



**Proposal for Establishment of
Centre of Excellence
in
Forest Survey of India**



Forest Survey of India
(Ministry of Environment, Forests & Climate Change)
Dehradun

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	year		
10	Software/Hardware including AMC cost		40,00,000
11	Miscellaneous Cost(including purchase of field equipment's etc.)		10,00,000
	Total		9,01,00,000

The total funds required for this activity for the five years (April 2023 to March 2028) will be Rs. 901.00 lakhs.

4.5 RADAR application studies in Forestry

Above Ground Biomass (AGB) Estimation using Synthetic Aperture Radar (SAR) data

4.5.1 Introduction:

The above ground biomass comprising mainly of trees, understory vegetation constituting shrubs, middle storey trees, and other woody and non-woody vegetation is an important component of forest and is an indicator of forest health that is equally significant for a healthy ecosystem, environment, wild life conservation, forest soil and drainage. The synthetic aperture radar(SAR) data owing to its unique capability to penetrate Cloud and plant canopy provides significant information of below canopy strata including information on forest structure, forest composition and untimely the total biomass of the forest. A study has already been carried out to estimate above ground biomass using SAR data at country level. The study carried out for the first time at pan India level needs to be further refined in terms of methodology, data quality, accuracy. The study is proposed to be further taken up for generating forest carbon maps at country level using SAR data.

4.5.2 Current status:

- Generated estimates of biomass under different forest cover across the country using ALOS PALSAR global mosaic (25m) data
- Creation of Basic Above Ground Biomass(AGB) Wall to Wall Map of the country with different biomass ranges at state level
- Explored the potential of Synthetic Aperture Data for understanding forest structure and ultimately biomass within a tree and Forest
- Prepared uncertainty map for the prepared biomass map
- Prepared detailed report on Above Ground Biomass estimation using SAR data.

4.5.3 Activities to be done:

- Estimation of forest carbon map (wall to wall) using AGB estimates
- Estimation of GHG emission based on the estimates of forest carbon sequestered within the tree and forest
- Estimation of AGB (Carbon) using multi-frequency SAR (NISAR) data on cycle basis.

4.5.4 Requirements of funds for five years

Table 7: Requirements of funds for five years for RADAR Study

SI.No.	Item	Person	Total Amount
1.	Salaries of Project Associates (Rs. 55,000 X 2 X 12 months X 5 years)	02	66,00,000
2.	Salaries of Sr. Technical Associate (Rs. 50,000 X 4 X 12 months X 5 years)	04	1,20,00,000
3.	Capacity Building		35,00,000
4.	Hardware/Software		35,00,000
5.	SAR Data cost		32,00,000
	Budget requirement for next 5 years		288.0 lakhs

The total funds required for this activity for five years period (during April 2023 to March 2028) would be Rs. 288.00 lakhs.

4.6 Deforestation Alert System

4.6.1 Introduction

FSI has been carrying out Forest Cover Assessment over a period of two years and uses LISS3 sensor imageries and publishes the India State of Forest Report biennially. However a need is felt for reporting deforestation as early as possible to the State Forest Departments for timely action.

4.6.2 Current status

Currently there is no satellite based system existing in India for reporting deforestation. However research studies are existing for utilizing RADAR data and optical data over small areas and using ML and AI for identifying deforested areas.

4.6.3 Activities to be done

- Research studies will be carried out for use of optical data of different resolutions and RADAR data for early identification of deforested areas.
- Using AI and ML, models will be developed and field tested for identifying deforested areas in different forest types.
- Finally robust models will be used for developing a Rapid Alert system for deforestation

4.6.4 Requirements of funds for five years

Table 8: Requirements of funds for five years for Deforestation Alert System Development

SI.No.	Item	Person	Total Amount
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1.	Procurement of data for studies		100,00,000
2.	Salaries to Sr. Technical Associates (Rs. 50,000 X 5 X 12 months X 5 years)	5	150,00,000
3.	Salaries for Programmer (Rs. 70,000 X 3 X 12 X 5 years)	3	126,00,000
4.	Salary for Senior Programmer (Rs. 1,50,000 X 1 X 12 X 5 years)	1	90,00,000
5.	Salary for DBA (Rs. 1,50,000 X 1 X 12 X 5 years)	1	90,00,000
6	Field work		50,00,000
	Contingencies and unforeseen expenditure		44,00,000
	Budget requirement for next 5 years		650 lakhs

The total funds required for this activity for five years (during April 2023 to March 2028) will be Rs. 650.00 lakhs.

4.7 LiDAR for Forestry Applications

4.7.1 Introduction

Apart from the other mandates of the organization, monitoring of the forest resources of the country on regular basis and National Forest Inventory based on large number of sample plots laid across the country is also carried out.

To obtain the higher accuracy in forest mensuration and mapping, LiDAR technology may provide better results in various applications of FSI. An important use of LiDAR data and technology is forest inventory, where retrieval of forest parameter can be effectively carried out with minimum effort and on wall to wall basis. The present objectives technology will also precisely validate the existing species-wise volume equations comprising of tree diameter (DBH), tree height, crown diameter etc. collected in forest inventory.

LiDAR (Light Detection and Ranging) is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth, with its capability to detect even small objects and create exact 3D models, offers an incredibly accurate and consistent results.

LiDAR technology is currently used for creating super detailed 3D maps and models of landscapes, buildings, and human-made objects and various applications. This technology comes with two types namely - Airborne and Terrestrial.

4.7.2 Objectives

- To extract forest parameters towards vertical tree height, density, basal area & timber volume.
- Mapping of individual tree/species.
- Precise calculation of Above Ground Biomass to estimate forest carbon storage.
- Burnt Area and Damage Assessment.