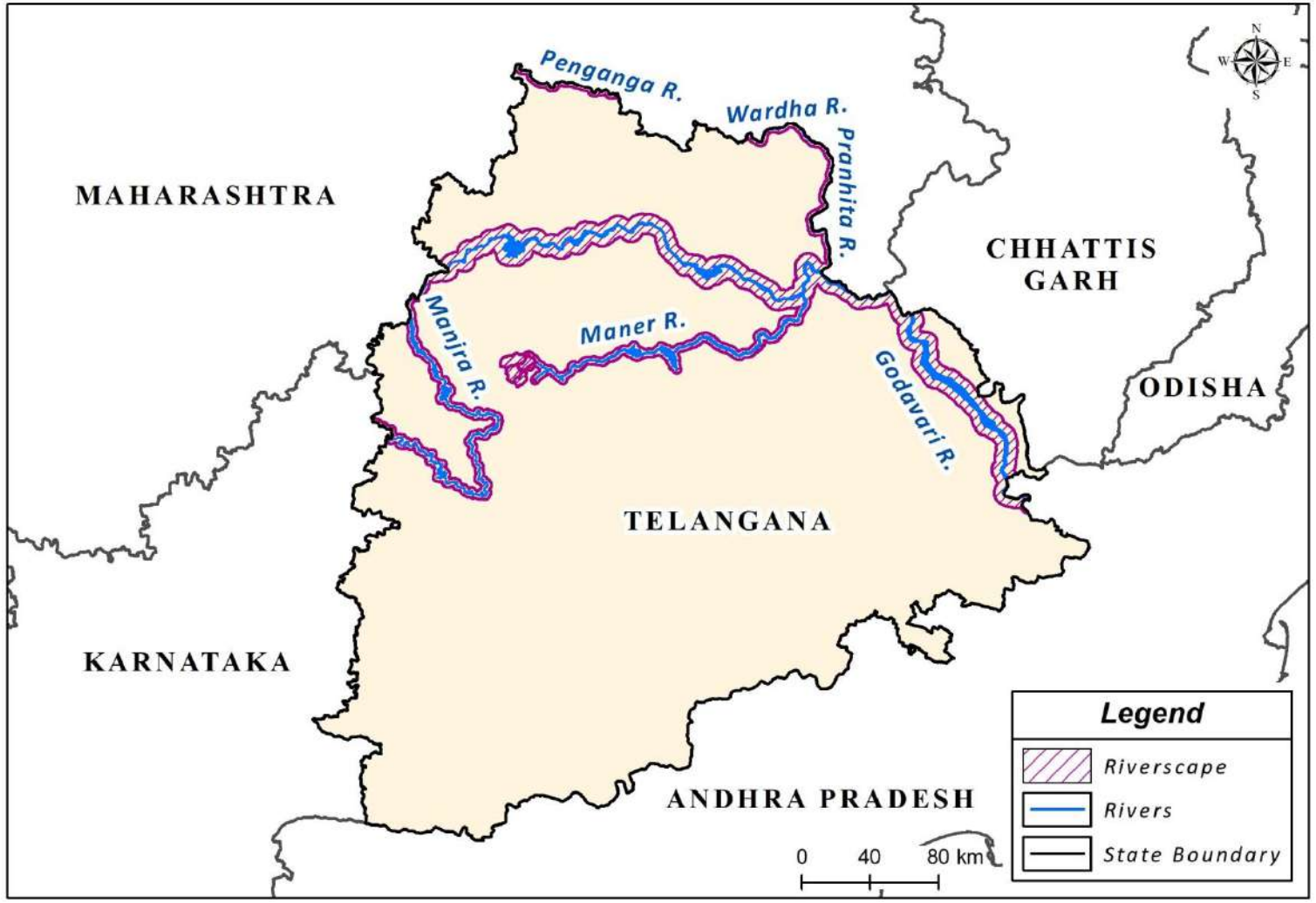


GODAVARI SUB-BASINS



Sub-basin Statistics for Telangana	
Sub-basin name	**Area**
1.Godavari lower	44,492.9
2.Godavari middle	36,290.5
3.Manjra	29,472.9
4.Pranhita & Others	36,119.6
Wardha	46,242.1
Total	**1,92,618.0**

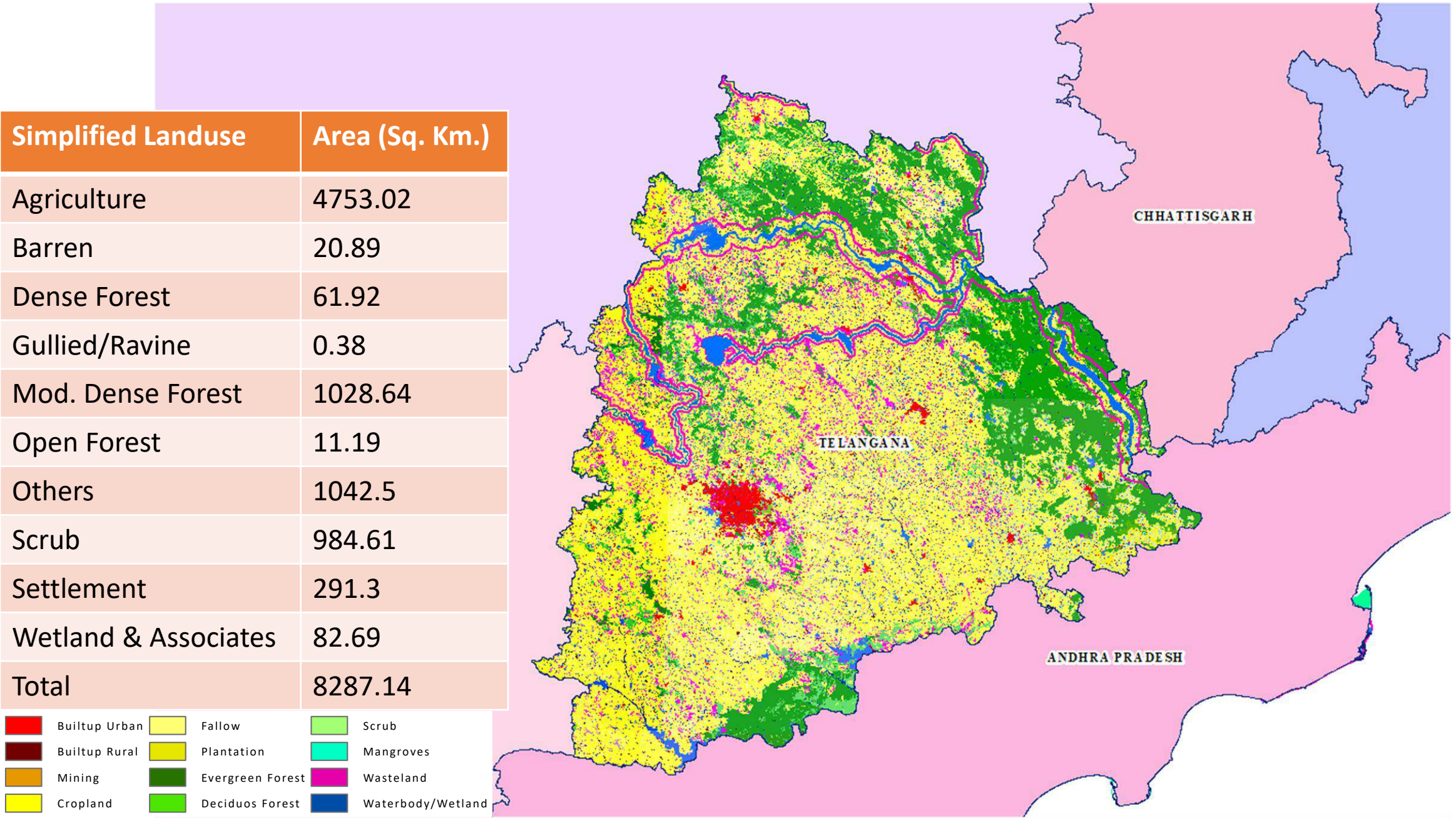
TELANGANA – MAIN STEM, TRIBUTARIES &CATCHMENT



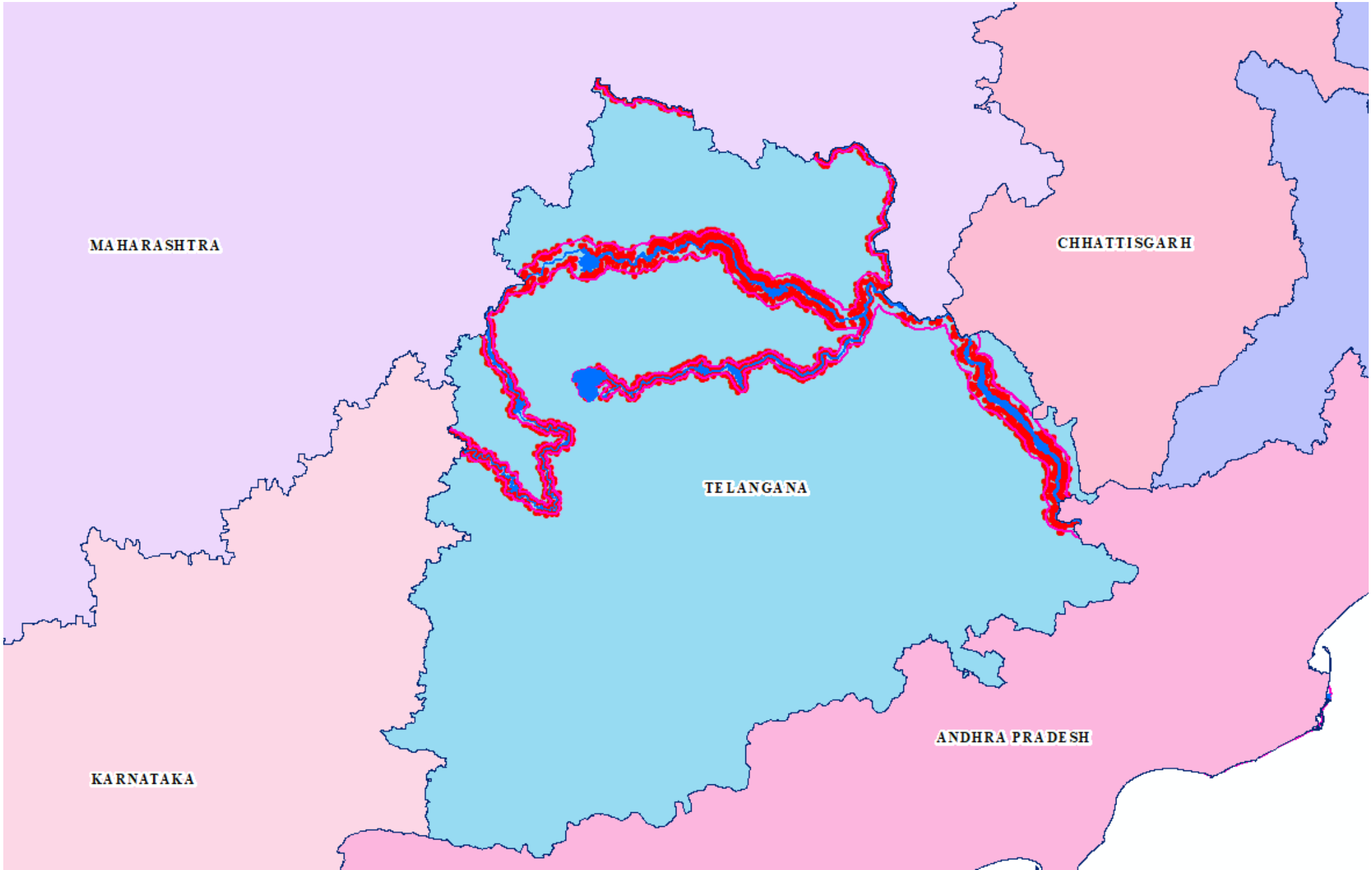
Main stem/Tributary name	River length (Km)	Headwater Catchment area (sq. km)	Riverscape area (sq. km)
Godavari	509.7	-	5304.51
Maner	230.29	212.76	1262.19
Manjra	310.22	-	1244.48
Penganga	72.18	-	149.45
Pranhita	108.46	-	249.84
Wardha	39.59	-	76.67
Total	**1270.4**	**212.76**	**8287.0**

TELANGANA – LAND USE AND LAND COVER

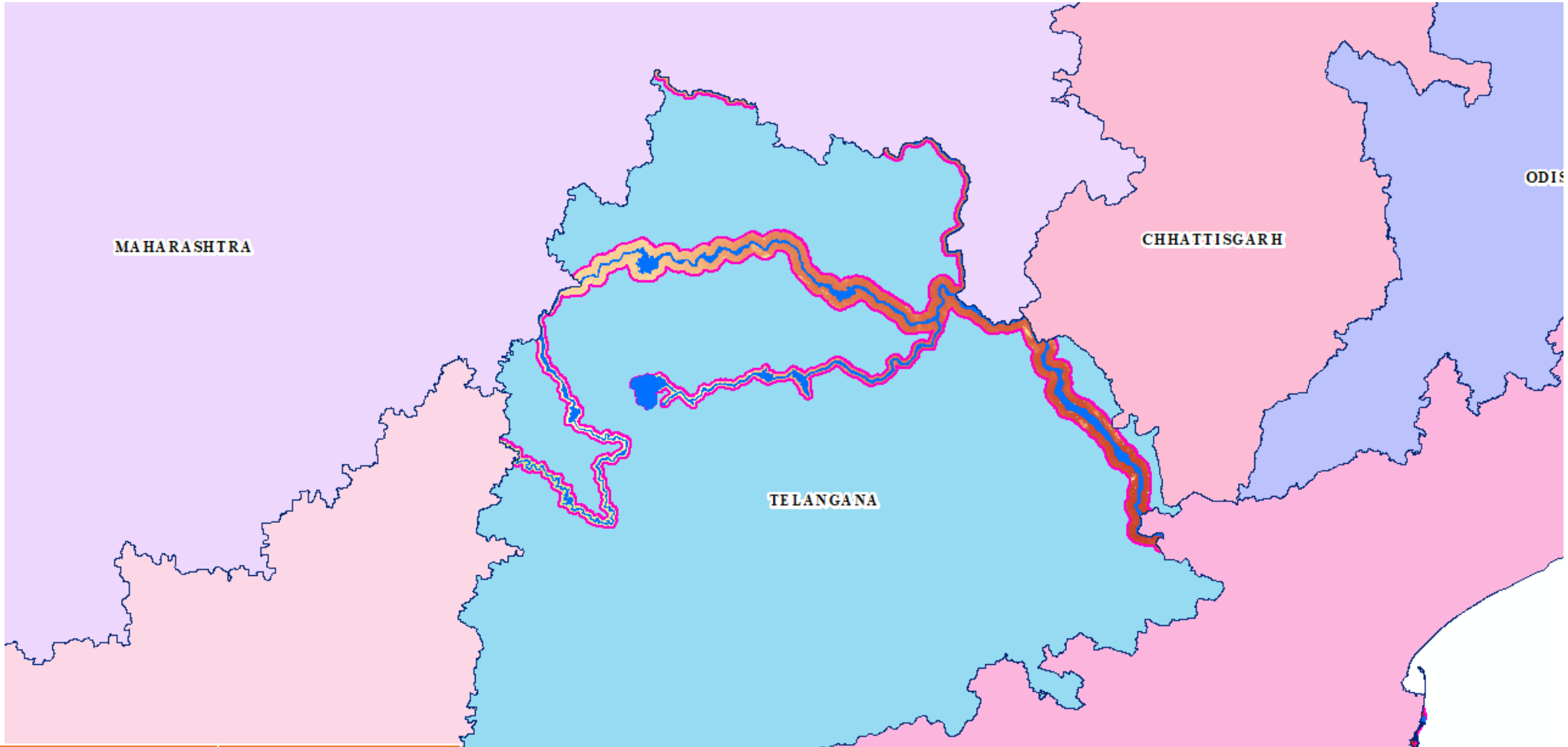
Simplified Landuse	Area (Sq. Km.)
Agriculture	4753.02
Barren	20.89
Dense Forest	61.92
Gullied/Ravine	0.38
Mod. Dense Forest	1028.64
Open Forest	11.19
Others	1042.5
Scrub	984.61
Settlement	291.3
Wetland & Associates	82.69
Total	8287.14



TELANGANA – SETTLEMENTS

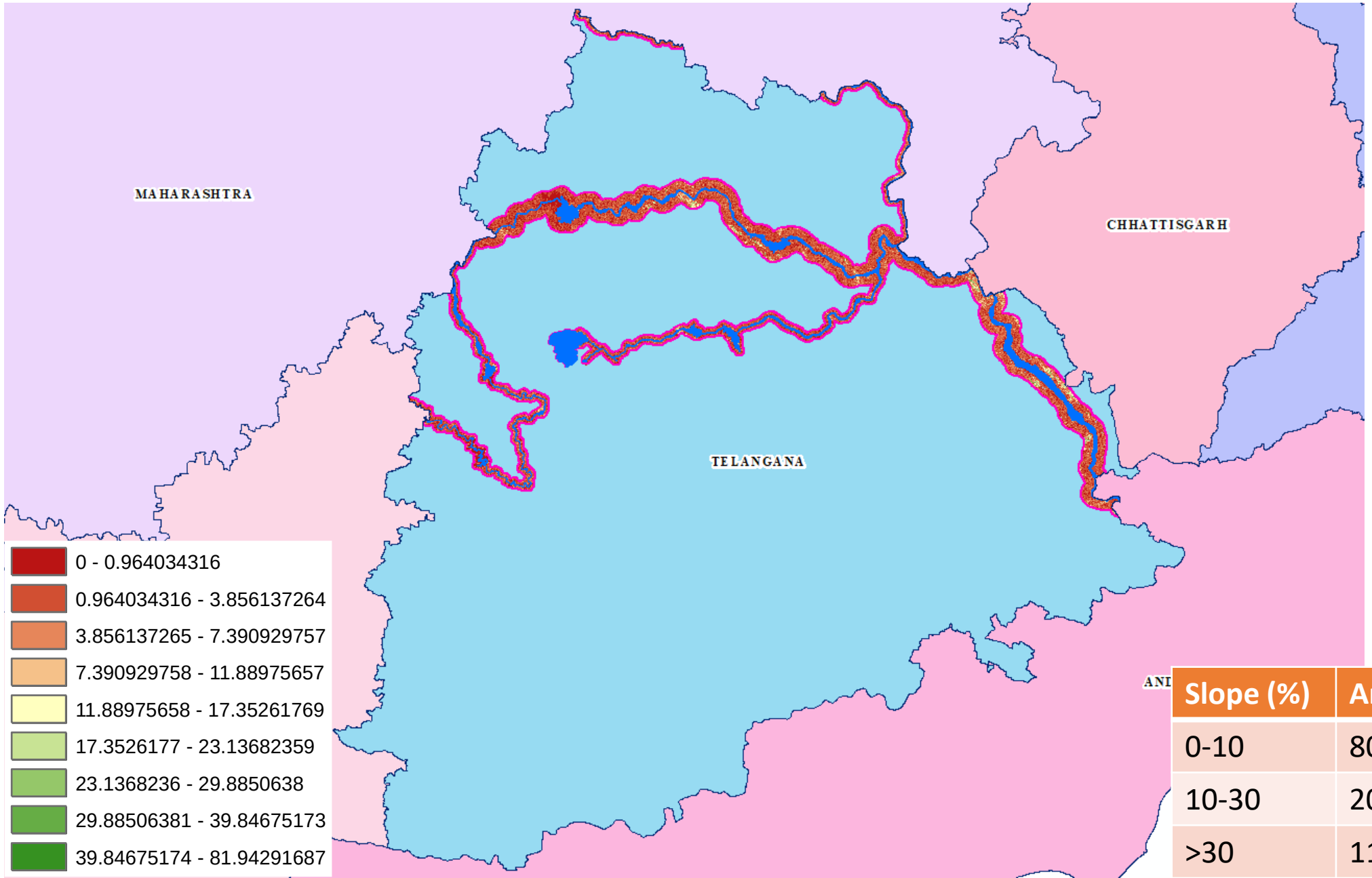


TELANGANA – DIGITAL ELEVATION MODEL



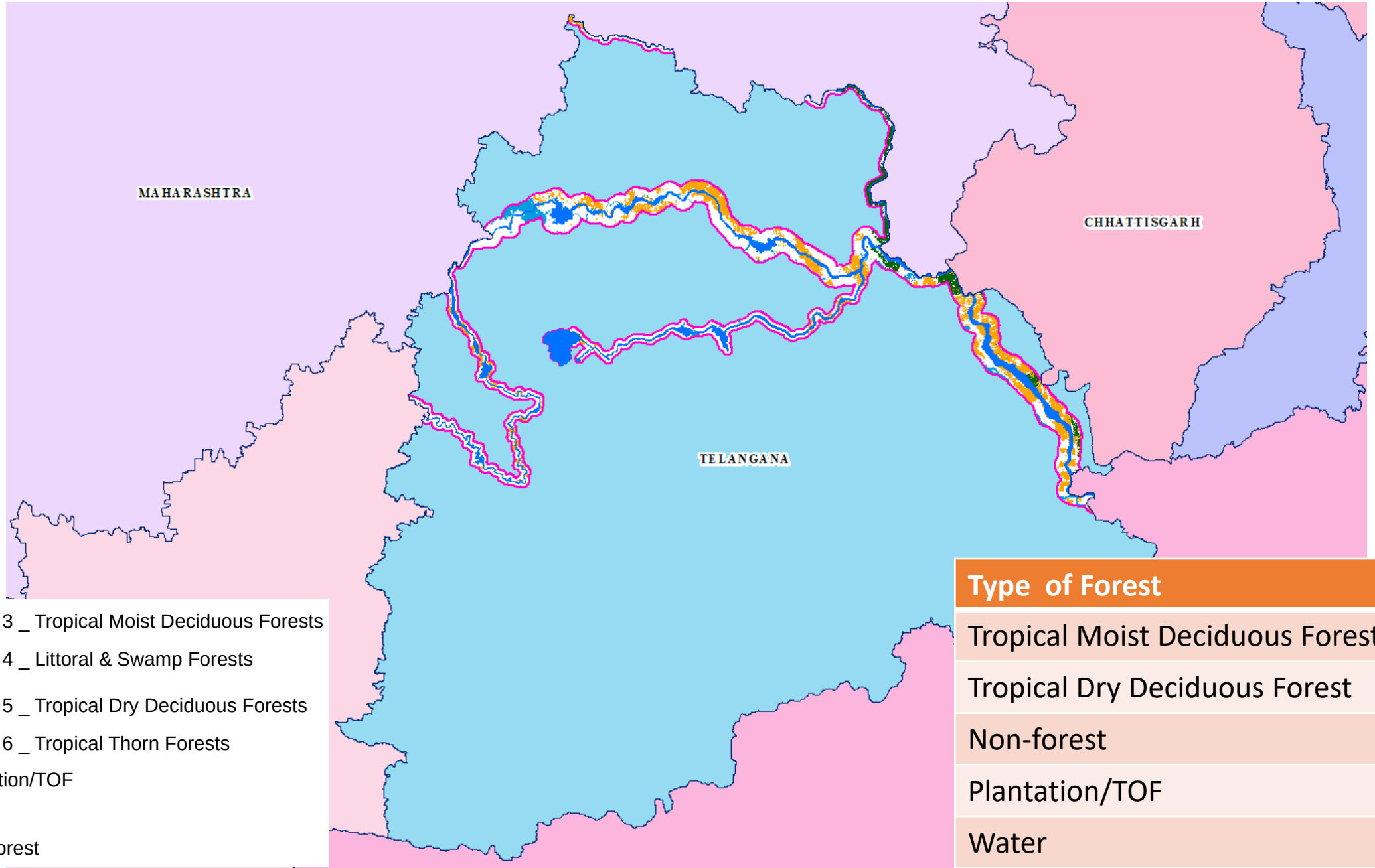
Altitude (m above MSL)	Area (Sq. Km)
0-250	4884.65
250-500	2710.79
500-750	691.7

TELANGANA – SLOPE



Slope (%)	Area (Sq. km)
0-10	8073.27
10-30	202.5
>30	11.37

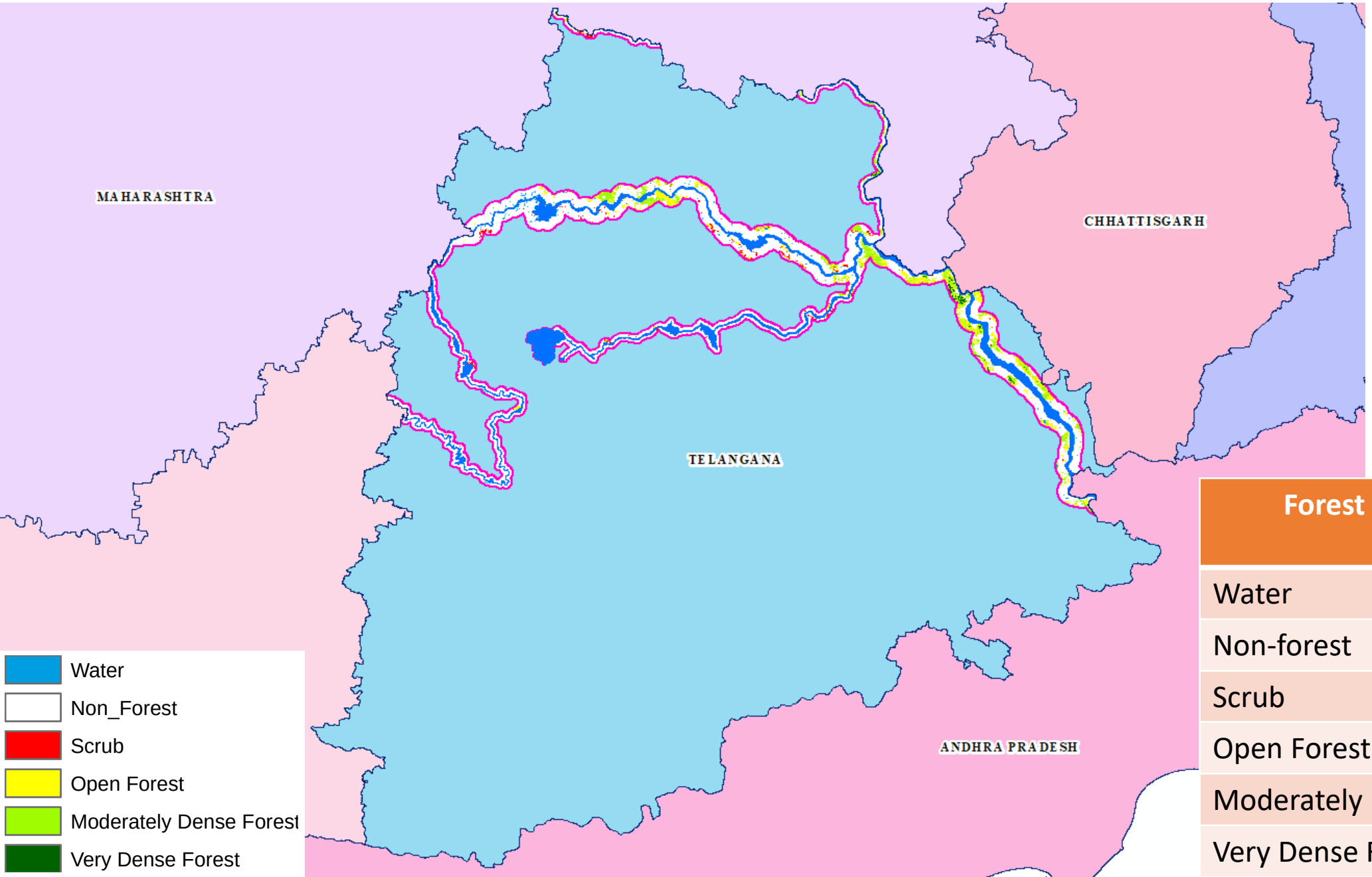
TELANGANA – FOREST TYPE



- Group 3 _ Tropical Moist Deciduous Forests
- Group 4 _ Littoral & Swamp Forests
- Group 5 _ Tropical Dry Deciduous Forests
- Group 6 _ Tropical Thorn Forests
- Plantation/TOF
- Water
- Non Forest

Type of Forest	Area(Sq.Km)
Tropical Moist Deciduous Forest	2.38
Tropical Dry Deciduous Forest	1253.6
Non-forest	6015.51
Plantation/TOF	8.81
Water	1006.84

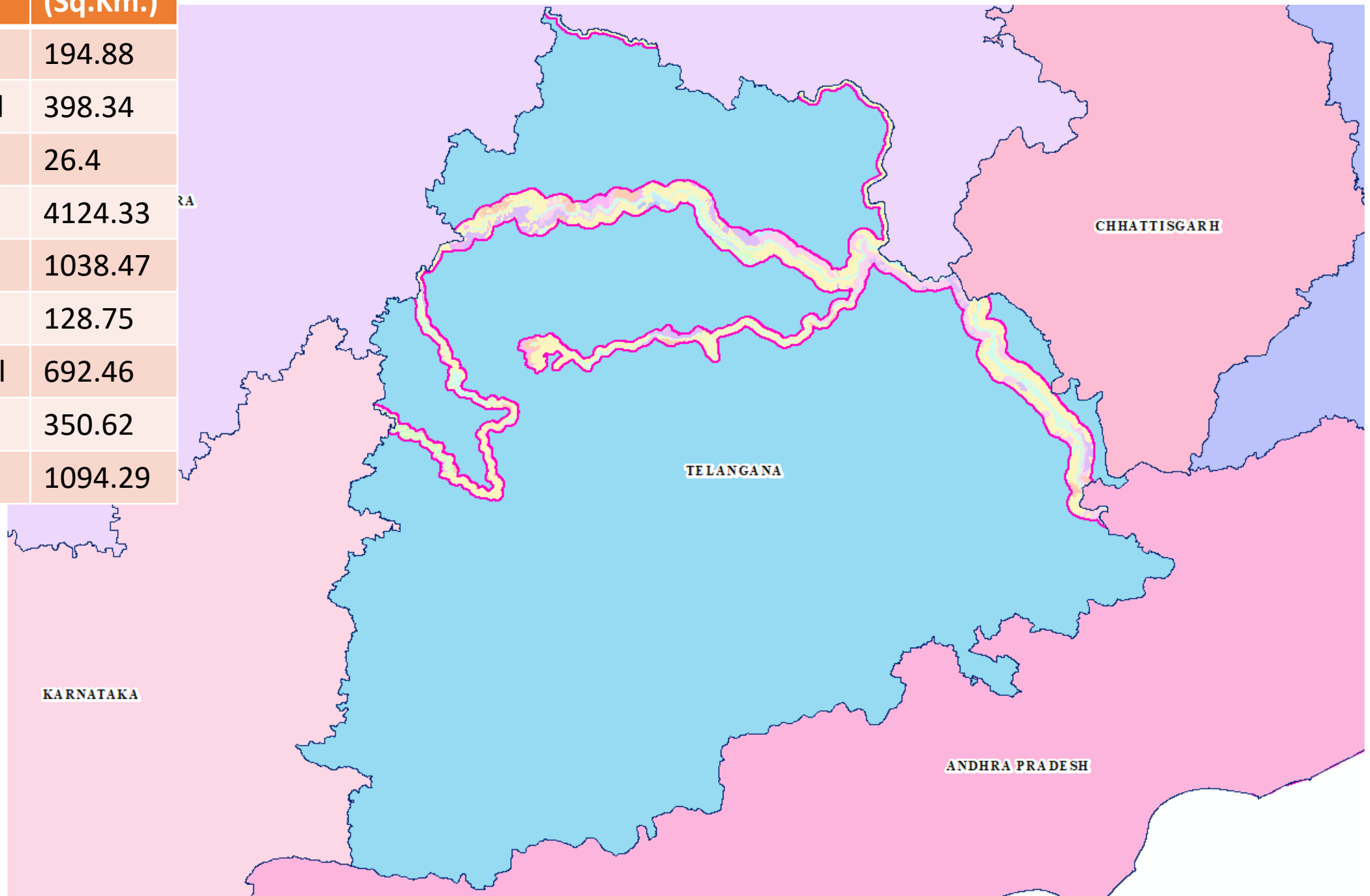
TELANGANA – FOREST DENSITY



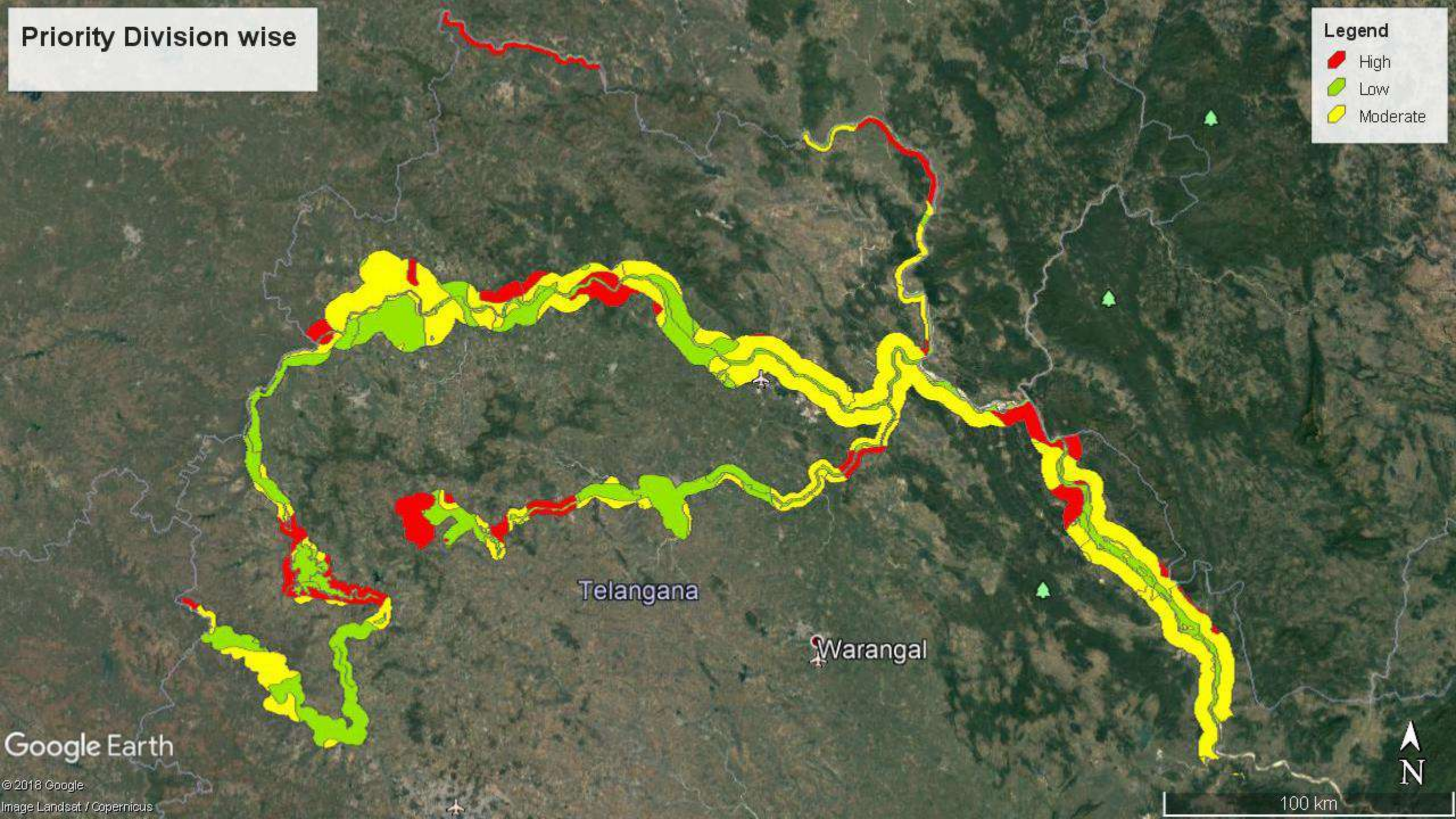
Forest Density	Area (Sq. Km)
Water	450.3
Non-forest	6524.9
Scrub	156.97
Open Forest	586.11
Moderately Dense Forest	524.9
Very Dense Forest	43.96

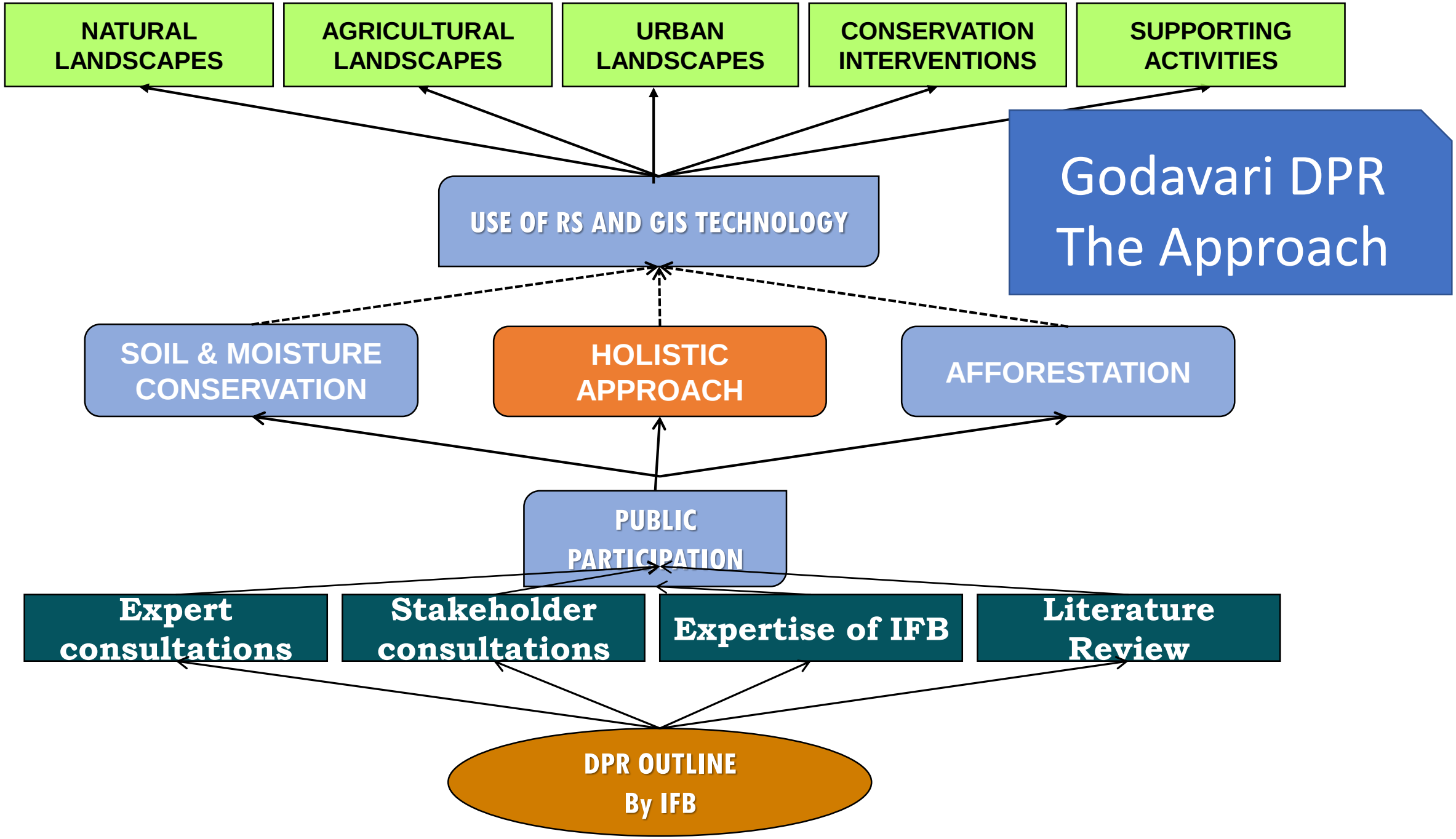
TELANGANA – SOIL TYPE

Soil Type	Area (Sq.Km.)
Clayey	194.88
Clayey-Skeletal	398.34
Coarse Loamy	26.4
Fine	4124.33
Fine Loamy	1038.47
Loamy	128.75
Loamy-Skeletal	692.46
Very fine	350.62
Water	1094.29




District wise villages
Legend
Adilabad
Karimnagar
Medak
Nizamabad
Warangal
Telangana
Warangal
Hyderabad
Khammam
Google Earth
© 2018 Google
Image Landsat / Copernicus
N
100 km


Priority Division wise
Legend
High
Low
Moderate
Telangana
Warangal
Google Earth
© 2018 Google
Image Landsat / Copernicus
N
100 km


NATURAL LANDSCAPES
AGRICULTURAL LANDSCAPES
URBAN LANDSCAPES
CONSERVATION INTERVENTIONS
SUPPORTING ACTIVITIES
USE OF RS AND GIS TECHNOLOGY
Godavari DPR
The Approach
SOIL & MOISTURE CONSERVATION
HOLISTIC APPROACH
AFFORESTATION
PUBLIC PARTICIPATION
Expert consultations
Stakeholder consultations
Expertise of IFB
Literature Review
DPR OUTLINE
By IFB

GODAVARI DPR – THE APPROACH

Phase – I (2019-20)
(Preparatory phase)

Project Initiation

- **Identification of IFB project team**
- **Inception training of IFB project team**
- **Review of existing literature, state of knowledge with respect to river basin and its ecology**
- **Identification of knowledge gaps and scoping of forestry activities**
- **Consultation with subject area experts**
- **Identification of state nodal officers**

Kickoff meeting with nodal officers

- Brainstorming session at IFB Hyderabad with state nodal officers from Maharashtra, Telangana, Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Odisha, Karnataka and Puducherry to decide about project area and approach.
- Identification of stakeholders/academia/experts/other organizations for developing implementation plan on forestry interventions for Godavari.

Development of web page and database application software

Application of Remote Sensing and Geographic Information System in spatial analysis

- Identification of agency/vendor
- Procurement of GIS layers
- River bank delineation
- Delineation of project area (Buffer zone along main river and major tributaries, catchment/watersheds)
- Identification and prioritization of sites for treatment

GODAVARI DPR – THE APPROACH

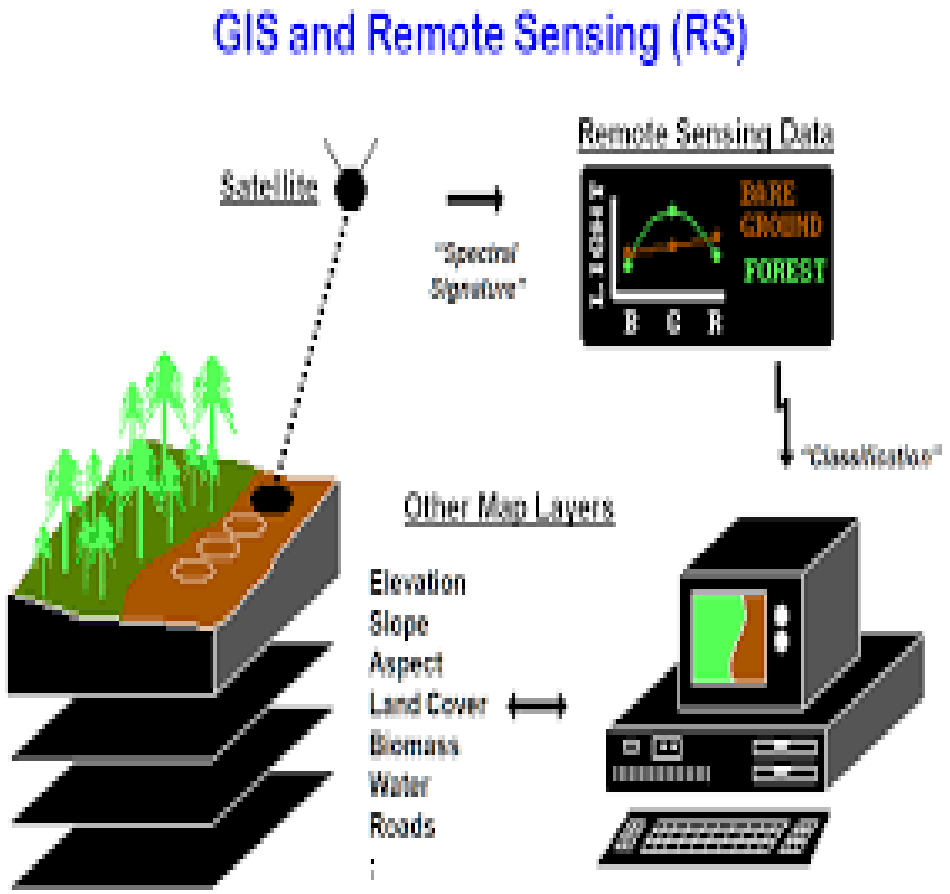
Phase – I (2019-20) (Preparatory phase)	**Stakeholder consultation meetings** • **State level consultation meetings with stakeholders to develop consensus on approach and region specific strategies, models for treatment etc.** • **Identification of sites by various stakeholders for taking up forestry interventions.** • **Development of state-wise cost norms for various treatment models to be implemented in various landscapes.**
	Preparation of draft DPR • Preparation of draft DPR based on the feedback received from stakeholder consultations – containing detailed activities, plantation models, SMC works etc to be implemented by SFDs and other agencies, budget requirement (state-wise/division-wise/district-wise budget) for various proposed interventions.
	Finalization of DPR • Further consultation with state nodal officers and various implementing agencies for finalizing DPR
	Submission of DPR to ICFRE for National level Consultation and Submission (NAEB, MoEF&CC)
Phase-II	**Implementation phase (2020-2025)**

RS & GIS APPLICATION IN SPATIAL ANALYSIS

- Procurement of GIS layers for entire Godavari basin
  - Forest type
  - Forest Cover
  - Land use and Land cover
  - Soil type
  - Soil depth
  - Soil erosion
  - Elevation
  - Aspect
  - Toposheets

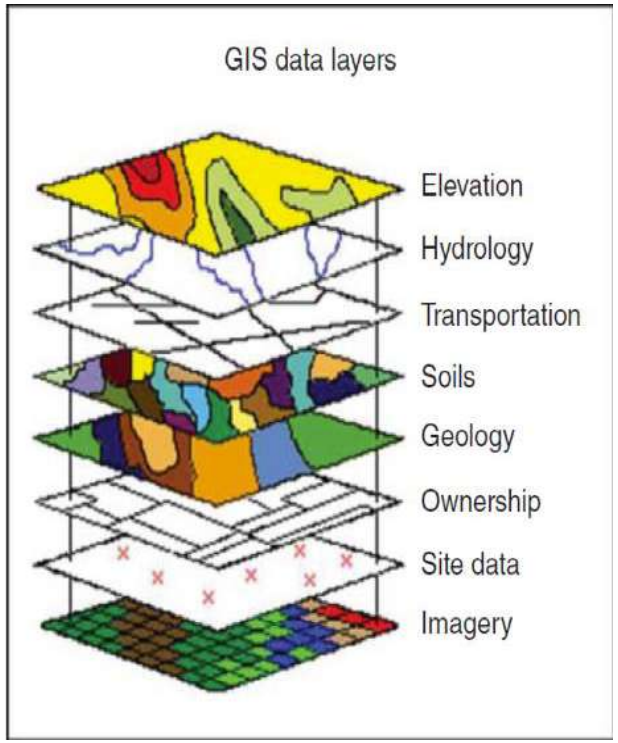
- Delineation of river banks (Taking into account past record of High Flood Level)

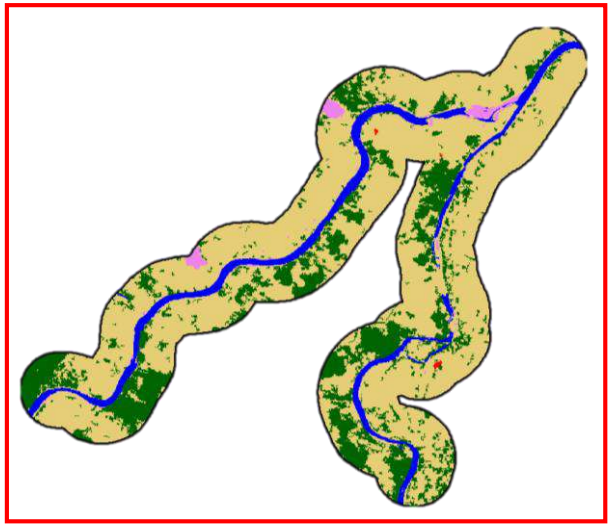
- Delineation riverscape (project area) consisting of headwater catchments and riparian buffer zone



RS & GIS APPLICATION IN SPATIAL ANALYSIS

- Multi-criteria analysis to identify potential sites (stressed sites) needing intervention
- Categorization of potential areas within riverscape for treatment into High, Medium and Low priority





STAKEHOLDER CONSULTATION

- Stakeholder consultation in the states of Maharashtra, Telangana, Andhra Pradesh, Madhya Pradesh, Chhattisgarh, Odisha, Karnataka and Puducherry.

- Wider consultation to arrive at a consensus on riverscape (project area), region specific strategies and the various interventions needed for such area.

- Sites for forestry interventions will be identified through stakeholders like SFDs, Agriculture Department, Rural Development Department, Urban Development Department etc.

- State Forest Department
- Water Resources Department
- Agriculture Department
- Watershed Development Department
- Urban Development Department
- Tribal Development
- Rural Development Department
- State Pollution Control Board
- Meteorology Department
- State Remote Sensing Organization
- Different Colleges and Universities
- Drinking Water and Sanitation Department
- Department of Mines and Geology
- National Remote Sensing Centre
- Krishna-Godavari Basin Organization
- Godavari River Management Board
- Municipal Corporations
- Non Government Organizations

SITE SPECIFIC DATA COLLECTION, COLLATION AND SYNTHESIS

- Site specific data collection from Forest Department and other implementing agencies for sites identified for intervention
  - Format 1 - Natural landscape
  - Format 2 - Agriculture landscape
  - Format 3 - Urban landscape
  - Format 4 – Other interventions

SITE SPECIFIC DATA COLLECTION, COLLATION AND SYNTHESIS

- Creation of data portal for data collation, analysis and synthesis
- Prioritization of sites for intervention
- Development of treatment models
- Development and standardization of cost norms for treatment models
- Preparation of budget estimate (Range-wise, Division-wise and State-wise)

DEVELOPMENT OF WEBSITE

Inbox | (4,408 unread) - swapnen@yaho | Detailed Project Report for Rejuv | Preparation of DPR on Rejuvenat

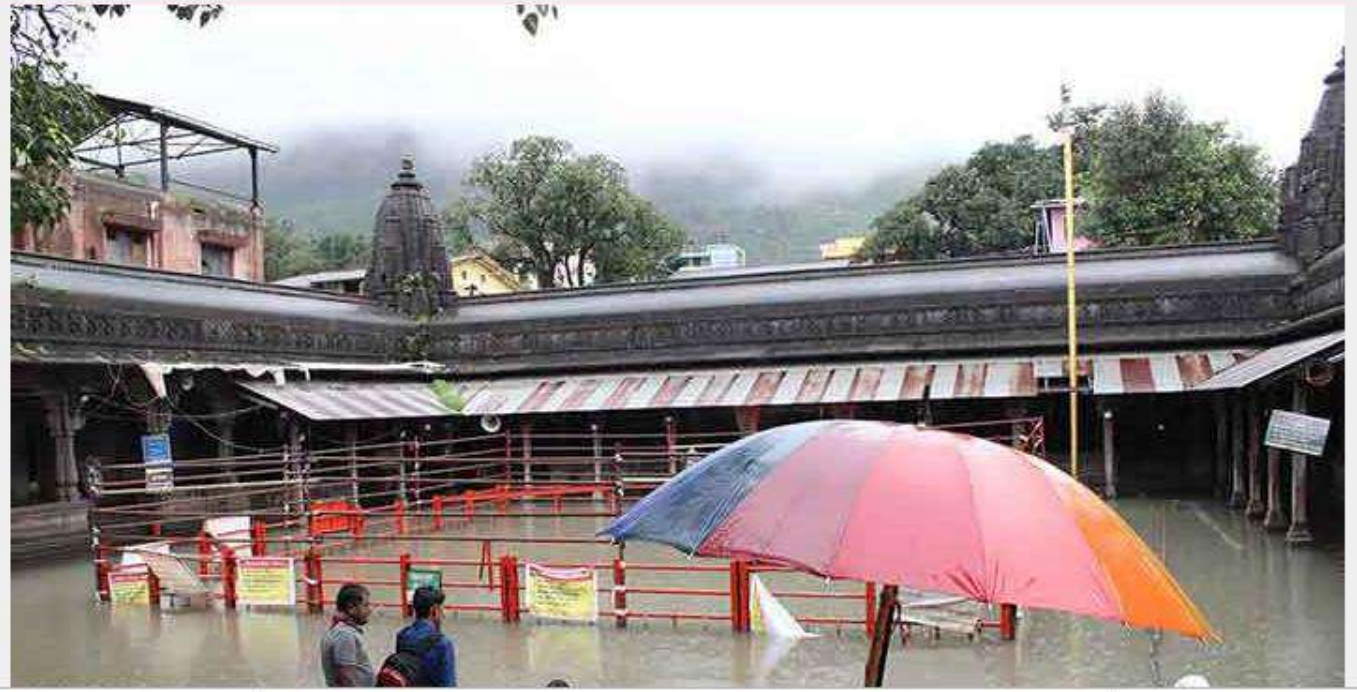
Not secure | dprgodavari.icfre.org

Apps | Imported From IE | Utilities | Yahoo India | GIS | Biodiversity | Bookmarks | 2D Distance Calcula... | ACT Fibernet Portal... | TIN | India Info Centre -... | Other bookmarks

Preparation of DPR on Rejuvenation of River Godavari through Forestry Interventions

Ministry of Environment, Forest and Climate Change

HOME | ABOUT PROJECT | EVENTS | PROJECT TEAM | REFERENCES | PHOTO GALLERY | CONTACT US



Kusavarta - Udgam Sthal at Trimbakeshwar, Nashik

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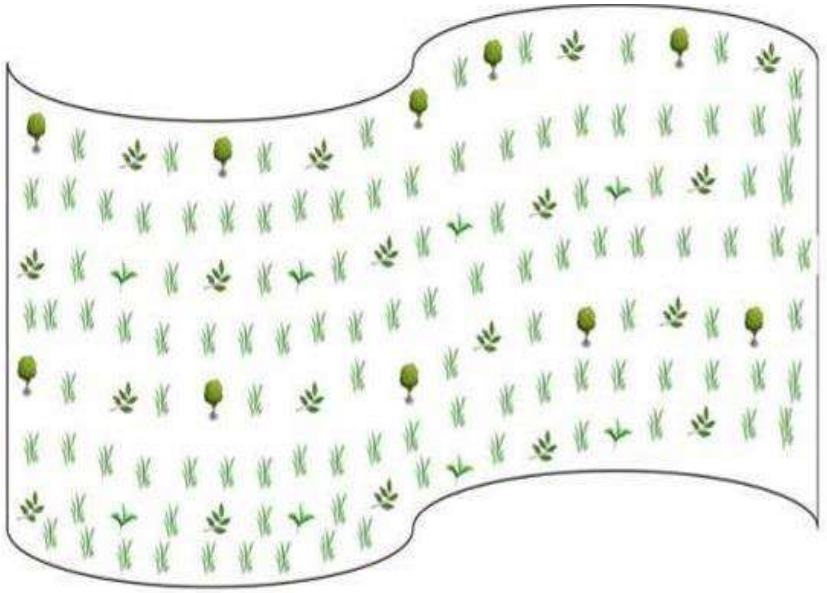
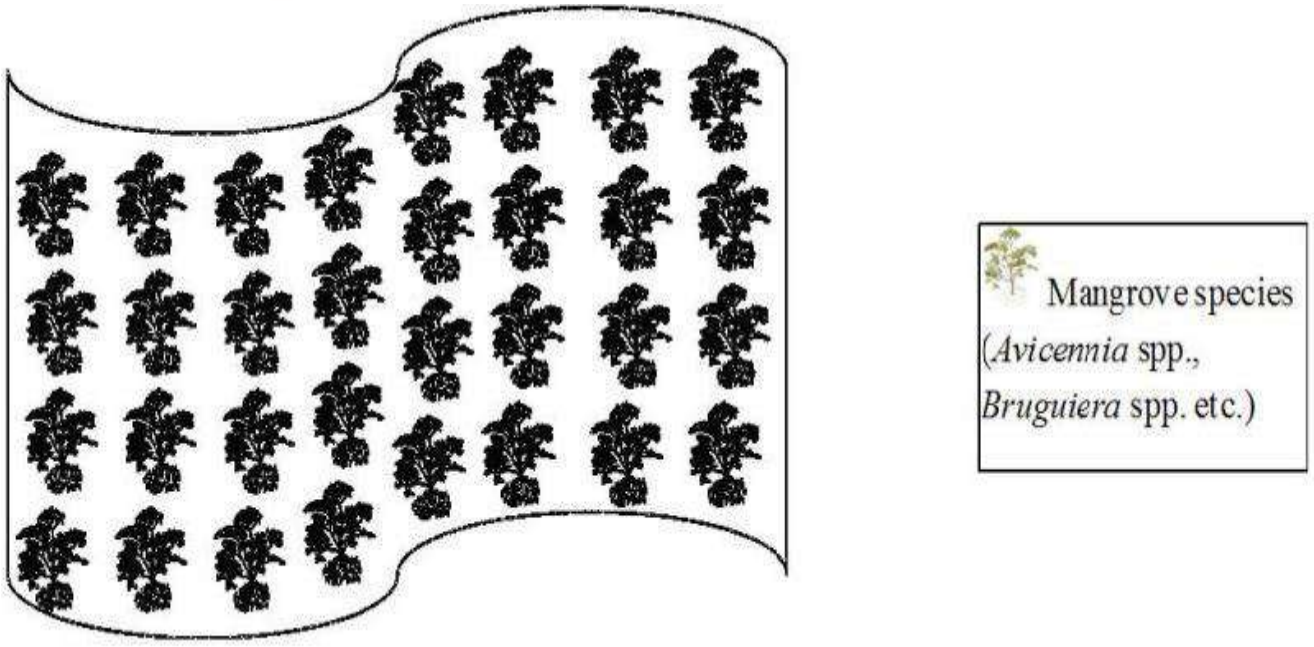
DEVELOPMENT OF TREATMENT MODELS

- Treatment Models for Natural landscape
- Treatment Models for Agricultural landscape
- Treatment Models for Urban landscape
- Models for Conservation Interventions

TREATMENT MODELS FOR NATURAL LANDSCAPE

Sl. No.	Model Name
1	Grassland conservation in headwater catchments
2	Plantation of miscellaneous tree species with grasses as ground cover
3	Under planting of forested areas with bamboos
4	Trees-Shrubs-Medicinal Herbs
5	Medicinal trees- Shrubs-Grasses
6	Mixed species strip plantation along rivers, nallas, streams
7	Riverbank afforestation
8	Restoration of degraded forests with aided natural regeneration (ANR)
9	Mangrove afforestation



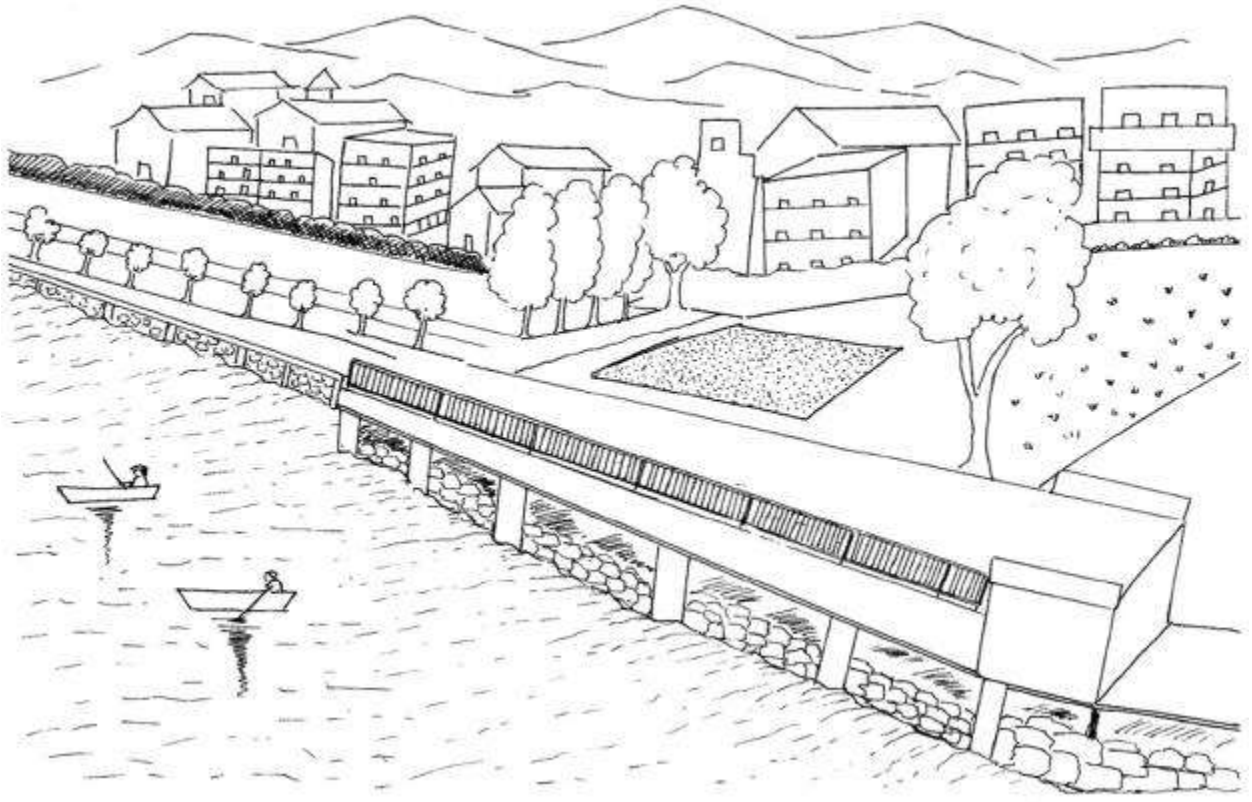


TREATMENT MODELS FOR AGRICULTURAL LANDSCAPE

Sl. No.	Model Name
1	Mango based Agri-Horticulture system
2	Tamarind based Agri-Horticulture system
3	*Melia dubia* based Agri-Silviculture system
4	Teak based Agri-Silviculture system
5	Sapota-Teak based Horti-Silviculture system
6	*Terminalia* based Agri-Silvicultural system
7	Horti-Silvi-Pastoral system

TREATMENT MODELS FOR URBAN LANDSCAPE

Sl. No.	Model Name
1	Bioremediation and Biofiltration
2	Riverfront Development
3	Eco-park Development
4	Institutional and Industrial Estate Plantation
5	Avenue plantation



TREATMENT MODELS FOR CONSERVATION INTERVENTION

Sl. No.	Model Name
1	Soil and Water Conservation
2	Riparian Wildlife Management
3	Wetland Management

SUPPORTING ACTIVITIES

Sl. No.	Activity
1	Awareness raising, attitudinal change, incentivization – making river rejuvenation a mass movement
2	Capacity building
3	Policy level interventions – river regulatory zone, change in land use, cropping pattern etc.
4	Adaptive research and development – species screening, innovative bioengineering, ecosystem services, livelihood support etc.
5	Monitoring parameters and mechanisms
6	Project evaluation
7	Project management

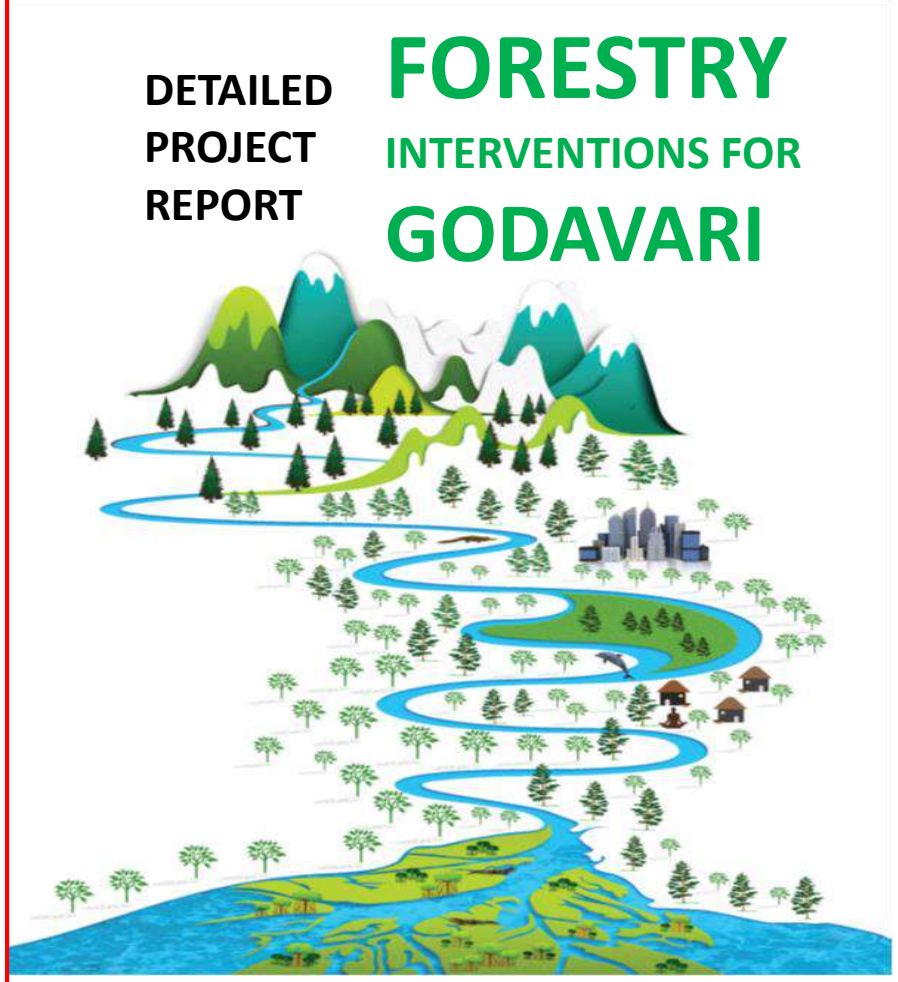
DPR GODAVARI

- A draft DPR will be prepared containing
  - Riverscape assessment
  - State-wise and agro-climatic zone-wise detailed forestry interventions
    - Plantation models
    - SMC works
    - Riverfront development works etc.
  - Policy interventions
  - Monitoring parameters/mechanisms
  - Project budget and schedule
  - And implementation mechanism

- Finalization of draft DPR in consultation with Nodal Officers

- Submission to ICFRE for National level consultation and Submission to NAEB, MoEF&CC

- Phase II – Fund allocation to implementing agencies for implementation of the proposed forestry interventions.



Thank You

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