Supporting native traditions of water conservation for building climate resilience in Jharkhand

A.K. Rastogi, IFS
Sanjay Srivastava, IFS

Department of Forest, Environment & Climate Change
Govt. of Jharkhand

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

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Outline

- To present the links between water, forest and climate change in Jharkhand
- To identify ways to address climate change issues in the case of existing forestry and water conservation programmes
- To develop a conceptual framework about the linkages between land use programs and climate change

Jharkhand: an overview

- Jharkhand, a forest and mineral rich state
- Area of 79,716 sq km which constitutes 2.42% of the geographical area of India
- Tribal population constitutes 8.7 million out of 33 million state population
- Forest cover is 23,553 sq km which is 29.55% of the total geographical area of the State
- Total Forest & Tree cover in the State has increased to 33.21%: surpassed threshold figure of 33% envisaged in the National Forest Policy, 1988
- Increase of 64 sq km in the extent of water bodies inside forests

(Source: State of Forest Report, FSI, 2017)

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- Forest carbon stock 222.882 MT (817.234 MT CO_2 equivalent)
- Sub-tropical climate with average annual rainfall of about 1,200 mm
- Maximum temperature varies from 40^0C to 47^0C
- 80% of the cultivable area is drought prone, especially north-western zone
- Agriculture is the major consumer of surface water

Forest, water, climate synergy

- Climate system and ecosystems direct linkage
- Climatic shocks hasten decline in ecosystem services
- Forests are essential for water availability and cooling at multiple scales: at watershed as well as at regional levels
- With increasing water scarcity, and growing change of climate and demands on forest resources, greater understanding of fundamental forest-water-climate relationships is required



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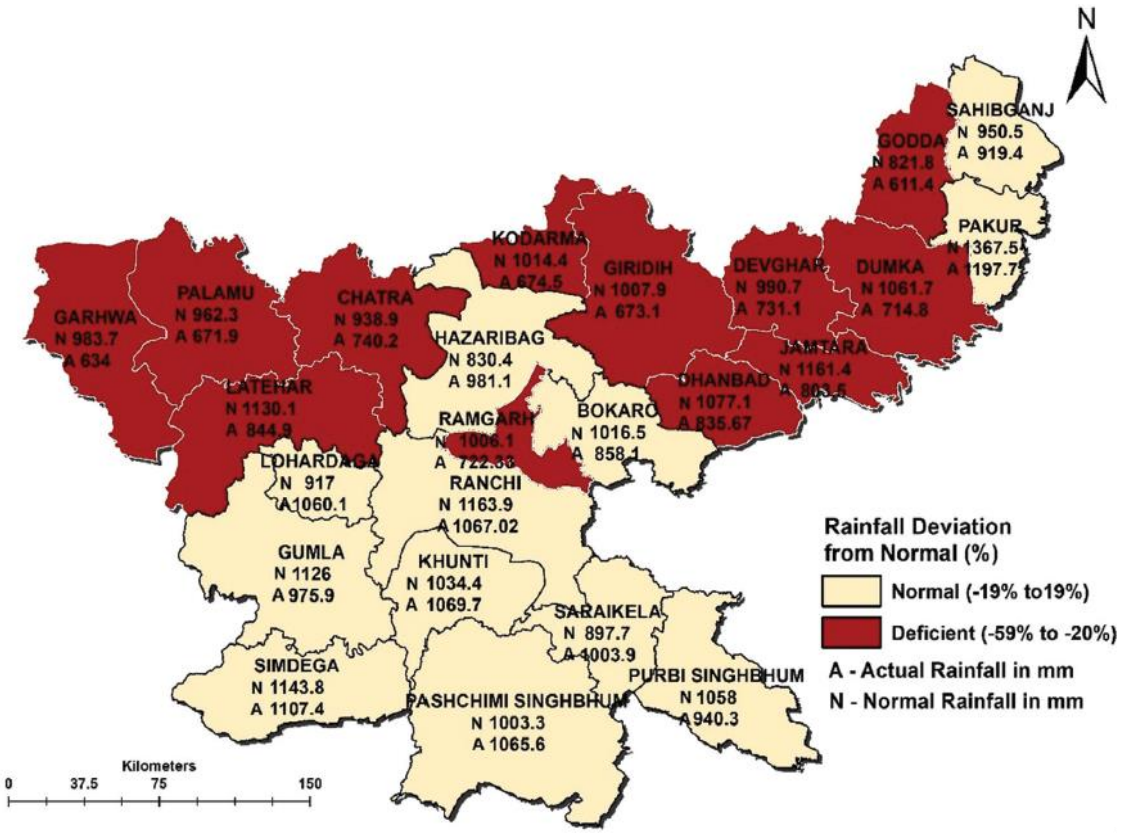
- Jharkhand, primarily due to its large tribal population, is one of the most vulnerable states to climate change
- Watersheds and landscapes are experiencing significant pressures from
  - land use change
  - climate change
- Understanding the linkage of land use change and climate change is critical for managing water resources
- There is an urgent need to accelerate efforts for water conservation through forestry related measures

Water Availability and Utilization

Spatial and temporal variation in rainfall

- Rainfall in Jharkhand (June to September, 2017) has observed a negative deviation of 15%
- Significant Rainfall deficit observed in 11 northern districts
- Rainfall has a fluctuating trend with a decrease of 26–270 mm in the north-western districts to an increase of 19–440 mm in the rest parts of the state
- About 20% is lost in the atmosphere, 50% flow as surface runoff and balance 30% soaks into the ground as soil moisture and ground water



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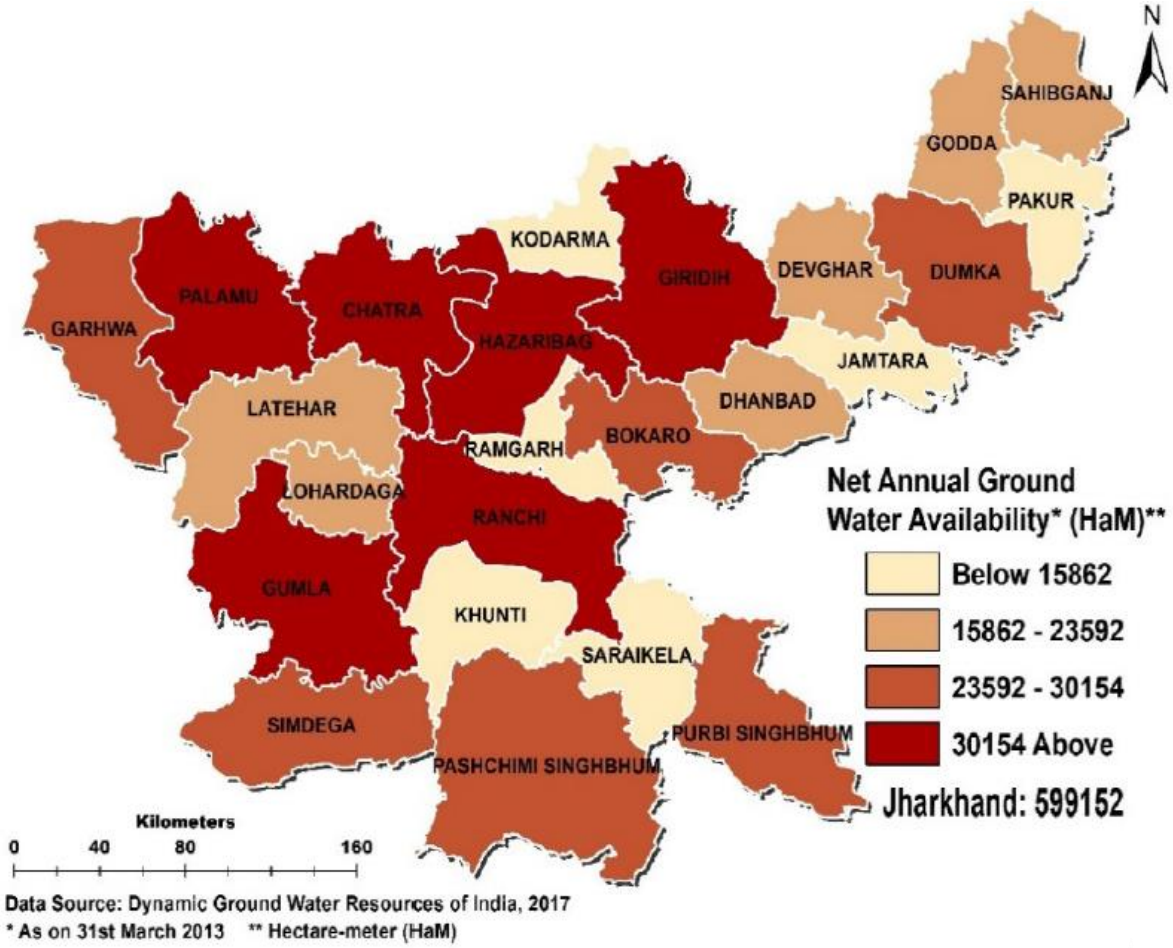
Ground water scenario

- Main source of replenishable ground water is rainfall (67%)



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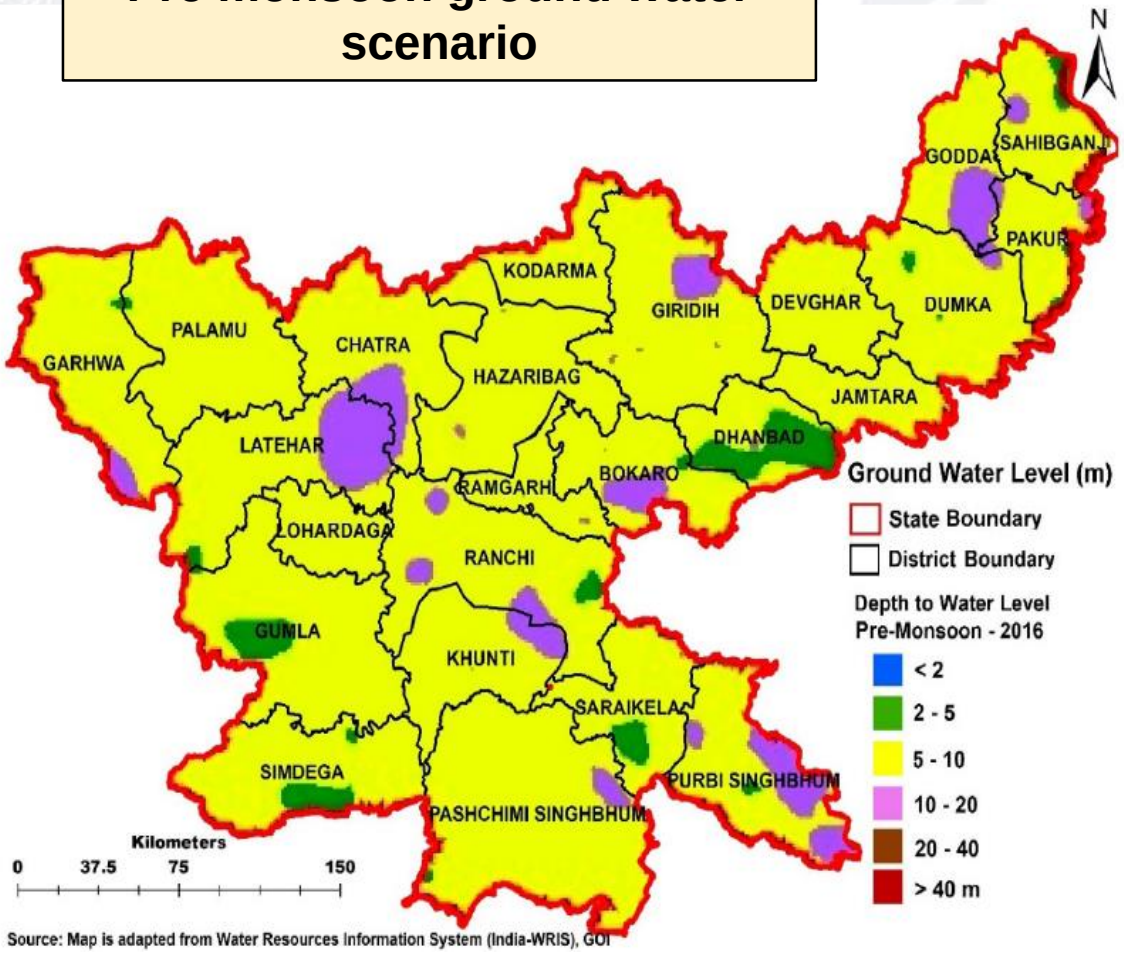
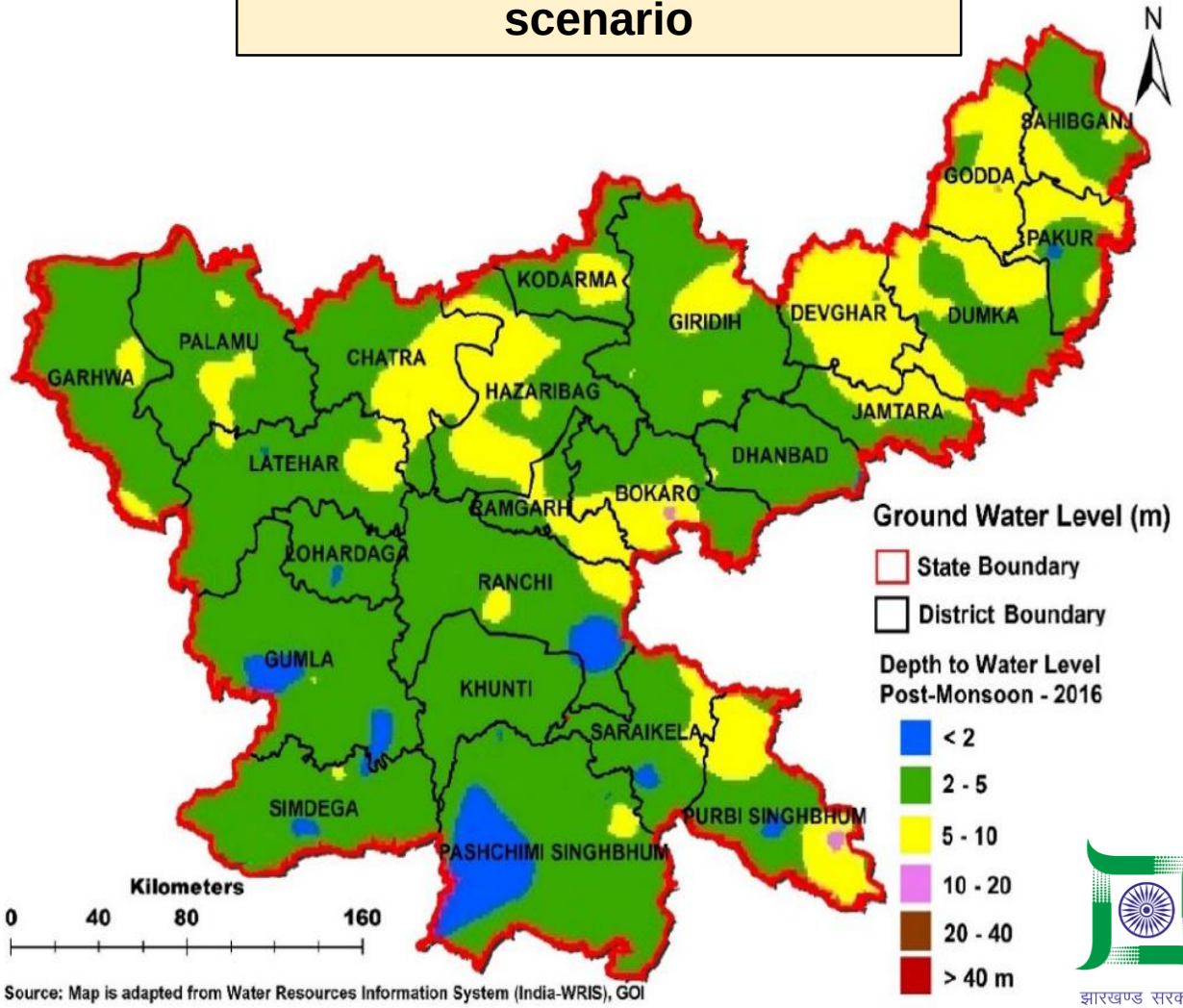
Rainfall and ground water scenario

Pre monsoon ground water scenario



Source: Map is adapted from Water Resources Information System (India-WRIS), GOI

Post monsoon ground water scenario



Source: Map is adapted from Water Resources Information System (India-WRIS), GOI

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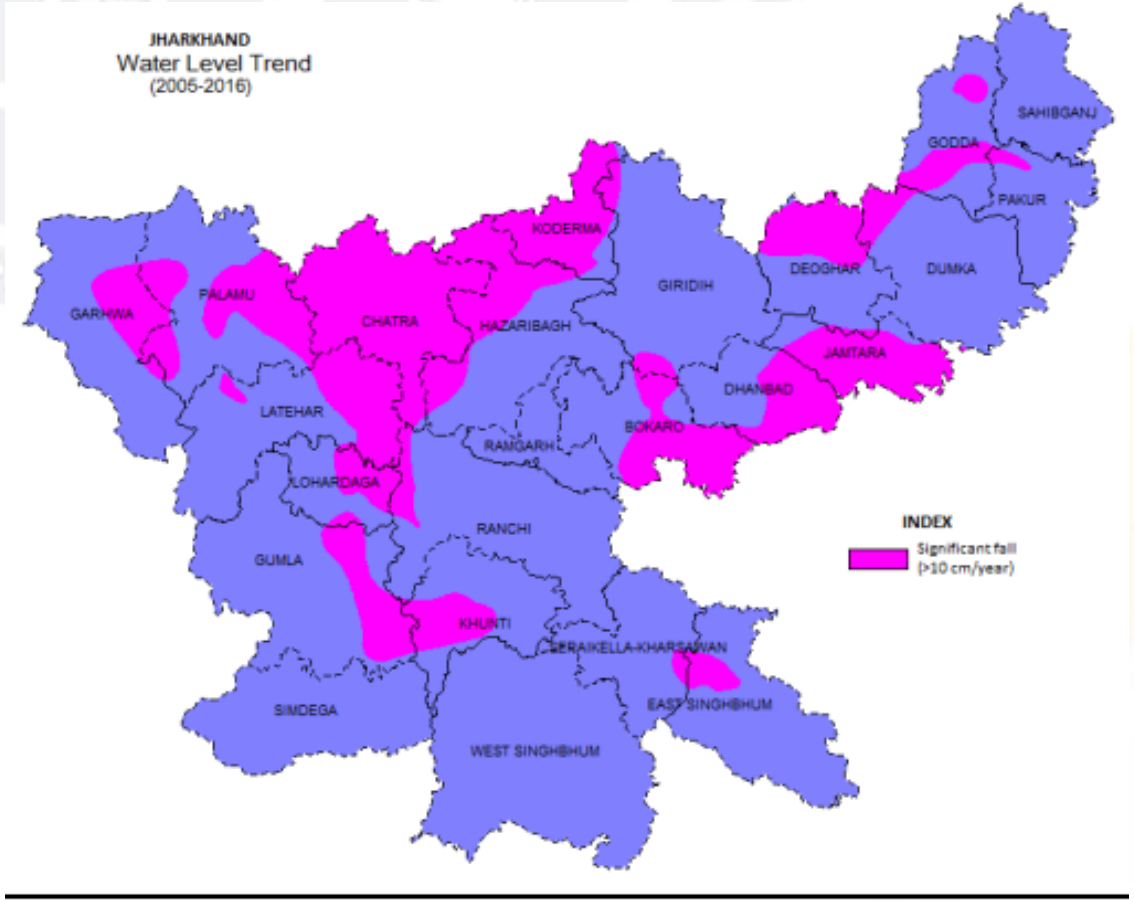
Critical ground water scenario



Significant decline in the decadal ground water level

Source: Central Ground Water Board Report (2015-16)

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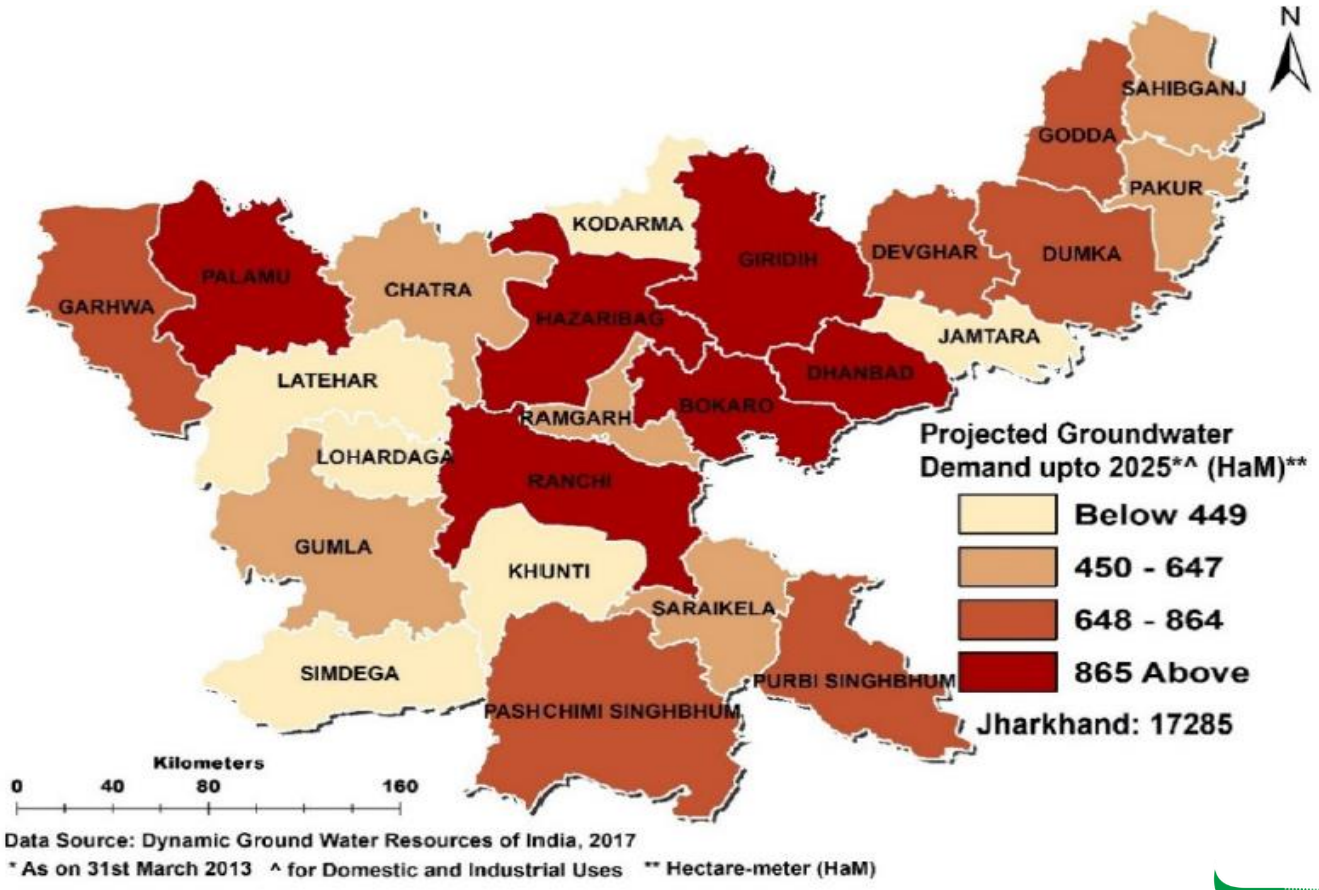
Ground water demand by 2025

- Overuse of ground water in urban areas has resulted in decline of ground water level



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Solution from forestry interventions

- Dissipation of energy of streams would result in retention of moisture in the catchment for a longer period

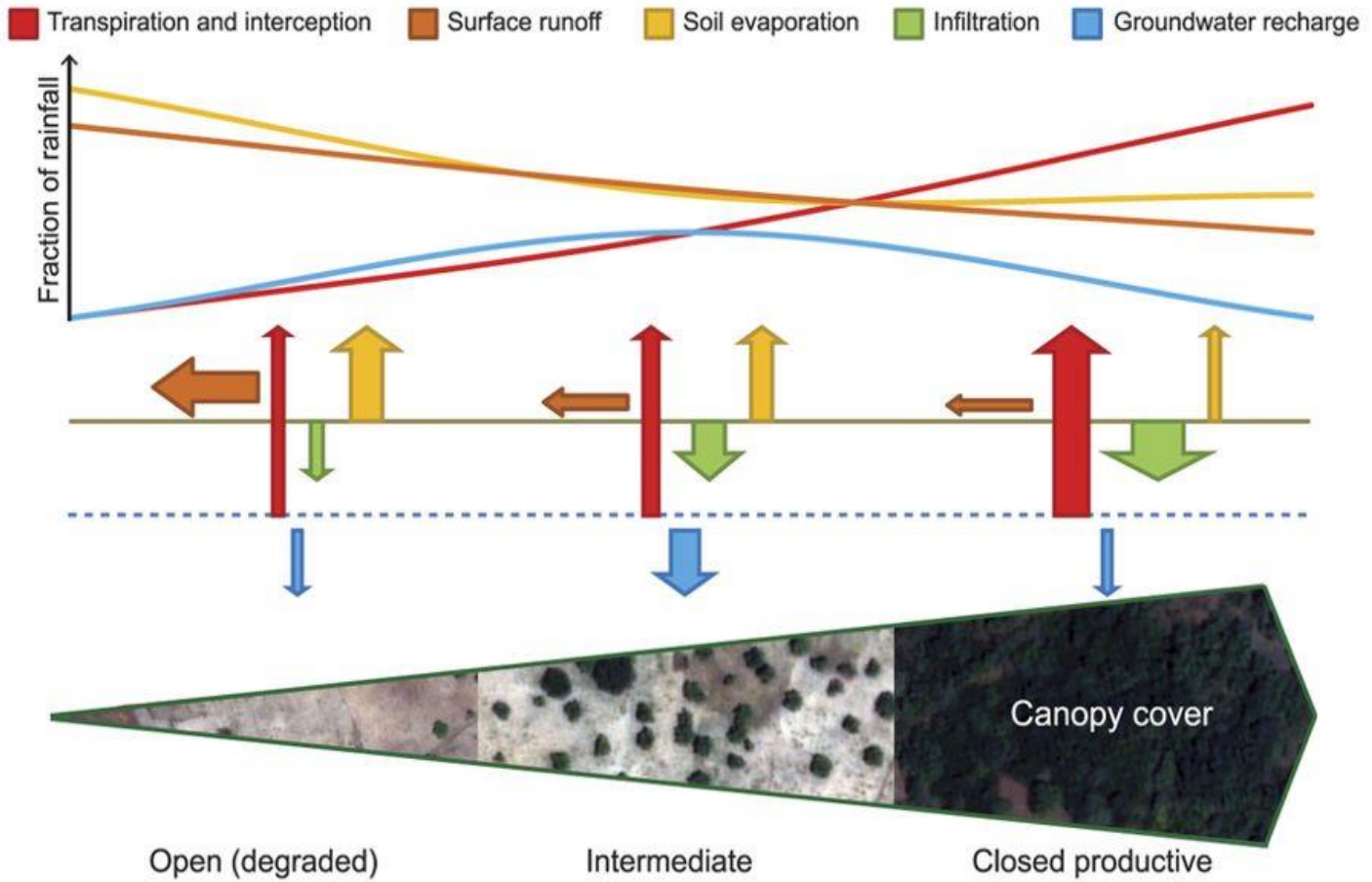
- It would, in turn facilitate:
  - recharging of ground water
  - reduction of soil erosion
  - augmentation of natural regeneration
  - reduction of vulnerability to forest fire
  - reduction of man-animal conflicts

Likely outcome: accelerated carbon sequestration and water security

Water conservation initiatives in Jharkhand

Water conservation through plantations

- Plantation in forest area –facilitates additional water percolation leading to increased groundwater recharge
- Without trees, surface runoff and soil evaporation are high, leading to low groundwater recharge despite low transpiration
- In Jharkhand, plantation on 55,000 ha area having 80 million plants was undertaken in last 3 years
- 11,000 ha of silvicultural operations assisted the work of natural regeneration of forests



Source: (www.nature.com/scientificreports/)

Promotion of agroforestry

Strategic initiatives: for reducing surface run off and addressing issue of water recharge in degraded land parcels

1. ***Mukhyamantri Jan Van Yojana***
   - Use of farmers' upland for agroforestry
   - 3600 acres have been taken up in last 2 years
2. **River side plantation drive**
   - 140 km plantation in current year
   - Target of 250 km next year
3. **Birsa Munda Horticulture Scheme**
4. **MNREGA**: 100 days of employment scheme
5. **Sub-Mission on Agroforestry**

Watershed programmes
(Ridge to valley)

- Watershed is a geo-hydrological unit surrounded by ridge line in which excess rainfall/ run-off passes through a single outlet
- It implies judicious use of rainfall, in-situ moisture, and surface water in conjunction with ground water
- Purpose: to enhance production of the crop by regenerating, developing and rational use of water

Key measures undertaken under watershed mission

Upland treatment measures -

- Staggered Contour Trench, Continuous Contour Trench, Water Absorption Trench (WAT),
- Contour Bunding, Water harvesting Structures, Field Bunding,
- Contour Farming, Percolation Tank, Afforestation/ Horticulture etc.

Lowland treatment measures - Farm pond, *Dobha*, Check Dam etc.

Drainage line treatment - Gully Plug, Vegetative Bund, Spurs

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Contour trenches

- Used in slowing surface water run-off and address soil erosion from sloping land, and in re-vegetating degraded land
- Staggered contour trenches have shown a decreased surface water run-off by 80%
- Water conserved in contour trench does not immediately run off the hill and does not evaporate uselessly
- The water stored in the trench results in
  - ground water recharge
  - micro climate in the area

Check dams

- In Jharkhand: water holding capacity of the soil is very low due to low porosity and undulating topography
- Check-dams are constructed
  - to collect runoff in streams (nalas)
  - enhance water conservation
  - control soil erosion
- State has promoted Participatory community irrigation management (PCIM) through Water Users Associations ***(Pani Panchayats)***
- 2168 check dams were constructed under CAMPA scheme in last 6 years

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Water conservation through involvement of local institutions and traditional experience

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Farm Ponds– *Dobha*

- Creation of dobha / farm pond structure is an effective in-situ water conservation technique for harvesting of rainwater before the onset of monsoon
- Post monsoon:
  - the *Dobha* structures are covered with thatch
  - Neem / karanj oil is poured to reduce evaporation
- 2.4 million *dobhas* / farm ponds have been created so far
- Co-benefit of alternate livelihood support

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Use of bamboo based loose boulder water harvesting structures

(*mix of traditional and scientific practice)*

- Water storage and usable capacity of the structure: approx. 70,000 to 100,000 gallons
- Period of availability of water: June- March
- Increased water infiltration rate
- Reduced water evaporation rate
- Reduced run-off
- Durability of the structure: 10-15 years

The monsoon water stored in turn is also used for irrigation purpose during non-monsoon period

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Climate adaptation opportunities

- Tribal population in the state has been using small water conservation structures thus conserving the forests in catchments
- Understanding the synergy of forest and water conservation involving the local people is the key
- Leveraging inter-departmental convergence on climate actions to address adaptation deficit for its existing and future climate vulnerabilities
- Agriculture based adaptation measures to predict crop diversification and intensification
- Undertaking water resource planning and management under present and future climate scenarios
- Improving climate resilience through implementing win-win adaptation practices




Way forward…..

- Establishment of a Water Resource Regulatory Authority as an umbrella policy initiative
- Mandatory rainwater harvesting
- Groundwater management with focused attention on over exploited areas
- Integration between two flagship programmes: watershed development and MNREGA to integrate forest, watershed and rural employment
- Encourage less water demanding developmental initiatives
- Structural measures in form of embankment, anti erosion works along the river banks etc. as well as non-structural measures such as afforestation in river catchment
- Enhancing preparedness for drought monitoring, drought mitigation and development of early warning system
- Introduction of Payment of Ecosystem Services (PES) option for water conservation

Thank you