



BAMBOO RESOURCE INVENTORY OF MEGHALAYA



Centre of Excellence
for Natural Resource Management and Sustainable Livelihoods
MBDA, Shillong



MESSAGE

Meghalaya's rich biodiversity and favourable climate support diverse bamboo species that play a key role in livelihoods, culture, and the economy. Recognized as a valuable "green gold," bamboo offers strong potential for sustainable development, climate resilience, and rural income generation. The Bamboo Resource Inventory will provide a scientific, spatial database on bamboo availability and distribution, enabling better policy decisions, sustainable harvesting, and value chain development. It supports the State's vision of community-led resource management while creating opportunities for farmers, artisans, and entrepreneurs, and helping integrate Meghalaya's bamboo sector into wider markets.

I commend the efforts of CoE (NRM&SL) and MBDA for undertaking this important work. I am confident that this publication will serve as a valuable resource for policymakers, researchers, development practitioners and all stakeholders engaged in the sustainable management and utilization of bamboo. I extend my best wishes for the successful dissemination and utilization of this important knowledge product.

Shri. Conrad K. Sangma
Hon'ble Chief Minister
Government of Meghalaya

FOREWORD

The socio-economic life of the rural people in Meghalaya intricately depends on bamboo and its products to a great extent. Bamboo as a raw material and hand-made products has enhanced the livelihood of the people in the State. The bamboo, moreover offers a large potential for creating significant income generating opportunities for the people of the State by utilizing bamboo resources for various new products by setting up small, medium and large enterprises. Besides having high economic and market value, it also helps in mitigating various environmental problems like protecting soil from erosion, carbon sequestration and biodiversity conservation.

Under the Centre of Excellence (for NRM & Sustainable Livelihoods), the State-wide Bamboo Resource Assessment has been carried out following a scientific inventory design in a short span of time. The work has provided the distribution of species in the State from the block to the State level along with estimation of growing stock and harvestable yield of bamboo. This kind of information can play a significant role in poverty alleviation, job creation and economic development in the State by planning bamboo sector development strategies.

Every time the strategy to develop bamboo sector by developing value-chains and bamboo-based enterprises in the State was discussed, the non-availability of bamboo resource information had been pointed out as a serious information gap by the experts and industrialists. In this backdrop, the district level detailed assessment of bamboo resource of the State done by CoE (NRM & SL) fulfils the much needed data requirement. I am sure the bamboo assessment estimates generated by the extensive exercise taken up under the CLLMP will be gainfully utilized by every stakeholder of bamboo in the State.

I place on record my appreciation for the whole team of CoE (NRM & SL) led by Dr. Subhash Ashutosh, IFS (Retd.) and the district teams of CLLMP and the VCFs involved in the exercise.

Shri. Sampath Kumar, IAS
Principal Secretary &
Development Commissioner
Government of Meghalaya

PREFACE

Meghalaya is blessed with rich biodiversity that also reflects in the rich diversity of bamboo species native to the State. Forty-three species of bamboo have been reported to be naturally growing in the State (Bamboos of Meghalaya, 2020). With favourable plant growth conditions and rich species base, bamboo resource offers immense potential for green economy growth along with their useful benefits in the State.

One of the handicaps in realising the potential of the bamboo resource for creating bamboo-based industries and creating large scale employment which has often been cited by the experts is the lack of information about the growing stock and its distribution in the State. To bridge this information gap, the Centre of Excellence (for NRM & Sustainable Livelihoods) conceptualised and executed a State-wide Bamboo Resource Assessment following a scientific inventory design. The growing stock and the potential harvestable yield of bamboo has been assessed for all the important species found in the State.

The first and foremost information for sustainably managing any resource is its inventory. For a resource like bamboo, the data about the growing stock of different species and their spatial spread is of critical importance for planning its industrial utilization and thus creating large scale income creating opportunities for the people. Absence of bamboo resource inventory at the desired granularity and details has been a felt need for planning strategic development of bamboo sector in the State.

The CoE (NRM& SL) conceptualised the State-wide exercise of Bamboo Resource Assessment following Stratified Random Sampling approach. The detailed methodology was finalised considering the available time frame, man-power and cost. The exercise was successfully implemented in a period of less than one year due to the hard work of the CoE Team, district CLLMP Teams and a large number of VCFs who were thoroughly trained in the methodology.

The district wise and species wise estimates of bamboo in different land use – land cover categories covering the whole geographical area of the State are expected to provide vital information for the bamboo sector development in the State.

Dr. Subhash Ashutosh, IFS, (Retd.)
Co-Chairman & Director
Centre of Excellence (NRM &SL)
MBDA, Shillong

ACKNOWLEDGEMENT

Bamboo Resource Assessment in the State of Meghalaya is an important initiative under the Community Led Landscape Management Project (CLLMP) of Meghalaya Basin Management Agency (MBMA). In Meghalaya, people particularly the rural populations are so intrinsically dependent upon bamboo for its variety of uses, that it is hard to imagine life without it. This work aims to assess growing stock of different species of bamboo that grow both in the wild and cultivated by the people in the State so as to enable the integration of this particular resource in creating income generating opportunities for the rural communities of Meghalaya. This document will provide an inventory of the different species of bamboo found in each district of the State in terms of number of culms and weight. This extensive study was carried out by carrying out enumeration and measurement on more than 7500 plots for which the contributions of everyone involved in this important exercise needs to be acknowledged.

First and foremost, I would like to express my gratitude to Shri. Sampath Kumar, IAS, Principal Secretary & Development Commissioner, Government of Meghalaya, who understood the significance that non- timber forest products (NTFPs) play in the daily lives of the rural communities of the State. His guidance and assured support to execute this task is noteworthy to be mentioned. The immense contribution made by Dr. S. Ashutosh, IFS (Retd.), Co-chairman & Director, Centre of Excellence for NRM & Sustainable Livelihoods, MBMA, for his rigor to plan, design the methodology, supervise field work and execution, data processing and finally report preparation. The reviews conducted along with constant guidance provided the momentum for the completion of tasks associated with this assessment.

Immense thanks to all the 11 District Project Management Units (DPMU) led by the District Project Managers (DPMs), for training imparted, coordination and management with the State Project Management Units (SPMU) and field workers to complete field survey and data collection on sample plots in a short time. The enormous task of generating the vast number of sample plots across Meghalaya was made possible by the GIS Team, MBMA for which I am extremely grateful. None of this work would have been possible without the unwavering efforts of the Village Community Facilitators (VCFs) engaged in their respective districts. Their effort and hard work in this inventory exercise as they venture into challenging terrain to complete their tasks is highly commendable.

The significant contribution of Shri Abhay Kumar Saxena, Assistant Director (Retd.), Forest Survey of India, Dehradun for analyzing and processing the collected data from the field is hereby

acknowledged with appreciation. The taxonomy of the different bamboo species collected was made possible by the expertise of Shri. Phukon Kharbuli, Forest Ranger (Retd.) Government of Meghalaya. His pivotal contribution in this assessment to provide complete information on the different species is acknowledged with gratitude. Last, but not the least, I would like to express my deepest gratitude to the team from the State Project Management Unit (SPMU) – comprising of GIS team, CoE team and CLLMP team, and especially the Data Entry Operators (DEO), for their enthusiasm and determination for the successful preparation of this report. The project is hugely indebted to their efforts.

Shri. Gunanka DB, IFS
Executive Director, MBDA &
Additional Project Director, MegLIFE & MegARISE

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ABBREVIATIONS & ACRONYMS

Avg	Average
C&RD	Community and Rural Development
CF	Clump Forming
CLLMP	Community Led-Landscape Management Plan
cm	centimeter
CoE	Centre of Excellence
CoE-NRM & SL	Centre of Excellence for Natural Resources Management and Sustainable Livelihoods
°C	Degree Celsius
DEO	Data Entry Operator
DF	Dense Forest
DPM	District Project Manager
DPMU	District Project Management Unit
DW	Dry Weight
EGH	East Garo Hills
EJH	East Jaintia Hills
EKH	East Khasi Hills
FSI	Forest Survey of India
GIS	Geographic Information System
GOI	Government of India
GPS	Global Positioning System
GS	Growing Stock
GW	Green Weight
ha	Hectare
Ht.	Height
IRS	Indian Remote Sensing (Satellite)
ISFR	India State of Forest Report
kg	Kilogram
LISS	Linear Imaging and Self-scanning Sensor
LULC	Land Use Land Cover
MBDA	Meghalaya Basin Development Authority
MBMA	Meghalaya Basin Management Agency
NA	Not available

NCF	Non-Clump Forming
NF	Non-Forest
NGH	North Garo Hills
NRM	Natural Resources Management
OF	Open Forest
pa	per annum
PPS	Probability Proportional to Size
RB	Ri Bhoi
SFD	State Forest Department
SGH	South Garo Hills
SL	Sustainable Livelihoods
SPMU	State Project Management Unit
Spp	Species
Sq. km	Square Kilometer
SWG	South West Garo Hills
SWKH	South West Khasi Hills
VCF	Village Community Facilitator
WGH	West Garo Hills
WJH	West Jaintia Hills
WKH & EWKH	West Khasi Hills and Eastern West Khasi Hills

GLOSSARY

Bamboo	Bamboos are tall, perennial and evergreen tree like grasses that belong to the subfamily Bambusoideae within the grass family Poaceae.
Bamboo Assessment	Bamboo is considered one of the world's highest-yielding renewable natural resources. Bamboo Resource Assessment involves evaluating the spatial distribution, area coverage, mapping of bamboo resources using remote sensing techniques to identify and quantify bamboo stands for effective management and utilization of bamboo resources which can contribute to achieving several sustainable development goals.
Bamboo brakes	Running bamboos like <i>Melocanna baccifera</i> spread by means of long underground rhizomes which send up multiple shoots and develop dense stands are often termed as “bamboo brakes”.
Biodiversity	The variety of life found on the earth (plants, animals, fungi and micro-organisms) as well as the communities that they form and habitats in which they live.
Canopy	The cover of branches and foliage formed by crowns of trees.
Canopy Cover	The percentage of ground covered by a vertical projection of outermost perimeter of natural spread of foliage of plants.
Clump Forming	Clumping bamboos have a pachymorph rhizome system, which appears short and thick. These rhizomes curve upward and remain close to the main plant. Clumping bamboo grows in dense clumps, forming discrete circles with new culms emerging from the center of the clump.
Clumps	A clump refers to a group or cluster of culms. It represents a collection of culms growing closely together.
Culms	Culm specifically refer to the stems or stalks of bamboo.
Dense Forest	All lands with a forest cover having a canopy density of 40 percent and above
Forest Area	The area recorded as a forest in the Government records. It is also referred as to “Recorded Forest Area”.

Forest Cover	All lands more than one hectare in area with a tree canopy density of more than 10 percent irrespective of ownership and legal status. Such lands may not necessarily be a recorded forest area. It also includes orchards, bamboo and palm.
Geographic Information System (GIS)	A computer-based system for capturing, storing manipulating, analyzing and displaying data which are spatially reference to the earth.
Growing Stock	The sum (by number or volume) of all the bamboo growing/ living in the forest or a specified part of it.
Herbarium	Herbarium is a place where dried and pressed culm sheath and leaves, mounted on sheets are kept systematically by a label that indicates the location where the culm was growing, its common and botanical name, the collector and the date collected.
Non-Clump Forming	Non-clumping bamboo also known as running bamboo, spreads rapidly by sending out long rhizomes. These rhizomes produce new culms at a distance from the mother plant. Running bamboo can grow rampantly and does not stay in one place.
Non-Forest Land	Land without forest cover.
Open Forest	Land with forest cover having a canopy density between 10- 40 percent.
Remote Sensing	Remote sensing is the acquisition of data, such as total forest area, forest type, canopy cover and height, from sensors on board aircraft or space-based platforms.
Scrub	Degraded forests lands having canopy density less than 10 percent.
Stratification	The division of the area into more homogenous units of carbon density. The purpose of stratification is to increase the accuracy and precision of accounting by reducing field data variability.

1. Introduction

Meghalaya, a State in northeastern India, was created as an autonomous region from Assam in April 1970 and achieved full statehood in January 1972. It is situated between Bangladesh to the south and west, and Assam to the north and east. The State spans latitudes from 24°58' N to 26°07' N and longitudes from 89°48' E to 92°51' E, covering an area of 22,429 sq. km. Characterized by its hilly terrain, Meghalaya features a landscape dotted with gorges and valleys, and is renowned for its extensive forests rich biodiversity and cascading rivers. The State's forest area totals 16966.84 sq. km (ISFR, 2023), but only 1,113 sq. km (ISFR, 2019) is under the control of the State Forest Department, accounting for 4.96% of the State's geographical area and 6.52% of its total forest area. The remaining forest land is either privately or community owned or under the administrative control of the three Autonomous District Councils *viz.*, Khasi, Jaintia and Garo. The State of Meghalaya is divided into 12 districts and 55 blocks. Meghalaya, being located in northeastern India has a varied climate with the western part of Meghalaya, including Garo Hills that experiences hotter and more oppressive weather compared to other parts of the State. Khasi and Jaintia Hills in the central and eastern parts have a cooler and more temperate climate. The State receives heavy rainfall, with annual average rainfall ranging from about 4000 mm to over 11,000 mm in some areas. Mawsynram and Sohra (formerly known as Cherrapunji) are particularly famous for extremely high rainfall, often being cited as some of the wettest places on Earth. The significant variations in climate, topography, soil and high rainfall within Meghalaya contributes to its rich biodiversity and lush landscapes, with 76% of its geographical area under forest cover. The majority of these forests are owned by clans, individuals, and communities, who benefit from the ecosystem services and forest produce they provide. It is very important that our communities in the State continue to enjoy ecosystem benefits sustainably for the future generations as well. Managing natural resources, especially forests, is crucial for ensuring both conservation and sustainable use. To ensure that these ecosystem services continue to flow sustainably, it is essential to manage forests scientifically by assessing the resource base, implement sustainable practices, monitor and adapt, engage stakeholders. The inclusion of input from local communities, indigenous groups, and other stakeholders to align management practices with local knowledge and needs is also important in safeguarding the diverse ecosystem

services, ensuring their health and availability for future generations.

Based on the field surveys conducted in 2007-2008, 2013, and 2014, a total of 43 bamboo species have been documented across all districts of the State. This suggests a comprehensive assessment of the bamboo diversity in Meghalaya over several years. The project intends to foster bamboo products as a sustainable substitute of less renewable resources like timber and promote economic prosperity of communities in the State of Meghalaya. It aims to support commercialisation of high potential bamboo products in the buildings, furniture, and other lifestyle sectors. Specifically, it aims to support enterprise development for sustainable supply of bamboo products and generate improved livelihoods, to start and expand bamboo product supply to existing/ new markets, and facilitate improved occupational security for the targeted beneficiaries. Other benefits that will arise include the promotion of bamboo products among high potential buyers and creation of Start-ups and to sustain and upscale local initiatives through community-led multi-stakeholder development models.

2. Land Use & Land Cover of the State

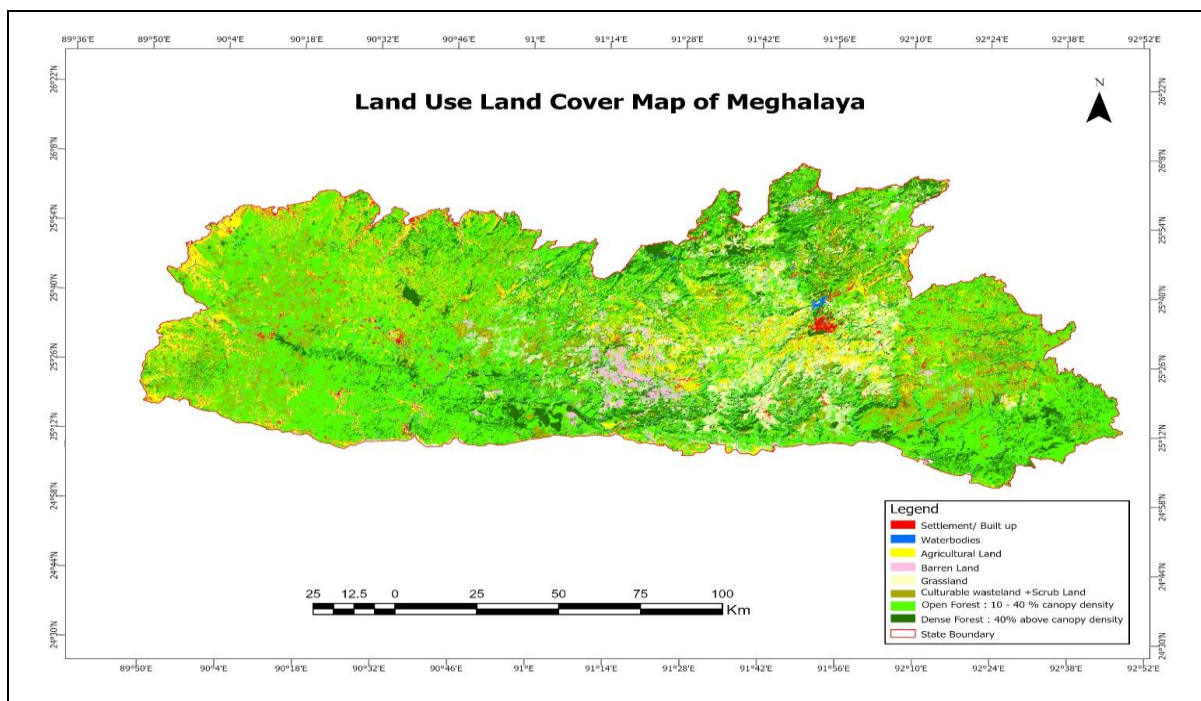


Fig. 1: land use & land cover map of Meghalaya

2.1 Land Use & Land Cover Area Figures

Table 1: Area under different land use & land cover

Sl. No.	Land Use Land Cover	Area (sq. km)	% of Geographical Area
1	Settlement/ Built up	773.15	3.45
2	Water bodies	221.09	0.99
3	Agricultural Land	2331.82	10.40
4	Barren Land	394.32	1.76
5	Grassland	1297.26	5.78
6	Culturable wasteland / Scrub Land	1766.53	7.88
7	Open Forest	11992.19	53.47
8	Dense Forest	3652.65	16.29
Total		22429.00	100.00

3. Forest Cover in the State

Forest cover in the State has been mapped using IRS P6 LISS-IV satellite data on 1:10,000 scale. Extent of forest cover in the State is 15644.84 sq. km out of which 3652.65 sq. km is Dense Forest and 11992.19 sq. km is Open Forest (LULC data, MBDA, 2024).

3.1 Forest Cover Map

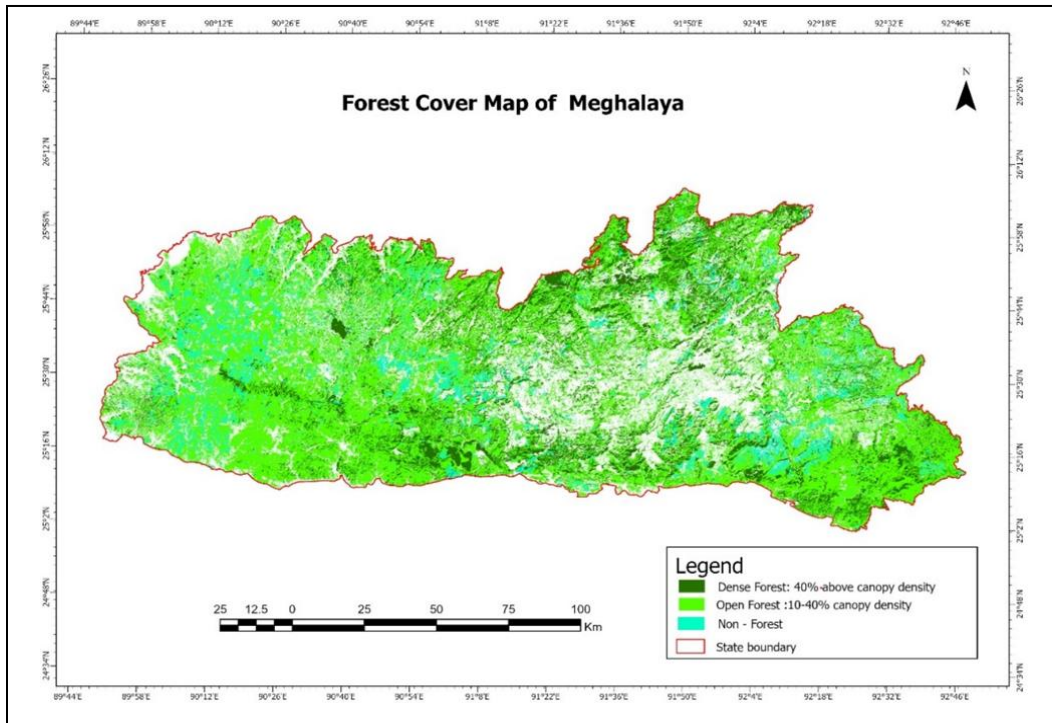


Fig. 2: Forest cover of the State

3.2 Forest Cover Area

Meghalaya's total geographical area of 22,429 sq. km comprises 7348.19 sq. km of Open Forest, accounting for 32.8% of the state's land area. Dense Forests cover 9618.65 sq. km, representing 42.9%, while the remaining 5462.16 sq. km or 24.3% falls under the non-Forest category (ISFR, 2023). This distribution highlights that a significant portion of Meghalaya's landscape is under open forest cover, reflecting both the State's rich vegetation and the potential for forest management interventions aimed at enhancing forest density and ecological resilience.

Table 2: Forest cover area in the State (ISFR, 2023)

Sl. No.	Forest Classification	Area (sq. km)	% of Geographical Area
1	Open Forest	9618.65	42.9
2	Dense Forest	7348.19	32.8
3	Non- Forest	5462.16	24.3
Total		22429.00	100.0

4. Bamboo Resources in Meghalaya: An Overview

Bamboo is a versatile group of plants which is capable of providing ecological, economic and livelihood security to the people. In most of the hilly States of the country, bamboo is used as building material/construction material, besides, having a niche as basic raw material in other countries with various traditional and an ever-increasing range of contemporary uses/applications in industries like paper and pulp, construction, furniture, textile, food, energy production etc. This is especially important from the potential of bamboo based livelihoods and employment for rejuvenating the rural economy and doubling of farmers' income. Meghalaya is endowed with rich bamboo resources due to its favourable climate, abundant rainfall, and diverse topography. Bamboo is found throughout the State with a wide variety of bamboo species—approximately 40 species across 16 genera. Notable species include *Bambusa tulda*, *Bambusa balcooa*, *Dendrocalamus hamiltonii*, and *Melocanna baccifera*. The distribution of different species of bamboo in the State is not uniform. Species like *Bambusa tulda*, *Bambusa bambos*, *Dendrocalamus hamiltonii*, are predominant in Garo Hills whereas *Melocanna baccifera*, *Bambusa jaintiana*, are common in Khasi and Jaintia Hills (Naithani, 2020).

Bamboo plays a crucial role in the State's rural economy, cultural practices, and environmental sustainability. The strength of the culms, the weight combined with hardness, range in size, hollowness, long fibres and easy working qualities, makes bamboo suitable for a variety of purposes.

Bamboo is a major livelihood resource in Meghalaya. It is used in construction, handicrafts, furniture-making, food source and many more. The State has a vibrant tradition of bamboo craftsmanship, and products are both locally sold and also exported outside the State. It also supports cottage industries and is increasingly recognized for its potential in bioenergy and sustainable architecture. Bamboo also plays a vital role in soil conservation, water retention, and biodiversity support in Meghalaya's fragile hilly ecosystem. Its rapid growth and regenerative nature make it a key resource for ecological restoration and climate resilience. The high growth potential of bamboo make them a good species for mitigation of climate change by way of carbon sequestration and to serve as carbon sinks.

There are immense opportunities to harness the market potential by increasing its production and ensuring establishment of proper value chain system. Keeping in view the vast untapped potential of the bamboo sector, boost domestic cultivation of quality and appropriate species for supply to our industry, the restructured National Bamboo Mission (NBM) has been approved for implementation across the country. The Meghalaya Bamboo Mission, launched by the state government, aims to promote bamboo cultivation, value addition, and marketing. It supports farmers, artisans, and entrepreneurs by providing training, financial support, and market linkages. With proper investment in infrastructure, training, and marketing, Meghalaya's bamboo resources can significantly contribute to sustainable development. Opportunities lie in eco-friendly construction, packaging alternatives to plastic, and global exports of value-added bamboo products.

5. Assessment of Meghalaya's Bamboo Resources

5.1 Background

The assessment of Meghalaya's bamboo resources is essential for understanding their economic potential, planning sustainable utilization, design suitable policies and plan value chain in clusters for bamboo led green economic development. Inventory of a resource is a prerequisite for its sustainable management. Given the State's rich biodiversity and traditional dependence on bamboo, a systematic assessment helps in resource management, conservation, and value chain development. The main objective of this assessment is that the data will serves as a foundation for sustainable management and industrial development. It will provide a means to quantify and map the bamboo resources across the State, identify species diversity, evaluate the productivity of bamboo stands and assess the sustainable harvestable yield.

The assessment involved Field Surveys and Inventories, Species Identification, GIS Mapping to identify bamboo-rich areas and to formulate an estimate of bamboo resources for the entire State based on the available data.

5.2 Methodology

The methodology followed for bamboo resource assessment for the entire State is based on stratified random sampling approach. First, for well distributing the sample plots in every part of the State, a grid coverage of the size 10km X 10km has been created for the whole State. The grid coverage has been overlaid on the LULC map of the State (section 2). The LULC map formed the basis for the stratification. In each grid then 30 sample points have been spatially distributed in such a manner that the number of plots over a particular stratum is in proportion to the area of the stratum in the grid, thus the sample plot distribution has been done following area proportion to size (PPS) method. After distribution of the sample plots, the list of geo-coordinates of the sample plots has been extracted using the GIS software. The field crew could reach at the sample plots location with the help of GPS. The sample plots of size 30m x 30m has been laid on each point following the procedure explained to the field crew during the field training, and as laid down in the manual. The field work for the bamboo inventory has been done with the community involvement as the crew for the field data collection compromised the local village persons mainly youths designated as village community facilitators (VCFs).

The field work includes laying out of the sample plots using pre-generated coordinates, measurements of Clump Size and circumference of culms, in each clump within the sample plots, identification of the bamboo species, preparation of herbarium using leaves and sheath for the unidentified species and finally the measurement of green weight and recording of Dry weight after 45 days for 8 to 10 culms of each species found in the district. Field data after checking and validation by the district teams has been sent to the CoE, SPMU where the same was processed and analyzed for all the 12 districts. The format of the sample plots data collection is given at Annexure-I. The data processing has been done using excel software. Checking of the data after processing has been done several times to ensure error free results. Work flow of the methodology has been presented in the Fig 3.

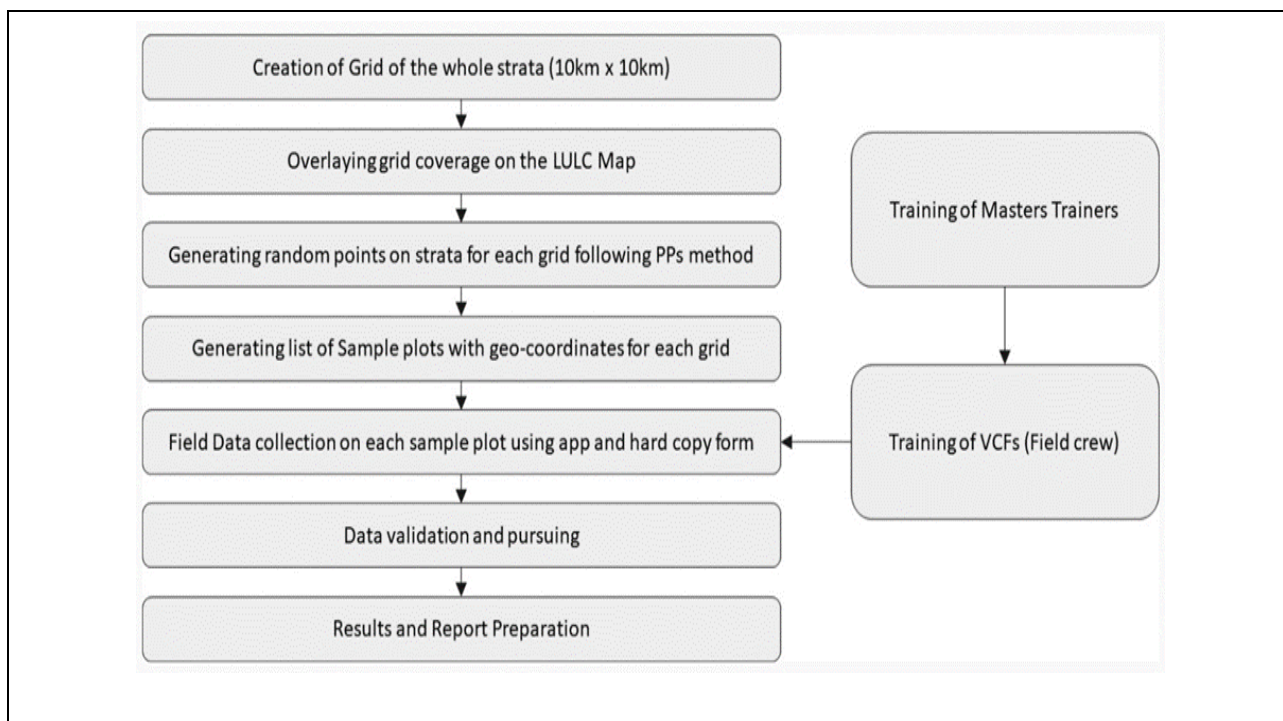


Fig. 3: Work flow of methodology

5.2.1 Strata Area for Bamboo Assessment

Table 3: Strata area in the State

Sl. No.	Strata	Area (sq. km)	No. of sample plots
1	Dense Forest	3652.65	971
2	Open Forest	11992.19	4480
3	Scrub & Culturable Waste Land	1766.53	295
4	Agricultural Land	2331.82	669
5	Urban & Rural Settlements	773.15	694
6	Non-Forest, Barren Land & Grassland	1691.58	160
Total		22207.91	7269

5.2.2 Sample Plot Distribution

A total of 6907 sample plots were established using a gridded stratified random sampling design. This method ensures a scientifically sound and representative collection of data across various types of land use and vegetation.

- The entire study area is overlaid with a grid, where each grid cell is 10 km x 10 km in size, within which random sample plots are placed.

- The distribution of plots follows a stratified design, meaning that the land is first categorized into different strata, and plots are randomly placed within each stratum to capture variability.

The plots were distributed across six broad strata, representing different land cover and land use types:

i. **Dense Forest**

- High canopy cover and minimal human disturbance.
- Contains mature and established tree species.

ii. **Open Forest**

- Forests with lower canopy cover.
- May include degraded forests or regions undergoing regeneration.

iii. **Scrub + Culturable Wasteland**

- Areas with sparse vegetation, including shrublands.
- Includes land that is not currently cultivated but has the potential for agriculture.

iv. **Agricultural Land**

- Actively cultivated farmland, including seasonal and perennial crops.

v. **Urban + Rural Settlement**

- Includes residential areas, villages, towns, and associated infrastructure.
- These plots help assess biodiversity and green cover in human-influenced landscapes.

vi. **Non-Forest + Barren Land + Grassland**

- Includes uncultivated, rocky, sandy, or otherwise barren areas.
- Also includes natural grasslands that provide unique ecological insights.

All plant species found in each sample plot were enumerated, i.e., systematically identified and recorded. This process will aid in understanding species distribution, richness, and composition across different strata.

A herbarium collection was also prepared for all identified species across the plots. Each specimen is pressed, dried, and mounted with proper labelling (including scientific name, date, location, habitat, etc.). The herbarium collection will serve as a permanent botanical record and can be used for further taxonomic studies, verification, and reference.

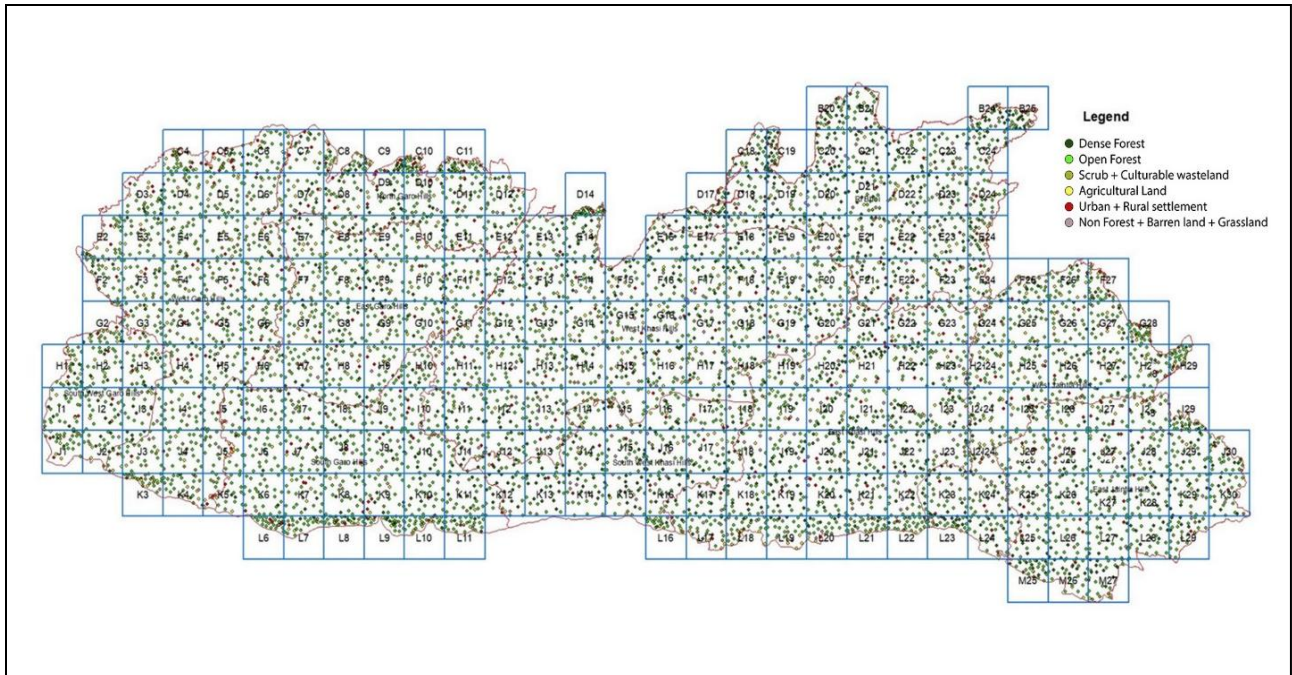


Fig. 4: Sample plots distribution over different strata across the State

Table 4: Number of sample plots district-wise

Sl. No.	District	No. of plots surveyed
1	East Garo Hills	489
2	East Jaintia Hills	678
3	East Khasi Hills	834
4	North Garo Hills	348
5	Ri-Bhoi	789
6	South Garo Hills	639
7	South West Garo Hills	212
8	South West Khasi Hills	374
9	West Garo Hills	850
10	West Jaintia Hills	587
11	West Khasi Hills & Eastern West Khasi Hills	1107
Total		6907

6. Bamboo Resources Inventory Estimates of the State

6.1 List of Species in the State

The Field inventory data collection is a very important exercise for assessing the Bamboo in the State. It is done for quantified estimation of parameters such as growing stock, number of culms in each stratum in different diameter classes for clump forming and non-clump forming Bamboo. The species found in the State are given in Table 5.

Table 5: List of species found in the State

Sl. No.	Botanical Name	Vernacular Name
1	<i>Bambusa balcooa</i>	K: Borua, Burma Bamboo G: Burua Wa'a
2	<i>Bambusa bambos</i>	G: Janglile, Jangwa, Jawa Wa'a, Wakanta Wa'a, Wakanta, Wakenta
3	<i>Bambusa cacharensis</i>	K: Richal, Siej Mot, Skhen Dkhar, Ba, Dkhar, Khon Raikkhai, Khonrikhar, Mot, Rikhar J: Ba, Dkhar, Khon Raikkhai, Khonrikhar, Rikhar
4	<i>Bambusa jaintiana</i>	K: Shken, Shong, Siej Shken, Siej Skhen, Skhen Heh, Skhen Rit, Thning, J: Kolongki, Latuba, Ronam, Skhen Sdiah, Skhen shong, G: Wabok, Wathesa, Wati, Watibok Wa'a, Watresa, Watrebok Wa'a
5	<i>Bambusa nutans</i>	G: Wagilsi, Wasim
6	<i>Bambusa pallida</i>	K: Riso
7	<i>Bambusa Polymorpha</i>	K: Siej Braw
8	<i>Bambusa Pseudopallida</i>	K: Wahminang G: Wamimang, Wamemang
9	<i>Bambusa tulda</i>	K: Betwa, Maikhozoi, Nai, Niai, Sba, Sbia, Siej Rnial, Siej Rnagi, Siej Rngai, Siej Ryntieh, Siej Swa, Swa, Thengrangai J: Rangai, Rangani, Rangnai, Rnai, Rngai, Rngai Rit, Rngai iong, Rngea, Rngi, Rnial, Rupui, Ryngai, Ryngain, Ryngngai G: Wage Wa'a, Wagi, Wagri, Wahming, Wate
10	<i>Bambusa vulgaris</i>	G: Bahina, Burabas, Wama, Wamanna, Wamina, Wanaru
11	<i>Cephalostachyum capitatum</i>	K: Hli, Hylloi, Sylli, Sili, Silli
12	<i>Chimonobambusa callosa</i>	K: Siej Skong, Skhen Skong, Skong, Spar, Spar Khlaw
13	<i>Chimonocalamus griffithiana</i>	K: Siej Tyrpait, Spar Rit, Tyrpait G: Wamang
14	<i>Dendrocalamus hamiltonii</i>	K: Siej Bam, Siej Khlaw, Siej Khloo, Siej Lieh, Bri J: Heh, Kako, Khlaw, Lieh, Ryntieh G: Wanok Wa'a
15	<i>Dendrocalamus hookeri</i>	K: Ktang, Siej Bah, Siej long, Siej longrim, Soit, Borbat
16	<i>Dendrocalamus sahnii</i>	K: Siej Tawang, Tawang
17	<i>Dendrocalamus sikkimensis</i>	G: Wada, Wadah
18	<i>Gigantochloa macrostachya</i>	G: Teksra, Teksra wa'a

19	<i>Melocanna baccifera</i>	K: Muli, Muri, Romai, Rithem, Rtem, Rthem, Siej Tyrlaw J: Tyra War G: Wasit, Watari, Watrai, Watre
20	<i>Ochlandra scriptoria</i>	G: Wadro, Wadro wa'a
21	<i>Phyllostachys mannii</i>	K: Naka, Naka long, Siej Naga, Siej Naka, Siej Neiong, Spar Naga, Spar Naka
22	<i>Pseudostachyum polymorphum</i>	K: Pyra, Siej Tyra, Sorin, Tyra, Tyr-a G: Wachal
23	<i>Schizostachyum dullooa</i>	G: Rolak, Rowa, Rugi K: Siej
24	<i>Sinarundinaria falcata</i>	K: Kdait
25	<i>Teinostachyum dullooa</i>	K: La, Muroi, Siej Ia, Tangla, Tarang, Bangla, Dongla, Dongum, A-La G: Wadow, Wahthri, Wathri
26	<i>Teinostachyum helferi</i>	G: Tumar, Tuna, Wale, Wali

K: Khasi; J: Jaintia; G: Garo

6.2 Bamboo Resource Inventory Estimates of the State

6.2.1 District Wise Estimates of Number of Culms and Weight of Bamboo

Assessment of bamboo resources across the districts of Meghalaya estimates a total of 2,189 million culms, with an estimated green weight of 20,938,161 tonnes and a corresponding dry weight of 10,472,257 tonnes (Table 6).

Table 6: Estimated number of culms & weight

Sl. No.	District	Number of Culms (in million)	Green Weight (in tonnes)	Dry Weight (in tonnes)
1	East Garo Hills	160	1375245	652084
2	East Jaintia Hills	193	1497226	805712
3	East Khasi Hills	224	1441988	752625
4	North Garo Hills	137	1054195	500721
5	Ri-Bhoi	163	2295240	1195380
6	South Garo Hills	247	2270625	1040224
7	South West Garo Hills	117	1081222	496562
8	South West Khasi Hills	63	360848	176998
9	West Garo Hills	284	1620842	706316
10	West Jaintia Hills	102	892987	445614
11	West Khasi Hills & Eastern West Khasi Hills	499	7047742	3700021
Total		2189	20938161	10472257

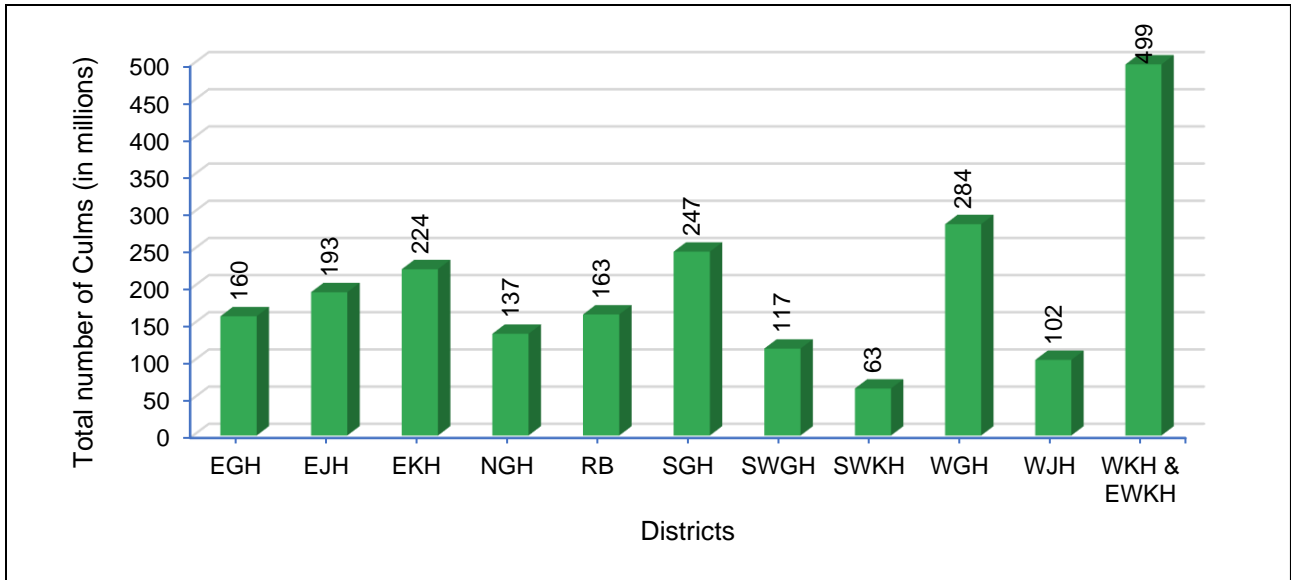


Fig. 5: Estimated number of culms (in million)

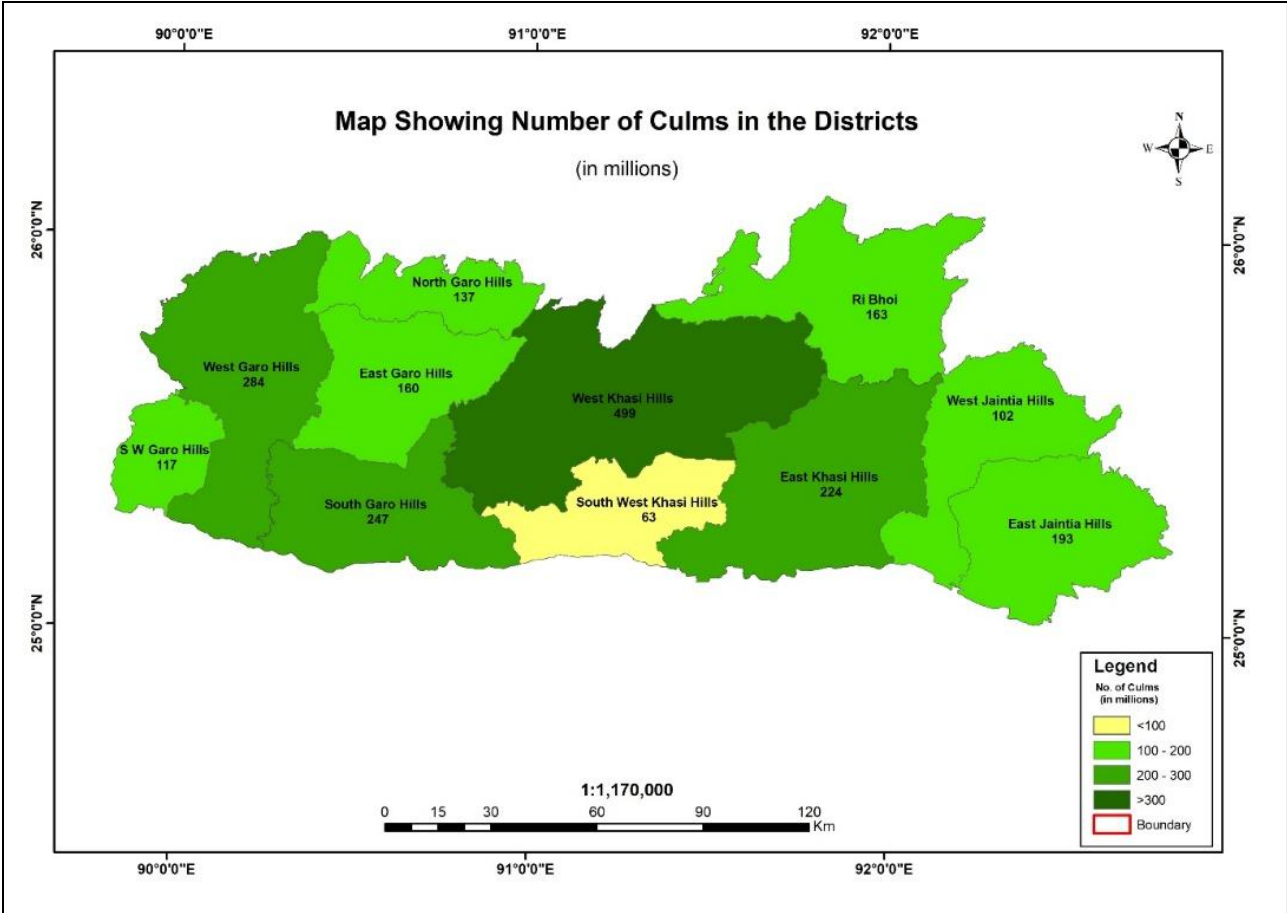


Fig. 6: Map showing estimated number of culms in Districts

6.2.2 Species-wise Estimates of Number of Culms and Weight for Each District

Table 7: Species-wise estimates of number of culms and weight

Sl. No.	District	CF/ NCF	Species	Number of culms in different girth classes				Weight (in tonnes)	
				1-15 (cm)	15-30 (cm)	>30 (cm)	Total	GW	DW
1	EGH	CF	<i>Bambusa balcooa</i>	74581	131160	7715	213456	7928	3964
		CF	<i>Bambusa jaintiana</i>	508701	5583393	161264	6253358	58895	27092
		CF	<i>Bambusa nutans</i>	25718	18002	0	43720	456	214
		CF	<i>Bambusa tulda</i>	2464442	23932280	800478	27197200	359826	172716
		CF	<i>Dendrocalamus hamiltonii</i>	2733021	19954050	979990	23667061	422390	223867
		CF	<i>Dendrocalamus sikkimensis</i>	131962	3559819	128210	3819991	135861	67931
		CF	<i>Gigantochloa macrostachya</i>	28289	645514	20574	694377	14724	7068
		CF	<i>Ochlandra scriptoria</i>	64294	1401614	59151	1525059	27430	11246
		NCF	<i>Melocanna baccifera</i>				91185199	324036	126374
		NCF	<i>Pseudostachyum polymorphum</i>				5851455	23701	11613
				Total	6031008	55225832	2157382	160450876	1375245
2	EJH	CF	<i>Bambusa cacharensis</i>	1935630	4051022	188343	6174995	64245	41117
		CF	<i>Bambusa jaintiana</i>	61656460	11274161	392460	73323081	331456	152470
		CF	<i>Bambusa tulda</i>	8108994	10162413	472286	18743693	190258	91324
		CF	<i>Chimonobambusa callosa</i>	293131	135504	0	428635	6087	3165
		CF	<i>Dendrocalamus hamiltonii</i>	421684	351128	31602	804414	10352	5487
		CF	<i>Dendrocalamus hookeri</i>	98424	187922	31001	317347	4337	2602
		CF	<i>Schizostachyum dullooa</i>	15707862	41033275	25292637	82033774	849489	492704
		CF	<i>Teinostachyum helferi</i>	277283	0	0	277283	1874	525
		NCF	<i>Melocanna baccifera</i>				8029419	28533	11128
		NCF	<i>Pseudostachyum polymorphum</i>				2615877	10595	5192
		Total	88499468	67195425	26408329	192748518	1497226	805712	
3	EKH	CF	<i>Bambusa balcooa</i>	169184	16766	0	185950	3608	1804
		CF	<i>Bambusa cacharensis</i>	123291	221422	16766	361479	3713	2376
		CF	<i>Bambusa jaintiana</i>	36352749	7412906	268256	44033911	203472	93597
		CF	<i>Bambusa pseudopallida</i>	234724	185950	76209	496883	8166	4165
		CF	<i>Bambusa tulda</i>	4067505	7120479	484690	11672674	128483	61672
		CF	<i>Bambusa vulgaris</i>	106693	111265	57919	275877	8904	3384
		CF	<i>Cephalostachyum capitatum</i>	413054	0	0	413054	1057	581
		CF	<i>Chimonobambusa callosa</i>	2065148	3961771	714593	6741512	145850	75842
		CF	<i>Dendrocalamus hamiltonii</i>	2808825	4733488	1000752	8543065	137137	72683
		CF	<i>Dendrocalamus hookeri</i>	5535476	10951999	6081369	22568844	352916	211749
		CF	<i>Dendrocalamus sahnii</i>	920557	472614	0	1393171	8553	5046
		CF	<i>Schizostachyum dullooa</i>	166067	764228	0	930295	8354	4845
		CF	<i>Sinarundinaria falcata</i>	307885	0	0	307885	1591	716
		CF	<i>Teinostachyum dullooa</i>	563255	355765	0	919020	16206	7617
		NCF	<i>Melocanna baccifera</i>				870017	3092	1206
		NCF	<i>Phyllostachys mannii</i>				121471149	400758	200379
NCF	<i>Pseudostachyum polymorphum</i>				2500557	10128	4963		
		Total	53834413	36308653	8700554	223685343	1441988	752625	

** CF: Clump Forming, NCF: Non-Clump Forming

***GW: Green Weight; DW: Dry Weight

Sl. No.	District	CF/ NCF	Species	Number of culms in different girth classes				Weight (in tonnes)	
				1-15 (cm)	15-30 (cm)	>30 (cm)	Total	GW	DW
4	NGH	CF	<i>Bambusa jaintiana</i>	4515652	1309454	38261	5863367	29160	13414
		CF	<i>Bambusa nutans</i>	19130	64348	0	83478	1194	561
		CF	<i>Bambusa tulda</i>	6334138	16085077	332838	22752053	260708	125140
		CF	<i>Bambusa vulgaris</i>	158302	439719	57878	655899	22090	8394
		CF	<i>Dendrocalamus hamiltonii</i>	11238971	17773848	1687186	30700005	458969	243254
		CF	<i>Gigantochloa macrostachya</i>	48696	55652	0	104348	1567	752
		CF	<i>Ochlandra scriptoria</i>	422322	239956	31994	694272	7933	3252
		CF	<i>Teinostachyum helferi</i>	57589	147173	0	204762	3186	892
		NCF	<i>Melocanna baccifera</i>				75807371	269389	105062
Total				22794800	36115227	2148157	136865555	1054195	500721
5	RB	CF	<i>Bambusa jaintiana</i>	1104669	1133903	194823	2433395	17788	8182
		CF	<i>Bambusa polymorpha</i>	29744	17846	0	47590	1106	520
		CF	<i>Bambusa tulda</i>	17874215	17375760	3330570	38580545	396294	190221
		CF	<i>Dendrocalamus hamiltonii</i>	47967994	52853177	18100556	118921727	1845042	977872
		CF	<i>Dendrocalamus hookeri</i>	377127	627148	244458	1248733	18095	10857
		CF	<i>Teinostachyum dullooa</i>	636215	269168	0	905383	14439	6786
		NCF	<i>Melocanna baccifera</i>				696741	2476	941
Total				67989964	72277002	21870407	162834114	2295240	1195380
6	SGH	CF	<i>Bambusa balcoa</i>	2598256	1875053	859594	5332903	190438	95219
		CF	<i>Bambusa bambos</i>	1400011	809104	89187	2298302	40506	15797
		CF	<i>Bambusa jaintiana</i>	9736545	7433927	701151	17871623	117030	53834
		CF	<i>Bambusa nutans</i>	328923	166772	61841	557536	6283	2953
		CF	<i>Bambusa pseudopallida</i>	11799788	2769870	59458	14629116	151082	77052
		CF	<i>Bambusa tulda</i>	19781423	18831594	6199487	44812504	484119	232377
		CF	<i>Bambusa vulgaris</i>	3960394	2515871	1117584	7593849	211551	80389
		CF	<i>Dendrocalamus hamiltonii</i>	15599501	12906343	2721700	31227544	426837	226224
		CF	<i>Dendrocalamus sikkimensis</i>	478788	601984	545385	1626157	54714	27357
		CF	<i>Gigantochloa macrostachya</i>	2904113	1354549	569649	4828311	69195	33214
		CF	<i>Ochlandra scriptoria</i>	4514268	4190843	302038	9007149	113241	46429
		CF	<i>Teinostachyum helferi</i>	6615334	119333	22297	6756964	47588	13325
NCF	<i>Melocanna baccifera</i>				100755004	358043	136056		
Total				79717344	53575243	13249371	247296962	2270625	1040224
7	SWG	CF	<i>Bambusa balcoa</i>	197292	309697	357948	864937	42446	21223
		CF	<i>Bambusa bambos</i>	1106039	840727	649181	2595947	61593	24021
		CF	<i>Bambusa jaintiana</i>	8096535	3096638	1994300	13187473	87353	40182
		CF	<i>Bambusa nutans</i>	266601	226835	269915	763351	12040	5659
		CF	<i>Bambusa tulda</i>	11253200	13703111	5632248	30588559	359581	172599
		CF	<i>Bambusa vulgaris</i>	112415	82033	30383	224831	6334	2407
		CF	<i>Dendrocalamus hamiltonii</i>	18230	36459	0	54689	808	428
		CF	<i>Dendrocalamus sikkimensis</i>	2902610	2547100	2533729	7983439	253886	126943
		CF	<i>Gigantochloa macrostachya</i>	1719220	1347023	358580	3424823	53341	25603
		CF	<i>Ochlandra scriptoria</i>	192201	0	0	192201	1240	509
NCF	<i>Melocanna baccifera</i>				57012725	202600	76988		
Total				25864343	22189623	11826284	116892975	1081222	496562

** CF: Clump Forming, NCF: Non-Clump Forming

***GW: Green Weight; DW: Dry Weight

Sl. No.	District	CF/ NCF	Species	Number of culms in different girth classes				Weight (in tonnes)	
				1-15 (cm)	15-30 (cm)	>30 (cm)	Total	GW	DW
8	SWKH	CF	<i>Bambusa jaintiana</i>	25127796	1099069	0	26226865	98473	45297
		CF	<i>Bambusa pallida</i>	9000277	10272	0	9010549	35105	15446
		CF	<i>Bambusa tulda</i>	8095876	3560929	98247	11755052	91174	43764
		CF	<i>Cephalostachyum capitatum</i>	635318	0	0	635318	1626	894
		CF	<i>Chimonobambusa callosa</i>	4051852	146132	0	4197984	40291	20951
		CF	<i>Dendrocalamus hamiltonii</i>	959529	152820	0	1112349	9294	4926
		CF	<i>Dendrocalamus hookeri</i>	1224257	1387738	235534	2847529	35042	21025
		CF	<i>Dendrocalamus sahnii</i>	629194	518613	0	1147807	7937	4683
		CF	<i>Teinostachyum dullooa</i>	2901881	0	0	2901881	30073	14134
		NCF	<i>Phyllostachys mannii</i>				2384655	7867	3934
		NCF	<i>Pseudostachyum polymorphum</i>				979303	3967	1944
Total				52625980	6875573	333781	63199292	360848	176998
9	WGH	CF	<i>Bambusa balcooa</i>	2608884	1709807	473957	4792648	156331	78165
		CF	<i>Bambusa bambos</i>	1559658	299282	58475	1917415	26472	10324
		CF	<i>Bambusa jaintiana</i>	17963557	10603235	4742015	33308807	235010	108105
		CF	<i>Bambusa nutans</i>	6403284	1715804	1842182	9961270	112335	52798
		CF	<i>Bambusa tulda</i>	2066764	3279224	1658541	7004529	89277	42853
		CF	<i>Bambusa vulgaris</i>	191767	239084	164878	595729	20880	7935
		CF	<i>Dendrocalamus hamiltonii</i>	3033865	1908971	197967	5140803	62006	32863
		CF	<i>Dendrocalamus sikkimensis</i>	139737	113983	123048	376768	11965	5983
		CF	<i>Gigantochloa macrostachya</i>	4709330	2562254	1948036	9219620	152316	73112
		CF	<i>Ochlandra scriptoria</i>	20984	26230	18361	65575	1100	451
		NCF	<i>Melocanna baccifera</i>				211939438	753148	293728
Total				38697830	22457874	11227460	284322602	1620842	706316
10	WJH	CF	<i>Bambusa cacharensis</i>	319596	677056	0	996652	10128	6482
		CF	<i>Bambusa jaintiana</i>	42444	26527	0	68971	408	188
		CF	<i>Bambusa pallida</i>	32818818	11322942	207543	44349303	254745	112088
		CF	<i>Bambusa tulda</i>	6053410	21962367	963707	28979484	353533	169696
		CF	<i>Chimonobambusa callosa</i>	5200	0	0	5200	47	24
		CF	<i>Dendrocalamus hamiltonii</i>	729796	845431	488133	2063360	35075	18590
		CF	<i>Dendrocalamus hookeri</i>	132636	538502	42444	713582	10470	6282
		CF	<i>Schizostachyum dullooa</i>	5808119	12829615	4969325	23607059	225103	130560
		NCF	<i>Pseudostachyum polymorphum</i>				859038	3479	1705
Total				45910019	48202440	6671152	101642649	892987	445614
11	WKH & EWKH	CF	<i>Bambusa jaintiana</i>	82072796	12471422	1505536	96049754	430474	198018
		CF	<i>Bambusa tulda</i>	6722783	25017723	2630743	34371249	433002	207841
		CF	<i>Chimonobambusa callosa</i>	3050248	6148125	1377997	10576370	234964	122181
		CF	<i>Dendrocalamus hamiltonii</i>	58325491	148733760	74059239	281118490	5356017	2838689
		CF	<i>Dendrocalamus hookeri</i>	3273213	10773915	5276921	19324049	317974	190784
		CF	<i>Dendrocalamus sahnii</i>	5707932	6541884	721573	12971389	102961	60747
		CF	<i>Teinostachyum dullooa</i>	533835	0	0	533835	5532	2600
		NCF	<i>Chimonocalamus griffithiana</i>				15589445	64316	34087
		NCF	<i>Phyllostachys mannii</i>				8892166	29337	14669
		NCF	<i>Pseudostachyum polymorphum</i>				5838904	23650	11588
		NCF	<i>Melocanna baccifera</i>				13934378	49517	18817
Total				159686298	209686829	85572009	499200029	7047742	3700021

** CF: Clump Forming, NCF: Non-Clump Forming

***GW: Green Weight; DW: Dry Weight

6.2.3 Strata-wise Estimates of Number of Culms

Table 8: Strata-wise estimates of number of culms

Strata	Number of Culms (in million)											Total
	EGH	EJH	EKH	NGH	RB	SGH	SWG H	SWKH	WGH	WJH	WKH & EWKH	
Dense Forest	28	45	66	42	90	44	19	16	11	17	115	491
Open Forest	115	135	90	90	54	197	63	37	201	60	264	1308
Scrub & Culturable Wasteland	15	4	6	1	6	2	9	3	57	5	44	153
Agricultural Land	2	7	56	2	10	3	25	5	15	19	65	210
Urban & Rural Settlements	0.02	1	2	1	1	1	1	0	1	1	1	11
Non-Forest, Barren Land & Grass Land	0	0.11	3	0.02	2	0	0	1	0.01	0.03	10	17
Total	160	193	224	137	163	247	117	63	284	102	499	2189

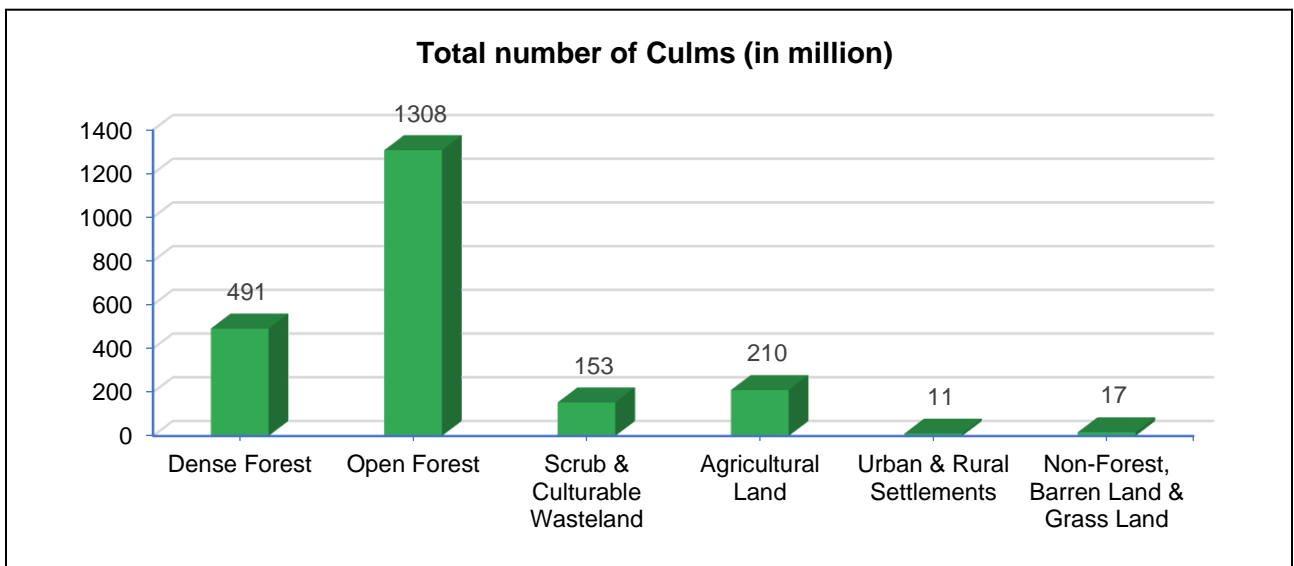


Fig. 7: Distribution of culms in different strata

The bamboo resource in the State was estimated to have an Overall Total of 2,189 million culms with the highest contributor being West Garo Hills with 284 million culms, followed by West Khasi Hills & Eastern West Khasi Hills with 499 million culms.

In terms of stratum-wise breakdown, Open Forests are the largest contributors, accounting for 1,308 million culms (~60% of the total), followed by Dense Forests with 491 million culms (~22.4%) and Agricultural Land and Scrub/Wastelands that accounts for 210 million and 153 million culms, respectively.

6.2.4 District wise Estimates of Bamboo bearing Area

Table 9: Bamboo bearing area

District	Total Bamboo Bearing Area (sq. km)	Percentage of District Area
East Garo Hills	232.39	15.60
East Jaintia Hills	424.36	19.96
East Khasi Hills	612.78	22.30
North Garo Hills	244.29	21.95
Ri Bhoi	536.49	22.26
South Garo Hills	621.62	32.94
South West Garo Hills	276.30	33.61
South West Khasi Hills	211.53	15.77
West Garo Hills	733.79	25.36
West Jaintia Hills	265.74	15.70
West Khasi Hills & Eastern West Khasi Hills	916.33	23.17
Total	5075.62	22.58

The total bamboo-bearing area across all districts spans an area of 5,075.61 sq. km that constitutes 22.58% of the State's total geographic area. South West Garo Hills has the highest percentage of its area under bamboo (33.61%), despite having a smaller total bamboo area than some other districts. West Khasi Hills & EWKH has the largest total bamboo-bearing area (916.33 sq. km), making it the most bamboo-rich district in terms of sheer size. South Garo Hills also shows a strong presence with both high area and percentage.

6.2.5 Species Distribution and Number of Culms in Districts

Table 10: Species distribution and number of culms in Districts

Sl. No.	Species	EGH	EJH	EKH	NGH	RB	SGH	SWGK	SWKH	WGH	WJH	WKH & EWKH	Total Number (in millions)
1	<i>Bambusa balcooa</i>	213457		185950			5332904	864938		4792648			11
2	<i>Bambusa jaintiana</i>	6253359	73323081	44033911	5863366	2433394	17871623	13187473	26226865	33308807	68971	96049753	319
3	<i>Bambusa nutans</i>	43720			83478		557536	763350		9961270			11
4	<i>Bambusa tulda</i>	27197199	18743692	11672674	22752052	38580545	44812504	30588559	11755052	7004529	28979484	34371249	276
5	<i>Dendrocalamus hamiltonii</i>	23667061	804414	8543065	30700005	118921727	31227544	54689	1112350	5140803	2063359	281118490	503
6	<i>Dendrocalamus sikkimensis</i>	3819990					1626158	7983439		376768			14
7	<i>Gigantochloa macrostachya</i>	694377			104348		4828312	3424823		9219621			18
8	<i>Ochlandra scriptoria</i>	1525058			694272		9007150	192201		65574			11
9	<i>Melocanna baccifera</i>	91185199	8029419	870017	75807371	696741	100755004	57012725		211939438		13934378	560
10	<i>Pseudostachyum polymorphum</i>	5851455	2615877	2500557					979303		859038	5838904	19
11	<i>Bambusa cacharensis</i>		6174995	361480							996652		8
12	<i>Chimonobambusa callosa</i>		428635	6741511					4197984		5200	10576371	22
13	<i>Dendrocalamus hookeri</i>		317347	22568843		1248733			2847530		713581	19324049	47
14	<i>Schizostachyum dullooa</i>		82033774	930295							23607059		107
15	<i>Teinostachyum helferi</i>		277283		204762		6756964						7
16	<i>Bambusa pseudopallida</i>			496884			14629115						15
17	<i>Bambusa vulgaris</i>			275877	655899		7593850	224831		595729			9
18	<i>Cephalostachyum capitatum</i>			413054					635318				1
19	<i>Dendrocalamus sahnii</i>			1393171					1147807			12971389	16
20	<i>Sinarundinaria falcata</i>			307885									0.3
21	<i>Teinostachyum dullooa</i>			919019		905383			2901881			533835	5
22	<i>Phyllostachys mannii</i>			121471149					2384655			8892166	133
23	<i>Bambusa polymorpha</i>					47590							0.0
24	<i>Bambusa bambos</i>						2298302	2595947		1917415			7
25	<i>Bambusa pallida</i>								9010549		44349302		53
26	<i>Chimonocalamus griffithiana</i>											15589445	16
	Total (in millions)	160	193	224	137	163	247	117	63	284	102	499	2189

Melocanna baccifera is the most abundant and widespread species, especially dominant in Garo Hills region. *Bambusa jaintiana* is highly concentrated in East Jaintia Hills and South West Khasi Hills, indicating localized abundance. West Khasi Hills & Eastern West Khasi Hills stands out as the most species-diverse district, with the highest total number of culms (499 million).

6.2.6 Grid wise Bamboo Distribution in Meghalaya

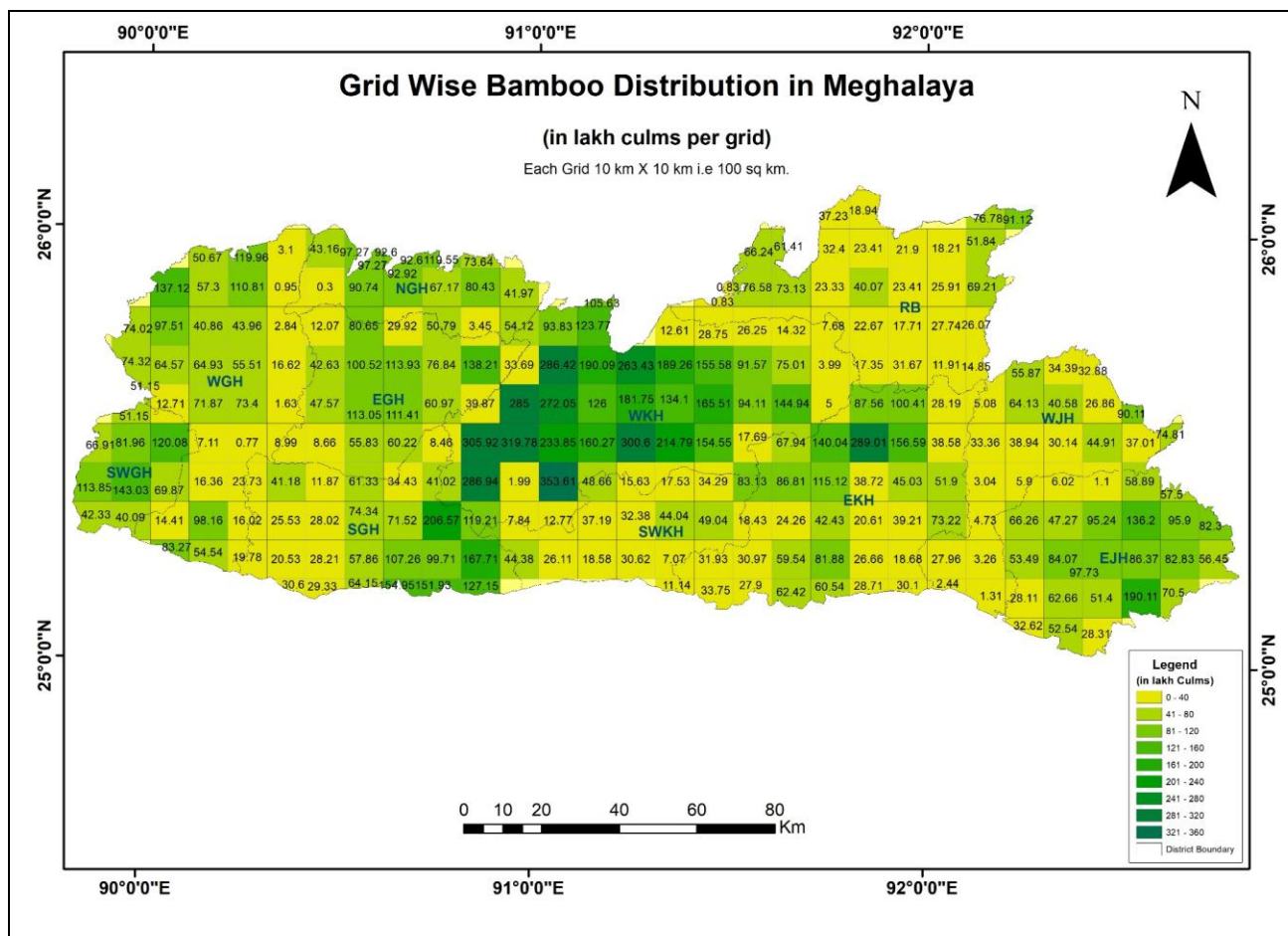


Fig. 8: Grid wise bamboo distribution in Meghalaya

6.2.7 Species wise Estimates of Number of Culms in the State

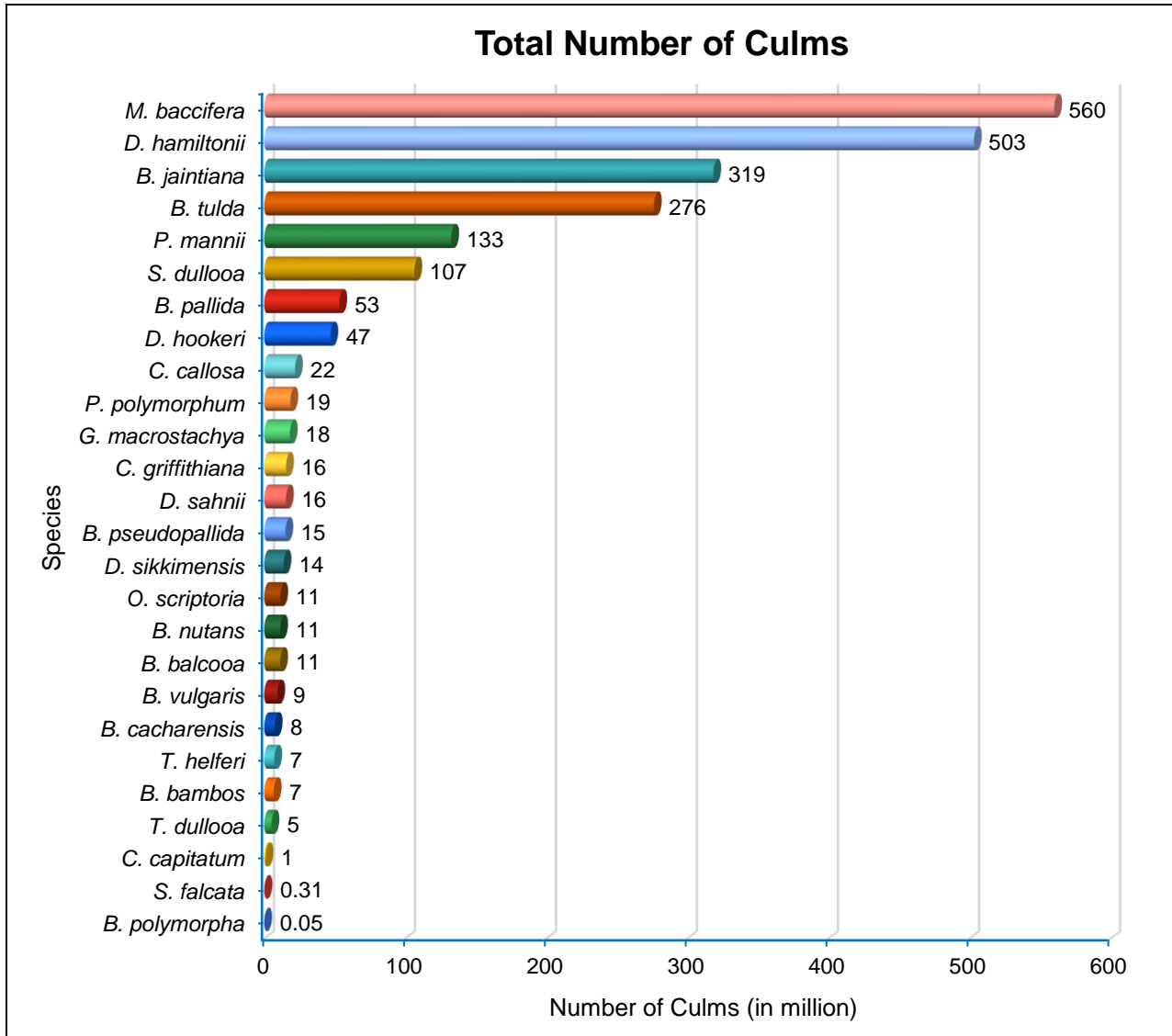


Fig. 9: Species-wise number of culms across the State

Fig. 9 compares the various bamboo species by their estimated total number of culms (in millions). It indicates that *Melocanna baccifera* has the highest number of culms at 560 million followed by *Dendrocalamus hamiltonii* with 503 million and *Bambusa jaintiana* and *Bambusa tulda* are next with 319 million and 276 million, respectively.

6.2.8 Sustainable Yield of 10 Commercially Important Bamboo Species

Based on the bamboo resource inventory data of the district, the quantum of harvestable bamboo for each species on the sustained basis is presented in the following table. Normally bamboo culms of the most of the species in the State mature in 4 to 5 years but to be on the conservative side the age of 6 years has been presumed for a culm to achieve the maturity. The sustainable yield has been derived by summing the number of culms in 15 cm-30cm and >30cm classes and then dividing the number by six. The figure so arrived has been further multiplied by 0.7 to keep an extra stock as allowance for uncertainties. Since most of the bamboo growing areas are not under regular harvesting it is likely that many clumps have concentration of large size culms. Therefore, in the initial years of regular harvesting, say upto three years, there may be increased extraction of large-sized culms from such clumps.

Table 11: Sustainably harvestable yield of 10 commercially important bamboo species

Sl. No.	Species	Sustainable Annual Yield	
		Number of Culms (in million)	Green Weight (in tonnes)
1	<i>Bambusa balcooa</i>	1.6	56105
2	<i>Bambusa jaintiana</i>	44.6	225333
3	<i>Bambusa nutans</i>	1.6	18523
4	<i>Bambusa tulda</i>	38.7	440476
5	<i>Dendrocalamus hamiltonii</i>	70.5	1226950
6	<i>Dendrocalamus hookeri</i>	6.6	103437
7	<i>Bambusa vulgaris</i>	1.3	37766
8	<i>Melocanna baccifera</i>	78.4	278717
9	<i>Bambusa bambos</i>	1.0	18000
10	<i>Bambusa pallida</i>	7.5	40579
	Total	251.7	2445885

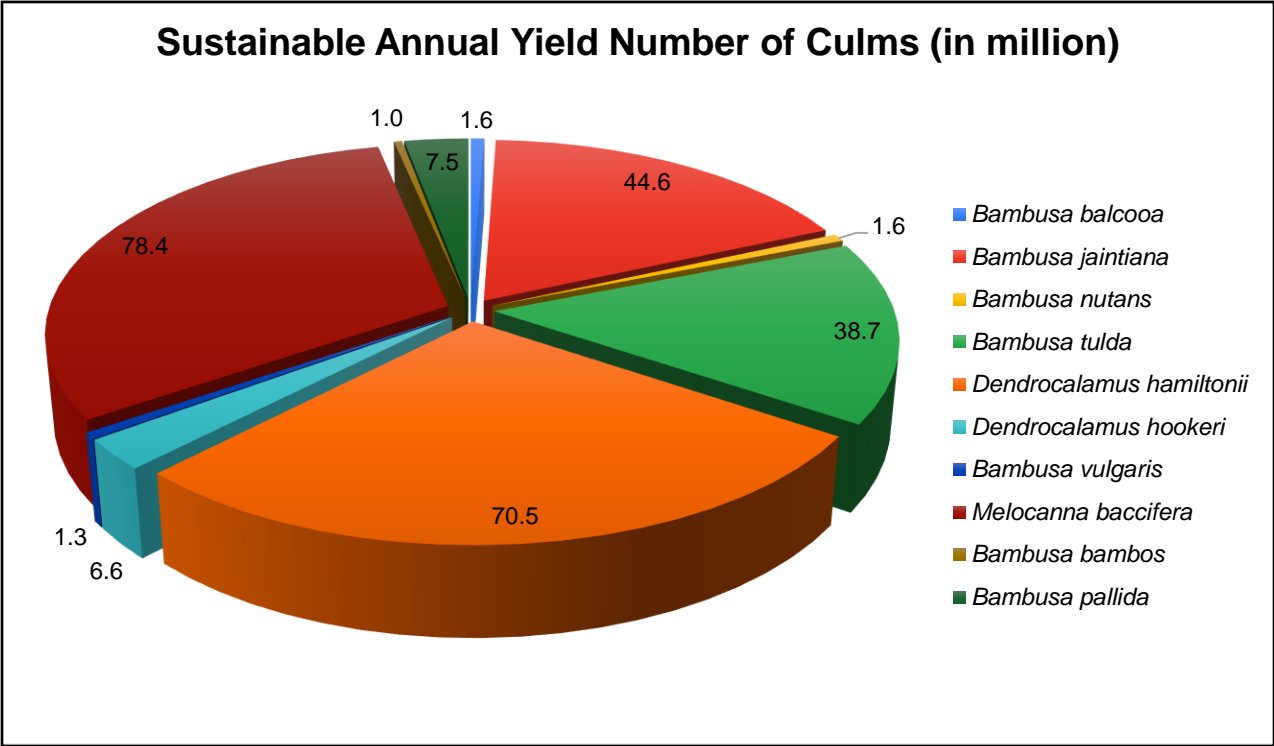


Fig. 10: Sustainable annual yield of culms

6.2.9 Photographs of 10 commercially important bamboo species



Fig. 11: Ccommercially important bamboo species

7. District Wise Estimates of Bamboo Resources

7.1 East Garo Hills

7.1.1 Map of Sample Plots Distribution over different Strata in East Garo Hills

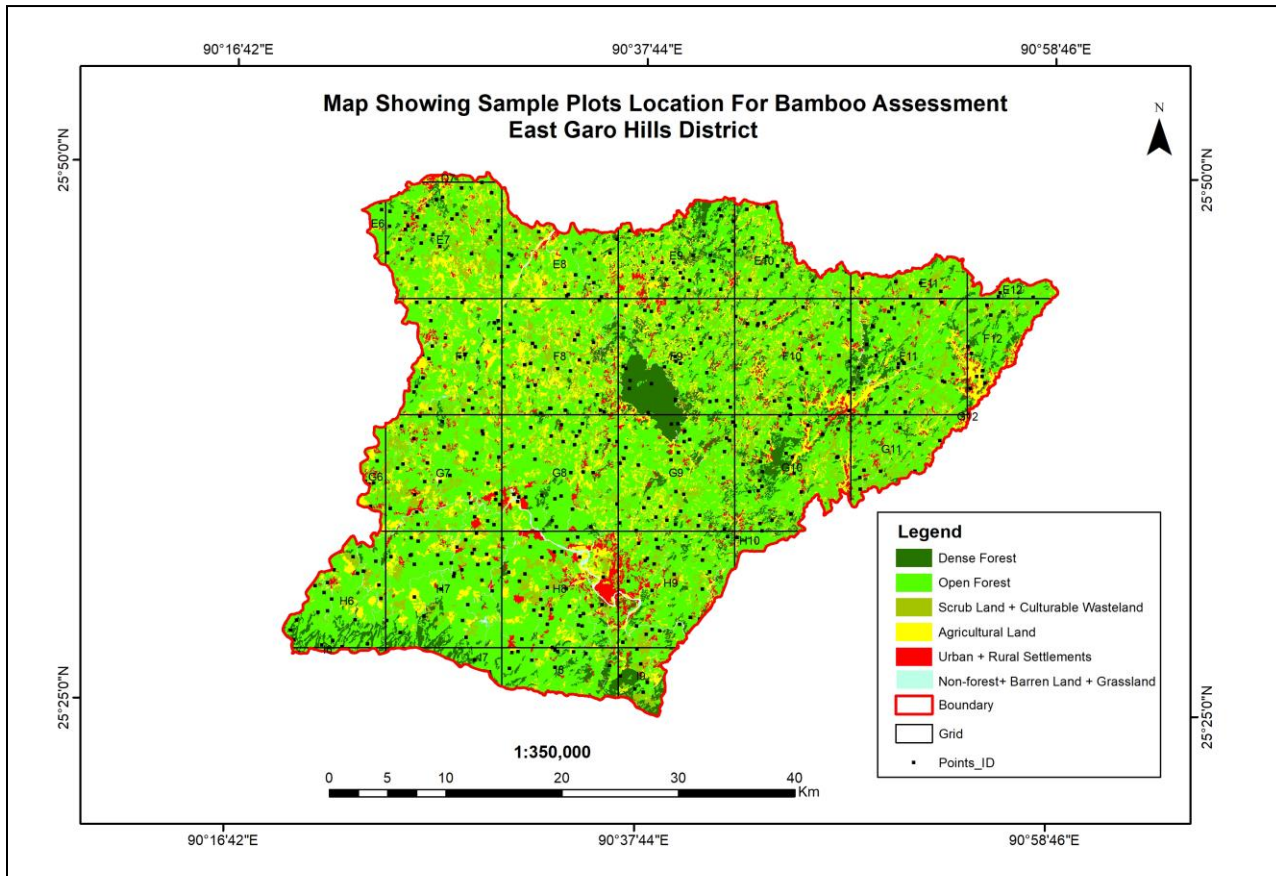


Fig. 12: Sample plot distribution over different strata in East Garo Hills

7.1.2 Bamboo Species found in East Garo Hills

Table 12: Bamboo species found in East Garo Hills

Sl. No.	Botanical Name	Vernacular Name
1	<i>Bambusa balcooa</i>	Borua
2	<i>Bambusa jaintiana</i>	Watebok
3	<i>Bambusa nutans</i>	Wasim
4	<i>Bambusa tulda</i>	Wage
5	<i>Dendrocalamus hamiltonii</i>	Wanok
6	<i>Dendrocalamus sikkimensis</i>	Wada
7	<i>Gigantochloa marostachya</i>	Teksra
8	<i>Melocanna baccifera</i>	Watre
9	<i>Ochlandra scriptoria</i>	Wadro
10	<i>Pseudostachyum polymorphum</i>	Wachal

7.1.3 Species wise Estimates of Number of Culms in East Garo Hills

Table 13: Species-wise estimates of number of culms in East Garo Hills

Clump Forming: Number of culms				
Species	1-15 (cm)	15-30 (cm)	>30 (cm)	Total
<i>Bambusa balcooa</i>	74581	131160	7715	213456
<i>Bambusa jaintiana</i>	508701	5583393	161264	6253358
<i>Bambusa nutans</i>	25718	18002	0	43720
<i>Bambusa tulda</i>	2464442	23932280	800478	27197200
<i>Dendrocalamus hamiltonii</i>	2733021	19954050	979990	23667061
<i>Dendrocalamus sikkimensis</i>	131962	3559819	128210	3819991
<i>Gigantochloa macrostachya</i>	28289	645514	20574	694377
<i>Ochlandra scriptoria</i>	64294	1401614	59151	1525059
Subtotal (A)	6031008	55225832	2157382	63414222
Non-Clump Forming: Number of culms				
<i>Melocanna baccifera</i>				91185199
<i>Pseudostachyum polymorphum</i>				5851455
Subtotal (B)				97063354
Total (A + B)				160450876

Melocanna baccifera is abundant in East Garo Hills with over 91 million culms, followed by *Bambusa tulda* and *D. hamiltonii*. Clump-forming bamboos account for ~39.5% of the total culms while Non-clump-forming bamboos, although fewer in species, account for ~60.5% of total culms.

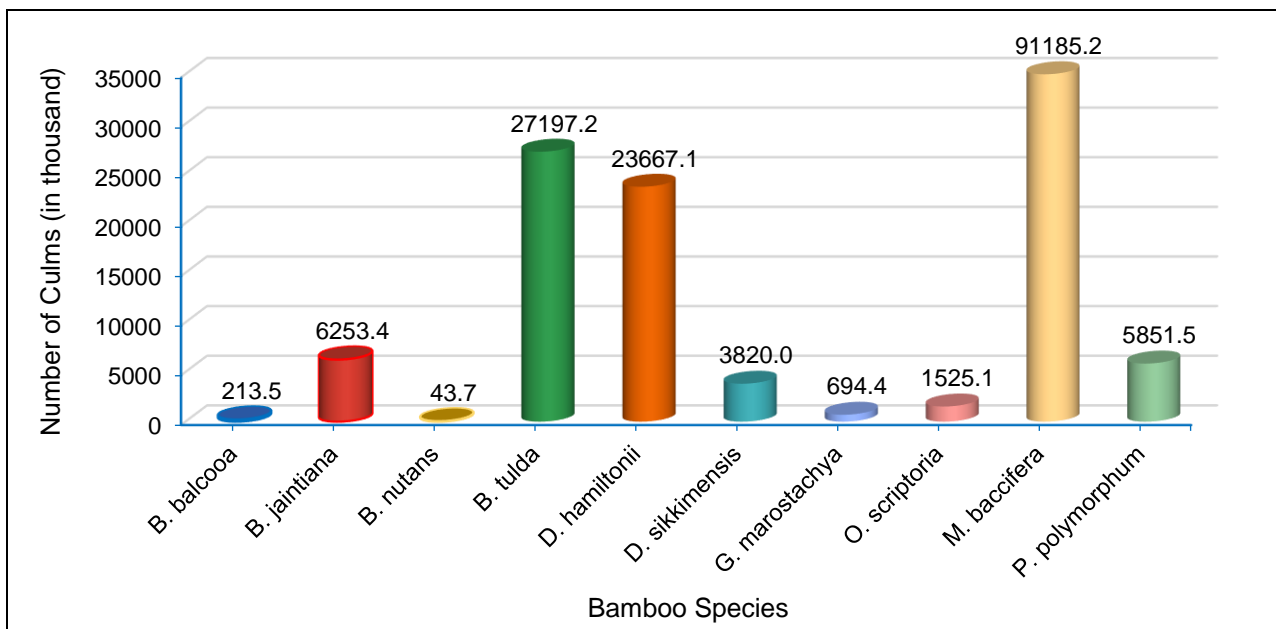


Fig. 13: Species-wise estimates of number of culms in East Garo Hills

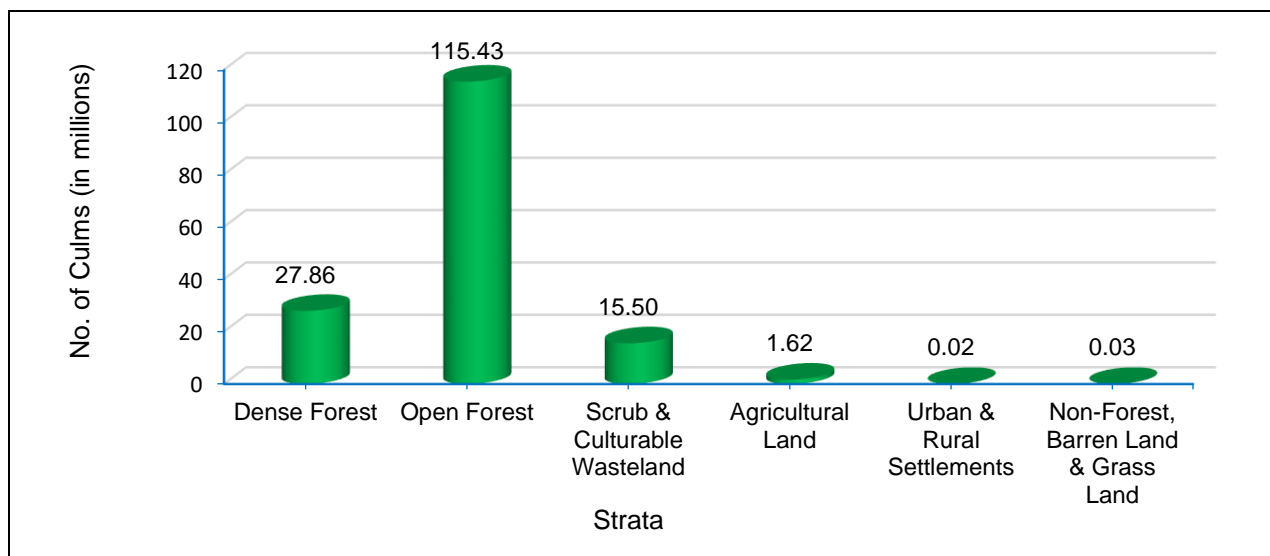


Fig. 14: Strata-wise distribution of number of culms in East Garo Hills

Open Forests are dominant areas for the occurrence of bamboo culms and contribute over 71.9% of total culms across all strata. Dense Forests and Scrub and Wastelands together account for another ~27% of the presence of culms while Non-forest areas (agriculture, urban, barren) accounts for approximately 1%.

7.1.4 Estimated Weight of Culms in East Garo Hills

Table 14: Species wise estimates of weight of culms for all Strata in East Garo Hills

Species	Clump Forming: Weight (in tonnes)						Total	
	1-15 (cm)		15-30 (cm)		>30 (cm)		G W	D W
	G W	D W	G W	D W	G W	D W		
<i>Bambusa balcooa</i>	1244	622	6153	3076	531	265	7928	3964
<i>Bambusa jaintiana</i>	1775	817	54798	25207	2321	1068	58895	27092
<i>Bambusa nutans</i>	153	72	302	142	0	0	456	214
<i>Bambusa tulda</i>	12135	5825	331432	159087	16259	7804	359826	172716
<i>Dendrocalamus hamiltonii</i>	18283	9690	375425	198976	28681	15201	422390	223867
<i>Dendrocalamus sikkimensis</i>	1685	842	127833	63917	6343	3172	135861	67931
<i>Gigantochloa marostachya</i>	216	104	13860	6653	648	311	14724	7068
<i>Ochlandra scriptoria</i>	415	170	25440	10431	1575	646	27430	11246
Subtotal (A)	35906	18142	935244	467489	56358	28467	1027509	514097
Non-Clump Forming: Weight (in tonnes)								
<i>Melocanna baccifera</i>							324036	126374
<i>Pseudostachyum polymorphum</i>							23701	11613
Subtotal (B)							347736	137987
Total (A + B)							1375245	652084

*G: Green Weight; DW: Dry Weight

7.1.5 Sustainably Harvestable Yield in East Garo Hills

Table 15: Sustainably harvestable yield for all strata in East Garo Hills

Sustainably Harvestable Yield (per year)			
Clump Forming			
Species	Number of culms	Weight (in tonnes)	
		G W	D W
<i>Bambusa balcooa</i>	29884	1110	555
<i>Bambusa jaintiana</i>	875470	8245	3793
<i>Bambusa nutans</i>	6121	64	30
<i>Bambusa tulda</i>	3807608	50376	24180
<i>Dendrocalamus hamiltonii</i>	3313389	59135	31341
<i>Dendrocalamus sikkimensis</i>	534799	19021	9510
<i>Gigantochloa macrostachya</i>	97213	2061	989
<i>Ochlandra scriptoria</i>	213508	3840	1574
Subtotal (A)	8877991	143851	71974
Non-Clump Forming			
<i>Melocanna baccifera</i>	12765928	17692	45365
<i>Pseudostachyum polymorphum</i>	819204	1626	3318
Subtotal (B)	13585132	48683	19318
Total (A + B)	22463123	192534	91292

Clump-forming species contribute ~75% of the total sustainably harvestable weight. Annual harvestable dry biomass is over 91,000 tonnes, a critical indicator for sustainable resource planning.

7.1.6 Strata-wise Bamboo Bearing Area in East Garo Hills

Table 16: Strata wise bamboo bearing area in East Garo Hills

Sl. No.	Strata	Bamboo Bearing Area (ha)
1	Dense Forest	3767
2	Open Forest	17258
3	Scrub & Culturable Wasteland	1881
4	Agricultural Land	329
5	Urban & Rural Settlements	1
6	Non-Forest, Barren Land & Grass Land	3
	Total	23239



Photographs of bamboo field inventory in East Garo Hills District

7.2 East Jaintia Hills

7.2.1 Map of Sample Plots Distribution over different Strata in East Jaintia Hills

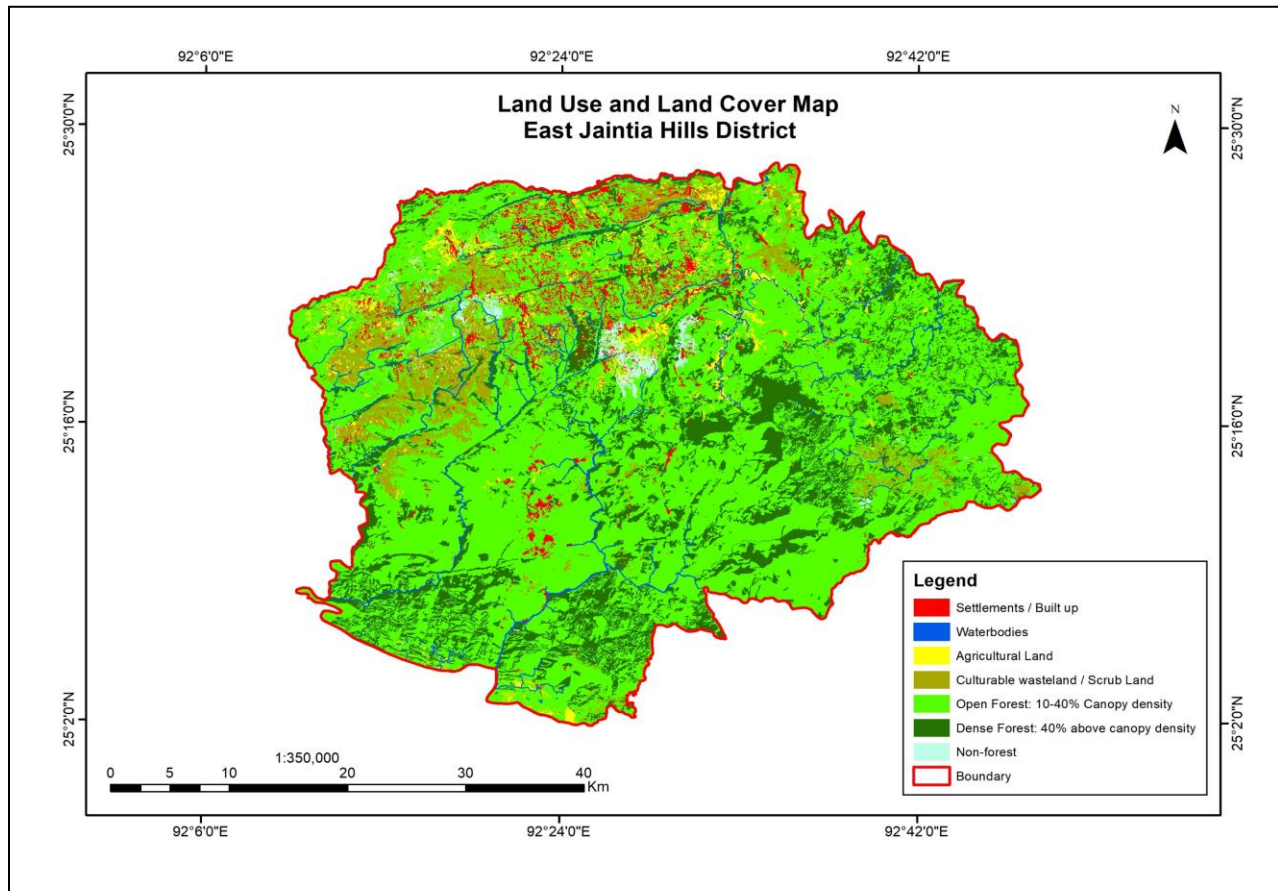


Fig. 15: Sample plot distribution over different Strata in East Jaintia Hills

7.2.2 Bamboo Species found in East Jaintia Hills

Table 17: Bamboo species found in East Jaintia Hills

SI. No.	Botanical Name	Vernacular Name
1.	<i>Bambusa cacharensis</i>	Ba
2.	<i>Bambusa jaintiana</i>	Shken
3.	<i>Bambusa tulda</i>	Rngai
4.	<i>Chimonobambusa callosa</i>	Skong
5.	<i>Dendrocalamus hamiltonii</i>	Siej Lieh
6.	<i>Dendrocalamus hookeri</i>	Siej long
7.	<i>Melocanna baccifera</i>	Rthem
8.	<i>Pseudostachyum polymorphum</i>	Tyra
9.	<i>Schizostachyum dullooa</i>	Siej
10.	<i>Teinostachyum helferi</i>	Tumar

7.2.3 Species wise Estimates of Number of Culms in East Jaintia Hills

Table 18: Species wise estimates of number of culms in East Jaintia Hills

Clump Forming: Number of culms				
Species	1-15 (cm)	15-30 (cm)	>30 (cm)	Total
<i>Bambusa cacharensis</i>	1935630	4051022	188343	6174995
<i>Bambusa jaintiana</i>	61656460	11274161	392460	73323081
<i>Bambusa tulda</i>	8108994	10162413	472286	18743692
<i>Chimonobambusa callosa</i>	293131	135504	0	428635
<i>Dendrocalamus hamiltonii</i>	421684	351128	31602	804414
<i>Dendrocalamus hookeri</i>	98424	187922	31001	317347
<i>Schizostachyum dullooa</i>	15707862	41033275	25292637	82033774
<i>Teinostachyum helferi</i>	277283	0	0	277283
Subtotal (A)	88499467	67195424	26408329	182103220
Non-Clump Forming: Number of culms				
<i>Melocanna baccifera</i>				8029419
<i>Pseudostachyum polymorphum</i>				2615877
Subtotal (B)				10645297
Total (A + B)				192748517

Schizostachyum dullooa showed highest abundance with 82 million culms, making it the most prevalent species. *Bambusa tulda* and *Bambusa jaintiana* follow in abundance with 18.7 million and 7.3 million culms, respectively. Non-clump-forming species, though fewer in diversity, contribute over 10 million culms.

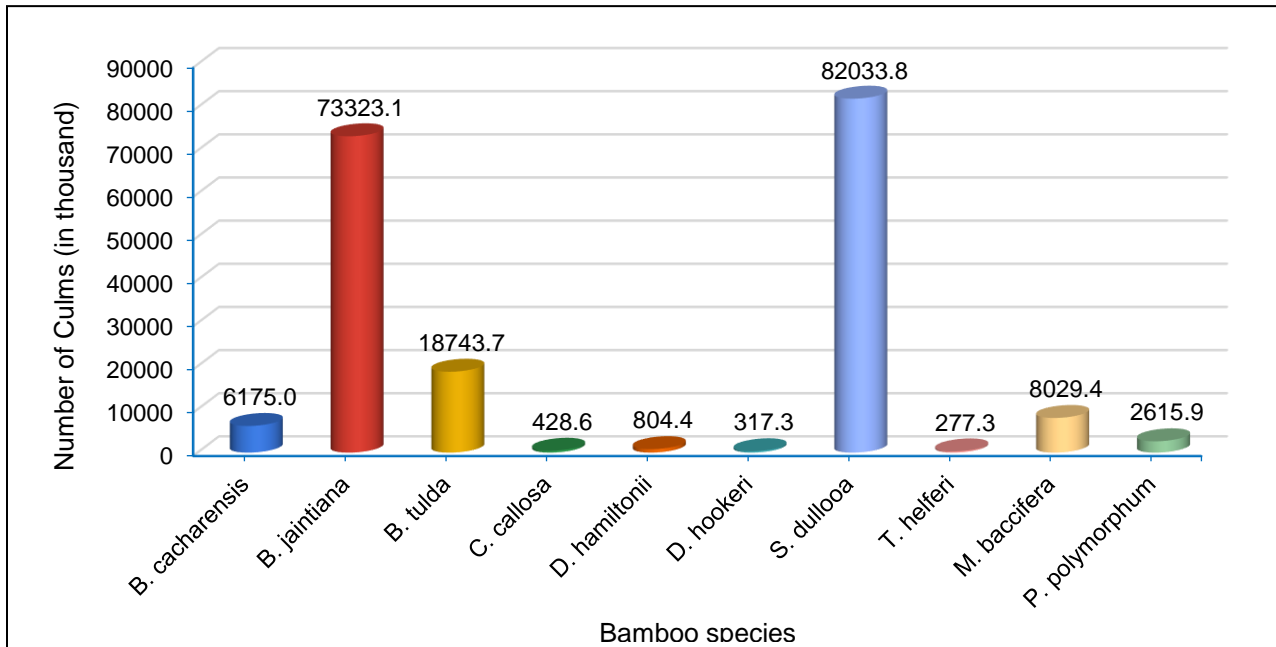


Fig. 16: Species-wise estimates of number of culms in East Jaintia Hills

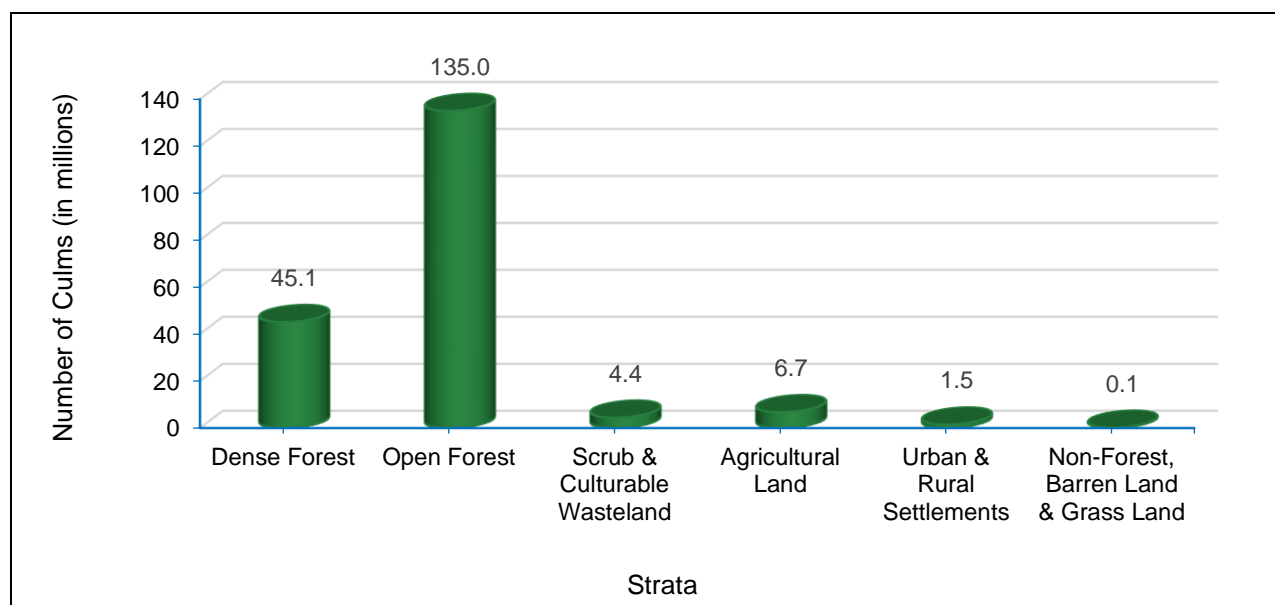


Fig. 17: Strata-wise distribution of number of culms in East Jaintia Hills

Open Forest has the highest bamboo culm population with 135 million culms while the area under Dense Forest is the second major contributor with 45.1 million culms. This distribution emphasizes the importance of forested areas, especially open forests, in bamboo resource availability.

7.2.4 Estimated Weight of Culms in East Jaintia Hills

Table 19: Estimated weight of culms in East Jaintia Hills

Species	Clump Forming: Weight (in tonnes)						Total	
	1-15 (cm)		15-30 (cm)		>30 (cm)		G W	D W
	G W	D W	G W	D W	G W	D W		
<i>Bambusa cacharensis</i>	8816	5642	51891	33210	3538	2265	64245	41117
<i>Bambusa jaintiana</i>	215156	98972	110650	50899	5649	2599	331456	152470
<i>Bambusa tulda</i>	39929	19166	140737	67554	9593	4605	190258	91324
<i>Chimonobambusa callosa</i>	2646	1376	3441	1789	0	0	6087	3165
<i>Dendrocalamus hamiltonii</i>	2821	1495	6606	3501	925	490	10352	5487
<i>Dendrocalamus hookeri</i>	566	339	3037	1822	735	441	4337	2602
<i>Schizostachyum dullooa</i>	56674	32871	416385	241503	376430	218330	849489	492704
<i>Teinostachyum helferi</i>	1874	525	0	0	0	0	1874	525
Subtotal (A)	328481	160386	732746	400279	396870	228728	1458098	789393
Non-Clump Forming: Weight (in tonnes)								
<i>Melocanna baccifera</i>							28533	11128
<i>Pseudostachyum polymorphum</i>							10595	5192
Subtotal (B)							39129	16320
Total (A + B)							1497227	805713

7.2.5 Sustainably Harvestable Yield in East Jaintia Hills

Table 20: Sustainably harvestable yield for all strata in East Jaintia Hills

Sustainably Harvestable Yield (per year)			
Clump Forming			
Species	Number of culms	Weight (in tonnes)	
		G W	D W
<i>Bambusa cacharensis</i>	864499	8994	5756
<i>Bambusa jaintiana</i>	10265231	46404	21346
<i>Bambusa tulda</i>	2624117	26636	12785
<i>Chimonobambusa callosa</i>	60009	852	443
<i>Dendrocalamus hamiltonii</i>	112618	1449	768
<i>Dendrocalamus hookeri</i>	44429	607	364
<i>Schizostachyum dullooa</i>	11484728	118929	68979
<i>Teinostachyum helferi</i>	38820	262	73
Subtotal (A)	25494451	204134	110515
Non-Clump Forming			
<i>Melocanna baccifera</i>	1124119	3995	1558
<i>Pseudostachyum polymorphum</i>	366223	1483	727
Subtotal (B)	1490342	5478	2285
Total (A + B)	26984793	209612	112800

An approximate of 26 million culms with Green Weight of 209,612 tonnes is the annual Sustainably Harvestable Yield for bamboo resources in East Jaintia Hills. This highlights that the dominant species in terms of sustainable harvest yield (both weight and number of culms) is *Schizostachyum dullooa*, followed by *Bambusa jaintiana* and *Bambusa tulda*.

7.2.6 Strata-wise Bamboo Bearing Area in East Jaintia Hills

Table 21: Strata wise bamboo bearing area in East Jaintia Hills

Sl. No.	Strata	Bamboo Bearing Area (ha)
1	Dense Forest	8245
2	Open Forest	31057
3	Scrub & Culturable Wasteland	1560
4	Agricultural Land	1257
5	Urban & Rural Settlements	271
6	Non-Forest, Barren Land & Grass Land	44
	Total	42436



Photographs of bamboo field inventory in East Jaintia Hills District

7.3 East Khasi Hills

7.3.1 Map of Sample Plots Distribution over different Strata in East Khasi Hills

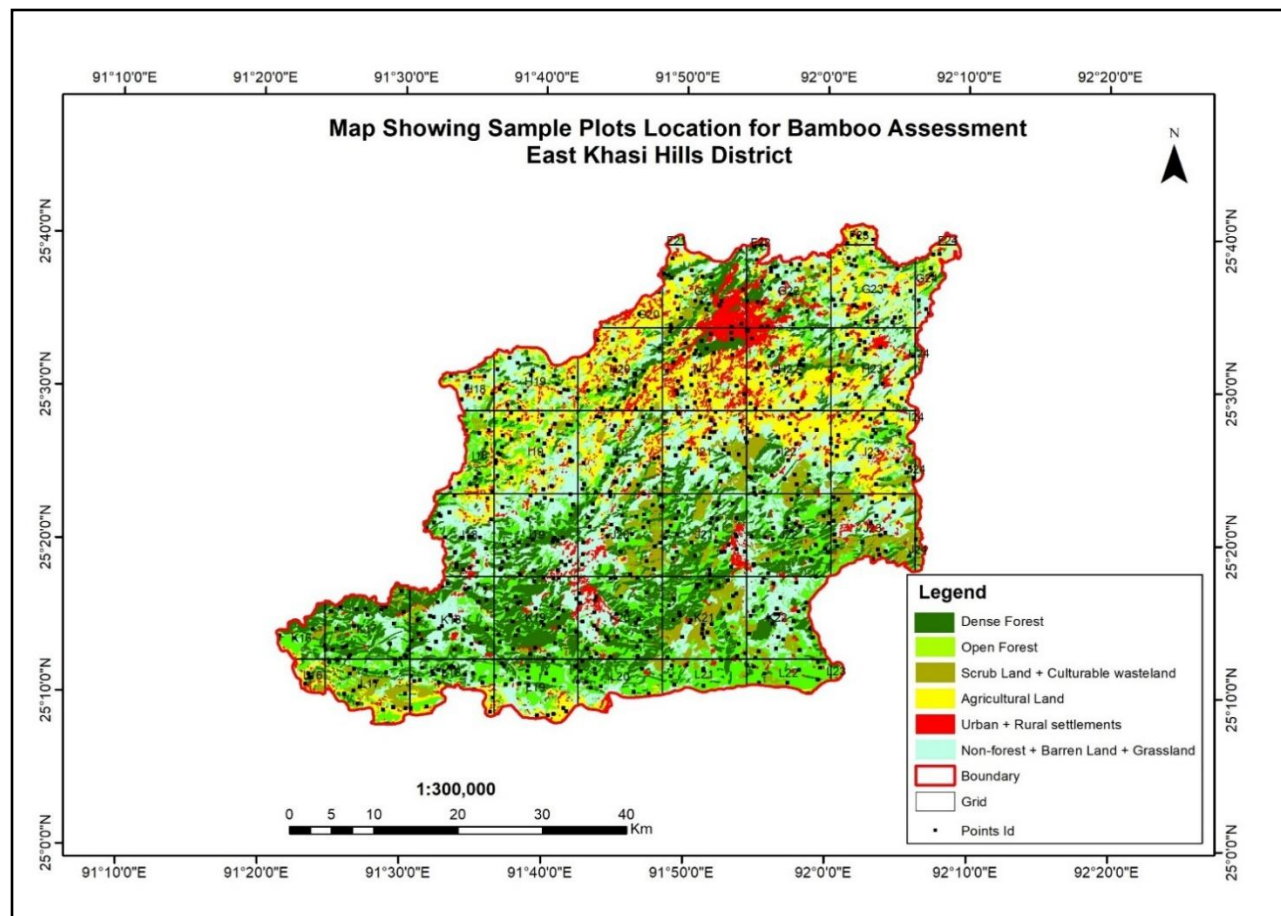


Fig. 18: Sample plot distribution in East Khasi Hills

7.3.2 Bamboo Species found in East Khasi Hills

Table 22: Bamboo species found in East Khasi Hills

Sl. No.	Botanical Name	Vernacular Name
1.	<i>Bambusa balcooa</i>	Burua
2.	<i>Bambusa cacharensis</i>	Dkhar
3.	<i>Bambusa jaintiana</i>	Shken
4.	<i>Bambusa pseudopallida</i>	Wahminang
5.	<i>Bambusa tulda</i>	Rngai
6.	<i>Bambusa vulgaris</i>	Burabas
7.	<i>Cephalostachyum capitatum</i>	Hylloi
8.	<i>Chimonobambusa callosa</i>	Spar Khlaw/ Skong
9.	<i>Dendrocalamus hamiltonii</i>	Lieh/ Bri/ Bam
10.	<i>Dendrocalamus hookeri</i>	Ktang/ long/ Bah
11.	<i>Dendrocalamus sahnii</i>	Tawang

12	<i>Schizostachyum dullooa</i>	Siej
13	<i>Sinarundinaria falcata</i>	Kdait
14	<i>Teinostachyum dullooa</i>	Muroi (Wahthri)/ Dongum/ Bangla
15	<i>Melocanna baccifera</i>	Rtem/ Muri/ Muli
16	<i>Phyllostachys mannii</i>	Naga
17	<i>Pseudostachyum polymorphum</i>	Tyr-a

7.3.3 Species wise Estimates of Number of Culms in East Khasi Hills

Table 23: Species wise estimates of number of culms in East Khasi Hills

Clump Forming: Number of culms				
Species	1-15 (cm)	15-30 (cm)	>30 (cm)	Total
<i>Bambusa balcooa</i>	169184	16766	0	185950
<i>Bambusa cacharensis</i>	123291	221422	16766	361480
<i>Bambusa jaintiana</i>	36352749	7412906	268256	44033911
<i>Bambusa pseudopallida</i>	234724	185950	76209	496884
<i>Bambusa tulda</i>	4067505	7120479	484690	11672674
<i>Bambusa vulgaris</i>	106693	111265	57919	275877
<i>Cephalostachyum capitatum</i>	413054	0	0	413054
<i>Chimonobambusa callosa</i>	2065148	3961771	714593	6741511
<i>Dendrocalamus hamiltonii</i>	2808825	4733488	1000752	8543065
<i>Dendrocalamus hookeri</i>	5535476	10951999	6081369	22568843
<i>Dendrocalamus sahnii</i>	920557	472614	0	1393171
<i>Schizostachyum dullooa</i>	166067	764228	0	930295
<i>Sinarundinaria falcata</i>	307885	0	0	307885
<i>Teinostachyum dullooa</i>	563255	355765	0	919019
Subtotal (A)	53834412	36308652	8700554	98843619
Non-Clump Forming: Number of culms				
<i>Melocanna baccifera</i>				870017
<i>Phyllostachys mannii</i>				121471149
<i>Pseudostachyum polymorphum</i>				2500557
Subtotal (B)				124841723
Total (A + B)				223685341

As indicated in Table 21, the Total Number of Culms is approximately 2.24 billion. This dataset indicates that *Phyllostachys mannii* alone dominates the total culm count, accounting for over 1.2 billion culms, making it the most abundant bamboo species in East Khasi Hills.

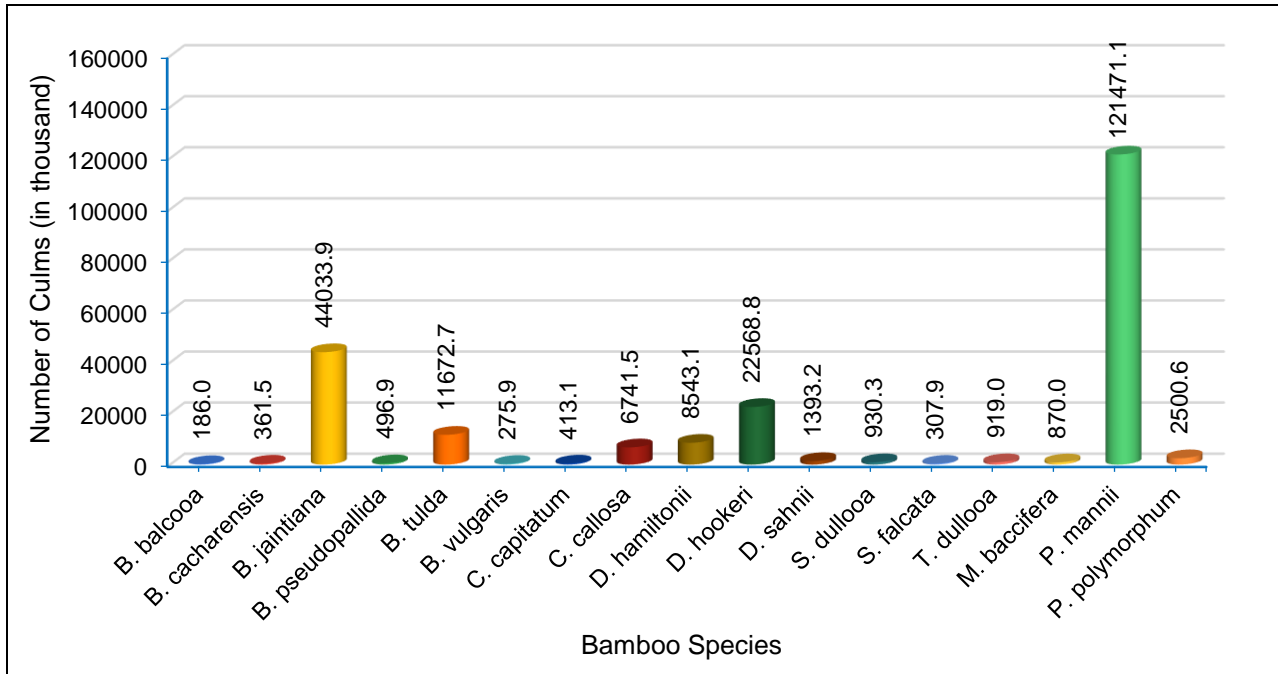


Fig. 19: Species-wise estimates of number of culms in East Khasi Hills

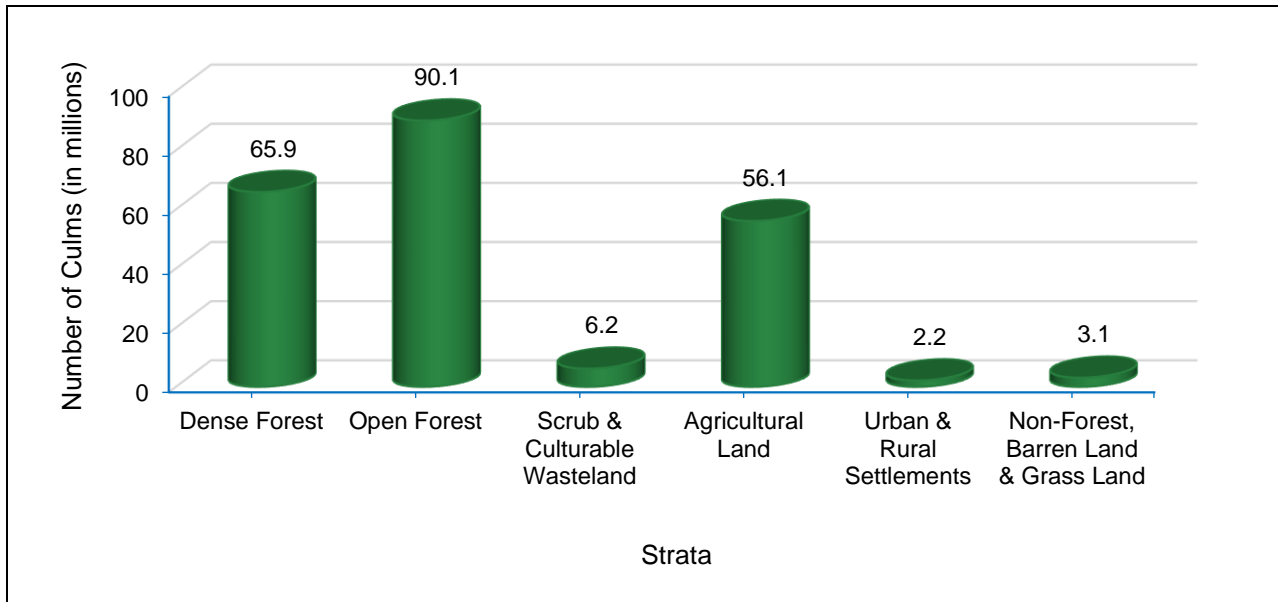


Fig. 20: Strata-wise distribution of number of culms in East Khasi Hills

Open Forest has the highest bamboo culm count (90 million), followed by Dense Forest (66 million). Urban/Rural Settlements, Grassland, etc. contribute small fractions to total bamboo presence.

7.3.4 Estimated Weight of Culms in East Khasi Hills

Table 24: Estimated weight of culms in East Khasi Hills

Species	Clump Forming: Weight (in tonnes)						Total		
	1-15 (cm)		15-30 (cm)		>30 (cm)		G W	D W	
	G W	D W	G W	D W	G W	D W			
<i>Bambusa balcooa</i>	2822	1411	786	393	0	0	3608	1804	
<i>Bambusa cacharensis</i>	562	359	2836	1815	315	202	3713	2376	
<i>Bambusa jaintiana</i>	126857	58354	72754	33467	3861	1776	203472	93597	
<i>Bambusa pseudopallida</i>	1788	912	3983	2032	2394	1221	8166	4165	
<i>Bambusa tulda</i>	20028	9614	98610	47333	9845	4725	128483	61672	
<i>Bambusa vulgaris</i>	1443	548	4231	1608	3230	1228	8904	3384	
<i>Cephalostachyum capitatum</i>	1057	581	0	0	0	0	1057	581	
<i>Chimonobambusa callosa</i>	18644	9695	100594	52309	26612	13838	145850	75842	
<i>Dendrocalamus hamiltonii</i>	18790	9959	89058	47201	29289	15523	137137	72683	
<i>Dendrocalamus hookeri</i>	31805	19083	176979	106187	144132	86479	352916	211749	
<i>Dendrocalamus sahnii</i>	3500	2065	5053	2981	0	0	8553	5046	
<i>Schizostachyum dullooa</i>	599	348	7755	4498	0	0	8354	4845	
<i>Sinarundinaria falcata</i>	1591	716	0	0	0	0	1591	716	
<i>Teinostachyum dullooa</i>	5837	2743	10369	4874	0	0	16206	7617	
Subtotal (A)	235321	116387	573010	304697	219679	124993	1028010	546077	
Non-Clump Forming: Weight (in tonnes)									
<i>Melocanna baccifera</i>							3092	1206	
<i>Phyllostachys mannii</i>							400758	200379	
<i>Pseudostachyum polymorphum</i>							10128	4963	
Subtotal (B)							39129	16320	
Total (A + B)							413978	206547	

7.3.5 Sustainably Harvestable Yield in East Khasi Hills

Table 25: Sustainably harvestable yield for all strata in East Khasi Hills

Species	Number of culms	Clump Forming	
		Weight (in tonnes)	
		G W	D W
<i>Bambusa balcooa</i>	26033	505	253
<i>Bambusa cacharensis</i>	50607	520	333
<i>Bambusa jaintiana</i>	6164748	28486	13104
<i>Bambusa pseudopallida</i>	69564	1143	583
<i>Bambusa tulda</i>	1634174	17988	8634
<i>Bambusa vulgaris</i>	38623	1247	474
<i>Cephalostachyum capitatum</i>	57828	148	81
<i>Chimonobambusa callosa</i>	943812	20419	10618
<i>Dendrocalamus hamiltonii</i>	1196029	19199	10176
<i>Dendrocalamus hookeri</i>	3159638	49408	29645
<i>Dendrocalamus sahnii</i>	195044	1197	706
<i>Schizostachyum dullooa</i>	130241	1170	678
<i>Sinarundinaria falcata</i>	43104	223	0
<i>Teinostachyum dullooa</i>	128663	2269	1066
Subtotal (A)	13838107	143921	76351

Non-Clump Forming			
Species	Number of culms	Weight (in tonnes)	
		G W	D W
<i>Melocanna baccifera</i>	121802	433	169
<i>Phyllostachys mannii</i>	17005961	56106	28053
<i>Pseudostachyum polymorphum</i>	350078	1418	695
Subtotal (B)	17477841	57957	28917
Total (A + B)	31315948	201878	105268

Approximately 31 million culms is the annual Sustainably Harvestable Yield for bamboo resources in East Khasi Hills. This highlights that the dominant species in terms of sustainable harvest yield (both weight and number of culms) is *Phyllostachys mannii* followed by *Bambusa jaintiana* and *Bambusa tulda*.

7.3.6 Strata-wise Bamboo Bearing Area in East Khasi Hills

Table 26: Strata wise bamboo bearing area in East Khasi Hills

Sl. No.	Strata	Bamboo Bearing Area (ha)
1	Dense Forest	16235
2	Open Forest	30262
3	Scrub & Culturable Wasteland	2146
4	Agricultural Land	10628
5	Urban & Rural Settlements	442
6	Non-Forest, Barren Land & Grass Land	1565
	Total	61278



Photographs of bamboo field inventory in East Khasi Hills District

7.4 North Garo Hills

7.4.1 Map of Sample Plots Distribution over different Strata in North Garo Hills

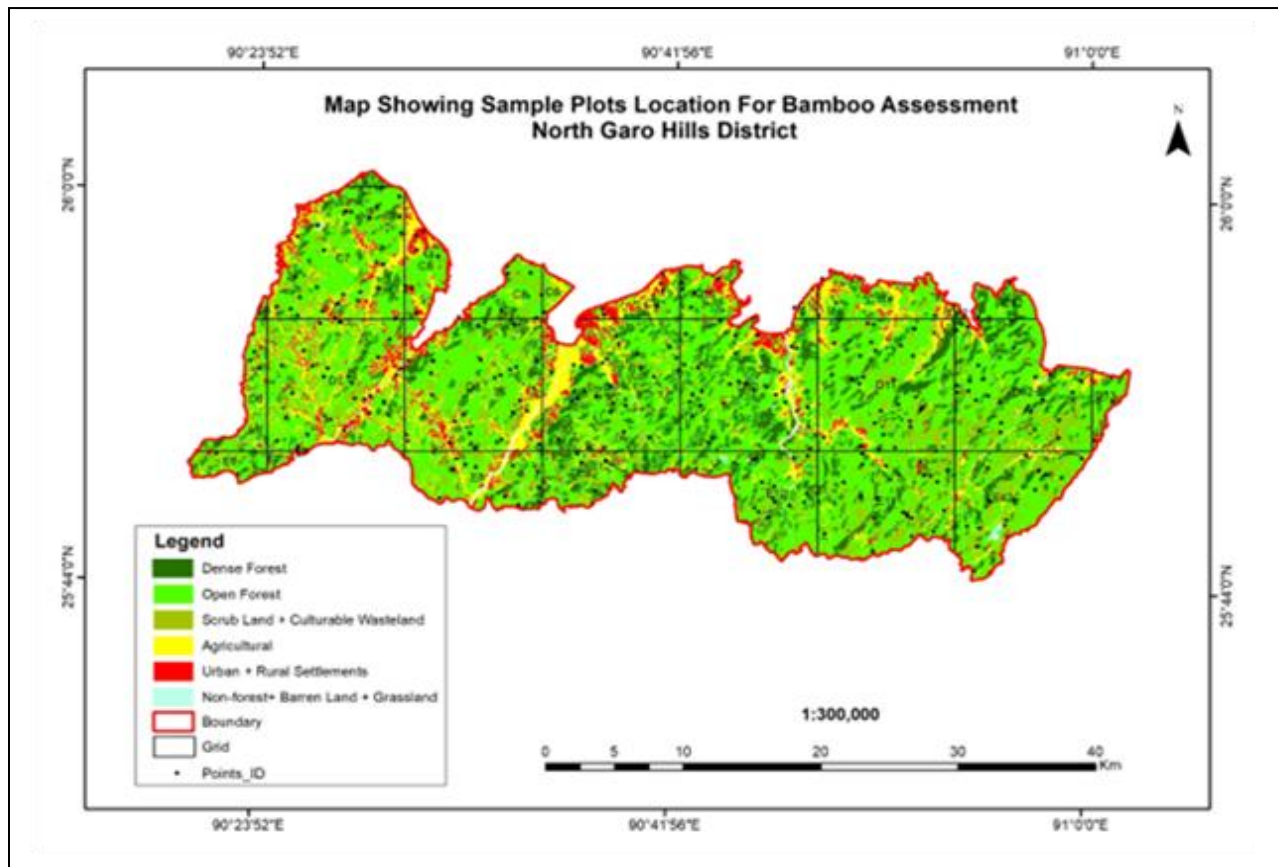


Fig. 21: Sample plot distribution in North Garo Hills

7.4.2 Bamboo Species found in North Garo Hills

Table 27: Bamboo species found in North Garo Hills

Sl. No.	Botanical Name	Vernacular Name
1.	<i>Bambusa jaintiana</i>	Watesa/ Kolongi/ Watibok/ Wabok
2.	<i>Bambusa nutans</i>	Wasim
3.	<i>Bambusa tulda</i>	Wage
4.	<i>Bambusa vulgaris</i>	Wanaru
5.	<i>Dendrocalamus hamiltonii</i>	Wanok
6.	<i>Gigantochloa marostachya</i>	Teksra
7.	<i>Ochlandra scriptoria</i>	Wadro
8.	<i>Teinostachyum helferi</i>	Wali/ Tumar/ Tuna
9.	<i>Melocanna baccifera</i>	Watre

7.4.3 Species wise Estimates of Number of Culms in North Garo Hills

Table 28: Species wise estimates of number of culms in North Garo Hills

Clump Forming: Number of culms				
Species	1-15 (cm)	15-30 (cm)	>30 (cm)	Total
<i>Bambusa jaintiana</i>	4515652	1309454	38261	5863366
<i>Bambusa nutans</i>	19130	64348	0	83478
<i>Bambusa tulda</i>	6334138	16085077	332838	22752052
<i>Bambusa vulgaris</i>	158302	439719	57878	655899
<i>Dendrocalamus hamiltonii</i>	11238971	17773848	1687186	30700005
<i>Gigantochloa macrostachya</i>	48696	55652	0	104348
<i>Ochlandra scriptoria</i>	422322	239956	31994	694272
<i>Teinostachyum helferi</i>	57589	147173	0	204762
Subtotal (A)	22794800	36115226	2148156	61058183
Non-Clump Forming: Number of culms				
<i>Melocanna baccifera</i>				75807371
Subtotal (B)				75807371
Total (A + B)				136865553

Melocanna baccifera showed highest abundance with more than 75 million culms, making it the most prevalent species. *Bambusa tulda* and *Dendrocalamus hamiltonii* follow in abundance with more than 30 million and 22 million culms, respectively.

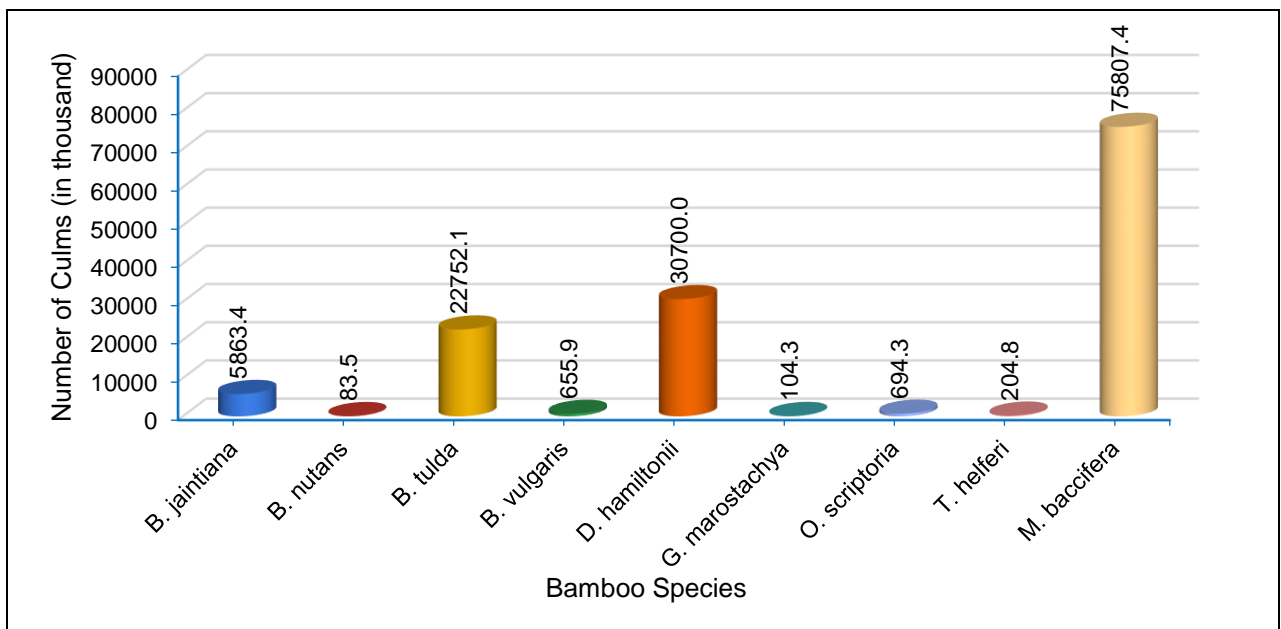


Fig. 22: Species wise estimates of number of culms in North Garo Hills

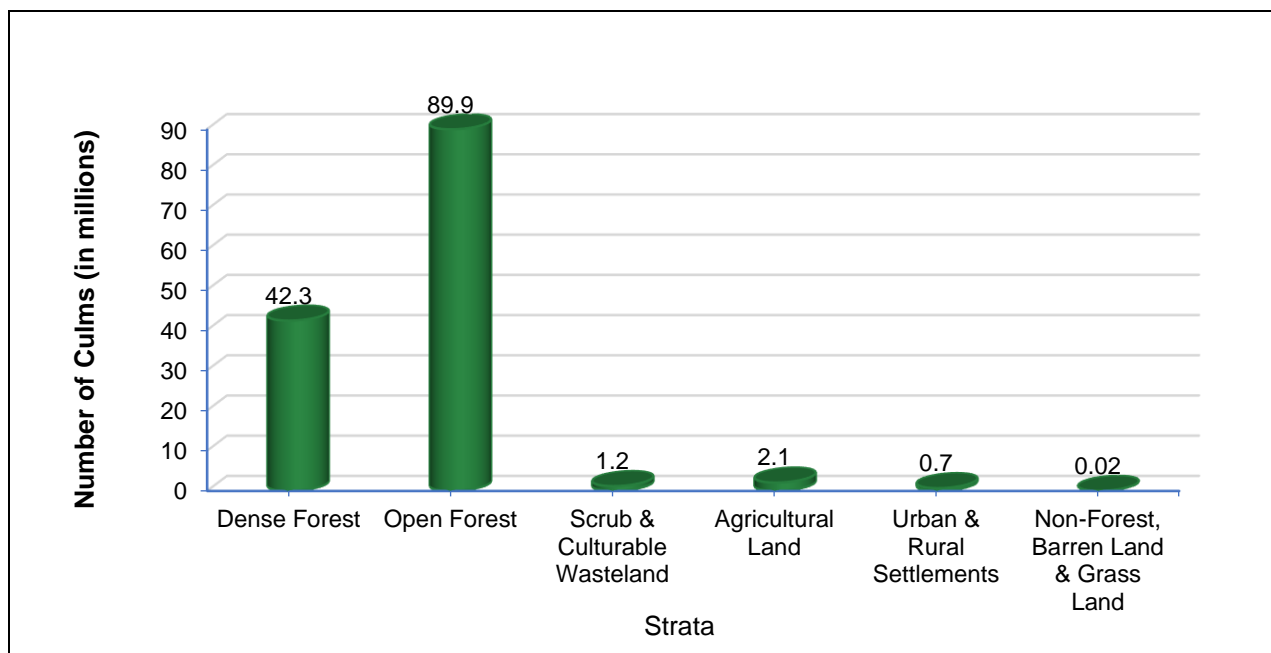


Fig. 23: Strata-wise distribution of the number of culms in North Garo Hills

Open Forest has the highest bamboo culm count (90 million approximately), followed by Dense Forest (42.3 million). The remaining strata showed a cumulative presence of approximately 4 million bamboo culms in the district.

7.4.4 Estimated Weight of Culms in North Garo Hills

Table 29: Estimated weight of culms in North Garo Hills

Species	Clump Forming: Weight (in tonnes)						Total	
	1-15 (cm)		15-30 (cm)		>30 (cm)		G W	D W
	G W	D W	G W	D W	G W	D W		
<i>Bambusa jaintiana</i>	15758	7249	12852	5912	551	253	29160	13414
<i>Bambusa nutans</i>	114	54	1080	508	0	0	1194	561
<i>Bambusa tulda</i>	31189	14971	222758	106924	6760	3245	260708	125140
<i>Bambusa vulgaris</i>	2140	813	16721	6354	3228	1227	22090	8394
<i>Dendrocalamus hamiltonii</i>	75184	39848	334406	177235	49379	26171	458969	243254
<i>Gigantochloa macrostachya</i>	372	178	1195	574	0	0	1567	752
<i>Ochlandra scriptoria</i>	2725	1117	4355	1786	852	349	7933	3252
<i>Teinostachyum helferi</i>	389	109	2797	783	0	0	3186	892
Subtotal (A)	127872	64339	596164	300075	60770	31245	784806	395659
Non-Clump Forming: Weight (in tonnes)								
<i>Melocanna baccifera</i>							269389	105062
Subtotal (B)							269389	105062
Total (A + B)							1054195	500721

7.4.5 Sustainably Harvestable Yield in North Garo Hills

Table 30: Sustainably harvestable yield for all strata in North Garo Hills

Clump Forming			
Species	Number of culms	Weight (in tonnes)	
		G W	D W
<i>Bambusa jaintiana</i>	820871	4082	1878
<i>Bambusa nutans</i>	11687	167	79
<i>Bambusa tulda</i>	3185287	36499	17520
<i>Bambusa vulgaris</i>	91826	3093	1175
<i>Dendrocalamus hamiltonii</i>	4298001	64256	34056
<i>Gigantochloa macrostachya</i>	14609	219	105
<i>Ochlandra scriptoria</i>	97198	1111	455
<i>Teinostachyum helferi</i>	28667	446	125
Subtotal (A)	8548146	109873	55392
Non-Clump Forming			
<i>Melocanna baccifera</i>	10613032	37714	14331
Subtotal (B)	10613032	37714	14331
Total (A + B)	19161178	147587	69723

It was estimated that approximately 19 million culms is the annual Sustainably Harvestable Yield for bamboo resources in North Garo Hills. This estimation also indicated that the dominant species in terms of sustainable harvest yield (both weight and number of culms) is *Melocanna baccifera* followed by *Dendrocalamus hookeri* and *Bambusa tulda*

7.4.6 Strata-wise Bamboo Bearing Area in North Garo Hills

Table 31: Strata wise bamboo bearing area in North Garo Hills

Sl. No.	Strata	Bamboo Bearing Area (ha)
1	Dense Forest	5718
2	Open Forest	17813
3	Scrub & Culturable Wasteland	270
4	Agricultural Land	513
5	Urban & Rural Settlements	112
6	Non-Forest, Barren Land & Grass Land	5
	Total	24429



Photographs of bamboo field inventory in North Garo Hills District

7.5 Ri - Bhoi

7.5.1 Map of Sample Plots Distribution over different Strata in Ri-Bhoi

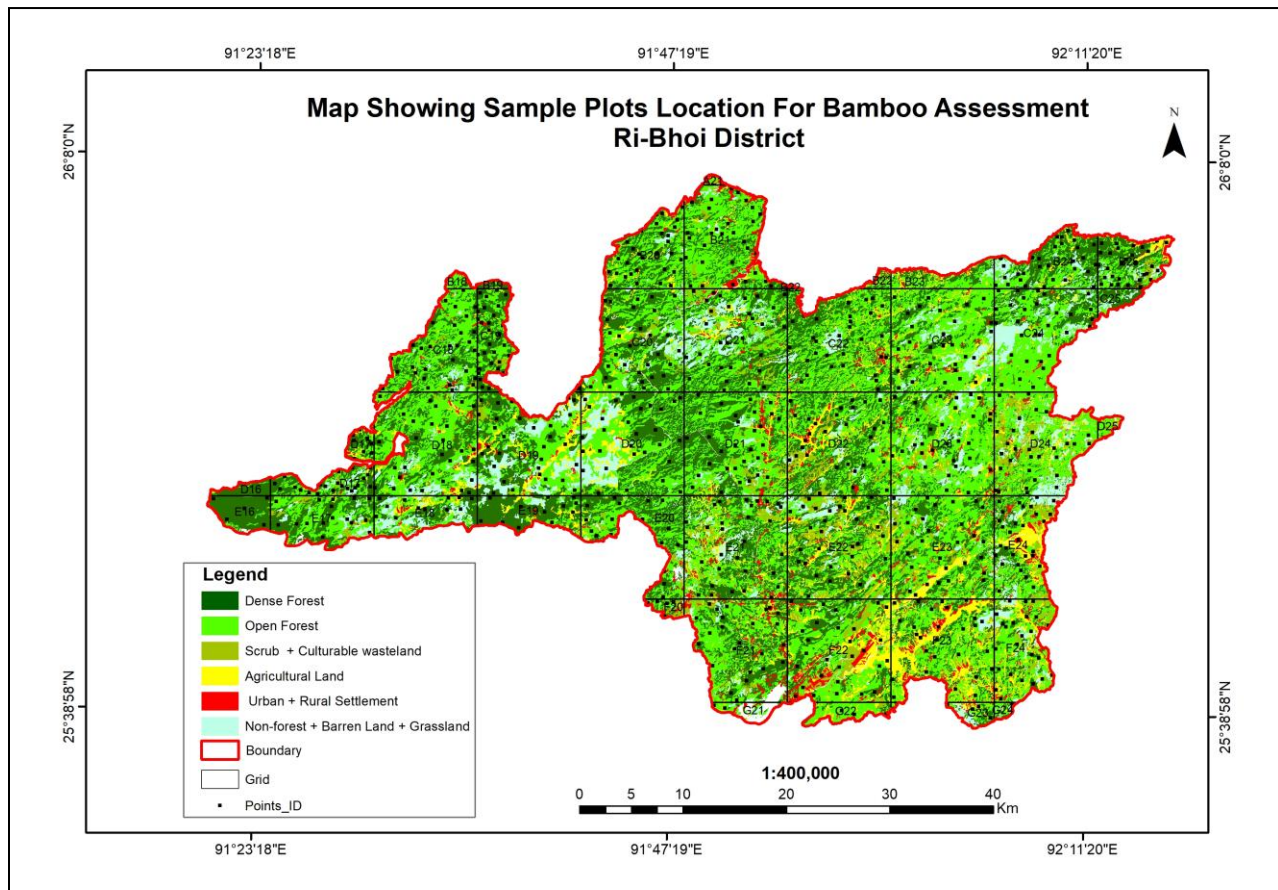


Fig. 24: Sample plots distribution over different strata in Ri –Bhoi

7.5.2 Bamboo Species found in Ri-Bhoi

Table 32: Bamboo species found in Ri Bhoi

SI. No.	Botanical Name	Vernacular Name
1.	<i>Bambusa jaintiana</i>	Skhen
3.	<i>Bambusa polymorpha</i>	Siej Braw
2.	<i>Bambusa tulda</i>	Rniai
4.	<i>Dendrocalamus hamiltonii</i>	Siej Khlaw/ Siej Lieh
7.	<i>Dendrocalamus hookeri</i>	Siej Bah
5.	<i>Melocanna baccifera</i>	Siej Tyrlaw
6.	<i>Teinostachyum dullooa</i>	Siej La
7.	<i>Melocanna baccifera</i>	Siej Trylaw

7.5.3 Species wise Estimates of Number of Culms in Ri-Bhoi

Table 33: Species wise estimates of number of culms in Ri-Bhoi

Clump Forming: Number of Culms				
Species	1-15 (cm)	15-30 (cm)	>30 (cm)	Total
<i>Bambusa jaintiana</i>	1104669	1133903	194823	2433394
<i>Bambusa polymorpha</i>	29744	17846	0	47590
<i>Bambusa tulda</i>	17874215	17375760	3330570	38580545
<i>Dendrocalamus hamiltonii</i>	47967994	52853177	18100556	118921727
<i>Dendrocalamus hookeri</i>	377127	627148	244458	1248733
<i>Teinostachyum dullooa</i>	636215	269168	0	905383
Subtotal (A)	67989963	72277002	21870408	162137373
Non – Clump Forming: Number of Culms				
<i>Melocanna baccifera</i>				696741
Subtotal (B)				696741
Total (A + B)				162834115

More than 118 million culms of *Dendrocalamus hamiltonii* were estimated to be present in Ri Bhoi making this species the most dominant bamboo species. The total number of culms for both the Clump Forming and Non-Clump Forming bamboo species was estimated to be more than 162 million culms in the district

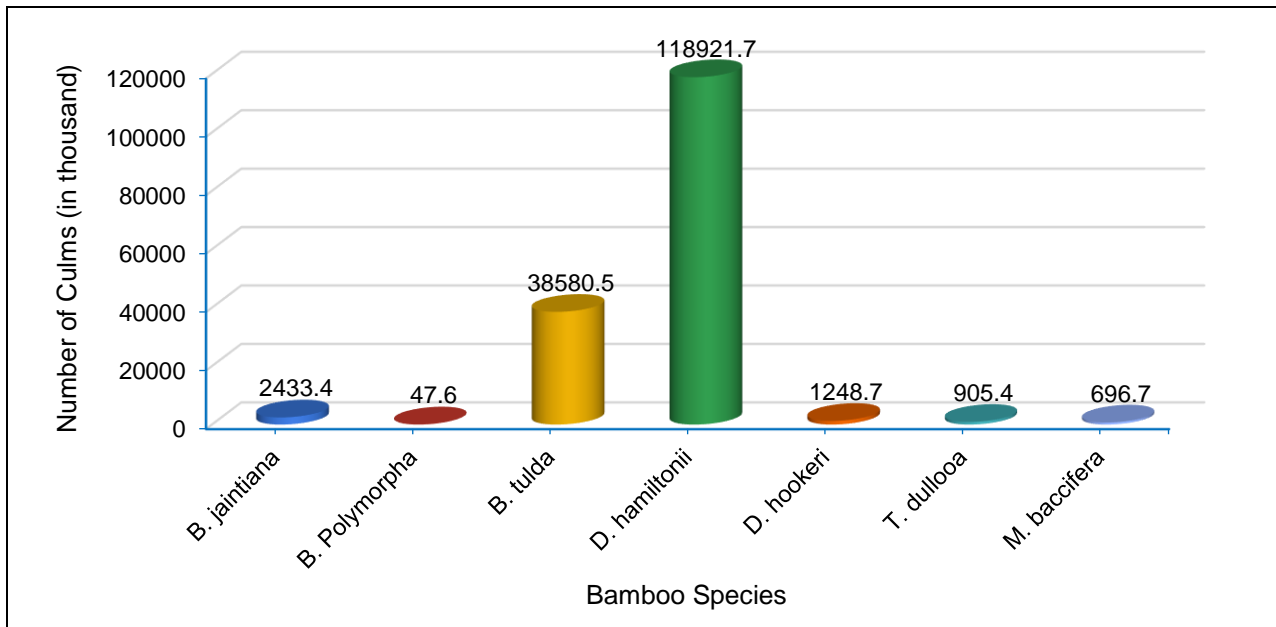


Fig. 25: Species wise estimates of number of culms in Ri-Bhoi

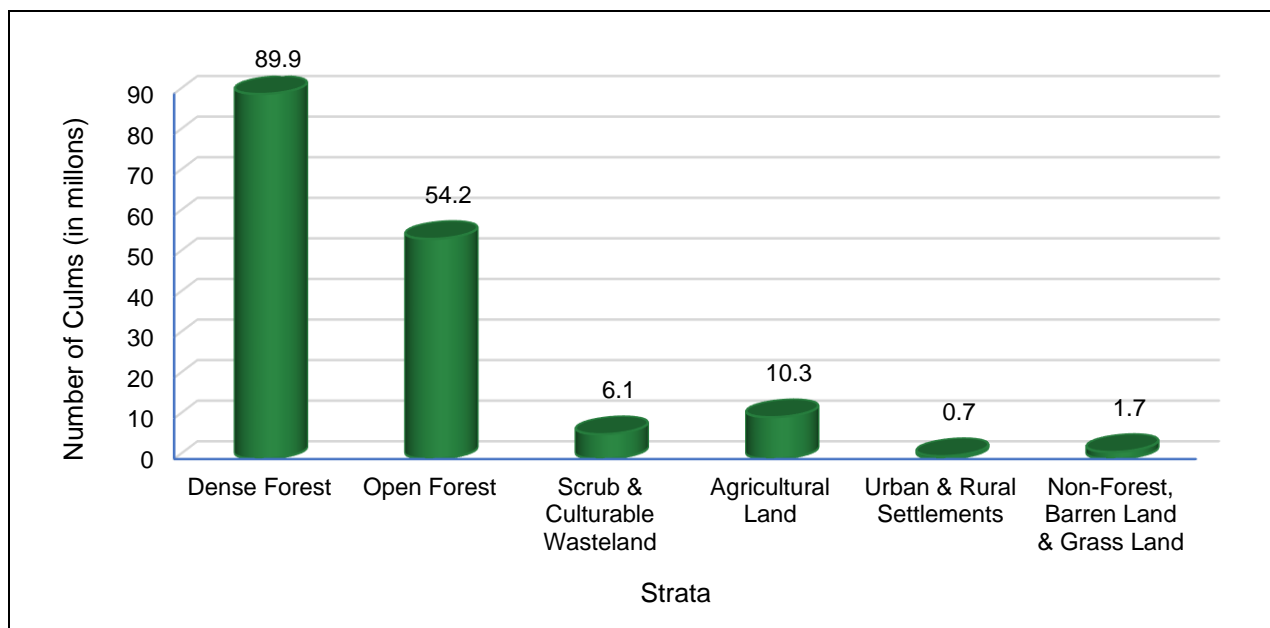


Fig. 26: Strata-wise distribution of the number of culms in Ri-Bhoi

Dense Forest has the highest occurrence of bamboo culm count (90 million approximately), followed by Open Forest (54.2 million). The remaining strata indicated the presence of approximately 19 million culms.

7.5.4 Estimated Weight of Culms in Ri-Bhoi

Table 34: Estimated weight of culms in Ri-Bhoi

Species	Clump Forming: Weight (in tonnes)						Total		
	1-15 (cm)		15-30 (cm)		>30 (cm)		G W	D W	
	G W	D W	G W	D W	G W	D W			
<i>Bambusa jaintiana</i>	3855	1773	11129	5119	2804	1290	17788	8182	
<i>Bambusa polymorpha</i>	412	193	695	326	0	0	1106	520	
<i>Bambusa tulda</i>	88013	42246	240633	115504	67649	32471	396294	190221	
<i>Dendrocalamus hamiltonii</i>	320887	170070	994406	527035	529749	280767	1845042	977872	
<i>Dendrocalamus hookeri</i>	2167	1300	10134	6081	5794	3476	18095	10857	
<i>Teinostachyum dullooa</i>	6593	3099	7845	3687	0	0	14439	6786	
Subtotal (A)	421926	218682	1264842	657752	605996	318005	2292764	1194439	
Non-Clump Forming: Weight (in tonnes)									
<i>Melocanna baccifera</i>							2476	966	
Subtotal (B)							2476	966	
Total (A + B)							2295240	1195405	

7.5.5 Sustainably Harvestable Yield in Ri-Bhoi

Table 35: Sustainably harvestable yield for all strata in Ri-Bhoi

Clump Forming			
Species	Number of culms	Weight (in tonnes)	
		G W	D W
<i>Bambusa jaintiana</i>	340675	2490	1146
<i>Bambusa polymorpha</i>	6663	155	73
<i>Bambusa tulda</i>	5401276	55481	26631
<i>Dendrocalamus hamiltonii</i>	16649042	258306	136902
<i>Dendrocalamus hookeri</i>	174823	2533	1520
<i>Teinostachyum dullooa</i>	126754	2021	950
Subtotal (A)	22699232	320987	167221
Non-Clump Forming			
<i>Melocanna baccifera</i>	97544	347	135
Subtotal (B)	97544	347	135
Total (A + B)	22796776	321334	167356

The annual Sustainably Harvestable Yield for bamboo resources in Ri Bhoi was estimated to be approximately 23 million culms. This estimation also showed that the dominant species in terms of sustainable harvest yield (both weight and number of culms) is *Dendrocalamus hamiltonii* (16 million culms).

7.4.6 Strata-wise Bamboo Bearing Area in Ri Bhoi

Table 36: Strata wise bamboo bearing area in Ri Bhoi

Sl. No.	Strata	Bamboo Bearing Area (ha)
1	Dense Forest	21723
2	Open Forest	25315
3	Scrub & Culturable Wasteland	1826
4	Agricultural Land	4226
5	Urban & Rural Settlements	171
6	Non-Forest, Barren Land & Grass Land	387
	Total	53649



Photographs of bamboo field inventory in Ri-Bhoi District

7.6 South Garo Hills

7.6.1 Map of Sample Plots Distribution over different Strata in South Garo Hills

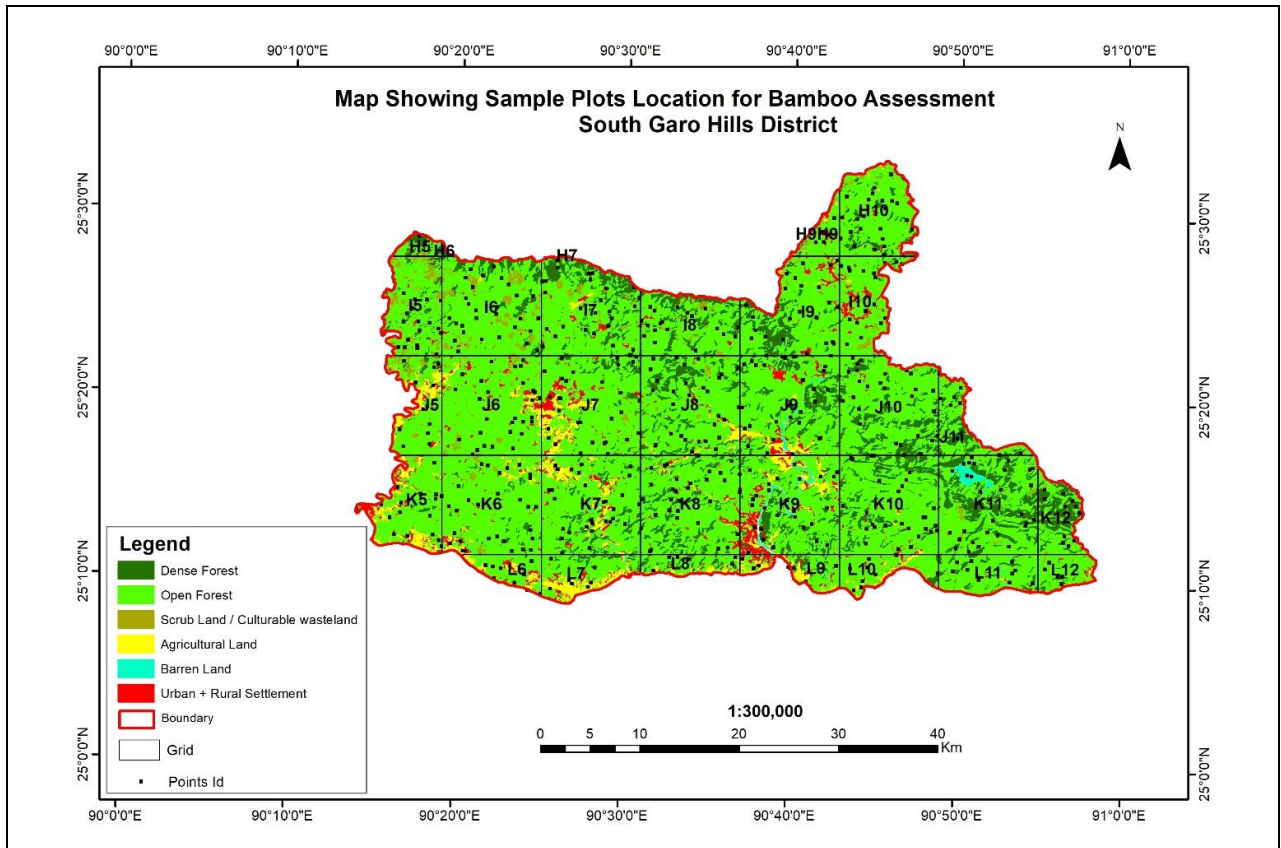


Fig. 27: Sample plots distribution over different strata in South Garo Hills

7.6.2 Bamboo Species found in South Garo Hills

Table 37: Bamboo species found in South Garo Hills

Sl. No.	Botanical Name	Vernacular Name
1.	<i>Bambusa balcooa</i>	Borua
2.	<i>Bambusa bambos</i>	Wakanta
3.	<i>Bambusa jaintiana</i>	Watebok
4.	<i>Bambusa nutans</i>	Wasim
5.	<i>Bambusa pseudopalida</i>	Wahminang
6.	<i>Bambusa tulda</i>	Wage
7.	<i>Bambusa vulgaris</i>	Wamanna
8.	<i>Dendrocalamus hamiltonii</i>	Wanok
9.	<i>Dendrocalamus sikkimensis</i>	Wada
10.	<i>Gigantochloa marostachya</i>	Teksra
11.	<i>Melocanna baccifera</i>	Watre
12.	<i>Ochlandra scriptoria</i>	Wadro
13.	<i>Teinostachyum helferi</i>	Wali

7.6.3 Species wise Estimates of Number of Culms in South Garo Hills

Table 38: Species wise estimates of number of culms in South Garo Hills

Clump Forming: Number of Culms				
Species	1-15 (cm)	15-30 (cm)	>30 (cm)	Total
<i>Bambusa balcooa</i>	2598256	1875053	859594	5332904
<i>Bambusa bambos</i>	1400011	809104	89187	2298302
<i>Bambusa jaintiana</i>	9736545	7433927	701151	17871623
<i>Bambusa nutans</i>	328923	166772	61841	557536
<i>Bambusa pseudopallida</i>	11799788	2769870	59458	14629115
<i>Bambusa tulda</i>	19781423	18831594	6199487	44812504
<i>Bambusa vulgaris</i>	3960394	2515871	1117584	7593850
<i>Dendrocalamus hamiltonii</i>	15599501	12906343	2721700	31227544
<i>Dendrocalamus sikkimensis</i>	478788	601984	545385	1626158
<i>Gigantochloa macrostachya</i>	2904113	1354549	569649	4828312
<i>Ochlandra scriptoria</i>	4514268	4190843	302038	9007150
<i>Teinostachyum helferi</i>	6615334	119333	22297	6756964
Subtotal (A)	79717346	53575244	13249370	146541961
Non – Clump Forming: Number of Culms				
<i>Melocanna baccifera</i>				100755004
Subtotal (B)				100755004
Total (A + B)				247296964

The estimation indicated that the Clump Forming bamboo species accounts for approximately 147 million culms while Non-Clump Forming species (*Melocanna baccifera*) contribute to more than 100 million culms. *Bambusa tulda* (~45 million culms) was the most prevalent followed by *Dendrocalamus hamiltonii* and *Bambusa jaintiana*.

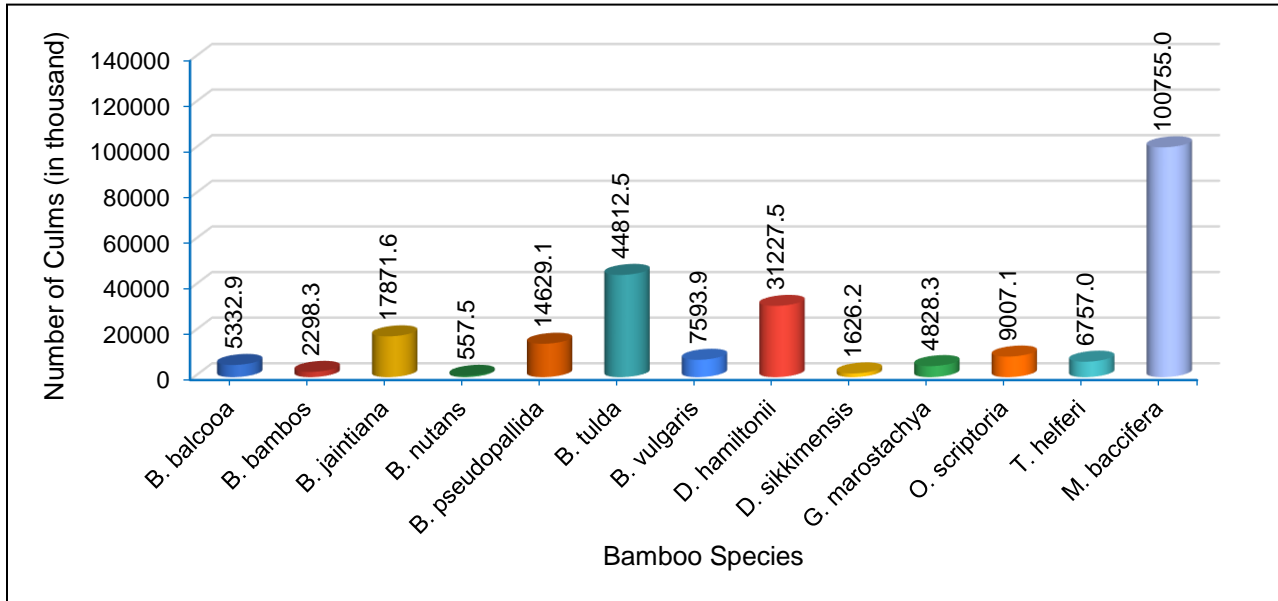


Fig. 28: Species wise estimates of number of culms in South Garo Hills

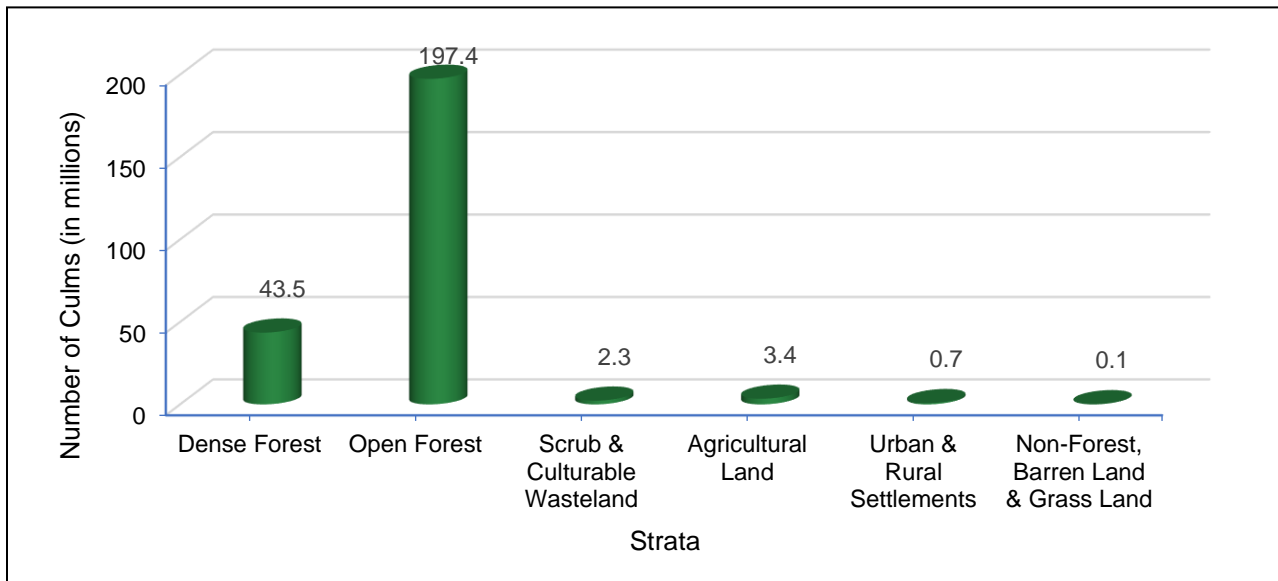


Fig. 29: Strata-wise distribution of the number of culms in South Garo Hills

Open Forest has the highest occurrence of bamboo culm count accounting for approximately 80% of the bamboo in the district. This stratum is followed by Dense Forest that provide for approximately 18% of bamboo grooving area in South Garo Hills. Non-Forest, Barren Land and Grass Land showed the least presence of bamboo with 0.1 million culms (0.04%).

7.6.4 Estimated Weight of Culms in South Garo Hills

Table 39: Estimated weight of culms in South Garo Hills

Species	Clump Forming: Weight (in tonnes)							
	1-15 (cm)		15-30 (cm)		>30 (cm)		Total	
	G W	D W	G W	D W	G W	D W	G W	D W
<i>Bambusa balcooa</i>	43337	21668	87959	43980	59142	29571	190438	95219
<i>Bambusa bambos</i>	14025	5470	22796	8890	3685	1437	40506	15797
<i>Bambusa jaintiana</i>	33977	15629	72960	33562	10093	4643	117030	53834
<i>Bambusa nutans</i>	1962	922	2799	1315	1522	715	6283	2953
<i>Bambusa pseudopallida</i>	89877	45837	59337	30262	1868	953	151082	77052
<i>Bambusa tulda</i>	97404	46754	260794	125181	125921	60442	484119	232377
<i>Bambusa vulgaris</i>	53548	20348	95672	36355	62331	23686	211551	80389
<i>Dendrocalamus hamiltonii</i>	104354	55308	242826	128698	79656	42218	426837	226224
<i>Dendrocalamus sikkimensis</i>	6113	3057	21617	10809	26983	13492	54714	27357
<i>Gigantochloa macrostachya</i>	22171	10642	29085	13961	17939	8611	69195	33214
<i>Ochlandra scriptoria</i>	29133	11945	76067	31187	8041	3297	113241	46429
<i>Teinostachyum helferi</i>	44698	12516	2268	635	621	174	47588	13325
Subtotal (A)	540599	250096	974180	464835	397803	189238	1912582	904168
Non-Clump Forming: Weight (in tonnes)								
<i>Melocanna baccifera</i>							358043	139637
Subtotal (B)							358043	139637
Total (A + B)							2270625	1043805

7.6.5 Sustainably Harvestable Yield in South Garo Hills

Table 40: Sustainably harvestable yield for all strata in South Garo Hills

Species	Clump Forming		
	Number of culms	Weight (in tonnes)	
		G W	D W
<i>Bambusa balcooa</i>	746607	26661	13331
<i>Bambusa bambos</i>	321762	5671	2212
<i>Bambusa jaintiana</i>	2502027	16384	7537
<i>Bambusa nutans</i>	78055	880	413
<i>Bambusa pseudopallida</i>	2048076	21151	10787
<i>Bambusa tulda</i>	6273751	67777	32533
<i>Bambusa vulgaris</i>	1063139	29617	11254
<i>Dendrocalamus hamiltonii</i>	4371856	59757	31671
<i>Dendrocalamus sikkimensis</i>	227662	7660	3830
<i>Gigantochloa macrostachya</i>	675964	9687	4650
<i>Ochlandra scriptoria</i>	1261001	15854	6500
<i>Teinostachyum helferi</i>	945975	6662	1865
Subtotal (A)	20515874	267761	126584
Non-Clump Forming			
<i>Melocanna baccifera</i>	14105701	50126	19549
Subtotal (B)	14105701	50126	19549
Total (A + B)	34621575	317887	146133

The annual Sustainably Harvestable Yield for bamboo resources in South Garo Hills was estimated to be approximately 35 million culms.

7.6.6 Strata-wise Bamboo Bearing Area in South Garo Hills

Table 41: Strata wise bamboo bearing area in South Garo Hills

Sl. No.	Strata	Bamboo Bearing Area (ha)
1	Dense Forest	8755
2	Open Forest	51606
3	Scrub & Culturable Wasteland	544
4	Agricultural Land	986
5	Urban & Rural Settlements	245
6	Non-Forest, Barren Land & Grass Land	25
	Total	62162



Photographs of bamboo field inventory in South Garo Hills District

7.7 South West Garo Hills

7.7.1 Map of Sample Plots Distribution over different Strata in South West Garo Hills

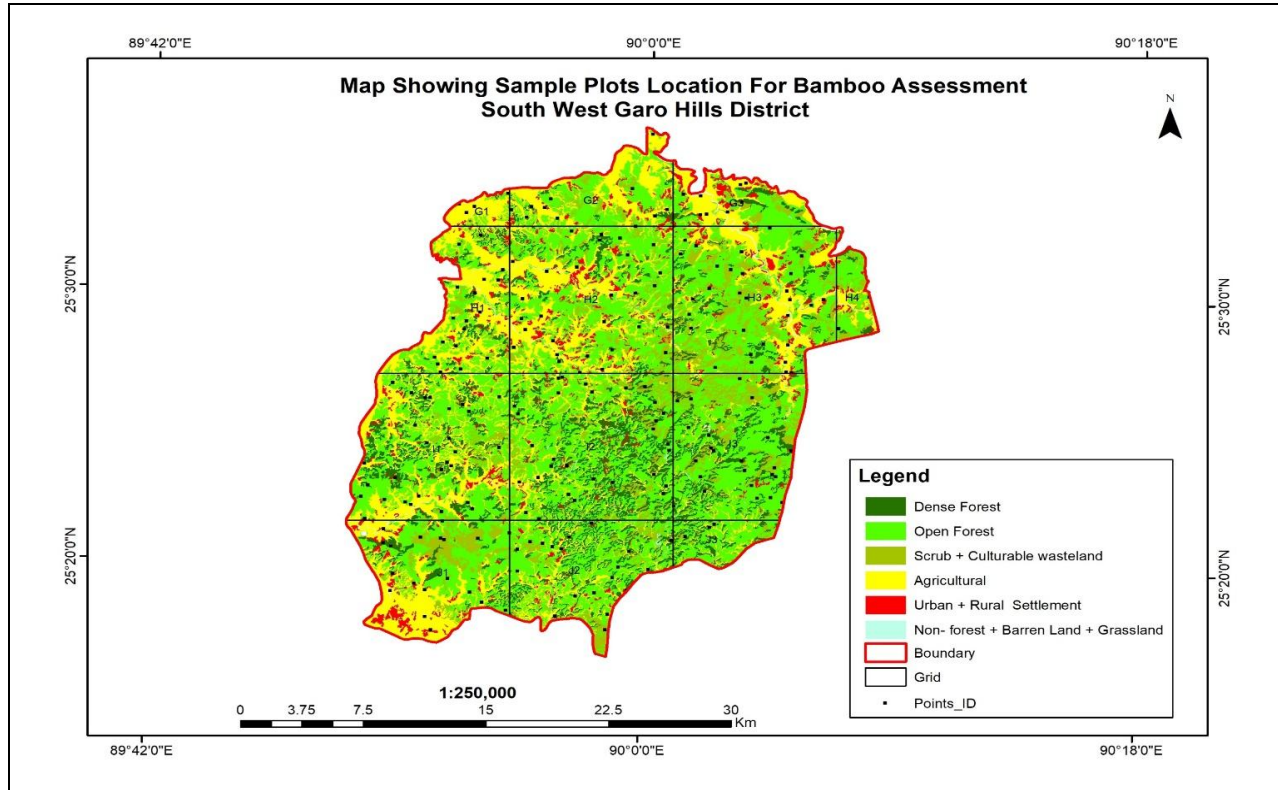


Fig. 30: Sample plots distribution over different strata in South West Garo Hills

7.7.2 Bamboo Species found in South West Garo Hills

Table 42: Bamboo species found in South West Garo Hills

Sl. No.	Botanical Name	Vernacular Name
1.	<i>Bambusa balcooa</i>	Burma
2.	<i>Bambusa bambos</i>	Wakanta/ Jangwa
3.	<i>Bambusa jaintiana</i>	Watibok
4.	<i>Bambusa nutans</i>	Wasim
5.	<i>Bambusa tulda</i>	Wage
6.	<i>Bambusa vulgaris</i>	Bahina
7.	<i>Dendrocalamus hamiltonii</i>	Wanok
8.	<i>Dendrocalamus sikkimensis</i>	Wada
9.	<i>Gigantochloa macrostachya</i>	Teksra
10.	<i>Ochlandra scriptoria</i>	Wadro
11.	<i>Melocanna baccifera</i>	Watre

7.7.3 Species wise Estimates of Number of Culms in South West Garo Hills

Table 43: Species wise estimates of number of culms in South West Garo Hills

Clump Forming: Number of Culms				
Species	1-15 (cm)	15-30 (cm)	>30 (cm)	Total
<i>Bambusa balcooa</i>	197292	309697	357948	864938
<i>Bambusa bambos</i>	1106039	840727	649181	2595947
<i>Bambusa jaintiana</i>	8096535	3096638	1994300	13187473
<i>Bambusa nutans</i>	266601	226835	269915	763350
<i>Bambusa tulda</i>	11253200	13703111	5632248	30588559
<i>Bambusa vulgaris</i>	112415	82033	30383	224831
<i>Dendrocalamus hamiltonii</i>	18230	36459	0	54689
<i>Dendrocalamus sikkimensis</i>	2902610	2547100	2533729	7983439
<i>Gigantochloa macrostachya</i>	1719220	1347023	358580	3424823
<i>Ochlandra scriptoria</i>	192201	0	0	192201
Subtotal (A)	25864342	22189624	11826283	59880249
Non – Clump Forming: Number of Culms				
<i>Melocanna baccifera</i>				57012725
Subtotal (B)				57012725
Total (A + B)				116892974

Table 36 provides a species-wise estimate of the number of bamboo culms in South West Garo Hills, categorized into **Clump Forming** and **Non-Clump Forming** types. The prevalent Clump Forming species include *Bambusa tulda* (31 million culms approximately) *Bambusa jaintiana* (~13 million culms) and *Dendrocalamus sikkimensis* (~8 million culms). *Melocanna baccifera* is the only Non-Clump Forming species in South West Garo Hills with an estimated 57 million culms.

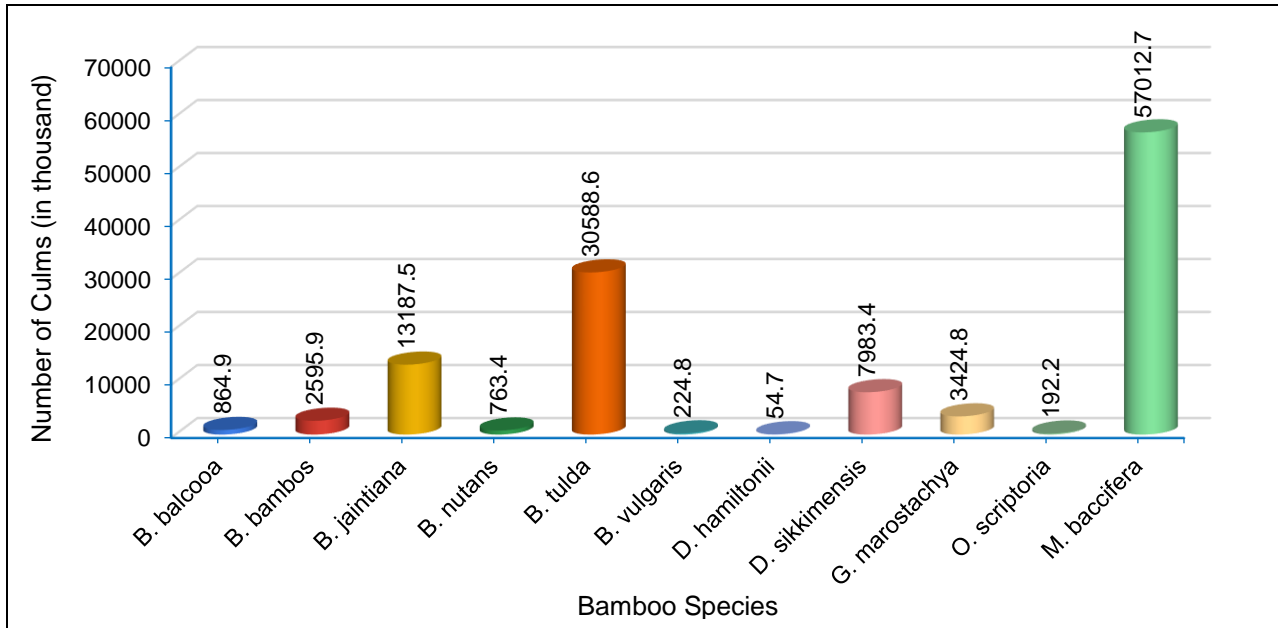


Fig. 31: Species wise estimates of number of culms in South West Garo Hills

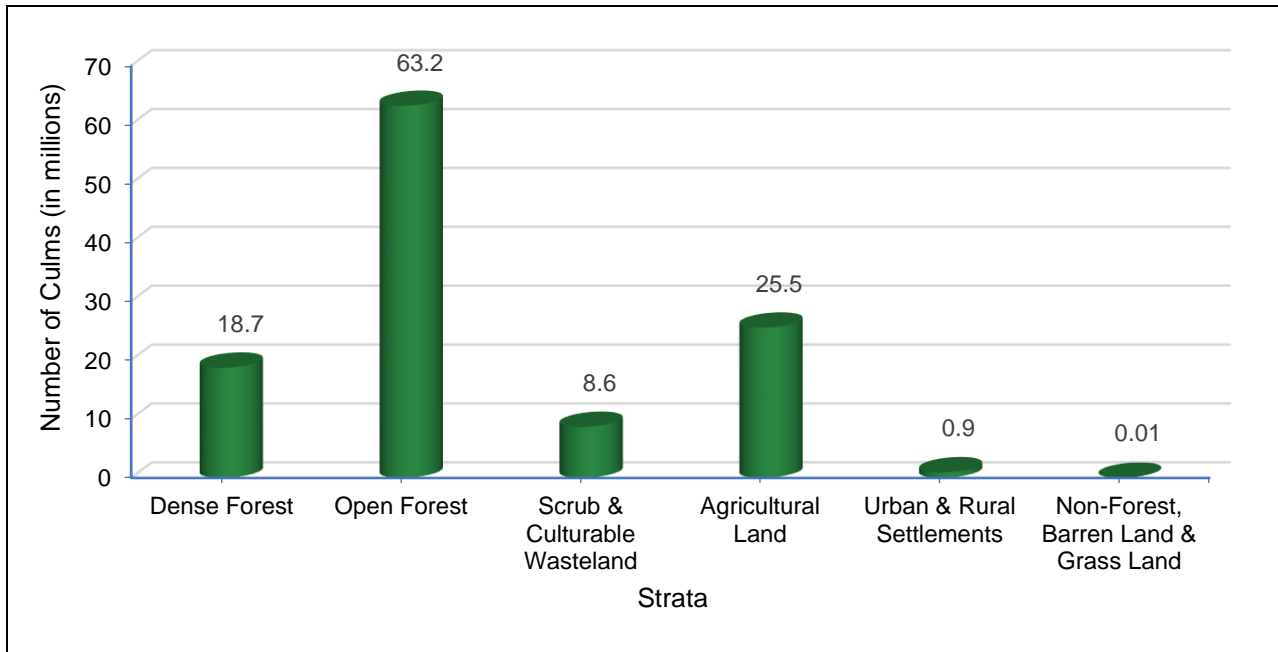


Fig. 32: Strata-wise distribution of the number of culms in South West Garo Hills

This bar chart shows the strata-wise distribution of bamboo culms in South West Garo Hills, indicating the maximum number of culms estimated at 63.2% are distributed in Open Forests of the district.

7.6.4 Estimated Weight of Culms in South West Garo Hills

Table 44: Estimated weight of culms in South West Garo Hills

Species	Clump Forming: Weight (in tonnes)							
	1-15 (cm)		15-30 (cm)		>30 (cm)		Total	
	G W	D W	G W	D W	G W	D W	G W	D W
<i>Bambusa balcooa</i>	3291	1645	14528	7264	24627	12314	42446	21223
<i>Bambusa bambos</i>	11080	4321	23687	9238	26826	10462	61593	24021
<i>Bambusa jaintiana</i>	28254	12997	30392	13980	28707	13205	87353	40182
<i>Bambusa nutans</i>	1591	748	3806	1789	6643	3122	12040	5659
<i>Bambusa tulda</i>	55411	26597	189771	91090	114399	54912	359581	172599
<i>Bambusa vulgaris</i>	1520	578	3119	1185	1695	644	6334	2407
<i>Dendrocalamus hamiltonii</i>	122	65	686	364	0	0	808	428
<i>Dendrocalamus sikkimensis</i>	37061	18530	91466	45733	125359	62679	253886	126943
<i>Gigantochloa macrostachya</i>	13125	6300	28923	13883	11292	5420	53341	25603
<i>Ochlandra scriptoria</i>	1240	509	0	0	0	0	1240	509
Subtotal (A)	152694	72289	386379	184526	339549	162759	878621	419574
Non-Clump Forming: Weight (in tonnes)								
<i>Melocanna baccifera</i>							202600	79014
Subtotal (B)							202600	79014
Total (A + B)							1081221	498588

7.7.5 Sustainably Harvestable Yield in South West Garo Hills

Table 45: Sustainably harvestable yield for all strata in South West Garo Hills

Species	Clump Forming		
	Number of culms	Weight (in tonnes)	
		G W	D W
<i>Bambusa balcooa</i>	121091	5942	2971
<i>Bambusa bambos</i>	363433	8623	3363
<i>Bambusa jaintiana</i>	1846246	12229	5626
<i>Bambusa nutans</i>	106869	1686	792
<i>Bambusa tulda</i>	4282398	50341	24164
<i>Bambusa vulgaris</i>	31476	887	337
<i>Dendrocalamus hamiltonii</i>	7656	113	60
<i>Dendrocalamus sikkimensis</i>	1117681	35544	17772
<i>Gigantochloa macrostachya</i>	479475	7468	3584
<i>Ochlandra scriptoria</i>	26908	174	71
Subtotal (A)	8383235	123007	58740
Non-Clump Forming			
<i>Melocanna baccifera</i>	7981781	28364	11062
Subtotal (B)	7981781	28364	11062
Total (A + B)	16365016	151371	69802

Total Number of Harvestable bamboo culms is 16 million (approximately) with a total Green Weight of 151,371 tonnes.

7.7.6 Strata-wise Bamboo Bearing Area in South West Garo Hills

Table 46: Strata wise bamboo bearing area in South West Garo Hills

Sl. No.	Strata	Bamboo Bearing Area (ha)
1	Dense Forest	4617
2	Open Forest	14224
3	Scrub & Culturable Wasteland	2096
4	Agricultural Land	6488
5	Urban & Rural Settlements	202
6	Non-Forest, Barren Land & Grass Land	2
	Total	27630



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Assessment, zikzak, swgh



Photographs of bamboo field inventory in South West Garo Hills District

7.8 South West Khasi Hills

7.8.1 Map of Sample Plots Distribution over different Strata in South West Khasi Hills

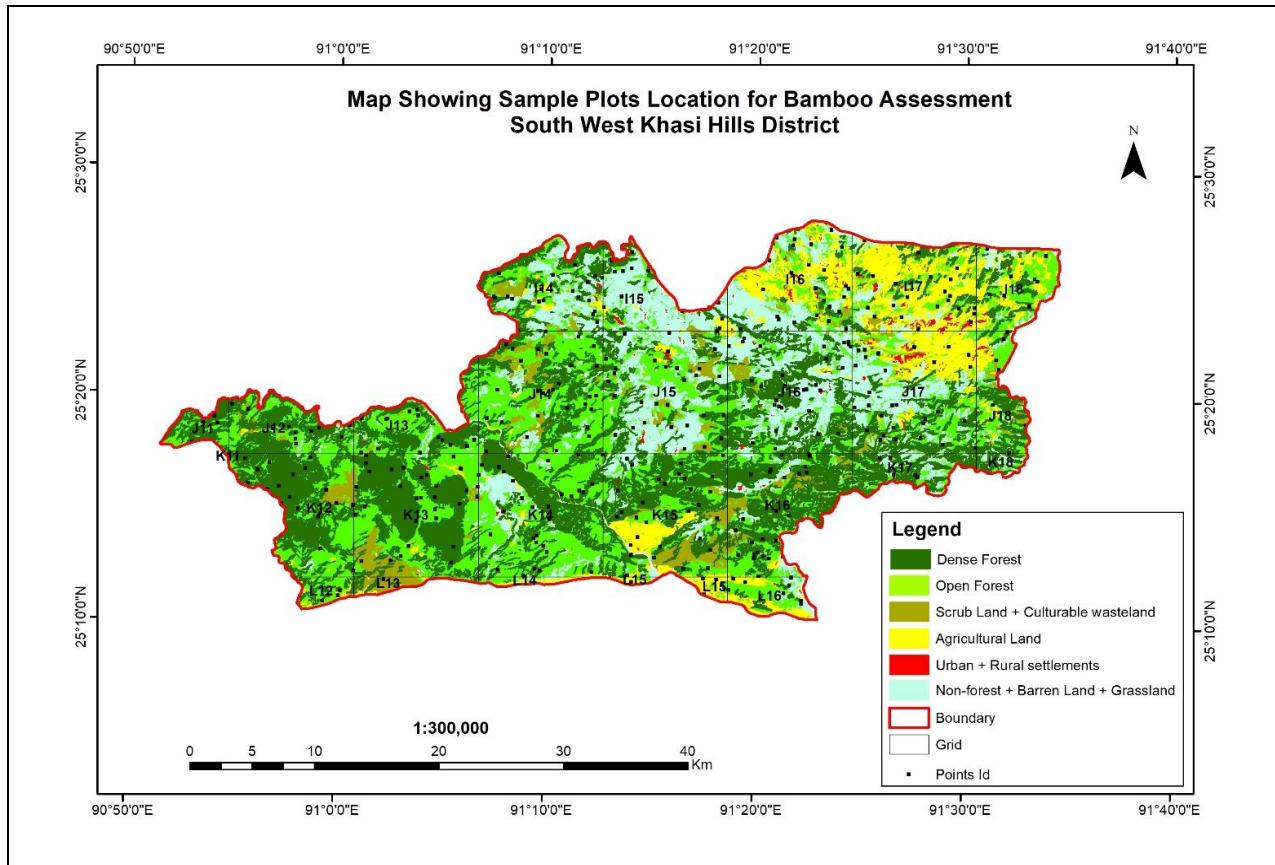


Fig. 33: Sample plots distribution over different strata in South West Khasi Hills

7.8.2 Bamboo Species found in South West Khasi Hills

Table 47: Bamboo species found in South West Khasi Hills

Sl. No.	Botanical Name	Vernacular Name
1	<i>Bambusa jaintiana</i>	Skhen
2	<i>Bambusa pallida</i>	Risoi
3	<i>Bambusa tulda</i>	Rngai
4	<i>Cephalostachyum capitatum</i>	Rngai
5	<i>Chimonobambusa callosa</i>	Skong/ Spar
6	<i>Dendrocalamus hamiltonii</i>	Siejlieh
7	<i>Dendrocalamus hookeri</i>	Siejjong/ Barbat
8	<i>Dendrocalamus sahnii</i>	Tawang
9	<i>Teinostachyum dullooa</i>	A-la
10	<i>Phyllostachys mannii</i>	Naka
11	<i>Pseudostachyum polymorphum</i>	Tyr-a

7.8.3 Species wise Estimates of Number of Culms in South West Khasi Hills

Table 48: Species wise estimates of number of culms in South West Khasi Hills

Clump Forming: Number of Culms				
Species	1-15 (cm)	15-30 (cm)	>30 (cm)	Total
<i>Bambusa jaintiana</i>	25127796	1099069	0	26226865
<i>Bambusa pallida</i>	9000277	10272	0	9010549
<i>Bambusa tulda</i>	8095876	3560929	98247	11755052
<i>Cephalostachyum capitatum</i>	635318	0	0	635318
<i>Chimonobambusa callosa</i>	4051852	146132	0	4197984
<i>Dendrocalamus hamiltonii</i>	959529	152820	0	1112350
<i>Dendrocalamus hookeri</i>	1224257	1387738	235534	2847530
<i>Dendrocalamus sahnii</i>	629194	518613	0	1147807
<i>Teinostachyum dullooa</i>	2901881	0	0	2901881
Subtotal (A)	52625981	6875574	333781	59835336
Non – Clump Forming: Number of Culms				
<i>Phyllostachys mannii</i>				2384655
<i>Pseudostachyum polymorphum</i>				979303
Subtotal (B)				3363957
Total (A + B)				63199293

The estimated number of culms of the Clump Forming species is more than 59 million with the major species being *Bambusa jaintiana*, *Bambusa tulda* and *Bambusa pallida*. The Non-Clump Forming species in South West Khasi Hills include *Phyllostachys mannii* and *Pseudostachyum polymorphum* with a cumulative estimate of more than 3.3 million culms. Overall, an estimate of more than 63 million bamboo culms have been estimated to be present in the district.

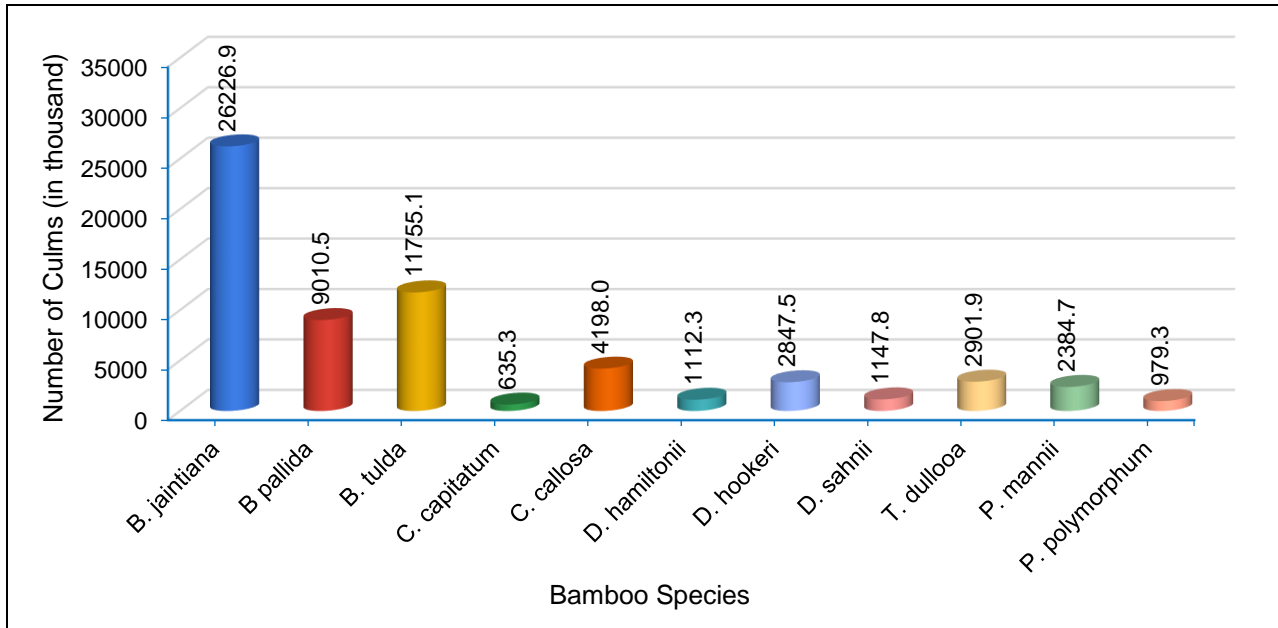


Fig. 34: Species wise estimates of number of culms in South West Khasi Hills

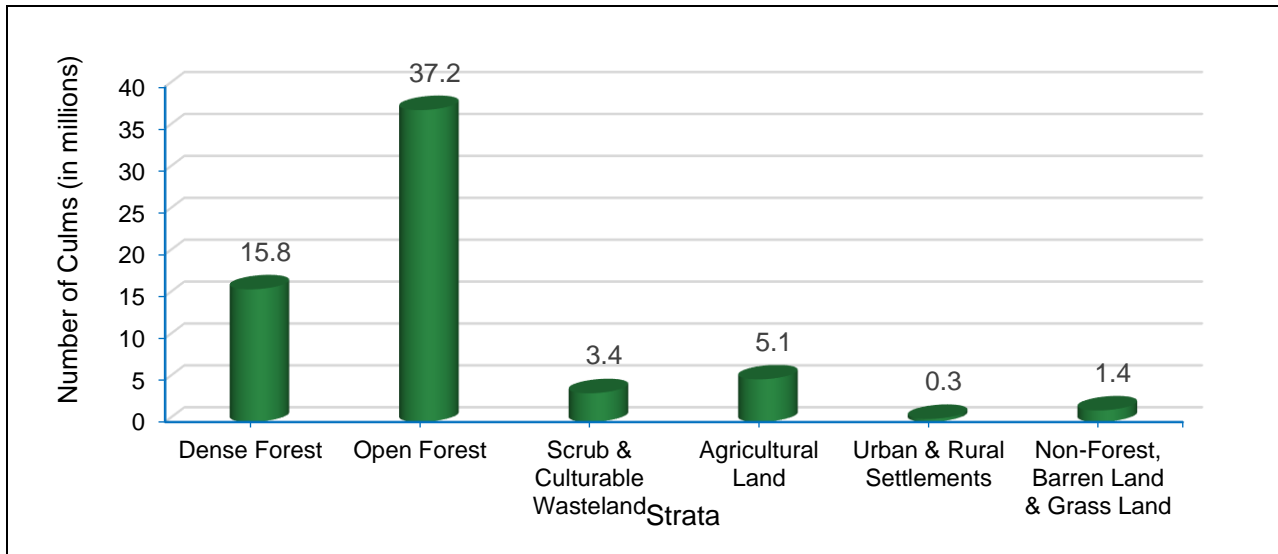


Fig. 35: Strata-wise distribution of the number of culms in South West Khasi Hills

Open Forest has the highest occurrence of bamboo culm count accounting for approximately 59% of the bamboo in the district. This stratum is followed by Dense Forest that provide for approximately 25% of bamboo grooving area in South West Khasi Hills. The remaining strata indicated the presence of approximately 10 million which accounts for 16% of the bamboo presence in the district.

7.8.4 Estimated Weight of Culms in South West Khasi Hills

Table 49: Estimated weight of culms in South West Khasi Hills

Clump Forming: Weight (in tonnes)								
Species	1-15 (cm)		15-30 (cm)		>30 (cm)		Total	
	G W	D W	G W	D W	G W	D W	G W	D W
<i>Bambusa jaintiana</i>	87686	40336	10787	4962	0	0	98473	45297
<i>Bambusa pallida</i>	34993	15397	112	49	0	0	35105	15446
<i>Bambusa tulda</i>	39864	19135	49314	23671	1996	958	91174	43764
<i>Cephalostachyum capitatum</i>	1626	894	0	0	0	0	1626	894
<i>Chimonobambusa callosa</i>	36580	19022	3710	1929	0	0	40291	20951
<i>Dendrocalamus hamiltonii</i>	6419	3402	2875	1524	0	0	9294	4926
<i>Dendrocalamus hookeri</i>	7034	4220	22425	13455	5582	3349	35042	21025
<i>Dendrocalamus sahnii</i>	2392	1411	5545	3272	0	0	7937	4683
<i>Teinostachyum dullooa</i>	30073	14134	0	0	0	0	30073	14134
Subtotal (A)	246667	117951	94769	48862	7578	4307	349014	171121
Non-Clump Forming: Weight (in tonnes)								
<i>Phyllostachys mannii</i>							7867	3934
<i>Pseudostachyum polymorphum</i>							3967	1944
Subtotal (B)							11834	5877
Total (A + B)							360848	176998

7.8.5 Sustainably Harvestable Yield in South West Khasi Hills

Table 50: Sustainably harvestable yield for all strata in South West Khasi Hills

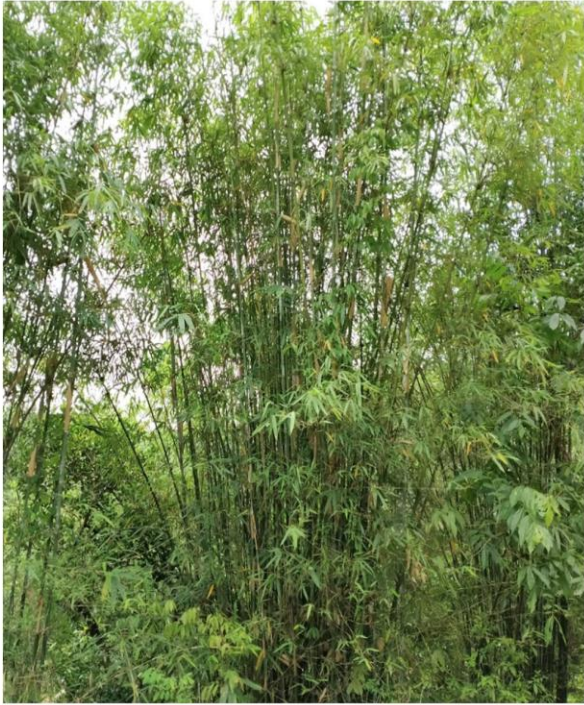
Clump Forming			
Species	Number of culms	Weight (in tonnes)	
		G W	D W
<i>Bambusa jaintiana</i>	3671761	13786	6342
<i>Bambusa pallida</i>	1261477	4915	2162
<i>Bambusa tulda</i>	1645707	12764	6127
<i>Cephalostachyum capitatum</i>	88944	228	125
<i>Chimonobambusa callosa</i>	587718	5641	2933
<i>Dendrocalamus hamiltonii</i>	155729	1301	690
<i>Dendrocalamus hookeri</i>	398654	4906	2943
<i>Dendrocalamus sahnii</i>	160693	1111	656
<i>Teinostachyum dullooa</i>	406263	4210	1979
Subtotal (A)	8376947	48862	23957
Non-Clump Forming			
<i>Phyllostachys mannii</i>	333852	1101	551
<i>Pseudostachyum polymorphum</i>	137102	555	272
Subtotal (B)	470954	1657	823
Total (A + B)	8847901	50519	24780

Table 42 shows the Sustainably Harvestable Yield for various bamboo species in the South West Khasi Hills. Both categories of Clump Forming and Non-Clump Forming species have a total of 8,847,901 culms with green weight of 50,519 tonnes, can be harvested sustainably.

7.8.6 Strata-wise Bamboo Bearing Area in South West Khasi Hills

Table 51: Strata wise bamboo bearing area in South West Khasi Hills

Sl. No.	Strata	Bamboo Bearing Area (ha)
1	Dense Forest	6738
2	Open Forest	10142
3	Scrub & Culturable Wasteland	1528
4	Agricultural Land	2144
5	Urban & Rural Settlements	83
6	Non-Forest, Barren Land & Grass Land	518
	Total	21153



Photographs of bamboo field inventory in South West Khasi Hills District

7.9 West Garo Hills

7.9.1 Map of Sample Plots Distribution over different Strata in West Garo Hills

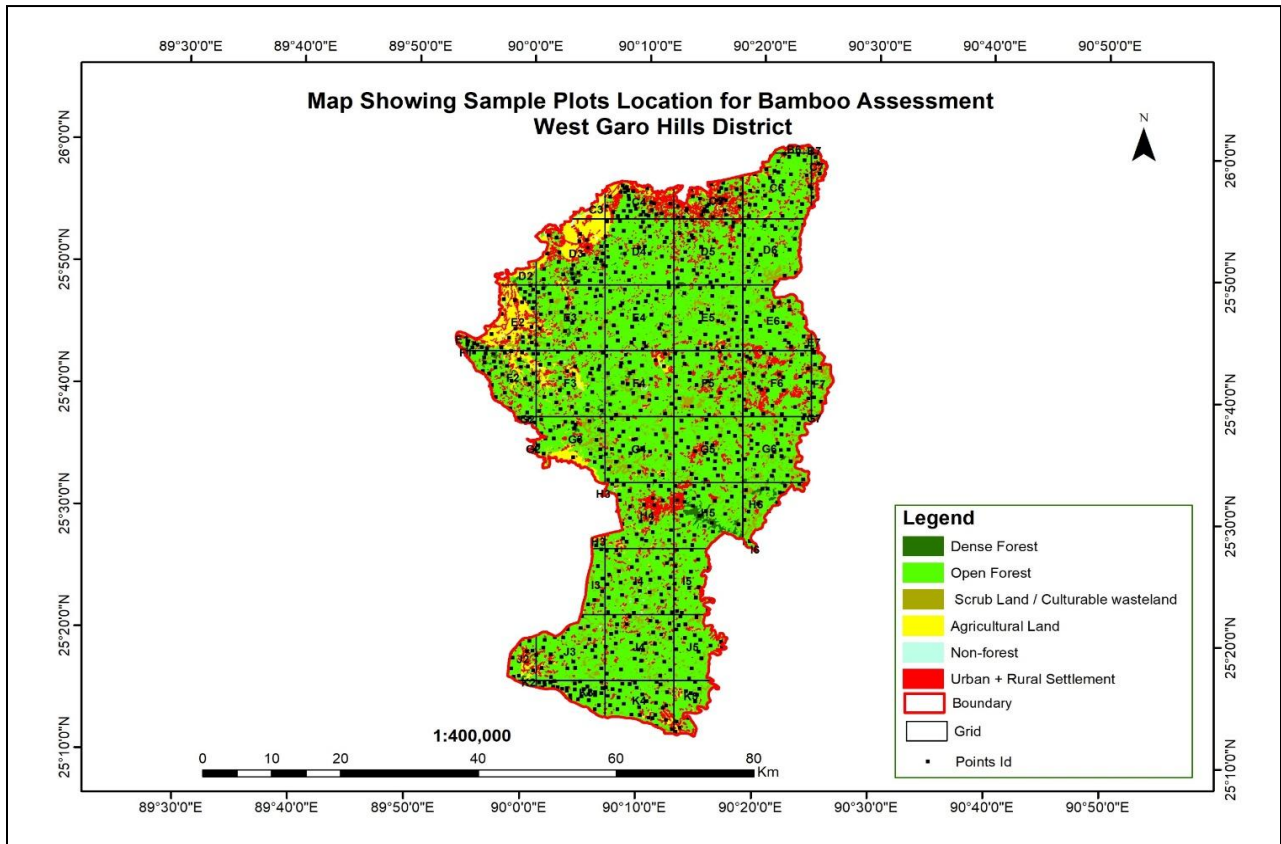


Fig. 36: Sample plots distribution over different strata in West Garo Hills

7.9.2 Bamboo Species found in West Garo Hills

Table 52: Bamboo species found in West Garo Hills

Sl. No.	Botanical Name	Vernacular Name
1	<i>Bambusa balcooa</i>	Borua
2	<i>Bambusa bambos</i>	Jawa Wa'a
3	<i>Bambusa jaintiana</i>	Watibok/Wabok
4	<i>Bambusa nutans</i>	Wasim/ Wagilsi
5	<i>Bambusa tulda</i>	Wage
6	<i>Bambusa vulgaris</i>	Wama/ Wanaru
7	<i>Dendrocalamus hamiltonii</i>	Wanok
8	<i>Dendrocalamus sikkimensis</i>	Wada
9	<i>Gigantochloa macrostachya</i>	Teksra
10	<i>Ochlandra scriptoria</i>	Wadro
11	<i>Melocanna baccifera</i>	Watre

7.9.3 Species wise Estimates of Number of Culms in West Garo Hills

Table 53: Species wise estimates of number of culms in West Garo Hills

Clump Forming: Number of Culms				
Species	1-15 (cm)	15-30 (cm)	>30 (cm)	Total
<i>Bambusa balcooa</i>	2608884	1709807	473957	4792648
<i>Bambusa bambos</i>	1559658	299282	58475	1917415
<i>Bambusa jaintiana</i>	17963557	10603235	4742015	33308807
<i>Bambusa nutans</i>	6403284	1715804	1842182	9961270
<i>Bambusa tulda</i>	2066764	3279224	1658541	7004529
<i>Bambusa vulgaris</i>	191767	239084	164878	595729
<i>Dendrocalamus hamiltonii</i>	3033865	1908971	197967	5140803
<i>Dendrocalamus sikkimensis</i>	139737	113983	123048	376768
<i>Gigantochloa macrostachya</i>	4709330	2562254	1948036	9219621
<i>Ochlandra scriptoria</i>	20984	26230	18361	65574
Subtotal (A)	38697830	22457875	11227458	72383163
Non – Clump Forming: Number of Culms				
<i>Melocanna baccifera</i>				211939438
Subtotal (B)				211939438
Total (A + B)				284322601

The species-wise estimates of the number of bamboo culms in West Garo Hills, has indicated that Clump-Forming and Non-Clump Forming bamboo species account for 72,383,163 and 21,193,438 culms respectively. *Bambusa jaintiana* is most abundant with more than 33 million culms followed by *Bambusa nutans* and *Gigantochloa macrostachya* (more than 9 million culms each). The Non-Clump Forming species *Melocanna baccifera* was estimated to be more than 21 million culms.

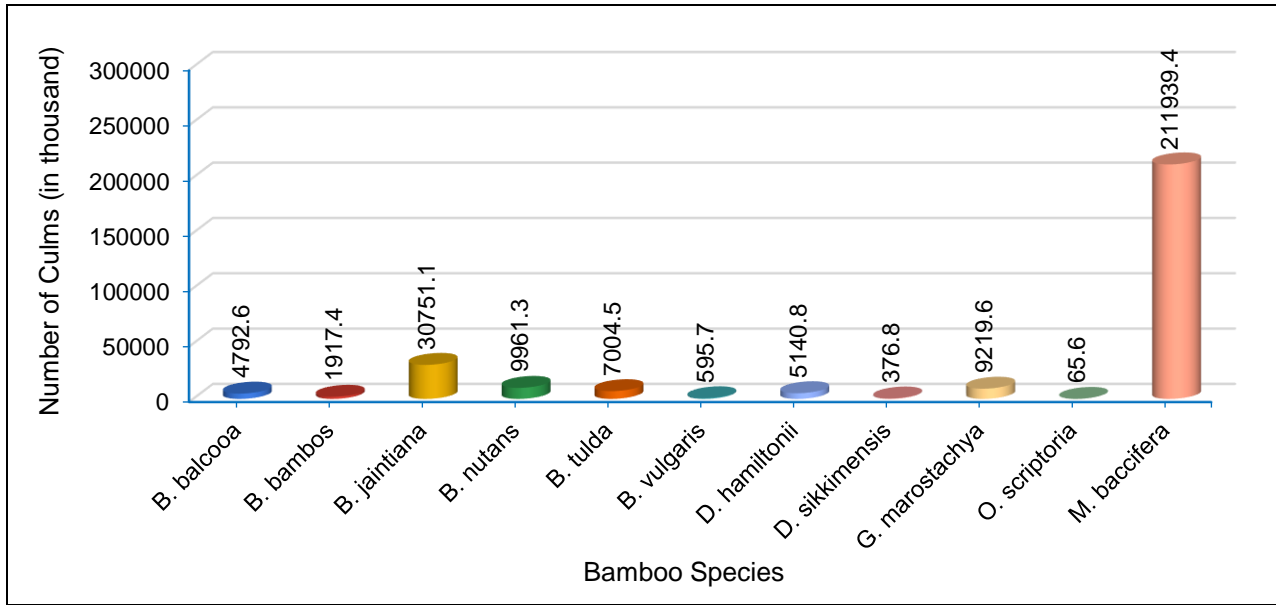


Fig. 37: Species wise estimates of number of culms in West Garo Hills

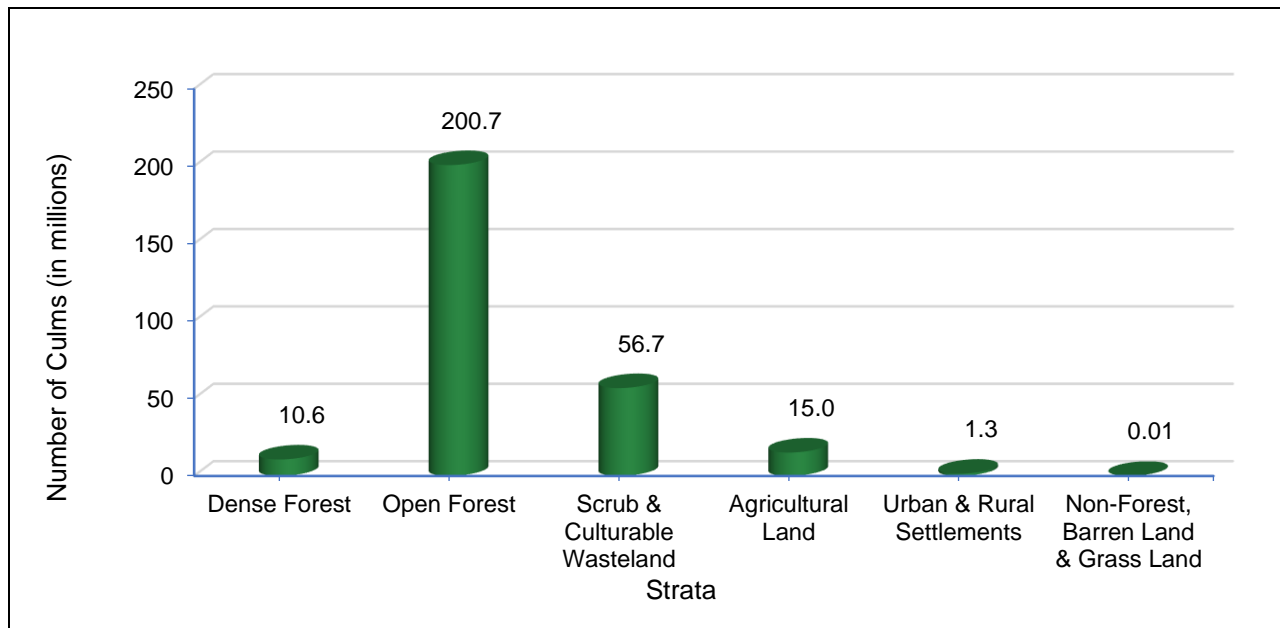


Fig. 38: Strata-wise distribution of the number of culms in West Garo Hills

An analysis of the strata-wise distribution of culms indicated that Open Forests dominate bamboo culm presence, holding 200.7 million culms, which is higher than any other land type. Scrub and Culturable Wasteland showed the presence of almost 57 million culms while the remaining strata relatively contribute minimally with moderate bamboo presence.

7.9.4 Estimated Weight of Culms in West Garo Hills

Table 54: Estimated weight of culms in West Garo Hills

Clump Forming: Weight (in tonnes)								
Species	1-15 (cm)		15-30 (cm)		>30 (cm)		Total	
	GW	DW	GW	DW	GW	DW	GW	DW
<i>Bambusa balcooa</i>	43514	21757	80207	40104	32609	16305	156331	78165
<i>Bambusa bambos</i>	15624	6093	8432	3289	2416	942	26472	10324
<i>Bambusa jaintiana</i>	62686	28835	104065	47870	68259	31399	235010	108105
<i>Bambusa nutans</i>	38205	17956	28792	13532	45339	21309	112335	52798
<i>Bambusa tulda</i>	10177	4885	45413	21798	33687	16170	89277	42853
<i>Bambusa vulgaris</i>	2593	985	9092	3455	9196	3494	20880	7935
<i>Dendrocalamus hamiltonii</i>	20295	10757	35916	19036	5794	3071	62006	32863
<i>Dendrocalamus sikkimensis</i>	1784	892	4093	2047	6088	3044	11965	5983
<i>Gigantochloa macrostachya</i>	35953	17257	55016	26408	61347	29447	152316	73112
<i>Ochlandra scriptoria</i>	135	56	476	195	489	200	1100	451
Subtotal (A)	230966	109474	371504	177733	265225	125382	867694	412588
Non-Clump Forming: Weight (in tonnes)								
<i>Melocanna baccifera</i>							753148	293728
Subtotal (B)							753148	293728
Total (A + B)							1620842	706316

7.9.5 Sustainably Harvestable Yield in West Garo Hills

Table 55: Sustainably harvestable yield for all species in West Garo Hills

Clump Forming			
Species	Number of culms	Weight (in tonnes)	
		GW	DW
<i>Bambusa balcooa</i>	670971	21886	10943
<i>Bambusa bambos</i>	268438	3706	1445
<i>Bambusa jaintiana</i>	4663233	32901	15135
<i>Bambusa nutans</i>	1394578	15727	7392
<i>Bambusa tulda</i>	980634	12499	5999
<i>Bambusa vulgaris</i>	83402	2923	1111
<i>Dendrocalamus hamiltonii</i>	719712	8681	4601
<i>Dendrocalamus sikkimensis</i>	52747	1675	838
<i>Gigantochloa macrostachya</i>	1290747	21324	10236
<i>Ochlandra scriptoria</i>	9180	154	63
Subtotal (A)	10133643	121477	57762
Non-Clump Forming			
<i>Melocanna baccifera</i>	29671521	105441	41122
Subtotal (B)	29671521	105441	41122
Total (A + B)	39805164	226918	98884

The number of bamboo culms in South West Garo Hills that can be harvested sustainably has been estimated to be almost 40 million culms inclusive of the Clump Forming and Non-Clump Forming types. The prevalent Clump Forming species include *Bambusa jaintiana*

(~5 million culms), *Gigantochloa macrostachya* (~1.3 million culms) and *Bambusa nutans* (~1.4 million culms). *Melocanna baccifera* is the only Non-Clump Forming species in South West Garo Hills with an estimated 30 million culms approximately.

7.9.6 Strata-wise Bamboo Bearing Area in West Garo Hills

Table 56: Strata wise bamboo bearing area in West Garo Hills

Sl. No.	Strata	Bamboo Bearing Area (ha)
1	Dense Forest	2222
2	Open Forest	52568
3	Scrub & Culturable Wasteland	13551
4	Agricultural Land	4670
5	Urban & Rural Settlements	365
6	Non-Forest, Barren Land & Grass Land	3
	Total	73379



Photographs of bamboo field inventory in West Garo Hills District

7.10 West Jaintia Hills

7.10.1 Map of Sample Plots Distribution over different Strata in West Jaintia Hills

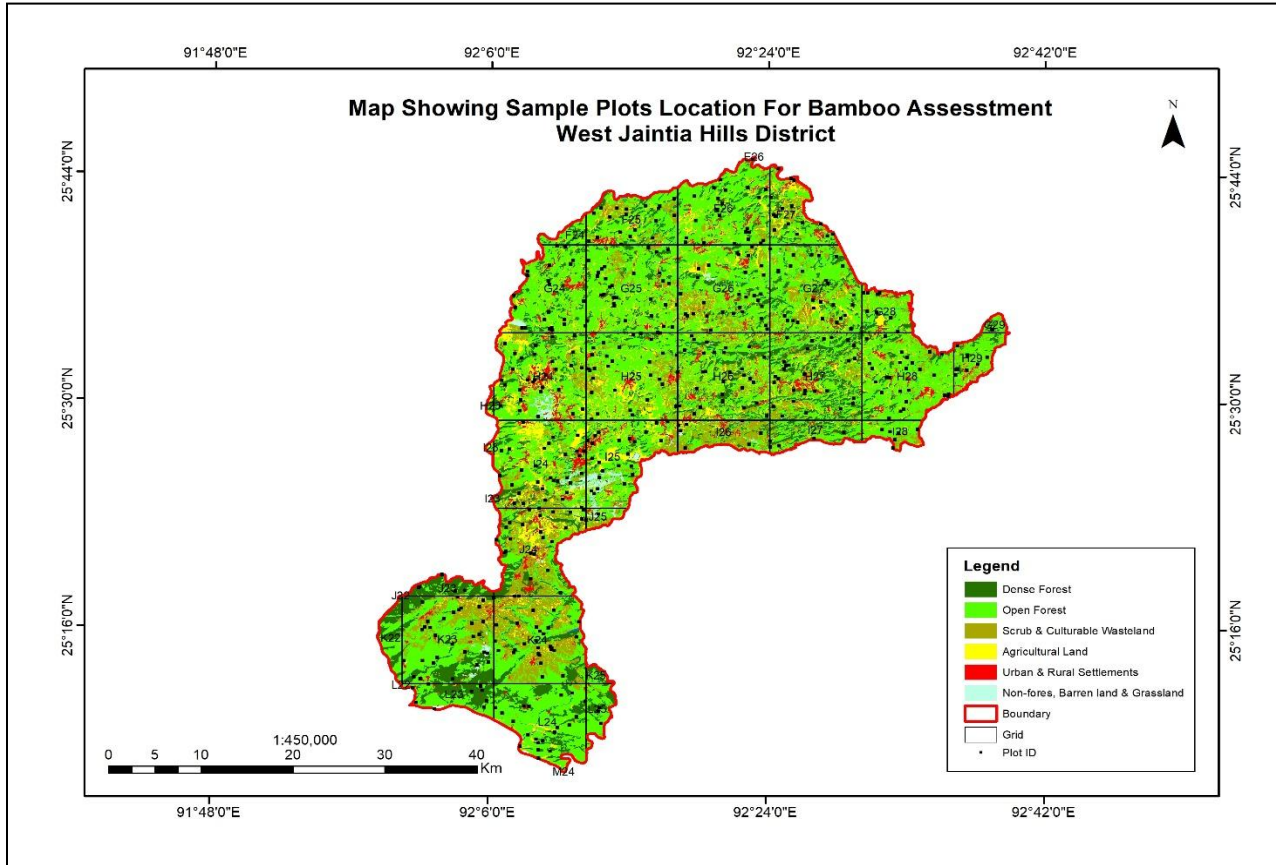


Fig. 39: Sample plots distribution over different strata in West Jaintia Hills

7.10.2 Bamboo Species found in West Jaintia Hills

Table 57: Bamboo species found in West Jaintia Hills

Sl. No.	Botanical Name	Vernacular Name
1.	<i>Bambusa cacharensis</i>	Mot
7.	<i>Bambusa jaintiana</i>	Shken Shong
2.	<i>Bambusa pallida</i>	Shken
3.	<i>Bambusa tulda</i>	Rngai
4.	<i>Chimonobambusa callosa</i>	Skong
5.	<i>Dendrocalamus hamiltonii</i>	Siej Khlaw
8.	<i>Dendrocalamus hookeri</i>	Siej long
9.	<i>Schizostachyum dullooa</i>	Siej
6.	<i>Pseudostachyum polymorphum</i>	Tyra

7.10.3 Species wise Estimates of Number of Culms in West Jaintia Hills

Table 58: Species wise estimates of number of culms in West Jaintia Hills

Clump Forming: Number of Culms				
Species	1-15 (cm)	15-30 (cm)	>30 (cm)	Total
<i>Bambusa cacharensis</i>	319596	677056	0	996652
<i>Bambusa jaintiana</i>	42444	26527	0	68971
<i>Bambusa pallida</i>	32818818	11322942	207543	44349302
<i>Bambusa tulda</i>	6053410	21962367	963707	28979484
<i>Chimonobambusa callosa</i>	5200	0	0	5200
<i>Dendrocalamus hamiltonii</i>	729796	845431	488133	2063359
<i>Dendrocalamus hookeri</i>	132636	538502	42444	713581
<i>Schizostachyum dullooa</i>	5808119	12829615	4969325	23607059
Subtotal (A)	45910018	48202439	6671151	100783609
Non – Clump Forming: Number of Culms				
<i>Pseudostachyum polymorphum</i>				859038
Subtotal (B)				859038
Total (A + B)				101642648

The species-wise estimates of the number of Clump Forming bamboo culms in West Jaintia Hills that can be harvested sustainably is more than 100 million culms while inclusive of the Non-Forming Clump species is 859038 culms. *Bambusa pallida*, *Bambusa tulda* and *Schizostachyum dullooa* among the Clump Forming species.

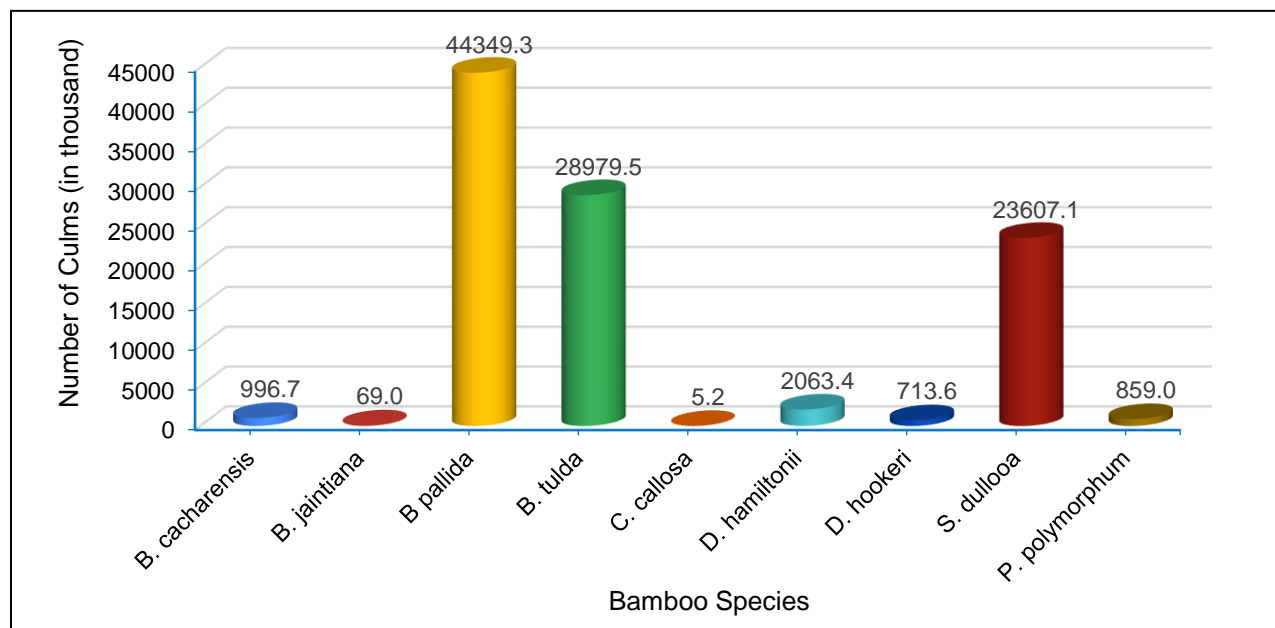


Fig. 40: Species wise estimates of number of culms in West Jaintia Hills

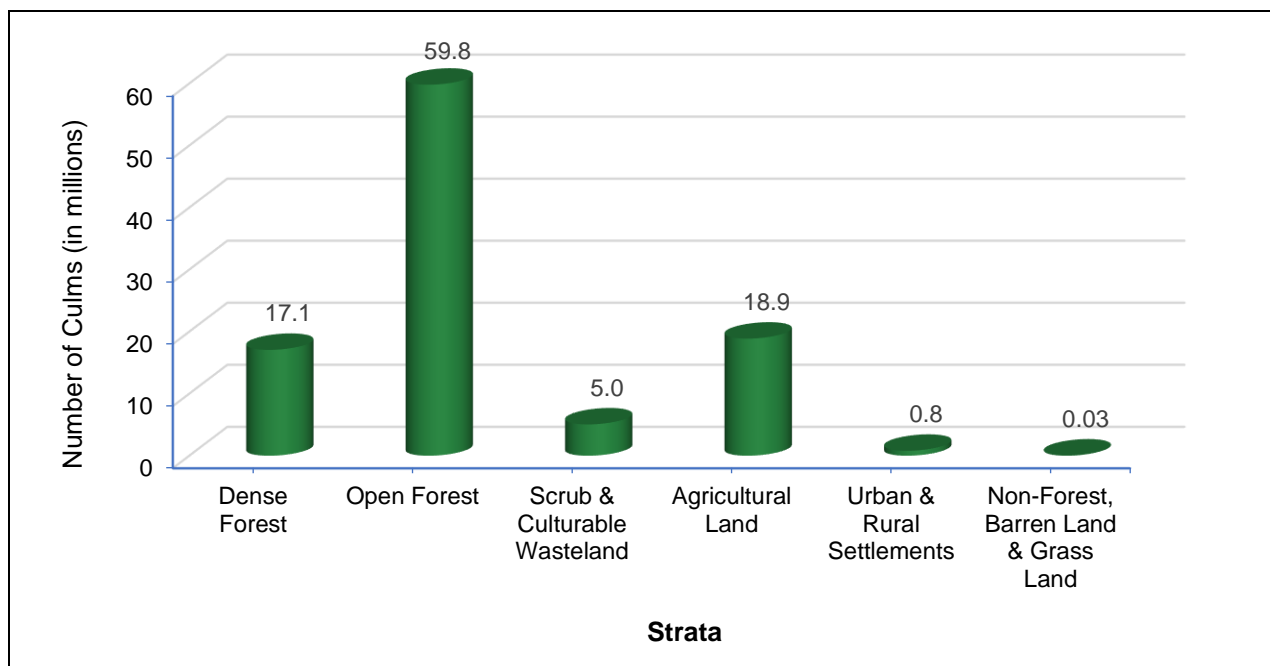


Fig. 41: Strata-wise distribution of the number of culms in West Garo Hills

7.10.4 Estimated Weight of Culms in West Jaintia Hills

Table 59: Estimated weight of culms in West Jaintia Hills

Species	Clump Forming: Weight (in tonnes)						Total		
	1-15 (cm)		15-30 (cm)		>30 (cm)		G W	D W	
	G W	D W	G W	D W	G W	D W			
<i>Bambusa cacharensis</i>	1456	932	8673	5550	0	0	10128	6482	
<i>Bambusa jaintiana</i>	148	68	260	120	0	0	408	188	
<i>Bambusa pallida</i>	127600	56144	123816	54479	3329	1465	254745	112088	
<i>Bambusa tulda</i>	29807	14307	304151	145993	19574	9396	353533	169696	
<i>Chimonobambusa callosa</i>	47	24	0	0	0	0	47	24	
<i>Dendrocalamus hamiltonii</i>	4882	2587	15906	8430	14286	7572	35075	18590	
<i>Dendrocalamus hookeri</i>	762	457	8702	5221	1006	604	10470	6282	
<i>Schizostachyum dullooa</i>	20956	12154	130189	75509	73958	42896	225103	130560	
Subtotal (A)	185657	86674	591697	295303	112153	61931	889508	443909	
Non-Clump Forming: Weight (in tonnes)								G W	D W
<i>Pseudostachyum polymorphum</i>							3479		
Subtotal (B)							3479	1705	
Total (A + B)							892987	445614	

7.10.5 Sustainably Harvestable Yield in West Jaintia Hills

Table 60: Sustainably harvestable yield for all strata in West Jaintia Hills

Clump Forming			
Species	Number of culms	Weight (in tonnes)	
		G W	D W
<i>Bambusa cacharensis</i>	139531	1418	907
<i>Bambusa jaintiana</i>	9656	57	26
<i>Bambusa pallida</i>	6208902	35664	15692
<i>Bambusa tulda</i>	4057128	49495	23757
<i>Chimonobambusa callosa</i>	728	7	3
<i>Dendrocalamus hamiltonii</i>	288870	4910	2603
<i>Dendrocalamus hookeri</i>	99901	1466	879
<i>Schizostachyum dullooa</i>	3304988	31514	18278
Subtotal (A)	14109705	124531	62147
Non-Clump Forming			
<i>Pseudostachyum polymorphum</i>	120265	487	239
Subtotal (B)	120265	487	239
Total (A + B)	14229971	125018	62386

Table 49: Sustainably Harvestable Yield for all Strata in West Jaintia Hills represents the number of bamboo culms and their harvestable weight, divided into Clump Forming and Non-Clump Forming species. The number of culms that have been estimated for the total Sustainably Harvestable Yield of all species combined include 14,229,971 with Total Green Weight of 1,25,018 tonnes.

7.10.6 Strata-wise Bamboo Bearing Area in West Jaintia Hills

Table 61: Strata wise bamboo bearing area in West Jaintia Hills

Sl. No.	Strata	Bamboo Bearing Area (ha)
1	Dense Forest	3871
2	Open Forest	16734
3	Scrub & Culturable Wasteland	1891
4	Agricultural Land	3903
5	Urban & Rural Settlements	168
6	Non-Forest, Barren Land & Grass Land	7
	Total	26574



Photographs of bamboo field inventory in West Jaintia Hills District

7.11 West Khasi Hills & Eastern West Khasi Hills

7.11.1 Map of Sample Plots Distribution over different Strata in West Khasi Hills & Eastern West Khasi Hills

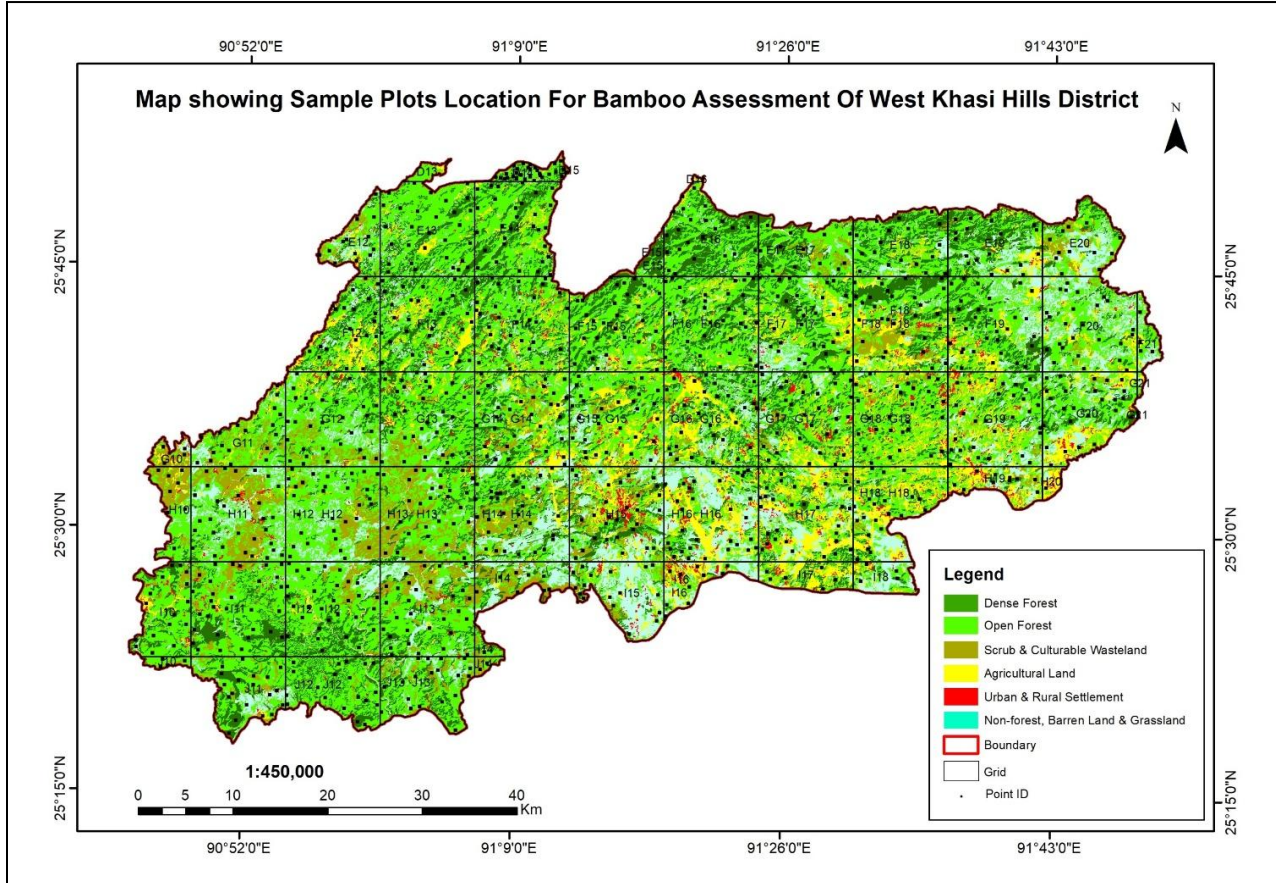


Fig. 42: Sample plots distribution in West Khasi Hills & Eastern West Khasi Hills

7.11.2 Bamboo Species found in West Khasi Hills & Eastern West Khasi Hills

Table 62: Bamboo species found in West Jaintia Hills

Sl. No.	Botanical Name	Vernacular Name
1	<i>Bambusa jaintiana</i>	Skhen/ Sdiah,
2	<i>Bambusa tulda</i>	Rangnai/Rngai/Siej Ryntieh
3	<i>Chimonobambusa callosa</i>	Skong/Spar
4	<i>Dendrocalamus hamiltonii</i>	Siej lieh/Ryntieh
5	<i>Dendrocalamus hookeri</i>	Siej long/Siej Bah
6	<i>Dendrocalamus sahnii</i>	Tawang
7	<i>Teinostachyum dullooa</i>	Siejja
8	<i>Chimonocalamus griffithiana</i>	Tyrpait
9	<i>Phyllostachys mannii</i>	Naka/Naka iong/Naga
10	<i>Pseudostachyum polymorphum</i>	Sorin/Siej Tyra
11	<i>Melocanna baccifera</i>	Siej Trylaw/ Watre

7.11.3 Species wise Estimates of Number of Culms in West Khasi Hills & Eastern West Khasi Hills

Table 63: Species wise estimates of number of culms in West Khasi Hills & Eastern West Khasi Hills

Clump Forming: Number of Culms				
Species	1-15 (cm)	15-30 (cm)	>30 (cm)	Total
<i>Bambusa jaintiana</i>	82072796	12471422	1505536	96049753
<i>Bambusa tulda</i>	6722783	25017723	2630743	34371249
<i>Chimonobambusa callosa</i>	3050248	6148125	1377997	10576371
<i>Dendrocalamus hamiltonii</i>	58325491	148733760	74059239	281118490
<i>Dendrocalamus hookeri</i>	3273213	10773915	5276921	19324049
<i>Dendrocalamus sahnii</i>	5707932	6541884	721573	12971389
<i>Teinostachyum dullooa</i>	533835	0	0	533835
Subtotal (A)	159686299	209686829	85572009	454945137
Non – Clump Forming: Number of Culms				
<i>Chimonocalamus griffithiana</i>				15589445
<i>Phyllostachys mannii</i>				8892166
<i>Pseudostachyum polymorphum</i>				5838904
<i>Melocanna baccifera</i>				13934378
Subtotal (B)				44254893
Total (A + B)				499200030

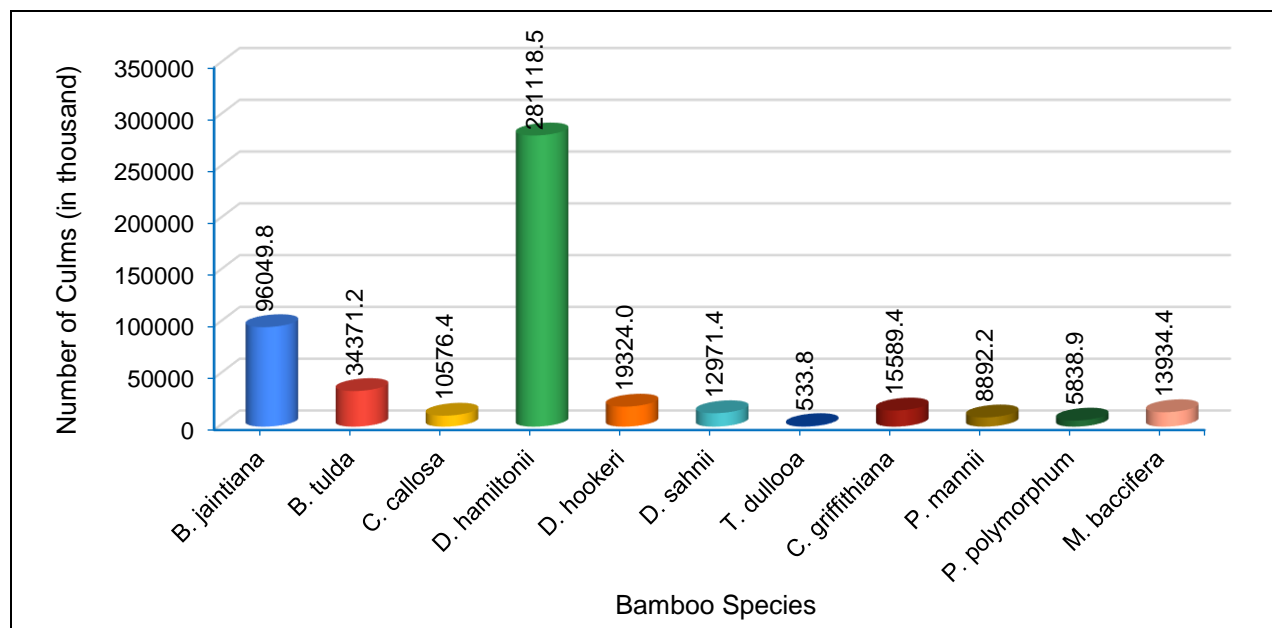


Fig. 43: Species wise Estimates of Number of Culms in West Khasi Hills & Eastern West Khasi Hills

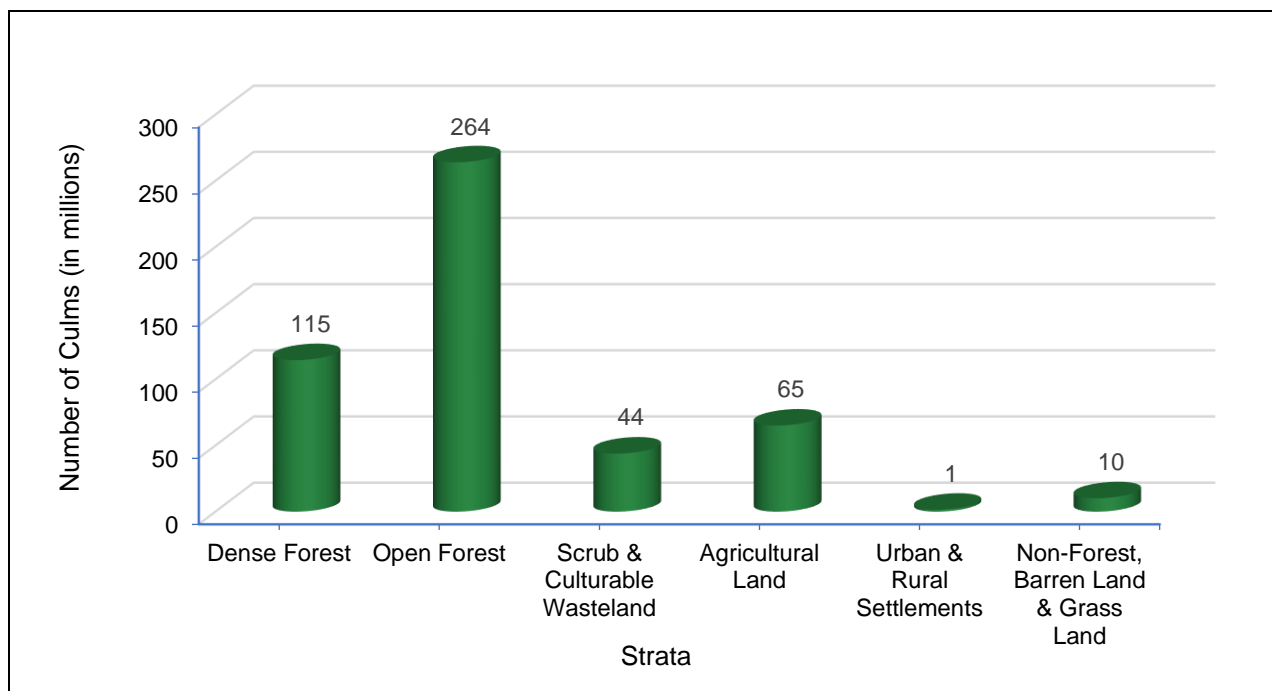


Fig. 44: Strata-wise distribution of the number of culms in West Khasi Hills & Eastern West Khasi Hills

7.11.4: Estimated Weight of Culms in West Khasi Hills & Eastern West Khasi Hills

Table 64: Estimated weight of culms in West Khasi Hills & Eastern West Khasi Hills

Species	Clump Forming: Weight (in tonnes)						Total		
	1-15 (cm)		15-30 (cm)		>30 (cm)		G W	D W	
	G W	D W	G W	D W	G W	D W			
<i>Bambusa jaintiana</i>	286401	131745	122401	56304	21672	9969	430474	198018	
<i>Bambusa tulda</i>	33103	15889	346464	166303	53434	25648	433002	207841	
<i>Chimonobambusa callosa</i>	20598	10711	116767	60719	38385	19960	175749	91389	
<i>Dendrocalamus hamiltonii</i>	390174	206792	2798351	1483126	2167492	1148771	5356017	2838689	
<i>Dendrocalamus hookeri</i>	18807	11284	174101	104461	125066	75040	317974	190784	
<i>Dendrocalamus sahnii</i>	21699	12803	69946	41268	11315	6676	102961	60747	
<i>Teinostachyum dullooa</i>	6124	2878	0	0	0	0	6124	2878	
Subtotal (A)	776906	392102	3628030	1912181	2417364	1286064	6822299	3590346	
Non-Clump Forming: Weight (in tonnes)								G W	D W
<i>Chimonocalamus griffithiana</i>							64316		
<i>Phyllostachys mannii</i>							29337	14669	
<i>Pseudostachyum polymorphum</i>							23650	11588	
<i>Melocanna baccifera</i>							49517	18817	
Subtotal (B)							166820	79161	
Total (A + B)							6989119	3669507	

7.11.5 Sustainably Harvestable Yield in West Khasi Hills & Eastern West Khasi Hills

Table 65: Sustainably harvestable yield for all strata in West Khasi Hills & Eastern West Khasi Hills

Clump Forming			
Species	Number of culms	Weight (in tonnes)	
		G W	D W
<i>Bambusa jaintiana</i>	13446965	60266	27722
<i>Bambusa tulda</i>	4811975	60620	29098
<i>Chimonobambusa callosa</i>	1480692	24605	12795
<i>Dendrocalamus hamiltonii</i>	39356589	749842	397416
<i>Dendrocalamus hookeri</i>	2705367	44516	26710
<i>Dendrocalamus sahnii</i>	1815994	14414	8505
<i>Teinostachyum dullooa</i>	74737	857	403
Subtotal (A)	63692319	955122	502648
Non-Clump Forming			
<i>Chimonocalamus griffithiana</i>	2182522	9004	4772
<i>Phyllostachys mannii</i>	1244903	4107	2054
<i>Pseudostachyum polymorphum</i>	817447	3311	1622
<i>Melocanna baccifera</i>	1950813	6932	2634
Subtotal (B)	6195685	23355	11083
Total (A + B)	69888004	978477	513731

7.11.6 Strata-wise Bamboo Bearing Area in West Khasi Hills & Eastern West Khasi Hills

Table 66: Strata wise bamboo bearing area in West Khasi Hills & Eastern West Khasi Hills

Sl. No.	Strata	Bamboo Bearing Area (ha)
1	Dense Forest	18571
2	Open Forest	50849
3	Scrub & Culturable Wasteland	8079
4	Agricultural Land	12362
5	Urban & Rural Settlements	243
6	Non-Forest, Barren Land & Grass Land	1529
	Total	91633



Photographs of bamboo field inventory in West Khasi Hills & Eastern West Khasi Hills District

Herbarium

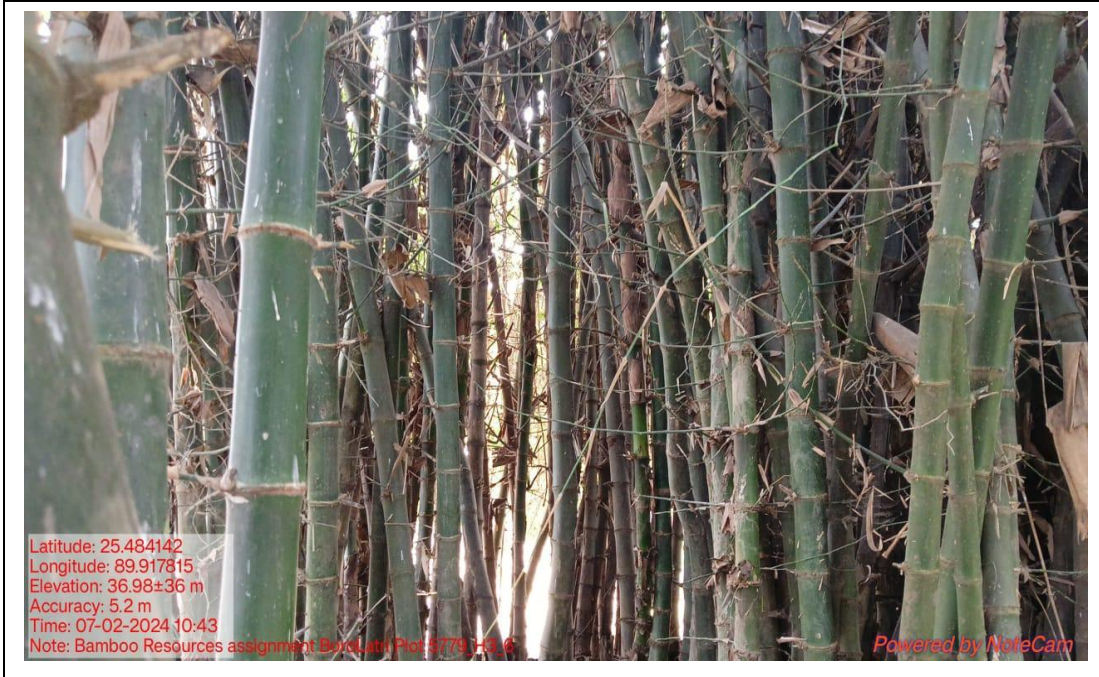


Field picture of *Bambusa balcooa*



Herbarium of *Bambusa balcooa*

Bambusa bambos



Field picture of *Bambusa bambos*

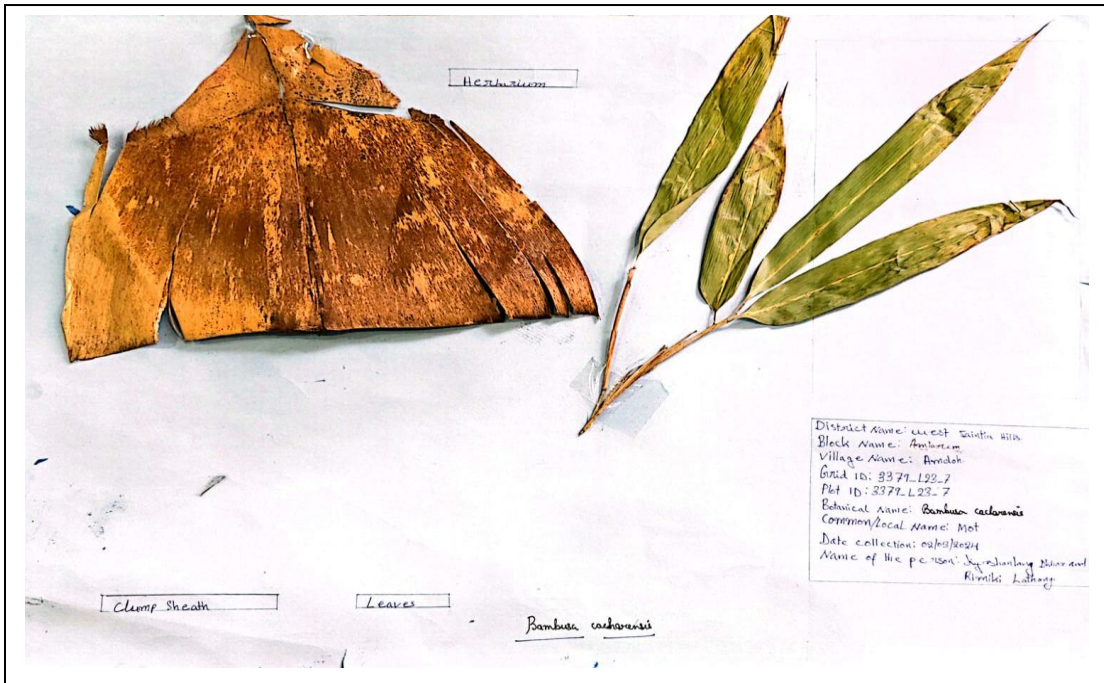


Herbarium of *Bambusa bambos*

Bambusa cacharensis



Field picture of *Bambusa cacharensis*

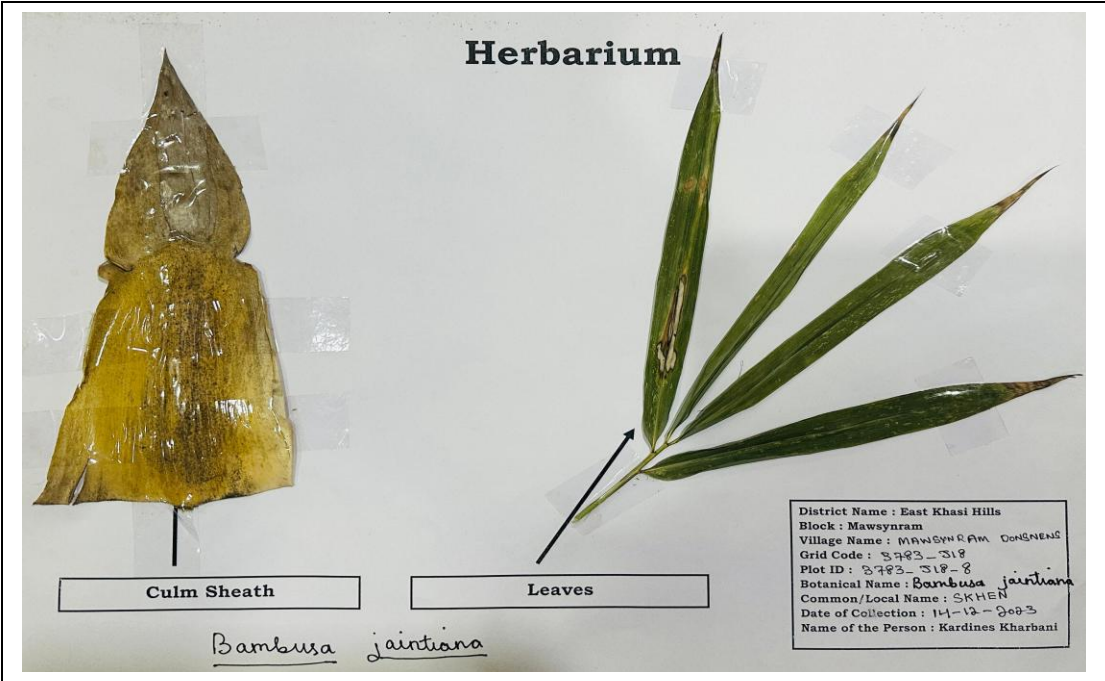


Herbarium of *Bambusa cacharensis*

Bambusa jaintiana



Field picture of *Bambusa jaintiana*



Herbarium of *Bambusa jaintiana*

Bambusa nutans



Field picture of *Bambusa nutans*

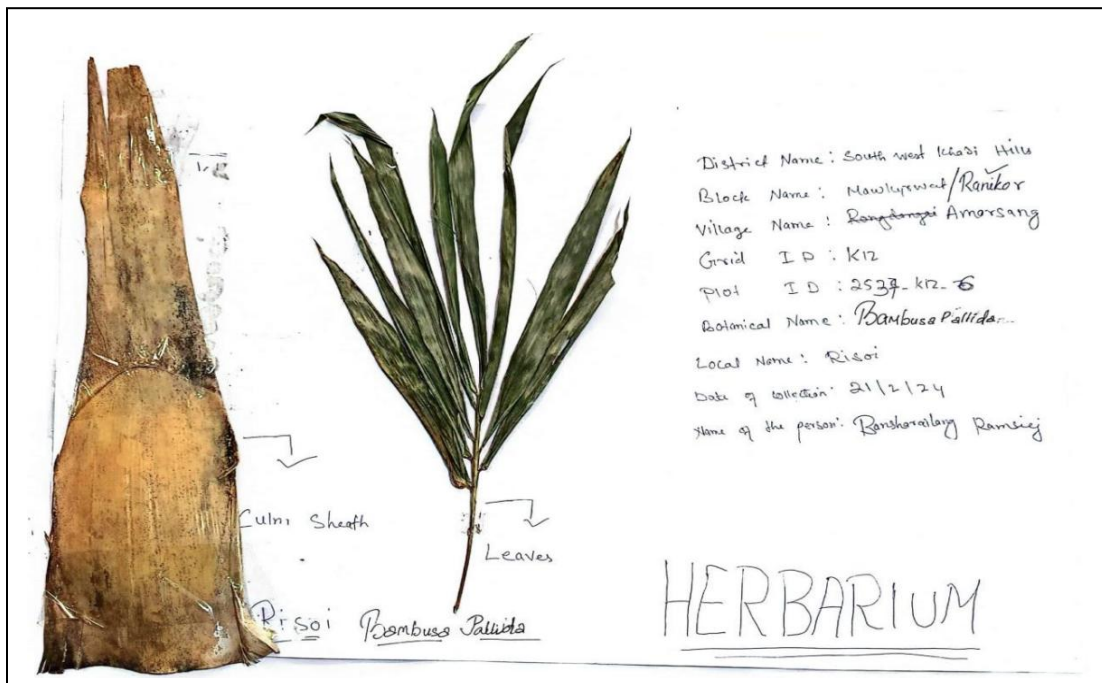


Herbarium of *Bambusa nutans*

Bambusa pallida



Field picture of *Bambusa pallida*

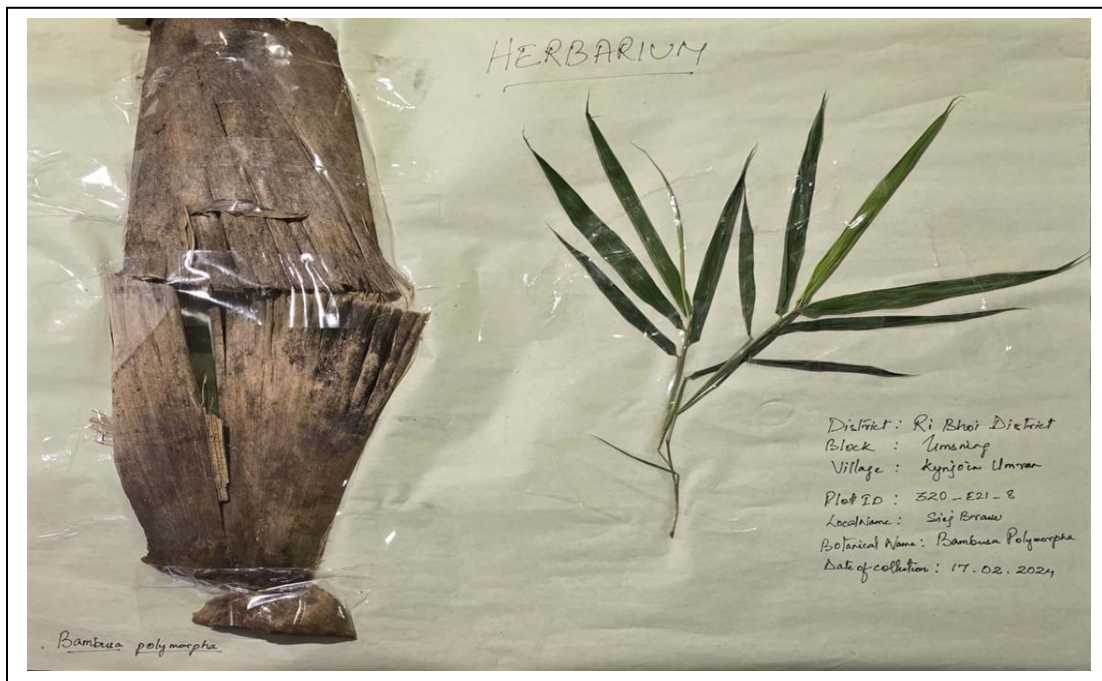


Herbarium of *Bambusa pallida*

Bambusa polymorpha



Field picture of *Bambusa polymorpha*



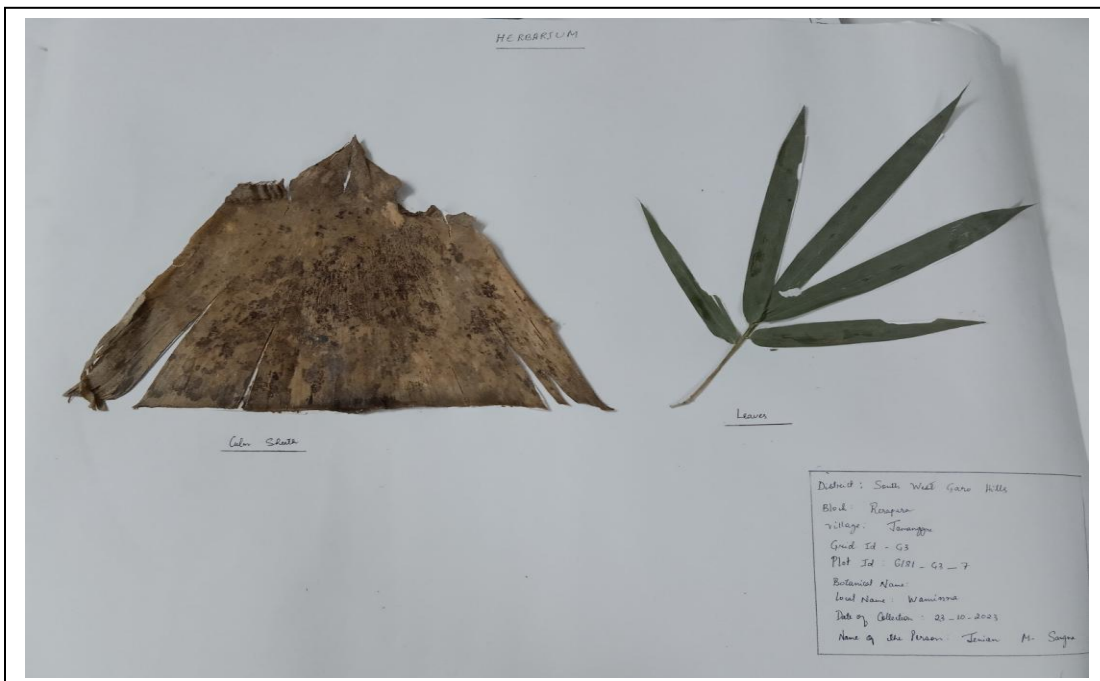
Herbarium of *Bambusa polymorpha*

Bambusa pseudopallida



Field picture of *Bambusa pseudopallida*

Bambusa pseudopallida

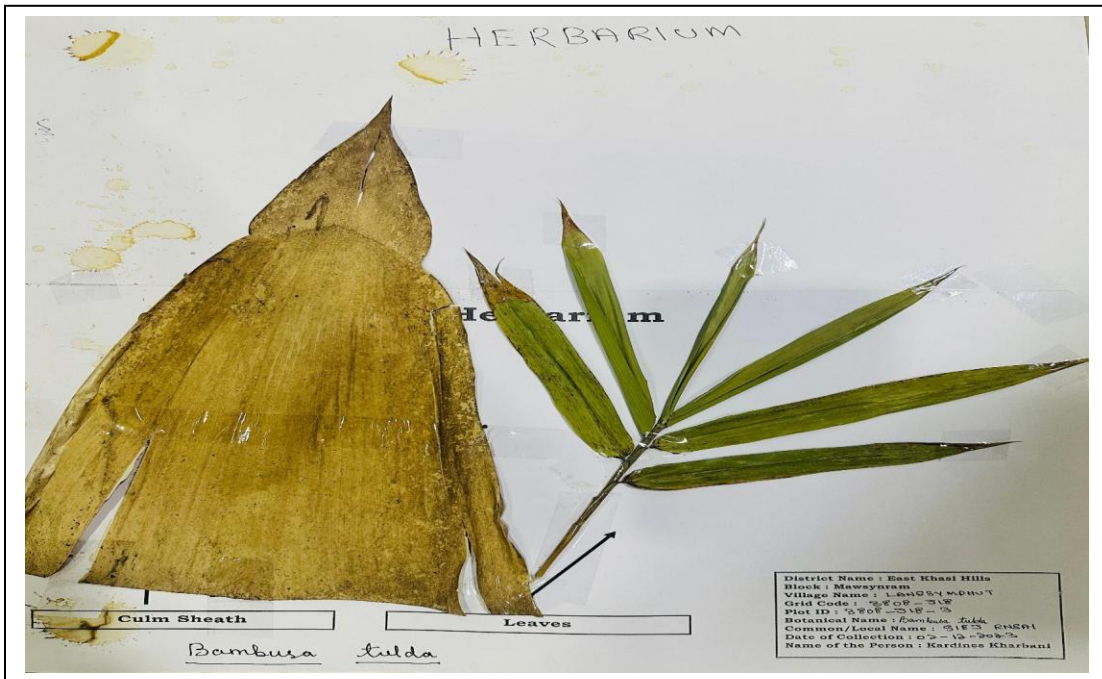


Herbarium of *Bambusa pseudopallida*

Bambusa tulda



Field picture of *Bambusa tulda*



Herbarium of *Bambusa tulda*

Bambusa vulgaris



Field picture of *Bambusa vulgaris*

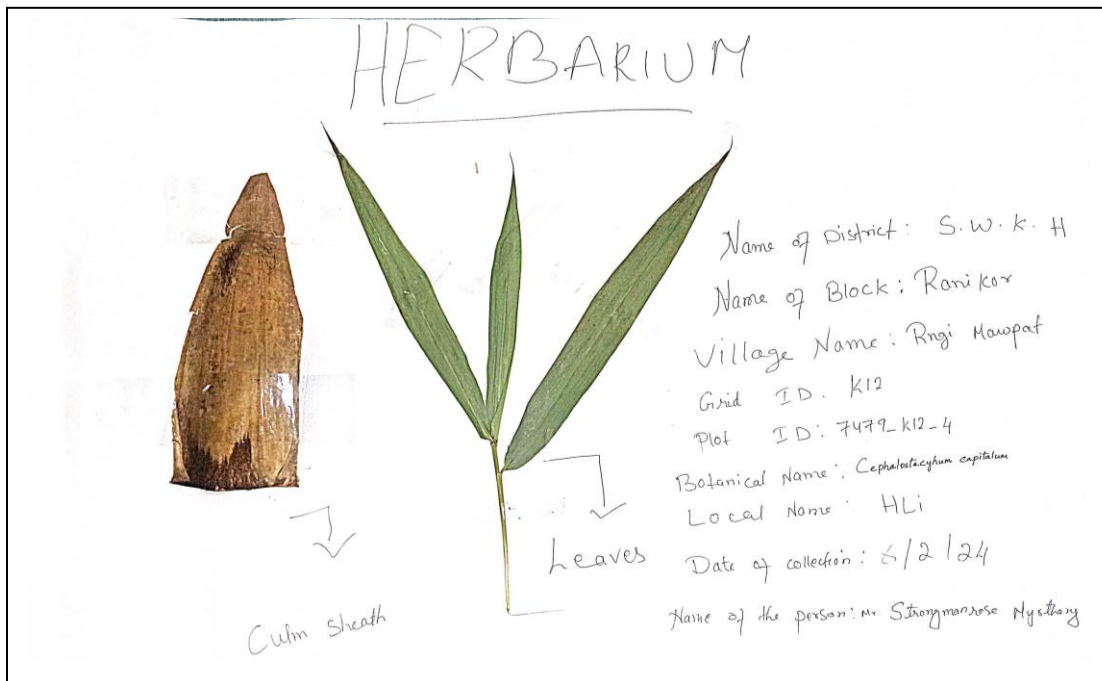


Herbarium of *Bambusa vulgaris*

Cephalostachyum capitatum



Field picture of *Cephalostachyum capitatum*

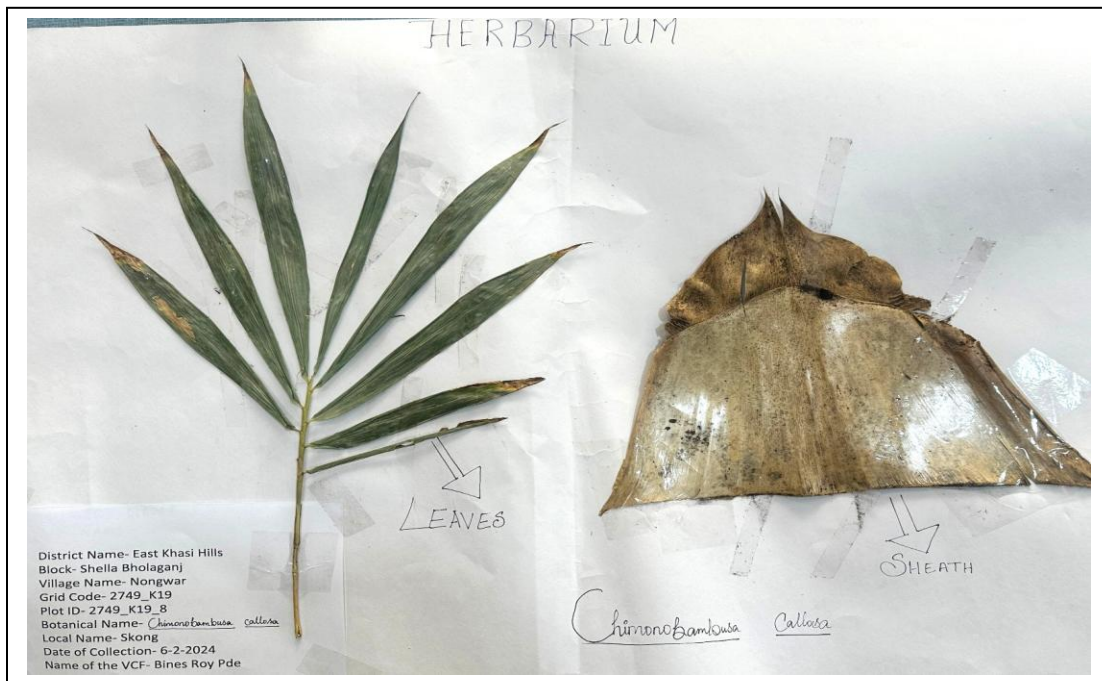


Herbarium of *Cephalostachyum capitatum*

Chimonobambusa callosa



Field picture of *Chimonobambusa callosa*



Herbarium of *Chimonobambusa callosa*

Chimonocalamus griffithiana



Field picture of *Chimonocalamus griffithiana*



Herbarium of *Chimonocalamus griffithiana*

Dendrocalamus hamiltonii



Field picture of *Dendrocalamus hamiltonii*

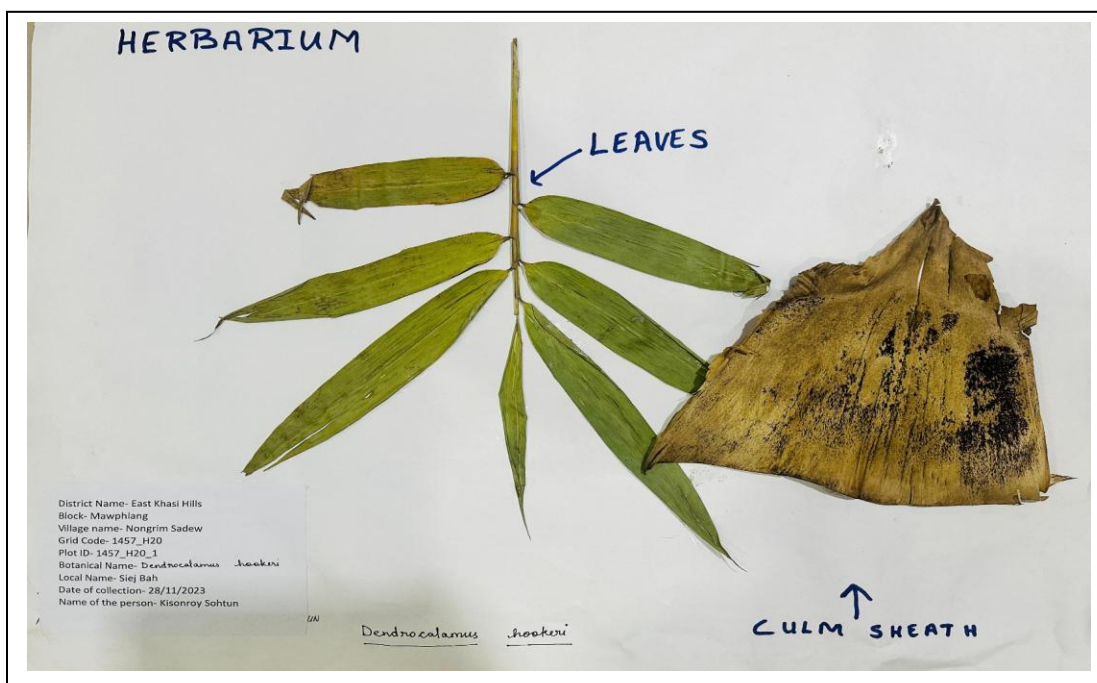


Herbarium of *Dendrocalamus hamiltonii*

Dendrocalamus hookeri



Field picture of *Dendrocalamus hookeri*



Herbarium of *Dendrocalamus hookeri*

Dendrocalamus sahnii

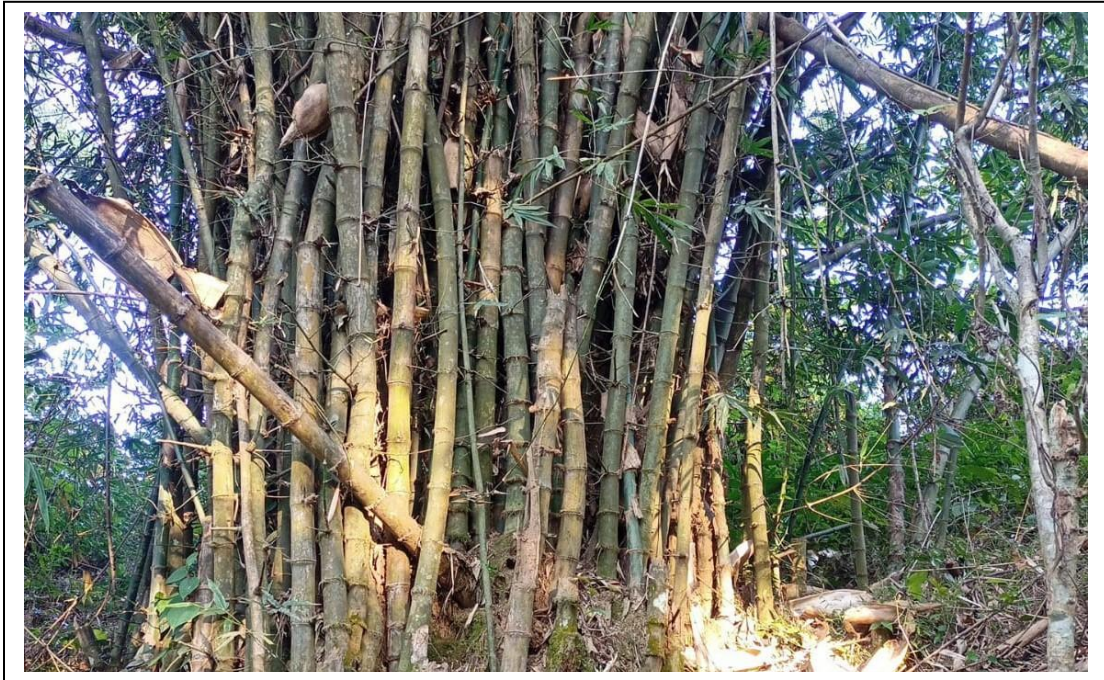


Field picture of *Dendrocalamus sahnii*

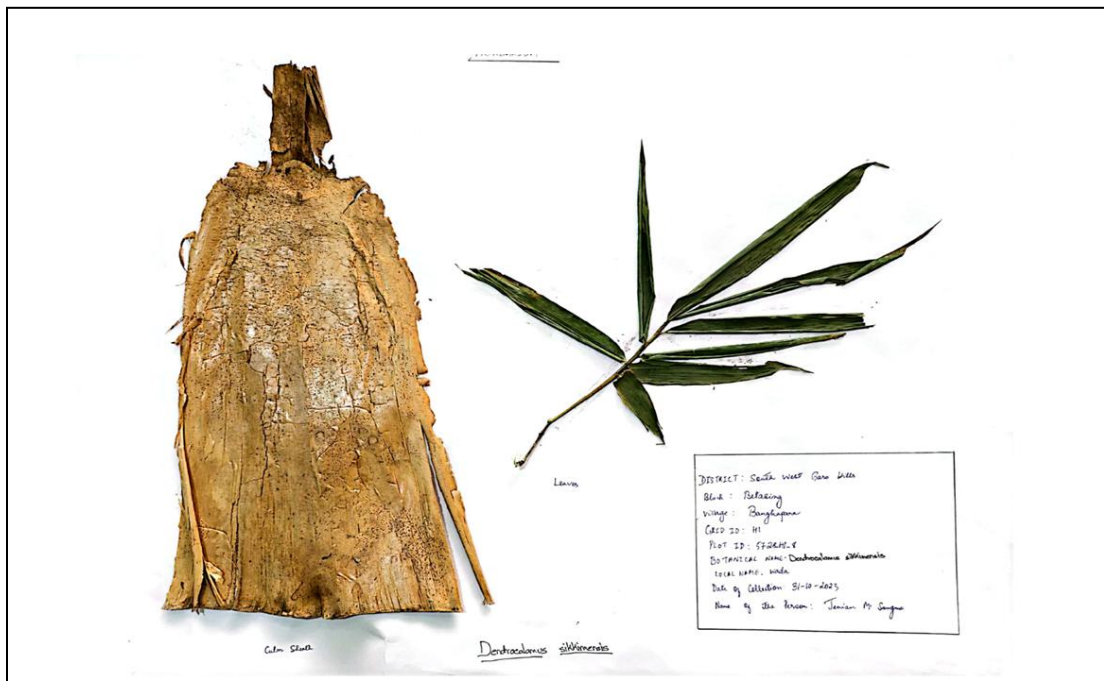


Herbarium of *Dendrocalamus sahnii*

Dendrocalamus sikkimensis



Field picture of *Dendrocalamus sikkimensis*

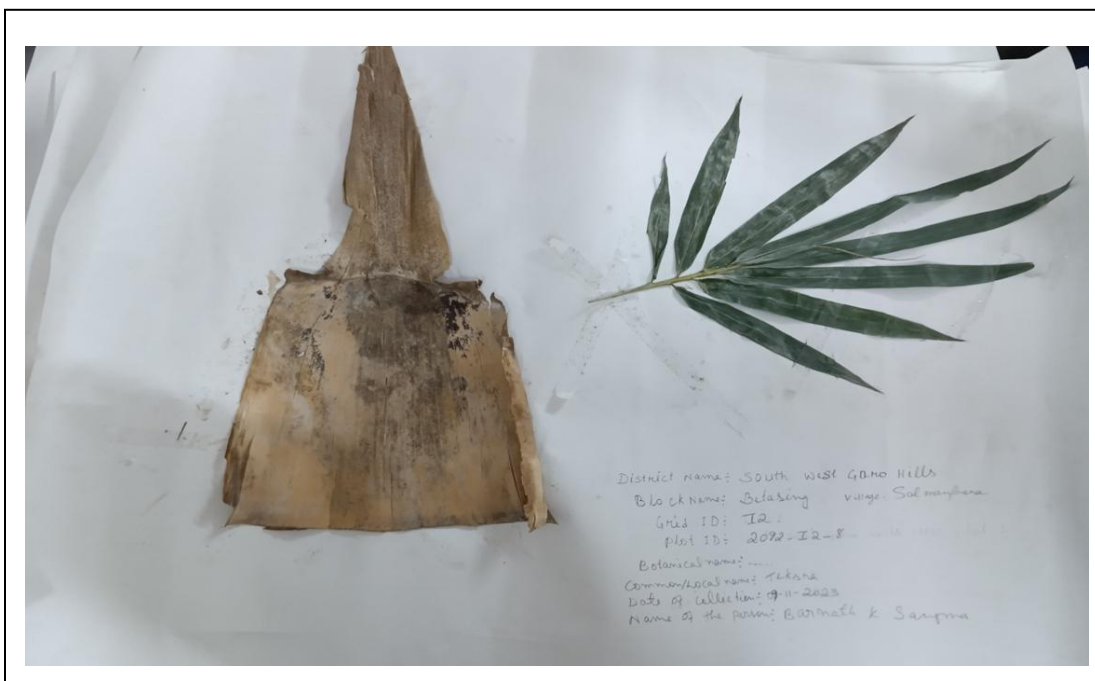


Herbarium of *Dendrocalamus sikkimensis*

Gigantochloa macrostachya



Field picture of *Gigantochloa macrostachya*



Herbarium of *Gigantochloa macrostachya*

Melocanna baccifera



Field picture of *Melocanna baccifera*

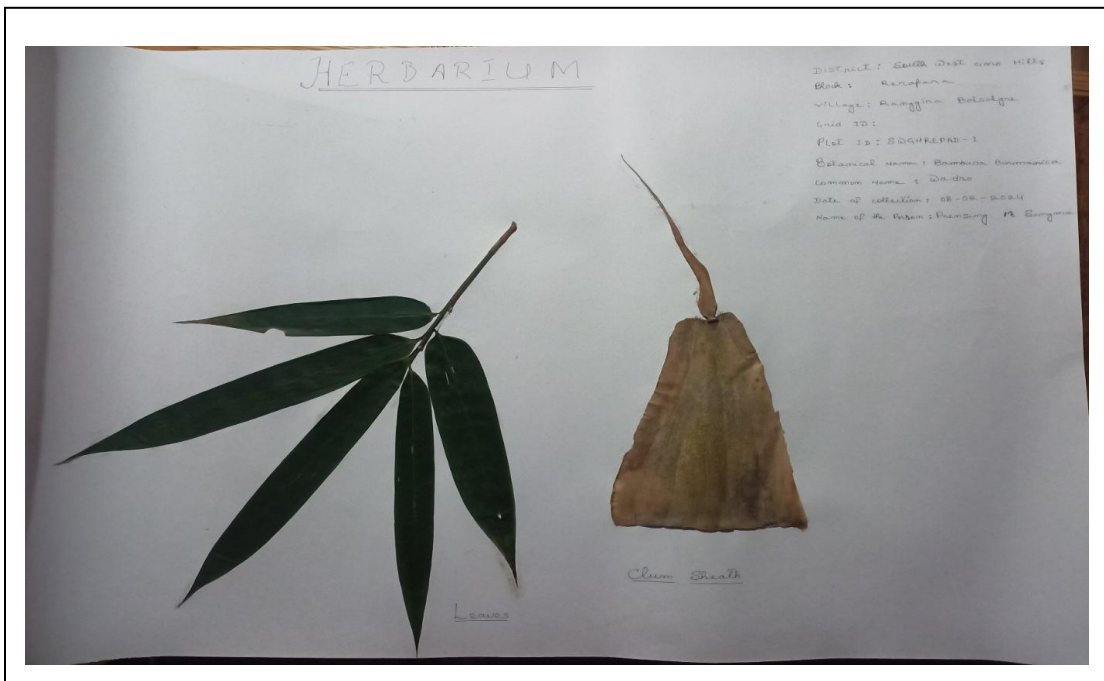


Herbarium of *Melocanna baccifera*

Ochlandra scriptoria



Field picture of *Ochlandra scriptoria*



Herbarium of *Ochlandra scriptoria*

**The Centre of Excellence (CoE) for
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