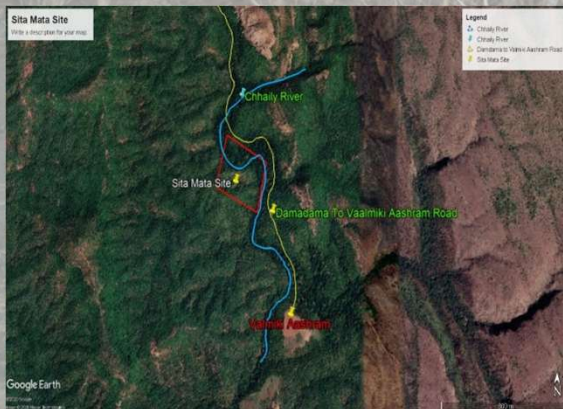


Sitamata Wildlife Sanctuary

- Sitamata Wildlife Sanctuary is located in the southeastern part of Rajasthan, lies at the confluence of the Aravalli and Vindhyan hill ranges and the Malwa Plateau.
- It spans across latitudes 24°04' - 24°23' N and longitudes 74°25' - 74°40' E, comprising 359.60 km² of Reserved Forest and 63.35 km² of Protected Forest.
- According to classification of forests by Champion and Seth, the forest type of Chittorgarh division is predominated by Type Cla i.e. very dry teak forest with associations of C2 type i.e. Northern mixed deciduous forest.
- The occurrence of teak (*Tectona grandis*)-dominated forest in Rajasthan is a rare and ecologically unique feature, as teak is typically native to the moist deciduous forests of peninsular India and is largely absent from the arid and semi-arid regions of Rajasthan.

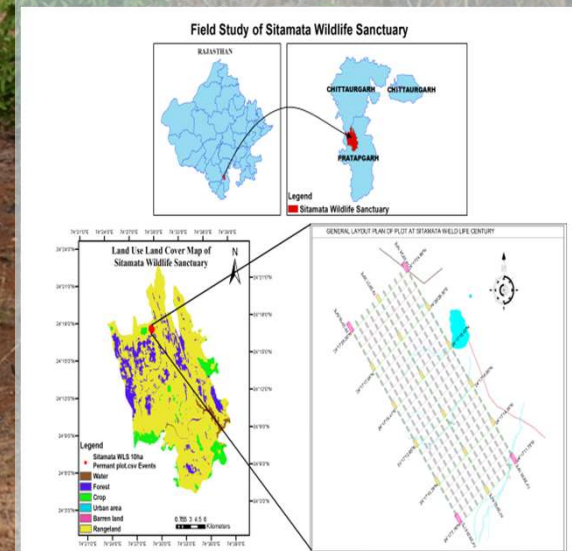


How Carbon Stock is Estimated

- The standard procedure for forest carbon stock estimation is given by Forest Survey of India (FSI).
- It estimates biomass using forest-type-specific allometric equations, allowing for the calculation of various carbon pools within forest ecosystems.
- These include Above Ground Biomass (AGB), comprising the trunks, branches, and leaves of trees; Below Ground Biomass (BGB), which includes root systems; deadwood; litter; and Soil Organic Carbon (SOC).
- The estimation of BGB is typically derived from AGB using standardized root-to-shoot ratios, while deadwood and litter are assessed using biomass expansion factors.
- Once the biomass is estimated, it is converted into carbon stock using default carbon fractions provided by the Intergovernmental Panel on Climate Change (IPCC).
- For AGB and BGB, it is assumed that 47% of the oven-dry biomass constitutes carbon. Deadwood and litter are similarly converted using empirically derived biomass expansion factors. This methodology enables a comprehensive and standardized approach to estimating forest carbon stocks across India.

Methodology Used

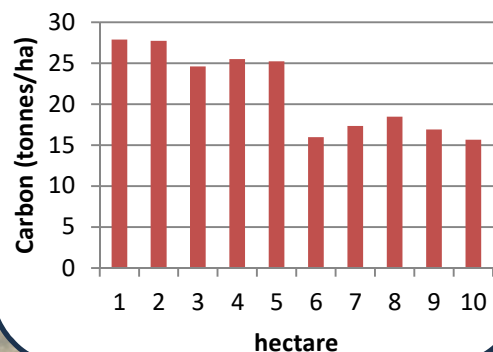
- A permanent plot of 10 hectare area is established and all trees of more than 1 cm diameter at breast height (DBH) have been measured and tagged.
- Biomass (AGB and BGB) in permanent plot (10ha) is calculated for all the trees (DBH>10cm) enumerated in permanent plot.
- Carbon in BGB in permanent plot will be calculated as $0.25 \times \text{AGB}$ (tonnes/hectare) according to IPCC, 2006.
- The carbon stock (C) is derived by applying a carbon fraction to the total biomass. It is calculated using allometric equation provided by Chave et al. (2014) for tropical trees:
- $$\text{AGB} = 0.0673 * (\rho \text{DBH}^2 \text{H})^{0.976}$$



Key Findings

- The carbon stock assessment indicates a variation in carbon stock across different hectares within the study area. It highlights the spatial and altitudinal differences in carbon sequestration potential.
- The carbon stock ranged from 27.873 t/ha to 15.66561 t/ha. The average carbon stock across all hectares is 21.52 t/ha.
- The higher values suggest denser vegetation, healthier biomass, or more mature ecosystems.
- Whereas, lower values suggest earlier successional stage, less dense vegetation, or under environmental stress.
- The carbon estimation allows for the identification of areas with higher or lower carbon storage.

Total Carbon Stock



Why Carbon Stock Estimation is Important

- Carbon stock estimation plays a critical role in climate change mitigation by quantifying the amount of carbon stored in forests and other ecosystems.
- It is an essential tool for assessing the capacity of forests to act as carbon sinks and for evaluating its contribution to offset greenhouse gas emissions.
- Carbon stock data is also used in carbon trading mechanisms and offset programs, where measurable and verifiable carbon sequestration can generate carbon credits for climate finance.
- It is also vital for national greenhouse gas inventories and the development of climate action plans such as NAPCC (national action plan for climate change).
- It helps to make informed decisions in climate policy and sustainable development.

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Director, ICFRE - Arid Forest Research Institute

Post Office - Krishi Mandi,
Pali Road, Jodhpur - 342005, Rajasthan.

Contact: [http:// https://afri.icfre.org](http://https://afri.icfre.org), Email:

dir_afri@icfre.org

Phone: +91-0291-2722549

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Prepared by:

S.R. Baloch, Scientist-E, Sachin Sharma, Scientist-C,
Veenu Mahecha, JPF
Mobile: 9829320199

All India Coordinated Research Project -31

Study of Climate Driven Effects on Indian Forests through Long-term Monitoring

Estimation of Carbon stock in the permanent plot at Sitamata Wildlife Sanctuary, Chittorgarh



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