सत्यमेव जयते

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MESSAGE

Sacred Groves of Meghalaya are the one live examples of rich tradition of preserving biodiversity of the State. These forests also showcase rich conservation practices of local tribal populace which have been part of their traditional ethos and passed on from generations to generations. While many sacred groves are being preserved by the communities with full religious fervor, however, some sacred groves reflect neglect and degradation and degeneration of the spirit. Preservation of sacred groves is a good in-situ conservation strategy. There is a need for developing a conservation plan for preserving these islands of natural heritage with the involvement of communities and create wide awareness about the same.

I am happy to learn that Climate Change, Research & Training Wing of Forests& Environment Department has taken such an initiative of preparing inventory of sacred groves of the State. This initiative includes mapping, floral survey and growing stock estimation. Scientific information on these sacred groves will greatly help in developing suitable conservation actions for preserving these biodiversity rich areas. This volume is first of the series. I congratulate the team of officers and staff involved in this very important task and wish that the inventory reports on sacred groves will be used by all those who have interest in Sacred Groves of Meghalaya and conservation in core of their hearts.



Dr. Shreeranjan IAS
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FOREWORD

Sacred Groves in Meghalaya hold special significance as they are not only rich repositories of Biodiversity but also important from the point of view of traditional knowledge, beliefs and faith of the people. Since these forests have not been disturbed since time immemorial, they also represent climax vegetation type where they exist.

I am happy to see that Forest Resources Survey Division under the Climate Change Research & Training Wing of the Department has undertaken the initiative of inventorising Sacred Groves of Meghalaya on scientific lines and to bring out the reports in volumes for a group of sacred groves. The series of inventory reports will provide useful information for preparing management plans of these sacred groves for further conservation of these vital hotspots of Biodiversity. These inventory reports will also be of immense use to the academicians and researchers for various studies including impact of Climate Change on biodiversity.

I compliment the officers and the staff of Forest Resources Survey Division and Climate Change, Research & Training Wing for undertaking this important exercise and releasing the first volume of the Inventory Report on 20 (twenty) sacred groves in the series.

Shillong
24th May, 2017



(C.P. Marak, IFS)
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PREFACE

Numerous sacred groves in Meghalaya are live examples of age old conservation ethos of the tribal people in the State. These Sacred Groves which according to some estimates may number over 400 in the State have been traditionally preserved by the tribal people viz Khasi, Jaintia and Garo since time immemorial. Religious beliefs and customs associated with these forests have led to evolution of sacred rules (do's and don'ts) in protecting and conserving these forests. Since many of the Sacred Groves have not been disturbed, they represent the climax vegetation flora of the representative forest type. These sacred groves are store houses of rich biodiversity. Though few studies have been undertaken to study and document flora and traditions associated with these sacred forests, no systematic effort has been done to inventorise flora in the Sacred Groves. Considering the high importance of these traditional systems of biodiversity conservation and their profound ecological role, Forest Resources & Survey Division under Climate Change Research and Training Wing of the Forests and Environment Department, Government of Meghalaya has initiated a State vide programme of survey, mapping and inventorization of Sacred Groves existing in the State by using GPS and about 125 sacred groves in Khasi & Jaintia Hills has already been completed and a spatial database in GIS has been created. Inventory of first set of 20 of these sacred groves has also been completed. The inventory of sacred groves includes information such as growing stock, estimate of number and dia-class distribution of trees, identification of trees, shrubs, herbs, climbers and bushes.

This book is the first in the series of volumes presenting survey and inventory information of sacred groves of the State in parts. It is expected that this book will meet the much needed information on the sacred groves of Meghalaya and will be useful to the forest managers, academicians, conservationists and students who have interest in this unique and rich biodiversity resource of the State.

Shillong
24th May, 2017

Dr. Subhash Ashutosh, IFS
Addl. Principal Chief Conservator of Forests
Climate Change, Research & Training,

ACKNOWLEDGEMENT

It gives me great satisfaction to see culmination of the efforts of several officers of the Department and staff of my Division in the form of this book which is the first volume in the series of Forest Inventory of Sacred Groves of Meghalaya for twenty sacred groves.

As we all know, sacred groves of the State are store houses of Biodiversity which have been preserved by the communities since immemorial time. Inventory of forest resources in the sacred groves is important to understand species and their distribution, growing stock and other parameters of plants, growing naturally in these forest groves.

I am grateful to PCCF & HoFF for his kind support and encouragement in implementing the work.

I thankfully acknowledge the initiation, conceptualization and technical guidance provided by Dr. Subhash Ashutosh, Additional PCCF (CC, R&T) at every stage of this work including writing of the book.

I acknowledge valuable assistance given by Shri D. Sathiyan, IFS and Shri W.S. Manner, IFS, the previous and present Conservator of Forests (CC, R&T) during the course of the field work.

I would like to thank Shri D.S. Bist, former Assistant Director of Forest Survey India (FSI) Dehradun for his valuable inputs, imparting training on growing stock estimation, calculation of volume and preparing guidelines which has been followed comprehensively throughout this exercise. I would also like to thank Shri N.N. Rabha Ex-Assistant Botanist, Botanical Survey of India (BSI), Shillong for his contribution in the taxonomy (identification) of floral species. I thank Shri. M. Wanniang, Range Forest Officer for his utmost dedication in his duties and close monitoring of whole exercise without whom this report could not have been made possible. I convey my heartfelt gratitude to the members of all the three Crews and their leaders for their dedication and hard work in collection of field data. I am also thankful to our staff Smti. Bemeness Lyngdoh and Smti. Senobia Chyne for their dedication in data entry and typing the text of this document.

Shillong

24th May, 2017

M.M. Sangma, MFS,
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Chapter - I

1. Introduction

Meghalaya is known for the age old conservation practice by the community people of the State in the form of preserving sacred groves. According to the estimates by different academicians, the number of sacred groves in the State is likely to be more than 400 hundred. These sacred groves are store houses of rich floral and faunal diversity. There are rich traditional knowledge, beliefs, stories, rituals and faith of the people associated with these sacred groves.

There are only few studies available on some of the sacred groves in the literature but so far no detailed and systematic study of these sacred groves has been undertaken. To bridge this information gap, the Forest Resources Survey Division under the Climate Change, Research and Training Wing of the Forests and Environment Department, Meghalaya has undertaken an exercise of conducting detailed forest inventory of the sacred groves of the State in phased manner as a continuing work over the several years. In the first set, 20 sacred groves in Khasi and Jaintia Hills have been taken up for the inventory exercise. Inventory of sacred groves include boundary mapping, assessment of growing stock, diameter class distribution of trees, listing of all floral species including herbs, shrubs and bamboo species. Inventory has been done using a random sample design for each sacred groves separately on random sample points. Sample plot of 0.2 ha were laid on the ground and measurements were taken accordingly. Methodology of inventory has been given in the later section of this document. Inventory results and other observations for each of the 20 sacred groves are presented in the sub chapters for each sacred grove separately.

2. General Information on Sacred Groves of Meghalaya

A good example of the traditional practices by various indigenous communities of the world in the conservation and protection of small forests patches and dedicating these to the local ‘deities’ and such forest patches are called “sacred groves”. Sacred Groves are the tracts of virgin forests that are left untouched by the local inhabitants which harbour rich biodiversity and are protected by the local people due to their culture and religious beliefs and taboos believing that the deities reside in them (Khan et al 2008).

Sacred Groves originated in Meghalaya since time immemorial much before the advent of Christianity. The local tribal people believe that ‘U Basa’ or goddess dwell among these thick and virgin forests. According to their belief that pleasing ‘U Basa’ through sacrifice of animals (pig, goat, cow, buffalo and fowl) together with performing dances; the Basa will protect their villages or clans from famine and other sufferings or bad omens. In the past, people did not dare to enter or destroy

these forests. It is interesting to know that till date, in some sacred groves, people are not allowed even to pluck twigs of plants, use wire or steel, wear shoes/ slippers take photography or attend a nature's call.

All forms of vegetation are supposed to be protected by the reigning deity of that groves, and any disturbance is a taboo (Vartak and Gadgil 1973, khan et al. 1987, Khiewtam and Ramakrishna 1989). Sacred Groves are used as indicators for potential natural vegetation (Schaaf 1998) and are vital for the well-being of the society. Sacred groves or sacred trees serve as home for birds and mammals and hence, they indirectly help in conservation of living organisms (Islam et al. 1998). Even before starting the survey works in some selected sacred groves, the Lyngdoh (Chief) had to initially perform rituals, seeking permission from the "Basa" to allow the field crew to enter and carry out the survey works in peace and harmony. In some sacred groves rituals are performed annually even today.

Later with the advent of Christianity and with the rise of education and literacy; the people slowly drifted away from the beliefs of "U Basa". This trend perhaps led to the sacrilege of the sacred groves in several instances. Some of the sacred groves are plagued with encroachment, illegal felling of trees and invasion by unwanted weeds and invasive species which has in turn destroyed these pristine and relic forests of the State.

The National Forests Policy of 1988 which aims at bringing 33% of the country's geographical area under the forests/tree covers (hilly areas 60% or more of the total geographical area) assume much significance for protection and improvement of the existing forest in the wake of various ecological and anthropological threats, hence requiring attention, protection and conservation of these virgin forests to achieve the desired goals.

Besides, the sacred groves provide a number of ecosystem services such as reduction in erosive force of water, conservation of soil, maintenance of hydrological cycle, availability of water of desired quality and natural dispersal of seeds of useful species. The sacred groves also help in maintaining the desirable health of ecosystems, reduce habitat destruction, conserve the viable population of pollinators and predators, serve as potential source of propagules that are required for colonization of wastelands and fallows, conserve the indigenous flora and fauna and preserve the cultural ethical practices developed through indigenous knowledge of generations (Ramakrishna and Ram 1988, Godbole et al. 1998, Godbole and Sarnaik 2004, Tiwari et al. 1998 and Singh et al. 1998).

Thus the traditional worship practices of nature as followed in different parts of the world do contribute to the promotion of the regional/national goals of conservation of biodiversity and keeps the ecological processes balanced, which is necessary for human survival. They also play an important

role in the conservation of flora and fauna. Several rare and threatened species are found only in sacred groves, which perhaps are the last refuge for those vulnerable species.

In Khasi hills, Law Lyngdoh Nonglyngkien and Law Lyngdoh Iing-Blei Nonglyngkien situated in South West Khasi Hills are good exemples of such sacred groves. These two sacred groves are owned and controlled by the Lyngdoh Nonglyngkien clan. They have been registered with the Chief (Syiems) of Maharam Syiemship on 5th April 1909. In these sacred groves, people who are not from the Lyngdoh clan cannot enter inside and even the clan members are allowed only when at the time of giving offering or performing rituals. Only the designated clans involve the preparation of such sacrifices like Nongknia Lyngdoh Rangbah (head of sacrificing ceremony), U Lyngdoh pomblang (one who sacrifices goat), U Lyngdoh Dieng Sning (one who plant Quercus species during rituals), ka nong seng knia (one who prepares the sacrifice) ka nong pom sla (who gather leave for the sacrifice) can enter into the sacred groves, that too only four times a year.

Four types of offerings performed by the lyngdoh Nonglyngkien clan since time immemorial are:-

1. **Krod Lyngdoh**- This is performed annually in the month of March for repairing of the altar and for jungle clearance along the boundaries/burning down of debris. This offering is made to the deity, to pray and seek blessings before sowing the crops.

2. **Rah Snieh**- This is performed annually during the month of June where a sapling of a Quercus species (Dieng sning) is planted in front of the altar performed with chanting, singing, dancing and beating of drums. This is a symbol to preserve the flora of the sacred grove. In this offering they also sacrifice a goat, praying to the deity to bless them and cleanse their sins. They kept the head of the goat on the planted tree as a symbol of sacrifice.

3. **Knia San dei**- This ritual is performed during the month of October. It is performed by a lady priest and U Lyngdoh by sacrificing a fowl (hen). In these rituals, they pray to the god to save their crops like rice, maize etc from the storms, or other calamities until harvesting time.

4. **Shat dur**- This ritual is performed during the month of December or January after harvest. In these rituals, their harvest is gathered from each household for sharing the same with community members, they also dance and sing to thank god for their harvest. It is performed at the altar of Law Lyngdoh Iingblei. Other sacred groves which are still performing annual rituals are Law Lyngdoh Lyngiong and Khlo Blai Raij Khonshnong

Chapter - II

Estimation of Growing Stock (wood volume)

The information on forest growing stock has traditionally been reckoned as a key indicator of forest health and productivity. Periodic estimate on forest growing stock is essential to develop national policies and strategies for sustainable use of forest resources. In addition, the growing stock estimate leads to quantification of biomass, which in turn is essential to assess the amount of carbon stored in the forests. The estimation of growing stock has, therefore, assumed significance in the existing climate change scenario. In addition, the precise and time series information on growing stock has become essential for implementation of REDD+ strategy in the country. As per the FAO and UNFCCC guidelines for implementation of REDD+ strategy, every country should have a National Forest Monitoring System under which three essential components are, satellite based monitoring system, national forest inventories and Green House Gas inventory.

There are about 125 sacred groves spread over the State in different locations of different districts especially in East Khasi Hills, West Khasi Hills, South West Khasi Hills, Ri-bhoi, East Jaintia Hills and West Jaintia Hills. The extent of the grooves varies from 0.2 ha to about 200 ha. The terrain varies from flat, gently rolling to steep slope. Most of the grooves are having closed forest of mixed spp. These groves are under the control of the nearby villages. In some of the groves plantations activities are carried out by the Forest Department.

Methodology

For the purpose of estimating growing stock, enumeration has been carried out depending upon the size of the grove. Since some of the groves are of big size, therefore, in such cases 100% enumerations has not been recommended. The following criteria has been adopted.

1. 100% enumeration – in grooves having area < 10 ha.
2. 20% enumeration – in grooves having area 10 - 50 ha.
3. 10% enumeration – in grooves having area > 50 ha.

(a) Groves having area less than 10 ha

These areas have been approached with the help of GPS and the map. 100% enumerations has been done in these groves. With the help of a nylon rope or a measuring tape the area was divided in different parts as per the convenience and then enumeration was carried out part by part. The trees which were enumerated once were marked with some marker or chalk stick so that there may not be any chance of duplicacy or skipping of any trees.

(b) Selection of 20% and 10% area of the Groves having extent of 10-50 ha and more than 50 ha respectively.

- For selecting 20% of the area for enumeration, in the map of the grove, grid lines (lat-long) were drawn at the spacing of 2′ x 2″. As an example this exercise has been done in BRI RAIJ BHOIRYMBONG sacred grove.

- Numbering was done on the grided map, starting from the NW corner of the map. The numbering was done (North to South) downwards along the column followed by West to East along the row. The grids covering less than half of the area was ignored and not numbered. In the present case total number of grids comes out to be 25.
- 20% of the total area of the grove was calculated. In the present case total area of the grove is 10.13 ha, then 20% of this area may be about 2 ha i.e. enumeration should be done in 2 ha area within the groove.
- Within a grid, enumeration in a plot size of 0.2 ha i.e. 44.72 m x 44.72 m is recommended. As such in the present grove the number of plots of 0.2 ha to be enumerated will be 2/0.2= 10 plots. These 10 plots were laid down in 10 different grids.
- Out of the 25 grids marked on the map, 10 grids were selected. For this purpose divide 25 by 10, the quotient is 2 and remainder is 5. So the first grid selected is No. 5 (i.e. remainder) and the rest grids will be after a gap of 2 (quotient) i.e. 7,9,11,13,15,17,19,21& 23. In this way no. of grids to be enumerated may be found for other groves also.
- The diagonals of selected grids were drawn and the intersection of these diagonals is called the centre of the grid.
- The coordinates i.e. Lat-Long of the central pt. of the selected grids were noted with the help of the same grids map.

Field Work:

1. Equipment and other materials required

The following items should be used for field work:

1)	Silva Compass/Any other compass	1 No
2)	GPS handset with extra batteries	1 No
3)	Hypsometer/Abney's level for height measurement	1 No
4)	30-50 m (Self rolling) measuring tape or rope/chain marked at every 10 meters	2 No
5)	Digital Camera & charger	1 No
6)	Calliper	1 No
7)	Field Maps	as necessary
8)	Field Form	-do-
9)	Field Manual	-do-
10)	Note Books	-do-
11)	Pen & Markers	-do-
12)	Hand calculator	1 No
13)	Pathal/Khukhri	2 No
14)	Girth measuring tapes (2m length)	2 No

2. Laying out of plots

(a) Groves having area less than 10 ha

No plot is laid out in these grooves since 100% enumerations have to be done in such cases.

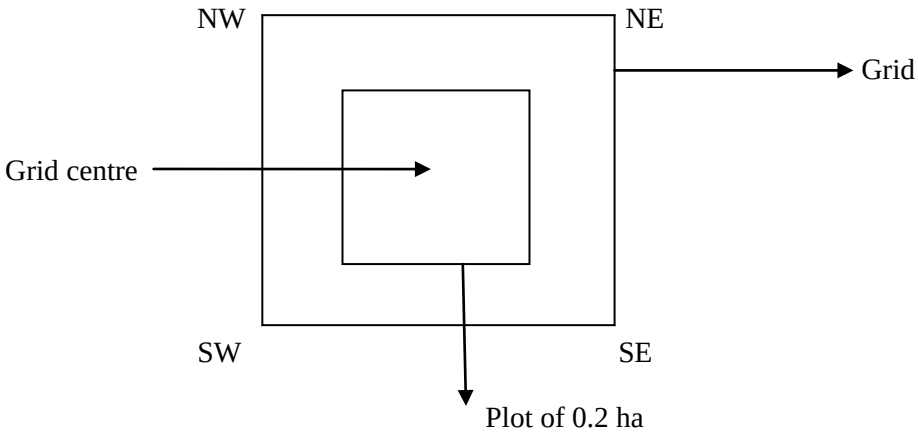
(b) Groves having area 10-50 ha

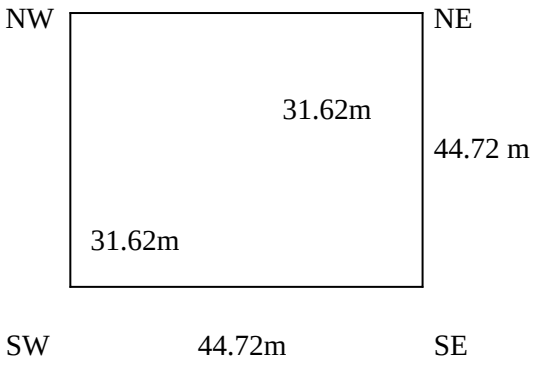
To locate the centre point of the selected grid (for enumeration) the GPS is used (by feeding the Lat-Long of the central pt.). After locating the center point a stout peg of 10cm dia and 1.5m ht is fixed. From this center point 31.62m distance is measured in NE, SE, NW and SW directions i.e. in the direction of 45°, 135°, 225° and 315°. These four corners are joined so as to form the desired plot and these corners are marked by thin poles of 1.5m ht. If possible ranging rods or some flags could be used at the corner points to check the dimension of the plot. Each side of the plot should be 44.72 metres. All distances are measured horizontally. It is ensured that the laid out plot (0.2 ha) does not fall outside the limits of the grove. If in any direction it falls outside, in that case the centre pt. is shifted as necessary, so that the laid out plot may fall inside the grove area. Now the grid plot can be used for enumerations and other measurements.

If any selected grid is inaccessible due to difficult terrain, then in that situation the next/previous grid is laid out for enumeration.

(c) Grooves having area more than 50 ha

Same procedure as given in (b) (for 10-50 ha area grooves) has been adopted.





3. <u>Data collection</u>

After reaching the desired grove or the grid centre inside the grove, some of the qualitative information is recorded by occular method for the entire grove. Various information are collected from the field such as land use, legal status, crop composition, soil, grazing, fire etc. The collected

information is recorded in ***Sacred Grove Plot description Form*** (Field Form No. 1) and ***Sacred Grove Plot Enumeration Form*** (Field Form No. 2).Description to fill up these forms are given below:

1. ***Sacred Groove Description Form***

   Only one form is filled up for each sacred grove. In this form general information about the grove is recorded by field observations and local enquiry. The form is self-explanatory.

2. ***Sacred Groove Plot Enumeration Form***

   In this form data of all the trees at breast height (1.37m) of having diameter 10cm and above is collected starting from North- East direction of the plot centre. The dead tress having utility less than 70% and all trees having less than 10cm dbh are ignored. If the plot contains Bamboo, then in that case bamboo clumps are considered as tree for the purpose of Sl No., name of species and height except for girth, where no. of culms in the clump are recorded. For filling this form following instructions are followed:

Item	**Description/Definitions**
Plot No	in two digits from the map
Name of the District	in text form
Name of the Sub-division	in text form
Name of Block	in text form
Name of the grove	in text form
Name of village/Nearest village	in text form
Syiemship	in text form
Distance from road	in text form
Lat-long of plot centre	from map in numeric form
Total No. of trees enumerated	in three digits
Sl No. of tree	in three digits
Species Name	in text form, - the name should be preferably botanical otherwise common/local names may also be written
Girth of tree	in cms in three digits
Tree height	in metres in two digits

4. Field Measurements

Mainly two types of measurements are made within the grove/plot:

(a) Measurements of Girth/DBH (Diameter at Breast Height) over bark:

Girth of the tree is measured at breast height i.e. 1.37m above the ground with the help of measuring tape to the nearest cm and recorded in the field form in 3 digits e.g. 85cm girth is recorded as 085cm. Diameter of the tree over bark (dbh.ob) is measured with the help of calliper keeping all the arms of the calliper horizontal, if required otherwise everywhere girth is measured for uniformity. In case of hilly terrain, the measurements are taken at 1.37meters above the ground from uphill side.

(b) Measurement of Height of the tree:

The height of the trees is measured in meter to the nearest even number from bottom of the tree to the top of the tree with the help of ***Abney's Level*** or ***Blume Leiss Hypsometer***. In hilly terrain, bottom of the tree is considered in the uphill side and corrections are applied for the slope. The height is recorded in two digits in the field form.

Abbreviation used:

dbh (ob)	Diameter at breast height over bark
Girth (ob)	Girth at breast height over bark
m	metres
cm	centimeters
pt.	point
Lat.	Latitude
Long.	Longitude
ha	hectare
ht.	height.
wrt	with respect to
MSL	mean sea level
KHADC	Khasi Hills Autonomous District Council
JHADC	Jaintia Hills Autonomous District Council
FSI	Forest Survey of India

In the sacred groves volume corresponding to each tree was calculated using the local volume equations developed by Forest Survey of India (Govt. of India) for Meghalaya state. The tree species for which volume equation are not available for Meghalaya, for them the volume equation of adjoining state i.e. Assam state have been used. A list of volume equations used for estimating the

volume of the trees is given below. By using these volume equations, Volume has been estimated for all the species enumerated within the grove specieswise and girth classwise.

Volume Equations for Forests of Meghalaya

1. *Albizzia* spp
2. *Bombax ceiba*
3. *Duababga sonneratiodes*

Local $V = 0.29208+0.00092412\ D^2$ (dia in cm)

4. *Amoora wallichii*
5. *Gmelina arborea*
6. *Kydia calycina*

Local $V = -0.0087 +0.003675D+0.0007398D^2$ (dia in cm)

7. *Anthocephalus cadamba*
8. *Schima wallichii*

Local $V = -0.0189+0.0008073D^2$ (dia in cm)

9. *Lannea coromandelica*
10. *Toona ciliata*

Local $V = -1.391-0.14129D+0.001645D^2+0.90411\sqrt{D}$ (dia in cm)

11. *Pinus khasiyana* — Local $V = 0.0232 – 0.011613D+0.0011549D^2$ (dia in cm)

12. *Shorea robusta*
13. *Tectona grandis*

Local $V = -0.027862+0.0010882D^2$ (Dia in cm)

14. *Artocarpus chaplasha* – Local $V = 1.65081-4.57531\sqrt{D}+11.62114\ D^2$
15. *Callicarpa* spp – Local $\sqrt{V} = -0.04506+2.33466\ D$
16. *Careya arborea* – Local $\sqrt{V} = 0.23738 +2.33289D+0.48512\sqrt{D}$
17. *Casearia* spp – Local $V = 0.14031-2.06478\ D+11.25750\ D^2$
18. *Cassia siamea* – Local $V = 0.5159-0.53331D+3.46016\ D^2+10.18473\ D^3$
19. *Cinnamomun* spp – Local $V = 0.14885-1.62875D+5.93114\ D^2+11.73286\ D^3$
20. *Dillenia pentagyna* – Local $\sqrt{V} = 0.31202 +4.75915D-1.83940\sqrt{D}$
21. *Dillenia indica* – Local $\sqrt{V} = 0.05376+3.73731D-0.79622\sqrt{D}$

(At P-88 of book)

22. *Dysoxylum linectiferum* – Local $V = 0.04752+0.50667D+1.88433\ D^2+11.30632\ D^3$
23. *Elaeocarpus* spp – Local $\sqrt{V} = 0.43483+5.72522D-2.59907\sqrt{D}$
24. *Emblicia officinalis* – Local $V = 0.13734-2.49039D+15.59566\ D^2-11.06205\ D^3$
25. *Erythrina* spp – Local $V = -0.07803+1.70258D-9.16180\ D^2+33.91455\ D^3$
26. *Ficus* spp – Local $\sqrt{V} = 0.3629+3.95389D-0.84421\sqrt{D}$
27. *Grewia* spp – Local $V = -0.44075+7.49221D-36.09962\ D^2+71.91238\ D^3$
28. *Macaranga denticulata* – Local $V = 0.13333-2.18825D+13.12678\ D^2$
29. *Mallotus philippinensis* – Local $V = 0.14749-2.87503D+19.61977\ D^2-19.11630\ D^3$
30. *Michelia* spp – Local $V = 0.23057-3.51494D+17.62619\ D^2$
31. *Quercus* spp – Local $V = 0.000295-0.0079835\ D+0.000862\ D^2$ (Dia in cm)
32. *Rhododendron* spp – Local $V = -0.08934+0.70730D +2.139141D^2$
33. *Spondias pinnata* – Local $\sqrt{V} = 0.49487+6.18662\ D-2.95076\sqrt{D}$

34. *Sterculia villosa* – Local V = 0.27909-3.26515D+13.46829 D^2

35. *Terminalia* spp – Local V = 0.50603-6.64203 D+25.23882 D^2 -9.19797 D^3

36. *Vitex peducularis* – Local V = - 0.16386+2.23116D-7.00969 D^2 +22.13099 D^3

37. Rest of the species – Local V= - 0.081297+0.0010659D^2

(Dia in cm)

- Volume in cubic metres ($m^{3)}$
- Diameter (D) is in metres. In some equations it is in cm and has been mentioned there itself.
- $\sqrt{D} = (D)^{1/2} = \left\{ \frac{G}{3.14} \right\}^{1/2}$
- Diameter (D) = $\frac{\text{Girth (G)}}{3.14}$ D and G both in cm

  If D is in metres and G is in cm then

  (D) = $\frac{\text{Girth (G)}}{314}$

5. Forest Resources Survey Division has undertaken the task of mappings of sacred grove of the state. So far 125 Nos. of sacred groves has been mapped with the help of GIS and the list of the 125 mapped sacred grove are as follows:-

Sl. No	Name of the Sacred Grove	Area
1	Khlieh Shnong Sohra Syiemship at Mawphon Syiem	15.932 ha
2	Sacred Groves of Raid Nongpoh	53.71 ha
3	Protected forest of Rikaksiem, Mustoh Village	9.567 ha
4	Sacred Groves of Umwai, at Diengkain	1.246 ha
5	Sacred Groves of Mawthang Sohkhyllung, Wahlong	0.2775 ha
6	Protected Forest of Kynrem Umwai, Mawlong Sirdarship	9.203 ha
7	Protected Forest of Umwai Village, Mawlong Sirdarship at Nurbah	2.001 ha
8	Sacred Groves of Kyntoit Nongduh, Mawlong	0.511 ha
9	Umiong Protected Forest of Khlieh Shnong, Sohra	200.58 ha
10	Inkhrong Sacred Groves of Khlieh Shnong Sohra	11.39 ha
11	Sacred Groves of Kyntoit Mawriang, Mawlong	0.2797 ha

12	Protected forest of Mawthoh Umwai, East Khasi Hills	3.02 ha
13	Sacred Groves of Kyntoit Diengsiar, Mawlong Sidarship, East Khasi Hills	0.675 ha
14	Protected Forest of Mawhiang at Sawsymper	103.44 ha
15	Protected Forest of Pamsanngut Sirdarship at Tyrsad, East Khasi Hills	51.002 ha
16	Protected Forest of Nongsiej Laitwir Kmawan at Bisap Tdei Pongkung, East Khasi Hills	5.866 Ha
17	Sacred Groves of Nongsiej Laitwir Kmawan Clan at Shanglop Nongspung Syiemship, East Khasi Hills	15.715 ha
18	Protected Forest of Nongsiej Laitwir Kmawan Nongdom at Lait Nomlang, East Khasi Hills	17.189 ha
19	Protected Forest of Lait Mawpat at Wah Mawpat, East Khasi Hills	66.273 ha
20	Sacred Groves of Lumsymper at Sawsymper, Pongkung-Lang Symphut	78.189 ha
21	Protected Forest of Mawlynnu at Khon Weiloi	4.851 ha
22	Sacred Groves of Kmawan Rum at Khlar Rumphet, East Khasi Hills	1.933 ha
23	Protected Forest of Lum Kyrphei at Kyrphei, East Khasi Hills	24.138 ha
24	Protected Forest of Mawteibah Village at Lyngkha U Jon, East Khasi Hills	134.96 ha
25	Sacred Groves of Khongsit Clan of Mawlum Tyrsad, Mylliem Syiemship	1.839 ha
26	Protected Forest of Khongsit Clan at Mawlum Tyrsad Mylliem Syiemship	195.07 ha
27	Protected Forest of Kur Myrthong at Umlangmar, Nongspung Syiemship	107.00ha
28	Protected Forest of Mawlynnu at Mawksan War of Raid Saw Symper	39.628 ha
29	Protected Forest of Mawtangor village Pnenbah Mawpait	3.783 ha
30	Protected Forest of Mawlynnu at Rngi Weiloi	62.648 ha
31	Khlaw Blai Pohmurang Dongwahshnong Khlaw Blai Kur Biam Raliang	2.04 ha
32	Sacred Groves Khlaw Blai Moopasah Khonshnong, Raliang	0.60 ha
33	Khlaw Blai Shyllong Raliang- Khlaw Blai Kur Biam	0.08 ha
34	Law A-Dong of Pynden Sakwang, South West Khasi Hills	9.89 ha

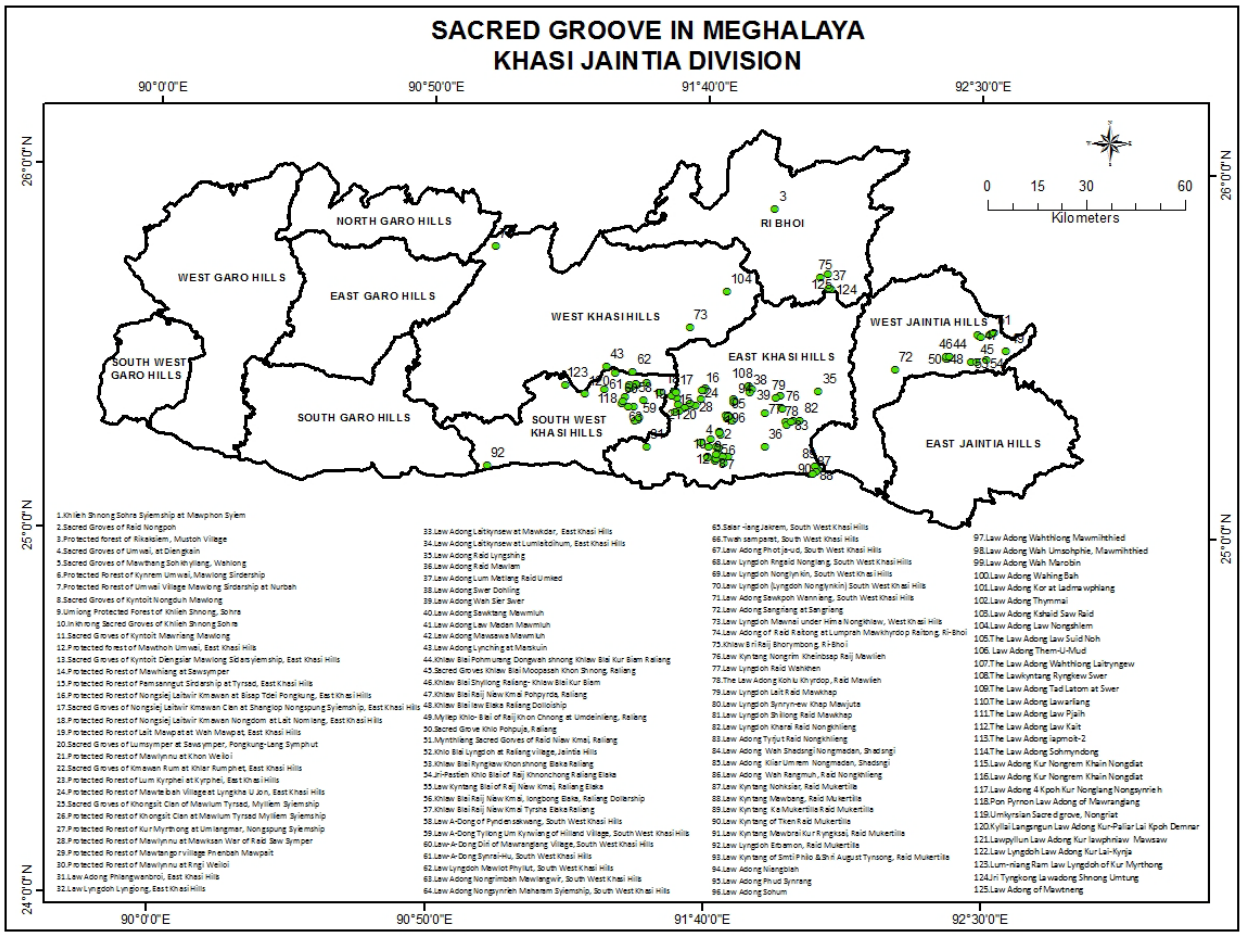
35	Law A-Dong Tyllong Um Kyrwiang of Hilland Village, South West Khasi Hills	16.2 ha
36	Khlaw Blai Raij Niaw Kmai Pohpyrda, Raliang	4.36 ha
37	Khlaw Blai Iaw Elaka Raliang Dolloiship	0.68 ha
38	Myllep Khlo- Blai of Raij Khonshnong at Umdeinlieng, Raliang	11.85 ha
39	Law-A-Dong Diri of Mawranglang Village, South West Khasi Hills	6.93 ha
40	Sacred Grove Khlo Pohpuja, Raliang	0.63 ha
41	Law-A-Dong Synrai-Hu, South West Khasi Hills	5.38 ha
42	Mynthliang Sacred Grove of Raid Niaw Kmai, Raliang	0.33 ha
43	Law Lyngdoh Mawlot Phyllut, South West Khasi Hills	16.54 ha
44	Law Adong Nongrimbah Mawlangwir, South West Khasi Hills	34.65 ha
45	Law Adong Nongsynrieh Maharam Syiemship, South West Khasi Hills	9.83 ha
46	Salar –iang Jakrem, South West Khasi Hills	10.5 ha
47	Twahsamparat, South West Khasi Hills	29.232 ha
48	Rei-missiom Lawadong of Photja-ud	63.71 ha
49	Law Lyngdoh Rngaid Nonglang, South West Khasi Hills	2.04 ha
50	Law Lyngdoh Iingblei Nonglyngkien, South West Khasi Hills	2.39 ha
51	Law Lyngdoh (Lyngdoh Nonglyngkien) South West Khasi Hills	5.234 ha
52	Law Adong Sawkpoh Wanniang, South West Khasi Hills	5.15 ha
53	Law Adong Phlangwanbroi ,East Khasi Hills	9.65 ha
54	Law Lyngdoh Lyngiong, East Khasi Hills	62.42 ha
55	Law Adong of Raid Raitong at Lumprah Mawkhyrdop Raitong Ri-Bhoi	54.9 ha
56	Khlaw Bri Raij Bhorymbong, Ri-Bhoi	10 ha
57	Law Lyngdoh Mawnai under Hima Nongkhlaw, West Khasi Hills	23.7 ha
58	Law Adong Laitkynsew at Mawkdar, East Khasi Hills	3.79 ha

59	Law Adong Laitkynsew at Lumlaitdihum, East Khasi Hills	17.650 ha
60	Khlo Blai Lyngdoh at Raliang village, Jaintia Hills	3.68 ha
61	Khlaw Blai Ryngkaw Khonshnong Elaka Raliang	55.62 ha
62	Jri-Pastieh Khlo Blai of Raij Khonshnong Raliang Elaka	3.3 ha
63	Law Kyntang Blai of Raij Niaw Kmai, Raliang Elaka	0.47 ha
64	Khlaw Blai Raij Niaw Kmai, Iongbong Elaka, Raliang Dalloiship	1.79 ha
65	Khlaw Blai Raij Niaw Kmai Tyrsha Elaka Raliang	0.51 ha
66	Law Lyngdoh Umjapiar, Mawskuin	9.91 ha
67	Law Lyngdoh Lynching, Mawskuin	47.06 ha
68	Sangriang Sacred grove, Sangriang	40.49 ha
69	Sacred Grove of Kur Maweit	73.91 ha
70	Swer Dohling Sacred grove	73.32 ha
71	Sacred grove of Wahsier, Swer	34.69 ha
72	Sawktang Sacred grove, Mawmluh	18.52 ha
73	Law madan Sacred grove, Mawmluh	11.68 ha
74	Mawsawa Sacred grove, Mawmluh	16.43 ha
75	Mawsahep Sacred groves, Nongriat	1 ha
76	Law Kyntang Nongrim Kheinbsap Raij Mawlieh	1.43 ha
77	Law Lyngdoh Raid Wahkhen	1.97 ha
78	The Law Adong Kohlu Khyrdop, Raid Mawlieh	1.19 ha
79	Law Lyngdoh Lait Raid Mawkhap	4.88 ha
80	Law Lyngdoh Synryn-ew KhapMawjuta	1.01 ha
81	Law Lyngdoh Shillong Raid Mawkhap	0.26 ha
82	Law Lyngdoh Kharai Raid Nongkhlieng	2.02 ha

83	Law Adong Tyrjut Raid Nongkhlieng	13.52 ha
84	Law Adong Wah Shadsngi Nongmadan, Shadsngi	1.15 ha
85	Law Adong Kliar Umrem Nongmadan, Shadsngi	2.59 ha
86	Law Adong Wah Rangmuh, Raid Nongkhlieng	2.58 ha
87	Law Kyntang Nohksiar, Raid Mukertilla	0.13 ha
88	Law Kyntang Mawbang, Raid Mukertilla	0.11 ha
89	Law Kyntang Ka Mukertilla Raid Mukertilla	6.26 ha
90	Law Kyntang of Tken Raid Mukertilla	1.49 ha
91	Law Kyntang Mawbrai Kur Ryngksai, Raid Mukertilla	0.146 ha
92	Law Lyngdoh Erbamon, Raid Mukertilla	0.24 ha
93	Law Kyntang of Smti Philo & Shri August Tynsong, Raid Mukertilla	0.99 ha
94	Law Adong Niangblah	22.00 ha
95	Law Adong Phud Synrang	1.18 ha
96	Law Adong Sohum	1.17 ha
97	Law Adong Wahthlong Mawmihthied	0.69 ha
98	Law Adong Wah Umsohphie	2.92 ha
99	Law Adong Wah Marobin	1.90 ha
100	Law Adong Wahing Bah	2.67 ha
101	Law Adong Kor at Ladmawphlang	7.16 ha
102	Law Adong Thymmai	1.32 ha
103	Law Adong Kshaid	3.42 ha
104	Law Adong Law Nongshlem	43.94 ha
105	The Law Adong Law Suid Noh	1.16 ha
106	Law Adong Them-U-Mud	1.05 ha

107	The Law Adong Wahthlong Laitryngew	1.90 ha
108	The Lawkyntang Ryngkew Swer	11.07 ha
109	The Law Adong Tad Latom at Swer	17.58 ha
110	The Law Adong Lawarliang	11.07 ha
111	The Law Adong Law Pjaih	6.04 ha
112	The Law Adong Law Kait	0.58 ha
113	The Law Adong iapmoit-2	3.661 ha
114	The Law Adong Sohmyndong	0.80 ha
115	Law Adong Kur Nongrem Khain Nongdiat	6.93 ha
116	Law Adong Kur Nongrem Khain Nongdiat	6.94 ha
117	Law Adong Saw Kpoh Kur Nonglang Nongsynrieh	22.72 ha
118	Pon Pyrnon Law Adong of Mawranglang	9.00 ha
119	Umkyrsian Sacred grove, Nongriat	0.27 ha
120	Kyllai Langsngun Law Adong Kur-Paliar Lai Kpoh Demnar	39.36 ha
121	Lawpyllun Law Adong Kur Iawphniaw Mawsaw	52.03 ha
122	Law Lyngdoh Law Adong Kur Lai-Kynja	14.81 ha
123	Lum-niang Ram Law Lyngdoh of Kur Myrthong	144.39 ha
124	Jri Tyngkong Lawadong Shnong Umtung	10.12 ha
125	Law Adong of Mawtneng	6.942 ha

SACRED GROOVE IN MEGHALAYA
KHASI JAINTIA DIVISION

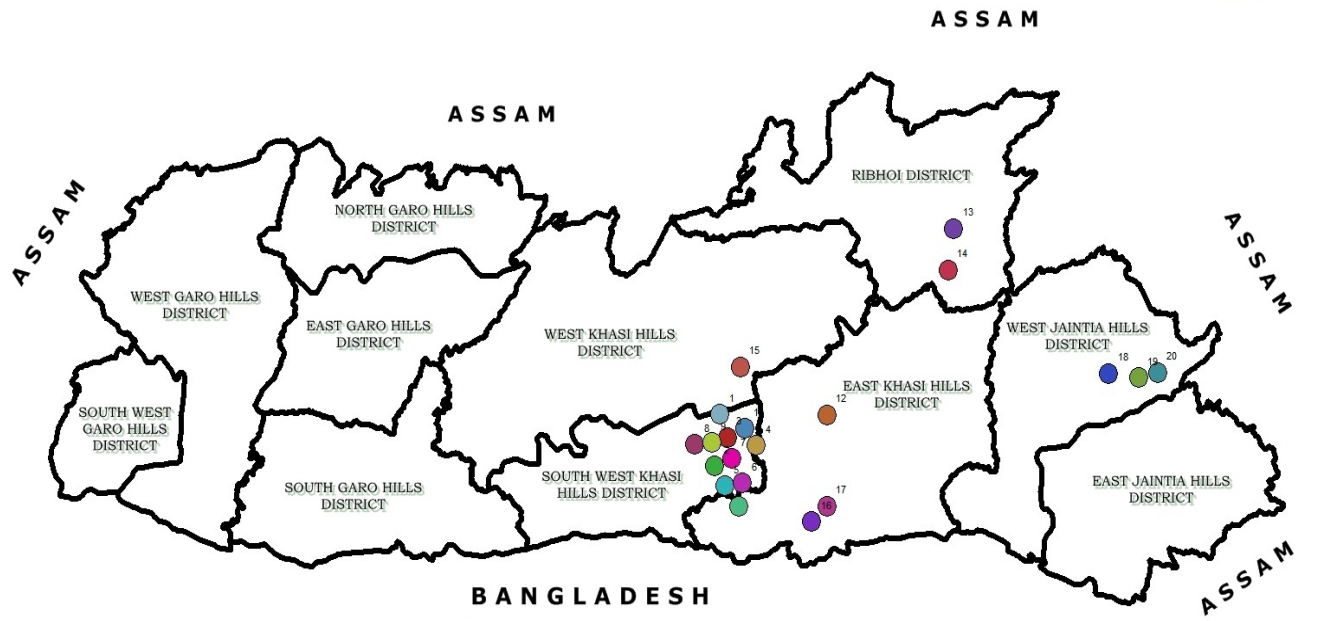


1.Khlieh Shnong Sohra Sylemship at Mawphon Sylem
2.Sacred Groves of Raid Nongpoh
3.Protected forest of Rikesklem, Muston Village
4.Sacred Groves of Umwai, at Dienglkain
5.Sacred Groves of Mawthang Sohkhyllang, Wahlong
6.Protected Forest of Kynrem Umwai, Mawlong Sirdarship
7.Protected Forest of Umwai Village Mawlong Sirdarship at Nurbah
8.Sacred Groves of Kyntoit Nongduh Mawlong
9.Umlong Protected Forest of Khlieh Shnong, Sohra
10.Inkhrong Sacred Groves of Khlieh Shnong Sohra
11.Sacred Groves of Kyntoit Mawriang Mawlong
12.Protected forest of Mawthoh Umwai, East Khasi Hills
13.Sacred Groves of Kyntoit Diengsiar Mawlong Sidarsylemship, East Khasi Hills
14.Protected Forest of Mawhlang at Sawsymper
15.Protected Forest of Pamsanngut Sirdarship at Tyrsad, East Khasi Hills
16.Protected Forest of Nongskiej Laitwir Kmawan at Bisap Tdei Pongkung, East Khasi Hills
17.Sacred Groves of Nongskiej Laitwir Kmawan Clan at Shanglop Nongspung Sylemship, East Khasi Hills
18.Protected Forest of Nongskiej Laitwir Kmawan Nongdom at Lait Nomlang, East Khasi Hills
19.Protected Forest of Lait Mawpat at Wah Mawpat, East Khasi Hills
20.Sacred Groves of Lumsymper at Sawsymper, Pongkung-Lang Symphut
21.Protected Forest of Mawlynnu at Khon Weiloi
22.Sacred Groves of Kmawan Rum at Khlar Rumphet, East Khasi Hills
23.Protected Forest of Lum Kyrphei at Kyrphei, East Khasi Hills
24.Protected Forest of Mawtebah Village at Lyngkha U Jon, East Khasi Hills
25.Sacred Groves of Khongsit Clan of Mawlum Tyrsad, Mylliem Sylemship
26.Protected Forest of Khongsit Clan at Mawlum Tyrsad Mylliem Sylemship
27.Protected Forest of Kur Myrthong at Umlangmar, Nongspung Sylemship
28.Protected Forest of Mawlynnu at Mawsaan Warof Raid Saw Symper
29.Protected Forest of Mawlangpr village Pnenbah Mawpait
30.Protected Forest of Mawlynnu at Rngi Weiloi
31.Law Adong Phlangwanbroi, East Khasi Hills
32.Law Lyngdoh Lyngiong, East Khasi Hills
33.Law Adong Laitkynsew at Mawkdar, East Khasi Hills
34.Law Adong Laitkynsew at Lumkdolhum, East Khasi Hills
35.Law Adong Raid Lyngshing
36.Law Adong Raid Mawlam
37.Law Adong Lum Wetlang Raid Umked
38.Law Adong Swer Dohling
39.Law Adong Wah Ser Siver
40.Law Adong Sawktang Mawmluh
41.Law Adong Law Maden Mawmluh
42.Law Adong Mawsawa Mawmluh
43.Law Adong Lynchiang at Mankuin
44.Khlaw Blei Pohmurang Dongvah shnong Khlaw Blei Kur Blem Rallang
45.Sacred Groves Khlaw Blei Mloopasah Khon Shnong, Rallang
46.Khlaw Blei Shylliong Rallang- Khlaw Blei Kur Blem
47.Khlaw Blei Raij New Kmai Pohpyrda, Rallang
48.Khlaw Blei law Elaka Rallang Dolloship
48.Mylieo khlo- Blei of Raji Khon Chnong at Umdeinieng, Rallang
50.Sacred Grove Khlo Ponguje, Rallang
51.Mynthleng Sacred Gorves of Raid New Kmai, Rallang
52.Khlo Blei Lyngton at Rallang village, Jaintia Hills
53.Khlaw Blei Rynglaw khonshnong Elaka Rallang
54.Jri-Pasteh Khlo Blei of Raji Khnonchong Rallang Elaka
55.Law Kyntang Blei of Raij New Kmai, Rallang Elaka
56.Khlaw Blei Raij New Kmai, Jongbong Elaka, Rallang Dolleship
57.Khlaw Blei Raij New Kmai Tyrsha Elaka Rallang
58.Law A-Dong of Pyndensakwang, South West Khasi Hills
59.Law A-Dong Tyllong Um Kynwlang of Hilland Village, South West Khasi Hills
60.Law-A-Dong Din of Mawrangiang Village, South West Khasi Hills
61.Law-A-Dong Synsniew, South West Khasi Hills
62.Law Lyngdoh Mawiot Phyllut, South West Khasi Hills
63.Law Adong Nongrimbah Mawlangwir, South West Khasi Hills
64.Law Adong Nongsynrieh Maharam Sylemship, South West Khasi Hills
65.Salar -lang Jakrem, South West Khasi Hills
66.Twah samparat, South West Khasi Hills
67.Law Adong Phot Je-ud, South West Khasi Hills
68.Law Lyngton Ringaid Nongiang, South West Khasi Hills
69.Law Lyngton Nongiyn Kin, South West Khasi Hills
70.Law Lyngton (Lyngdoh Nongiynkin) South West Khasi Hills
71.Law Adong Sawkpoh Wanniang, South West Khasi Hills
72.Law Adong Sangniang at Sangriang
73.Law Lyngton Mawnai under Hima Nongkhlaw, West Khasi Hills
74.Law Adong of Raid Rabong at Lumpreh Mawkhyrdop Rabong, Ri-Bhoi
75.Khlaw Bri Raij Bnorymbong, Ri-Bhoi
76.Law Kyntang Nongrim Kheinbssp Raij Mawlieh
77.Law Lyngton Raid Wahkhen
78.The Law Adong Kohlu Khydop, Raid Mawlieh
79.Law Lyngton Lait Raid Mawkhap
80.Law Lyngton Synryn-ew Khap Mawjuto
81.Law Lyngton Shillong Raid Mawkhap
82.Law Lyngton Kharai Raid Nongkhleng
83.Law Adong Tyrjut Raid Nongkhleng
84.Law Adong Wah Shadong Nongmaden, Shadong
85.Law Adong Kilar Ummern Nongmaden, Shadong
86.Law Adong Wah Rangmuh, Raid Nongkhleng
87.Law Kyntang Nonksier, Raid Mukertile
88.Law Kyntang Mawbang, Raid Mukertile
89.Law Kyntang Ka Mukertile Raid Mukertile
90.Law Kyntang of Tkon Raid Mukertile
91.Law Kyntang Mawbrel Kur Rynglsei, Raid Mukertile
92.Law Lyngton Ebamon, Raid Mukertile
93.Law Kyntang of Smti Phlo Bhri August Tynsong, Raid Mukertile
94.Law Adong Niangbiah
95.Law Adong Phud Synrang
96.Law Adong Sohum
97.Law Adong WahthHong Mawmlththied
98.Law Adong Wah Umsohphie, Mawmlththied
99.Law Adong Wah Marobin
100.Law Adong Wahing Bah
101.Law Adong Kor at Iadmawphlang
102.Law Adong Thymmai
103.Law Adong Kshaid Saw Raid
104.Law Adong Law Nongshlem
105.The Law Adong Law Suid Noh
106. Law Adong Them-U-Mud
107.The Law Adong WahthHong Laitryngew
108.The LawKyntang Ryngkew Swer
109.The Law Adong Tad Latom at Swer
110.The Law Adong Lawarliang
111.The Law Adong Law Pjaih
112.The Law Adong Law Kait
113.The Law Adong Iapmoit-2
114.The Law Adong Sohmyndong
115.Law Adong Kur Nongrem Khain Nongdiat
116.Law Adong Kur Nongrem Khain Nongdiat
117.Law Adong 4 Kpoh Kur Nonglang Nongsynrieh
118.Pon Pyrnon Law Adong of Mawrangiang
119.Umlyrsian Sacred grove, Nongriat
120.Kylla Langngun Law Adong Kur-Pallar Lal Kpoh Demrar
121.Lawpyllun Law Adong Kur lawphniaw Mawsaw
122.Law Lyngdoh Law Adong Kur Lai-Kynja
123.Lum-niang Ram Law Lyngdoh of Kur Myrthong
124.Jri Tyngkong Lawadong Shnong Umtung
125.Law Adong of Mawtneng

6. List of 20 nos. Sacred groves with No. of Plots visited in the field:-

Sl. No	Name of Sacred Groves	Area in Ha.	No. of plots
1	Law Lyngdoh Mawlot Phyllut, South West Khasi Hills	16.54	15
2	Law Adong Nongrimbah Mawlangwir, South West Khasi Hills	34.65	36
3	Law Adong Nongsynrieh Maharam Syiemship, South West Khasi Hills	9.83	100%
4	Salar –iang Jakrem, South West Khasi Hills	10.5	10
5	Twahsamparat,Tynnai, South West Khasi Hills	29.32	29
6	Law Adong Photja-ud, South West Khasi Hills	8.59	100%
7	Law Lyngdoh Rngaid Nonglang, South West Khasi Hills	2.04	100%
8	Law Lyngdoh Iingblei Nonglyngkien, South West Khasi Hills	2.39	100%
9	Law Lyngdoh (Lyngdoh Nonglyngkien), South West Khasi Hills	5.234	100%
10	Law Adong Sawkpoh Wanniang, South West Khasi Hills	5.15	100%
11	Law Adong Phlangwanbroi, Hima Malai Sohmat, East Khasi Hills	9.65	100%
12	Law LyngdohLyngiong, Hima Lyngiong, East Khasi Hills	62.42	31
13	Law Adong Raid Raitong at Ri-bhoi District	54.9	25
14	Khlaw Bri Raij Bhorymbong, Raitong, Ri-bhoi District	10	10
15	Law Lyngdoh Mawnai under Hima Nongkhlaw, West Khasi Hills	23.7	25
16	Law Adong Laitkynsew at Mawkdar, East Khasi Hills	3.79	100%
17	Law Adong Laitkynsew at Lumlaitdihum, East Khasi Hills	17.650	17
18	Khlo Blai Lyngdoh at Raliang village of Raliang Elaka	3.68	100%
19	Khlaw Blai Ryngkaw Khonchnong Elaka Raliang Doloiship	55.62	27
20	Jri-Pastieh Khlo Blai of Raij Khonchnong Raliang Elaka	3.3	100%
	Total =	**368.954**	

SACRED GROVES IN MEGHALAYA
KHASI JAINTIA DIVISION



1 Law Lyngdoh Mawlot Phyllut
2 Law Adong Nongrimbah Mawlangwir
3 Law Adong Nongsynrieh Maharam
4 Law Adong of Jakrem
5 Law Adong of Tynnai
6 Law Adong of Phot Ja Ud
7 Law Lyngdoh Rngaid Nonglang
8 Law Ing Blei Lyngdoh Nonglynkin
9 Law Lyngdoh at Nonglynkin
10 Lawadong SawKpoh Wanniang
11 Law Adong Phlangwanbroi
12 Law Lyngdoh Lyngiong
13 Law Adong Raid Raitong
14 Bri Raij Bhoirymbong
15 Lyngdoh Mawnai
16 Lawadong Laitkynsew Mawdkar
17 Law Adong Laikynsew-Lumlaitdihum
18 Khlo Blai Lyngdoh
19 Khlaw Blai Ryngkaw
20 Jri-Pastieh

Chapter –III

1 - MAWKDAR

1.1 Location:

Mawkdar Sacred Grove is situated in East Khasi Hills District of Meghalaya at Laitkynsew village under the Syiemship of Hima Nongkhlaw. It has an area of 3.79 ha and lies between 25° 13′ 8″ to 25° 13′ 10″ N latitude and 91° 40 16″ to 91° 40 20″ E longitude with an altitude of 896m above mean sea level. It is bounded in the North by PWD road to Mawsikriah village, in the South, East and West by village forest and kutcha road to nursery. The grove is accessible by road from Shillong via Sohra-Mawmluh Road. It is about 65km from Shillong.

1.2 Brief History:

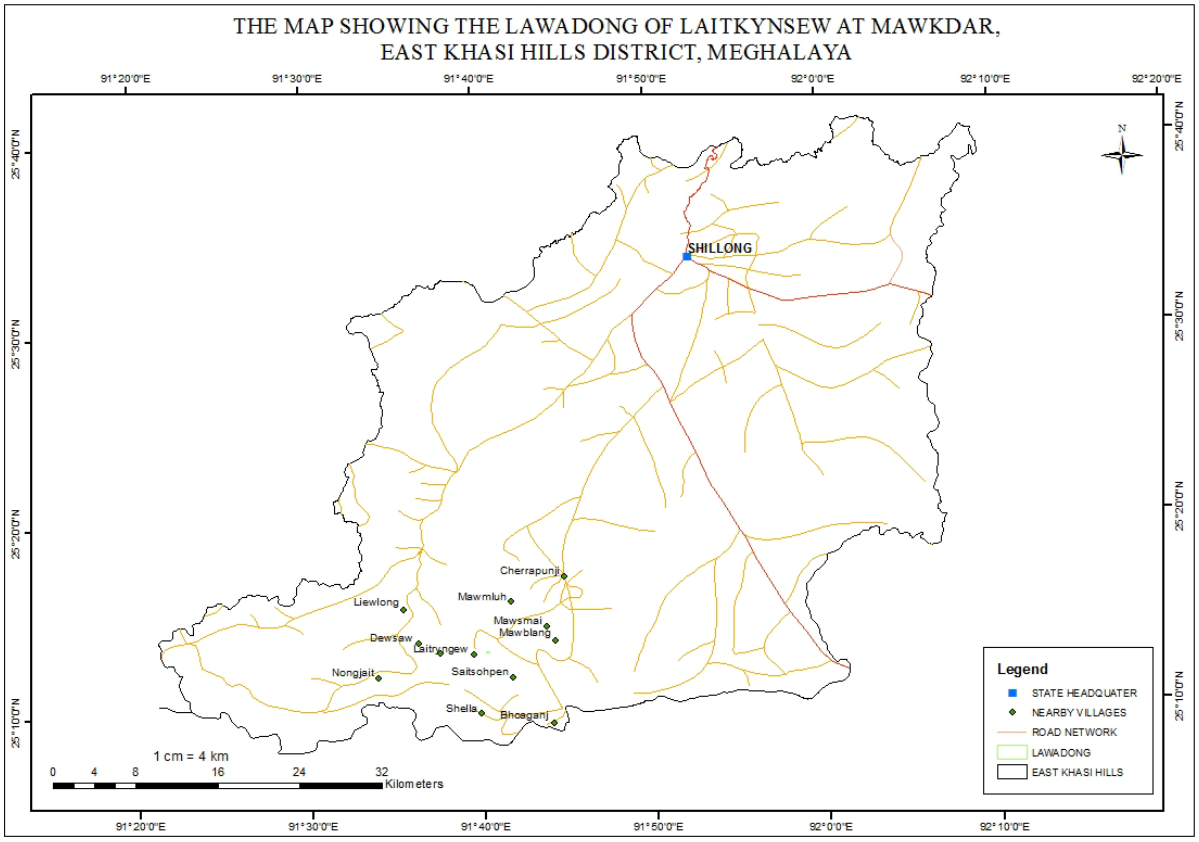
This grove originated many years ago. Offerings and prayers have been ceased long way back since the embraced of Christianity. But the villagers still preserve this Sacred grove for the sake of the environment and to help the family of the villager to reconstruct their house by donating some trees if any natural calamity happen to a particular family. It is ownedby the village community and controlled by the Headman elected by the villagers. The State Forest Department has no direct control of the said grove as it falls under the jurisdiction of the KHADC.

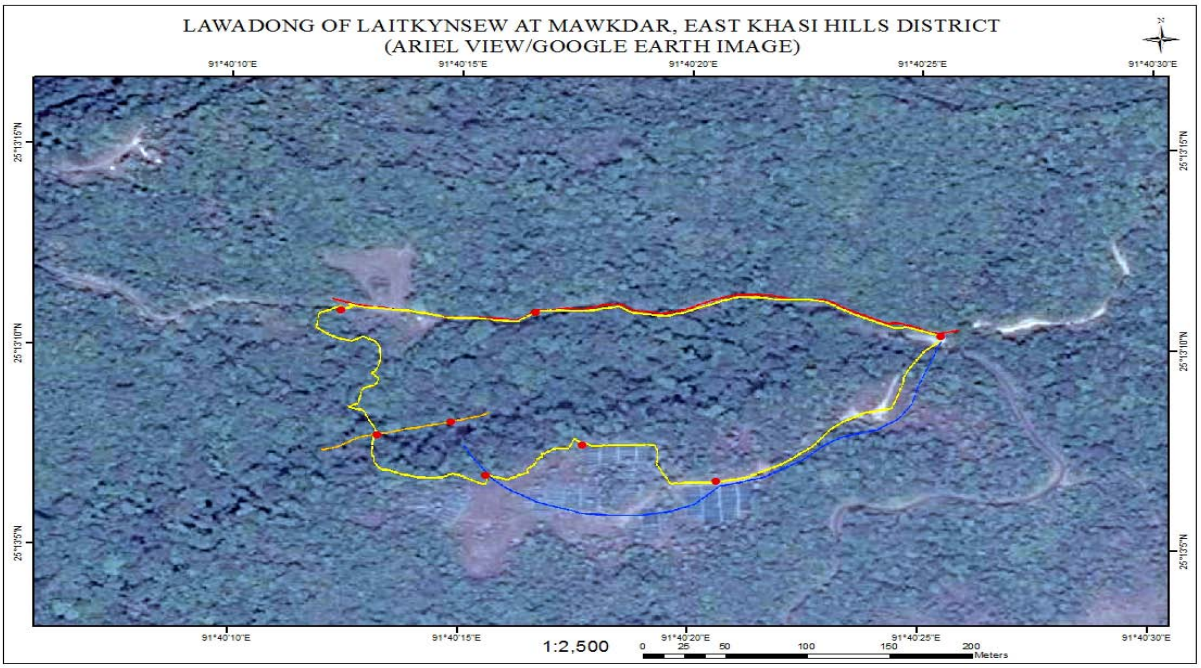
1.3 Geography and Climate:

Topography of the grove is gently rolling in nature with slope varying from 4° to 10°.The soil texture is loamy with no coarse fragment and slightly compact consistency. The colour of the soil is brown with high soil depth. There is no soil erosion in the grove area. There is only one perennial stream flowing through the grove. It is the only source of water which feeds the Community Fish Pond, constructed by the villagers inside of the grove.

The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 10°C and maximum is 30°C. Biotic pressure, encroachment, wild fire, hunting & poaching, grazing and the activities of illegal timber were found to be absent in the grove.

Location map of Mawkdar Sacred Grove





1.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

1.5 Flora and Fauna:

The vegetation is of mixed type dominant species found are *Schima khasiana* and *Castonopsis indica*, Origin of the forest is natural and it is two storeyed forests. The wildlife found within the grove are jungle fowls, barking deers, jackals and some vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

(a) The virgin forests where human interference is almost zero.
(b) High level endemic plant and animal species.
(c) Existence of many rare endangered plant species.
(d) Conservation of flora and fauna and maintaining of rich forest natural resources.

1.6 Floral species:

List of trees found in Mawkdar Sacred Grove, East Khasi Hills

Sl. No.	Botanical Name	Local Name	Sl. No.		
1	*Albizia procera*	Dieng Sohriew	17	*Elaeocarpus lancifolius*	Dieng Sohlynkgsan
2	*Artocarpus lacucha*	Dieng Sohsyrtet	18	*Eugenia jambolana*	Dieng Sohum
3	*Baccaurea sapida*	Dieng Sohramthein	19	*Eurya accumilata*	Dieng Sohshit /Dieng Pyrshit/ Dieng Shit
4	*Betula alnoides*	Dieng Lieng	20	*Ficus erecta/Eugenia aquea*	Dieng Sohlwa
5	*Breynia patens*	Dieng Mat-iar	21	*Ficus hispida*	Dieng Lajri/ Dieng jri
6	*Camelia caduca*	Dieng Tyrnem	22	*Galore edulis*	Unknown
7	*Caryota urens*	Dieng Tlai	23	*Glochidion velutimum*	Dieng Jem
8	*Castanopsis armata*	Dieng Sning /Dieng siar	24	*Gynocardia odorata*	Dieng Sohliang
9	*Castanopsis armata*	Dieng Sning	25	*Ilex venulosa*	Dieng Soh Shyieng
10	*Castanopsis hysteric*	Dieng Sohstap	26	*Macaranga denticulata*	Dieng Lakhar
11	*Castanopsis spp*	Dieng Sohot Dngiem	27	*Mahomia acanthifolia*	Dieng Sohiong
12	*Cepadoss fruticosa*	Dieng Phaniaw	28	*Memecylon calostrimum*	Dieng tiewdieng ngai
13	*Cinnamomum bejolghota*	Dieng Latyrdop	29	*Michilia champala*	Dieng rai
14	*Cinnamomum tamala*	Dieng Latyrpad	30	*Mollotus alba*	Dieng Lakhar lieh
15	*Decospermum paniculatum*	Dieng Sohum	31	*Myrica nagi*	Dieng Sohphie
16	*Drimycarpus racemusus*	Dieng Sohrang	32	*Pantapanox racemasmum*	Dieng tlonglynsi
33	*Prema bengalensis*	Dieng Lieh	40	*Symplocus theaefolia*	Dieng Pei
34	*Prema bengalensis/Ilex venulosa*	Dieng Lieh	41	*Toona ciliata*	Dieng bti
35	*Quercus glanca*	Dieng Sohwar	42	*Uraria alopecuroides*	Dieng Sohmluh
36	*Saurauia punduana*	Dieng Jalngap	43	*Wendlandia wallichii*	Dieng Shadmoit
37	*Schima khasiana*	Dieng Ngan	44	*Zanthoxylum avalijolium*	Dieng Shiah
38	*Schima waliichi*	Dieng ngan lieh	45	*Ziziphus jujuba*	Dieng Sohbroi
39	*Smilax glabra*	Dieng Krot			

List of shrubs, herbs, climbers, orchids &bamboo found in Mawkdar Sacred Grove, East Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng sohjabuit	*Plogocanthus thyrsifolia*	Acantaceae
2.	Lajarem	*Clerodendrum viscum*	Vervenaceae
3.	Dieng soh kynruin		
4.	Dieng soh pyrsit		
5.		*Draccina angustifolia*	Liliaceae
6.		*Boehimeria diffuca*	Urticaceae
7.	Dieng jamyrait		Anonaceae
8.		*Clerodendrum colebrukianum*	Barbaraceae
9.	Dieng soh brai		
10.	Synsar	*Thysaemolia myscina*	Poaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.		*Aretae spp*	Arakaceae
2.		*Stroebilenthum spp*	Rubiaceae
3.	Jajew khlaw	*Begonia roxburghii*	Begoniaceae
4.	Sohbyrthit	*Urena labata*	Malvaceae
5.	Wang khlaw	*Esculanta*	Araceae
6.	Sying khlaw	*Zingerber purpurena*	Zingiberaceae
7.	Tyrkhang	*Fenn spp*	Pterophyteceae
8.	Sla lamet	*Phrynium placentarium*	Morantaceae
9.	Shynrai khlaw	*Alpinea alogus*	Gingiberaceae
10.	Sla waitlam	*Asplinium ridus*	Aspliniaceae
11.	Tyrkhang	*Polypodyal vulgaris*	Polypodalio
12.		*Asplinia midus*	Ptireophytes

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng sohmatan/sohpdong	*Stephania globra*	Lilyceae
2.	Loapla	*Rhaphidophra*	Aralaceae
3.	Dieng longkhasaw (jyrmi)		
4.	Jyrmi sohthied		
5.	Sla kynda jyrmi	*Pothos spp*	Aralaceae

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng tiew dieng	*Ascehinanthus spp*	Orchideceae
2.	Dieng tiew dieng	*Micropera manii*	Orchideceae
3.	Dieng tiew dieng	*Dendrobium aphyllum*	Orchideceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Shken	*Bamboo spp*	

1.7 Number of Stems:

Number of stems in each girth class and specieswise are given in table 1.1. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40cm to 71-80 cm classes.

Table 1.1
Girth class-wise and Species-wise No. of Stems in the entire grove (Area- 3.79 ha)

Girth Class Wise	*Schima khasiana* 1st Dominant	*Castanopsis* spp 2nd Dominant	Rest of the species	Total stems
30-40	49	22	367	**438**
41-50	52	62	265	**379**
51-60	35	12	164	**211**
61-70	43	11	94	**148**
71-80	27	3	99	**129**
81-90	29	10	58	**97**
91-100	11	2	45	**58**
101-110	14	2	49	**65**
111-120	12	9	32	**53**
121-130	11	7	27	**45**
131-140	9	11	23	**43**
141-150	9	3	19	**31**
151 & Above	21	28	66	**115**
Total =	**322**	**182**	**1308**	**1812**

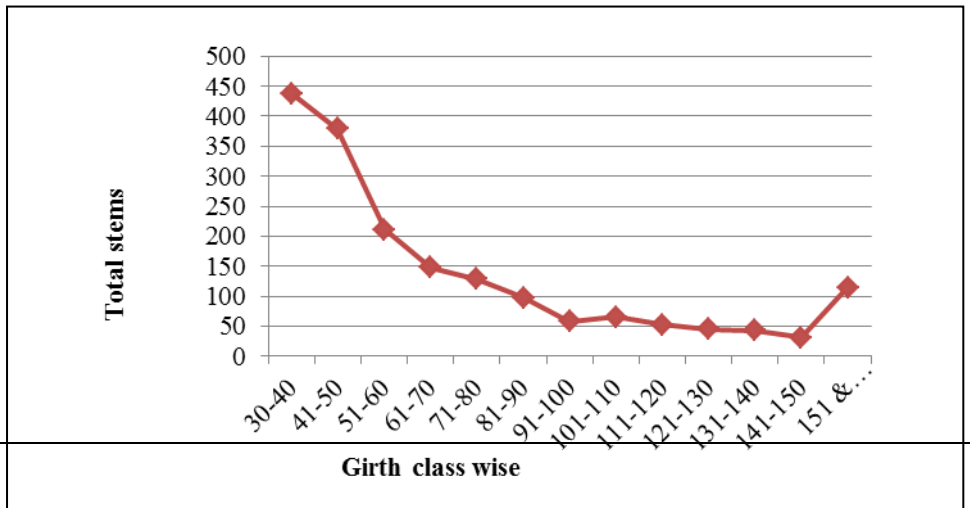


Figure 1.1: Girth class wise with respect to total stems

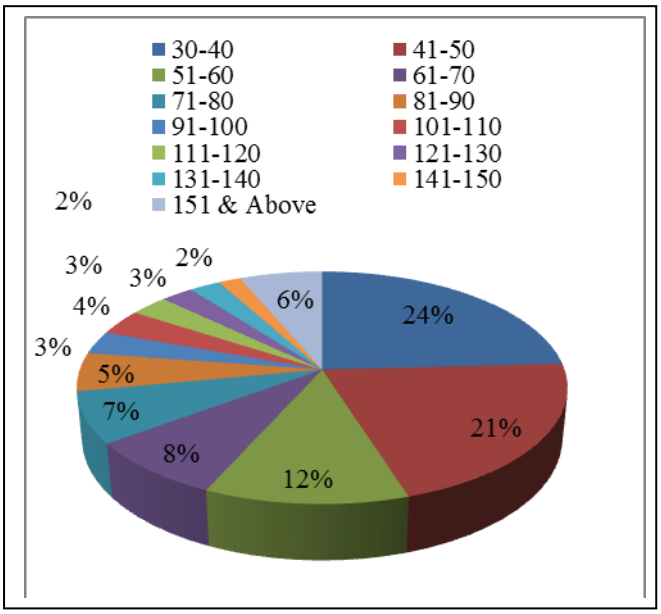


Figure 1.2: Girth classwise with respect to Total stems

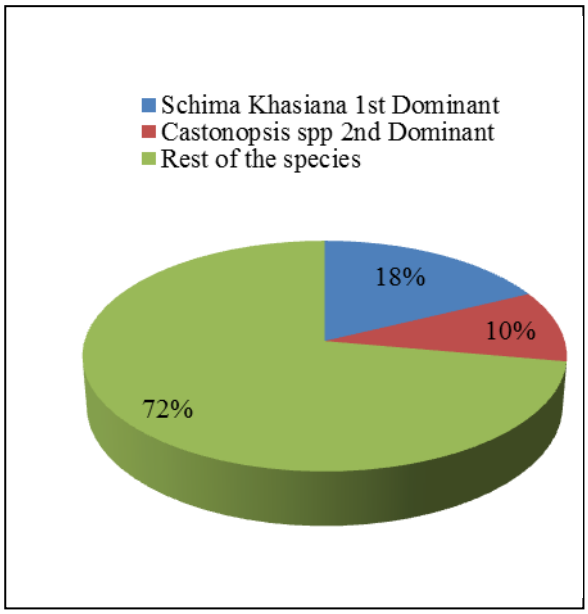


Figure 1.2(a): Specieswise with respect to Total stems



Figure1 (a): Field exercise at Mawkdar Sacred Grove. Grove.



Figure 1 (b): Inside view of Mawkdar Sacred

1.8 Growing Stock:

As per the methodology described in Chapter-I, 100% enumeration is carried out in the grove as its area is less than 10 ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 1812 tree species consisting of 322 *Schima khasiana* (1st dominant), 182 *Castanopsis spp* (2nd dominant) and 1308 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151cm and above. The results are given in table 1.2 for Mawkdar sacred grove which shows the volume specieswise and girth classwise. The total growing stock (volume) of the Grove works out to 1213.42 cubic metres.

Table 1.2:
Girth class wise & specieswise volume in the sampled area (Area -3.79 ha)
(volume in cu.m)

Girth Class Vise	*Schima Khasiana* 1st Dominant	*Castanopsis spp* 2nd Dominant	Rest of the species	Total	% with respect of total volume
30-40	3.986	1.112	19.226	**24.324**	2.005
41-50	7.629	3.464	36.959	**48.052**	3.960
51-60	8.185	2.865	41.919	**52.969**	4.365
61-70	14.223	4.458	36.301	**54.982**	4.531
71-80	12.257	1.663	53.186	**67.106**	5.530
81-90	16.097	6.966	40.98	**64.043**	5.278
91-100	8.164	1.769	41.479	**51.412**	4.237
101-110	12.642	2.178	55.635	**70.455**	5.806
111-120	12.602	11.893	44.029	**68.524**	5.647
121-130	14.202	11.236	43.869	**69.307**	5.712
131-140	13.179	20.707	43.845	**77.731**	6.406
141-150	15.473	6.671	41.463	**63.607**	5.242
151 & above	70.835	134.537	295.537	**500.909**	41.281
Total	**209.474**	**209.519**	**794.428**	**1213.421**	**100.000**
% wrt Total volume	**17.263**	**17.267**	**65.470**	**100.000**	

The table shows that the volume contributed by the 1st dominant species (*Schima khasiana*) and the 2nd dominant species (*Castanopsis* spp) with respect to the total volume of the grove is almost equal i.e. 17.27 % by each while the volume of Rest of the species is maximum i.e. 65.47 %. Total volume of the grove is 1213.421 cubic metres.

From the table it is observed, that in general, as the girth class increases, the volume in that class also increases i.e. girth class is directly proportional to the volume in that class.

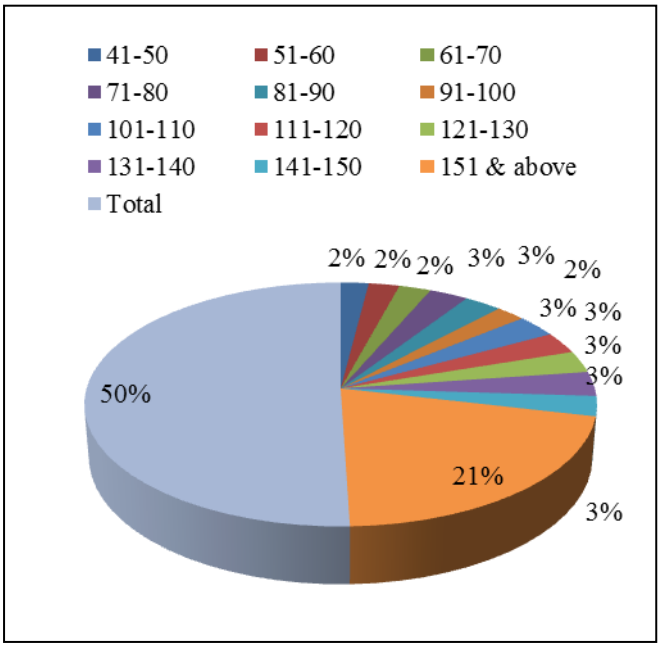


Figure 1.2: Girth classwise with respect to Total volume

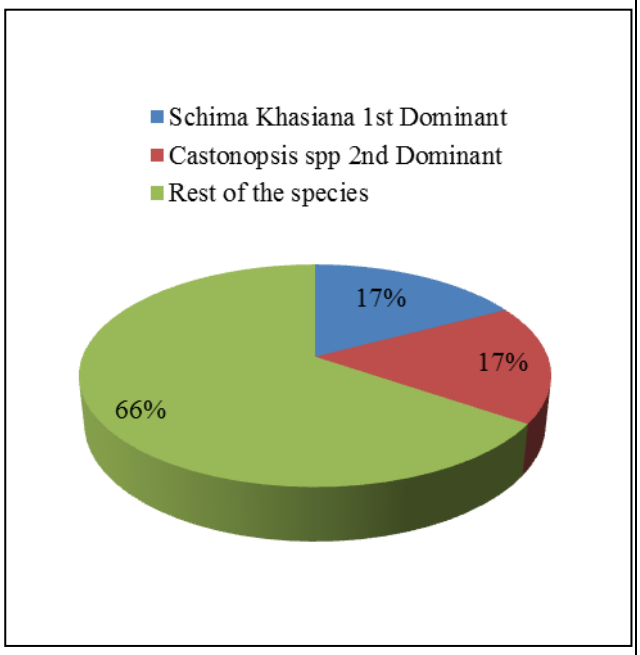


Figure 1.2(a): Specieswise with respect to Total volume

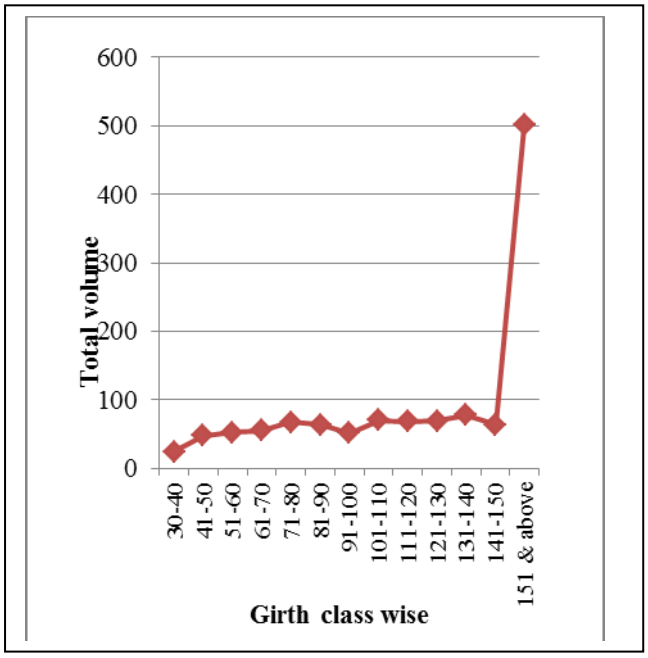


Figure 1.2: Girth class wise with respect to total volume

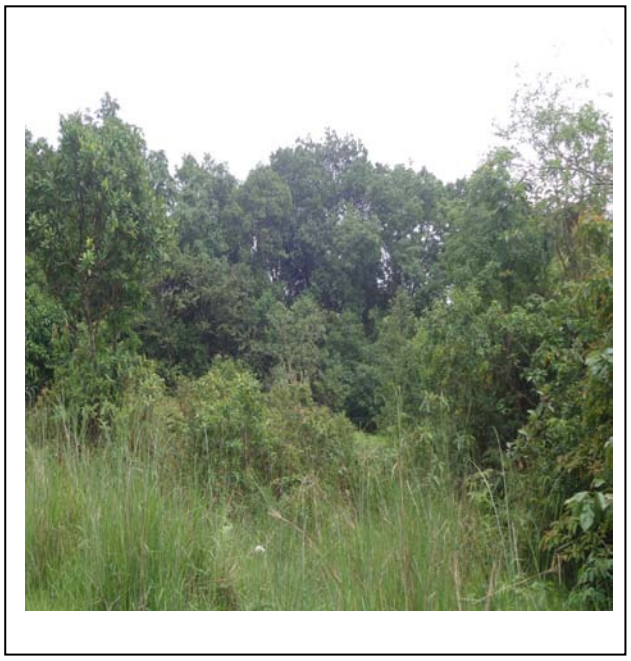


Figure 1: (c) Over view of Mawkdar Sacred Grove.

1.9 Brief Note on Management of Law Adong Mawkdar:

(i) Protection from Biotic Interference:-

It is observed during field visits that in this grove biotic pressure is almost Nil since the village durbar of Laitkynsew strictly prohibited felling of trees in any form except when a particular family met with any tragedy of natural calamity. Thus the Durbar donates some trees for reconstruction of their house. As of now, there is no report of grazing, illegal felling of timber or poaching in the grove, but these illegal activities may happen in the years to come. Hence it is recommended that this grove if declared as Community Forest, this will help to protect this prestige forest from extinction.

(ii) Fire control:-

Fire is a major factor responsible for devastating rich biodiversity of plants and animals. During interaction with elders of Laitkynsew village it is learnt that no fire incidence had occur in this grove and there is no evidence of such fire incidence in the past. For better protection of the rich biodiversity of this grove, it is suggested that if funding can be done to the village durbar, external fire line can be created to avoid any unintentional fire to spread inside of this grove.

(iii) Water stress:-

Water is the main factor responsible for the life of plants and animals. In this grove there is only one perennial stream which feed the fish pond constructed by the village durbar inside of the grove. This fish pond also served as a source of water for wild animal and plant species. Check dams may also be constructed to retain the over flow water especially during rainy season to further strengthened moisture conservation.

(iv) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

2- LYNGIONG

2.1 Location:

Lyniong sacred grove is situated in East Khasi Hills District of Meghalaya at Lyngiong village under Hima Lyngiong. It covers an area of 62.42 ha and lies between 91° 42′ 0" E to 91° 42′ 45"E longitude and 25° 25′ 30" N to 25° 26′0" N latitude with an altitude of 1674 m from mean sea level. It is bounded to the North by Lyngiong village, to the South by a private forest, East and West by village forest only. It is accessible by road from Shillong via Mawphlang-Balat Road. It is about 32km from Shillong and to reach the spot one have to walk on foot for about 20 min from the main road.

2.2 Brief History:

This Sacred grove originated hundred of years ago. It is own and controlled by the Lyngdoh of HimaLyngiong. The Hima (Kingdom) select a Lyngdoh to look after and performed rituals in this Sacred grove. Rituals are performed every year by way of sacrificing poultry/livestock; to please the Basa (Deiti) who in-turn bless the Kingdom and its subjects. Trespassing inside the Sacred grove is strictly prohibited without the knowledge of the Lyngdoh and whenever permission for entry is granted a guide is required to accompany the persons. Plucking of twigs, branches or uprooting anything is strictly prohibited. Even eating of fruits is only allowed inside the Sacredgroves but taking them away/home is believed to cause an omens/curse. Carrying of any iron/steel made materials is also not allowed and even attending nature's call is prohibited inside the Sacred grove which according to the village elders if committed may invite the wrath of the deity (Basa) and is therefore an offence.The Sacred grove belongs to the people of Hima Lyngiong and it is under the direct control of the Lyngdoh of Hima Lyngiong. The State Forest Department or for that matter any other Government department or agencies has no propriety rights over the land nor has it any powers to manage/control over the forest land.

2.3 Geography and Climate:

Topography of the grove is gentle rolling in nature with slopes varying from 4° to 15°. Soil texture is sandy loam with gravel fragments in some area which is slightly compact consistency.The colour of the soil is brown with high soil dept.

There is no soil erosion in the grove.There are only three streams that are flowing out of this Sacred grove. They are Phud NongSnuin stream, Kyndong Rongpongwang stream and Phud Jakma stream. These streams serve as a source of perennial drinking water to some villages and also as a source for many agricultural lands.

The Sacred grove experience cold weather during winters starting from mid October to February and warm summers from May to September. Monsoon onsets from May to September, the average

minimum temperature is 6°C and maximum is 26°C. Frost in this area occur during December to February. Biotic pressure, encroachment, wild fire, hunting & poaching, grazing and the activities of illegal timber felling were found in the grove.

2.4 Forest Type:

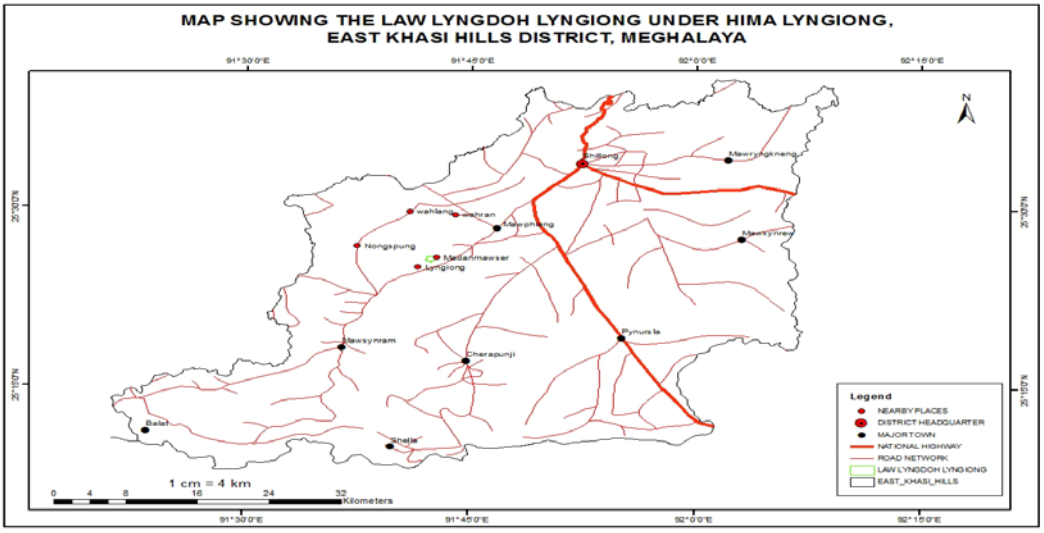
According to Champion & Seth classification (1968) the forest types found in this sacred grove are mixed deciduous Forest.

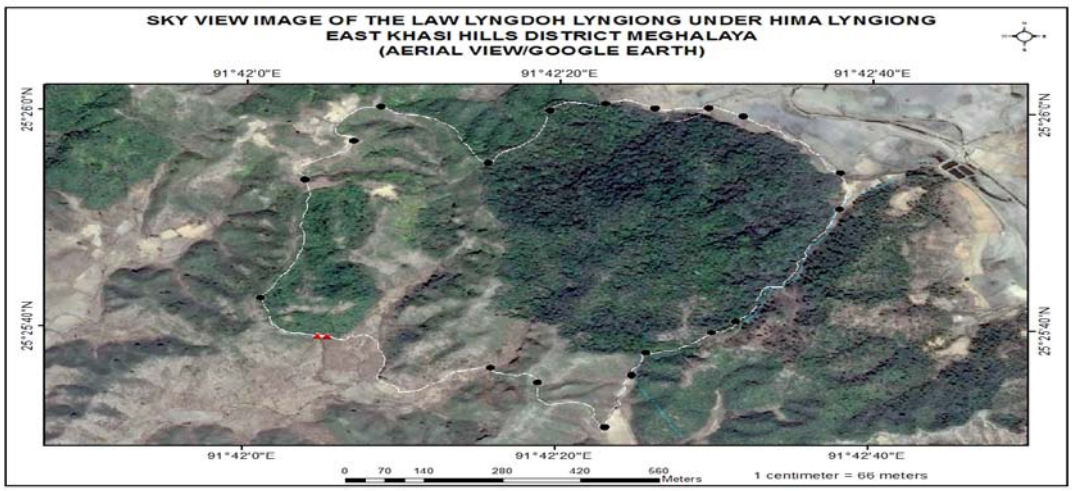
2.5 Flora and Fauna:

The vegetation is of mixed type consisting mainly of *Quercus spp and castanopsis spp* as dominant species. The relic Forest is natural and it is of two storeyed layer. The wildlife found here are barking deer, pangolin, jungle fowls, jackals and many more vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

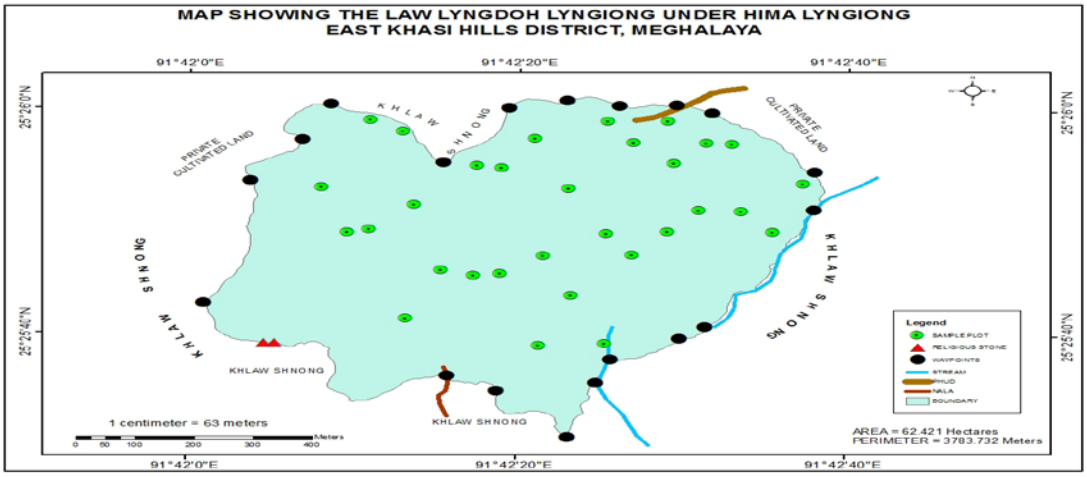
(a) It is one of the virgin forests where human interference is almost zero.
(b) The area is very significant from the biodiversity point of view with high density of endemic plants and animals.
(c) Existence of many rare and endangered plant species.
(d) The unique culture and traditions of the local people have attracted many scholars, researches and historians from both local/national and even foreigners. These practices are associated with various mythological and cultural values of local residents.
(e) With all restrictions- “do’s and don’ts;” has immensely help the Sacred grove in conservation of flora and fauna and maintaining the rich forest natural resources.

Location map of Lyngiong Sacred Grove





Map showing sample plot of Law Lyngdoh Lyngiong



2.6 Floral species:

List of Trees found in Lyngiong Sacred Grove

Sl. No.	Botanical Name	Local Name	Sl No.	Botanical Name	Local Name
1	*Aporsa roxburghii*	Dieng wah	18	*Michelia ablonga*	Dieng laniar
2	*Aralia armata*	Dieng latymphu	19	*Michelia champaca*	Dieng rai
3	*Beilschmiedia brandisii*	Dieng soh khyllam	20	*Myrica induca*	Dieng sohphie
4	*Castanopis indica*	Dieng sohot	22	*Pieris ovalifolia*	Dieng jalynsnaing
5	*Shcima khasiana*	Dieng ngan	23	*Pimus khasiana*	Dieng kseh
6	*Cinnamomum cecicodahne*	Dieng pingwait	24	*Pourthiaea arquta*	Dieng sohryngkham
7	*Cinnamomum pauciflorum*	Dieng latyrpad	25	*Pronus undulate*	Dieng tyrkhum
8	*Citrus latipes*	Dieng sohkynphor	26	*Quercus dealbata*	Dieng sai
9	*Combretum aquamosum*	Ding sohrisang	27	*Rhododendron arboretum*	Dieng tiewsaw
10	*Docynia indica*	Dieng sohphoh khasi	28	*Rhus chinensis*	Dieng sohma
11	*Elaeocarpus canceaefollios*	Dieng soh khyllam	29	*Rhus succedanea*	Dieng kain
12	*Eleocarpus robusta*	Dieng lasaw	30	*Schima wallichi*	Dieng ngan
13	*Erythrina indica*	Dieng song	31	*Symplocos chinensis*	Dieng iong
14	*Exbucklandia populnea*	Dieng doh	32	*Symplocus theaefolia*	Dieng pei
15	*Ilex venulosa*	Dieng sohshyieng	33	*Vaccinium griffitheanum*	Dieng soh ryngkham
16	*Itea chinensis*	Dieng sohsyrtet	34	*Zanthoxylum ovalifolium*	Dieng shiah
17	*Machilus parviflora*	Dieng sohniar			

List of shrubs, herbs, climbers & bamboo found in Lyngiong Sacred Grove, East Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.		*Symplocos chienssis*	Symplocasaceae
2.		*Symplocos paniculata*	Symplocasaceae
3.		*Lithoscarpus dealbatus*	Fagaceae
4.		*Vaccinum serratum*	Vaccinaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.		*Polygmum glabrum*	Polygonaceae
2.		*Rubusrogosus*	Rosaceae
3.		*Ophiopogon spp*	Poaceae/Graminceae
4.		*Adiantum raddeanum*	Adiantaceae
5.	Jajew khlaw	*Begonia roxburghii*	Begoniaceae
6.	Sying khlaw	*Zingiber purpurium*	Zingiberaceae

7.	Bat eroplane	*Inola chapa*	Asteraceae
8.	Lantana iong	*Eupatorium odenoflorum*	Asteraceae
9.	Tmain khla	*Lycopodium clavatum*	Lycopodales
10.	Lantana shiah	*Lantana camera*	Verbenaceae
11.	Shyrmit khlaw	*Curcuma aromatic*	Zingiberaceae
12.	Sohbyrthit	*Achyranthus aspera*	Amaranthaceae
13.	Jawieh bsein	*Arisaema causanguineum*	Araceae
14.	Jalynthem	*Polygonum chinense*	Polygonaceae
15.	Longniang	*Potentilla gracilis*	Rosaceae
16.	Jamyrdoh	*Houttuynia cordata*	Saururaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.		*Lycopodium clavatum*	Lycopodales
2.		*Dioscoria bulbifera*	Dioscoreaceae
3.		*Dendrobium enciflorum*	Orchidaceae
4.		*Dioscaria alata*	Dioscoreaceae
5.	Sohkrot	*Smilax zeylanicum*	Smilacaceae
6.	Sohmrit khlaw	*Piper longum*	Piperaceae
7.	Jyrmi kynsew	*Argyreia nervosa*	Convolvulaceae
8.	Phan jyrmi	*Stephania glabra*	Liliaceae
9.	Soh nepbah	*Rubus molluccanus*	Rosaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Kdait namlang	*Chimona bambusa khasiana*	Poaceae

2.7 Number of Stems:

Number of stems in each girth class and specieswise are given in table 2.1 & 2.2. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40cm to 101-110cm classes.

Table-2.1
Girth class-wise and Species-wise no. of stems in the sampled area (31 plots -6.20 ha)

Girth Class Vise	*Castonopsis indica* 1st Dominant	*Quercus dealbata* 2nd Dominant	*Schima khasiana* 3rd Dominant	*Pinus khasiana*	Rest of the species	Total Stems
30-40	67	28	27	0	229	**351**
41-50	53	41	27	0	192	**313**
51-60	40	36	23	0	170	**269**
61-70	42	36	30	0	105	**213**
71-80	23	39	23	0	127	**212**

81-90	29	26	17	2	93	**167**
91-100	20	26	16	2	71	**135**
101-110	16	18	20	2	49	**105**
111-120	11	14	15	0	41	**81**
121-130	19	4	9	1	23	**56**
131-140	16	4	6	0	11	**37**
141-150	19	7	8	0	10	**44**
151 & above	41	3	22	0	18	**84**
Total	**396**	**282**	**243**	**7**	**1139**	**2067**

Table-2.2
Girth class-wise and Species-wise no. of stems in the entire grove (Area =64.42ha)

Girth Class Vise	*Castonopsis indica* 1st Dominant	*Quercus dealbata* 2nd Dominant	*Schima khasiana* 3rd Dominant	*Pinus khasiana*	Rest of the species	Total Stems
30-40	675	282	272	0	2306	3534
41-50	534	413	272	0	1933	3151
51-60	403	362	232	0	1712	2708
61-70	423	362	302	0	1057	2144
71-80	232	393	232	0	1279	2134
81-90	292	262	171	20	936	1681
91-100	201	262	161	20	715	1359
101-110	161	181	201	20	493	1057
111-120	111	141	151	0	413	815
121-130	191	40	91	10	232	564
131-140	161	40	60	0	111	373
141-150	191	70	81	0	101	443
151 & above	413	30	221	0	181	846
Total	**3987**	**2839**	**2446**	**70**	**11467**	**20810**

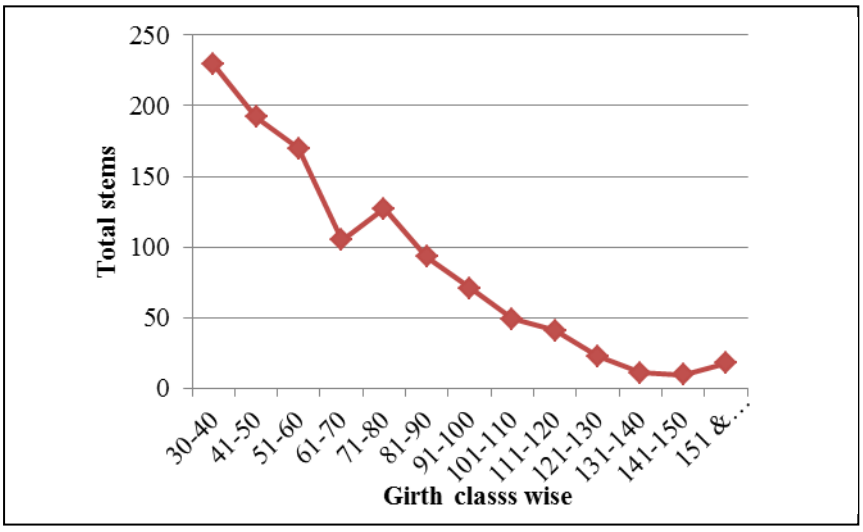


Figure 2.1: Girth class wise with respect to total stems

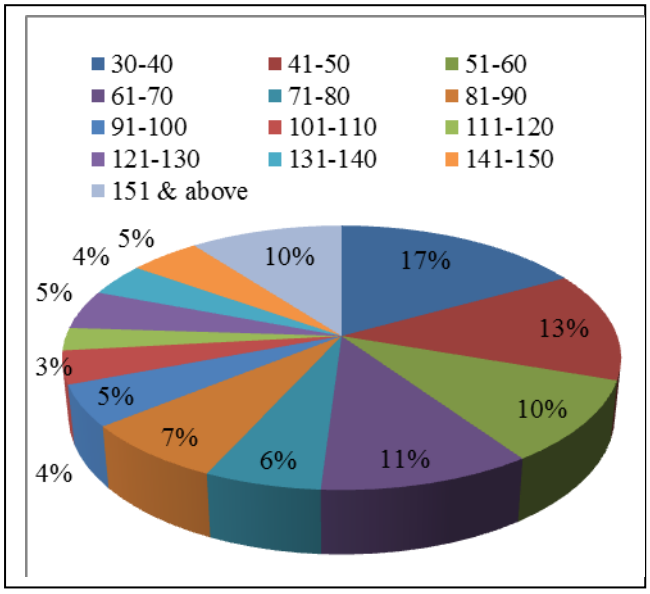


Figure 2.2: Girth class wise with respect to Total stem Stem

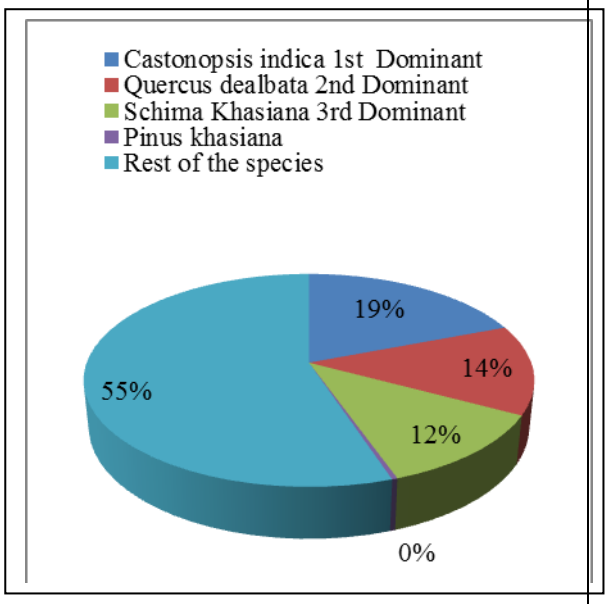


Chart 2.2 (a): Species wise with respect to Total



Plate 2 (a): Inside view of Lyngiong Sacred Grove Grove.



Figure 2 (b): Wild mushroom at Lyngiong Sacred

2.8 Growing Stock:

As per the methodology described in Chapter-I, 10% enumeration is carried out in the grove as its area is more than 50ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within 31 plots of 0.2 ha size i.e.6.2 ha. , data was collected for 2067 tree species consisting of 396 *Castanopsis indica* (1st dominant), 282 *Quercus dealbata* (2nd dominant), 7 *Pinus khasiana* and 1382 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40cm to 151cm and above. The results are given in table 2.3 & 2.4 for Lyngiong sacred grove which shows the volume specieswise and girth classwise. The total growing stock of the Grove works out to 12,625.77 cubic metres.

Table-2.3
Specieswise and girth class wise volume for sampled area (31 plots - area 6.2 ha)
(volume in cu.m)

Girth Class Vise	*Castanopsis indica* 1st Dominant	*Quercus dealbata* 2nd Dominant	*Schima Khasiana* 3rd Dominant	*Pinus khasiana*	Rest of the species	Total
30-40	3.446	0.634	2.381	–	12.913	**19.374**
41-50	7.700	2.825	4.081	–	27.885	**42.491**
51-60	10.265	4.699	5.404	–	43.674	**64.042**
61-70	16.422	7.705	10.043	–	40.063	**74.233**
71-80	12.450	12.004	10.876	–	68.507	**103.837**
81-90	20.592	10.899	10.011	1.063	66.241	**108.806**
91-100	18.359	14.520	11.563	1.610	64.852	**110.904**
101-110	18.009	12.737	17.898	1.896	55.266	**105.806**
111-120	14.718	12.499	16.310	–	56.307	**99.834**
121-130	31.468	4.082	11.557	1.443	37.275	**85.825**
131-140	30.647	5.260	9.019	–	20.672	**65.598**
141-150	41.691	10.405	13.959	–	21.706	**87.761**
151 & above	142.312	5.750	65.523	–	71.986	**285.571**
Total	**368.079**	**104.019**	**188.625**	**6.012**	**587.347**	**1254.082**

Table - 2.4
Girth class wise & specieswise volume in the entire grove (area 62.42 ha)
(volume in cu.m)

Girth Class Vise	*Castanopsis indica* 1st Dominant	*Quercus dealbata* 2nd Dominant	*Schima Khasiana* 3rd Dominant	*Pinus khasiana*	Rest of the species	Total	% wrt to total volume
30-40	34.69	6.38	23.97	0.00	130.00	**195.05**	1.54
41-50	77.52	28.44	41.09	0.00	280.74	**427.79**	3.39

51-60	103.35	47.31	54.41	0.00	439.70	**644.76**	5.11

61-70	**165.33**	**77.57**	**101.11**	**0.00**	**403.34**	747.36	**5.92**
71-80	125.34	120.85	109.50	0.00	689.71	**1045.40**	8.28
81-90	207.31	109.73	100.79	10.70	666.90	**1095.43**	8.68
91-100	184.83	146.18	116.41	16.21	652.91	**1116.55**	8.84
101-110	181.31	128.23	180.19	19.09	556.40	**1065.23**	8.44
111-120	148.18	125.84	164.20	0.00	566.88	**1005.10**	7.96
121-130	316.81	41.10	116.35	14.53	375.28	**864.06**	6.84
131-140	308.55	52.96	90.80	0.00	208.12	**660.42**	5.23
141-150	419.73	104.75	140.54	0.00	218.53	**883.56**	7.00
151 & above	1432.76	57.89	659.67	0.00	724.74	**2875.06**	22.77
Total	**3705.72**	**1047.24**	**1899.03**	**60.53**	**5913.26**	**12625.77**	100.00
% wrt total volume	29.35	8.29	15.04	0.48	46.83	100.00	

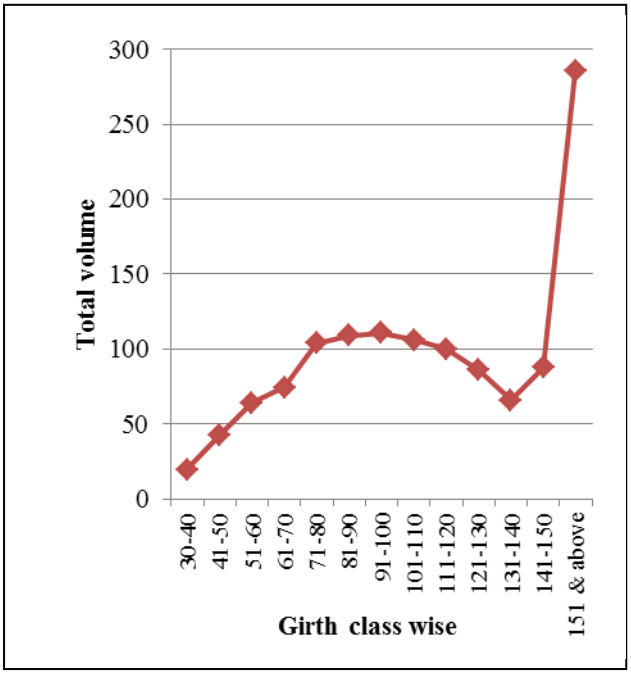


Figure 2.3: Girth class wise with respect to total volume

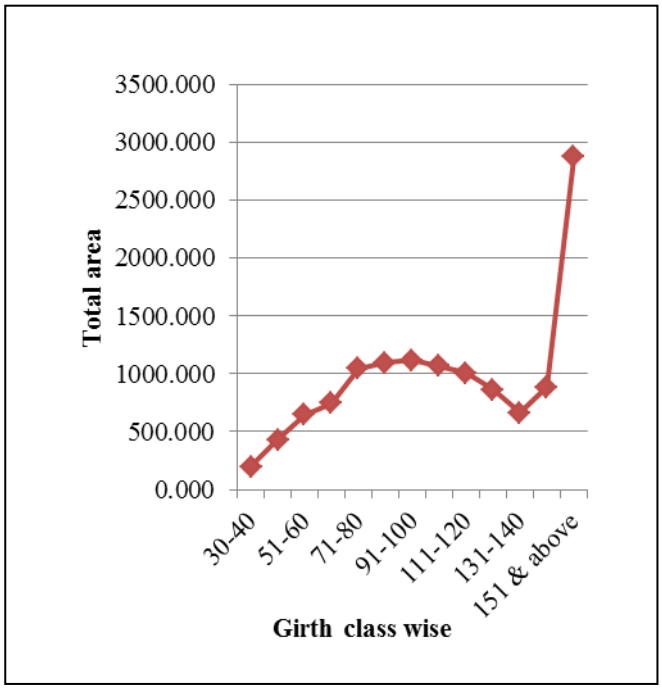


Figure 2.4: Girth class wise with respect to total area

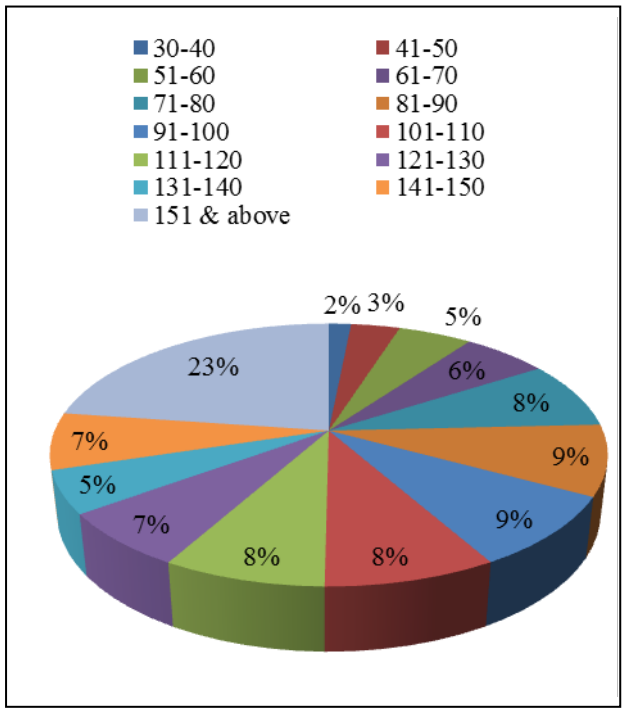


Figure 2.2: Girth class wise with respect to Total Volume

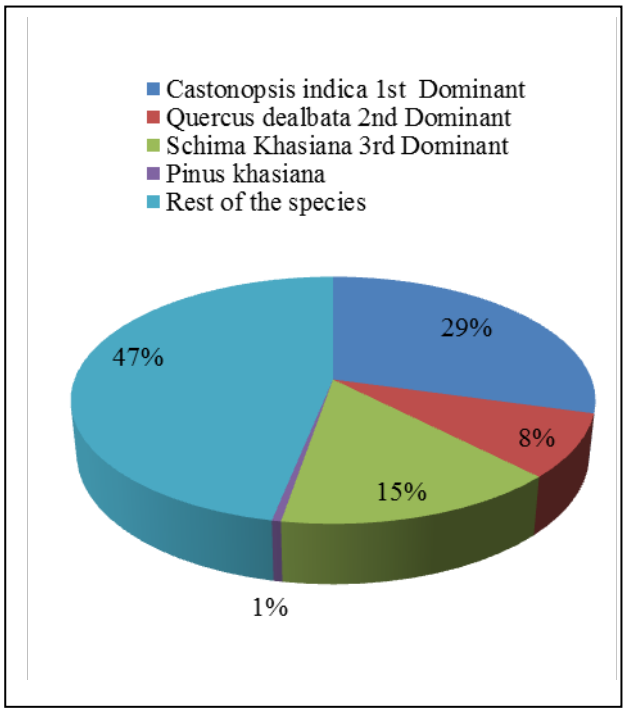


Figure 2.2(a): Species wise with respect to Total volume



Figure 2 (c): Over view of Lyngiong Sacred Grove

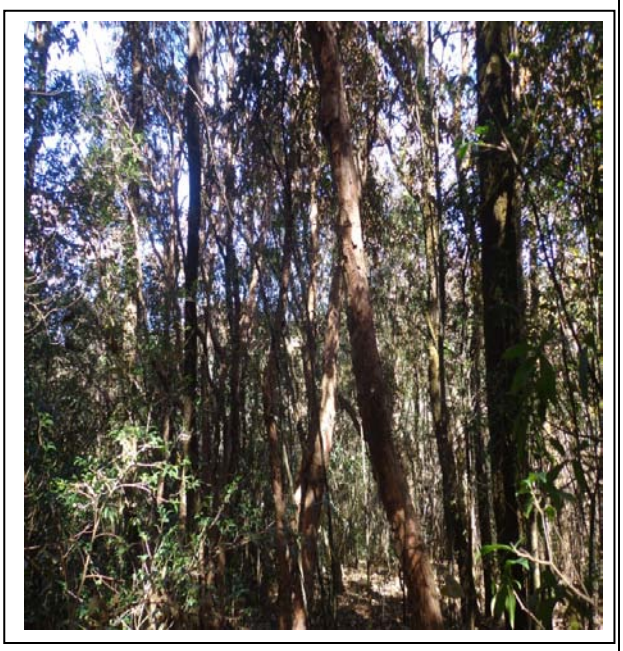


Figure 2 (d): Inside view of Lyngiong Sacred Grove

Table 2.4 shows that the volume contributed by the 1st dominant species (*Castonopsis indica*) with respect to the total volume of the grove is 29.35% , the 2nd dominant species (*Quercus dealbata*) is 8.29%, 3rd dominant species (*Schima khasiana)* is 15.04%, *Pinus khasiana* is 0.48% while Rest of the species is maximum i.e. 46.83%. Total volume of the grove is 12625.77 cubic metres

From the table it is observed that in general that the girth class and the volume in that class is flexible i.e. girth class is not directly proportional to the volume in that class.

2.9 Brief Note on Management of Law Lyngdoh Lyngiong:

(i) Protection from Biotic Interference:-

Law Lyngdoh Lyniong is one of the most restricted Sacred grove. Here no one is allowed to enter without the knowledge of the Lyngdoh, cattle are also not allowed to graze inside of this grove. Although presently there is negligible biotic pressure but it cannot be ruled out totally in the near future unless the State Forest Department take necessary steps to declare this virgin forest into a Community Reserve.

(ii) Fire control:-

Though there is no report of intentional or accidental fire occurrence in this grove but it will be better if prevention can be taken care of in the near future. External fire line can be created all along the boundary of the grove except in those areas where the boundary line is bounded by natural stream or rivers. This will help to preserve the rich natural resources of the sacred grove.

(iv) Afforestation:-

In the northern part of the grove trees are very scattered. Hence it is suggested that if vacancy filling can be done through respective Social Forestry Division this will help to restore the forest cover of this grove.

(v) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

3 - NONGRIMBAH

3.1 Location:

This Sacred grove is located in South West Khasi Hills District, Mawlangwir village under the Syiemship of Hima Maharam. It covers an area of 34.65 ha and lies between 91° 2532" E to 91° 26′ 28" E longitude and 25° 21′ 26" N to 25° 21′ 42" N latitude with an altitude of 1509m from main sea level. This Sacred grove is bounded in the North by Maweit Ksar river, to the South by the PWD Road proceeding towards Rangthong village, village forest and private land of Lina Wanniang, in the East and is bounded by a footpath and in the West by the village forest. The Sacred grove is located a few kilometres from Mawkyrwat, the capital of South West Khasi Hills District. It is accessible from Shillong via Mawphlang-Balat road and Weiloi-Mawkyrwat road. It is about 78km from Shillong and 2km from Mawkyrwat-Rangthong-Ranikor road.

3.2 Brief History:

In the past few decades, rituals are performed here every year like other Sacred groves, but now it has been stopped. Activities inside this Sacred grove is not allow and it is strictly prohibited. Only during cremation, dead wood is allowed to collect. This Sacred grove is owned by the villagers of Mawlangwir village, South west Khasi Hills District under Maharam Syiemship. The elected Myntri command and controlled this Sacred grove.

3.3 Geography and Climate:

The area is hilly in nature with steep slopes and undulating terrain varying from 4°-15° slope gradient. The area falls under the Northern aspect. Soil texture is loamy with gravel fragments in some patches which is slightly compact in its consistency and dark brown in colour. Rocks are found in some places with medium soil dept. There is no soil erosion. There is only one stream that is flowing in the Northern part of the boundary of this sacred grove i.e Maweit Ksar river. It serves as a source of water to many agricultural lands and in the West part of the grove.

The cold winter starts from mid October to February and warm summers from May to September. Monsoon onsets from May to September, sometime early monsoon may starts from April. The average minimum temperature is 7°C and maximum is 29°C. Frost in this area occurs during late December to early February. Biotic pressure, encroachment**,** wild fire**,** hunting and poaching, grazing and illegal timber felling were found to be absent in the grove.

3.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are moist deciduous Forest.

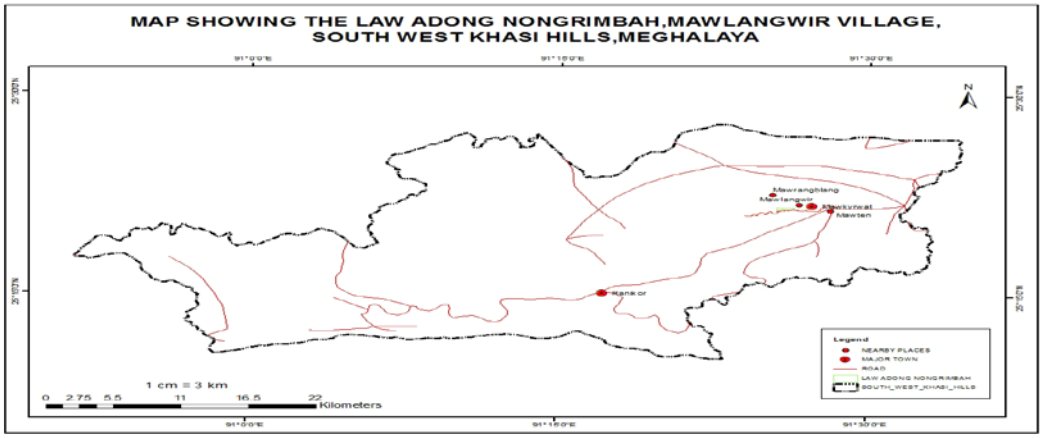
3.5 Flora and Fauna:

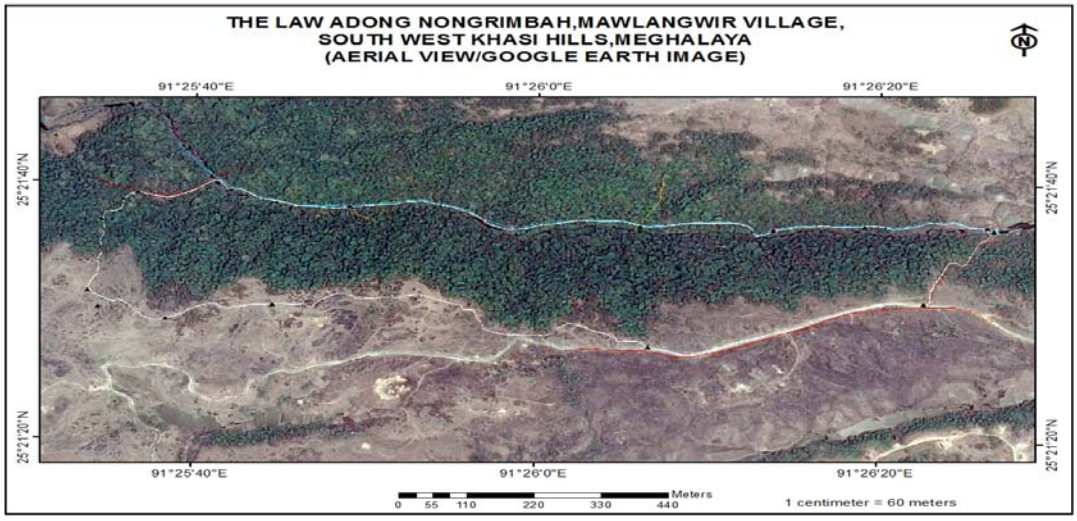
The vegetation type is of mixed species consisting mainly of *Syzygiumssps, Dieng dpei etc* as dominant species. The relic Forest is a natural forest consisting of two layer Storey. The Northern part is thick and virgin except in few patches in the Southern side where blank patches were spotted.

It is evident during field exercise that many wild animals are found in this Sacred grove. Two caves were found where animals especially barking deer used to spent the night. During interaction with locals every year deers, sambaris etc used to visit this Sacred grove as they said that there is a natural salt lick in this grove. Conservation significance of the grove is mainly doe to:

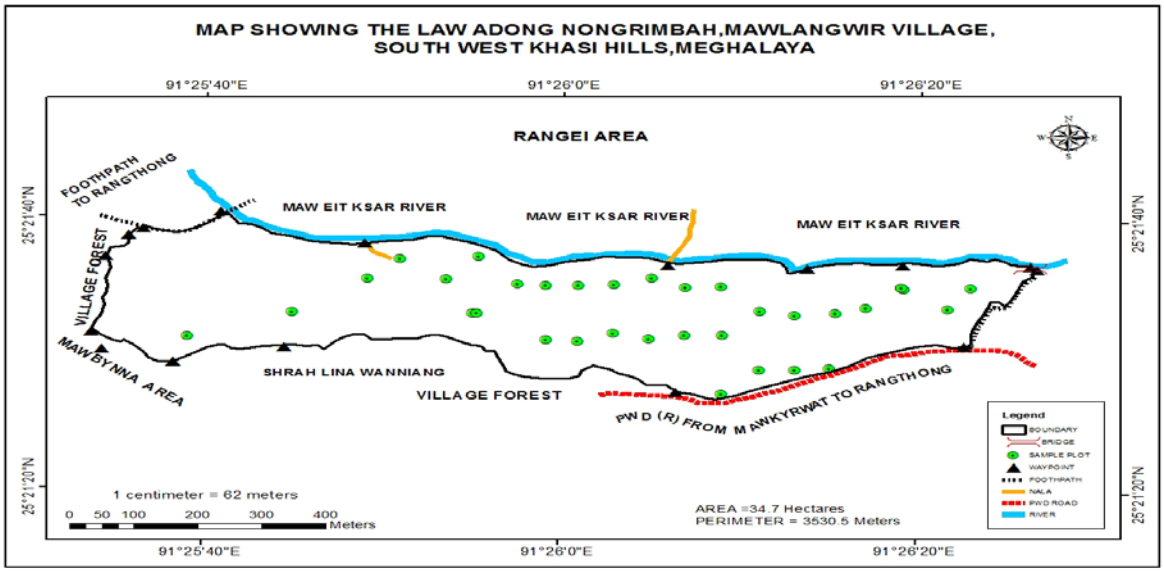
(a) It is one of the virgin forests where human interference is almost zero.
(b) The area is very significant from the biodiversity point of view with high density of endemic plants and animals.
(c) Existence of many rare and endangered plant species.
(d) With all restrictions- “do’s and don’ts” has immensely helps the Sacred grove in conservation of flora and fauna and maintaining the rich forest natural resources.

Location map of Nongrimbah Sacred Grove





Map showing sample plots of Law Adong Nongrimbah, Mawlangwir



3.6 Floral species:

List of Trees found in Nongrimbah Sacred Grove

Sl. No.	Botanical Name	Local Name	Sl. No.	Botanical Name	Local Name
1	*Alibizia lucidior*	Dieng ri	31	*Itea chinensis*	Dieng sohsyrtet/ Dieng sohrynted
2	*Alstonia scholaris*	Dieng ksuid	32	*Ligustrum robustum*	Dieng Syiang
3	*Aralia armata*	Dieng latymphu	33	*Macaranga denticulate*	Dieng lakhar
4	*Artisia griffithii*	Dieng sohkhaw krai	34	*Michelia oblonga*	Dieng laniar
5	*Bauhinia prosphirea*	Dieng tyrlong	35	*Myrica indica*	Dieng sohphie
6	*Bauhinia variegate*	Dieng long	36	*Myrica nagi*	Doing sohliya
7	*Betula alnoides*	Dieng lieng	37	*Pajanelia kheedii*	Dieng tanglung
8	*Bucklandia populnea*	Dieng doh	38	*Pantapanox racemasmum*	Dieng tyllongrangsei
9	*Calicarpa arborea*	Dieng lakhiat	39	*Parkia roxburghii*	Dieng jariat
10	*Camelia caduca*	Dieng tyrnem	40	*Pinus khasiana*	Dieng kseh
11	*Castanopsis armata*	Dieng sning	41	*Pithecellboiu heterophylum*	Dieng iap-iar
12	*Castanopsis indica*	Dieng sohot	42	*Premna bengalensis/ilex benulosa*	Dieng lalieh
13	*Cesearia varieca*	Dieng rang	43	*Pyrus khasiana*	Dieng sohjhur
14	*Cinnamomum cesicodahne*	Dieng pingwait	44	*Quercus dealbata*	Dieng sai
15	*Citrus latipes*	Dieng sohkynphor	45	*Rhododendron arborium*	Dieng tiewsaw/ Dieng tiewjynroh
16	*Derris robusta*	Dieng phyllut	46	*Rhus chinensis*	Dieng sohma
17	*Docynia indica*	Dieng sohphoh khlaw/ Dieng sohphoh	47	*Rhus succedanea*	Dieng kain
18	*Elaeocarpus robustus*	Dieng sohkhyllam	49	*Schima khasiana*	Dieng ngan
19	*Engelhardia spicata*	Dieng lymba	50	*Shesleria wallichina*	Dieng langrop
20	*Erythrina indica*	Dieng song	51	*Symplocus khasiana*	Dieng pe
21	*Eurya accuminata*	Dieng pyrshit/ Dieng shit	52	*Symplocus theaefolia*	Dieng pei
22	*Ficos globarata*	Dieng sohpian	53	*Taxus bacata*	Dieng sohblei
23	*Ficus nerifolia*	Dieng sohmehblang	54	*Vernonia volkameriaefolia*	Dieng laniar
24	*Ficus spp*	Dieng sohpongum	55	*Viburnum carilifolium*	Dieng sohlang ksew
25	*Fotina integrefolia*	Dieng snam maw	56	*Zanthoxylum ovalifolium*	Dieng shiah
26	*Grewia abutilifolia*	Dieng sohmeblang			
27	*Hypericum patulum spp*	Dieng sohlamut			
28	*Ilex venulosa*	Dieng shyieng/ Dieng soh khawshyieng			
29	*Inula cappa*	Dieng lalieh			
30	*Irithina indica*	Dieng song			

List of shrubs, herbs, climbers, grass and bamboo found in Nongrimbah Sacred Grove, South West Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.		*Boehmeria nivea*	Urticeace
2.	Kait khlaw	*Musa pudica*	Musaceae
3.		*Garcinia accuminata*	Clusiaceae
4.		*Polygonum capitatum*	Polygonaceae
5.		*Malva verticillata*	Malvaceae
6.	Sohlamut	*Agapetes variegata*	Vaccinaceae
7.	Dieng shit (rit)	*Murrya khasiana*	Theaceae
8.		*Cuphea bracteata*	Rubiaceae
9.		*Vernonia volkameriifolia*	Asteraceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Sla jajew	*Begonia roxborghii (m)*	Begoniaceae
2.	Tiew sying maw	*Gingiber spicatum*	Zingiberaceae
3.	Shiah sohprew	*Rubus khasiana*	Rosaceae
4.	Teinthap or synrem	*Artemisiacina*	Asteraceae
5.	Tiew sying maw	*Vaccinium khasianum*	Vaccinaceae
6.	Batnebru	*Centela asiatica*	Apiaceae
7.	Sohkrot	*Smilax zeylanicum*	Smilaceae
8.		*Bluemia radigata*	Asteraceae
9.	Sla lamet	*Phrynium plancentorium*	Morantaceae
10.	Tyrkhang	*Diplazium esculentum*	Athyriaceae
11.	Tyrkhang	*Cyatheagigantea*	Cyatheaceae
12.	Tyrkhang	*Maesa indica*	Myrsinaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.		*Pothos scandens*	Araceae
2.		*Fissistigma parviflora*	Anonaceae
3.		*Aeschynanthus superba*	Orchidaceae
4.	Sohmrit khlaw	*Piper nigram*	Piperaceae
5.	Jyrmi khlaw	*Mucuna macrocarpa*	Leguminaceae
6.		*Smilax griffithiana*	Smilaceae
7.	Jyrmi khlaw	*Entooda parsactha*	Leguminaceae
8.		*Embelia ribes*	Myrsinaceae
9.		*Floscopa scandens*	Commelinaceae
10.		*Hoya lobii*	Asclepiadaceae

11.		*Hoya parasitica*	Asclepiadiaceae
12.		*Pothos kunsleria*	Araceae
13.	Jyrmi shiah	*Xanthuzylum khasiana*	Rutaceae
14.	Bat fefugee	*Mokania micrantha*	Asteraceae

GRASS

Sl No.	Local Name	Botanical Name	Family
1.	Lang traw	*Imperatus cylindrical*	Poaceae
2.		*Cyperus rotunda*	Cyperaceae
3.	Lang tung khar	*Ageratina odenophora*	Cyperaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Siej namlang	*Chemona bambusa khasiana*	Poaceae
2.	Siej khlaw	*Bambusa khasiana*	Poaceae
3.	Siej shken	*Bambusa pallida*	Poaceae

3.8 Number of Stems:

Number of stems in each girth class and specieswise are given in table 3.1 & 3.2. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40cm to 111-120cm classes.

Table – 3.1

Girth class-wise and Species-wise No. of Stems in the sampled area (35 plots – 7.0 ha)

Girth Class Vise	*Inula cappa* 1st Dominant	*Symplocus khasiana* 2nd Dominant	*Albizia lucidior* 3rd Dominant	*Schima Khasiana* 4th Dominant	*Michelia oblonga* 5th Dominant	*Pinus khasiana*	Rest of the species	Total Stems
30-40	75	14	17	2	25	4	364	**501**
41-50	62	25	21	6	33	10	404	**561**
51-60	47	25	25	9	25	16	336	**483**
61-70	31	25	25	23	18	12	310	**444**
71-80	28	35	17	23	21	18	296	**438**
81-90	13	46	21	37	8	10	227	**362**
91-100	4	33	19	38	6	4	167	**271**
101-110	4	7	5	6	1	1	86	**110**
111-120	6	9	9	5	0	4	81	**114**
121-130	0	4	7	5	0	0	38	**54**
131-140	3	2	3	6	0	0	21	**35**
141-150	4	0	1	4	0	0	17	**26**
151 & above	0	4	4	8	0	0	59	**75**
Total	**277**	**229**	**174**	**172**	**137**	**19**	**2406**	**3474**

Table – 3.2

Girth class-wise and Species-wise No. of Stems in the entire grove (Area 34.65 ha)

Girth Class Vise	*Inula cappa* 1st Dominant	*Symplocus khasiana* 2nd Dominant	*Albizia lucidior* 3rd Dominant	*Schima Khasiana* 4th Dominant	*Michelia oblonga* 5th Dominant	*Pinus khasiana*	Rest of the species	Total Stems
30-40	371	69	84	10	124	20	1802	**2480**
41-50	307	124	104	30	163	50	2000	**2777**
51-60	233	124	124	45	124	79	1663	**2391**
61-70	153	124	124	114	89	59	1535	**2198**
71-80	139	173	84	114	104	89	1465	**2168**
81-90	64	228	104	183	40	50	1124	**1792**
91-100	20	163	94	188	30	20	827	**1341**
101-110	20	35	25	30	5	5	426	**545**
111-120	30	45	45	25	0	20	401	**564**
121-130	0	20	35	25	0	0	188	**267**
131-140	15	10	15	30	0	0	104	**173**
141-150	20	0	5	20	0	0	84	**129**
151 & above	0	20	20	40	0	0	292	**371**
Total	**1371**	**1134**	**861**	**851**	**678**	**391**	**11910**	**17196**

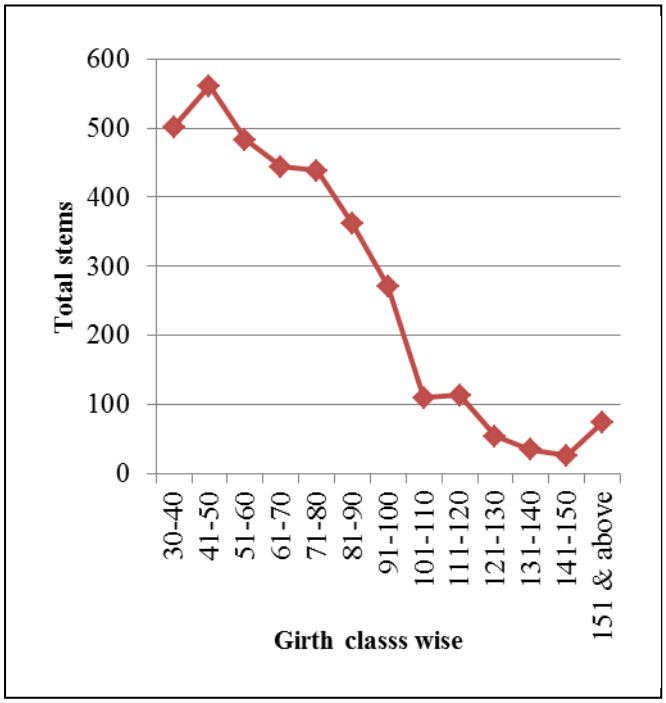


Figure 3.1: Girth class wise with respect to total stems

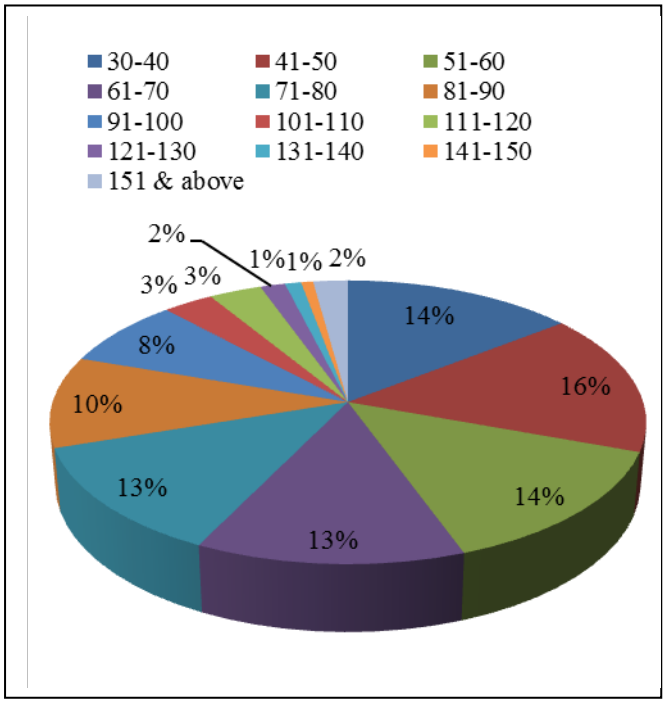


Figure 3.1: Girth class wise with respect to total stems

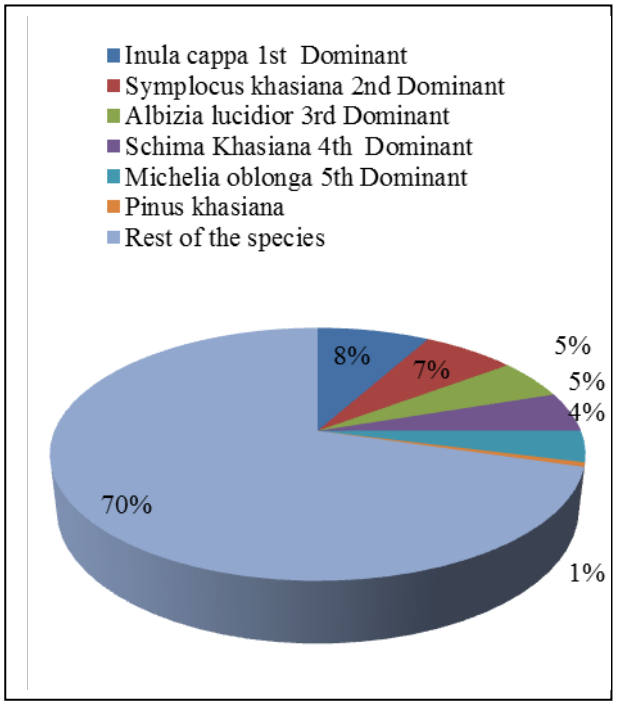


Figure 3.1 (a): Species wise with respect to Total Stems

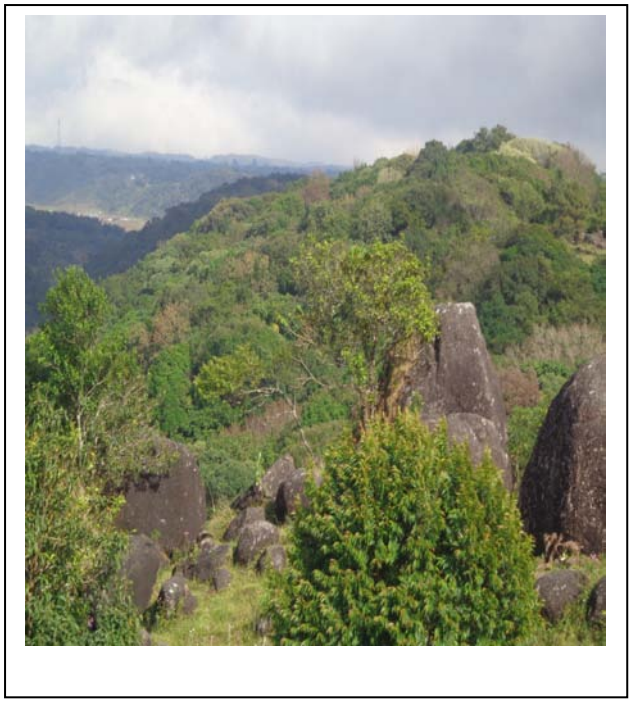


Figure 3 (a): Over view of Nongrimbah Sacred Grove



Figure 3 (b): Inside view of Nongrimbah Sacred Grove

3.8 Growing Stock:

As per the methodology described in Chapter-I, 20% enumeration is carried out in the grove as its area is less than 50ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within 35 plots of 0.2 ha size, i.e. 6.93 ha. , data was collected for 3474 tree species consisting of 277 *Inula cappa* (1st dominant), 229 *Symplocus khasiana* (2nd dominant), 174 *Albizia lucidor* (3rd dominant), 172 *Schima khasiana* (4th dominant), 137 *Michelia oblonga* (5th dominant), 19 *Pinus khasiana* and 2406 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40cm to 151cm and above. The results are given in table 3.3 & 3.4 for Nongrimbah sacred grove which shows the volume specieswise and girth classwise. The total growing stock of the grove works out to 9510.50 cubic metres.

Table- 3.3

Specieswise girth class wise volume in the sampled area (35 plots-7.0 ha) (volume in cu.m)

Girth Class Vise	*Inula cappa* 1st Dominant	*Symplo cus khasiana* 2nd Dominant	*Schima Khasiana* 3rd Dominant	*Albizia lucidior* 4th Dominant	*Michelia oblonga* 5th Dominant	*Pinus khas-iana*	Rest of the species	Total
30-40	4.558	0.725	0.199	7.199	1.526	0.173	22.473	**36.853**
41-50	8.903	3.716	0.931	10.279	3.056	1.107	57.504	**85.496**
51-60	12.097	6.070	2.183	14.609	3.965	3.071	85.240	**127.235**
61-70	11.780	9.757	7.993	17.475	4.810	3.317	118.537	**173.669**
71-80	14.326	18.466	10.251	13.956	8.502	7.633	157.140	**230.274**
81-90	8.962	32.103	20.996	20.363	4.328	5.721	158.861	**251.334**
91-100	3.497	30.075	27.317	21.940	4.712	2.900	149.412	**239.853**
101-110	4.424	7.757	5.304	6.749	1.053	0.990	96.560	**122.837**
111-120	7.992	12.441	5.418	14.179	0	4.520	111.132	**155.682**
121-130	0	6.761	6.429	12.300	0	0	62.416	**87.906**
131-140	5.755	3.721	9.020	5.955	0	0	40.279	**64.730**
141-150	16.877	0	6.719	2.317	0	0	37.460	**63.373**
151 & above	0	12.495	21.357	14.637	0	0	233.582	**282.071**
Total	**99.171**	**144.087**	**124.117**	**161.958**	**31.952**	**14.131**	**1330.596**	**1921.31**

Table- 3.4

Species wise girth class wise volume in the entire grove (Area- 34.65 ha) (volume in cu.m)

Girth Class Vise	*Inula cappa* 1st Dominant	*Symplocus khasiana* 2nd Dominant	*Schima Khasiana* 3rd Dominant	*Albizia lucidior* 4th Dominant	*Michelia oblonga* 5th Dominant	*Pinus khas-iana*	Rest of the species	Total	% wrt total volume
30-40	22.56	3.59	0.99	35.64	7.55	0.86	111.24	**182.42**	**1.92**
41-50	44.07	18.39	4.61	50.88	15.13	5.48	284.64	**423.21**	**4.45**
51-60	59.88	30.05	10.81	72.31	19.63	15.20	421.94	**629.81**	**6.62**
61-70	58.31	48.30	39.57	86.50	23.81	16.42	586.76	**859.66**	**9.04**
71-80	70.91	91.41	50.74	69.08	42.08	37.78	777.84	**1139.86**	**11.99**
81-90	44.36	158.91	103.93	100.80	21.42	28.32	786.36	**1244.10**	**13.08**
91-100	17.31	148.87	135.22	108.60	23.32	14.36	739.59	**1187.27**	**12.48**
101-110	21.90	38.40	26.25	33.41	5.21	4.90	477.97	**608.04**	**6.39**
111-120	39.56	61.58	26.82	70.19	0.00	22.37	550.10	**770.63**	**8.10**
121-130	0.00	33.47	31.82	60.89	0.00	0.00	308.96	**435.13**	**4.58**
131-140	28.49	18.42	44.65	29.48	0.00	0.00	199.38	**320.41**	**3.37**
141-150	83.54	0.00	33.26	11.47	0.00	0.00	185.43	**313.70**	**3.30**
151 & above	0.00	61.85	105.72	72.45	0.00	0.00	1156.23	**1396.25**	**14.68**
Total	**490.90**	**713.23**	**614.38**	**801.69**	**158.16**	**145.69**	**6586.45**	**9510.50**	**100.00**
% wrt total volume	**5.16**	**7.50**	**6.46**	**8.43**	**1.66**	**1.53**	**69.25**	**100.00**	

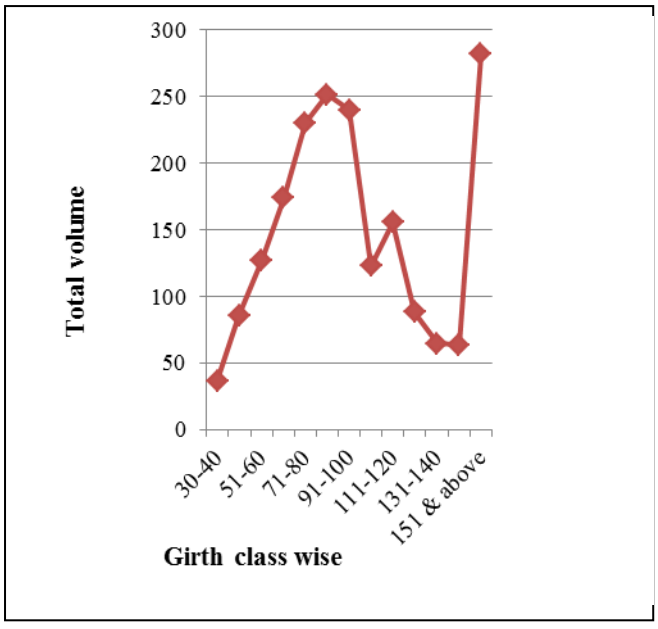


Figure 3.3: Girth class wise with respect to total volume

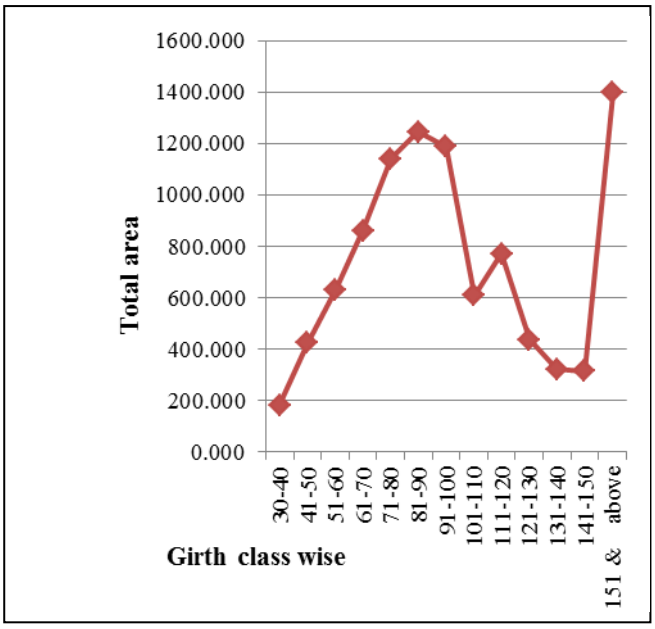


Figure 3.4: Girth class wise with respect to total area

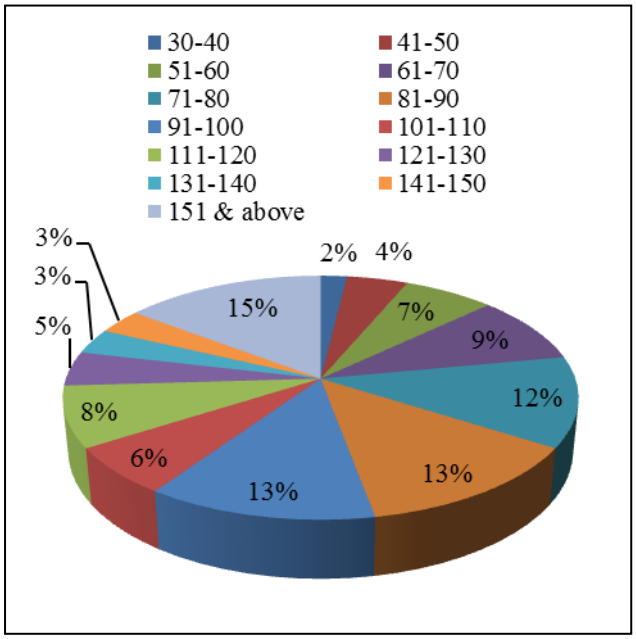


Figure 3.3: Girth class wise with respect to Total Volume

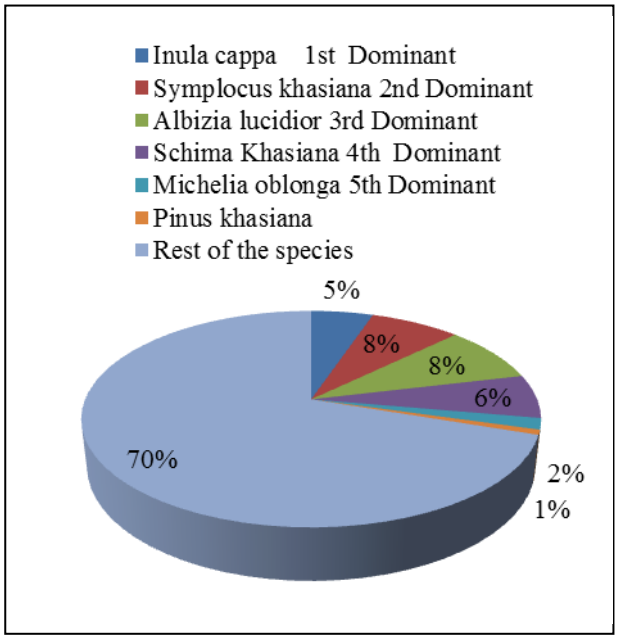


Figure 3.3(a): Specieswise with respect to Total Volume



Figure 3 (c): Inside view of Nongrimbah Sacred Grove.



Figure 3 (d):Wild fruit found at Nongrimbah Sacred Grove.

Table 3.4 shows that the volume contributed by the 1st dominant species (*Inula cappa*) with respect to the total volume of the grove is 5.16%, the 2nd dominant species (*Symplocus khasiana*) is 7.5%, 3rddominant species (*Albizia lucidor*) is 8.43%, 4th dominant species (*Schima khasiana)* is 6.46%, 5th dominant species (*Michelia oblonga*) is 1.66, *Pinus khasiana* is 1.53 while Rest of the species is maximum i.e. 69.25%. Total volume of the grove is 9510.50 cubic metres

From the table it is observed that in general as the girth class increases, the volume in that class also increases i.e. girth class is directly proportional to the volume in that class

3.9 Brief Note on Management of Law Adong Nongrimbah:

(i) Biotic Interference:-

In this grove felling of tress is strictly prohibited and there is no sign of felling of timber in the past. As this grove is isolated from villages, illegal hunting cannot be ruled out. During field visits there are some cave where pugmark of barking dear is clearly visible, hence to protect them, it is high time that the Department should take necessary steps to stop illegal hunting of wild animal in this grove.

(ii) Fire control:-

So far there is no report of fire incident in this grove. To avoid any unwanted fire in this grove, external fire line is needed all along the boundary except in the northern side where Maweit ksar river is running as natural boundary.

(iii) Water stress:-

Creation of check dams inside of the grove will help wild animal from straying out of the grove especially in dry season. This will also help to check soil erosion.

(iv) Afforestation:-

Open forest and blank patches was found mainly in the southern part of the grove. It is therefore suggested that afforestation works is highly needed to maintain its forest cover and its beauty.

(v) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

4- LUMLAITDIHUM

4.1. Location:

Lumlaitdihum Sacred Grove is situated in East Khasi Hills District at Laitkynsew village under the Syiemship of Hima Nongkhlaw. It covers an area of 17.65 ha and lies between 91° 40′ 04 ″E to 91° 40′ 58 ″E longitude and 25° 13′ 18 ″N to 25° 13′ 46 ″N latitude with an elevation of 968 m from MSL. It is bounded to the North by David Scott road, to the South by an approach footpath to view point, to the East by private forest and towards the East by the village forest of Laitkynsew. The grove is accessible by road from Shillong via Sohra-Mawmluh Road. It is about 65 Km from Shillong.

4.2 Brief History:

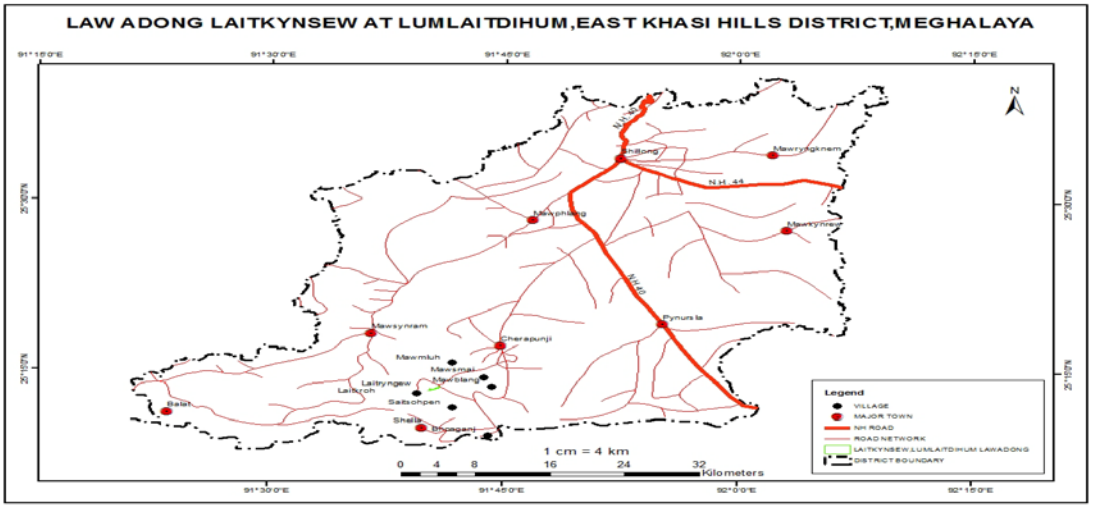
This Sacred grove is owned by the villagers of Laitkynsew village and is control by the Headman of the village. Although at present, rituals are not performed any more, but the people still preserve this relic forest with heart and soul. Entry in side this grove is not illegal but cutting down of timber is highly illegal and punishable under the rules framed by the village Durbar and may warrant penalty. It is also interesting to know that the legendary road used by David Scott while travelling to Sylhet, Bangladesh or vice-versa is running along the boundary of this sacred grove. Pitcher plant plantation carried out by the Forest Department and a view point constructed by Tourism Department may attract tourists in the near future.

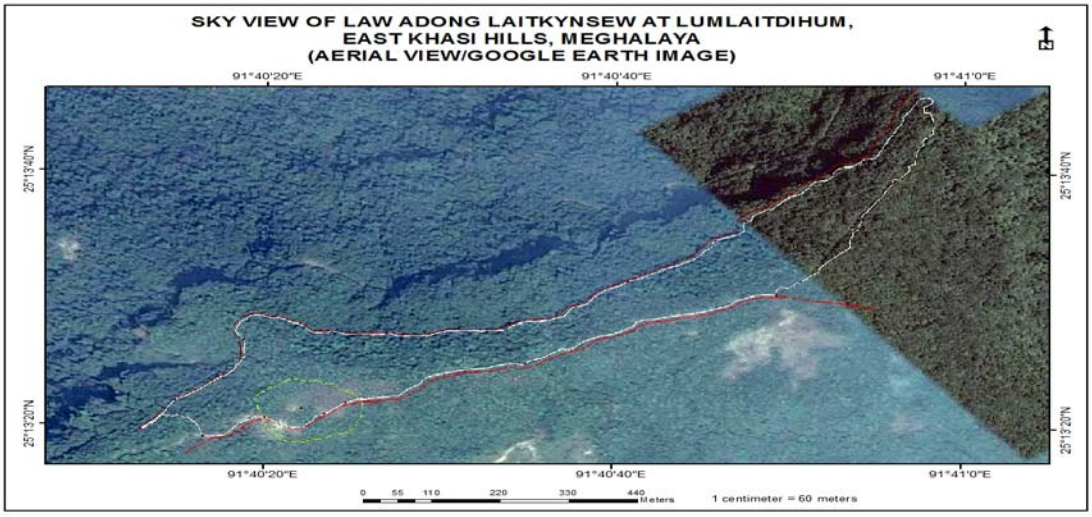
4.3 Geography and Climate:

Topography of the grove is gentle rolling in nature with slope varying from 4° to 10°. It falls under South-West aspect. The Soil texture is of sandy loam, gravels coarse fragment, slightly compact in consistency and red in colour with high soil dept. There is no stream or river that are flowing through this Sacred grove.

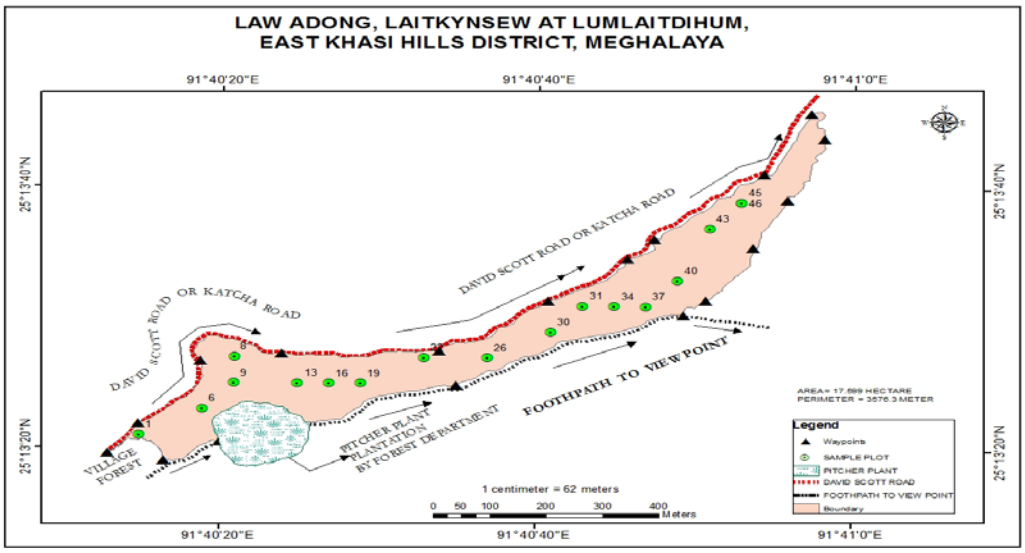
The cold winter starts from mid November to February and warm summer from May to October. Monsoon started from May to September, the average minimum temperature is 10°C and maximum is 30°C. Biotic pressure, encroachment, wild fire, hunting and poaching, grazing and illegal felling of timber were found absent in the grove.

Location Map of Lumlaitdihum Sacred Grove





Maps showing sample plots of Law Adong, Laitkynsew at Lumlaitdihum



4.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

4.5 Flora and Fauna:

The vegetation type is of mix-species mainly *Schima khasiana, Costonopsis indica* and *Quercus sps.* as dominant species. Origin of the forest is of natural in nature and it is of two storey forest Wildlife found here are jungle fowls, barking deer, jackals, and some vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

(a) It is one of the virgin forests where human interference is almost zero.

(b) The area is very significant from the biodiversity point of view with high level endemic plant and animal species.

(c) Existence of many rare endangered plant species.

(d) With all restrictions- do's and don'ts; help this groves in conservation of flora and fauna and maintaining of rich forest natural resources.

4.6 Floral species:

List of Trees found in Lumlaitdihum, Laitkynsew Sacred Grove, East Khasi Hills District

Sl No	*Botanical Name*	Local Name	Sl No	*Botanical Name*	Local Name
1	*Albizzia procera*	Dieng Sohriew	16	*Elaeocarpus lancifolius*	Dieng Sohkhyllam
2	*Amora wallichii*	Dieng Soh Shrieh	17	*Erythrina indica*	Dieng Song
3	*Artocarpus lacucha*	Dieng Sohsyrtet	18	*Eugenia jambolana*	Dieng sohum
4	*Betula alnoides*	Dieng Lieng	19	*Eurya accumilata*	Dieng Sohshit
5	*Breynia patens*	Dieng Mat-iar	20	*Ficus hispida*	Dieng Lajri
6	*Callicarpa arborea*	Dieng Lakhiat	21	*Glochidion acuminatum*	Dieng Jem
7	*Camelia caduca*	Dieng Tyrnem	22	*Ilex venulosa*	Dieng Soh Shyieng
8	*Caryota urens*	Dieng Tlai	23	*Macaranga denticulata*	Dieng Lakhar
9	*Castanopsis indica/ hysteric/spps*	Dieng Sohot sning/ Sohstap/Sohot patuia	24	*Macropanaz undulatus*	Dieng Jarasi
10	*Cepadoss fruticosa*	Dieng Phaniaw	25	*Mahomia acanthifolia*	Dieng Sohiong
11	*Cinnamomum bejolghota*	Dieng latyrdop	26	*Myrica indica*	Dieng Sohphie
12	*Cinnamomum tamala*	Dieng latyrpad	27	*Pantapanax recemasum*	Dieng Jangrongsi
13	*Citrus riticulata*	Dieng sohsyiem	28	*Prema bengalensis*	Dieng Lieh
14	*Drimycarpus racemusus*	Dieng sohrang	29	*Quercus glanca*	Dieng Lariwar
15	*Dysoxylum hamiltonii*	Dieng kyrbei	*30*	*Saurauia punduana*	Dieng Jalngap
31	*Schima khasiana/Schima wallichii*	Dieng Ngan/Dieng ngan lieh	35	*Toona celiata*	Dieng Bti
32	*Smilax glabra*	Dieng krot	36	*Uraria alopecuroides*	Dieng Sohmluh
33	*Symplocus chinensis*	Dieng Iong	37	*Wendlandia wallichii*	Dieng Shadmoit
34	*Symplocus theaefolia*	Dieng Pei			

List of shrubs, herbs, climbers, orchids & bamboo found in Lum Laitdihum Sacred Grove, East Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Lajarem	*Clerodendrum viscum*	Vervenaceae
2.	Dieng sohjabuit	*Plogocanthus thyrsifolia*	Acantaceae
3.	Dieng sohniang riang blei		
4.	Dieng soh phong phong		
5.	Dieng lasis sia		
6.	Dieng smaw		
7.	Dieng sohtait		
8.	Dieng eit miang		
9.	Dieng soh kynruin		
10.	Dieng soh pyrsit		
11.		*Draccina angustifolia*	Liliaceae
12.		*Boehimeria diffuca*	Urticaceae
13.	Dieng jamyrait		Anonaceae
14.		*Clerodendrum colebrukianum*	Barbaraceae
15.	Dieng soh brai		
16.	Synsar	*Thysaemolia myscina*	Poaceae
17.	Kait khlaw	*Mausea spp*	

HERBS

Sl No.	Local Name	Botanical Name	Family
1.		*Stroebilenthum spp*	Rubiaceae
2.		*Aretae spp*	Arakaceae
3.	Tyrkhang	*Asplinia midus*	Ptireophytes
4.	Sying khlaw	*Zingerber purpureum*	Zingiberaceae
5.	Jajew khlaw	*Begonia roxburghii*	Begoniaceae
6.	Sohbyrthit	*Urena labata*	Malraceae
7.	Wangkhlaw	*Essculenta*	Araceae
8.	Bat eroplain	*Enola chapa*	Asteraceae
9.	Sla lamet	*Placentarum*	Morantaceae
10.	Sla lamut	*Phyrnium plecentrum*	Moranteceae
11.	Shynrai khlaw	*Alpinea alogus*	Gingiberaceae
12.	Sohtrun shiah	*Ananus spp*	
13.	Phud wang	*Cololasia spp*	Araceae

CLIMBERS

Sl	Local Name	Botanical Name	Family

No.			
1.	Loapla	*Rhaphidophra*	Aralaceae
2.	Dieng sohmatan/sohpdong	*Stephania globra*	Lilyceae
3.	Dieng longkhasaw (jyrmi)		
4.	Jyrmi sohthied		
5.	Sla kynda jyrmi	*Pothos spp*	Aralaceae
6.		*Thandirdia spp*	
7.		*Apocynacea globra*	Apocynaceae
8.		*Hoya parasitica*	Asclipa depaceae
9.	Kophi khlaw	*Arvaena coronania*	Rubiceae

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng tiew dieng	*Micropera manii*	Orchideceae
2.	Dieng tiew dieng	*Ascehinanthus spp*	Orchideceae
3.	Dieng tiew dieng	*Dendrobium aphyllum*	Orchideceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Shken	*Bombusa pallida*	

4.7 Number of Stems:

Number of stems in each girth class and species wise are given in table 4.1 & 4.2. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40cm to 71-80cm classes.

Table- 4.1

Girth class wise and species wise No. of stems in the sampled area (17 plots – Area 3.4 ha)

Girth class wise	*Schima khasiana/ Wallichii* 1st dominant	*Costonopsis indica* 2nd dominant	*Quercus glanca* 3rd dominant	Rest of the species	Total
30-40	49	50	102	416	**617**
41-50	45	40	76	311	**472**
51-60	33	36	33	208	**310**
61-70	32	30	18	161	**241**
71-80	25	28	6	133	**192**
81-90	17	29	4	88	**138**
91-100	27	26	1	78	**132**
101-110	21	15		57	**93**
111-120	9	15		38	**62**
121-130	19	7		25	**51**
131-140	13	11		23	**47**
141-150	11	3		14	**28**

151 & above	27	13		37	**77**
Total	**328**	**303**	**240**	**1589**	**2460**

Table- 4.2
Girth class wise and species wise No. of stems in the entire grove (Area =17.65 ha)

Girth class wise	*Schima khasiana/ Wallichii* 1st dominant	*Costanopsis indica* 2nd dominant	*Quercus glanca* 3rd dominant	Rest of the species	Total
30-40	254	260	529	2159	**3203**
41-50	234	208	395	1614	**2450**
51-60	171	187	171	1080	**1609**
61-70	166	156	93	836	**1251**
71-80	130	145	31	690	**997**
81-90	88	151	21	457	**716**
91-100	140	135	5	405	**685**
101-110	109	78	0	296	**483**
111-120	47	78	0	197	**322**
121-130	99	36	0	130	**265**
131-140	67	57	0	119	**244**
141-150	57	16	0	73	**145**
151 & above	140	67	0	192	**400**
Total	**1703**	**1573**	**1246**	**8248**	**12770**

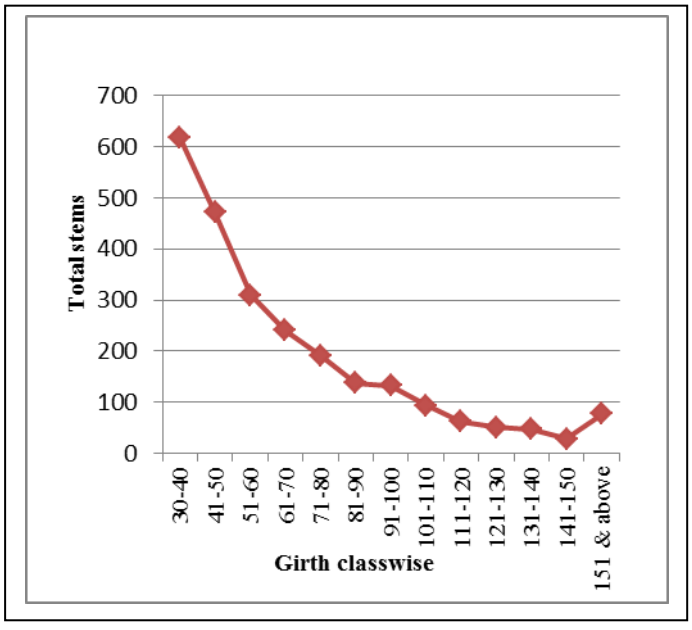


Figure 4.1: Girth classwise stems with respect to total stems

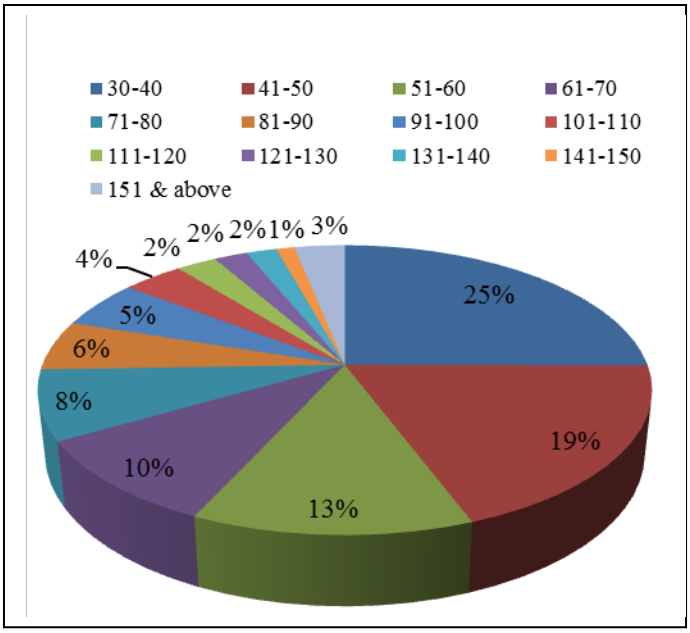


Figure 4.1: Girth class wise with respect to total stems stems

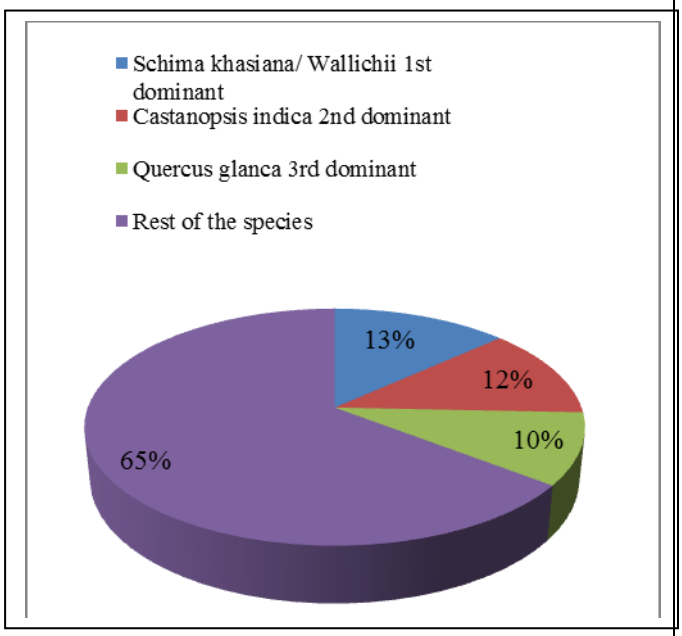


Figure 4.1 (a): Specieswise stems with respect to total



Figure 4 (a): Inside view of Lum Laitdihum Sacred Grove



Figure 4 (b): Laying of sample plot at Lum Laitdihum Sacred Grove.

4.8 Growing Stock:

As per the methodology described in Chapter-I, 20% enumeration is carried out in the grove as its area is more than 10ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within 17 plots of 0.2 ha size, i. e. 3.4 ha., data was collected for 2460 tree species consisting of 328 *Schima khasiana*, (1st dominant), 303 *Costonopsis indica* (2nd dominant), 240 *Quercus glauca* (3rd dominant) and 1589 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151 cm and above. The results are given in table 4.3 & 4.4 for Lumlaitdihum sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 6291.85 cubic metres.

Table - 4.3
Girth class wise & species wise volume in sampled area (17 plots-3.4 ha)
(volume in cu.m)

Girth class wise	*Schima khasiana/ Wallichii* 1st dominant	*Castonopsis indica* 2nd dominant	*Quercus glanca* 3rd dominant	Rest of the species	Total
30-40	3.947	2.381	1.936	21.457	**29.721**
41-50	6.701	5.658	4.822	43.766	**60.947**
51-60	7.392	9.358	4.088	51.469	**72.307**
61-70	10.464	11.501	3.765	61.104	**86.834**
71-80	10.970	14.912	1.845	71.109	**98.836**
81-90	9.706	20.497	1.642	63.068	**94.913**
91-100	19.557	23.314	0.576	70.101	**113.548**
101-110	19.075	16.518		63.677	**99.270**
111-120	9.617	20.610		51.570	**81.797**
121-130	23.944	11.507		40.400	**75.851**
131-140	18.920	21.467		43.172	**83.559**
141-150	19.524	6.957		31.012	**57.493**
151 & above	73.863	47.495		135.594	**256.952**
Total	**233.680**	**212.175**	**18.674**	**747.499**	**1212.028**

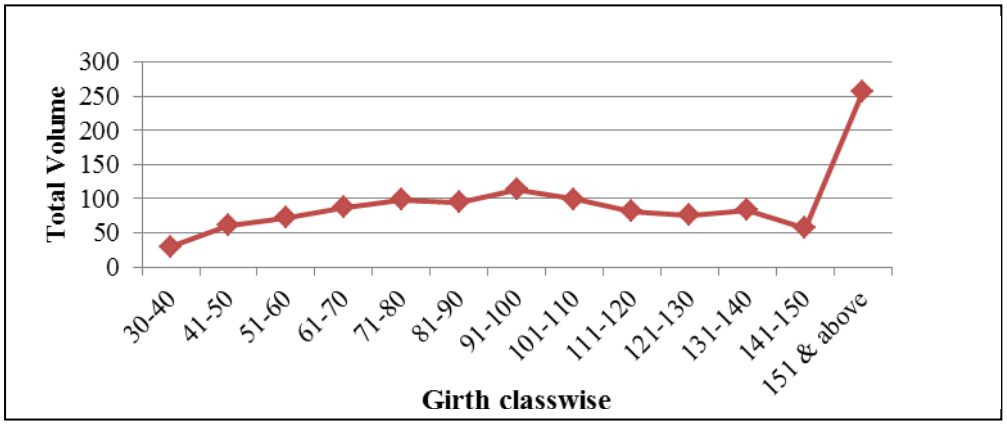


Figure 4.3: Girth classwise class with respect to total volume

Table - 4.4

Girth class wise & species wise volume in the entire grove (Area 17.65 ha)

(volume in cu.m)

Girth class wise	*Schima khasiana/ Wallichii* 1st dominant	*Costonopsis indica* 2nd dominant	*Quercus glanca* 3rd dominant	Rest of the species	Total	% wrt total volume
30-40	20.49	12.36	10.05	111.39	**154.29**	2.45
41-50	34.79	29.37	25.03	227.20	**316.39**	5.03
51-60	38.37	48.58	21.22	267.18	**375.36**	5.97
61-70	54.32	59.70	19.54	317.20	**450.77**	7.16
71-80	56.95	77.41	9.58	369.14	**513.08**	8.15
81-90	50.39	106.40	8.52	327.40	**492.71**	7.83
91-100	101.52	121.03	2.99	363.91	**589.45**	9.37
101-110	99.02	85.75	0.00	330.56	**515.33**	8.19
111-120	49.92	106.99	0.00	267.71	**424.62**	6.75
121-130	124.30	59.73	0.00	209.72	**393.76**	6.26
131-140	98.22	111.44	0.00	224.11	**433.77**	6.89
141-150	101.35	36.12	0.00	160.99	**298.46**	4.74
151 & above	383.44	246.55	0.00	703.89	**1333.88**	21.20
Total	**1213.07**	**1101.44**	**96.94**	**3880.40**	**6291.85**	100.00
% wrt total volume	**19.28**	**17.51**	**1.54**	**61.68**	**100.00**	

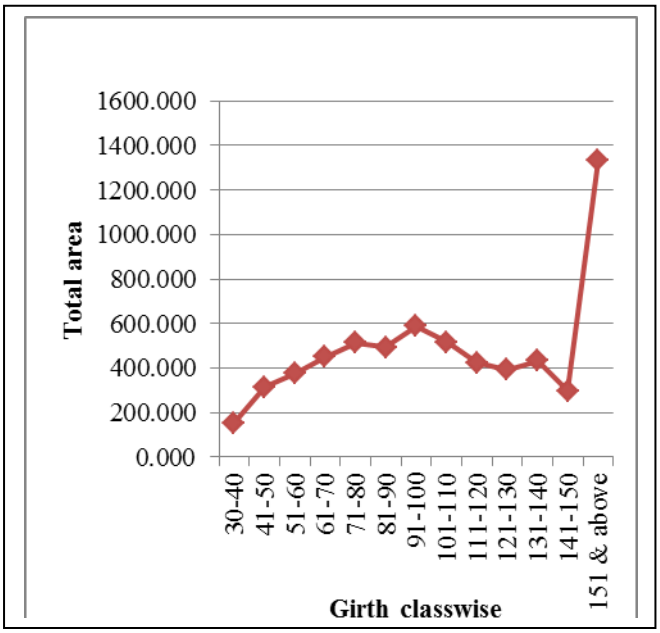


Figure4.4: Girth class wise with respect to total area

Table 4.2 shows that the volume contributed by the 1st dominant species (*Schima khasiana*) with respect to the total volume of the grove is 19.28%, the 2nd dominant species (*Costonopsis indica*) is 17.51%, 3rd dominant (*Quercus glauca*) is 1.54% while Rest of the species is maximum i.e. 61.68%. Total volume of the grove is 6291.85 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class also increases i.e. girth class is directly proportional to the volume in that class.

4.9 Brief Note on Management of Law Adong Lumlaitdihum:

(i) Biotic Interference:-

In this grove, the village durbar of Laitkynsew had imposed restriction on felling of trees, but since the grove is located far away from villages this cannot be ruled out in the near future. Existence of view point created by Tourism Department may also attract people's interference in this Law Adong. Hunting of wild animals cannot also be ruled out; grazing was found to be absent. By declaring this rich vegetation forest area into a Community Reserve will help to stop biotic pressure in this grove.

(ii) Fire incidence:-

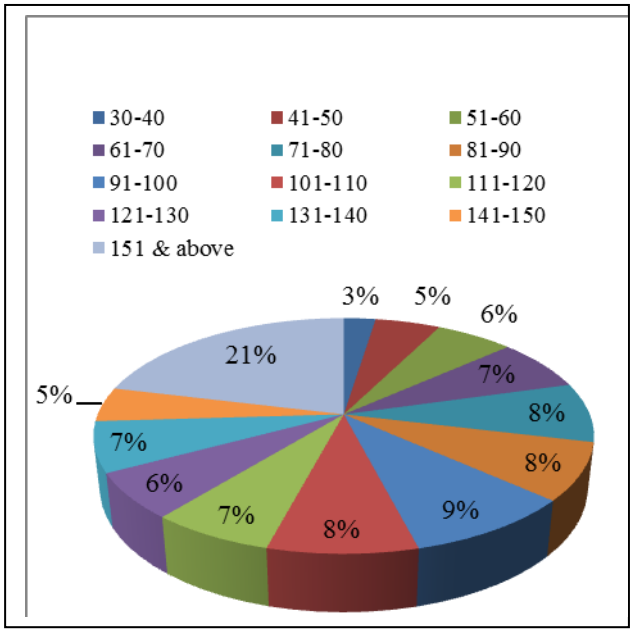
So far there is no report of fire incidence in this grove. To prevent any fire incidence in the future a 6 metre wide strip external fire line all along the boundary is highly recommended.

(iii) Water stress:-

There is no stream or river in this grove. The only way to store water is by harvesting rain water, this can be done by constructing check dams across the slope, and this will help wildlife's attraction and improve moisture content of the soil.

(iv) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.



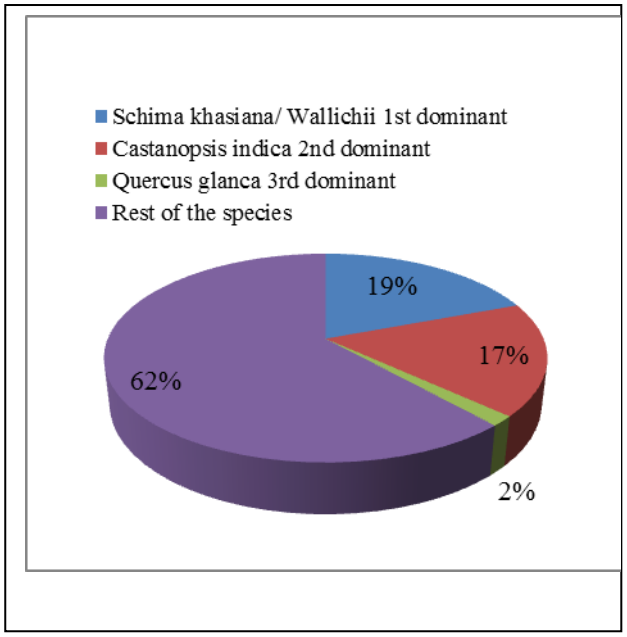


Figure 4.3: Girth class wise with respect to Total volume Figure 4.3(a): Species wise with respect to Total volume



Figure 4 (c): Scorpion found in Lum Laitdihum Sacred Grove.



Figure 4 (d): Inside view of Lum Laitdihum Sacred Grove.

5 - SALARIANG

5.1 Location:

Salariang Sacred Grove is situated in South West Khasi Hills District of Meghalaya at Jakrem village under the Syiemship of Hima Maharam. It covers an area of 10.5 ha and lies between 91° 31′ 18″ E to 91° 31′ 30″ E longitude and 25° 23′ 50″ N to 25° 24′ 10″ N Latitude with an elevation of 1529 m from MSL. It is bounded to the North by Salariang stream, to the South by Private forest of Ianty Jyrwa, to the East by land of Relin Jyrwa and T.Wahlang and towards the West by Salariang stream. The grove is accessible by road from Shillong via Weiloi-Jakrem Road. The grove is accessible by road from Shillong via Weiloi-Mawkyrwat Road. It is about 67 km from Shillong.

5.2 Brief History:

There is no records as to establish when this grove originated but it is believed that this Sacred grove have originated hundred of years ago. Offerings and prayers have been ceased long way back since the inception of Christianity. But the villagers still preserve this Sacred grove for the sake of the environment and to help the family of the villager to reconstruct their house by donating some trees if any natural calamity happen to a particular family. It is owned by the village community and controlled by the Headman elected by the villagers. The State Forest Department has no direct control of the said grove rather it falls under the jurisdiction of the KHADC.

5.3 Geography and Climate:

Topography of the grove is gently rolling in nature with slope varying from 4° to 15°. The soil texture is sandy loam with boulders and slightly friable consistency. The colour of the soil is brown with medium soil depth. There is neglegible soil erosion in the grove area. There is only one perennial stream flowing along the boundary of the grove. It is the only source of water which feeds the agricultural land in the adjoining areas. PWD road from Shillong to Mawkyrwat passes through the middle of the grove.

The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 5°C and maximum is 25°C. Biotic pressure, encroachment, wild fire, hunting & poaching, grazing and the activities of illegal timber were found to be absent in the grove.

5.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

5.5 Flora and Fauna:

The vegetation type is of mix-species mainly Costonopsis indica and Myrica indica as dominant species. Origin of the forest is of natural in nature and it is of two storey forest Wildlife found here are jungle fowls, barking deer, jackals, and some vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

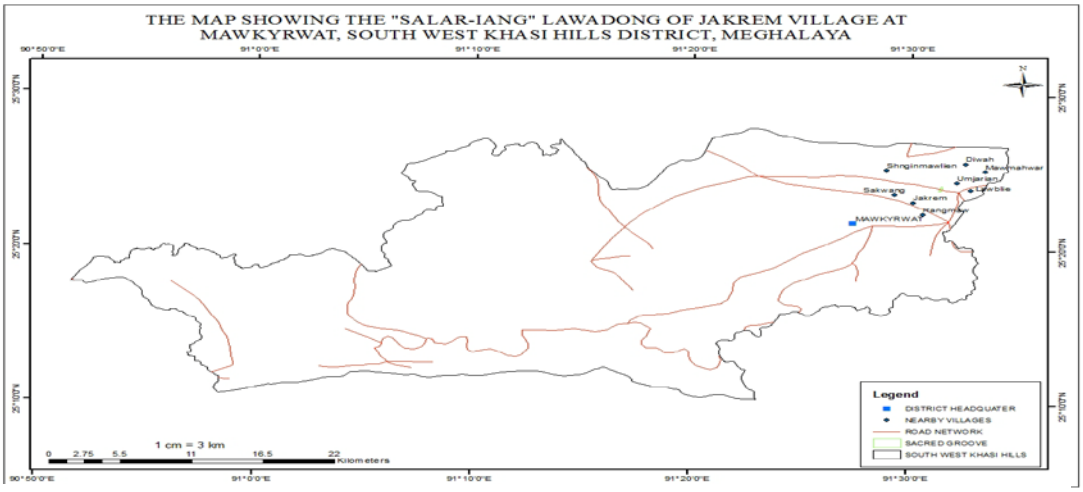
a) The area is very significant from the biodiversity point of view with high level endemic plant and animal species.
b) Existence of many rare endangered plant species.
c) With all restrictions- do's and don'ts; help this groves in conservation of flora and fauna and maintaining of rich forest natural resources.

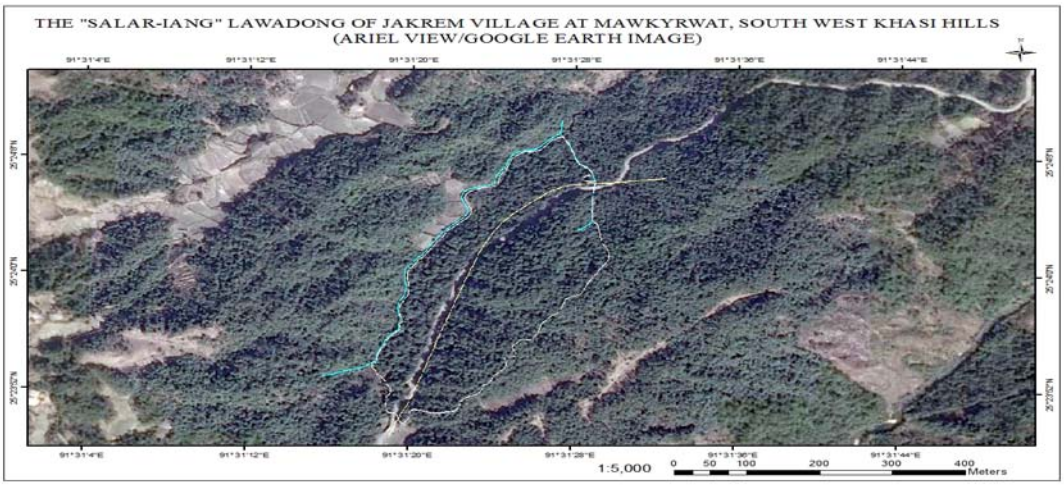
5.6 Floral species:

List of Trees found in Sala-riang Sacred Grove, South West Khasi Hills

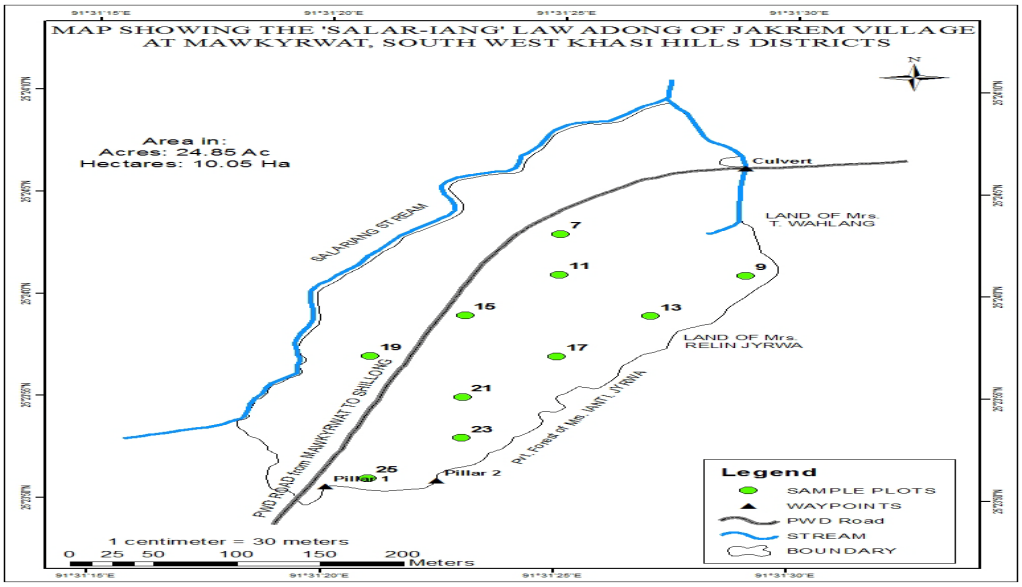
Sl No	Botanical Name	Local Name	Sl No	Botanical Name	Local Name
1	*Albizia griffithii*	Dieng sohkhaw shyieng	19	*Macaranga denticulate*	Dieng lakhar
2	*Albizia lucidior*	Dieng ri	20	*Michelia oblonga*	Dieng laniar
3	*Aralia armata*	Dieng latymphu	21	*Myrica indica*	Dieng sohphie
4	*Camelia caduca*	Dieng tyrnem	22	*Parkia roxburghii*	Dieng jariat
5	*Castanopsis armata*	Dieng sning	23	*Pinus khasiana*	Dieng kseh
6	*Castanopsis indica*	Dieng sohot	24	*Pithecellboiu heterophylum*	Dieng iap-iar
7	*Cesearia varieca*	Dieng rang	25	*Premna bengalensis*	Dieng lalieh
8	*Cinamomum cesicodahne*	Dieng pingwait	26	*Pyrus khasiana*	Dieng sohjhur
9	*Docynia indica*	Dieng sohphoh khlaw	27	*Quercus dealbata*	Dieng sai
10	*Elaeocarpus lancefolium*	Dieng sohkhyllam	28	*Rhododendron arboretum*	Dieng tiewsaw
11	*Engelhardia spiculata*	Dieng lymba	29	*Rhododendron arborium*	Dieng tiew rilang
12	*Eurya accuminata*	Dieng shit	30	*Rhus chinensis*	Dieng sohma
13	*Fotina integrefolia*	Dieng snam maw	31	*Rhus succedanea*	Dieng kain
14	*Grewia abutilifolia*	Dieng sohme blang	32	*Schima khasian*	Dieng ngan
15	*Ilex griffithii*	Dieng sohkhaw krai	33	*Shesleria wallichina*	Dieng langrop
16	*Inuala cappa*	Dieng lalieh	34	*Symplocos khasiana*	Dieng pe
17	*Irithina indica*	Dieng song	35	*Viburnum carilifolium*	Dieng sohlang ksew
18	*Ligustrum robostos*	Dieng sohsyiang	36		

Location Map of Salariang Sacred Grove





Map showing sample plots of Law Adong Salar-Iang



List of Orchids, shrubs, herbs, climbers, grass, ferns and bamboo found in Salariang Sacred Grove, South West Khasi Hills

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew sla rem-maw	*Rhaphidophora lancifolia*	Araceae
2.	Tiew dieng	*Pholidata articulata*	Orchidaceae
3.		*Melotoma malaberica*	Melastomaceae
4.		*Alangium chinense*	Alangiaceae
5.	Orchid	*Micropera manii*	Orchidaceae
6.	Orchid	*Dendrobium chrysanthum*	Orchidaceae
7.	Orchid	*Liparis longipes*	Orchidaceae
8.	Orchid	*Aeschinanthus*	Orchidaceae
9.	Orchid	*Oberonia parvula*	Orchidaceae
10.	Orchid	*Pholidata imbricata*	Orchidaceae
11.	Orchid	*Eriacaronarisea coronarea*	Orchidaceae
12.	Orchid	*Otochilus fusca*	Orchidaceae
13.	Orchid	*Dendrobium fimbriatum*	Orchidaceae
14.	Orchid	*Papihonanthe vandaram*	Orchidaceae
15.	Orchid	*Coelogyne suavealensis*	Orchidaceae
16.	Orchid	*Cymbidium elegans*	Orchidaceae
17.	Orchid	*Neogyne graminifolia*	Orchidaceae
18.	Orchid	*Calenthe masuca (rare sppp)*	Orchidaceae
19.	Orchid	*Pholidata imbricata*	Orchidaceae
20.	Orchid	*Paphiolentheteres*	Orchidaceae
21.	Orchid	*Polidata articulata*	Orchidaceae
22.	Orchid	*Dendrobium transparens*	Orchidaceae
23.	Orchid	*Dendrobium eraceoflorum*	Orchidaceae
24.	Orchid	*Liparis veriodifolia*	Orchidaceae
25.	Orchid	*Coelogynenitida*	Orchidaceae
26.	Orchid	*Eria tomentosa*	Orchidaceae
27.	Orchid	*Bulbophyllum uniflorum*	Orchidaceae
28.	Orchid	*Dendodrombium cathcastii*	Orchidaceae
29.	Orchid	*Liparis elliptica*	Orchidaceae

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Kait khlaw	*Mausa accuminata*	Musaceae
2.	Sohlamut	*Agapetes variegata*	Vaccinaceae
3.	Dieng shit (rit)	*Murrya khasiana*	Theaceae
4.		*Coffiana balsamina*	*Balsaminaceae*
5.		*Vernonia volkameriifolia*	Asteraceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Sla jajew	*Begonia roxborghii (m)*	Begoniceae
2.	Tiew sying maw	*Zingeber spicatum*	Zingibaraceae
3.	Tyrkhang	*Cyatheagigantea*	Cyatheaeceae
4.	Teinthap or synrem	*Artemisia cina*	Asteraceae
5.	Tyrkhang	*Diplazium esculentum*	Athyriaceae
6.			Myrsinaceae
7.	Soh rishan	*Duchesnea indica*	Rosaceae
8.	Tyrkhang	*Maesa indica*	Myrsinaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.		*Pothos scandens*	Araceae
2.		*Smilax zeylanicum*	Smilaceae
3.	Jyrmi khlaw	*Emtada parsaetha*	Leguminaceae
4.		*Embelia ribes*	Myrsinaceae
5.		*Floscopa scandens*	Commelinaceae
6.		*Hoya lobii*	Asclepiadaceae
7.		*Hoya parasitica*	Asclepiadaceae
8.	Jyrmi shiah	*Xanthuzylum khasiana*	Rutaceae
9.	Sohbyrthit khasi	*Trium felta rhomboida*	Malvaceae
10.	Soh nepbah	*Rubus rogosus*	rosaceae

GRASS

Sl No.	Local Name	Botanical Name	Family
1.		*Cyperus rotunda*	Cyperaceae
2.	Lang tung khar		

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Siej namlang	*Chimona bambusa khasiana*	Poaceae

5.7 Number of Stems:

Number of stems in each girth class and species wise are given in table 5.1 & 5.2. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40cm to 91-100cm classes.

Table - 5.1
Girth class wise No. of stems in the sampled area (10 plots – 2.0ha)

Girth class wise	*Costonopsis armata* 1st dominant	*Myrica indica* 2nd dominant	*Pinus khasiana*	Rest of the species	Total Stems
30-40	34	76	13	363	**486**
41-50	32	40	22	193	**287**
51-60	30	20	21	205	**276**
61-70	46	27	38	203	**314**
71-80	29	17	57	127	**230**
81-90	25	11	55	65	**156**
91-100	4	1	59	41	**105**
101-110	2	1	21	16	**40**
111-120	4	1	6	8	**19**
121-130	2	-	4	2	**8**
131-140	2	-	1	1	**4**
141-150	-	-	-	-	**-**
151 & above	1	1	-	3	**5**
Total	**211**	**195**	**297**	**1227**	**1930**

Table - 5.2

Girth class wise and species wise No. of stems in the entire grove (Area 10.5 ha)

Girth class wise	*Costonopsis armata* 1st dominant	*Myrica indica* 2nd dominant	*Pinus khasiana*	Rest of the species	Total Stems
30-40	179	399	68	1906	**2552**
41-50	168	210	116	1013	**1507**
51-60	158	105	110	1076	**1449**
61-70	242	142	200	1066	**1649**
71-80	152	89	299	667	**1208**
81-90	131	58	289	341	**819**
91-100	21	5	310	215	**551**
101-110	11	5	110	84	**210**
111-120	21	5	32	42	**100**
121-130	11	0	21	11	**42**
131-140	11	0	5	5	**21**
141-150	0	0	0	0	**0**
151 & above	5		0	16	**21**
Total	**1108**	**1019**	**1559**	**6442**	**10127**

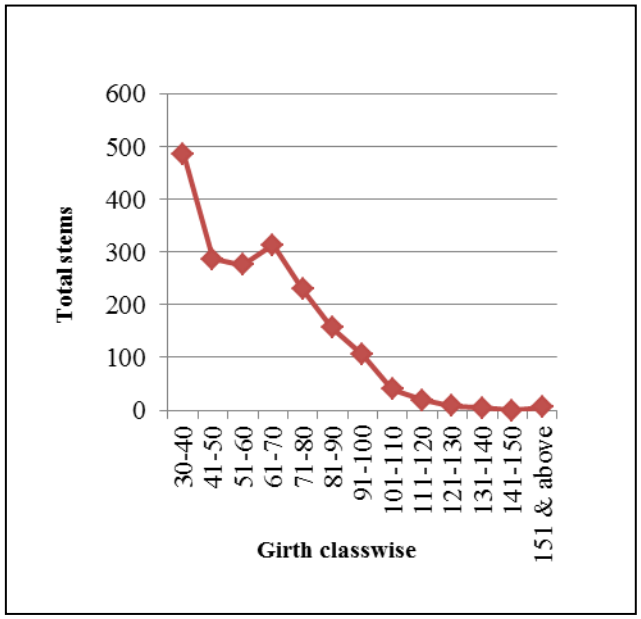


Figure 5.1: Girth classwise with respect to total stems

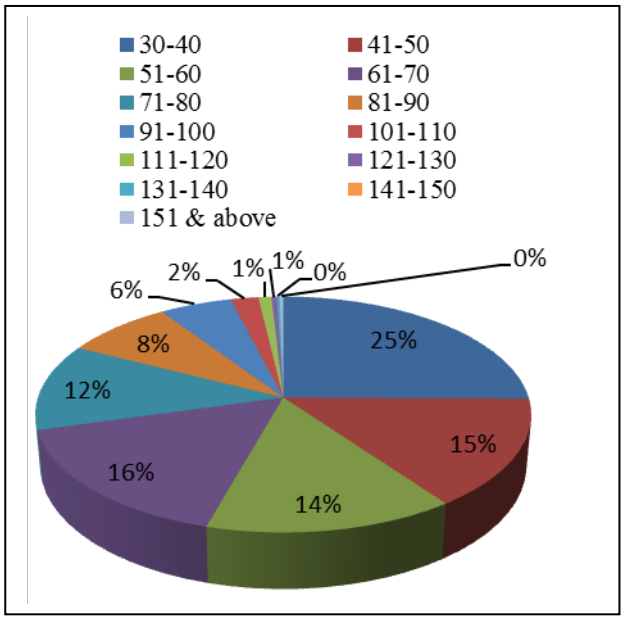


Figure 5.1 Girth class wise with respect to Total stems

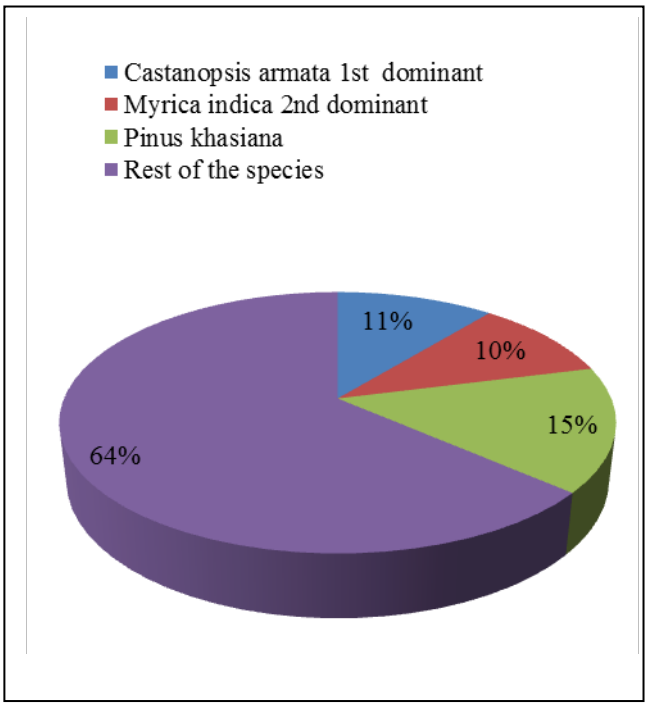


Figure 5.1 (a): Species wise with respect to Total stems

5.8 Growing Stock:

As per the methodology described in Chapter-I, 20% enumeration is carried out in the grove as its area is more than 10ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within 10 plots of 0.2 ha size, i.e. 2 ha. , data was collected for 1930 tree species consisting of 211 *Castanopsis indica* (1st dominant), *195 Myrica indica* (2nd dominant), 297 *Pinus khasiana* and 1227 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40cm to 151cm and above. The results are given in table 5.3 & 5.4 for Salariang sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 3386.429 cubic metres.

Table – 5.3
Specieswise girth class wise volume in the sampled area (10 plots -2 ha)

(volume in cu.m)

Girth class wise	*Costonopsis armata* 1st dominant	*Myrica indica* 2nd dominant	*Pinus khasiana*	Rest of the species	Total
30-40	1.967	4.011	17.108	0.593	**23.679**
41-50	4.796	5.608	26.236	2.271	**38.911**
51-60	7.651	4.908	51.640	3.909	**68.108**
61-70	17.314	10.113	77.666	10.863	**115.956**
71-80	15.291	9.147	65.424	23.301	**113.163**
81-90	16.892	7.488	44.717	30.907	**100.004**
91-100	3.600	0.915	36.131	42.517	**83.163**
101-110	2.360	1.133	17.894	19.737	**41.124**
111-120	5.271	1.251	10.790	6.910	**24.222**
121-130	3.247		3.189	5.570	**12.006**
131-140	4.045		1.948	1.687	**7.680**
141-150					
151 & above		3.539	13.479		**17.018**
Total	**82.434**	**48.113**	**366.222**	**148.265**	**645.034**

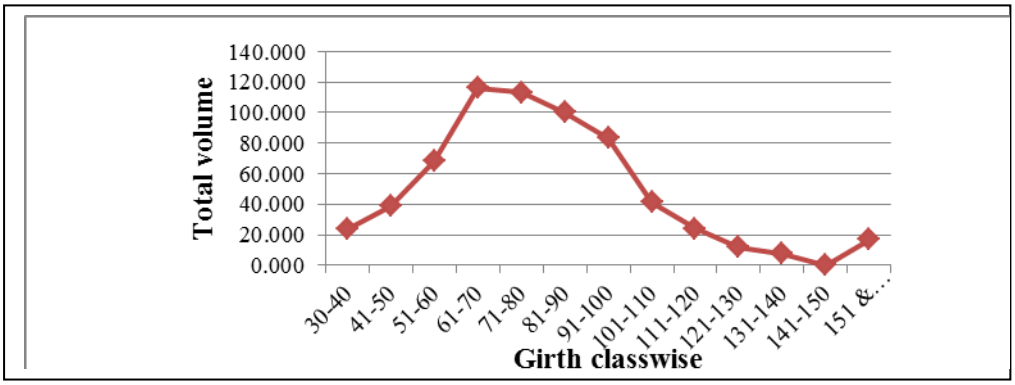


Figure 5.3: Girth classwise with respect to total volume

ve (Area 10.5 ha)

(volume in cu.m)

Girth class wise	*Castonopsis armata* 1st dominant	*Myrica indica* 2nd dominant	*Pinus khasiana*	Rest of the species	Total	% wrt total volume
30-40	10.33	21.06	89.82	3.11	**124.31**	**3.67**
41-50	25.18	29.44	137.74	11.92	**204.28**	**6.03**
51-60	40.17	25.77	271.11	20.52	**357.57**	**10.56**
61-70	90.90	53.09	407.75	57.03	**608.77**	**17.98**
71-80	80.28	48.02	343.48	122.33	**594.11**	**17.54**
81-90	88.68	39.31	234.76	162.26	**525.02**	**15.50**
91-100	18.90	4.80	189.69	223.21	**436.61**	**12.89**
101-110	12.39	5.95	93.94	103.62	**215.90**	**6.38**
111-120	27.67	6.57	56.65	36.28	**127.17**	**3.76**
121-130	17.05	0.00	16.74	29.24	**63.03**	**1.86**
131-140	21.24	0.00	10.23	8.86	**40.32**	**1.19**
141-150	0.00	0.00	0.00	0.00	**0.00**	**0.00**
151 & above	0.00	18.58	70.76	0.00	**89.34**	**2.64**
Total	**432.78**	**252.59**	**1922.67**	**778.39**	**3386.43**	**100.00**
% wrt total volume	**12.78**	**7.46**	**56.78**	**22.99**	**100.00**	

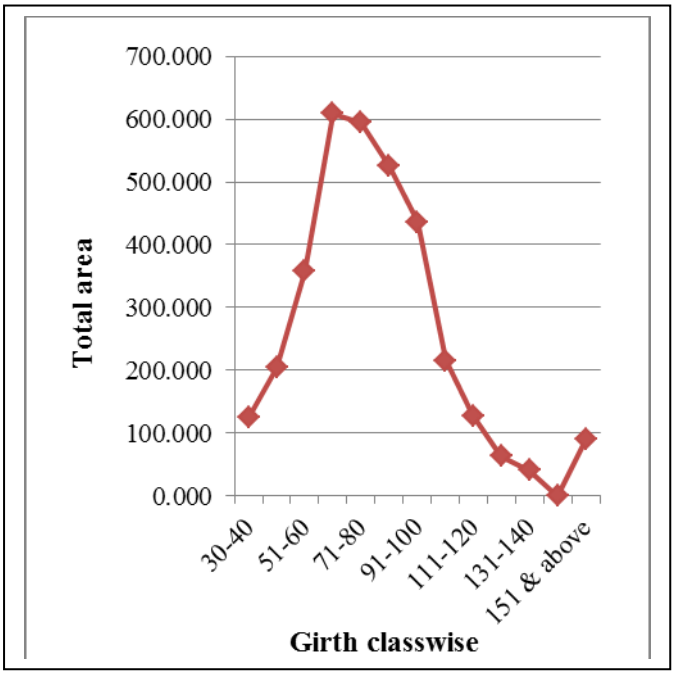


Figure 5.4: Girth class wise with respect to total area

Table 5.4 shows that the volume contributed by the 1st dominant species (*Castanopsis indica*) with respect to the total volume of the grove is 12.78%, 2nd dominant species (*Myrica indica*) is 7.46%, *Pinus khasiana 56.78%* while Rest of the species is 22.99%. Total volume of the grove is 6390.10 cubic metres

From the table it is observed that in general as the girth class increases, the volume in that class also increases i.e. girth class is directly proportional to the volume in that class

5.9 Brief Note on Management of Law Adong Salariang:

(i) Biotic Interference:-

In this grove there is no prohibition on entry and exit, though there is restriction on felling of trees. The main threat to wildlife in this grove is because of the main PWD road from Shillong to Mawkyrwat which passes right through the heart of the grove. Illegal hunting cannot also be ruled out. If this forest can declare as Community Reserve, these restrictions can be imposed and this will help in conservation of the flora and fauna of this grove. Encroachment, illegal feeling of timber, grazing were found to be absent.

(ii) Fire control:-

Almost half of the boundary of this grove is bounded by natural stream i.e. Salariang stream. To avoid any spread of fire, external fire this has to be cleared in areas where there is no natural boundary and on both areas of the road side.

(iii) Water stress:-

In this grove, almost half of the grove's boundary is bounded by Salariang stream; hence water is not a crisis. However for the betterment of wildlife and moisture content of the soil especially in the upper slope, check dams can be created to check soil erosion and spread of natural fire.

(iv) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

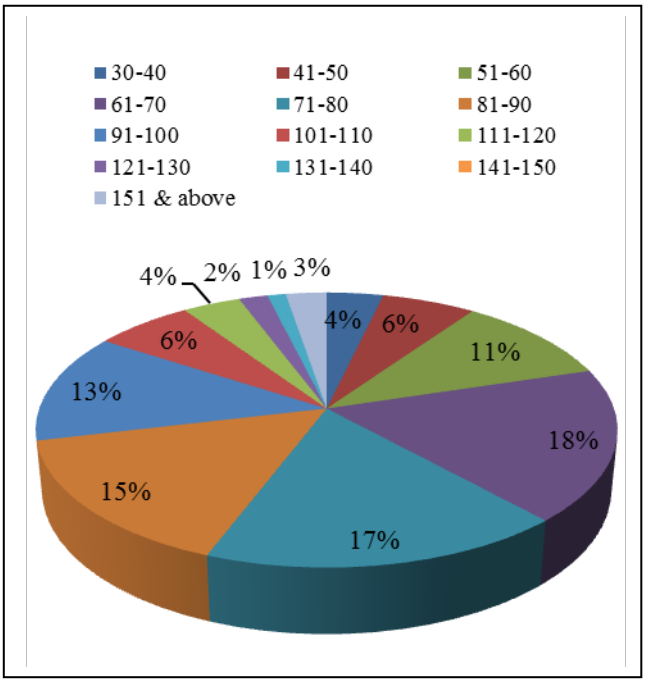


Figure 5.3: Girth class with respect to Total volume

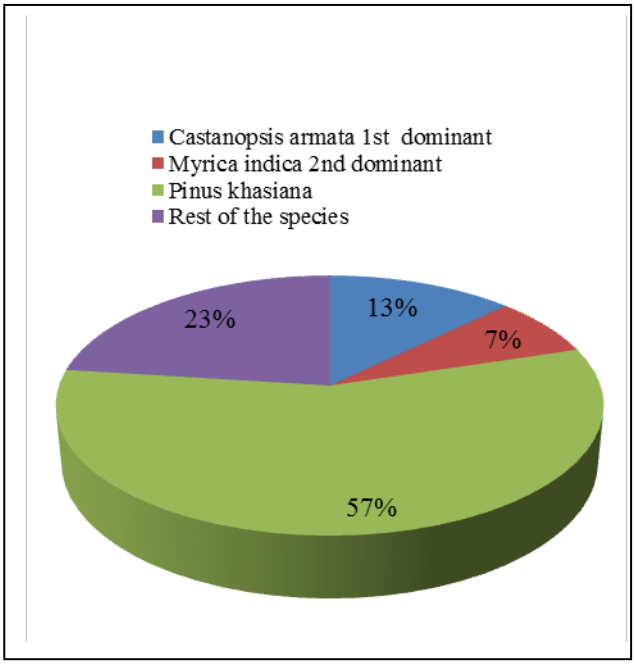


Figure 5.3 (a): Species wise with respect to Total volume



Figure 5 (a): Over view of Salariang Sacred Grove



Figure 5 (b): Showing alignment of sample plot.

6 - TWAHSAMPARAT

6.1 Location:

Twahsamparat Sacred Grove is situated in South West Khasi Hills District of Meghalaya at Tynnai village under the Syiemship of Maharam. It covers an area of 29.09 ha and lies between 25° 19′ 0″ N to 25°19′ 25″ N latitude and 91° 26′ 20″ E to 91° 26′ 50″ E longitude with an elevation of 1487 m from MSL. It is bounded to the North by Mawkhoh stream and a dam, to the South by PWD road to Mawrap village, to the East by Village land and Football ground and towards the West by Village land. The grove is accessible by road from Shillong Weiloi- Mawkyrwat Road. It is about 5 km from Mawkyrwat.

6.2 Brief History:

There is no records as to establish when this grove originated but it is believed that this Sacred grove have originated hundred of years ago. The forefather of this village realize the need to protect the environment in and around the village in order to avoid famine. Rituals are no longer performed in this grove. It is owned by the community of Tynnai village and controlled by the elected Headman The State Forest Department has no direct control of the said grove rather it falls under the jurisdiction of the KHADC.

6.3 Geography and Climate:

Topography of the grove is gently rolling in nature with slope varying from 4° to 15°. The soil texture is sandy loam with boulders and slightly friable consistency. The colour of the soil is brown with high soil depth. There is negligible soil erosion in the grove area. Mawkhoh stream is the only stream that feed the fish pond constructed by the villagers in side of the grove.

The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 10°C and maximum is 28°C. Biotic pressure, encroachment, wild fire, hunting & poaching, grazing and the activities of illegal timber were found to be absent in the grove.

6.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

6.5 Flora and Fauna:

The vegetation type is of mix-species mainly Costonopsis indica, *Symplocus theofolia* and *Viburnum foetidum* as dominant species. Origin of the forest is of natural in nature and it is of two storey forest Wildlife found here are jungle fowls, barking deer, jackals, and some vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

a) The area is very significant from the biodiversity point of view with high level endemic plant and animal species.

b) Existence of many rare endangered plant species.

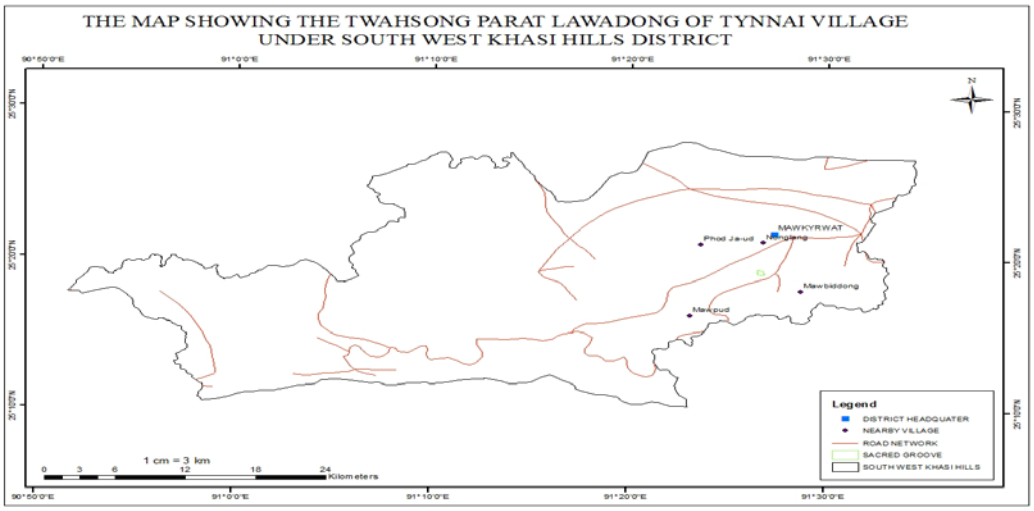
c) With all restrictions- do's and don'ts; help this groves in conservation of flora and fauna and maintaining of rich forest natural resources.

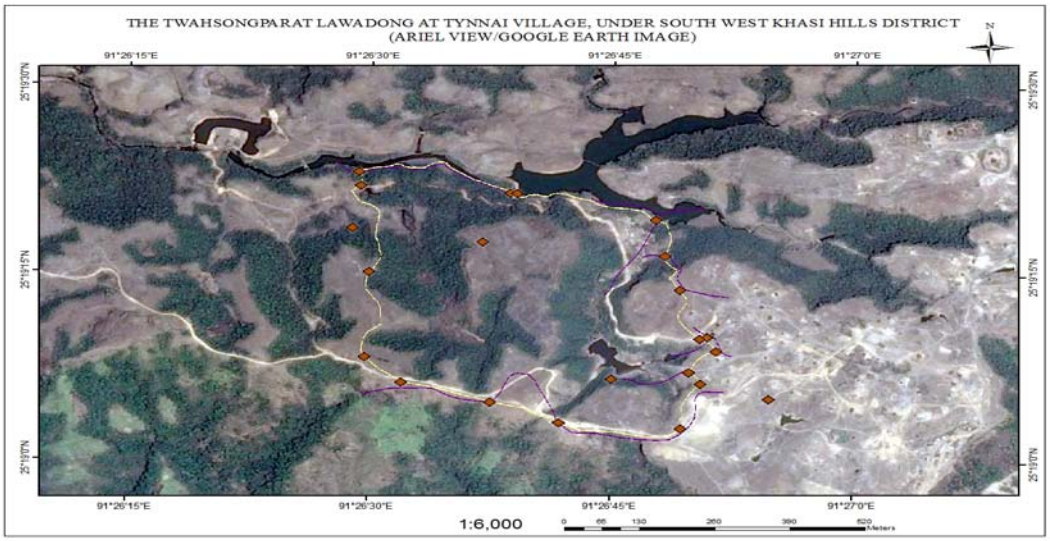
6.6 Floral species:

List of Trees found in Twahsamparat Sacred Grove, South West Khasi Hills

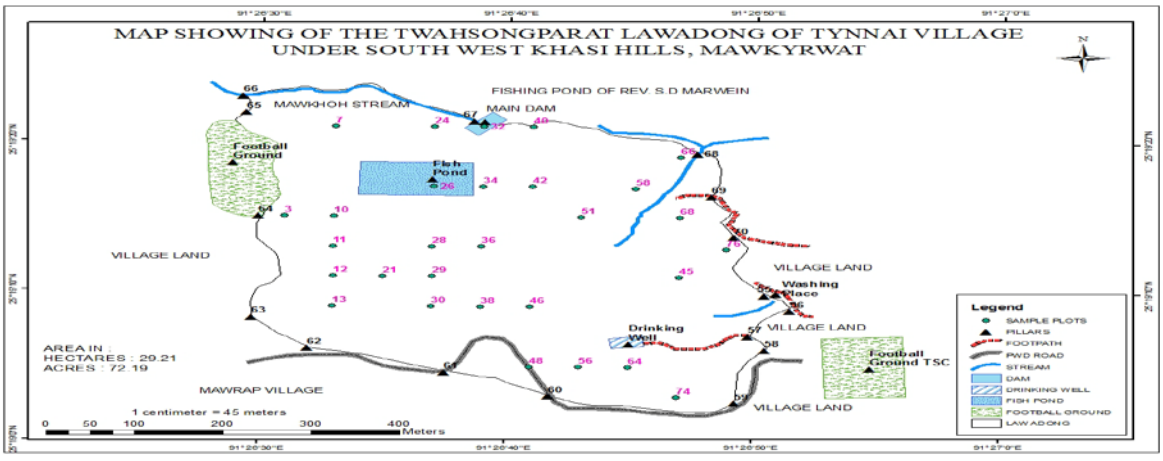
Sl No.	Botanical Name	Local Name	Sl No.	Botanical Name	Local Name
1	*Albizia lucidior*	Dieng ri	17	*Grewia abutilifolia*	Dieng sohme blang
2	*Bucklandia populnea*	Dieng doh	18	*Irithina indica*	Dieng song
3	*Camellia caduca*	Dieng tyrnem	19	*Itea chinensis*	Dieng sohsyrtet
4	*Castanopsis armata*	Dieng sning war	20	*Mallatus alba*	Dieng lakhar shrieh
5	*Castanopsis indica*	Dieng sohot	21	*Michelia oblonga*	Dieng laniar
6	*Castonopsis*	Dieng stap	22	*Myrica indica*	Dieng sohphiemaw
7	*Castonopsis spp*	Dieng sning	23	*Pantapanox racemasmum*	Dieng tyllang rangsei
8	*Cesearia varieca*	Dieng rang	24	*Prema bengalensis*	Dieng lalieh
9	*Cinnamomum tamala*	Dieng latyrpad	25	*Pyrus khasiana*	Dieng sohjhur
10	*Elaeocarpus lancifolius*	Dieng sohkhyllam	26	*Rhus succedanea*	Dieng kain
11	*Engelhardia spiculata*	Dieng lymba	27	*Schima khasiana*	Dieng ngan
12	*Eurya accuminata/japonica*	Dieng pyrshit	28	*Shesleria wallichina*	Dieng langrop
13	*Ficus hispida*	Dieng lajri	29	*Smilax glabra*	Dieng krot
14	*Ficus spp*	Dieng jri	30	*Symplocos theaefolia*	Dieng pei
15	*Fotina integrefolia*	Dieng snam maw	31	*Viburnum foetidum*	Dieng sohlangksew
16	*Wendlandia wallichii*	Dieng shadmoit	32	*Zanthoxylum ovalifolium*	Dieng shiah

Location Map of Twahsamparat Sacred Grove





Map showing sample plots of Twahsamparat



List of orchids, shrubs, herbs, climbers and bamboo found in Twahsamparat Sacred Grove, South West Khasi Hills

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Sohrishan	*Duchesnea indica*	Rosaceae
2.	Jajew	*Begonia palmata*	Begoniaceae
3.	Ground orchid	*Cymbidium alaifodium*	Orchidaceae
4.	Orchid	*Phaius flavus*	Orchidaceae
5.	Tiew sohmyndong	*Baccaura sapida*	Rubiaceae
6.	Tiewshiah	*Rosa involucrate*	Rosaceae
7.	Tiew ladew	*Hedychium spicatum*	Zingiberaceae
8.	Orchid	*Bulbophyllum affime*	Orchidaceae
9.	Orchid	*Oberonia acaulis*	Orchidaceae
10.	Orchid	*Coelogyne suaveolens*	Orchidaceae
11.	Tiew sohpoitdong	*Rhaphidophora lanciflora*	Araliaceae
12.	Tiew saw	*Rhododendron arboratum*	Ericaceae
13.	Ground orchid	*Calanthemasuca*	Orchidaceae
14.	Tiew lieh	*Rhododendron formosum*	Ericaceae
15.	Orchid	*Ceologyne panctualata*	Orchidaceae
16.	Orchid	*Ceologyne punctualata*	Orchidaceae
17.	Orchid	*Agrostophyllum collosum*	Orchidaceae
18.	Orchid	*A Agrostophyllum brevipes*	Orchidaceae
19.	Tiew lieh blang	*Bluemea radigata*	Astericeae
20.	Tiew orchid	*Dendrobium heterocarpum*	Orchidaceae

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Synsar	*Thysonachia maxima*	Poaceae
2.	Dieng hyllew	*Lecaula grandis*	Palmaceae
3.	Dieng shlan	*Pandonusodora tissinum*	Pandaceae
4.	Sohshang	*Elaeagnus khasiana*	*Elaeagnaceae*

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew lakot	*Carculagu recurba*	*Carculagoceae*
2.	Sohbsein	*Arisaema tortuosum*	Arasceae
3.	Tyrkhang	*Diplazium esculentums*	Athyriaceae
4.	Dieng jalakthem	*Osbekia nepalensis*	Melostomaceae
5.	Tyrkhang	*Selaginella pantagona*	Selagimellaceae
6.	Sohlamut	*Agapetes variegate*	Vaccinaceae
7.	Sohlang	*Viburnum foetidum*	Cripifoliacea

8.	Tiew phlang	*Fimbristylii aestivalis*	Cyperaceae
9.	Tiew jasat	*Polygonum hydropiper*	Polygonaceae
10.	Dieng soh krismas	*Chloramthus brachystachys*	Rubiaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Sohmrit	*Piper longum*	Piperaceae
2.	Shiah sohparu	*Rubus ellipticus*	Rosaceae
3.	Sohpdung	*Vaccinum serratum*	Vaccinaceae
4.	Climbers	*Pothos scandens*	Araceae
5.	Tiew shiah	*Rosa involucrate*	Rosaceae
6.	Sohkrot	*Smilax khasiana*	Smilaceae
7.	Climbers	*Berberis khasiana (m)*	Beberidaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Spit	*Chimonobambusa callosa*	Poaceae
2.	Siej hyllei	*Bambusa hammiltoni*	Bambusaceae
3.	Siej spar	*Chimonobambusa griffithiana*	Poaceae
4.	Siej nam lang	*Cheimona bambusa khasiana*	Poaceae

6.7 Number of Stems:

Number of stems in each girth class and species wise are given in Table 6.1 & 6.2. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40cm to 61-70cm classes.

Table - 6.1
Girth class wise and species wise No. of stems in the sampled area (29 plots- 5.8ha)

Girth class wise	*Castanopsis indica* 1st dominant	*Symplocos theaefolia* 2nd dominant	*Viburnum foetidum* 3rd dominant	Rest of the species	Total
30-40	595	181	130	799	**1705**
41-50	143	72	29	346	**590**
51-60	78	24	13	176	**291**
61-70	32	10	2	88	**132**
71-80	15	3		44	**62**
81-90	13	4	1	14	**32**
91-100	9	2		10	**21**
101-110	6			5	**11**
111-120	7			2	**9**
121-130	5			2	**7**
131-140				3	**3**
141-150	2			3	**5**
151 & above	4			2	**6**

Total	**909**	**296**	**175**	**1494**	**2874**

Table - 6.2
Girth class wise and species wise No. of stems in the entire grove (Area 29.09ha)

Girth class wise	*Castanopsis indica* 1st dominant	*Symplocos theaefolia* 2nd dominant	*Viburnum foetidum* 3rd dominant	Rest of the species	Total
30-40	2984	908	652	4007	**8551**
41-50	717	361	145	1735	**2959**
51-60	391	120	65	883	**1460**
61-70	160	50	10	441	**662**
71-80	75	15	0	221	**311**
81-90	65	20	5	70	**160**
91-100	45	10	0	50	**105**
101-110	30	0	0	25	**55**
111-120	35	0	0	10	**45**
121-130	25	0	0	10	**35**
131-140	0	0	0	15	**15**
141-150	10	0	0	15	**25**
151 & above	20	0	0	10	**30**
Total	**4559**	**1485**	**878**	**7493**	**14415**

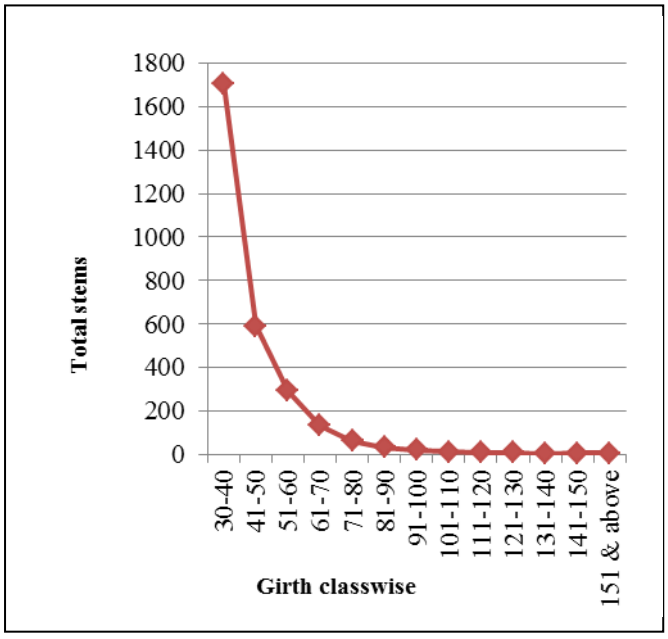


Figure 6.1: Girth classwise with respect to total stems

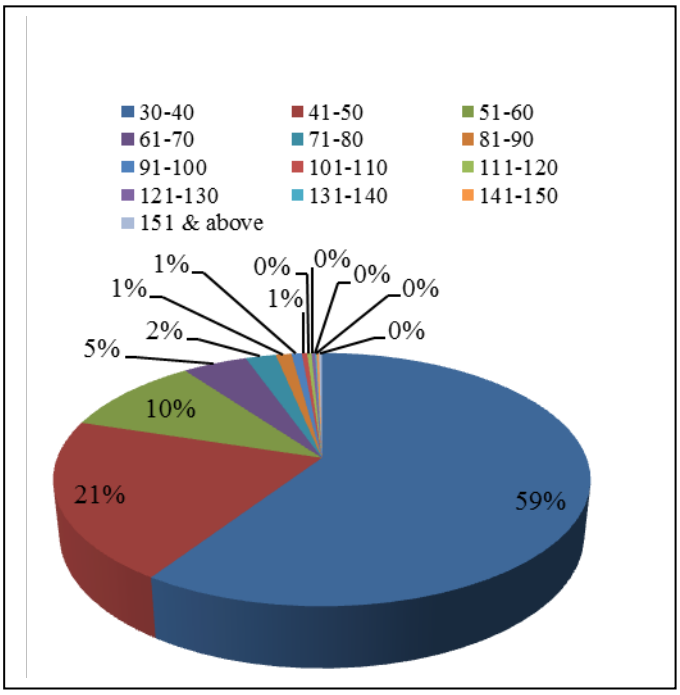


Figure 6.1: Girth classwise with respect to Total Stems

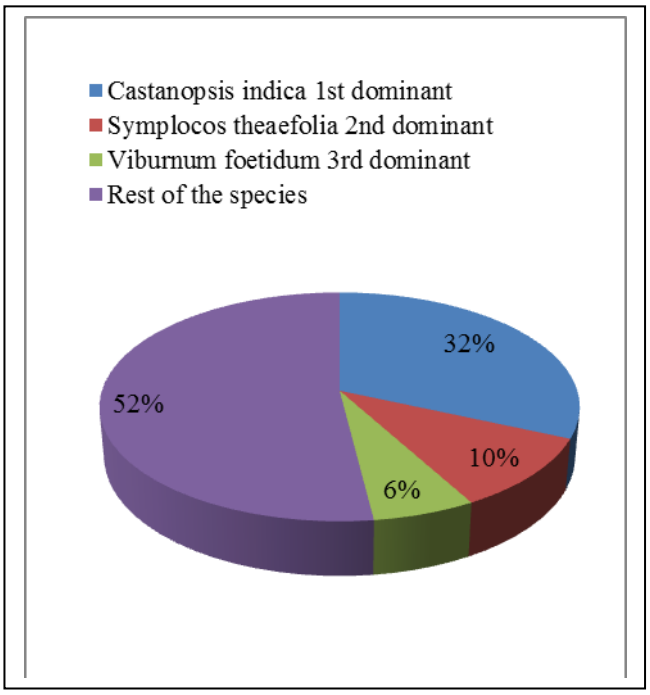


Figure 6.1 (a): Species wise with respect to Total Stems





Figure 6 (a): Snake found at Twahsamparat Sacred Grove. Figure 6 (b): Showing measurement of girth inTwahsamparat

6.8 Growing Stock:

As per the methodology described in Chapter-I, 20% enumeration is carried out in the grove as its area is more than 10ha but less than 50 ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within 29 plots of 0.2 ha size, i.e.5.8 ha. , data was collected for 2874 tree species consisting of 909 *Costonopsis indica* (1st dominant), *296* *Symplocus theaefolia* (2nd dominant), 175 *Viburnum foetidum* (3rd dominant) and 1494 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151cm and above. The results are given in table 6.3 & 6.4 for Salariang sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 2198.848 cubic metres.

Table -6.3
Specieswise girth class wise volume in the smapled area (29 plots- 5.8ha)

volume in cu.m)

Girth class wise	*Costonopsis indica* 1st dominant	*Symplocos theaefolia* 2nd dominant	*Viburnum foetidum* 3rd dominant	Rest of the species	Total
30-40	27.196	8.530	5.511	38.402	**79.639**
41-50	19.306	9.542	4.034	47.626	**80.508**
51-60	18.392	5.729	3.090	44.424	**71.635**
61-70	11.989	3.723	0.669	32.256	**48.637**
71-80	7.699	1.501		22.596	**31.796**
81-90	8.711	2.655	0.663	10.052	**22.081**
91-100	8.160	1.914		9.261	**19.335**
101-110	7.011			5.764	**12.775**
111-120	9.994			2.798	**12.792**
121-130	8.261			3.300	**11.561**
131-140	-			5.845	**5.845**
141-150	4.290			6.671	**10.961**
151 & above	22.766			8.078	**30.844**
Total	**153.775**	**33.594**	**13.967**	**237.073**	**438.409**

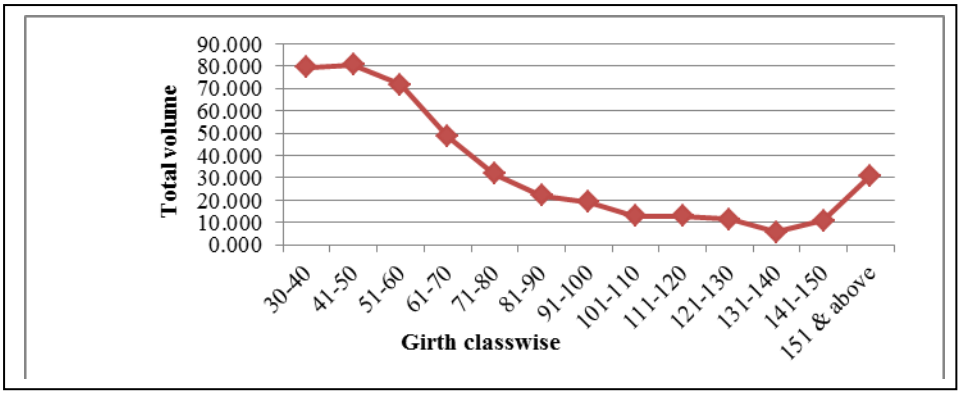


Figure 6.3: Girth classwise with respect to total volume

Specieswise girth class wise volume in the entire grove (Area 29.09ha)

(volume in cu.m)

Girth class wise	*Costonopsis indica* 1st dominant	*Symplocos theaefolia* 2nd dominant	*Viburnum foetidum* 3rd dominant	Rest of the species	Total	% wrt total volume
30-40	136.40	42.78	27.64	192.61	**399.43**	**18.17**
41-50	96.83	47.86	20.23	238.87	**403.79**	**18.36**
51-60	92.25	28.73	15.50	222.81	**359.29**	**16.34**
61-70	60.13	18.67	3.36	161.78	**243.94**	**11.09**
71-80	38.61	7.53	0.00	113.33	**159.47**	**7.25**
81-90	43.69	13.32	3.33	50.42	**110.75**	**5.04**
91-100	40.93	9.60	0.00	46.45	**96.98**	**4.41**
101-110	35.16	0.00	0.00	28.91	**64.07**	**2.91**
111-120	50.13	0.00	0.00	14.03	**64.16**	**2.92**
121-130	41.43	0.00	0.00	16.55	**57.98**	**2.64**
131-140	0.00	0.00	0.00	29.32	**29.32**	**1.33**
141-150	21.52	0.00	0.00	33.46	**54.98**	**2.50**
151 & above	114.18	0.00	0.00	40.52	**154.70**	**7.04**
Total	**71.26**	**168.49**	**70.05**	**1189.04**	**2198.85**	**100.00**
% wrt total volume	**35.08**	**7.66**	**3.19**	**54.08**	**100.00**	

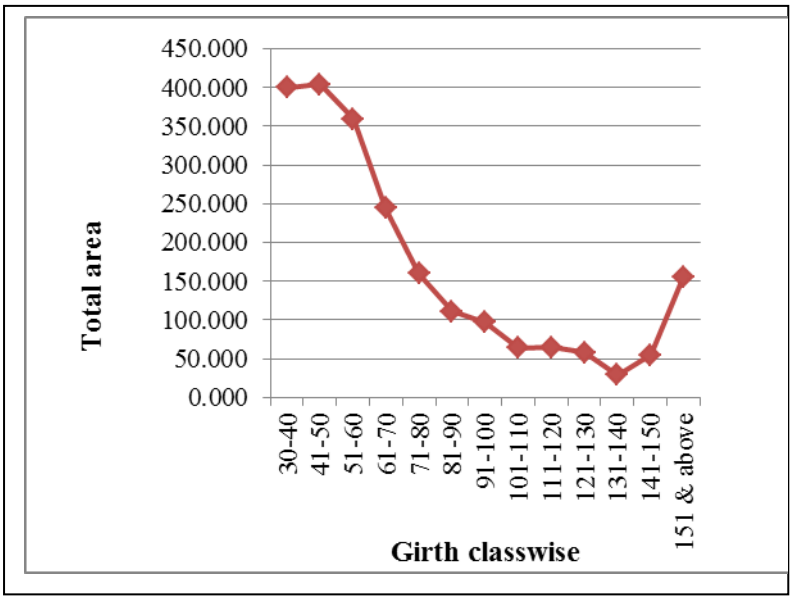


Figure 6.4: Girth class wise with respect to total area

Table 6.4 shows that the volume contributed by the 1st dominant species (*Castanopsis indica*) with respect to the total volume of the grove is 35.08%, 2nd dominant species (*Symplocus theaefolia*), is 7.66% 3rd dominant (*Viburnum foetidum*) is 3.19% while Rest of the species is maximum i.e 54.08%. Total volume of the grove is 2198.85 cubic metres.

On looking at the table it is observed that in general as the girth class increases, the volume in that class decreases i.e. girth class is indirectly proportional to the volume in that class.

6.9 Brief Note on Management of Law Adong Twahsamparat

(i) Biotic Interference:-

There is no restriction on entry and exit in this grove. However the village Durbar of Tynnai village strictly prohibited cutting or felling of trees. The main biotic interference is man himself. Although there is no reports of illegal felling of timber, poaching and grazing but as the forest is left open there are chances of such illegal activities in the near future. Hence it is suggested that if the Department can declare this grove as a Community Reserve, this beautiful forest can be protected accordingly.

(ii) Fire control:-

There is no report of any fire incidence in the past. Some portion of the PWD road towards Mawrap village passes through this grove, hence fire incidence cannot be ruled out in the days to come. To avoid such incidence, an external fire line of 5m wide can be cleared every year especially before the onset of dry season, except in the areas where natural stream of rivers act as natural boundary as seen in the northern side of the grove.

(iii) Water stress:-

There are plenty of water bodies in this grove, like the Mawkhoh stream in the north, fishing pond created by the village durbar, drinking well in the southern part and a dam for washing purposes in the eastern part of the grove. However in order to improve moisture of the soil especially in the western part of the grove, check dams can be created and this will serve not only as a source of drinking water to wild animals but also will check soil erosion and spread of fire.

(iv) Creation of natural boundary:-

Proper boundary marking is important in order to avoid encroachment, this can be done either by fixing cement pillars or earth's digging all along the boundary of the grove of 2′ x 2′ size except in the areas where water body act as natural boundary, it will also act as fire line.

(v) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

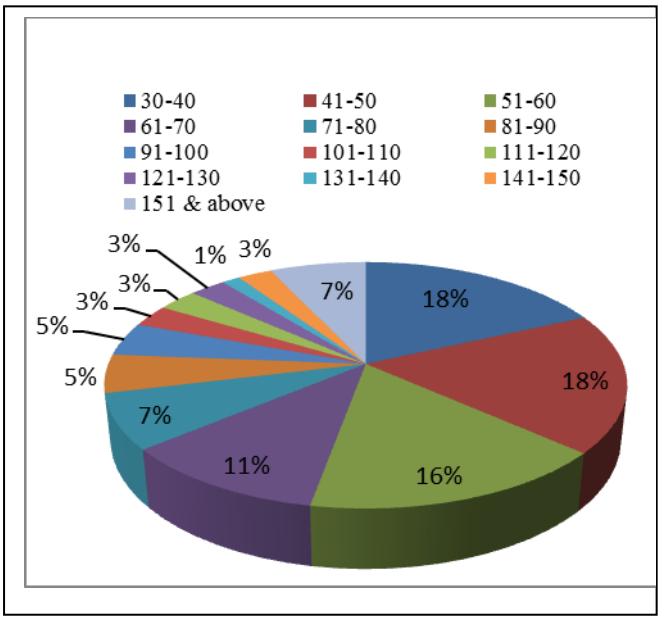


Figure 6.4: Girth class wise with respect to Total Volume

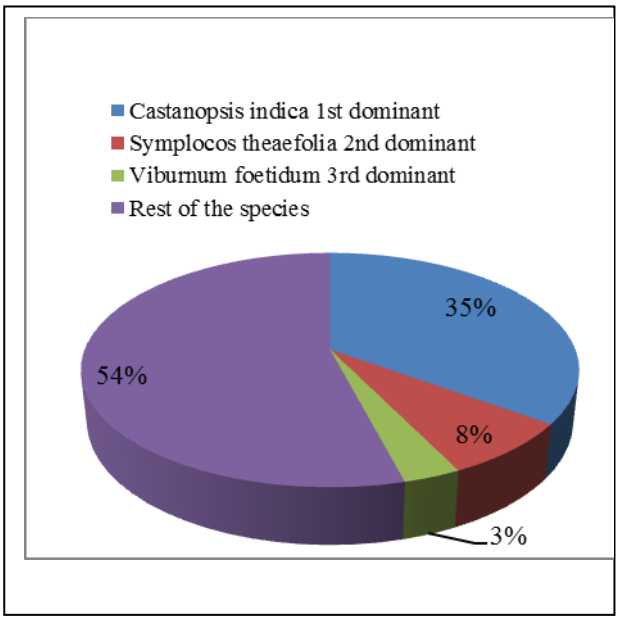


Figure 6.4 (a): Specieswise with respect to Total Volume



Figure 6 (c): Showing ficus spp at Twahsamparat Sacred Grove



Figure 6 (d): Centering of sample plot at Twahsamparat Sacred Grove.

7 - LAW ING BLEI LYNGDOH NONGLYNGKIEN

7.1 Location:

Law Ing Blei Lyngdoh Nonglyngkien Sacred Grove is situated in South West Khasi Hills District of Meghalaya at Nonglyngkien village under the Syiemship of Maharam. It covers an area of 5.23 ha and lies in between 25° 25′ 0″ N to 25° 25′ 10″ N latitude and 91° 25′ 45″ E to 91° 26′ 0″ E longitude with an elevation of 1607m from MSL. It is bounded to the North by footpath, to the South by land of Mrs Beronica Shangpliang and Mrs Sara Sangriang, to the East by land of Mrs S. Sangriang, Mr. Klingsing L. Lynkien and footpath to Pukri stream and towards the West by land of Mrs. L. Lyngkhoi and Mrs. T. Shangpliang. The grove is accessible by road from Shillong Weiloi- Mawkyrwat Road. It is about 15 km from Mawkyrwat.

7.2 Brief History:

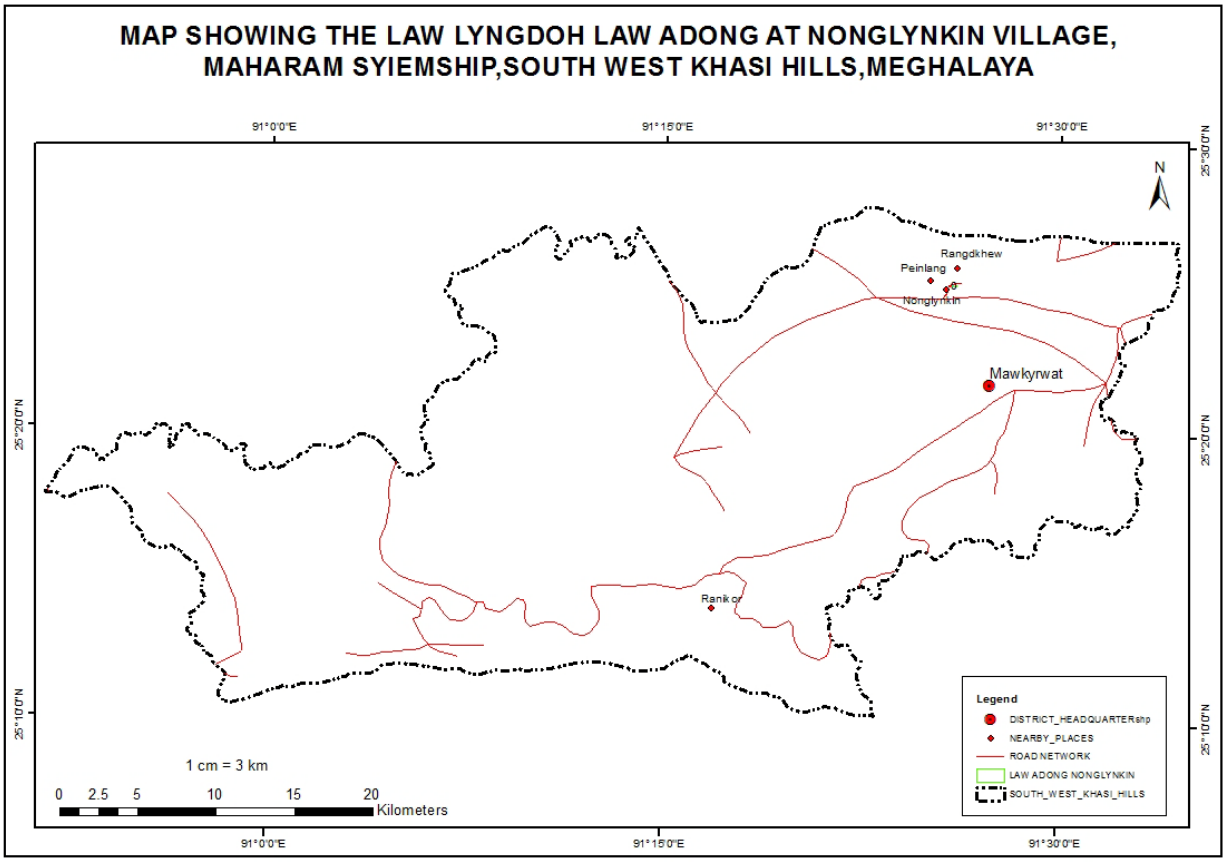
There is no records as to establish when thisgrove originated but it is believed that this Sacred grove have originated hundred of years ago.It was stated by the elders of the clan that Ritual are performed here every year but has ceased in the year 1975. It is owned by the Lyngdoh Nongyngkien clan and controlled by the Lyngdoh. The State Forest Department has no direct control of the said grove rather it falls under the jurisdiction of the KHADC.

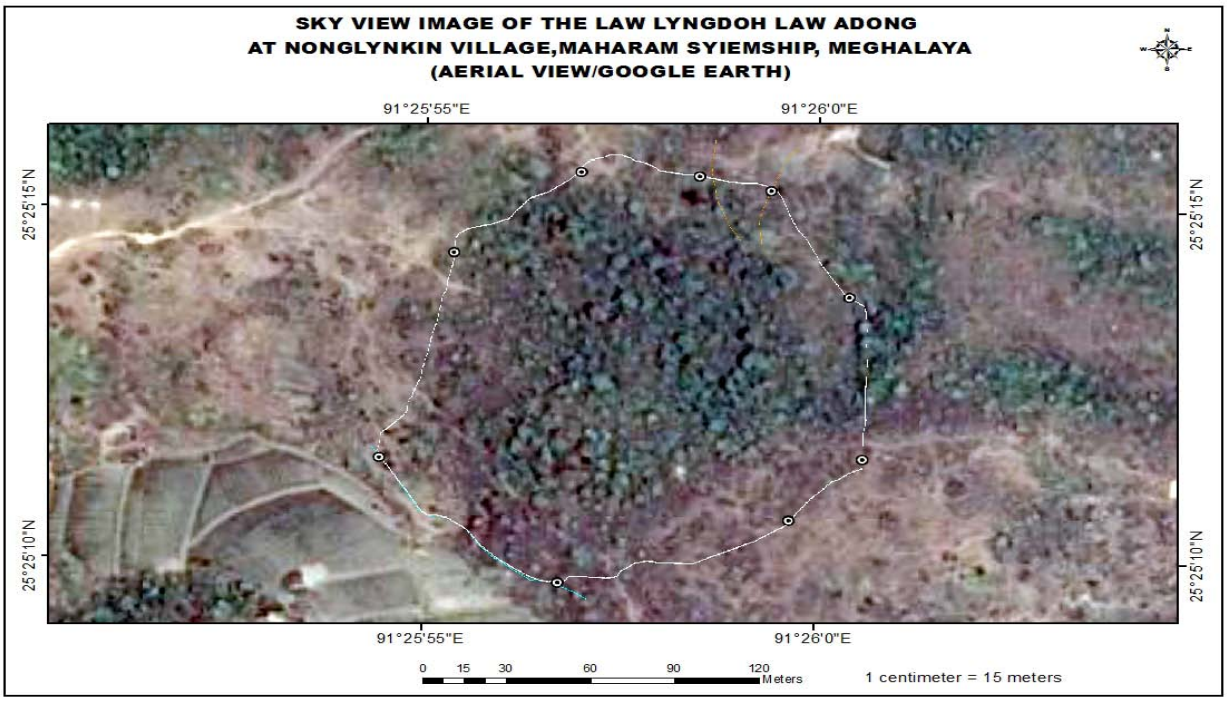
7.3 Geography and Climate:

Topography of the grove is gently rolling in nature with slope varying from 4° to 15°.The soil texture is sandy loam with boulders and slightly friable consistency. The colour of the soil is brown with high soil depth.There is negligible soil erosion in the grove area.Pukri stream is the only stream that feed many agricultural land around the grove.

The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 10°C and maximum is 28°C. Biotic pressure, encroachment, wild fire, hunting & poaching, grazing and the activities of illegal timber were found to be absent in the grove.

Location map of Law Ing Blei Lyngdoh Nonglyngkien Sacred Grove





7.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

7.5 Flora and Fauna:

The vegetation type is of mix-species mainly*Schima khasiana, Grewia sps,* and *Pyrus khasiana* as dominant species. Origin of the forest is of natural in nature and it is of two storey forest Wildlife found here arejungle fowls, barking deer, jackals, and some vertebrates and invertebrates .Conservation significance of the grove is mainly due to:

a) The area is very significant from the biodiversity point of view with high level endemic plant and animal species.
b) Existence of many rare endangered plant species.
c) With all restrictions- do's and don'ts; help this groves in conservation of flora and fauna and maintaining of rich forest natural resources.

7.6 Floral species:

List of Trees found in Lawingblei Sacred Grove

Sl. No.	Botanical Name	Local Name	Sl. No.	Botanical Name	Local Name
1	*Albizia lucidior*	Dieng ri	17	*Fieces globarata*	Dieng sohpian
2	*Aralia armata*	Dieng latymphu	18	*Fotina integrefolia*	Dieng snam maw
3	*Bauhinia prosphirea*	Dieng tyrlong	19	*Grewia abutilifolia*	Dieng sohme blang
4	*Bauhinia variegate*	Dieng long	20	*Ilex excodsa*	Dieng sohrynted
5	*Betula alnoides*	Dieng lieng	21	*Ilex griffithii*	Dieng sohkhaw krai
6	*Callicaspa arbarea*	Dieng lakhiat	22	*Ilex venulosa*	Dieng shyieng
7	*Camelia caduca*	Dieng tyrnem	23	*Inuala cappa*	Dieng lalieh
8	*Castanopsis armata*	Dieng sning	24	*Irithina indica*	Dieng song
9	*Castanopsis indica*	Dieng sohot	25	*Ligustrum robostos*	Dieng syiang
10	*Cesearia varieca*	Dieng rang	26	*Macaranga denticulate*	Dieng lakhar
11	*Citrus latipes*	Dieng sohkynphor	27	*Michelia oblonga*	Dieng laniar
12	*Docynia indica*	Dieng sohphoh	28	*Myrca indica*	Dieng sohphie
13	*Elactica indica*	Dieng jri	29	*Myrica nagi*	Dieng sohphie rit
14	*Elaeocarpus lanceafolia*	Dieng sohkhyllam	30	*Pajanelia kheedii*	Dieng tanglung
15	*Engelhardia spiculata*	Dieng lymba	31	*Pantapanox racemasmum*	Dieng tyllong rangsei
16	*Eurya accuminata*	Dieng shit	32	*Parkia roxburghii*	Dieng jariat
33	*Pithecellboiu heterophylum*	Dieng iap-iar	41	*Shesleria wallichina*	Dieng langrop
34	*Pronus undulate*	Dieng tyrkhung	42	*Symplocos chinensis*	Dieng iong
35	*Pyrus khasiana*	Dieng sohjhur	43	*Symplocos khasiana*	Dieng pei
36	*Quercus dealbata*	Dieng sai	44	*Symplocos perifolia*	Dieng pei lieh
37	*Rhododendron arboretum*	Dieng tiewsaw	45	*Taxus bacata*	Dieng sohblei
38	*Rhus chinensis*	Dieng sohma	46	*Viburnum carilifolium*	Dieng sohlang ksew

39	*Rhus succedanea*	Dieng kain	47	*Zanthoxylum ovalifolium*	Dieng shiah
40	*Schima khasiana*	Dieng ngan			

List of orchids, shrubs, herbs, climbers, grass and bamboo found in Lawingblei Lyngdoh Nonglyngkien Sacred Grove, South West Khasi Hills

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew sla rem-maw	*Rhaphidophora lancifolia*	Araliaceae
2.	Tiew dieng	*Pholidata articulate*	Orchidaceae
3.	Orchid	*Melastoma malabathicum*	Melastomaceae
4.	Orchid	*Alangium chinense*	Alangiaceae
5.	Orchid	*Floscepa scandens*	Commelinaceae
6.	Tiew jyrsieh maw	*Polygonum chinense*	Polyganoceae
7.	Orchid	*Micropera manii*	Orchidaceae
8.	Orchid	*Dendrobium aphyllum*	Orchidaceae
9.	Orchid	*Liparis elliptica*	Orchidaceae
10.	Orchid	*Aeschynanthus superba*	Orchidaceae
11.	Orchid	*Oberomia aculis*	Orchidaceae
12.	Orchid	*Pholidata imbricata*	Orchidaceae
13.	Orchid	*Eriacoromeria*	Orchidaceae
14.	Orchid	*Otochilus fusca*	Orchidaceae
15.	Orchid	*Dendrobium fimbriatum*	Orchidaceae
16.	Orchid	*Papiliomanthe vandarum*	Orchidaceae
17.	Orchid	*Coelogyne punctualata*	Orchidaceae
18.	Orchid	*Cymbidium elegam*	Orchidaceae
19.	Orchid	*Neogyne gardeneriana*	Orchidaceae
20.	Orchid	*Dendronbium transparens*	Orchidaceae
21.	Orchid	*Eria pennia*	Orchidaceae

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Kait khlaw	*Mausa accuminata*	Musaceae
2.		*Garcinia accuminata*	Clusiaceae
3.	Sohlamut	*Agapetes variegata*	Vaccinaceae
4.	Dieng shit (rit)	*Murrya khasiana*	Theaceae
5.		*Suphe bracteata*	Rubiaceae
6.		*Vernonia volkameriifolia*	Asteraceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew sying maw	*Zingiber spicatum*	Zingiberaceae
2.	Tyrkhang	*Diplazium escutentum*	Athysiaceae
3.	Shiah sohprew	*Rubus khasiana*	Rosaceae
4.	Teinthap or synrem	*Artimisia cina*	Compositae
5.	Tiew sying maw	*Vaccinium khasiana*	Vaccinaceae

6.	Tyrkhang	*Maesa indica*	Myrsinaceae
7.	Sla lamet	*Phrynium placentrum*	Morantaceae
8.	Dieng soh krismas	*Chloramthus brachystachys*	Rubiaceae
9.	Jamyrdoh	*Houttuynia cordatta*	Sauruaceae
10.	Tiew jasat	*Polygonum hydropiper*	Polygonaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.		*Fissistigma verrucosum*	Anonaceae
2.		*Aeschynanthus*	Orchidaceae
3.	Sohmrit khlaw	*Piper nigram*	Piperaceae
4.	Jyrmi khlaw	*Mucuna macroxaspa*	Leguninaceae
5.		*Hoya parasitica*	Asclapiadaceae
6.		*Pothusscandan araliaceae*	Araceae
7.	Jyrmi shiah	*Xanthuzylum khasiana*	Rutaceae
8.	Bat refugee	*Mokania micrantha*	Asteraceae
9.	Sohbyrthit khasi	*Trium felta rhomboida*	Malvaceae
10.	Soh nep bah	*Rubus rogosus*	Rosaceae

GRASS

Sl No.	Local Name	Botanical Name	Family
1.	Lang traw	*Imperathus cymlindrica*	Poaceae
2.		*Cyperus rotunda*	Cyperaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Siej namlang	*Chimona bambusa*	Poaceae

7.7 Number of Stems:

Number of stems in each girth class and specieswise are given in table 7.1.The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40cm to 81-90 cm classes

Table – 7.1

Girth class-wise and Species-wise No. of Stem in the entire grove (Area- 5.23 ha)

Girth Class Vise	*Schima Khasiana* 1st Dominant	*Grewia spp* 2nd Dominant	*Pyrus khasiana* 3rd Dominant	Rest of the species	Total Stems
30-40	5	4	7	191	**207**
41-50	13	5	15	186	**219**
51-60	15	10	15	150	**190**
61-70	26	17	14	172	**229**
71-80	22	15	7	154	**198**
81-90	16	11	5	121	**153**
91-100	26	4	1	51	**82**
101-110	5	0	0	17	**22**
111-120	9	1	0	8	**18**
121-130	2	0	0	4	**6**
131-140	2	0	0	3	**5**
141-150	1	0	0	0	**1**
151 & above	5	0	0	2	**7**
Total =	**147**	**67**	**64**	**1059**	**1337**

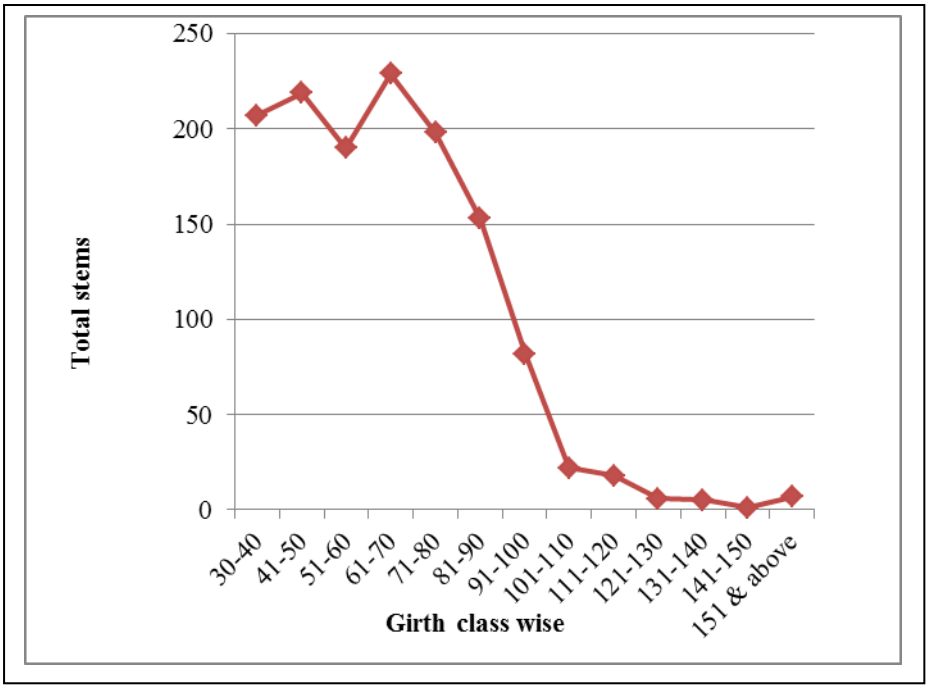


Figure 7.1: Girth class wise with respect to total stems

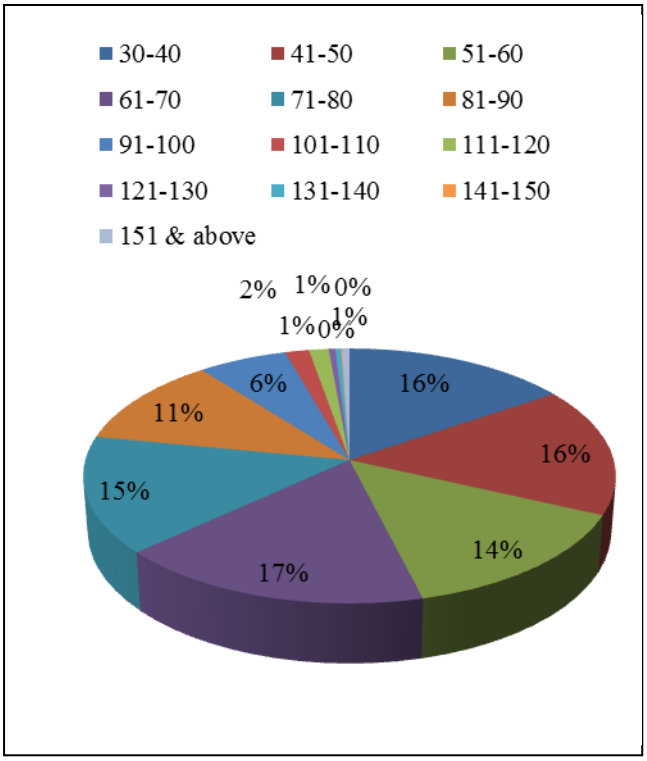


Figure 7.1: Girth class wise with respect to Total stems

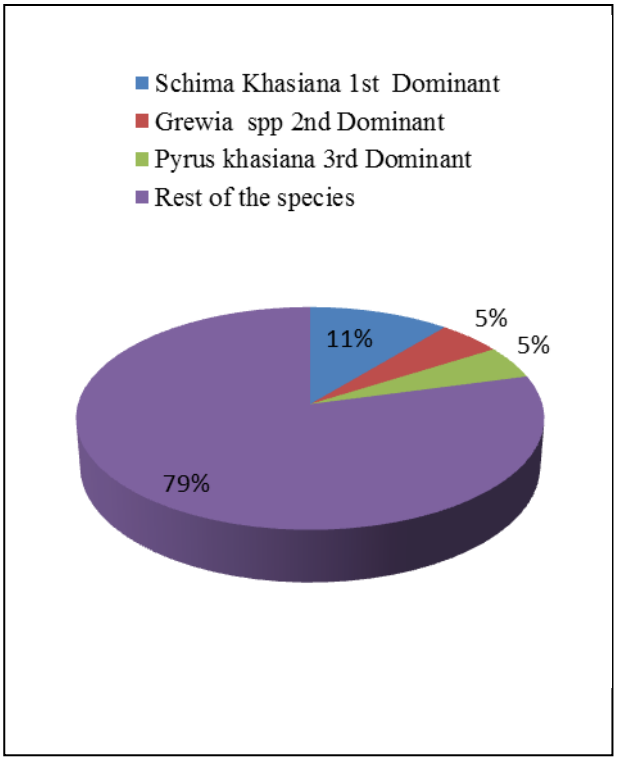


Figure 7.1(a): Species wise with respect to Total stems



Figure 7 (a): Showing *taxus baccata* at Law Ing Blei Lyngdoh Nonglyngkien Sacred Grove.



Figure 7 (b): Inside view of Law Ing Blei Lyngdoh Nonglyngkien Sacred Grove.

7.7 Growing Stock:

As per the methodology described in Chapter-I, 100% enumeration is carried out in the grove as its area is less than 10ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 1337 tree species consisting of 147 *Schima khasiana* (1st dominant), 67 *Grewia sps.* (2nd dominant), 64 *Pyrus khasiana* (3rd dominant) and 1059 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151 cm and above. The results are given in table 7.2 for Law ing Blei sacred grove which shows the volume specieswise and girth classwise. The total growing stock of the Grove works out to 543.725 cubic metres.

Table-7.2
Girth class wise & specieswise volume in the entire grove (Area: 5.23 ha)

(volume in cu.m)

Girth Class Vise	*Schima Khasiana* 1st Dominant	*Grewia spp* 2nd Dominant	*Pyrus khasiana* 3rd Dominant	Rest of the species	Total	% with respect to Total volume
30-40	0.429	0.226	0.550	10.320	**11.525**	2.120
41-50	1.782	0.579	2.144	26.415	**30.920**	5.687
51-60	3.522	1.496	3.721	38.480	**47.219**	8.684
61-70	8.812	3.472	5.410	67.431	**85.125**	15.656
71-80	9.840	4.090	3.560	80.685	**98.175**	18.056
81-90	9.033	3.850	3.428	83.704	**100.015**	18.394
91-100	18.890	2.087	0.814	44.734	**66.525**	12.235
101-110	4.629	0	0	19.057	**23.686**	4.356
111-120	9.523	0.902	0	10.447	**20.872**	3.839
121-130	2.562	0	0	6.545	**9.107**	1.675
131-140	3.059	0	0	5.701	**8.760**	1.611
141-150	1.703	0	0	0	**1.703**	0.313
151 & above	31.769	0	0	8.324	**40.093**	7.374
Total =	**105.553**	**16.702**	**19.627**	**401.843**	**543.725**	**100.000**
% wrt Total volume	**19.413**	**3.072**	**3.610**	**73.906**	**100.000**	

Table 7.1 shows that the volume contributed by the 1st dominant species (*Schima khasiana*) with respect to the total volume of the grove is 19.413%, the 2nd dominant species (*Grewia sps.*), and 3rd dominant (*Pyrus khasiana*) is almost equal viz. 3.072% and 3.610% respectively while Rest of the species is maximum i.e. 73.906%. Total volume of the grove is 543.725 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class also increases i.e. girth class is directly proportional to the volume in that class

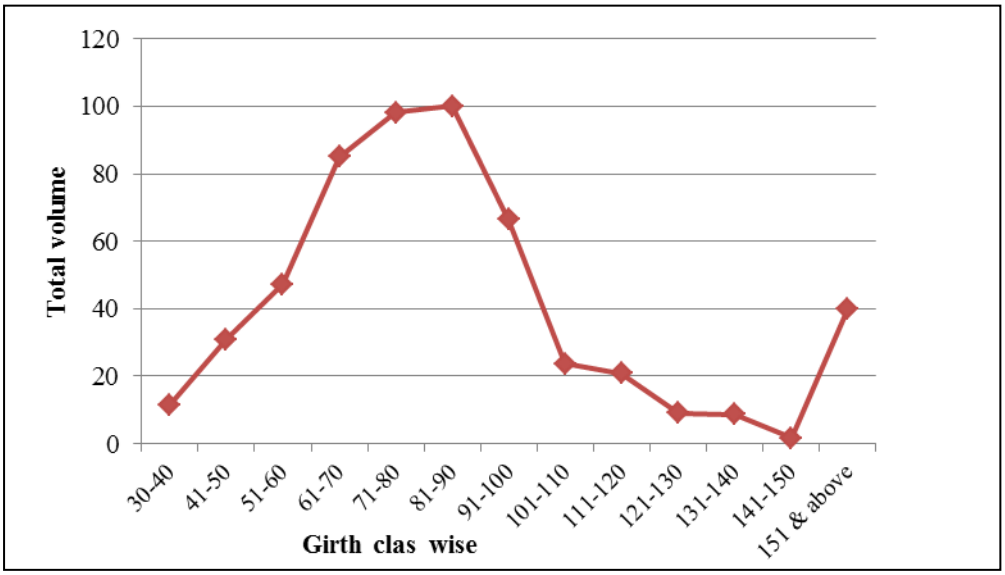


Figure 7.2: Girth class wise with respect to total volume

7.9 Brief Note on Management of Law Ingblei Lyngdoh Nonglyngkien:

(i) Biotic Interference:-

Biotic interference in this grove is negligible. There is no report of encroachment or illegal felling of timbers but poaching cannot be ruled out completely. Due to developmental activities, increasing human population, biotic pressure will be increasing day by day. Hence, it is high time for the Department to declare this grove as a Wildlife Community Reserve forest.

(ii) Fire control:-

Almost there is no report of fire incidence in the past, but it may happen in the near future. Hence creation of eternal fire line is highly needed all along the boundary of the grove.

(iii) Water stress:-

There is only one stream, the Pukri stream in the northern part of the grove. To improve soil moisture content and for the benefit of wildlife, check dams can be created especially in the higher slope.

(iv) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

(v) Creation of natural boundary:-

Creation of natural boundary can be done either by cement pillars or earth's digging all along the boundary of the grove of 2 x 2′ size except where the Pukri stream runs along the boundary of the grove.

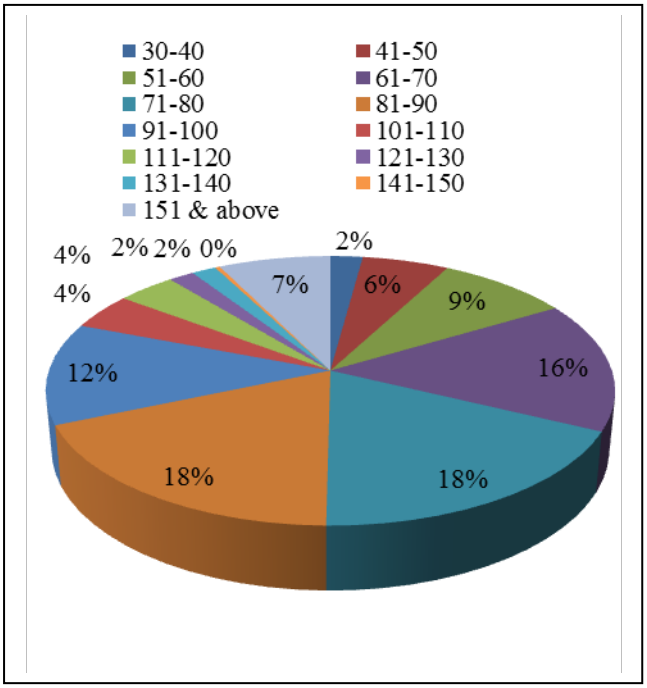


Figure 7.1: Girth class wise with respect to Total Volume

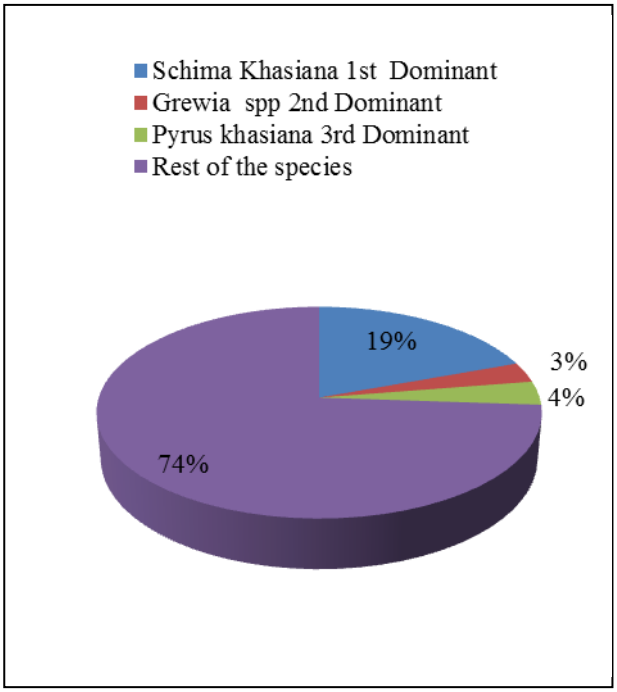


Figure 7.1(a): Species wise with respect to Total Volume

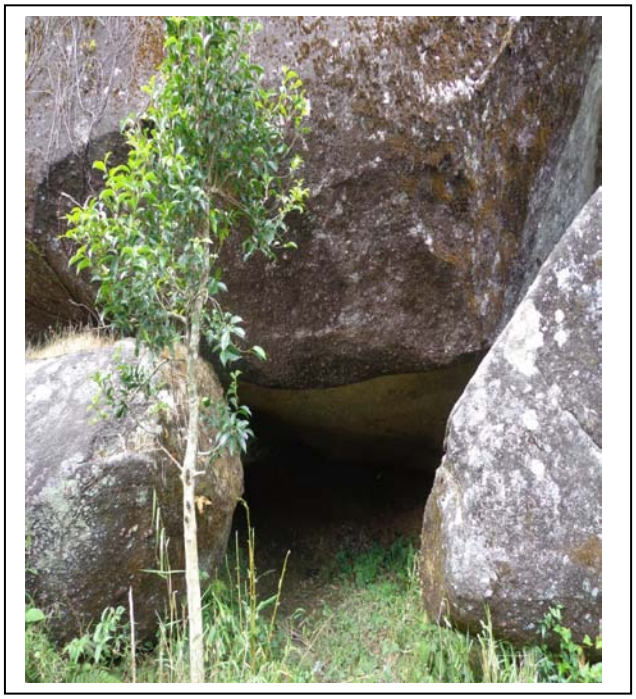


Figure 7 (c): Showing cave at Law Ing Blei Lyngdoh Nonglyngkien

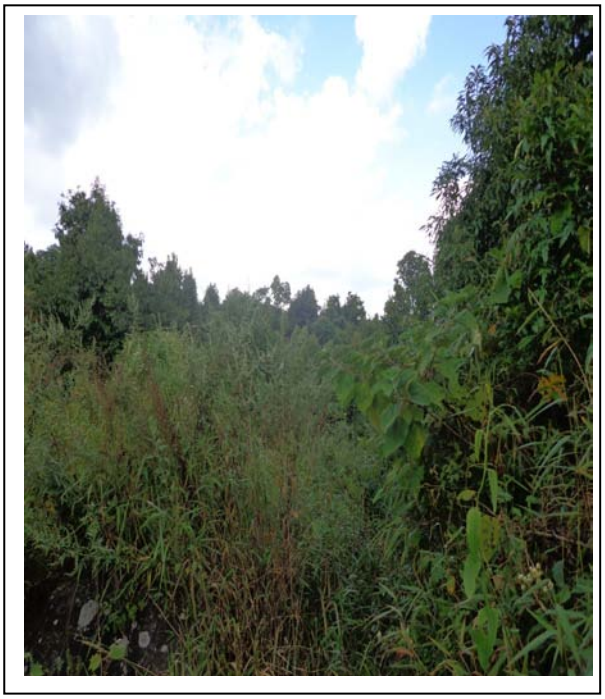


Figure 7 (d): Overview of Law Ing Blei Lyngdoh Nonglyngkien

8 - LAW LYNGDOH MAWLOT

8.1 Introduction/Location:

Law Lyngdoh Mawlot is situated in South West Khasi Hills District at Phyllut under the Syiemship of Hima Maharam. It has an area of 16.54 ha and lies between 25° 27′10" N to 25° 27′ 30" N latitude and 91° 26′ 20" E to 91° 26′ 45" E longitude with an altitude of 1635m from Mean Sea Level (MSL). It is bounded to the North by NREGS road, to the South by private forest and land of Sankur, to the East by the land of Sankur and to the West by NREGS road and a footpath. This grove is accessible by road from Shillong via Weiloi-Mawkyrwat road. It is about 108km from Shillong.

8.2 Brief history:

This grove may have originated many years ago. Offerings and rituals have ceased long way back. But people still preserve this relic forest for the sake of environment and to preserve the water body for their agricultural land, felling of timber is strictly prohibited. It is owned and controlled by the Lyngdoh Mawlot clan.

8.3 Geography and climate:

Topography of the grove is gentle rolling to steep slope ranging from 4° to 15°. The soil texture is clayey loam with boulders with slightly compact consistency. The colour of the soil is black with high soil dept. There is no soil erosion in the grove. There is only one stream in this grove, Phudjapung stream which feed many agricultural lands in the adjoining areas.

The cold winter starts from mid February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 8°C and maximum is 29°C. Biotic pressure, encroachment, wildfire, hunting, poaching and grazing were found absent in this grove.

8.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

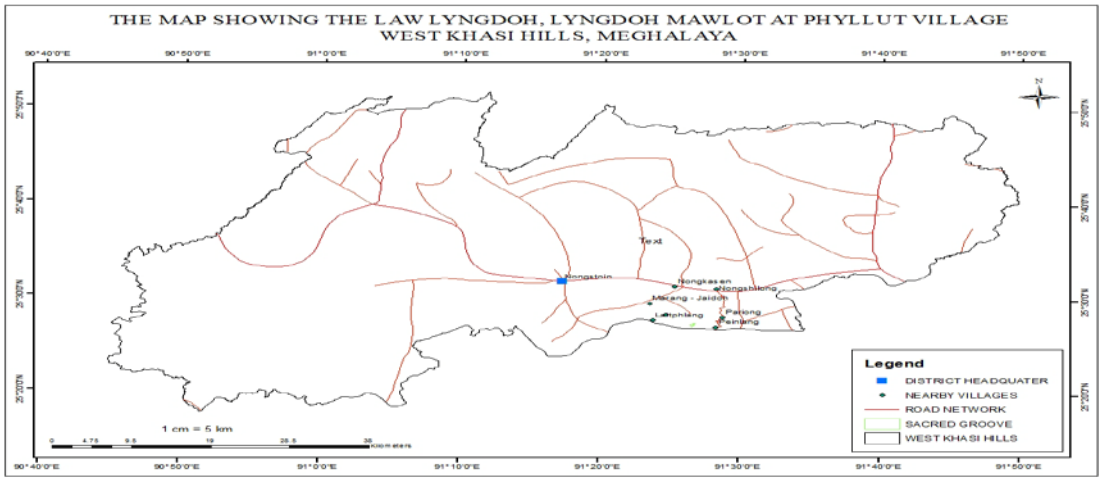
8.5 Flora and fauna:

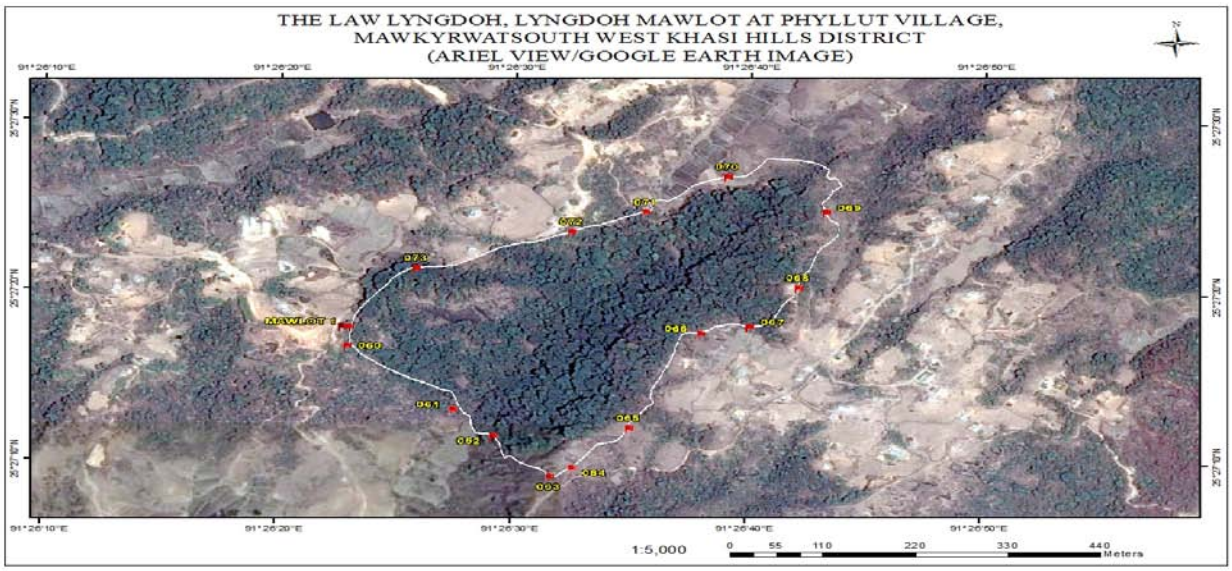
The vegetation is of mixed type. Dominant species found are *Engelhardia spiculata, Costonopsis armata and Shesleria wallichii*. Origin of the forest is natural and it is two storeyed forests. Wildlife that can be found here are *barking deer, wild pig, jungle fowls and various types of birds and fishes.*Conservation significance of the grove is mainly due to:-

(a) The area is very significant from the biodiversity point of view with high level endemic plant and animal species.

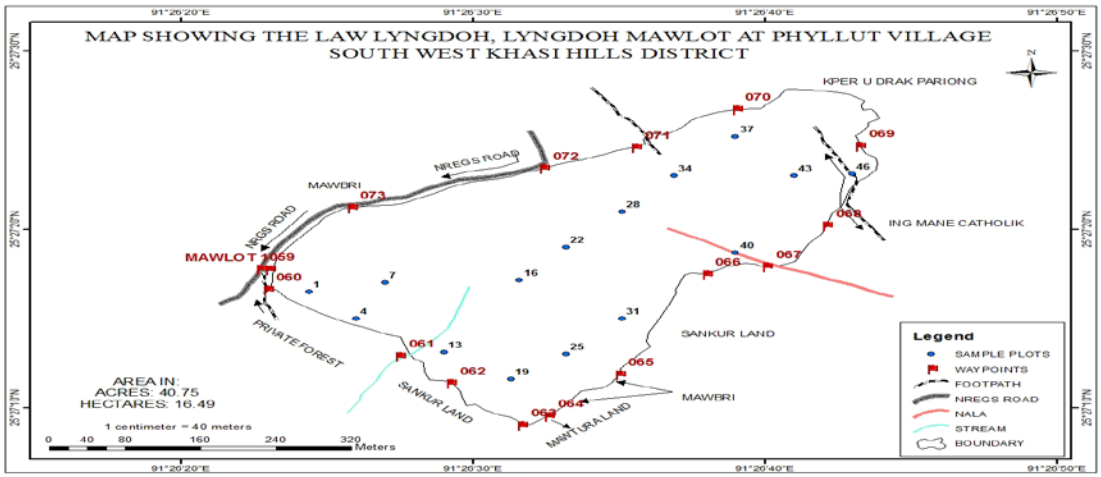
(b) Existence of many rare endangered plant species.

Location Map of Mawlot Sacred Grove





Map showing sample plots at Law Lyngdoh Mawlot



8.6 Floral species:

List of Trees found in Law LyngdohSankur, Mawlot Sacred Grove, West Khasi Hills District

Sl No.	Botanical Name	Local Name	Sl No.	Botanical Name	Local Name
1	*Albizia lucidior*	Dieng ri	16	*Ilex griffithii*	Dieng sohkhaw krai
2	*Camelia caduca*	Dieng tyrnem	17	*Irithina indica*	Dieng song
3	*Castanopsis armata*	Dieng sning lieh	18	*Ligustrum robostos*	Dieng syiang
4	*Castanopsis indica*	Dieng sohot	19	*Michelia oblonga*	Dieng laniar
5	*Cesearia varieca*	Dieng rang	20	*Myrica indica*	Dieng sohphie
6	*Cinamomum cesicodahne*	Dieng pingwait	21	*Pantapanox racemasmum*	Dieng tyllong rangsei
7	*Cinnamomum pauciflorum*	Dieng latyrpad	22	*Pinus khasiana*	Dieng kseh
8	*Citrus latipes*	Dieng sohkynphor	23	*Quercus dealbata*	Dieng sai
9	*Elaeocarpus lanceafolia*	Dieng sohkhyllam	24	*Rhododendron arboretum*	Dieng tiewsaw
10	*Engelhardia spicata*	Dieng lymba	25	*Rhus succedanea*	Dieng kain
11	*Eurya accuminata*	Dieng shit	26	*Schima khasiana*	Dieng ngan
12	*Ficcus Elastica indica*	Dieng jri	27	*Shesleria wallichina*	Dieng langrop
13	*Ficos globarata*	Dieng sohpian	28	*Symplocos khasiana*	Dieng pei
14	*Fotina integrefolia*	Dieng snam maw	29	*Grewia abutilifolia*	Dieng sohme blang
15	*Ilex excodsa/ Itea chinensis*	Dieng sohrynted	30		

List of orchids, shrubs, herbs, climbers, grass and bamboo found in Phyllut Sacred Grove, South West Khasi Hills

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew dieng	*Pholidata articulata*	Orchidaceae
2.	Tiew sla rem-maw	*Rhaphidophora lancifolia*	Araliaceae
3.	Orchid	*Melastoma malabathricum*	Melastomaceae
4.	Orchid	*Alangium chinensis*	Alangiaceae
5.	Orchid	*Floscopa scandens*	Commelinaceae
6.	Tiew jyrsieh maw	*Polygonum capitatum*	Polyganoceae
7.	Orchid	*Micropera manii*	Orchidaceae
8.	Orchid	*Dendrobium aphyllum*	Orchidaceae
9.	Orchid	*Liparis longipes*	Orchidaceae
10.	Orchid	*Aeschynanthus superba*	Orchidaceae
11.	Orchid	*Oberonia acaulis*	Orchidaceae
12.	Orchid	*Pholidata imbricata*	Orchidaceae
13.	Orchid	*Eria coronaria*	Orchidaceae
14.	Orchid	*Aotochialus fusscus*	Orchidaceae
15.	Orchid	*Dendrobium fimbriatum*	Orchidaceae
16.	Orchid	*Paphiolenthe vandrum*	Orchidaceae
17.	Orchid	*Coelogyne punctualata*	Orchidaceae
18.	Orchid	*Cymbidium elegans*	Orchidaceae

19.	Orchid	*Neogyna gandnesiana*	Orchidaceae
20.	Orchid	*Calenthemasuca (rare sppp)*	Orchidaceae
21.	Orchid	*Pholidata articulata*	Orchidaceae
22.	Orchid	*Papllionanthe teres*	Orchidaceae
23.	Orchid	*Pholidata articulata*	Orchidaceae
24.	Orchid	*Dendrobium transparens*	Orchidaceae
25.	Orchid	*Dendrobium eraeoflorum*	Orchidaceae
26.	Orchid	*Liparis veriadifolia*	Orchidaceae
27.	Orchid	*Coelogyne gramimifolia*	Orchidaceae
28.	Orchid	*Eria paniculata*	Orchidaceae
29.	Orchid	*Bulbophyllum uniflorum*	Orchidaceae
30.	Orchid	*Liparin ellipticus*	Orchidaceae

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.		*Boehmeria minea*	Urticaceae
2.	Kait khlaw	*Mausa accuminata*	Musaceae
3.		*Garcinia pedunculata*	Clusiaceae
4.	Tiew jyrsieh maw	*Polygonum orientale*	Polygonaceae
5.		*Malva verticillata*	Malvaceae
6.	Sohlamut	*Agapetes variegata*	Vaccinaceae
7.	Dieng shit (rit)	*Murrya japonicum*	Theaceae
8.		*Cuphea bracteatum*	Euphorbiaceae
9.		*Vernonia volkameriifolia*	Asteraceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Sla jajew	*Begonia roxborghii (m)*	Begoniceae
2.	Tiew sying maw	*Zingiber spicatum*	Zingiberaceae
3.	Tyrkhang	*Diplazium esculantum*	Athyriaceae
4.	Shiah sohprew	*Rubus khasiana*	Rosaceae
5.	Teinthap or synrem	*Artemisia parviflora*	Asteraceae
6.	Tiew sying maw	*Vaccinium khasiaum*	Vaccinaceae
7.	Batnebru	*Centela asiatica*	Apiaceae
8.	Sohkrot	*Smilax zeylanium*	Smilaceae
9.	Tyrkhang	*Cyathea gigantea*	Cyatheaceae
10.		*Bluemia radigata*	Asteraceae
11.	Tyrkhang	*Maesa indica*	Myrsinaceae
12.	Sla lamet	*Phrynium placentrum*	Morantaceae
13.	Dieng soh khrismas	*Chloramthus brachystachys*	Rubiaceae

14.	Jamyrdoh	*Houttuynia cordata*	Saururaceae
15.	Sohrishan	*Duchesnea indica*	Rosaceae
16.	Tiew jasat	*Polyganum hydropiper*	Polygonaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.		*Pothos scandens*	Araceae
2.		*Fissistigma parviflora*	Amonaceae
3.		*Aschinanthus*	Orchidaceae
4.	Sohmrit khlaw	*Piper longum*	Piperaceae
5.	Jyrmi khlaw	*Mucuna prugriens*	Leguminaceae
6.		*Smilax zeylanicum*	Smilaceae
7.	Jyrmi khlaw	*Emtada parsaetha*	Leguminacea
8.		*Embelia ribes*	Myrsinaceae
9.		*Floscopa scandens*	Commelinaceae
10.		*Hoya aloba*	Asclepiadaceae
11.		*Hoya parasitica*	Asclepiadiaceae
12.		*Pothos kunguria*	Araceae
13.	Jyrmi shiah	*Xanthuzylum khasianum*	Rutaceae
14.	Bat refugee	*Mokania micrantha*	Asteraceae
15.	Sohbyrthit khasi	*Trium felta rhomboida*	Malvaceae
16.	Soh nepbah	*Rubus ellipticus*	Rosaceae

GRASS

Sl No.	Local Name	Botanical Name	Family
1.		*Cyperus difformia*	Cyperaceae
2.	Lang traw	*Imperatus cylindrica grass*	Poaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Siej namlang	*Chimona bambusa*	Bambusaceae
2.	Siej khlaw	*Bambusa khasiana*	Bambusaceae

8.7 Number of Stems:

Number of stems in each girth class and species wise are given in table 8.1 & 8.2. The table shows that maximum number of stems are found in higher girth classes i.e. from 41-50cm to 151& above cm classes.

Table – 8.1

Girth class wise and Species wise No. of stems in the sampled area (15 plots – 3ha)

Girth class (cm)	*Engelhardia Spiculata* 1st dominant	*Costonopsis armata* 2nd dominant	*Pinus khasiana*	*Shesleria wallichina* 3rd dominant	Rest of the species	Total
30-40	7	8	0	3	43	**61**
41-50	16	13	0	9	104	**142**
51-60	24	21	0	13	127	**185**
61-70	29	22	0	16	162	**229**
71-80	28	24	0	14	145	**211**
81-90	30	28	0	23	132	**213**
91-100	32	29	2	18	126	**207**
101-110	28	14	0	11	79	**132**
111-120	25	23	0	8	76	**132**
121-130	20	22	0	6	82	**130**
131-140	13	14	0	3	60	**90**
141-150	25	13	1	5	63	**107**
151 & above	84	69	0	3	203	**359**
Total	**361**	**300**	**3**	**132**	**1402**	**2198**

Table – 8.2

Girth class wise and Species wise No. of stems in the entire grove (Area 16.54 ha)

Girth class (cm)	*Engelhardia Spiculata* 1st dominant	*Costonopsis armata* 2nd dominant	*Pinus khasiana*	*Shesleria wallichina* 3rd dominant	Rest of the species	Total
30-40	39	44	0	17	237	**336**
41-50	88	72	0	50	573	**783**
51-60	132	116	0	72	700	**1020**
61-70	160	121	0	88	893	**1263**
71-80	154	132	0	77	799	**1163**
81-90	165	154	0	127	728	**1174**
91-100	176	160	11	99	695	**1141**
101-110	154	77	0	61	436	**728**
111-120	138	127	0	44	419	**728**
121-130	110	121	0	33	452	**717**
131-140	72	77	0	17	331	**496**
141-150	138	72	6	28	347	**590**
151 & above	463	380	0	17	1119	**1979**
Total	**1990**	**1654**	**17**	**728**	**7730**	**12118**

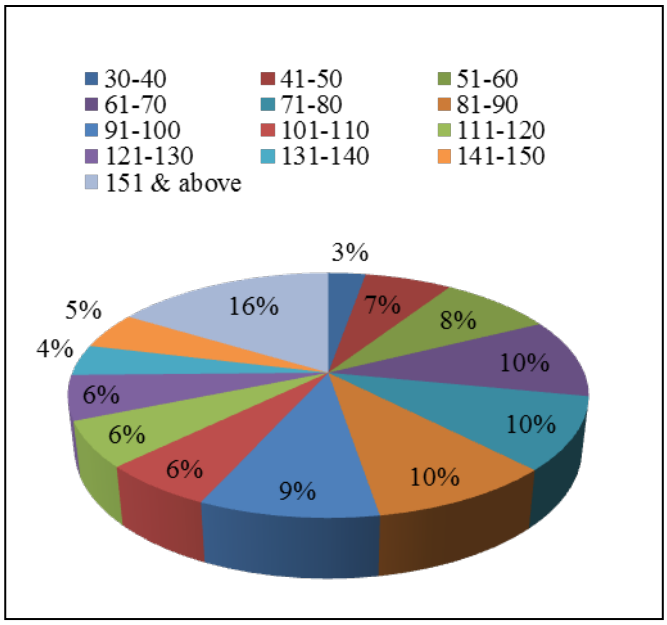


Figure 8.1: Girth class wise with respect to Total stems

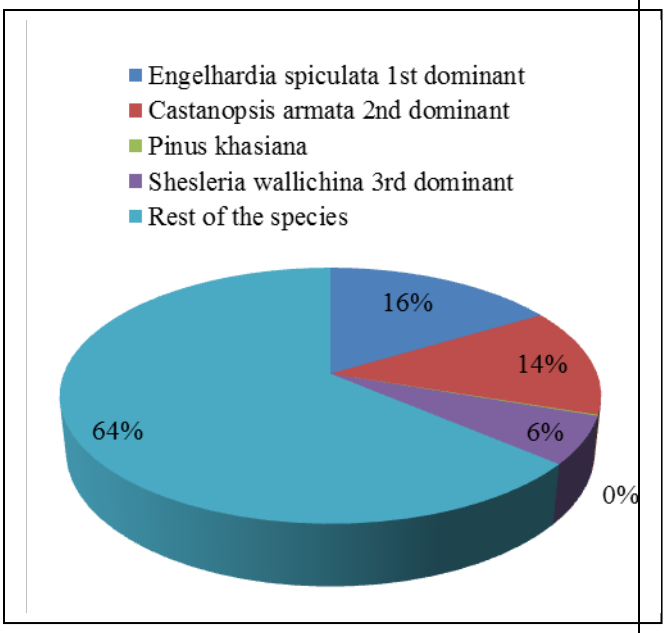


Figure 8.1(a): Species wise with respect to Total stems



Figure 8.1: Girth class wise with respect to total stems



Figure 8 (a): Showing orchid in Phyllut Sacred Grove.

8.7 Growing Stock:

As per the methodology described in Chapter-I, 20% enumeration is carried out in the grove as its area is more than 10 ha and less than 50 ha. Every tree species having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 2198 tree species consisting of 361 *Engelhardia spiculata* (1st dominant), 300 *Costonopsis armata*. (2nd dominant), 132 *Shesleria wallichii* (3rd dominant), 3 *Pinus khasiana* and 1402 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151cm and above. The results are given in table 8.3 & 8.4 for Lawlyngdoh Mawlot sacred grove which shows the volume specieswise and girth classwise. The total growing stock of the Grove works out to 21,909.932 cubic metres.

Table - 8.3
Specieswise girth class wise volume in the sampled area (15 plots -3 ha)
(volume in cu.m)

Girth class wise	*Engelhardia spiculata* 1st dominant	*Castanopsis armata* 2nd dominant	*Pinus khasiana*	*Shesleria wallichina* 3rd dominant	Rest of the species	Total
30-40	0.486	0.492	0	0.225	2.688	**3.891**
41-50	2.489	2.099	0	1.438	16.980	**23.006**
51-60	6.558	5.555	0	3.38	34.562	**50.055**
61-70	11.571	8.610	0	6.504	64.399	**91.084**
71-80	15.847	14.017	0	7.869	80.906	**118.639**
81-90	22.330	20.995	0	16.734	97.505	**157.564**
91-100	30.011	27.324	1.464	16.865	117.945	**193.609**
101-110	33.122	15.857	0	12.392	91.721	**153.092**
111-120	35.625	32.747	0	11.476	106.362	**186.210**
121-130	32.857	36.868	0	9.816	135.785	**215.326**
131-140	25.304	27.699	0	5.846	119.021	**177.870**
141-150	57.505	29.960	2.104	11.756	143.833	**245.158**
151 & above	632.451	398.071	0	13.745	1314.219	**2358.486**
Total	**906.156**	**620.294**	**3.568**	**118.046**	**2325.926**	**3973.990**

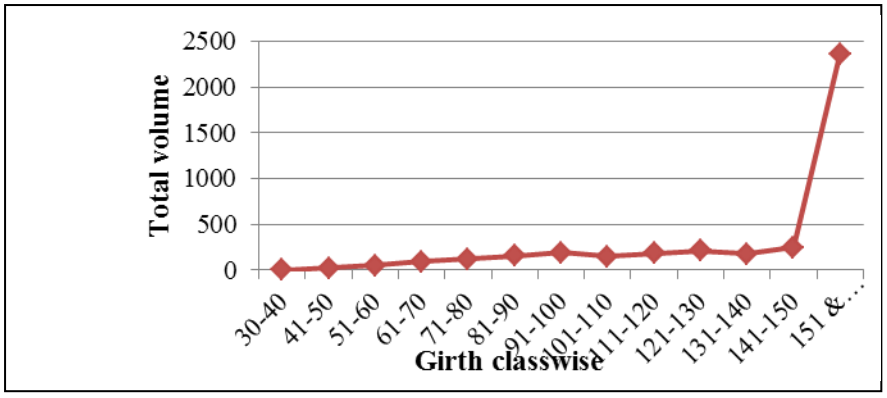


Figure 8.3: Girth class wise with respect to total volume

Table - 8.4
Specieswise girth class wise volume in the entire grove (Area -16.54 ha)

(volume in cu.m)

Girth class wise	*Engelhardia spiculata* 1st dominant	*Castanopsis armata* 2nd dominant	*Pinus khasiana*	*Shesleria wallichina* 3rd dominant	Rest of the species	Total	% wrt total volume
30-40	2.68	2.71	0.00	1.24	14.82	**21.45**	**0.10**
41-50	13.72	11.57	0.00	7.93	93.62	**126.84**	**0.58**
51-60	36.16	30.63	0.00	18.64	190.55	**275.97**	**1.26**
61-70	63.79	47.47	0.00	35.86	355.05	**502.18**	**2.29**
71-80	87.37	77.28	0.00	43.38	446.06	**654.10**	**2.99**
81-90	123.11	115.75	0.00	92.26	537.58	**868.70**	**3.96**
91-100	165.46	150.65	8.07	92.98	650.27	**1067.43**	**4.87**
101-110	182.61	87.42	0.00	68.32	505.69	**844.05**	**3.85**
111-120	196.41	180.55	0.00	63.27	586.41	**1026.64**	**4.69**
121-130	181.15	203.27	0.00	54.12	748.63	**1187.16**	**5.42**
131-140	139.51	152.71	0.00	32.23	656.20	**980.66**	**4.48**
141-150	317.04	165.18	11.60	64.81	793.00	**1351.64**	**6.17**
151 & above	3486.91	2194.70	0.00	75.78	7245.73	**13003.12**	**59.35**
Total	**4995.94**	**3419.89**	**19.67**	**650.83**	**12823.60**	**21909.93**	**100.00**
% wrt total volume	**22.80**	**15.61**	**0.09**	**2.97**	**58.53**	**100.00**	

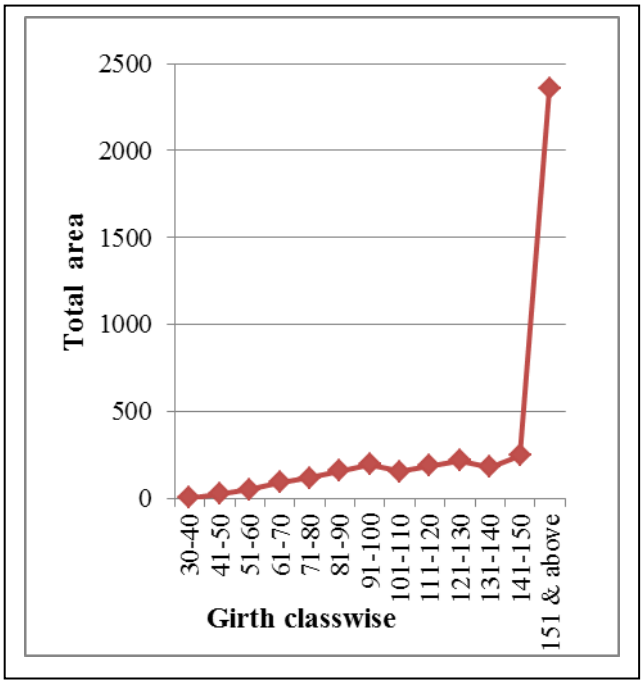


Figure 8.4: Girth class wise with respect to total area

Table 8.2 shows that the volume contributed by the 1st dominant species (*Engelhardia spiculata*) with respect to the total volume of the grove is 22.80%, the 2nd dominant species (*Costonopsis armata*) is 15.61 , 3rd dominant (*Shesleria wallichii*) is 2.97%, *Pinus khasiana* is 0.09% while Rest of the species is maximum i.e. 58.53%. Total volume of the grove is 21,909.932 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class also increases i.e. girth class is directly proportional to the volume in that class

8.9 Brief Note on Management of Law Lyngdoh Mawlot

(i) Biotic Interference:-

This grove is least disturbed, presently there is no encroachment, illegal felling of timber or any sign of grazing. To avoid maximum biotic pressure in the near future, it is suggested that if this grove can be declared as a Community Reserve with some financial incentives this will encourage people in preserving this rich forest natural resources which the nature is left within this grove.

(ii) Fire control:-

This grove is surrounded mostly by road, footpath and private forest. To avoid fire incidence in this grove external fire line can be created all along the boundary every year.

(iii) Water stress:-

There is only one stream in this grove i.e. Phud japung stream and a dry nullah. Construction of check dams to impound water for wildlife as well as to improve moisture content of the soil, which will also prevent soil erosion and spread of fire incidences.

(iv) Construction of natural boundary:-

Construction of permanent boundary pillars or earth's cutting all along the boundary of the grove will prevent encroachment. It will also act as a barrier for spreading of fire inside of the grove.

(v) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

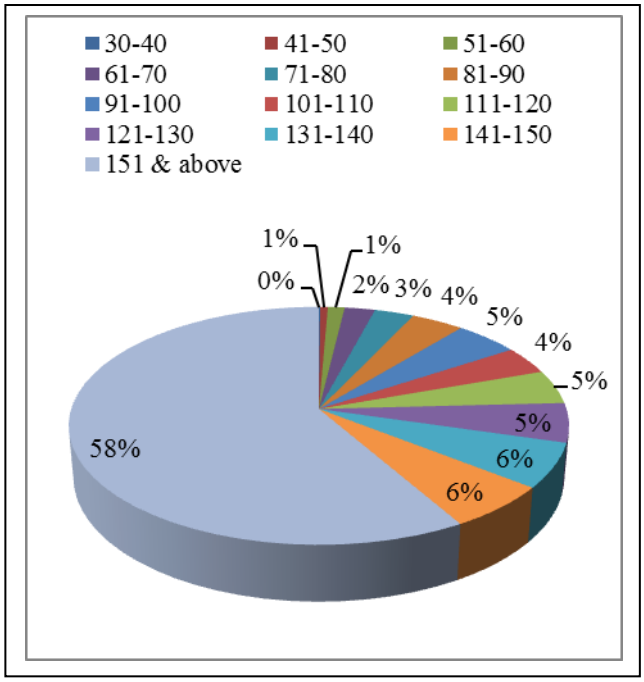


Figure 8.4: Girth class wise with respect to Total Volume

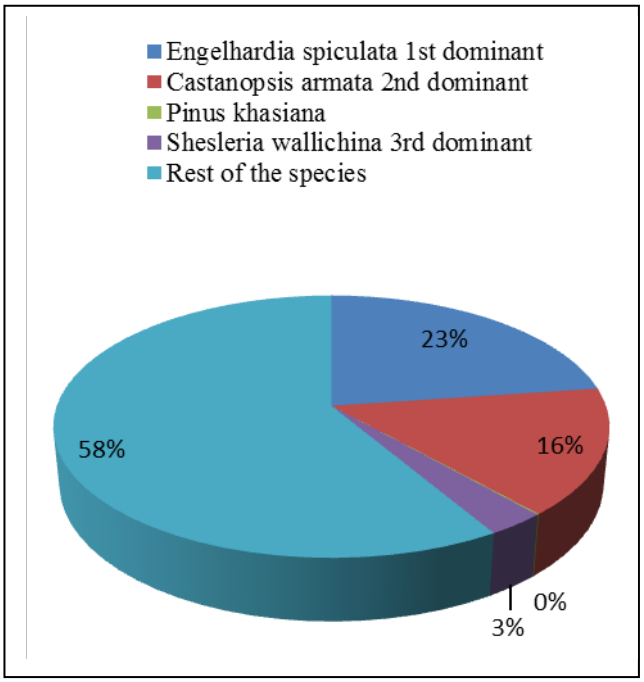


Figure 8.4: Species wise with respect to Total Volume



Figure 8 (b): Over view of Phyllut Sacred Grove



Figure 8 (c): Closer view of Phyllut Sacred Grove

9 - LAW LYNGDOH NONGLYNGKIEN

9.1 Introduction/Location:

Law Lyngdoh Nonglyngkien is situated in South West Khasi Hills District at Nonglyngkien village under Maharam Syiemship. It covers an area of 2.39 ha and lies between 25° 25′ 50" N to 25° 25′ 16" N latitude and 91° 25′ 54" E to 91° 26′ 2" E longitude and with an altitude of 1600 m from Main Sea Level (MSL). It is bounded in the North by private land of Mrs. P. Shangpliang, in the South by Khappukri stream and land of Mrs. Telbi Myrthong, to the East by the land of Pro Shangpliang, Dhaka Sangriang and T. Myrthong and toward the West by private land of Mrs. Klien L. Nonglyngkien. The grove is accessible by road from Shillong via Weiloi-Mawkyrwat road. It is about 80km from Shillong.

9.2 Brief history:

This Sacred grove originated long time ago since the inception of Nonglyngkien village way back to the year 1909. The clan Lyngdoh Nonglyngkien performs rituals here every year through sacrifices by the Lyngdoh (Chief) elected by the clan, so that the Basa (deity) will protect the clan from draught and famine or omens. No body, even from the clan members is allowed to enter in this Sacred grove except during offering days that too only four days in a year unfortunately this practices ceased way back during the year 1975. This grove is own by the clan Lyngdoh Nonglyngkien and controlled by the elected Lyngdoh (Chief).

9.3 General and climate:

Topography of the grove is gentle rolling with slope ranging from 4° to 11°. The soil texture is clayed loam with boulders with slightly compact in its consistency. The colour of the soil is brown with high soil dept. Soil erosion is negligible. The only stream that is flowing in the southern side of the boundary of this grove is Khap-pukri stream.

The cold winter starts from November to February and warm summer from May to October. Monsoon period starts from May to September, the average minimum temperature is 8°C and maximum is 29°C. Biotic pressure, encroachment, wild fire, hunting and poaching, grazing and illegal removal of timbers were found absent in this grove.

9.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

9.5 Flora and fauna:

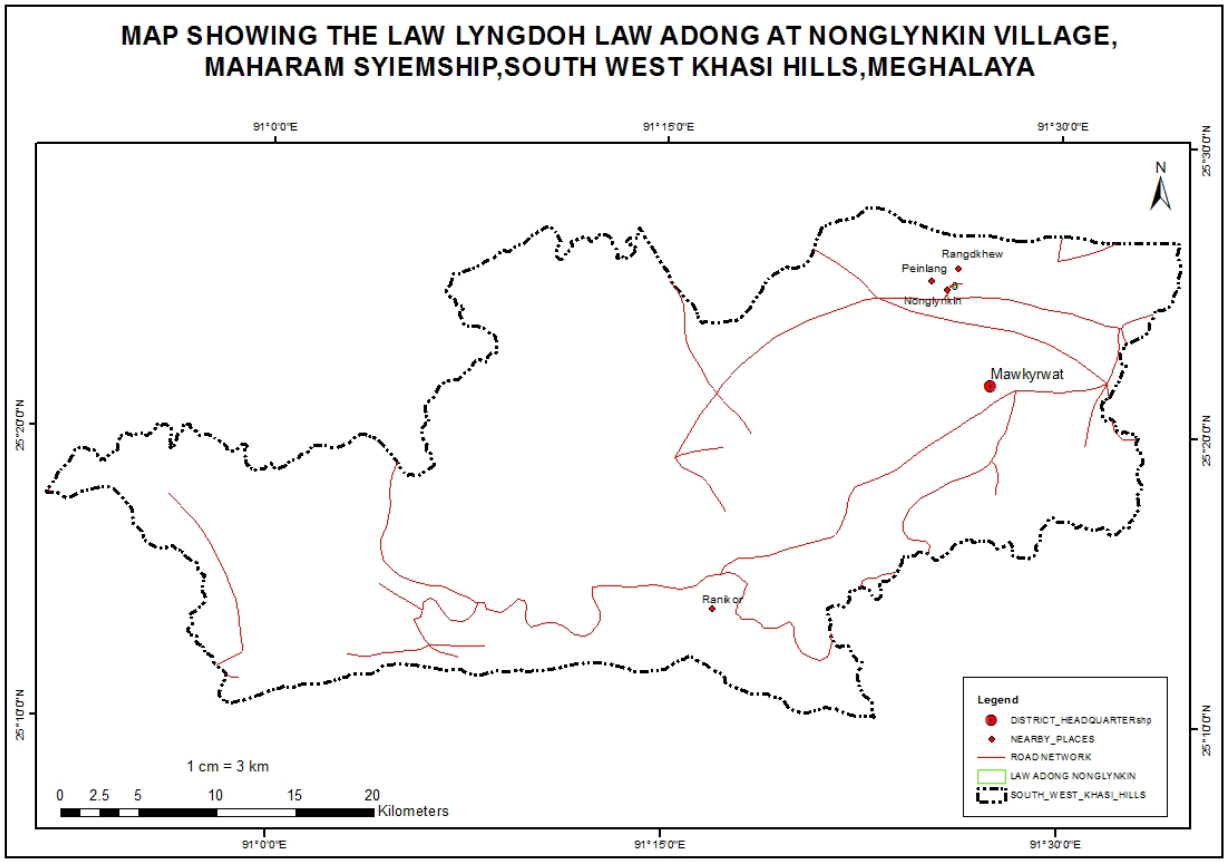
The vegetation is of mixed species. Dominant species found are *Schima khasiana* and *Michelia oblonga, Symplocos khasiana.* Origin of the forest is natural and it is two storeyed forests. Wildlife here *are jackal, rabbit, wild pig, jungle fowls, pangolin*. Various types of birds and reptiles.

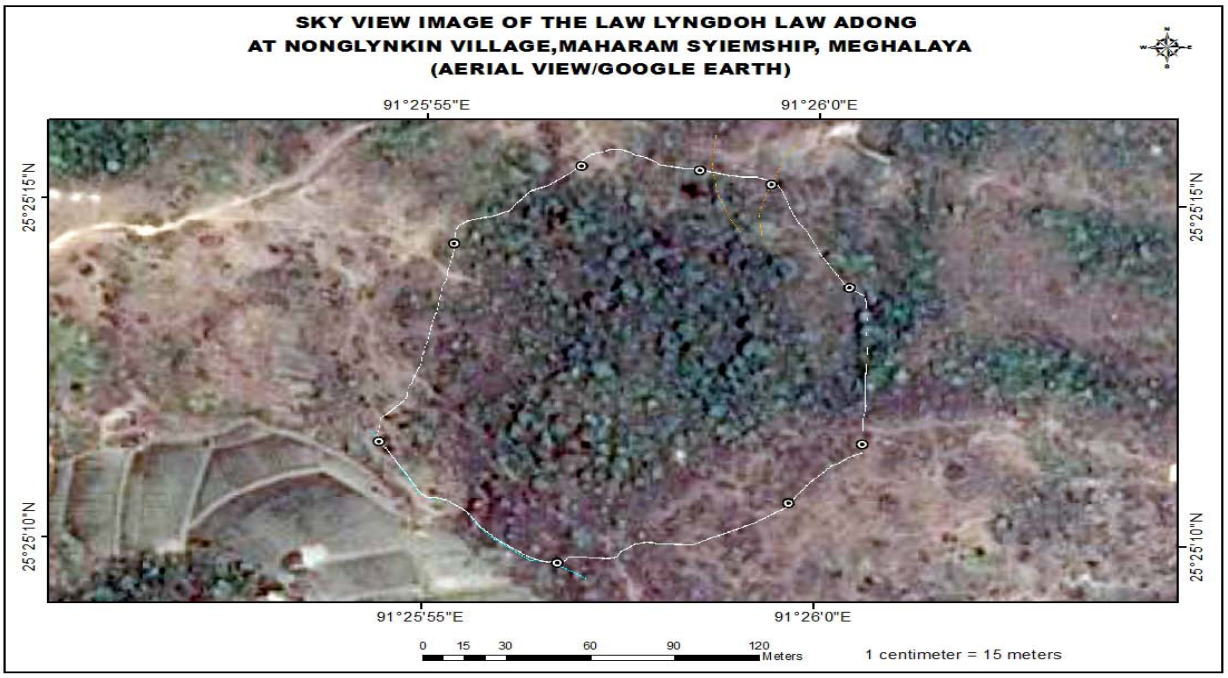
9.6 Floral species:

List of Trees found in Law Lyngdoh Lyngdoh Nonglyngkien Sacred Grove

Sl. No.	Botanical Name	Local Name	Sl. No.	Botanical Name	Local Name
1	*Albizia lucidior*	Dieng ri	27	*Itea chinensis*	Dieng sohrynted
2	*Aralia armata*	Dieng latymphu	28	*Ligustrum robostos*	Dieng syiang
3	*Bauhinia prosphirea*	Dieng tyrlong	29	*Macaranga denticulate*	Dieng lakhar
4	*Bauhinia variegate*	Dieng long	30	*Michelia oblonga*	Dieng laniar
5	*Betula alnoides*	Dieng lieng	31	*Myrica indica*	Dieng sohphie
6	*Callicaspa arbarea*	Dieng lakhiat	32	*Pajanelia kheedii*	Dieng tanglung
7	*Camelia caduca*	Dieng tyrnem	33	*Pantapanox racemasmum*	Dieng tyllong rangsei
8	*Castanopsis armata*	Dieng sning	34	*Parkia roxburghii*	Dieng jariat
9	*Castanopsis indica*	Dieng sohot	35	*Pithecellboiu heterophylum*	Dieng iap-iar
10	*Castanopsis spp*	Dieng sning	36	*Pyrus khasiana*	Dieng sohjhur
11	*Cesearia varieca*	Dieng rang	37	*Quercus dealbata*	Dieng sai
12	*Cinamomum cesicodahne*	Dieng pingwait	38	*Rhododendron arboretum*	Dieng tiewsaw
13	*Citrus latipes*	Dieng sohkynphor	39	*Rhus chinensis*	Dieng sohma
14	*Docynia indica*	Dieng sohphoh	40	*Rhus succedanea*	Dieng kain
15	*Docynia indica*	Dieng sohphoh khasi	41	*Schima khasiana*	Dieng ngan
16	*Elaeocarpus lanceafolia*	Dieng sohkhyllam	42	*Shesleria wallichina*	Dieng langrop
17	*Engelhardia spicata*	Dieng lymba	43	*Symplocos chinensis*	Dieng iong
18	*Eurya accuminata*	Dieng shit	44	*Symplocos khasiana*	Dieng pe
19	*Exbucklandia populnea*	Dieng doh	45	*Taxus bacata*	Dieng sohblei
20	*Ficus spp*	Dieng jri	46	*Viburnum carilifolium*	Dieng sohlang ksew
21	*Fieces globarata*	Dieng sohpian	47	*Zanthoxylum ovalifolium*	Dieng shiah
22	*Grewia abutilifolia*	Dieng sohme blang			
23	*Ilex griffithii*	Dieng sohkhaw krai			
24	*Ilex venulosa*	Dieng shyieng			
25	*Inuala cappa*	Dieng lalieh			
26	*Irithina indica*	Dieng song			

Location map of Law Lyngdoh Nonglyngkien Sacred Grove





List of orchids, Shrubs, herbsclimbers, and bamboo found in Law Lyngdoh Nonglyngkien Sacred Grove, South West Khasi Hills

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew dieng	*Pholidata imbricata*	Orchidaceae
2.	Orchid	*Melastoma nepalensis*	Melastomaceae
3.	Orchid	*Alangium chinensis*	Alangiaceae
4.	Orchid	*Floscopa scandens*	Commelinaceae
5.	Tiew jyrsieh maw	*Polygonum capitatum*	Polyganoceae
6.	Orchid	*Micropera rostrata*	Orchidaceae
7.	Orchid	*Dendrobium transparens*	Orchidaceae
8.	Orchid	*Liparis elliptica*	Orchidaceae
9.	Orchid	*Aeschynanthus superba*	Orchidaceae
10.	Orchid	*Pholidata convallariae*	Orchidaceae
11.	Orchid	*Eria coronaria*	Orchidaceae
12.	Orchid	*Otochillus fusca*	Orchidaceae
13.	Orchid	*Dendrobium finbriatum*	Orchidaceae
14.	Orchid	*Papilionanthe vandarum*	Orchidaceae
15.	Orchid	*Coelogyne flaccida*	Orchidaceae
16.	Orchid	*Cymbidium elegans*	Orchidaceae

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Kait khlaw	*Musa acuminate*	Musaceae
2.		*Garcinia pedunculata*	Clusiaceae
3.	Tiew jyrsieh maw	*Polygonum glabrum*	Polygonaceae
4.	Sohlamut	*Agapetes variegata*	Vaccinaceae
5.	Dieng shit (rit)	*Murrya exortica*	Meliaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew sying maw	*Zingiber spicatum*	Zingiberaceae
2.	Sla jajew	*Begonia roxborghii (m)*	Begoniceae
3.	Tyrkhang	*Diplazium orientale*	Diplaziaceae/Blechmaceae
4.	Shiah sohprew	*Rubus khasiana*	Rosaceae
5.	Sohkrot	*Smilax zeylanicum*	Smilacaceae
6.	Tyrkhang	*Cyathea gigantea*	Cyatheaceae
7.	Tyrkhang	*Maesa indica*	Myrsinaceae

8.	Jamyrdoh	*Houttuynia cordata*	Saururaceae
9.	Sohrishan	*Duchesnea indica*	Rosaceae
10.	Tiew jasat	*Polyganum hydropiper*	Polygonaceae
11.		*Floscopa scandens*	Commelinaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.		*Pothos scandens*	Araceae
2.		*Fissistigma verrucosum*	Amonaceae
3.		*Ascsinanthus*	Orchidaceae
4.	Sohmrit khlaw	*Piper diffusum*	Piperaceae
5.	Jyrmi khlaw	*Mucuna puriens*	Fabaceae/papilionaceae
6.	Shiah soh krot	*Smilax*	Smilaceae
7.	Jyrmi khlaw	*Pisonia acculeata*	Nyctaginaceae
8.		*Embilia ribes*	Myrsinaceae
9.		*Hoya lobii*	Asclepiadaceae
10.		*Hoya parasitica*	Asclepiadiaceae
11.		*Pothus scandan*	Araliaceae
12.	Jyrmi shiah	*Xanthuzylum khasiana*	Rutaceae
13.	Sohbyrthit khasi	*Trium felta rhomboida*	Asteraceae
14.	Soh nepbah	*Rubus moluccanus*	Rosaceae
15.	Soh kyrsu	*Dioscorea alata*	Dioscoreaceae
16.	Poplarem	*rhaphidophora lancifolia*	Araliacea
17.	Meitung	*Paederia foetida*	Convalvulaceae
18.		*Pisonia aculeate*	Nyctaginaceae
19.		*Willoughbeia edulis*	Apocynaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Siej namlang	*Chimona bambusa khasiana*	Poaceae

9.7 Number of Stems:

Number of stems in each girth class and specieswise are given in table 9.1.The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40cm to 81-90cm classes.

Table – 9.1

Girth class-wise and Species-wise No. of Stems in the entire grove (Area- 2.39 ha)

Girth Class wise	*Schima Khasiana* 1st Dominant	*Michelia oblonga* 2nd Dominant	Symplocos khasiana 3rd Dominant	Rest of the species	Total
30-40	9	21	7	226	**263**
41-50	4	22	10	186	**222**
51-60	9	12	6	125	**152**
61-70	15	13	6	149	**183**
71-80	20	8	19	137	**184**
81-90	26	5	22	118	**171**
91-100	20	3	12	59	**94**
101-110	2	2	0	8	**12**
111-120	0	0	1	6	**7**
121-130	2	0	0	1	**3**
131-140	0	0	0	0	**0**
141-150	0	0	0	0	**0**
151 & above	4	0	0	1	**5**
Total	**111**	**86**	**83**	**1016**	**1296**

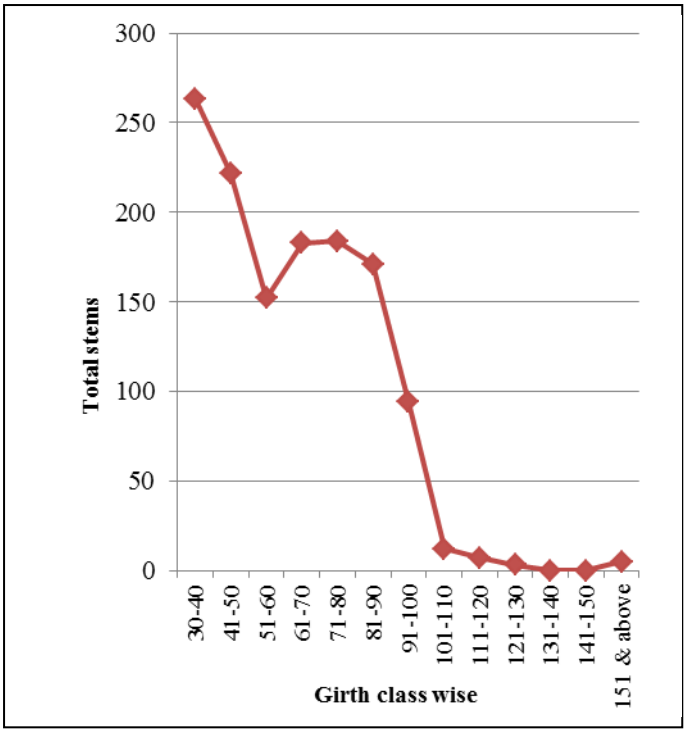


Figure 9.1: Girth class wise with respect to total stems

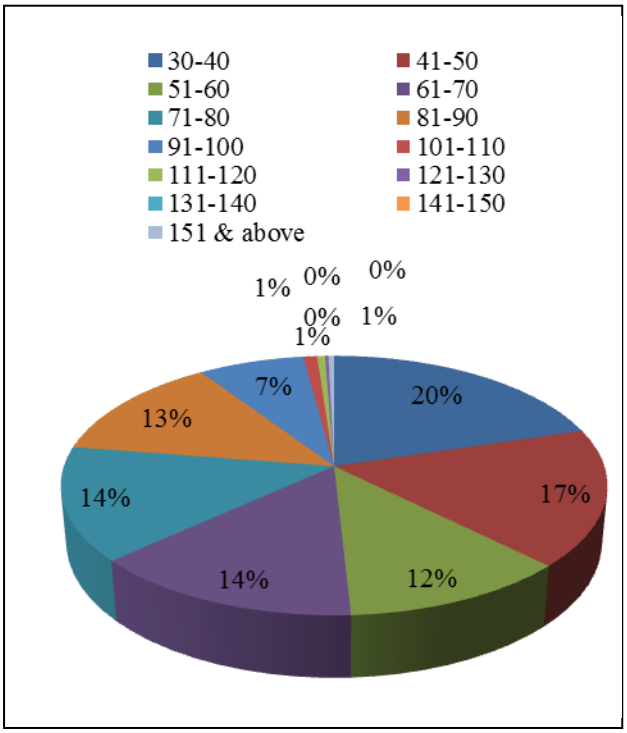


Figure 9.1: Girth class wise with respect to Total Volume Volume

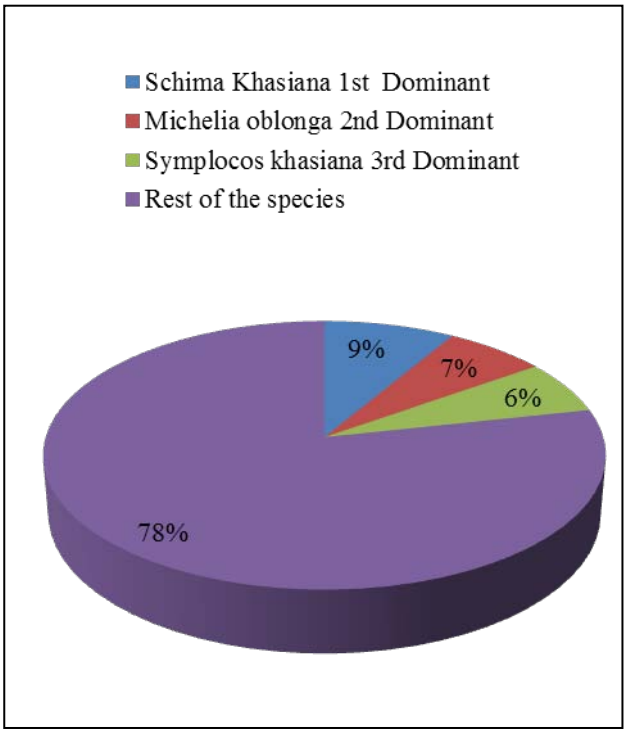


Figure 9.1(a): Specieswise with respect to Total

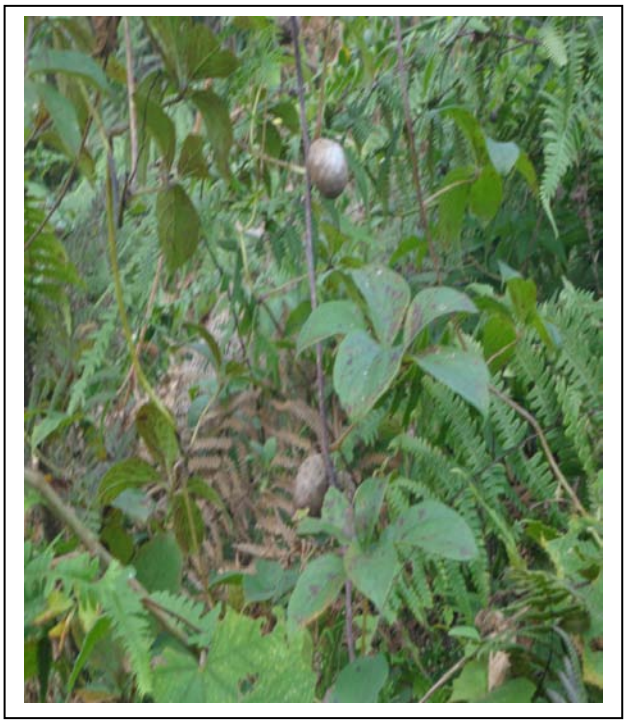


Figure 9 (a): Inside view of Nonglyngkien Sacred Grove

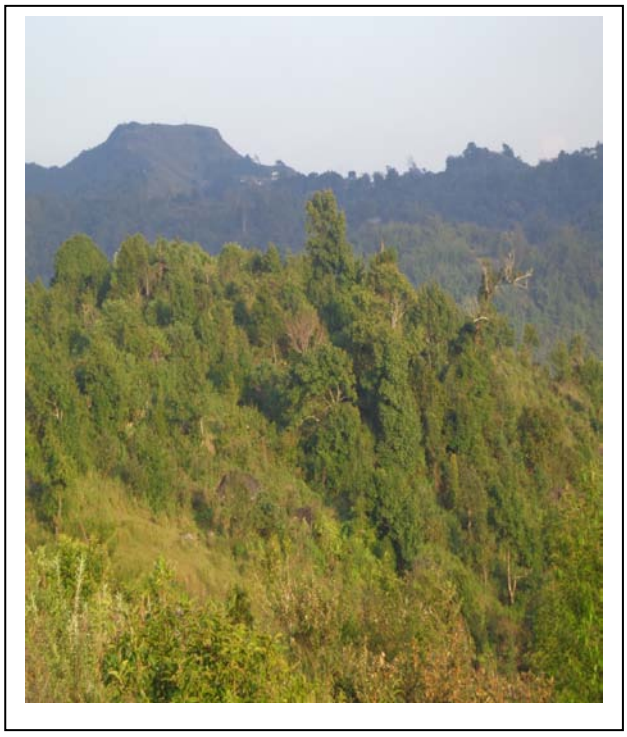


Figure 9 (b): Over view of Law Lyngdoh Sacred Grove

9.8 Growing Stock:

As per the methodology described in Chapter-I, 100% enumeration is carried out in the grove as its area is less than 10 ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 1296 tree species consisting of 111 *Schima khasiana* (1st dominant), 86 *Michelia oblonga* (2nd dominant), 83 *Symplocus khasiana.* (3rd dominant), and 1016 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151cm and above. The results are given in table 9.2 for Nongsynrieh sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 484.763 cubic metres.

Table – 9.2
Girth class wise & specieswise volume in the sampled area (Area: 2.39 ha)
(volume in cu.m)

Girth Class Vise	*Schima Khasiana* 1st Dominant	*Michelia oblonga* 2nd Dominant	*Symplocos khasiana* 3rd Dominant	Rest of the species	Total	% with respect to total volume
30-40	0.878	1.278	0.502	12.368	15.026	3.100
41-50	0.531	3.298	1.467	25.767	31.063	6.408
51-60	2.147	2.816	1.572	31.928	38.463	7.934
61-70	4.961	5.032	2.33	57.14	69.463	14.329
71-80	8.997	3.930	10.123	71.133	94.183	19.429
81-90	15.077	3.355	14.936	82.291	115.659	23.859
91-100	14.148	2.522	10.291	51.887	78.848	16.265
101-110	1.751	2.337	0	8.956	13.044	2.691
111-120	0	0	1.348	8.221	9.569	1.974
121-130	2.545	0	0	1.528	4.073	0.840
131-140	0	0	0	0	0	0.00
141-150	0	0	0	0	0	0.00
151 & above	10.686	0	0	4.686	15.372	3.171
Total	**61.721**	**24.568**	**42.569**	**355.905**	**484.763**	**100.000**
% wrt Total volume	**12.732**	**5.068**	**8.781**	**73.418**	**100.000**	

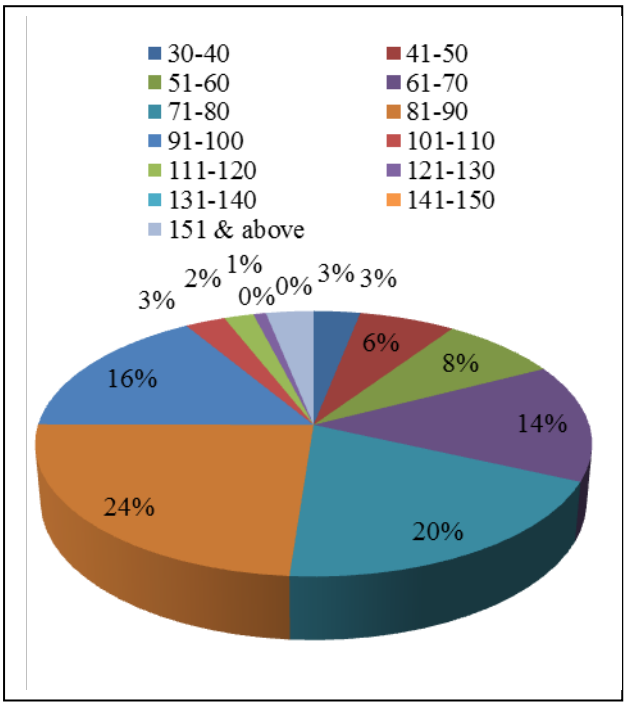


Figure 9.2: Girth class wise with respect to Total Volume Volume

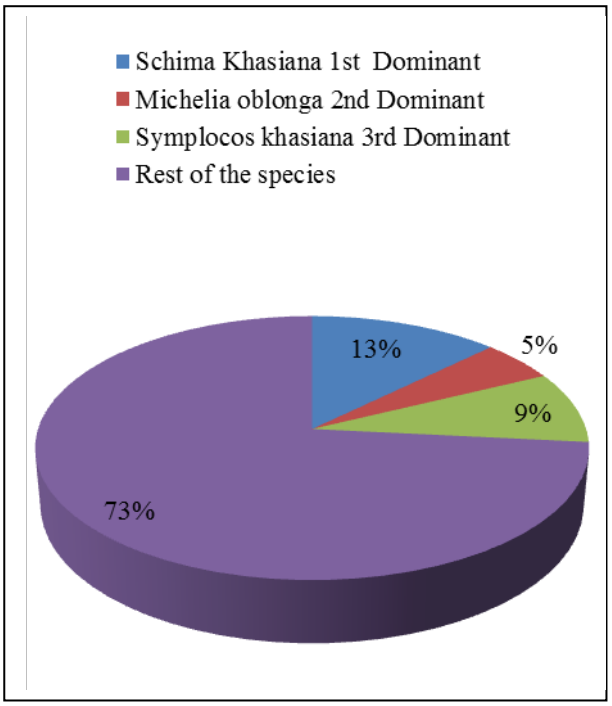


Figure 9.2(a): Specieswise with respect to Total

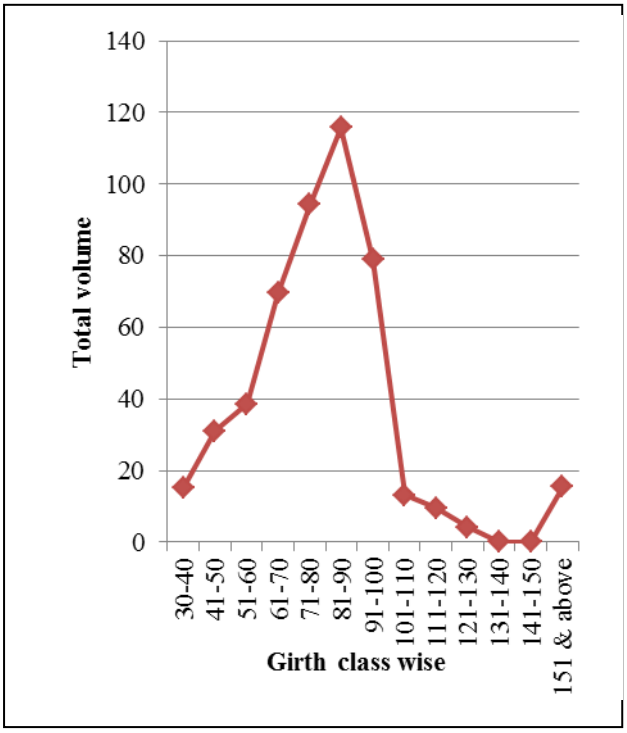


Figure 9.1: Girth class wise with respect to total volume

Table 9.1 shows that the volume contributed by the 1st dominant species (*Schima khasiana*) with respect to the total volume of the grove 12.73%, the 2nd dominant species *(Michelia oblonga*) is 5.07%, 3rd dominant species (*Symplocus khasiana*) is 8.78%, while Rest of the species is maximum i.e 73.42%. Total volume of the grove is 484.763 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class also increases i.e. girth class is directly proportional to the volume in that class.

9.9 Brief Note on Management of Law Lyngdoh Nonglyngkien:

(i) Protection from Biotic Interference:-

The villagers of Nonglyngkien village never enter freely in this grove for fear of punishment by the Basa. There is no report of illegal felling of timber but poaching of wild animals cannot be ruled out completely. Grazing was also found to be absent in this grove. In order to protect this rich natural forest resources, it is highly suggested that this grove may be declared as a Community Reserve so that the Department in collaboration with the villagers/clan can frames some rules and policy to prevent any damages to this grove in near future.

(ii) Fire incidence:-

During interaction with the Lyngdoh who is controlling this grove, there is no report of fire incidence in the past. But in order to avoid such incidence in the days to come, it is suggested that external fire line may be created in this grove every year before the onset of dry season.

(iii) Water stress:-

Khap pukri stream is the only stream that serves as drinking water to wild animals and as a source of water to many agricultural lands around the grove. If check dams can be created in the two dry nalas this will help to harvest rain water and this will also help to increase moisture content of the soil and will also acts as a barrier to stop the spread of fire inside the grove.

(iv) Marking of proper natural boundary:-

Proper boundary marking will help to check encroachment in the near future due to human populations explosion and developmental activities. This can be done either by fixing cement pillar along the boundary or by earth's digging of ′2x 2′ all along the boundary except in the area where Khap pukri stream flow along the boundary of the grove.

(v) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

10 - NONGSYNRIEH

10.1 Introduction/Location:

Nongsynrieh Sacred grove is situated in South West Khasi Hills District at Nonglang village under the Syiemship of Hima Maharam. It has an area of 9.83 ha and lies between 25° 2510" N to 25° 25′ 25" N latitude and 91° 26 50" E to 91° 27′ 10" E longitude with an altitude of 1542 m from Mean Sea Level (MSL). It is bounded in the North by Umkynjariver, in the South by footpath, in the East by Land of Nonglang Nongsynrieh clan and in the West by Lawthiepreh nullah and paddy field. The grove is accessible by road from Shillong via Weiloi-Mawkyrwat road. It is about 89km from Shillong.

10.2 Brief History:

As stated by the elders this Sacred grove have originated many years ago. In the past, rituals are performed every year by sacrificing of animals to please the Basa who in turn protect the clan from famine and natural disaster but now rituals are no longer performed in this Sacred grove long way back. Felling of trees is strictly prohibited. It is owned and controlled by the Nongsynrieh clan. The State Forest Department has no direct control of the said grove, rather it falls under the jurisdiction of the KHADC.

10.3 Geography and climate:

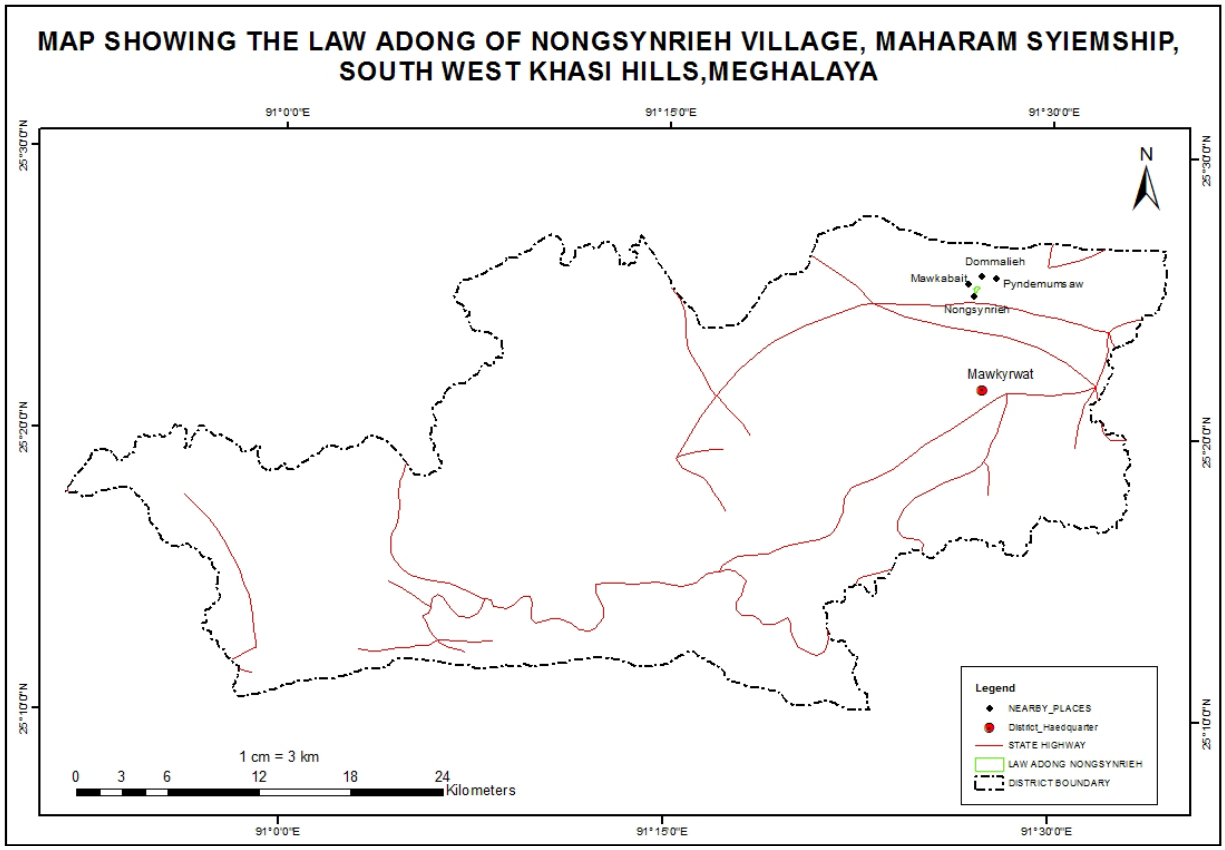
The topography of the grove is slightly gentle in nature with slope varying from 4° to 15°. The soil texture is clayey loam with boulders with slightly compact in consistency. The colour of the soil is brown with high soil dept. soil erosion is negligible. There is only one river that flows along the boundary in the Northern side of the grove i.e. Umkynja river.

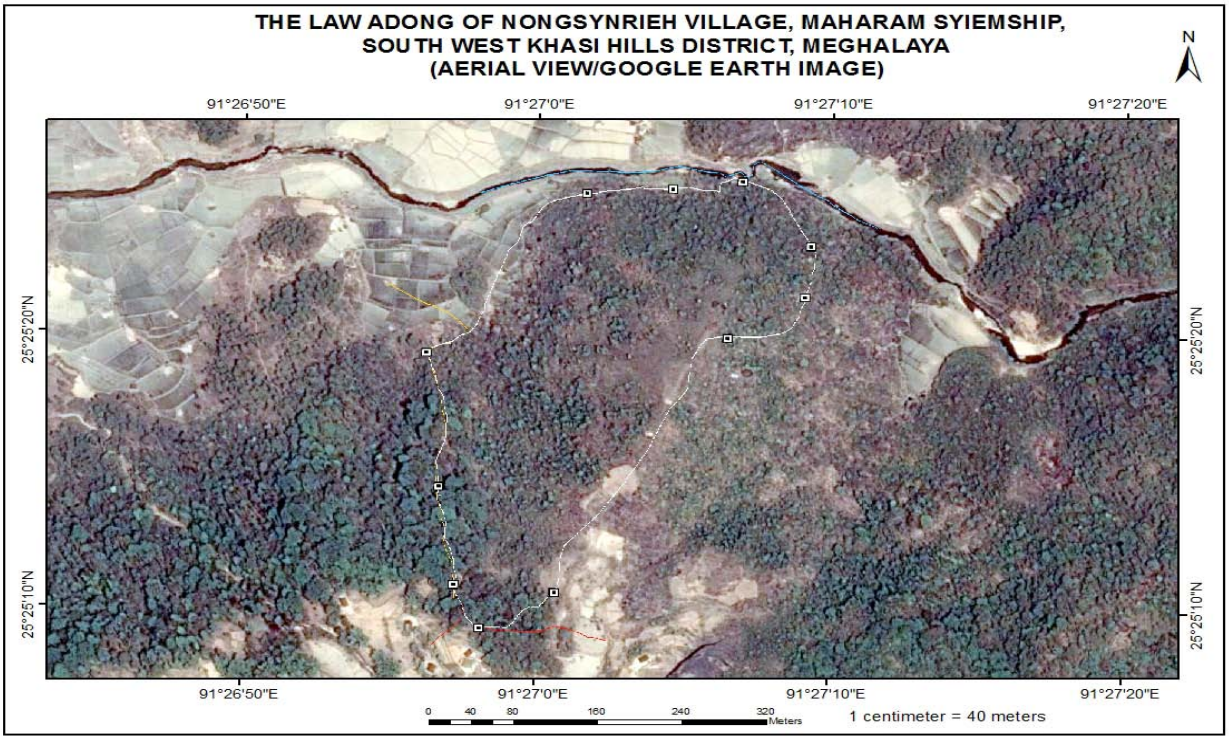
The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 5°C and maximum is 26°C. Biotic pressure, encroachment , wildfire, hunting and poaching, grazing and illegal felling of timber were found to be absent in this grove.

10.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

Location Map of Nongsynrieh Sacred Grove





10.5 Flora and fauna:

The vegetation is of mixed species. Dominant species found are *Schima khasiana* and *Symplocus khasiana*, origin of the forest is natural and it is two storeyed forests. Wildlife here *are jackal, rabbit, wild pig, jungle fowls, pangolin*. Various types of birds and reptiles. Conservation significance of the grove is mainly due to:

(a) The virgin forests where human interference is almost zero.

(b) High level endemic plant and animal species.

(c) Existence of many rare endangered plant species.

(d) Conservation of flora and fauna and maintaining of rich forest natural resources.

10.6 Floral species:-

List of Trees found in Nongsynrieh Sacred Grove, West Khasi Hills District

Sl No.	Botanical Name	Local Name	Sl No.	Botanical Name	Local Name
1	*Albizia lucidior*	Dieng ri	22	*Irithina indica*	Dieng song
2	*Aralia armata*	Dieng latymphu	23	*Itea chinensis*	Dieng sohsyrtet
3	*Artocarpus locucha*	Dieng sohrynted	24	*Ligustrum robustos*	Dieng syiang
4	*Bauhinia prospheria*	Dieng tyrlong	25	*Macaranga denticulate*	Dieng lakhar
5	*Bauhinia variegate*	Dieng long	26	*Michelia oblonga*	Dieng laniar (iong)
6	*Camelia caduca*	Dieng tyrnem	27	*Myrica indica*	Dieng sohphie
7	*Castanopis indica*	Dieng sohot	28	*Pajamelia khaedii*	Dieng tanglung
8	*Castanopis spp*	Dieng sning	29	*Pantapanox racemasmum*	Dieng tyllang rangsei
9	*Ceasearia varieca*	Dieng rang	30	*Parkia roxburghii*	Dieng jariat
10	*Cinnamomum cesicodahne*	Dieng pingwait	31	*Pithecellobium heterophylum*	Dieng iapiar
11	*Docynia indica*	Dieng sohphoh khlaw	32	*Pyrus khasian*	Dieng sohjhur
12	*Elaeocarpus robustus*	Dieng sohkhyllam	33	*Quercus dealbata*	Dieng sai
13	*Eurya accuminata*	Dieng shit	34	*Rhododendron arborium*	Dieng tiewrilang
14	*Ficcus Elastica indica*	Dieng jri	35	*Rhus chinensis*	Dieng sohma
15	*Ficos globarata*	Dieng sohpian	36	*Rhus succedana*	Dieng kain
16	*Fotina integrefolia*	Dieng snam maw	37	*Ilex griffithii*	Dieng sohkhaw krai
17	*Grewia abutilifolia*	Dieng sohme blang	38	*Symplocos chinensis*	Dieng iong
18	*Ilex venulosa*	Dieng shyieng	39	*Symplocos khasiana*	Dieng pe
19	*Schima khasiana*	Dieng ngan	40	*Taxus bacata*	Dieng sohblei
20	*Shesleria wallichina*	Dieng langrop	41	*Viburnum carilifolium*	Dieng sohlang ksew
21	*Inuala cappa*	Dieng lalieh			

List of shrubs, herbs, climbers, grass, bamboo & orchids found in Nongsynrieh Sacred Grove, South West Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.		*Boehmeria nivea*	Urticaceae
2.	Kait khlaw	*Musa accuminata*	Musaceae
3.		*Garcinia accuminatum*	Clusiaceae

4.	Tiew jyrsieh maw	*Polygonum glabrum*	Polygonaceae
5.		*Malva verticullata*	Malvaceae
6.	Sohlamut	*Agapetes variegata*	Vaccinaceae
7.	Dieng shit (rit)	*Murrya khasiana*	Theaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Sla jajew	*Begonia roxborghii (m)*	Begoniceae
2.	Tiew sying maw	*Zingiber spicatum*	Zingiberaceae
3.	Shiah sohprew	*Rubusellipticus*	Rosaceae
4.	Teinthap or synrem	*Artemisiacina*	Asteraceae
5.	Tiew sying maw	*Vaccinium khasiana*	Vaccinaceae
6.	Batnebru	*Centela asiatica*	Apiaceae
7.	Sohkrot	*Smilax glaucens*	Smilaceae
8.	Tyrkhang	*Cyatheagigantea*	Cyatheaceae
9.	Jamyrdoh	*Houttuynia cordatta*	Saururaceae
10.	Sohrishan	*Duchesnea indica*	Rosaceae
11.	Tiew jasat	*Polyganum hydropiper*	Polygonaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.		*Aschinanthus superba*	Orchidaceae
2.	Sohmrit khlaw	*Piper nigrum*	Peraceae
3.	Jyrmi khlaw	*Mucuna macrocarsa*	Leguminaceae
4.	Jyrmi khlaw	*Emtada parsaetha*	Leguminaceae
5.		*Embelia ribes*	Myrsinaceae
6.		*Hoya lobii*	Asclepiadaceae
7.		*Hoya parasitica*	Asclepiadaceae
8.	Jyrmi shiah	*Xanthuzylum khasiana*	Rutaceae
9.	Sohbyrthit khasi	*Trium felta rhomboida*	Molvaceae
10.	Soh nepbah	*Rubus ellipticus*	Rotaceae

GRASS

Sl No.	Local Name	Botanical Name	Family
1.		*Cyperus difformis*	Cyperaceae
2.	Lang traw	*Imperatus cylindrica*	Poaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Siej namlang	*Chimona bambusa khasiana*	Poaceae

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Orchid	*Melastoma nepalensis*	Melastomaceae
2.	Orchid	*Alangium chinensis*	Alangiaceae
3.	Orchid	*Floscopa scandens*	Commelinaceae
4.	Tiew jyrsieh maw	*Polygonum capitatum*	Polyganoceae
5.	Orchid	*Micropera rostrata*	Orchidaceae

10.7 Number of Stems:

Number of stems in each girth class and species wise are given in table 10.1. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40cm to 81-90cm classes.

Table - 10.1

Girth class wise and Species wise No. of stems in the entire grove (Area 9.83 ha)

Girth class wise	*Schima Khasiana* 1st dominant	*Symplocos Khasiana* 2nd dominant	Rest of the species	Total stems
30-40	14	20	246	**280**
41-50	16	16	155	**187**
51-60	15	13	140	**168**
61-70	17	12	131	**160**
71-80	20	12	99	**131**
81-90	19	16	72	**107**
91-100	17		39	**56**
101-110	14		18	**32**
111-120	10		25	**35**
121-130	2	1	17	**20**
131-140	1		3	**4**
141-150	1		6	**7**
151 & above	13		41	**54**
Total	**159**	**90**	**992**	**1241**

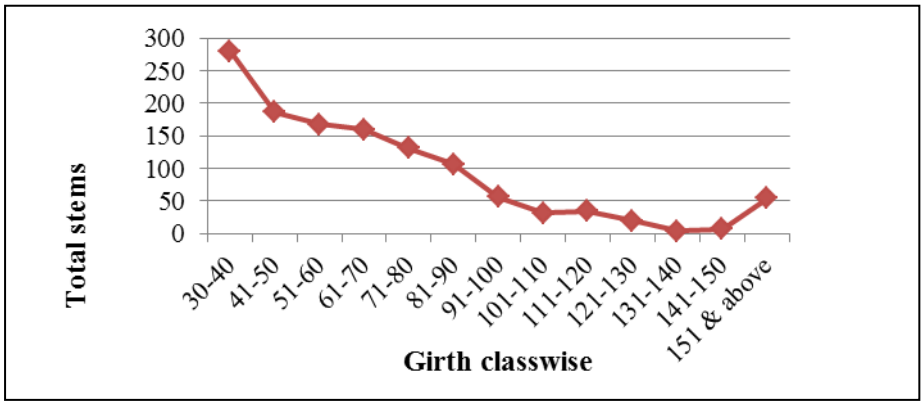


Figure 10.1: Girth class wise with respect to total stem.

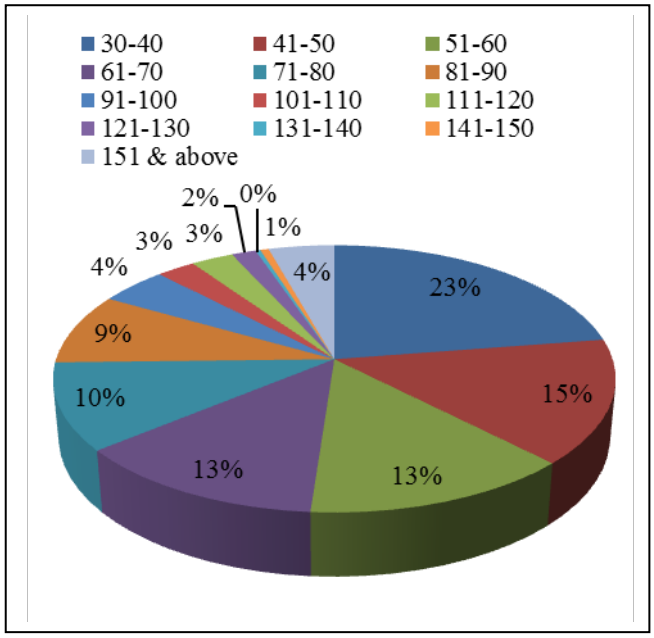


Figure 10.1: Girth class wise with respect to Total stems stems

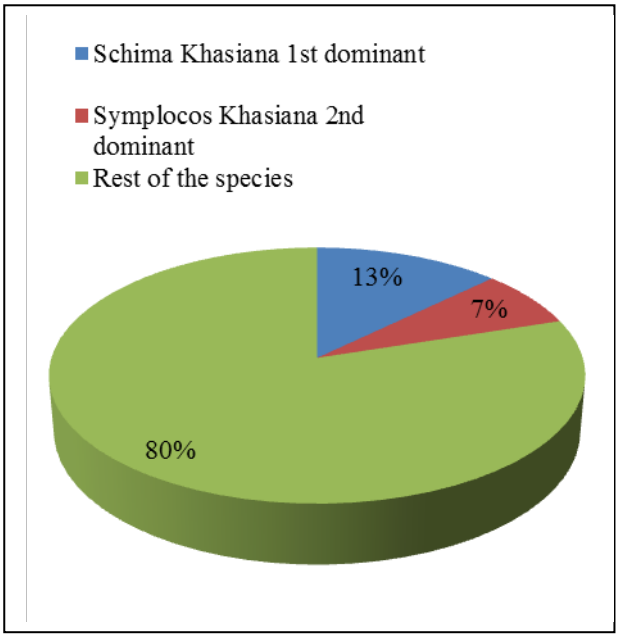


Figure 10.1(a): Species wise with respect to Total

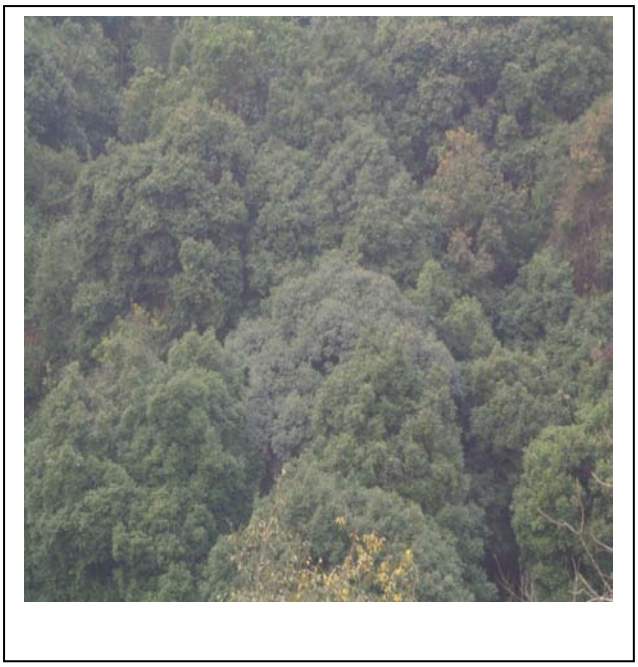


Figure 10 (a): Showing dense forest cover of Nongsynrieh Sacred Grove

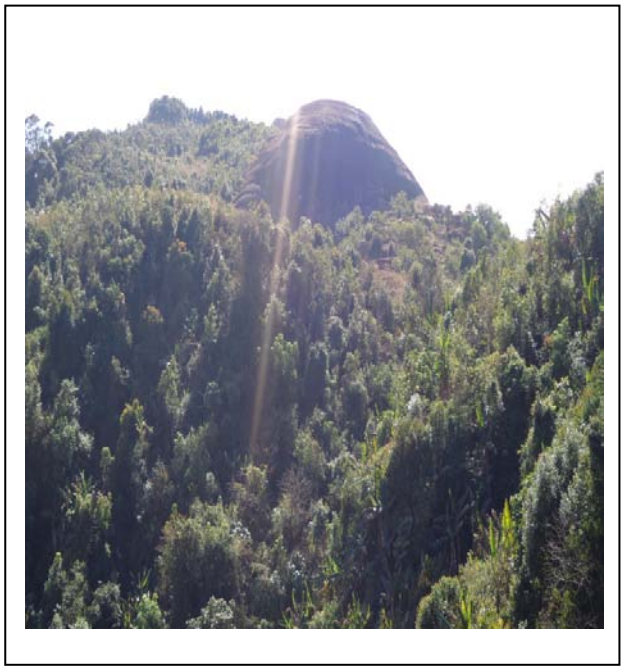


Figure 10 (b): Over view of Nongsynrieh Sacred Grove

10.8 Growing Stock:

As per the methodology described in Chapter-I, 100% enumeration is carried out in the grove as its area is less than 10ha.. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 1241 tree species consisting of 159 *Schima khasiana* (1st dominant), 90 *Symplocus khasiana.* (2nd dominant), and 992 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151cm and above. The results are given in table 10.2 for Nongsynrieh sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 792.184 cubic metres.

Table - 10.2
Girth classwise & species wise volume in the sampled area (Area = 9.83 ha)
(volume in cu.m)

Girth class wise	*Schima Khasiana* 1st dominant	*Symplocos Khasiana* 2nd dominant	Rest of the species	Total	% with respect to total volume
30-40	1.367	1.044	12.734	**15.145**	1.912
41-50	2.552	2.247	21.348	**26.147**	3.301
51-60	3.676	2.972	35.781	**42.429**	5.356
61-70	5.551	4.549	50.570	**60.670**	7.659
71-80	8.810	6.202	52.155	**67.167**	8.479
81-90	10.504	11.073	50.716	**72.293**	9.126
91-100	12.052		34.253	**46.305**	5.845
101-110	12.671		20.572	**33.243**	4.196
111-120	11.064		34.002	**45.066**	5.689
121-130	2.503	1.608	28.048	**32.159**	4.060
131-140	1.586		5.437	**7.023**	0.887
141-150	1.703		14.107	**15.810**	1.996
151 & above	111.864		216.863	**328.727**	41.496
Total	**185.903**	**29.695**	**576.586**	**792.184**	**100.000**
% wrt total volume	**23.467**	**3.748**	**72.784**	**100.000**	

Table 10.2 shows that the volume contributed by the 1st dominant species (*Schima khasiana*) with respect to the total volume of the grove 23.467%, the 2nd dominant species *Symplocus khasiana.*) is 3.748% , while Rest of the species is maximum i.e. 72.784%. Total volume of the grove is 792.184 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class also increases i.e. girth class is directly proportional to the volume in that class.

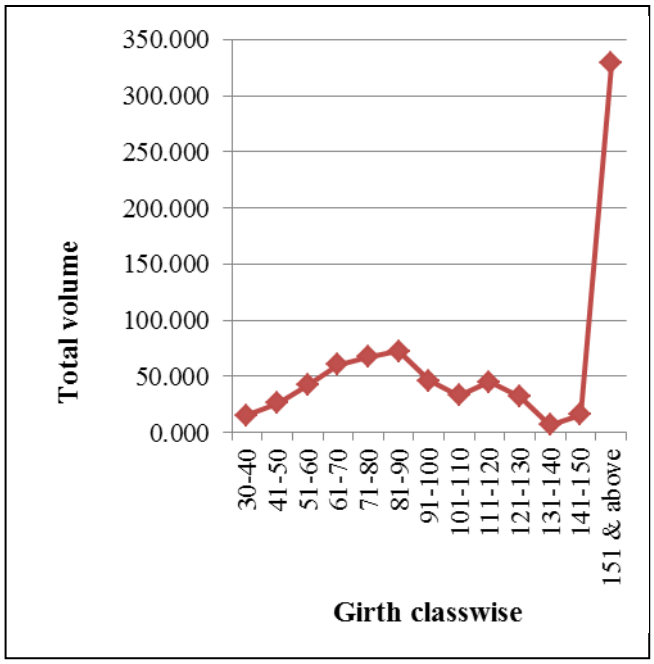


Figure 10.2: Girth class wise with respect to total volume

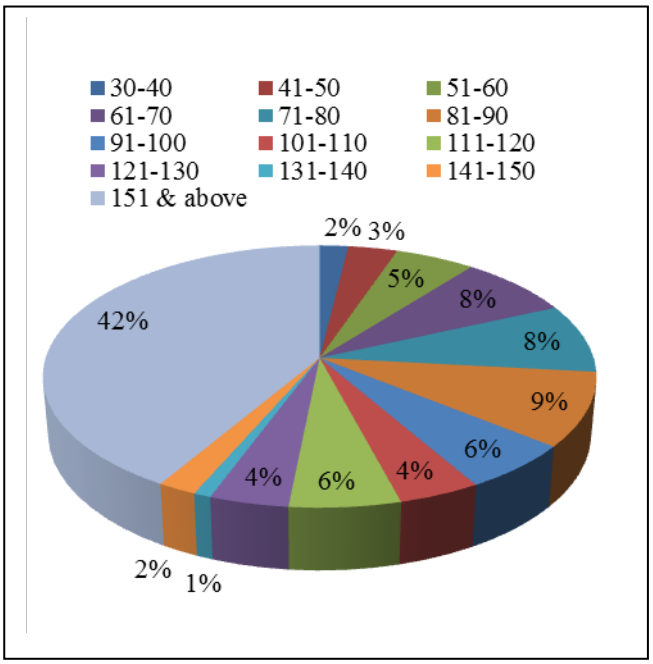


Figure 10.2: Girth class wise with respect to Total volume volume

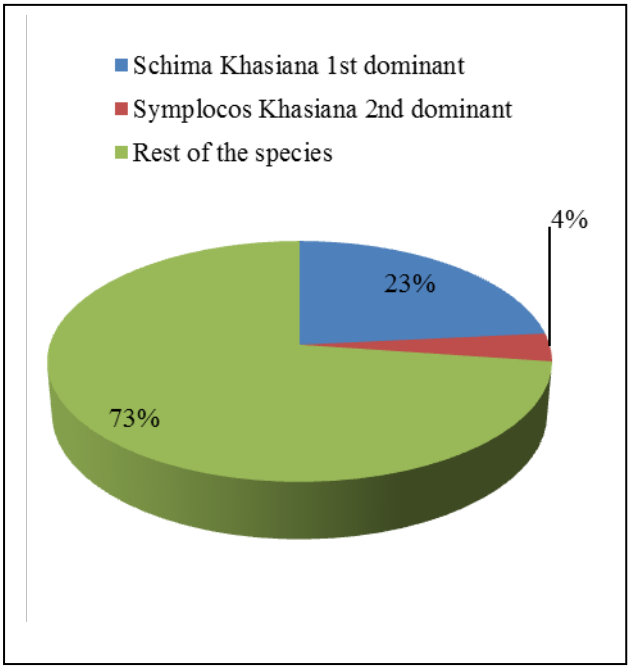


Figure 10.2(a): Specieswise with respect to Total

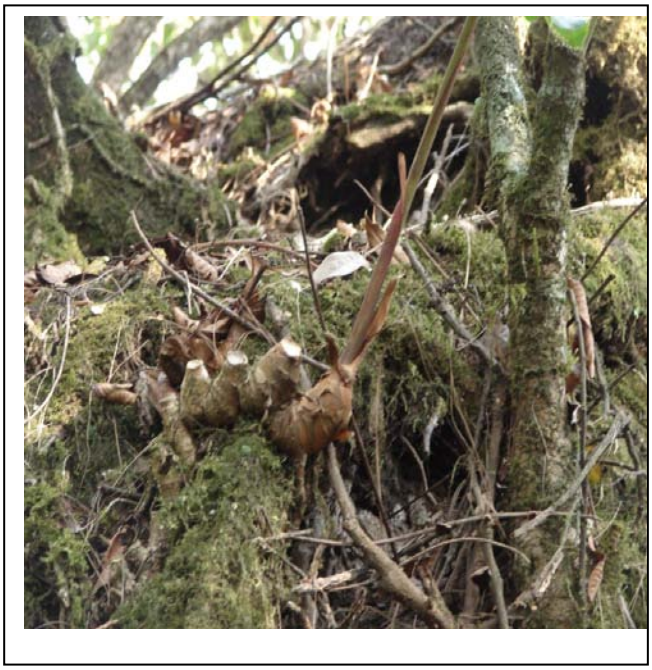


Figure 10 (c): Inside view of Nongsynrieh Sacred Grove

10.9 Brief Note on Management of Law Adong Nongsynrieh:

(i) Protection from Biotic Interference:-

This grove is left wide open, it is very difficult to prevent biotic interference especially man himself. Though there is no report of illegal felling of timber, encroachment, poaching or grazing but with the changes of the mindset of the people towards this Sacred grove, there is chances that this grove may face biotic interference in the near future. To avoid such damages, it is suggested that this grove may also be categorized as Community Reserve.

(ii) Fire incidence:-

Fire is the main enemy of flora and fauna in every sacred grove. Although there is no fire incidence reported in the past but it cannot be ruled out in the years to come. In order to avoid such incidences, it is highly suggested that external fire line may be cleared every year with a financial assistance to the owner especially before the onset of dry season.

(iii) Water stress:-

There is one river, Umlynga rive which flows in the northern part of the grove and Lawthiep rem nala in the western side of the grove. For the benefit of both flora and fauna, check dams may be created to tap rain water in the dry season.

(iv) Creation of permanent boundary:-

This can be carried out by fixing RCC pillar or by earth's digging of 2'x2' size all along the boundary except in the northern side and part of the western area where natural river/nala run along the boundary of the grove.

(v) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

11 - BRI RAIJ BHOIRYMBONG

11.1 Introduction/Location:

Briraij Bhoirymbong is situated in Ribhoi District of Meghalaya at Bhoirymbong under the Syiemship of Hima Mylliem. This Sacred grove covers an area 10.13 ha and lies between 92° 0′ 28" E, and 92° 0′ 42" E longitude and 25° 42′ 52" N, and 25° 43′ 6" N latitude with an altitude of 903m from main sea level. It is bounded to the North by Umlamashi stream, to the South by private land of Kong Rian, to the East it is bounded by private land of H. Lyngdoh and B. Mawthoh and towards the East by an approach road to Mynsai village. It is accessible by road from Shillong via Shillong Bye Pass and then towards the left after reaching Mynsain junction road. It is about 31km from Shillong.

11.2 Brief History:

This grove originated many years ago. Offerings and prayers have been ceased long way back since the inception of Christianity. But the villagers still preserve this Sacred grove for the sake of the environment and to help the family of the villager to reconstruct their house by donating some trees if any natural calamity happen to a particular family. It is ownedby the village community and controlled by the Headman elected by the villagers.The State Forest Department has no direct control of the said grove rather it falls under the jurisdiction of the KHADC.

11.3 Geography and Climate:

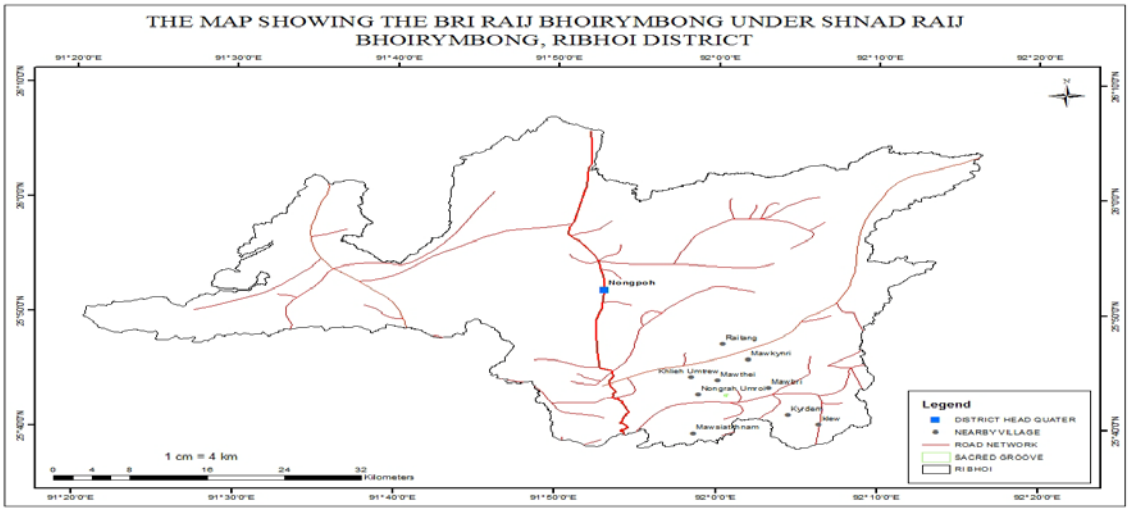
Topography of the grove is gently rolling in nature with slope varying from 4° to 10°.The soil texture is loamy with no coarse fragment and slightly compact consistency. The colour of the soil is brown with high soil depth.There is no soil erosion in the grove area. There is only one perennial stream flowing along the boundary of this grove. It is the only source of water which feeds many agricultural lands around the grove.

The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 10°C and maximum is 32°C. Biotic pressure, encroachment, wild fire, hunting & poaching, grazing and the activities of illegal timber were found to be absent in the grove.

11.4 Forest Type:

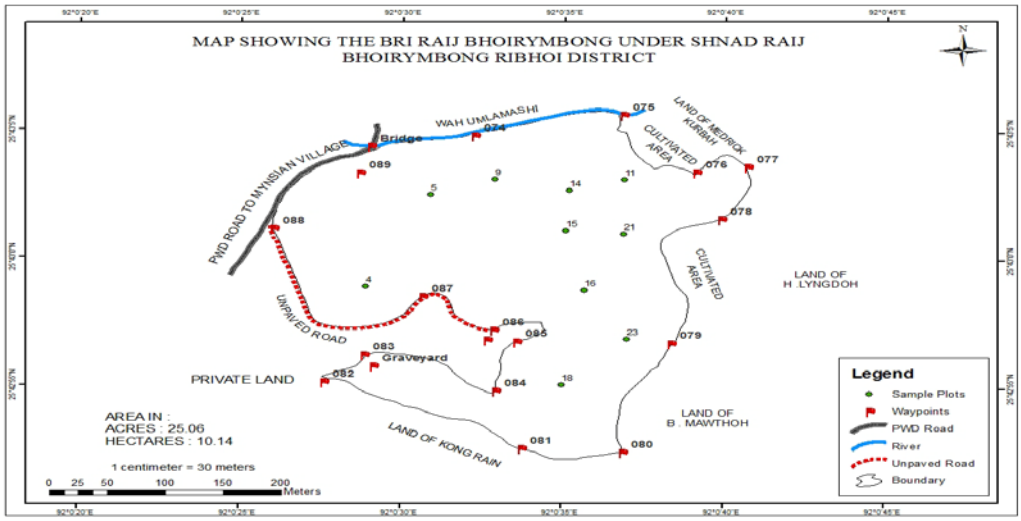
According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

Location map of Bri Raij Bhoirymbong Sacred Grove





Map showing sample plots of Bri Raij Bhoirymbong



11.5 Flora and Fauna:

Pine plantation has been carried out by Social Forestry Division, Nongpoh for about 20-25 years back. In the plantation area only Khasi pine (*Pinus Khasiana*) exists. Main dominant species in the mixed forest is *Schima khasiana, Quercus sps*., Rhus succedanea. The relic Forest is natural in mixed species area and manmade in the plantation area. The forest is of two layer storey. Conservation significance of the grove is mainly due to

(a) Existence of many rare endangered plant species.

(b) Conservation of flora and fauna and maintaining of rich forest natural resources.

11.6 Floral species:

List of Trees found in Bri Raij Bhoirymbong Sacred Grove

Sl.No.	Botanical Name	Local Name	Sl.No.	Botanical Name	Local Name
1	*Albizzia stipulata*	Dieng phyllut	10	*Myrica nagi*	Dieng sohlwa
2	*Carya arborca*	Dieng Slabiri	11	*Pinus khasiana*	Dieng kseh
3	*Castanopsis indica*	Dieng sohot	12	*Quercus dealbata*	Dieng sai
4	*Engelhardia spicata*	Dieng lymba	13	*Quercus sps*	Dieng rting
5	*Erythrina indica*	Dieng song	14	*Rhus Succedena*	Dieng kain
6	*Eurya acuminata*	Dieng pyrsit	15	*Schima khasiana*	Dieng ngan
7	*Gmelina arborea*	Dieng laphiang	16	*Spondias axillaries*	Dieng soh lait
8	*Ilex excelsa*	Dieng sohsyrtet	17	*Symplocos chinensis*	Dieng iong
9	*Litsaea polyantha*	Dieng jalwan	18	*Toona celiata*	Dieng sali

List of species found in Bri Raij Bhoirymbong, Sacred Grove, Ri Bhoi.

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng jakba	*Eurrya japonica*	Theaceae
2.	Dieng sohma	*Rhus semi-alata*	Anacardiaceae
3.	Dieng sohkynbat	*Leea asiatica*	Leeaceae
4.	Kaitkhlaw	*Musa accuminata*	Musaceae
5.	Dieng sohkhristmas	*Chlorenthus brachystachis*	Rubiaceae
6.		*Lindira calicifolia*	Lauraceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Lantana shiah	*Lantana camera*	Verbanaceae
2.		*Ammomum dealbata*	Zingiberaceae
3.		*Chlophytum tubarosum*	Asparagaceae
4.		*Orbekia crinata*	Melostomaceae

5.		*Aimslia spinosa*	Asteraceae
6.		*Bidens spilosa*	Asteraceae
7.	Shyrmit khlaw	*Curcuma aromatica*	Zingiberaceae
8.	Kynbat shaba	*Brunela vulgaris*	Asteraceae
9.	Lashein	*Curcumalonga*	Zingiberaceae
10.	Teinthap	*Artemisia nilagirica*	Asteraceae
11.	Sohbyrthit	*Triumfetha rhomboidea*	
12.	Sying khlaw	*Zingirber purpurum*	Zingiberaceae
13.	Lantana iong	*Eupatorium odenoflorum*	Asteraceae
14.	Jawieh bsein	*Arisaema causanguineum*	Araceae
15.	Jalynthem	*Polygonum chinense*	Polygonaceae
16.	Tmain khla	*Lycopodium clavatium*	Lycopodalis
17.	Wang khlaw	*Colocasia esculante*	Araceae
18.	Sohbyrthit	*Urena lobata*	Malvaceae

GRASS

Sl No.	Local Name	Botanical Name	Family
1.		*Inola cappa*	Asteraceae
2.		*Saccrium crysanthamum*	Poaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.		*Rubus ellipticus*	Rosaceae
2.	Bat refugee	*Mokhania micrantha*	Asteraceae
3.	Sohkrot	*Smilax elliptius*	
4.	Sohnep bah	*Rubus moluccamus*	Rosaceae
5.	Jyrmi kynsew	*Argyreia nervosa*	Convolvulaceae

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.		*Bulbophyllum ophyllum*	Orchidiaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Siej khlaw	*Bambusa khasiana*	Bambusaceae

11.7 Number of Stems:

Number of stems in each girth class and specieswise are given in table 11.1 & 11.2. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40 to 101-110 cm classes.

Table-11.1
Girth class-wise and Species-wise no. of stems in the sampled area (10 plots – 2ha)

Girth Class Vise	*Pinus khasiana*	*Quercus spp* 1st Dominant	*Schima Khasiana* 2nd Dominant	Rest of the species	Total Stems
30-40	0	59	12	23	**94**
41-50	6	11	17	20	**54**
51-60	32	5	19	15	**71**
61-70	53	3	19	5	**80**
71-80	62	1	11	4	**78**
81-90	87	2	10	5	**104**
91-100	107	7	3	2	**119**
101-110	96	3	1	4	**104**
111-120	43	2	1	0	**46**
121-130	24	0	0	2	**26**
131-140	10	0	0	0	**10**
141-150	4	0	0	0	**4**
151 & above	5	1	0	0	**6**
Total =	**529**	**94**	**93**	**80**	**796**

Table-11.2
Girth class-wise and Species-wise no. of stems in the entire grove (Area 10.13 ha)

Girth Class Vise	*Pinus khasiana*	*Quercus spp* 1st Dominant	*Schima Khasiana* 2nd Dominant	Rest of the species	Total Stems
30-40	0	299	61	116	**476**
41-50	30	56	86	101	**274**
51-60	162	25	96	76	**360**
61-70	268	15	96	25	**405**
71-80	314	5	56	20	**395**
81-90	441	10	51	25	**527**
91-100	542	35	15	10	**603**
101-110	486	15	5	20	**527**
111-120	218	10	5	0	**233**
121-130	122	0	0	10	**132**
131-140	51	0	0	0	**51**
141-150	20	0	0	0	**20**
151 & above	25	5	0	0	**30**
Total =	**2679**	**476**	**471**	**405**	**4032**

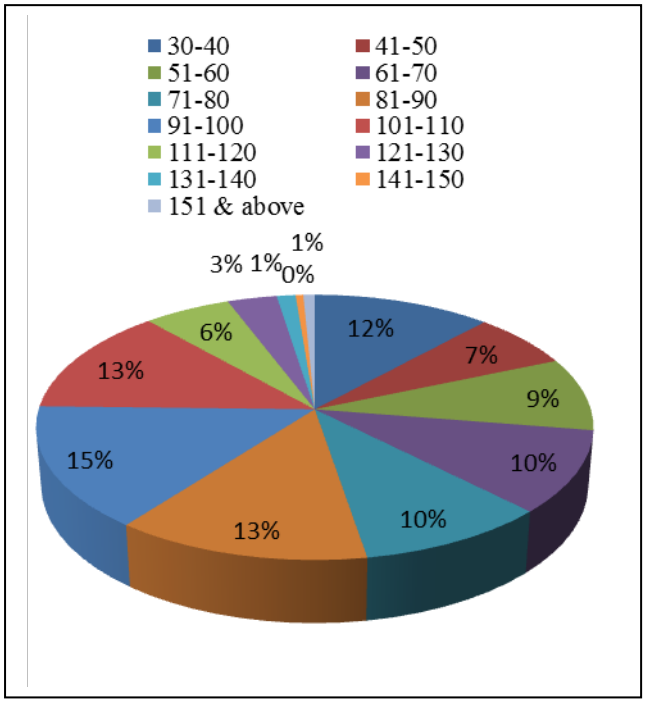


Figure 11.1 Girth class wise with respect to total stem

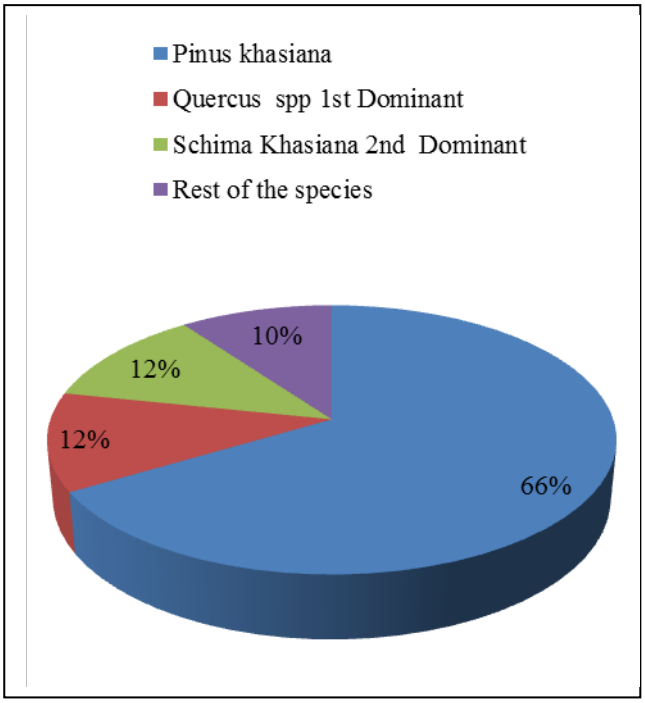


Figure 11.1(a): Species wise with respect to Total Stem

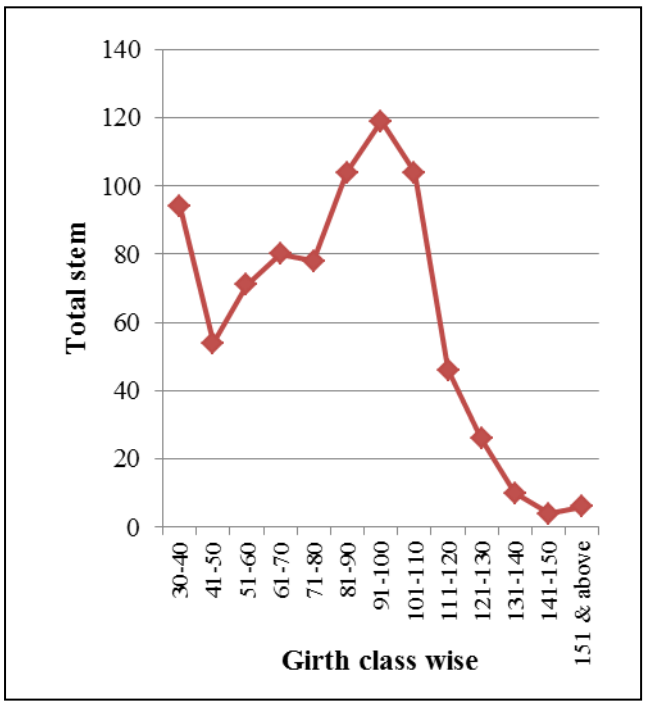


Figure 11.1: Girth class wise with respect to total stems.



Figure 11 (a): Field exercise on estimation of Growing stock by Shri D.S. Bist in Bri Raij Bhoirymbong

11.8 Growing Stock:

As per the methodology described in Chapter-I, 20% enumeration is carried out in the grove as its area is more than 10 ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within 10 plots of 0.2 size i.e 2 ha, data was collected for 796 tree species consisting of 94 *Quercus sps*. (1st dominant) 93 *Schima khasiana* (2nd dominant), 529 *Pinus khasiana* and 80 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151cm and above. The results are given in table 11.3 & 11.4 for Bri raj Bhoirymbong sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 2305.365 cubic metres.

Table - 11.3

Specieswise girth class wise volume in the sampled area (10 plots - 2 ha)

(volume in cu.m)

Girth Class Vise	*Pinus khasiana*	*Quercus spp* 1st Dominant	*Schima Khasiana* 2nd Dominant	Rest of the species	Total
30-40	–	1.180	1.026	1.118	**3.324**
41-50	0.677	0.581	2.778	2.886	**6.922**
51-60	6.004	0.565	4.460	3.650	**14.679**
61-70	14.962	0.669	6.228	2.040	**23.899**
71-80	24.981	0.334	5.141	2.033	**32.489**
81-90	49.253	0.821	5.791	3.391	**59.256**
91-100	79.028	3.940	2.194	1.914	**87.076**
101-110	89.680	1.937	0.850	4.606	**97.073**
111-120	50.456	1.908	1.141	0	**53.505**
121-130	33.663	0	0	3.550	**37.213**
131-140	16.791	0	0	0	**16.791**
141-150	7.381	0	0	0	**7.381**
151 & above	13.453	2.095	0	0	**15.548**
Total =	**386.329**	**14.030**	**29.609**	**25.188**	**455.156**

Table - 11.4

Specieswise girth class wise volume in the entire grove (Area -10.13 ha)

(volume in cu.m)

Girth Class Vise	*Pinus khasiana*	*Quercus spp* 1st Dominant	*Schima Khasiana* 2nd Dominant	Rest of the species	Total	% wrt total volume
30-40	0.00	5.98	5.20	5.66	**16.84**	**0.73**
41-50	3.43	2.94	14.07	14.62	**35.06**	**1.52**
51-60	30.41	2.86	22.59	18.49	**74.35**	**3.23**
61-70	75.78	3.39	31.54	10.33	**121.05**	**5.25**
71-80	126.53	1.69	26.04	10.30	**164.56**	**7.14**
81-90	249.47	4.16	29.33	17.18	**300.13**	**13.02**
91-100	400.28	19.96	11.11	9.69	**441.04**	**19.13**
101-110	454.23	9.81	4.31	23.33	**491.67**	**21.33**
111-120	255.56	9.66	5.78	0.00	**271.00**	**11.76**
121-130	170.50	0.00	0.00	17.98	**188.48**	**8.18**
131-140	85.05	0.00	0.00	0.00	**85.05**	**3.69**
141-150	37.38	0.00	0.00	0.00	**37.38**	**1.62**
151 & above	68.14	10.61	0.00	0.00	**78.75**	**3.42**
Total =	1956.76	71.06	149.97	127.58	**2305.37**	**100.00**
% wrt total volume	**84.88**	**3.08**	**6.51**	**5.53**	**100.00**	

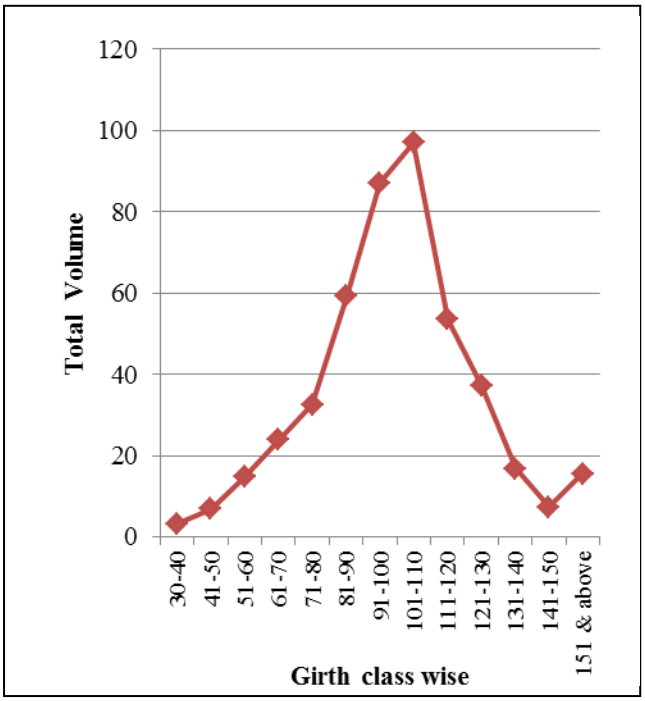


Figure 11.3: Girth class wise with respect to total volume

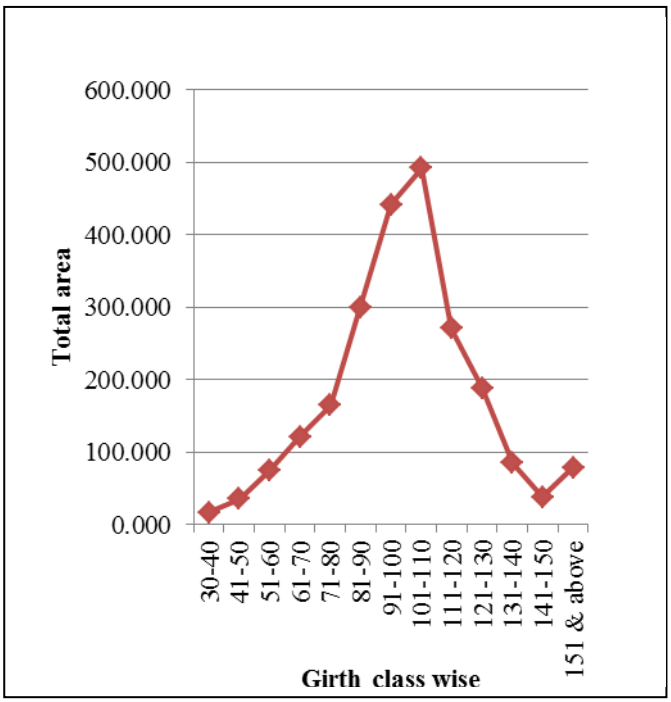


Figure 11.4: Girth class wise with respect to total area.

Table 11.4 shows that the volume contributed by the 1st dominant species (*Quercus sps*)with respect to the total volume of the grove 3.08% , the 2nd dominant species(*Schima khasiana)* is 6.51% , while Rest of the species is 5.53% while Pine is maximum i.e 84.88%. Total volume of the grove is 2305.365 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class also increases i.e. girth class is directly proportional to the volume in that class.

11.9 Brief Note on Management of Bri Raij Bhoirymbong:

(i) Protection from Biotic Interference:-

The villagers and the headman of Bhoirymbong village though imposed restriction on felling of timber in any forms but as the area is left open without any protection, villagers from nearby village illegally cut some trees for construction purposes but not for smuggling. Poaching and grazing cannot be ruled out in this grove. But till date there is no evidence of encroachment. It is learnt that some portion of this grove will be donated for the sake of development. The only way to stop biotic pressure on this grove, is only by declaring it as a Community Reserve.

(ii) Fire control:-

Fire incidence did occur only in the pine zone area as it is evident during field works. The PWD road approaching Mynsain village passes through the boundary of this grove, hence posing great danger to the grove especially during dry season. Fire line can be cleared all along the boundary to reduce/prevent spread of fire.

(iii) Water stress:-

There is only one small stream, Wah Umlamashi in the northern part of the grove. If check dams can be created in this stream this will help to impound water for both flora and fauna species and also help to increase moisture content of the soil whcih in turn will reduce soil erosion.

(iv) Proper boundary marking:-

To avoid encroachment proper marking of boundary is highly recommended. This can be done by fixing RCC pillars or earth's digging all along the boundary this will also acts as fire line.

(v) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

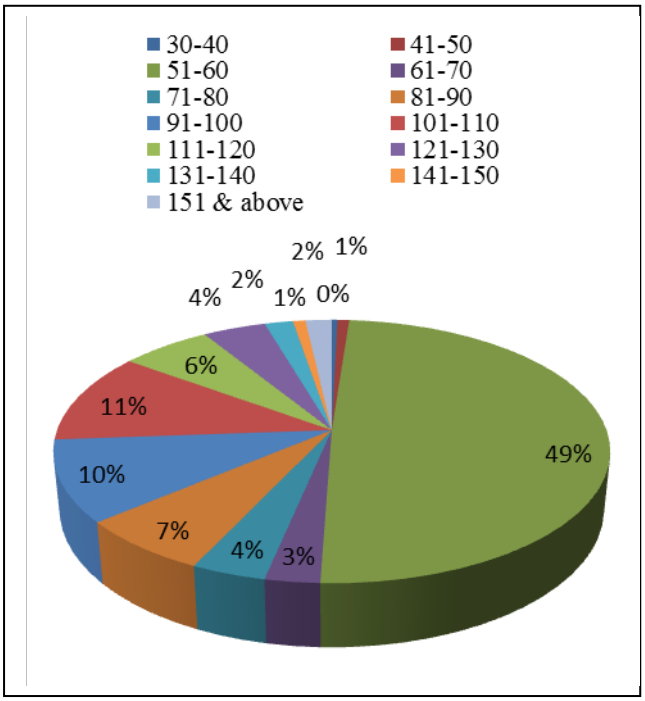


Figure 11.4: Girth class wise with respect to Total Volume

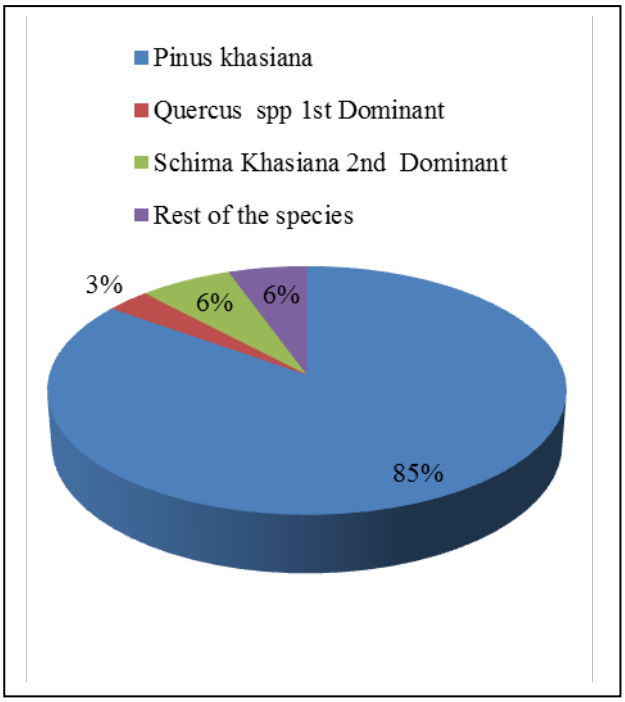


Figure 11.4(a): Specieswise with respect to Total Volume



Figure 11 (b): Over view of Bri Raij Bhoirymbong

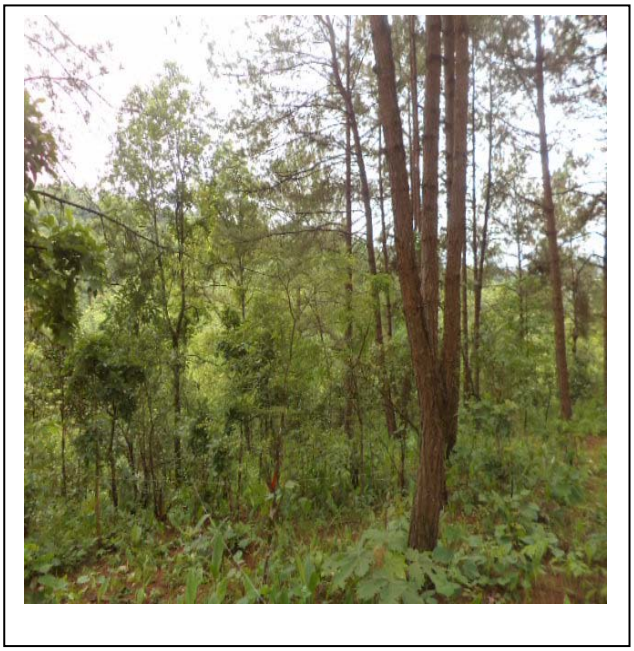


Figure 11 (c): Inside view of Bri Raij Bhoirymbong

12 - LAW LYNGDOH SAW KPOH WANNIANG

12.1 Introduction/Location:

Law lyngdoh Sawkpoh Wanniang is situated in South West Khasi Hills District at Shngi Mawlein village under the Syiemship of Hima Maharam. It has an area of 5.15 ha and lies between 25° 25’ 20” N to 25° 25’ 40” N latitude and 91° 28’ 55” E to 91° 29’ 05” E longitude with an altitude of 1604 m from Mean Sea Level (MSL). It is bounded in the North by paddy field of Mrs. R.Marwein and Mrs. Liora Lyngkhoi, in the South by football ground, in the East by Land a footpath and in the West by Krohbah nullah. The grove is accessible by road from Shillong via Weiloi-Mawkyrwat road. It is about 88km from Shillong.

12.2 Brief History:

As stated by the elders this Sacred grove have originated many years ago. Rituals are no longer performed in this Sacred grove long way back. Felling of trees is strictly prohibited. It is owned and controlled by the Saw kpoh Wanniang clan. The State Forest Department has no direct control of the said grove, rather it falls under the jurisdiction of the KHADC.

12.3 Geography and climate:

The topography of the grove is slightly gentle in nature with slope varying from 4° to 10°. The soil texture is sandy loam with boulders friable in consistency. The colour of the soil is brown with high soil dept. soil erosion is negligible. There is only one unknown stream that flows along the boundary in the Northern side of the grove.

The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 5°C and maximum is 26°C. Biotic pressure, encroachment , wildfire, hunting and poaching, grazing and illegal felling of timber were found to be absent in this grove.

12.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

12.5 Flora and fauna:

The vegetation is of mixed species. Dominant species found are *Schima khasiana* and *Cesearia varieca* and *Pyrus khasiana* origin of the forest is natural and it is two storeyed forests. Wildlife from here are jackal, rabbit, wild pig, jungle fowls, pangolin. Various types of birds and reptiles. Conservation significance of the grove is mainly due to:

(a) The virgin forests where human interference is almost zero.
(b) High level endemic plant and animal species.

(c) Existence of many rare endangered plant species.
(d) Conservation of flora and fauna and maintaining of rich forest natural resources.

12.6 Floral species:

List of Trees found in Lyngdoh Sawkpoh Wanniang Sacred Grove, South West Khasi Hills

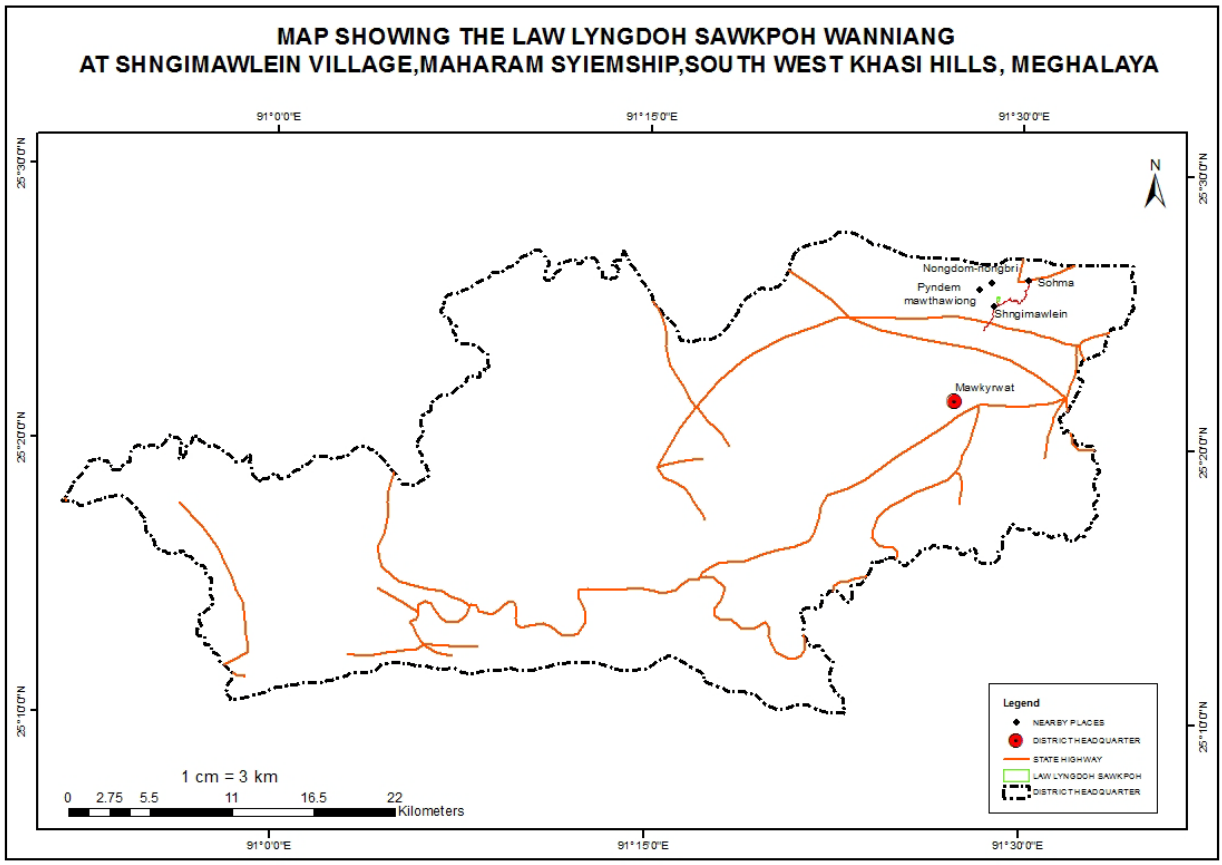
Sl No.	Botanical Name	Local Name	Sl No.	Botanical Name	Local Name
1	*Albizia lucidior*	Dieng ri	17	*Irithina indica*	Dieng song
2	*Aralia armata*	Dieng latymphu	18	*Ligustrum robostos*	Dieng syiang
3	*Bauhinia variegate*	Dieng long	19	*Michelia oblonga*	Dieng laniar
4	*Betula alnoides*	Dieng lieng	20	*Myrica indica*	Dieng sohphie
5	*Camelia caduca*	Dieng tyrnem	21	*Pajanelia kheedii*	Dieng tanglung
6	*Castanopsis armata*	Dieng sning	22	*Pantapanox racemasmum*	Dieng tyllong rangsei
7	*Castanopsis indica*	Dieng sohot	23	*Pithecellboiu heterophylum*	Dieng iap-iar
8	*Cesearia varieca*	Dieng rang	24	*Pyrus khasiana*	Dieng sohjhur
9	*Citrus latipes*	Dieng sohkynphor	25	*Quercus dealbata*	Dieng sai
10	*Elaeocarpus lancefolium*	Dieng sohkhyllam	26	*Rhus chinensis*	Dieng sohma
11	*Engelhardia spiculata*	Dieng lymba	27	*Rhus succedanea*	Dieng kain
12	*Eurya accuminata*	Dieng pyrshit	28	*Schima khasiana*	Dieng ngan
13	*Fotina integrefolia*	Dieng snam maw	29	*Shesleria wallichina*	Dieng langrop
14	*Grewia abutilifolia*	Dieng sohme blang	30	*Symplocos khasiana*	Dieng pei
15	*Inuala cappa*	Dieng lalieh	31	*Taxus bacata*	Dieng sohblei
16	*Zanthoxylum ovalifolium*	Dieng shiah			

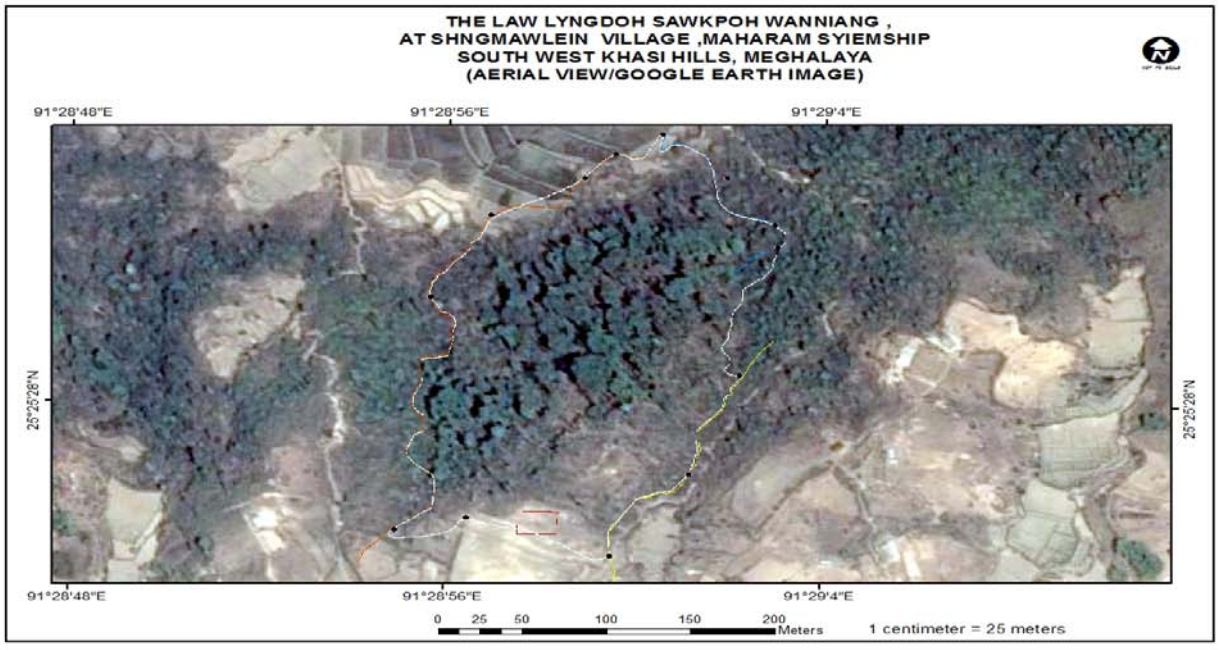
List of orchids, shrubs, herbs, climbers and grass found in Lyngdoh Sawkpoh Wanniang Sacred Grove, South West Khasi Hills

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew sla rem-maw	*Rhaphidophora lancifolia*	Araliaceae
2.	Tiew dieng	*Pholidata articulata*	Orchidaceae
3.	Orchid	*Melastoma malabathricum*	Melastomaceae
4.	Orchid	*Alangium chinensis*	Alangiaceae
5.	Orchid	*Floscopa scandens*	Commelinaceae
6.	Orchid	*Otochilus fusca*	Orchidaceae
7.	Orchid	*Dendrobium fimbriatum*	Orchidaceae
8.	Orchid	*paphiolenthe vandarum*	Orchidaceae
9.	Orchid	*Coelogyne flavida*	Orchidaceae
10.	Orchid	*Cymbidium elegans*	Orchidaceae
11.	Orchid	*Eria spicata*	Orchidaceae
12.	Orchid	*Bulbophyllum offine*	Orchidaceae
13.	Orchid	*Dendodronbium transparens*	Orchidaceae
14.	Orchid	*Liparis ellipticus*	Orchidaceae

Location Map of Sawkpoh Wanniang Sacred Grove





List of shrubs, herbs, climbers and grass found in Lyngdoh Sawkpoh Wanniang Sacred Grove, South West Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.		*Boehmeria nivea*	Urticaceae
2.		*Garcinia lancealata*	Clusiaceae
3.		*Polygonum glabrum*	Polygonaceae
4.		*Malvaverticillata*	Malvaceae
5.		*Cuphea bracteata*	Lythraceae
6.		*Vernonia volkameriifolia*	Asteraceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew sying maw	*Zingiber spicatum*	Zingiberaceae
2.	Sla jajew	*Begonia roxborghii (m)*	Begoniaceae
3.	Tyrkhang	*Diplezium esculentum*	Athyriaceae
4.	Shiah sohprew	*Rubus khasiana*	Rosaceae
5.	Teinthap or synrem	*Artemisiacina*	Asteraceae
6.	Sohkrot	*Smilax zeylanicum*	Smilaceae
7.	Tyrkhang	*Cyathea gigantea*	Cyatheaceae
8.		*Bluemia radigata*	Asteraceae
9.	Sla lamet	*Phrynium placentrum*	Morantaceae
10.	Dieng soh khrismas	*Chloramthus brachystachis*	Rubiaceae
11.	Jamyrdoh	*Houttuynia cordatta*	Saururaceae
12.	Tiew jasat	*Polygonum hydropiper*	Polygonaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.		*Pothos scandens*	Araceae
2.		*Fissistigma parviflora*	Amonaceae
3.		*Aeschinanthus superba*	Orchidaceae
4.	Sohmrit khlaw	*Piper longum*	Piperaceae
5.	Jyrmi khlaw	*Mucuna macrocarpa*	Anonaceae
6.	Jyrmi khlaw	*Lyonia ovalifolia*	Ericaceae
7.		*Embilia ribes*	Myrsinaceae
8.		*Pothos scandens*	Araceae
9.	Jyrmi shiah	*Xanthozylum khasiana*	Rutaceae
10.	Bat refugee	*Mokania micrantha*	Asteraceae

GRASS

Sl No.	Local Name	Botanical Name	Family
1.		*Cyperus rotundus*	Cyperaceae
2.	Lang traw	*Imperatus cylindrical*	Poaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Siej namlang	*Chimona bambusa khasiana*	Poaceae

12.7 Number of Stems:

Number of stems in each girth class and species wise are given in table 12.1. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40cm to 91-100cm

Table - 12.1
Girth class wise and Species wise no. of stems in the entire grove (Area = 5.15 ha)

Girth class wise	*Schima Khasiana* 1st dominant	*Cesearia varieca* 2nd dominant	*Pyrus khasiana* 3rd dominant	Rest of the species	Total stems
30-40	2	0	3	41	**46**
41-50	2	0	2	34	**38**
51-60	8	0	6	36	**50**
61-70	8	3	9	50	**70**
71-80	4	6	8	37	**55**
81-90	15	6	6	32	**59**
91-100	12	7	4	37	**60**
101-110	5	4		18	**27**
111-120	10	8	5	30	**53**
121-130	6	7	3	10	**26**
131-140	3	4	4	6	**17**
141-150	1	1	3	1	**6**
151 & above	40	38	16	77	**171**
Total	**116**	**84**	**69**	**409**	**678**

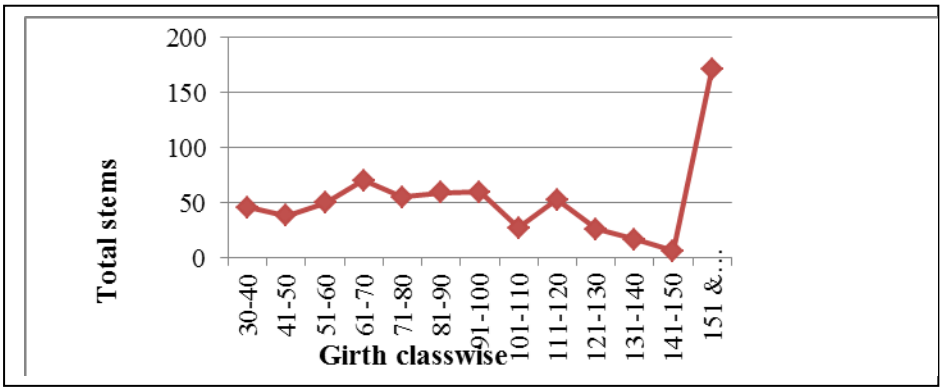


Figure 12.1: Girth class wise with respect to total stem

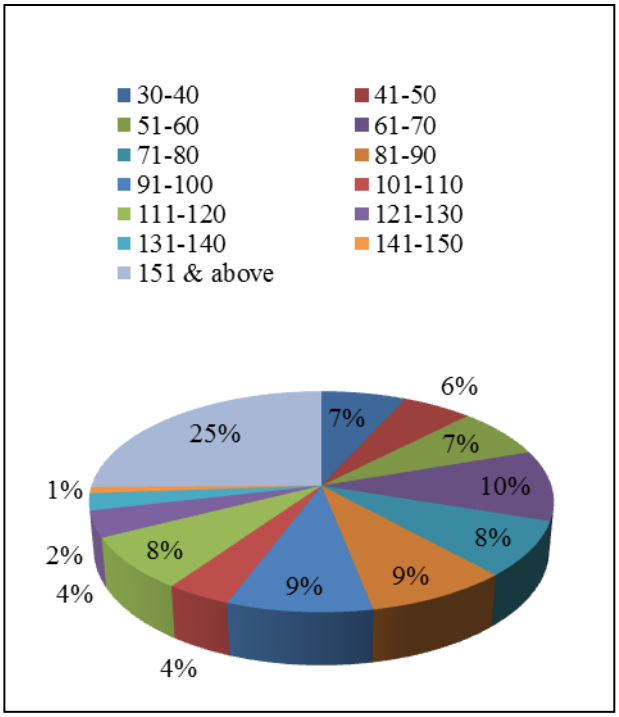


Figure 12.1: Girth classwise with respect to Total stems stems

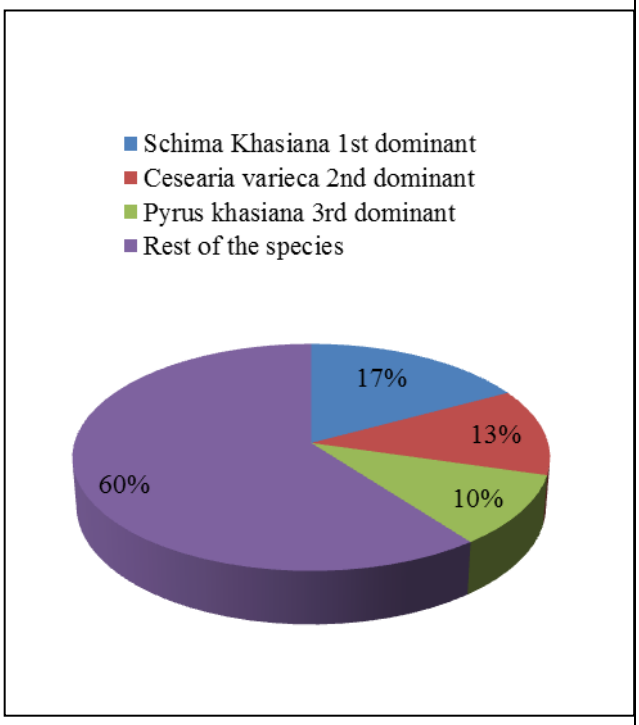


Figure 12.1 (a): Species wise with respect to Total



Figure 12 (a): Inside view of Lyngdoh SawkpohWanniang Sacred Grove o



Figure 12 (b): Showing dense orchid cover of Lyngdoh Sawkpoh Wanniang Sacred Grove

12.8 Growing Stock:

As per the methodology described in Chapter-I, 100% enumeration is carried out in the grove as its area is less than 10 ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 678 tree species consisting of 116 *Schima khasiana* (1st dominant), 84 *Cesearia varieca.* (2nd dominant), *Pyrus khasiana* (3rd dominant) and 409 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151cm and above. The results are given in table 12.2 for Saw Kpoh Wanniang sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 1389.226 cubic metres.

Table – 12.2
Girth class wise and species wise volume in the sampled area (Area 5.15ha)
(volume in cu.m)

Girth class wise	**Schima Khasiana 1st dominant**	**Cesearia varieca 2nd dominant**	***Pyrus khasiana* 3rd dominant**	**Rest of the species**	**Total**	**% with respect to total volume**
30-40	0.147		0.156	2.383	**2.686**	0.193
41-50	0.316		0.316	4.961	**5.593**	0.403
51-60	1.924		1.683	9.462	**13.069**	0.941
61-70	2.590	0.647	3.499	19.601	**26.337**	1.896
71-80	1.794	1.753	4.388	19.899	**27.834**	2.004
81-90	9.087	2.549	4.281	22.852	**38.769**	2.791
91-100	8.757	3.980	3.518	33.227	**49.482**	3.562
101-110	4.717	2.872		20.670	**28.259**	2.034
111-120	10.417	7.440	7.074	40.828	**65.759**	4.733
121-130	7.729	7.504	4.910	16.659	**36.802**	2.649
131-140	4.554	5.584	7.412	11.543	**29.093**	2.094
141-150	1.726	1.723	6.734	2.351	**12.534**	0.902
151 & above	245.346	266.613	82.260	458.790	**1053.009**	75.798
Total	**299.104**	**300.665**	**126.231**	**663.226**	**1389.226**	**100.000**
% wrt Total volume	21.530	21.643	9.086	47.741	100.000	

Table 12.2 shows that the volume contributed by the 1st dominant species (*Schima khasiana*) with respect to the total volume of the grove is 21.530%, the 2nd dominant species (*Cesearia varieca)* is 21.643%, 3rd dominant species (*Pyrus khasiana*) is 9.086% while Rest of the species is maximum i.e.47.741%. Total volume of the grove is 1389.226 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class also increases i.e. girth class is directly proportional to the volume in that class.

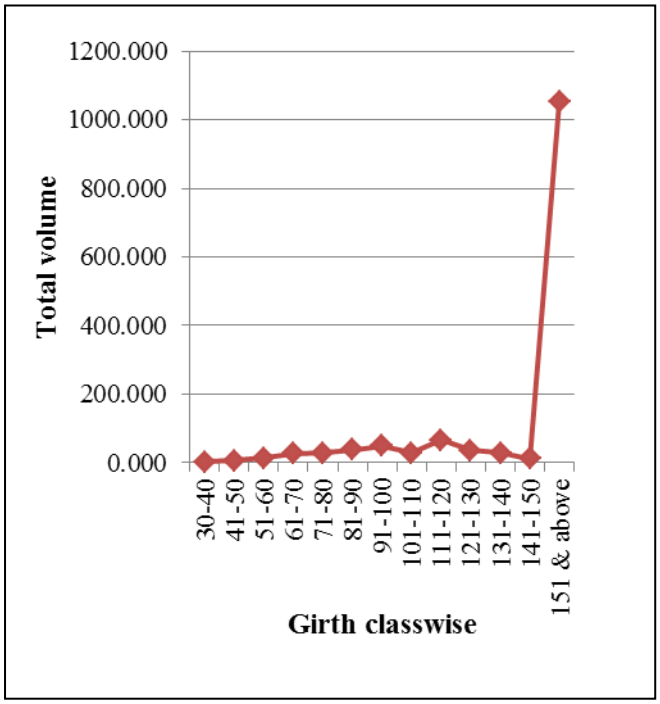


Figure 12.2: Girth class wise with respect to total volume

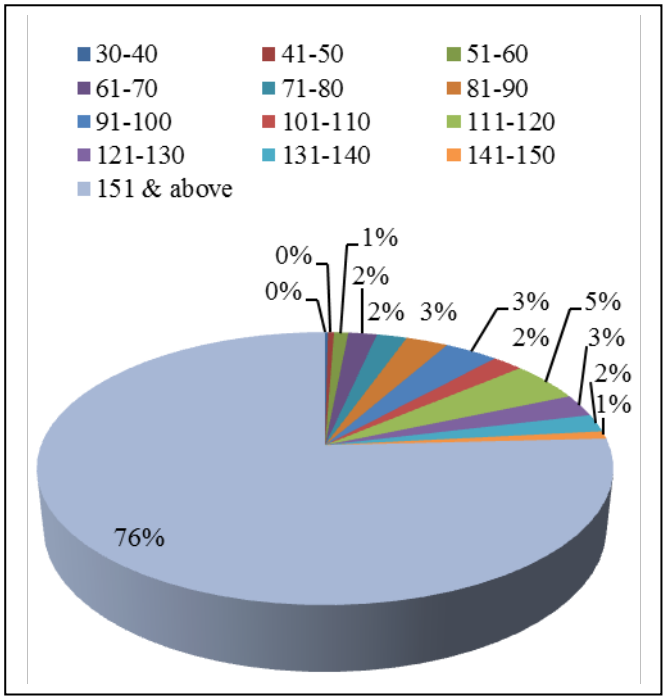


Figure 12.2:Chart 12.2: Girth class wise with respect to Total volume

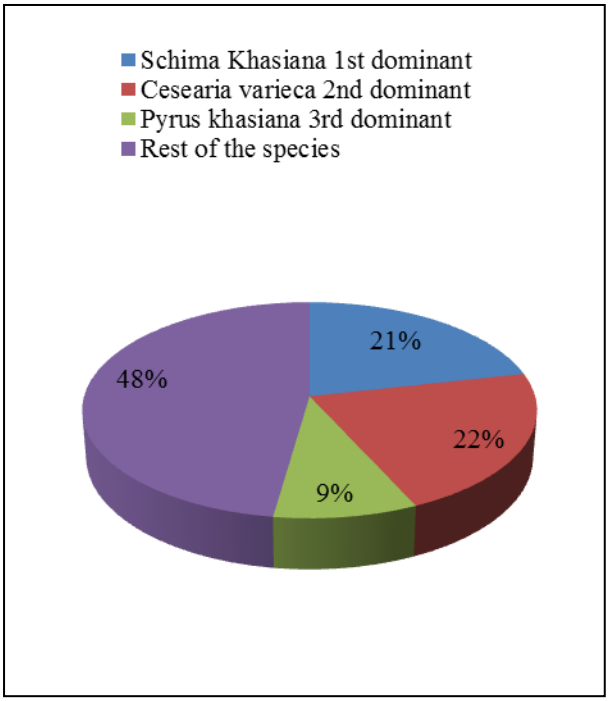


Chart 12.2 (a): Species wise with respect to Total volume

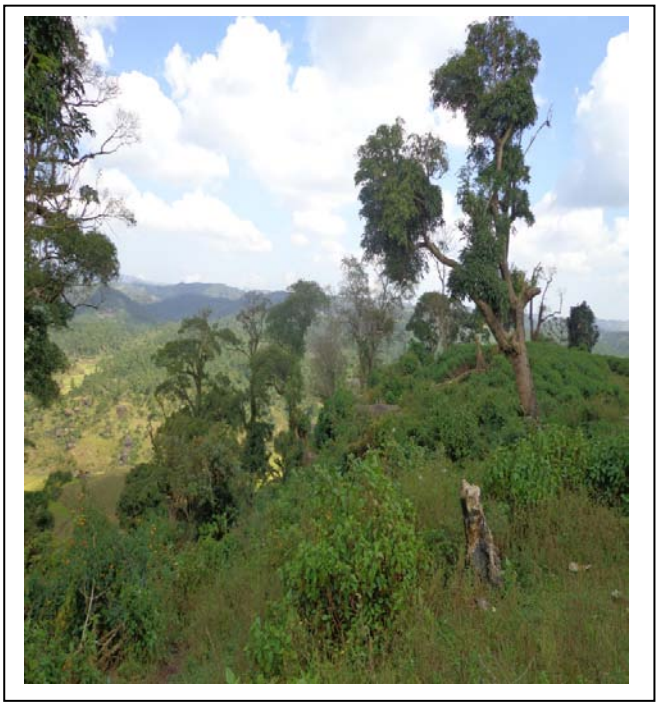


Figure 12 (c): Over view of Lyngdoh Sawkpoh Wanniang Sacred grove

12.9 Brief Note on Management of Law Lyngdoh Sawkpoh Wanniang:

(i) Protection from Biotic Interference:-

Although this grove is no longer considered a sacred grove but still the Saw Kpoh Wanniang clan protects this grove for the benefit of its own clan and to preserve water resources for their agricultural lands. There is no restrictions imposed on entry and exit but cutting of timber in any forms is strictly prohibited. Encroachment and illegal felling of timber were found to be absent in this grove but grazing and poaching cannot be ruled out completely. To protect and conserve the rich natural resources that is left within this grove declaring it as a Community Reserve will only serve the purpose.

(ii) Fire control:-

Though there is no report of fire occurrence in the past but it cannot be ruled out in the years to come as the grove is bounded mainly by private land. To prevent any unwanted fire incidence external fire line can be created all along the boundary line of the grove except those area where it is bounded by natural stream or river. This will help to preserve the rich natural resources of the grove.

(iii) Water stress:-

There is only one stream in this grove which feeds many agricultural land around the grove. If check dams can be created to tap rain water it will be benefitting to the wild animals and also help to increase the moisture content to the soil and this will in turns check soil erosion.

(iv) Afforestation:

In this grove tree are very scattered, hence it is suggested that if vacancy filling can be carried out with local indigenous species this will help to restore the forest cover of the grove.

(v) Marking proper natural boundary:-

This grove which totally bounded by private land, proper boundary marking will help to check encroachment in the near future. This can be done either by fixing cement pillar along the boundary or by earth's digging of 2′ x 2′ size all along the boundary except in the area where stream flow along the boundary of the grove.

(v) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

13 - LAW LYNGDOH RNGAID NONGLANG

13.1 Introduction/Location:

Law lyngdoh Rngaid Nonglang is situated in South West Khasi Hills District at Nonglang village under the Syiemship of Hima Maharam. It has an area of 2.04 ha and lies between 25° 21’ 28” N to 25° 21’ 36” N Latitude and 91° 26’ 38” E to 91° 26’ 44” E longitude with an altitude of 1566 m from Mean Sea Level (MSL). It is bounded in the North Phot Lyngdoh river, in the South by Private land, in the East by private land of Shri. D.Snaitang and Smit. L.Wanniang and in the West by nullah and private land of Shri L. Lyngdoh. The grove is accessible by road from Shillong via Weiloi-Mawkyrwat road. It is about 78km from Shillong.

13.2 Brief History:

As stated by the elders this Sacred grove have originated many years ago. Rituals are no longer performed in this Sacred grove long way back. Felling of trees is strictly prohibited. It is owned and controlled by the Lyngdoh Rngaid Nonglang clan. The State Forest Department has no direct control of the said grove, rather it falls under the jurisdiction of the KHADC.

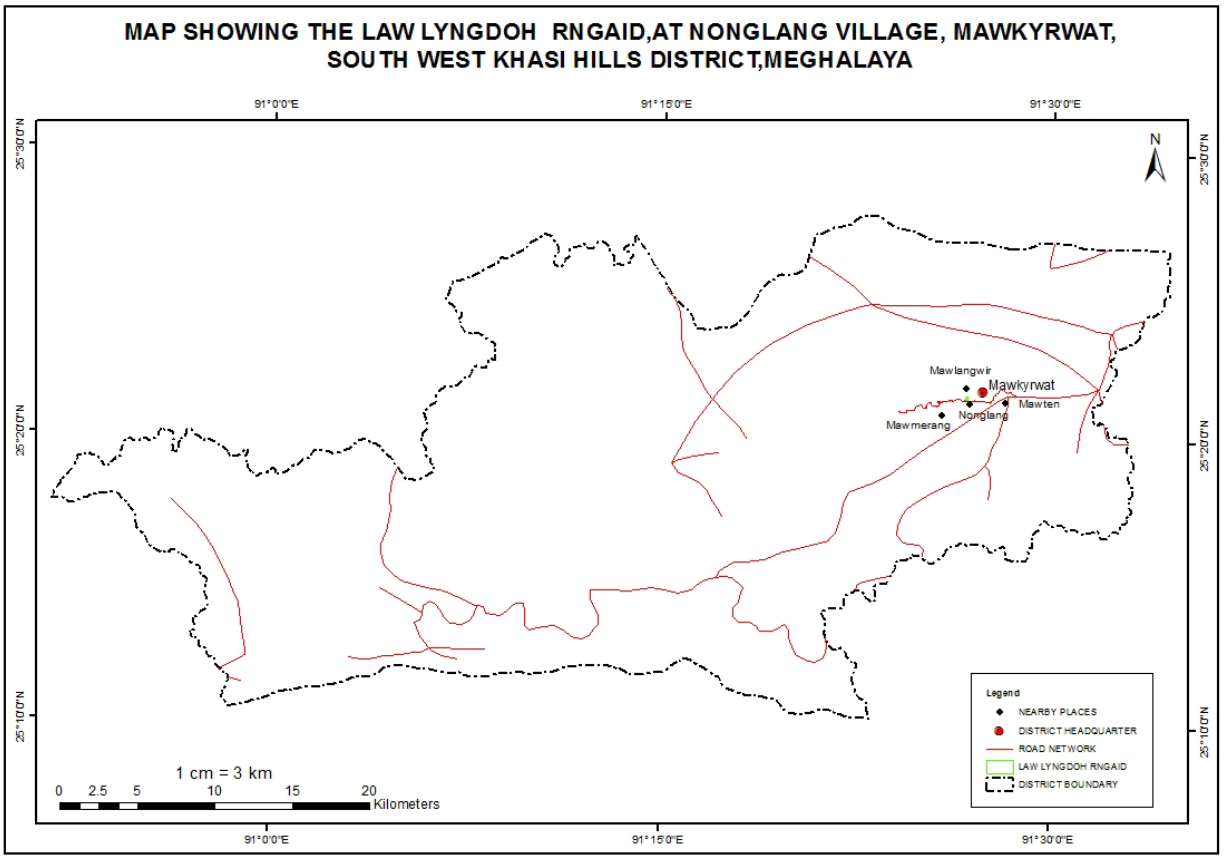
13.3 Geography and climate:

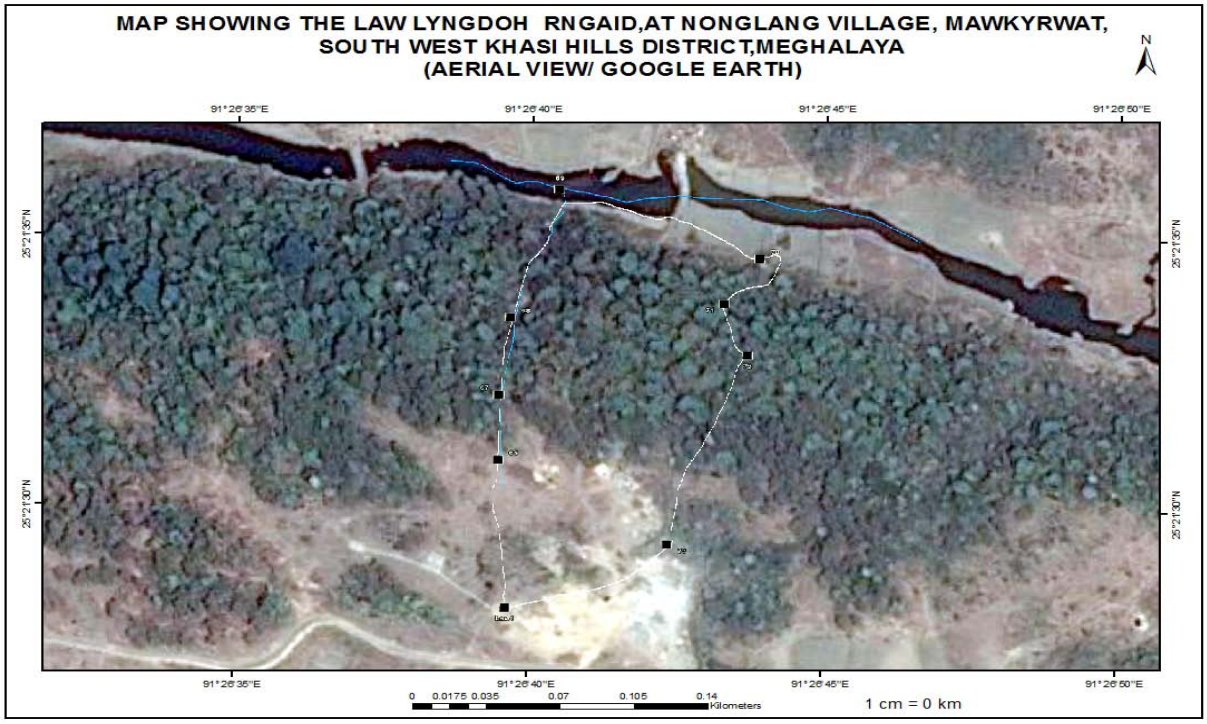
The topography of the grove is slightly gentle in nature with slope varying from 4° to 10°. The soil texture is sandy loam with boulders friable in consistency. The colour of the soil is brown with high soil dept. soil erosion is negligible. There is only one river Phot Lyngdoh that flows along the boundary in the Northern side of the grove. The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 5°C and maximum is 26°C. Biotic pressure, encroachment , wildfire, hunting and poaching, grazing and illegal felling of timber were found to be absent in this grove.

13.4 Forest type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

Location Map of Law Lyngdoh Rngaid Nonglang Sacred Grove





13.5 Flora and fauna:

The vegetation is of mixed species. Dominant species found are *Schima khasiana* and *Grewia abutifolia*, origin of the forest is natural and it is two storeyed forests. Wildlife here *are jackal, rabbit, wild pig, jungle fowls, pangolin.* Various types of birds and reptiles. Conservation significance of the grove is mainly due to:

(a) The virgin forests where human interference is almost zero.

(b) High level endemic plant and animal species.

(c) Existence of many rare endangered plant species.

(d) Conservation of flora and fauna and maintaining of rich forest natural resources.

13.6 Floral species:

List of Trees found in Law Lyngdoh Rngaid Nonglang Sacred Grove, South West Khasi Hills

Sl No.	Botanical Name	Local Name	Sl No.	Botanical Name	Local Name
1	*Alvizia lucidior*	Dieng ri	21	*Michelia oblonga*	Dieng laniar
2	*Aralia lantana*	Dieng latympu	22	*Myrica indica*	Dieng sohphie
3	*Artisia griffithii*	Dieng soh khaw shing	23	*Pantapanox racemasmum*	Dieng tyllong rangsei
4	*Camelia caduca*	Dieng tyrnem	24	*Parkia roxburghii*	Dieng jariat
5	*Castanopsis armata*	Dieng sning	25	*Pinus khasiana*	Dieng kseh
6	*Castanopsis indica*	Dieng sohot	26	*Pithecellboiu heterophylum*	Dieng iapiar
7	*Cesearia varieca*	Dieng rang	27	*Pojanelia kheedi*	Dieng tanglung
8	*Docynia indica*	Dieng sohphoh khlaw	28	*Pyrus khasiana*	Dieng sohjhur
9	*Elaeocarpus lancefolium*	Dieng sohkhyllam	29	*Quercus dealbata*	Dieng sai
10	*Engelhardia spicata*	Dieng lymba	30	*Rhus schinensis*	Dieng sohma
11	*Erythrina indica*	Dieng song	31	*Rhus succedanea*	Dieng kain
12	*Eurya accuminata*	Dieng pyrshit	32	*Schima khasiana*	Dieng ngan
13	*Fotina integrefolia*	Dieng snam maw	33	*Shesleria wallichina*	Dieng langrop
14	*Grewia abutilifolia*	Dieng sohme blang	34	*Srhu schinensis*	Dieng sohma
15	*Hypericum patulum spp*	Dieng sohlamut	35	*Symplocos theaefolia*	Dieng pei
16	*Ilex excelsa*	Dieng soh rynted	36	*Taxus bacata*	Dieng sehblei
17	*Ilex griffithii*	Dieng sohkhaw krai	37	*Viburnum foetidum*	Dieng Sohlangksew
18	*Ilex venulosa*	Dieng shyieng	38	*Zanthoxylum ovolifolium*	Dieng shiah
19	*Inuala cappa*	Dieng lalieh	39	*Irithina indica*	Dieng song
20	*Macaranga denticulate*	Dieng lakhar			

List of orchids, shrubs, herbs, climbers and bamboo found in Law Lyngdoh Rngaid Nonglang Sacred Grove, South West Khasi Hills

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew dieng	*Pholidata imbricate*	Orchidaceae
2.		*Osbekia stellate*	Melastomaceae
3.		*Alangium chinense*	Alangiaceae
4.	Orchid	*Floscopa scandens*	Commelinaceae

5.	Tiew jyrsieh maw	*Polygonum chinense*	Polygonaceae
6.	Orchid	*Micropera manii*	Orchidaceae
7.	Orchid	*Dendrobium fimbriatum*	Orchidaceae
8.	Orchid	*Liparis viridiflora*	Orchidaceae
9.	Orchid	*Aeschinanthus superba*	Orchidaceae
10.	Orchid	*Oberonia jenkinsiana*	Orchidaceae

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Kait khlaw	*Musa accuminata*	Musaceae
2.		*Garcinia accuminata*	Clusiaceae
3.		*Polygonum orientale*	Polygonaceae
4.	Sohlamut	*Agapetes variegata*	Vaccinaceae
5.	Dieng shit (rit)	*Murrya khasiana*	Theaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Sla jajew	*Begonia roxborghii (m)*	Begoniaceae
2.	Tiew sying maw	*Zingiber spicatum*	Zingiberaceae
3.	Shiah sohprew	*Rubus khasiana*	Rosaceae
4.	Tiew sying maw	*Vaccinium khasiana*	Vaccinaceae
5.	Batnebru	*Centela asiatica*	Apiaceae
6.	Sohkrot	*Smilax zeylanium*	Smilacaceae
7.	Tyrkhang	*Cyathea gigantea*	Cyatheaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.		*Pothos scandens*	Araceae
2.		*Fissistigma versucosum*	Anonaceae
3.		*Aschynanthus superba*	Orchidaceae
4.	Sohmrit khlaw	*Piper longum*	Piperaceae
5.	Jyrmi khlaw	*Mucuma puriens*	Leguminaceae
6.		*Smilax zeylanicum*	Smilacaceae
7.	Jyrmi khlaw	*Emtada parsaetha*	Leguminaceae
8.		*Embelia ribes*	Myrsinaceae
9.		*Floscopa scandens*	Commelinaceae
10.	Jyrmi shiah	*Xanthuzylum khasiana*	Rutaceae

GRASS

Sl No.	Local Name	Botanical Name	Family
1.	Phlang	*Cyperus iris*	Cyperaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Siej namlang	*Chimona bambusa khasiana*	Poaceae

13.7 Number of Stems:

Number of stems in each girth class and species wise are given in table 13.1. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40 to 61-70 cm.

Table – 13.1
Girth class wise and Species wise no. of stems in the entire grove (Area 2.04 ha)

Girth class wise	*Schima Khasiana* 1st dominant	*Grewia abutilifolia* 2nd dominant	*Pinus khasiana*	Rest of the species	Total stems
30-40	6	5	8	51	**70**
41-50	8	9	12	65	**94**
51-60	6	7	11	58	**82**
61-70	13	7	7	41	**68**
71-80	9	1	2	36	**48**
81-90	7	1	1	32	**41**
91-100	12	3	1	37	**53**
101-110	6			16	**22**
111-120	3	1		3	**7**
121-130				4	**4**
131-140	1			4	**5**
141-150	1			2	**3**
151 & above	4			5	**9**
Total	**76**	**34**	**42**	**354**	**506**

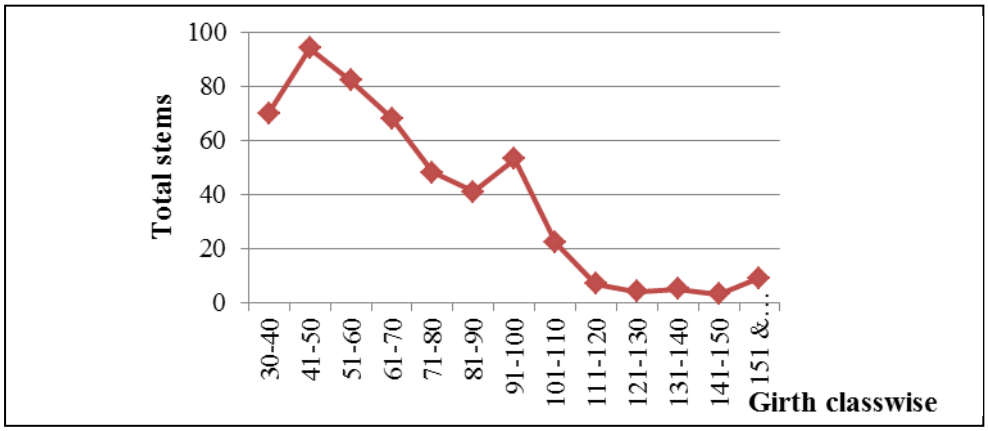


Figure 13.1: Girth class wise with respect to total stems

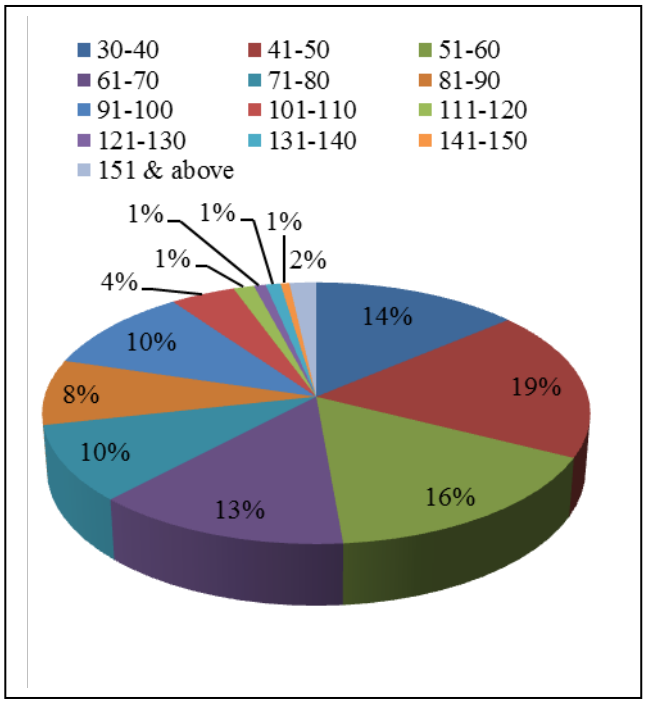


Figure 13.1: Girth class wise with respect to Total stems stems

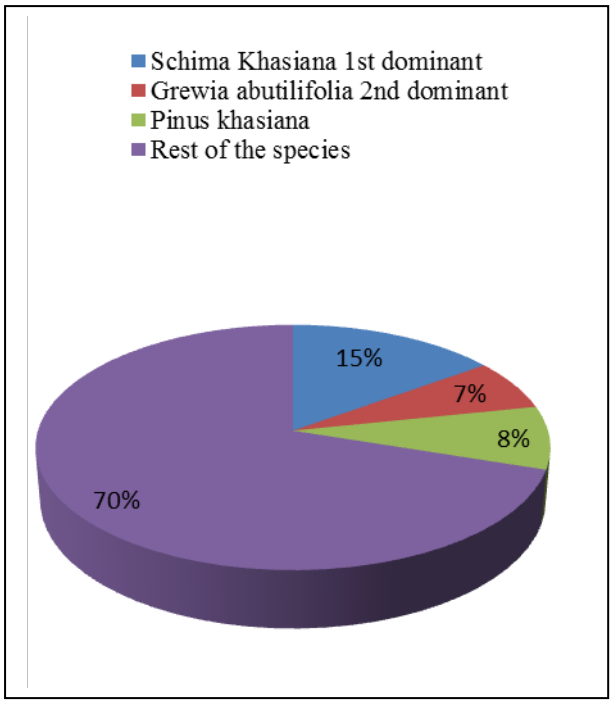


Figure 13.1 (a) Species wise with respect to Total



Figure 13 (a): Inside view of Law Lyngdoh Rngaid Nonglang Sacred Grove



Figure 13 (b): Inside view of LawLyngdoh Rngaid Nonglang Sacred Grove

13.8 Growing Stock:

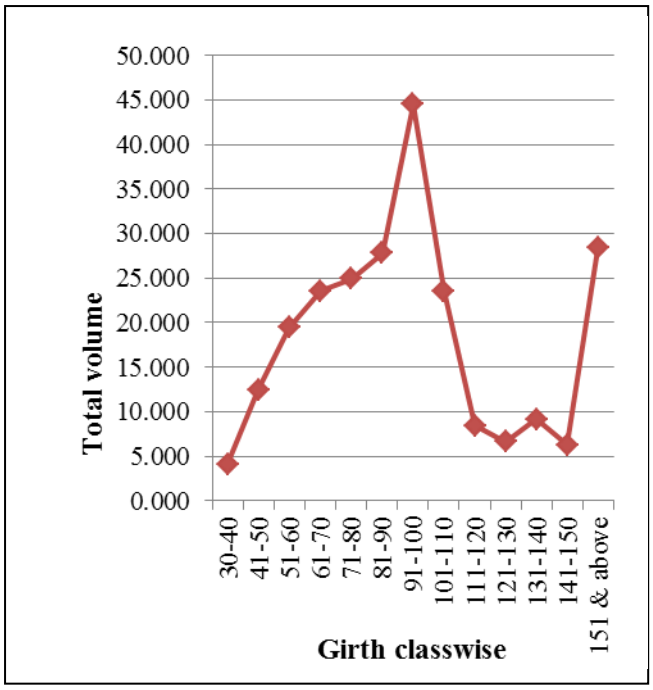
As per the methodology described in Chapter-I, 100% enumeration is carried out in the grove as its area is less than 10ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 506 tree species consisting of 76 *Schima khasiana* (1st dominant), 34 *Grewia abutifolia.* (2nd dominant), 42 *Pinus khasiana* and 354 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151cm and above. The results are given in table 13.2 for Rngaid Nonglang sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 239.301 cubic metres.

Table - 13.2
Girth class wise & Species wise volume in the sampled area (Area = 2.04 ha)
(volume in cu.m)

Girth class wise	*Schima Khasiana* 1st dominant	*Grewia abutilifolia* 2nd dominant	*Pinus khasiana*	Rest of the species	Total	% with respect to total volume
30-40	0.506	0.259	0.326	3.070	**4.161**	1.739
41-50	1.232	0.863	1.137	9.217	**12.449**	5.202
51-60	1.496	1.116	2.028	14.796	**19.436**	8.122
61-70	4.412	1.389	1.844	15.939	**23.584**	9.855
71-80	4.243	0.269	0.756	19.635	**24.903**	10.407
81-90	4.056	0.393	0.555	22.801	**27.805**	11.619
91-100	8.990	1.444	0.711	33.330	**44.475**	18.585
101-110	5.599	-		17.988	**23.587**	9.857
111-120	3.250	1.026		4.146	**8.422**	3.519
121-130	-			6.653	**6.653**	2.780
131-140	1.451			7.707	**9.158**	3.827
141-150	1.750			4.510	**6.260**	2.616
151 & above	9.701			18.707	**28.408**	11.871
Total	**46.686**	**6.759**	**7.357**	**178.499**	**239.301**	100.000
% wrt Total volume	**19.509**	**2.824**	**3.074**	**74.592**	**100.000**	

Table 13.2 shows that the volume contributed by the 1st dominant species (*Schima khasiana*) with respect to the total volume of the grove 19.509%, the 2nd dominant species(*Grewia abutifolia)* is 2.824%, *Pinus khasiana* is 3.074% while Rest of the species is maximum i.e. 74.592%. Total volume of the grove is 239.301 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class also increases i.e. girth class is directly proportional to the volume in that class.



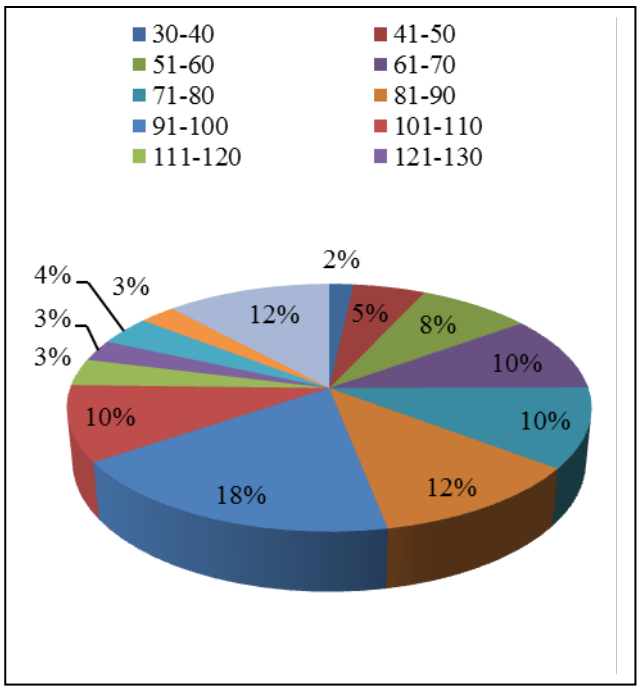
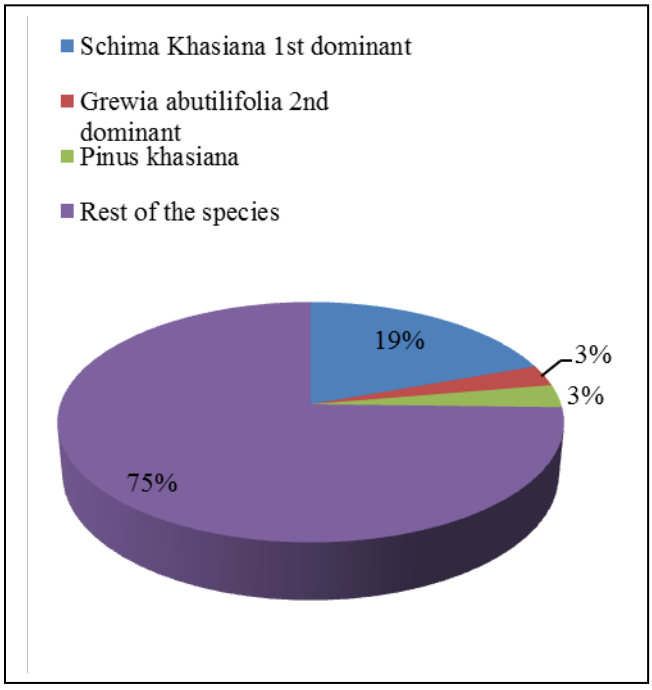


Figure 13.2: Girth class wise with respect to total volume

Figure 13.2: Girth class wise with respect to Total volume



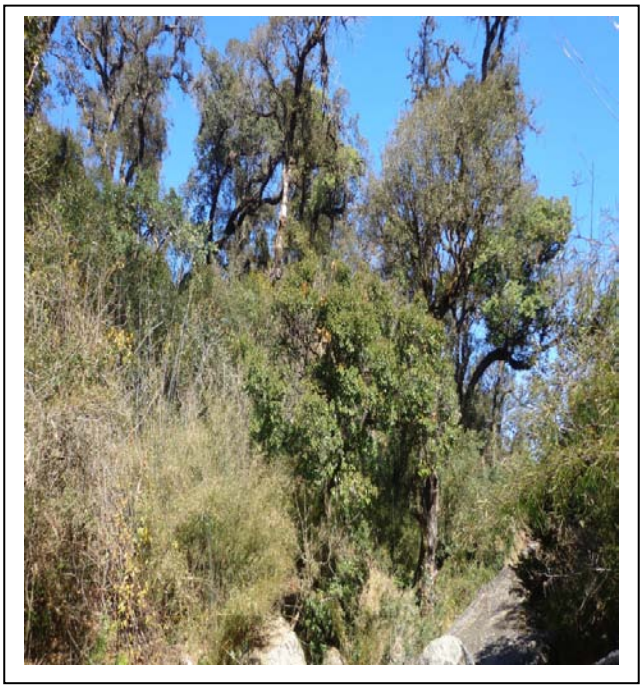


Figure 13.2(a): Specieswise with respect to Total volume

Figure 13 (c): Over view of Law Lyngdoh Rngaid Nonglang Sacred grove

13.9 Brief Note on Management of Law Lyngdoh Rngaid Nonglang:

(i) Protection from Biotic Interference:-

Although presently there is no evidence of encroachment, illegal felling of timber or grazing in this grove. But it cannot be ruled out in the years to come, hence to avoid biotic pressure in future it is suggested that this grove may be declared as a Community Reserve in consultation with the villagers/clan so that rules and policy can be frame accordingly to protect and preserve the rich natural resources of the grove.

(ii) Fire control:-

Though there is no report of intentional or accidental fire occurrence in the past, but prevention can be taken care of for the future. So to avoid fire incidence in the grove, fire line can be created all along the boundary except those areas which are bounded by natural stream. This will help to preserve the rich natural resources of the sacred grove.

(iii) Water stress:-

There is only one nullah and one Poh Lyngdoh river in this grove. Construction of check dams is highly recommended especially in the dry areas so as to impound water for the benefit of wildlife and plants as well as to improve moisture content of the soil, which will in turns prevent soil erosion.

(iv) Construction of natural boundary:-

To control encroachment in this grove in the near future, construction of permanent pillars or earth's digging all along the boundary of the grove except those areas which is bounded by nullah and river is highly recommended.

(v) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

14 - REI-MISSION

14.1 Introduction/Location:

Law Adong Rei Mission is situated in South West Khasi Hills District at Phot Ja-ud village under the Syiemship of Hima Maharam. It has an area of 8.59 ha and lies between 25° 1914" N to 25° 19′ 26" N latitude and 91° 27′ 30" E to 91° 27′ 46" E longitude with an altitude of 1491 m from Mean Sea Level (MSL). It is bounded in the North footpath to Phot Mawjaw stream, in the South by Sait sohphan stream, in the East Sait sohphan stream and in the West by grave yard and a stream. The grove is accessible by road from Shillong via Weiloi-Mawkyrwat road. It is about 92km from Shillong.

14.2 Brief History:

As stated by the elders this Sacredgrove have originated many years ago. Rituals are no longer performed in this Sacred grove long way back. Felling of trees is strictly prohibited. It is owned and controlled by the villagers of Phot Ja-ud. The State Forest Department has no direct control of the said grove, rather it falls under the jurisdiction of the KHADC.

14.3 Geography and climate:

The topography of the grove is slightly gentle in nature with slope varying from 4° to 10°. The soil texture is sandy loam with boulders friable in consistency. The colour of the soil is brown with high soil dept. soil erosion is negligible. There are three streams that flows along the grove they bare Phot Ja-ud stream, Sait Sohphan stream and the source of drinking water of Phot Ja-ud village.

The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 7°C and maximum is 28°C. Biotic pressure, encroachment , wildfire, hunting and poaching, grazing and illegal felling of timber were found to be absent in this grove.

14.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

14.5: Flora and fauna:

The vegetation is of mixed species. Dominant species found are *Schima khasiana* and *Castanopsis sps*, origin of the forest is natural and it is two storeyed forests. Wildlife from here are jackal, rabbit, wild pig, jungle fowls, pangolin. Various types of birds and reptiles. Conservation significance of the grove is mainly due to:

(a) The virgin forests where human interference is almost zero.

(b) Highlevel endemic plant and animal species.

(c) Existence of many rare endangered plant species.

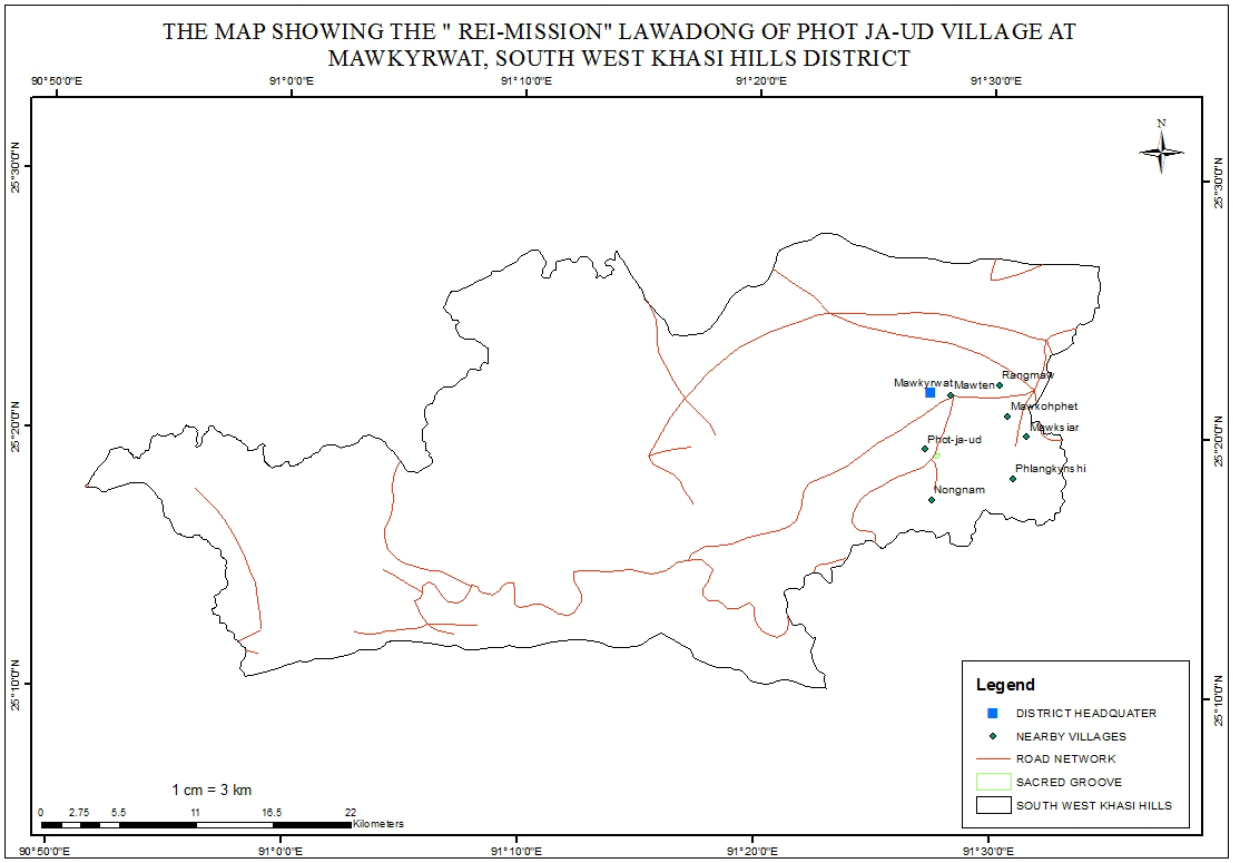
(d) Conservation of flora and fauna and maintaining of rich forest natural resources.

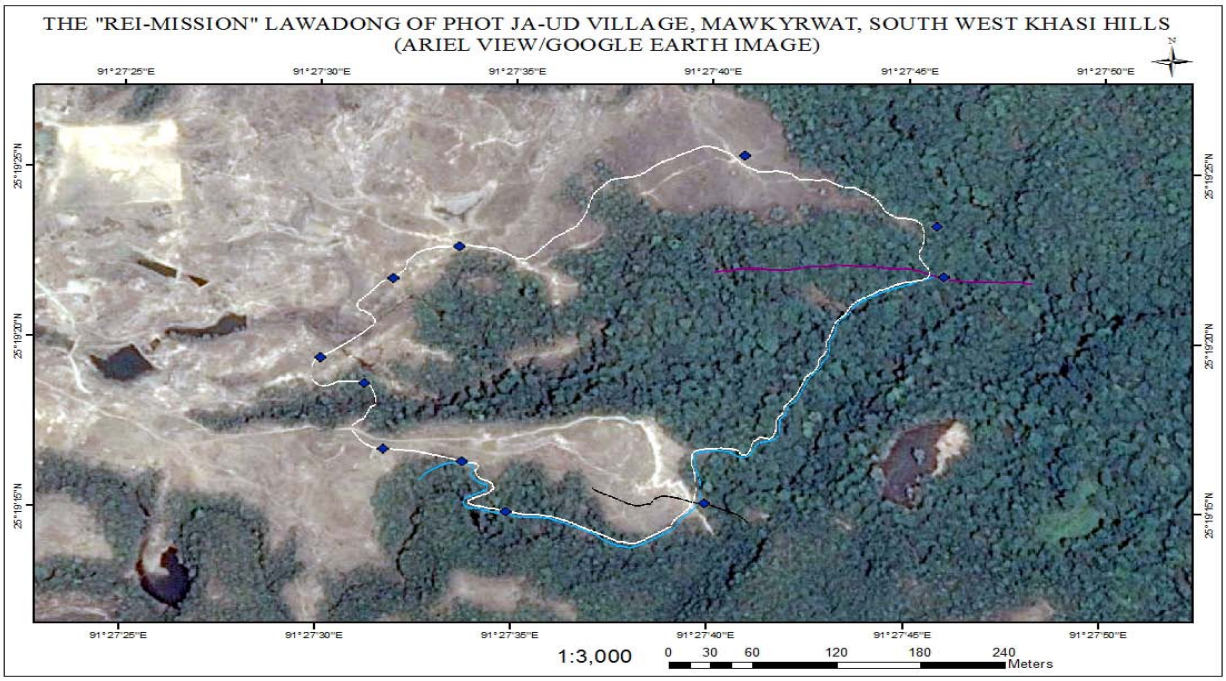
14.6 Floral species:

List of Trees found in Rei-mission Sacred Grove

Sl. No.	Botanical Name	Local Name	Sl. No.	Botanical Name	Local Name
1	*Albezia lebbek*	Dieng kreit	25	*Ilex excodsa*	Dieng sohrynted
2	*Albizia lisak*	Dieng krut	26	*Ilex griffithii*	Dieng sohkhaw shyieng/ Dieng sohkhaw krai
3	*Albizia lucidior*	Dieng ri	27	*Ilex venulosa*	Dieng shyieng
4	*Alstonia scholaris*	Dieng rai iong	28	*Inuala cappa*	Dieng lalieh
5	*Aralia armata*	Dieng latymphu	29	*Irithina indica*	Dieng song
6	*Astania scholaris*	Dieng rai-iong	30	*Ligustrum robostos*	Dieng soh syiang/ Dieng syiang
7	*Betula alnoides*	Dieng lieng	31	*Macaranga denticulate*	Dieng lakhar
8	*Camelic caduca*	Dieng tyrnem	32	*Michelia oblonga*	Dieng laniar
9	*Caryota urens*	Dieng tlai	33	*Myrica indica*	Dieng sohphie nam
10	*Castanopisis indica*	Dieng sohot/Dieng stap	34	*Myrica indica*	Dieng sohphie
11	*Castanopsis aramata*	Dieng sning	35	*Pajanelia kheedii*	Dieng tanglung
12	*Cesearia varieca*	Dieng rang	36	*Pandanus american*	Dieng shlan
13	*Cinamomum cesicodahne*	Dieng pingwait	37	*Pantapanox racemasmum*	Dieng tyllong rangsei
14	*Cinnamomum bejolghota*	Dieng tyrdop	38	*Parkia roxburghii*	Dieng jariat
15	*Cytrusl laitpes*	Dieng sohkynphor	39	*Pithecellboiu heterophylum*	Dieng iap-iar
16	*Derris robostus*	Dieng sohphyllad	40	*Pronus undulate*	Dieng tyrkhung
17	*Elaeocarpus robostos*	Dieng sohkhyllam	41	*Pyrus khasiana*	Dieng sohjhur
18	*Eleocarpus integrifolia*	Dieng sohshang khlaw	42	*Quercus dealbata*	Dieng sai
19	*Engelhardia spicata*	Dieng lymba	43	*Rhus succedanea*	Dieng kain
20	*Eurya accuminata*	Dieng shit	44	*Shcima khasiana*	Dieng ngan
21	*Exbucklandia populnea*	Dieng doh	45	*Shesleria wallichina*	Dieng langrop
22	*Ficus globarataa*	Dieng sohpian	46	*Symplocos khasiana*	Dieng pei
23	*Fotina integrefolia*	Dieng snam maw	47	*Viburnum carilifolium*	Dieng sohlang ksew
24	*Grewia abutilifolia*	Dieng sohme blang			

Location map of Rei-MissionSacred Grove





List of orchids, shrubs, herbs, climbers, and bamboo found in Rei-mission Sacred Grove, South West Khasi Hills

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Jajew	*Begonia roxburghii*	Begoniaceae
2.	Sohrishan	*Duchesnea indica*	Rosaceae
3.	Ground orchid	*Cymbidium macrorhizon*	Orchidaceae
4.	Orchid	*Phaius flavus*	Orchidaceae
5.	Tiew sohmyndong	*Baccaurea sapida*	Rubiaceae
6.	Tiewshiah	*Rosa involucrate*	Rosaceae
7.	Tiew ladew	*Hedychium gardeniamum*	Zingiberaceae
8.	Orchid	*Bulbophyllum gymnopus*	Orchidaceae
9.	Orchid	*Oberonia mucronata*	Orchidaceae
10.	Orchid	*Coelogyne prolifera*	Orchidaceae
11.	Tiew sohpoitdong	*Raphidophora lancoefolia*	Araliaceae
12.	Tiew saw	*Rhododendron arboratum*	Ericaceae
13.	Ground orchid	*Calanthe masuca*	Orchidaceae
14.	Tiew lieh	*Rhododendron formasum*	Ericaceae
15.	Orchid	*Ceologyne suaveolens*	Orchidaceae
16.	Orchid	*Ceologyne punctulata*	Orchidaceae
17.	Orchid	*Agrostophyllum callosum*	Orchidaceae
18.	Orchid	*Agrostophyllum planiscaule*	Orchidaceae
19.	Tiew lieh blang	*Bluemea radigata*	Astericeae
20.	Tiew orchid	*Dendrobium heterocarpum*	Orchidaceae

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng hyllew	*Leusus grandis*	Plamaceae
2.	Synsar	*Thysomaclia maxima*	Poaceae
3.	Dieng shlan	*Pandanus odora tissinum*	Pandanaceae
4.	Sohshang	*Elaeagnus khasiana*	Elaeagnaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Sohbsein	*Aresaema tortuosum*	Arasceae
2.	Tiew lakot	*Curculigo orchioides*	Hypoxidaceae
3.	Tyrkhang	*Asplenium finlasonium*	Asplaniaceae
4.	Dieng jalakthem	*Osbekia nepalensis*	Melostoaceae

5.	Tyrkhang	*Selaginella pentagona*	Selaginellaceae
6.	Sohlamut	*Agapetes variegate*	Vaccinaceae
7.	Sohlang	*Viburnum foetidum*	Cripifoliaceae
8.	Tiew phlang	*Cyperus rotundus*	Cyperaceae
9.	Dieng soh khrismas	*Chloramthus brachystachis*	Rubiaceae
10.	Jamyrdoh	*Houttuynia cordata*	Sauraceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Shiah sohparu	*Rubus ellipticus*	Rosaceae
2.	Sohmrit	*Piper longnum*	Piperaceae
3.	Sohpdung	*Vaccinum serratum*	Vaccinaceae
4.	Climbers	*Pothus scandens*	Aralisceae
5.	Tiew shiah	*Rosa involucrate*	Rosaceae
6.	Sohkrot	*Smilex khasiana*	Smilaceae
7.	Climbers	*Berberis khasiana (m)*	Berberidaceae
8.	Bat refugee	*Mokania micrantha*	Asteraceae
9.	Sohbyrthit khasi	*Trium felta rhomboida*	Asteraceae
10.	Soh nepbah	*Rubus rogusus*	Rosaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Spit	*Chimonabambusa callosa*	Poaceae
2.	Siej hyllei	*Phyllostakhys magrii*	Bambusaceae
3.	Siej spar	*Chimonabambusa griffithiana*	Bambusaceae

14.7 Number of Stems:

Number of stems in each girth class and specieswise are given in table 14.1.The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40cm to 91-100cm.

Table-14.1

Girth class-wise and Species-wise no. of stems in the entire grove (Area- 8.59 ha)

Girth Class Vise	*Schima Khasiana* 1st Dominant	*Castanopsis* 2nd Dominant	Rest of the species	Total Stems
30-40	7	21	489	517
41-50	10	10	368	388
51-60	21	15	351	387
61-70	51	30	371	452
71-80	37	37	228	302
81-90	45	55	165	265
91-100	23	16	76	115
101-110	2	3	22	27
111-120	1	0	19	20
121-130	0	1	13	14
131-140	1	0	7	8
141-150	1	0	1	2
151 & above	2	0	14	16
Total	**201**	**188**	**2124**	**2513**

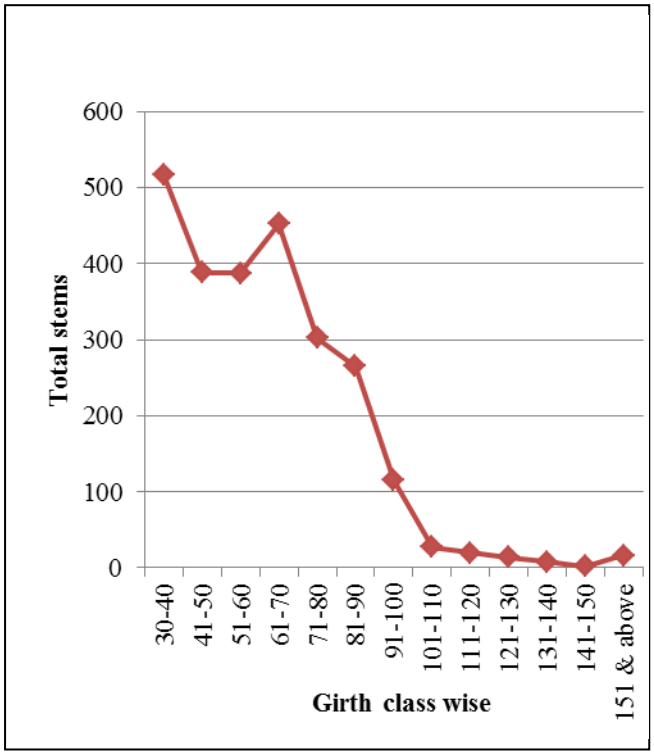


Figure 14.1: Girth class wise with respect to total stems.

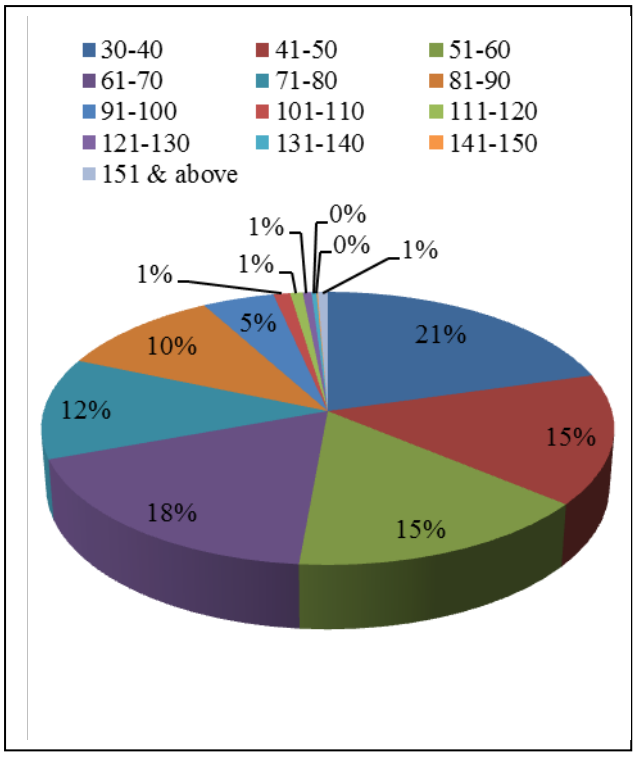


Figure 14.1: Girth class wise with respect to Total stems stems

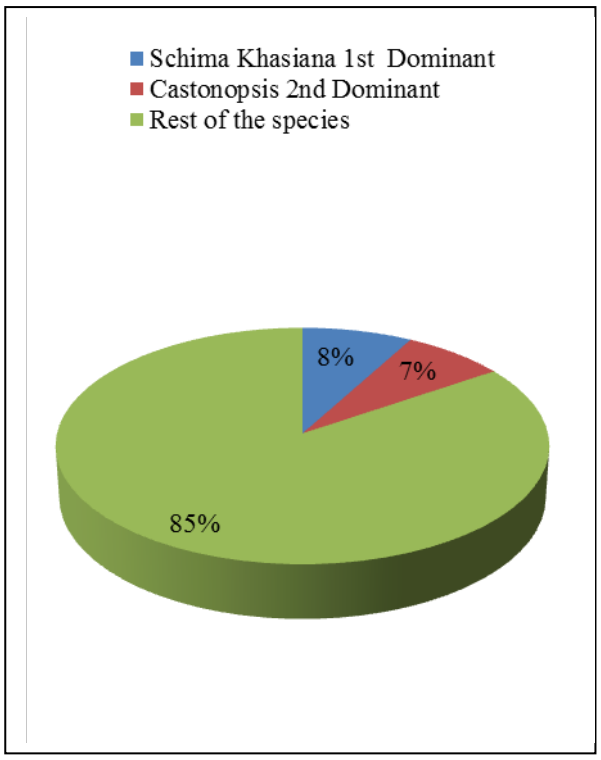


Figure 14.1(a): Specieswise with respect to Total



Figure 14 (a): Showing dense forest cover at Rei-mission Grove Sacred Grove

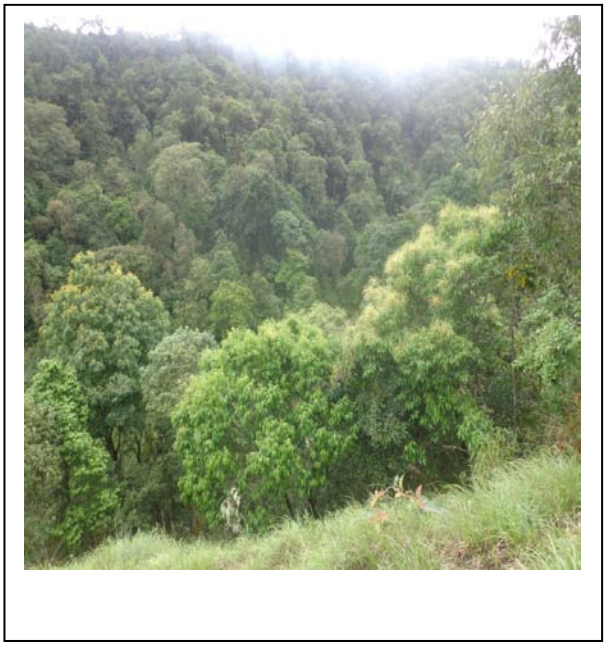


Plate 14 (b): Over view of Rei-mission Sacred

14.8 Growing Stock:

As per the methodology described in Chapter-I, 100% enumeration is carried out in the grove as its area is less than 10ha. Every tree species having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 2513 tree species consisting of 201 *Schima khasiana* (1st dominant), 188 *Castanopsis sps* (2nd dominant), and 2124 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151cm and above. The results are given in table 14.2 for Rei Mission sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 938.498 cubic metres.

Table-14.2
Girth class wise & specieswise volume in the sampled area (Area - 8.59 ha)
(volume in cu.m)

Girth Class Vise	*Schima Khasiana* 1st Dominant	*Castanopsis* 2nd Dominant	Rest of the species	Total	% with respect to total volume
30-40	0.632	1.168	28.306	**30.106**	3.208
41-50	1.445	1.443	50.676	**53.564**	5.707
51-60	4.934	3.733	87.379	**96.046**	10.234
61-70	17.211	11.456	139.680	**168.347**	17.938
71-80	16.392	19.261	119.184	**154.837**	16.498
81-90	25.115	37.737	111.936	**174.788**	18.624
91-100	15.97	13.729	68.022	**97.721**	10.412
101-110	1.769	3.381	24.406	**29.556**	3.149
111-120	1.045	0	26.382	**27.427**	2.922
121-130	0	1.635	21.841	**23.476**	2.501
131-140	1.518	0	13.231	**14.749**	1.572
141-150	1.799	0	2.160	**3.959**	0.422
151 & above	11.992	0	51.930	**63.922**	6.811
Total	**99.822**	**93.543**	**745.133**	**938.498**	**100.000**
% wrt Total volume	**10.636**	**9.967**	**79.3963**	**100.000**	

Table 14.2 shows that the volume contributed by the 1st dominant species (*Schima khasiana*)with respect to the total volume of the grove 10.63%, the 2nd dominant species(*Castanopsis sps.)* is 9.96%, while Rest of the species is maximum i.e. 79.39%. Total volume of the grove is 938.498 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class also increases i.e. girth class is directly proportional to the volume in that class.

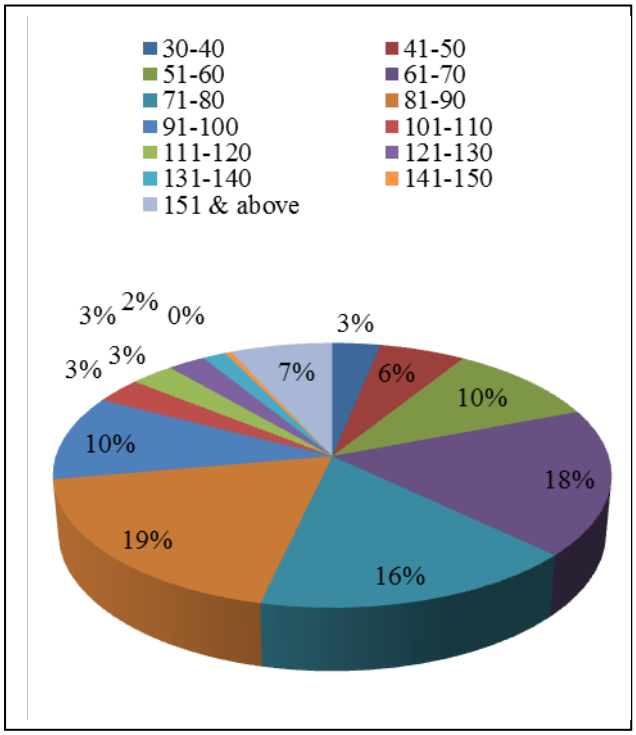


Figure 14.2: Girth class wise with respect to Total Volume Volume

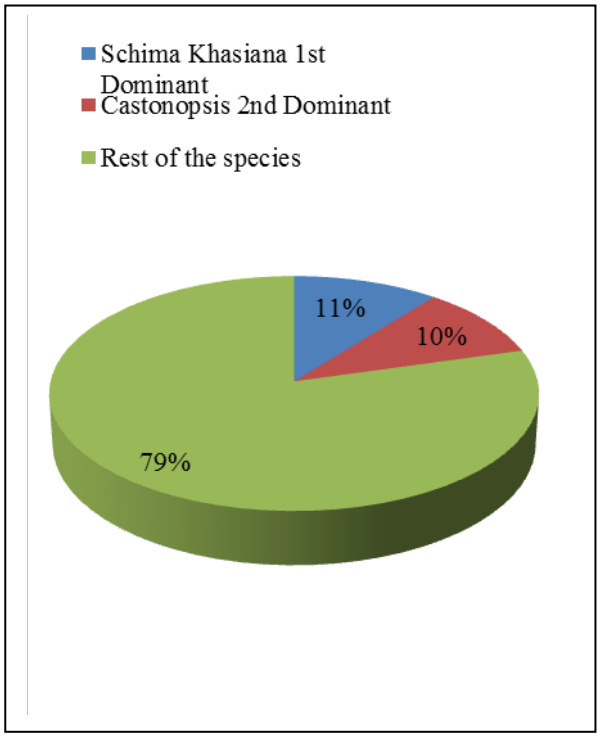


Figure 14.2(a): Specieswise with respect to Total Volume

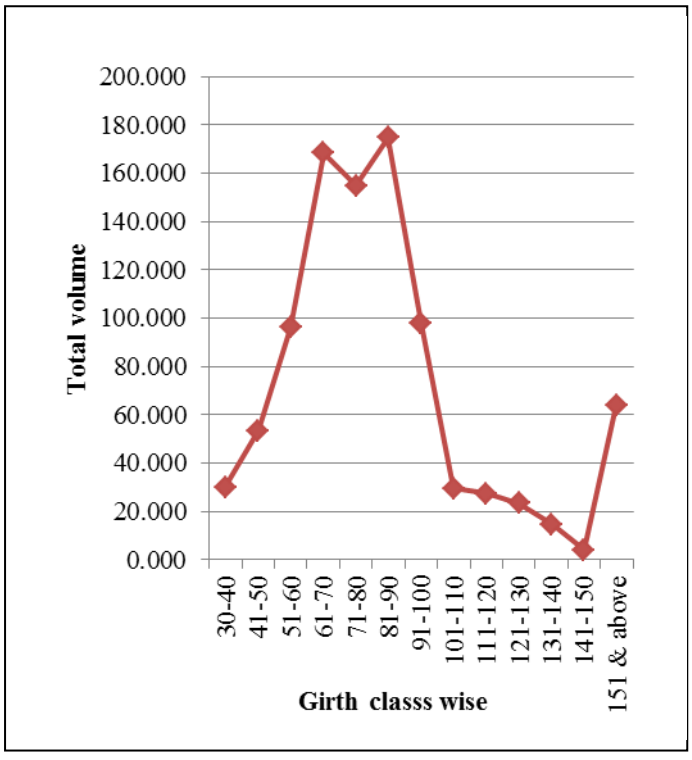


Figure 14.2: Girth class wise with respect to total volume.

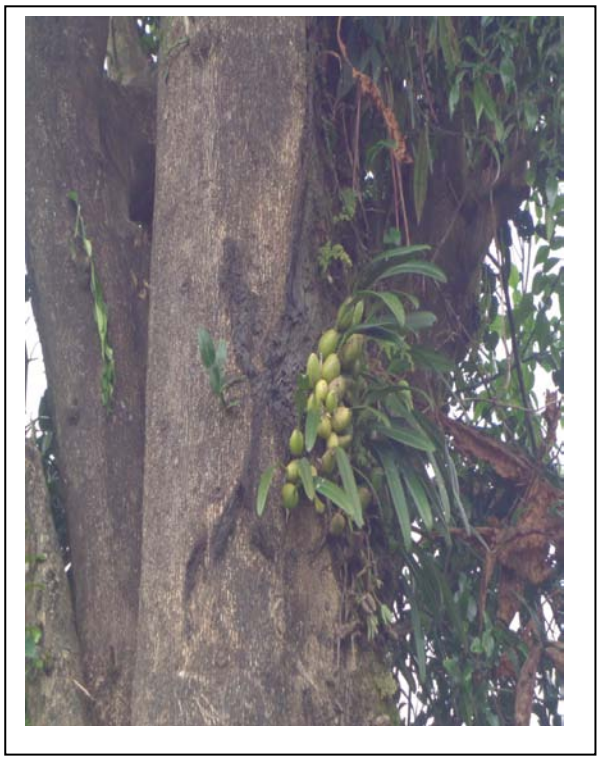


Figure 14 (c): Inside view of Rei-mission Sacred Grove

14.9 Brief note on Management of Law Adong Rei-mission

(i) Protection from biotic interference:-

Felling of timber is strictly prohibited by the village Dorbar and Myntri of Phudjaud village. So far there is no report of any illegal felling of timber, encroachment or grazing in this grove, but poaching cannot be ruled out completely as the forest is left wide open without any protection from any angle. The only way to stop this in the near future is only by declaring this grove into a Community Reserve.

(ii) Fire Control:-

Till date there is no evidence of fire incidence in this grove. But to prevent any such incidence in the years to come, it is highly recommended that an external fire line can be cleared all along the boundary of the grove except in the southern and the eastern part of the grove where Saitsohphan stream flow along its boundary.

(iii) Water stress:-

There are two main streams in this grove, viz. Saitsohphan and Phudjaud stream. They are the main source of water to the plants and animals. If check dam can be created in this stream this will help to restore water especially in the dry seasons. This will also helps spread of fire inside of the grove.

(iv) Demarcation of permanent boundary:-

This can be done by erecting of cement pillars or earth digging all along the boundary except in the southern and eastern part of the grove.

v) Afforestation:-

In few patches tress are scattered especially in the southern part of the grove. In this area plantation by using local indigenous species is highly recommended.

(vi) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

15 - PHLANGWANBROI

15.1 Introduction/Location:

Law Adong Phlangwanbroi is situated in East Khasi Hills District of Meghalaya at Phlangwanbroi village under the Syiemship of Hima Malai Sohmat. It has an area of 9.65 ha and lies between 25° 14′ 50" N to 25° 15′ 00" N latitude and 91° 29′ 00" E to 91° 29′ 20" E longitude with an altitude of 974 m from Mean Sea Level (MSL). It is bounded in the North by Mawphlang- Balat road, in the South by NREGS road, in the East by private land and in the West Wah Mawhknai stream. The grove is accessible by road from Shillong via Mawphlangi-Balat road. It is about 60 km from Shillong.

15.2 Brief History:

As stated by the elders this Sacred grove have originated many years ago. Rituals are no longer performed in this Sacred grove long way back. Felling of trees is strictly prohibited. It is owned and controlled by the Syiem of Hima Malai Sohmat. The State Forest Department has no direct control of the said grove, rather it falls under the jurisdiction of the KHADC.

15.3 Geography and climate:

The topography of the grove is slightly gentle in nature with slope varying from 4° to 15°. The soil texture is sandy loam with boulders friable in consistency. The colour of the soil is brown with high soil dept. soil erosion is negligible. There are three streams that flows along the grove they are Wah Lawadong stream, Umphangei stream and Wah Mawkhnai stream

The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 8°C and maximum is 29°C. Biotic pressure, encroachment, wildfire, hunting and poaching, grazing and illegal felling of timber were found to be absent in this grove.

15.4 Forest type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

15.5 Flora and fauna:

The vegetation is of mixed species. Dominant species found are *Cesearia varieca* and *Castanopsis armata, Inuala cappa,* origin of the forest is natural and it is two storeyed forests. Wildlife from here are jackal, rabbit, wild pig, jungle fowls, pangolin. Various types of birds and reptiles. Conservation significance of the grove is mainly due to:

(a) The virgin forests where human interference is almost zero.
(b) Highlevel endemic plant and animal species.
(c) Existence of many rare endangered plant species.

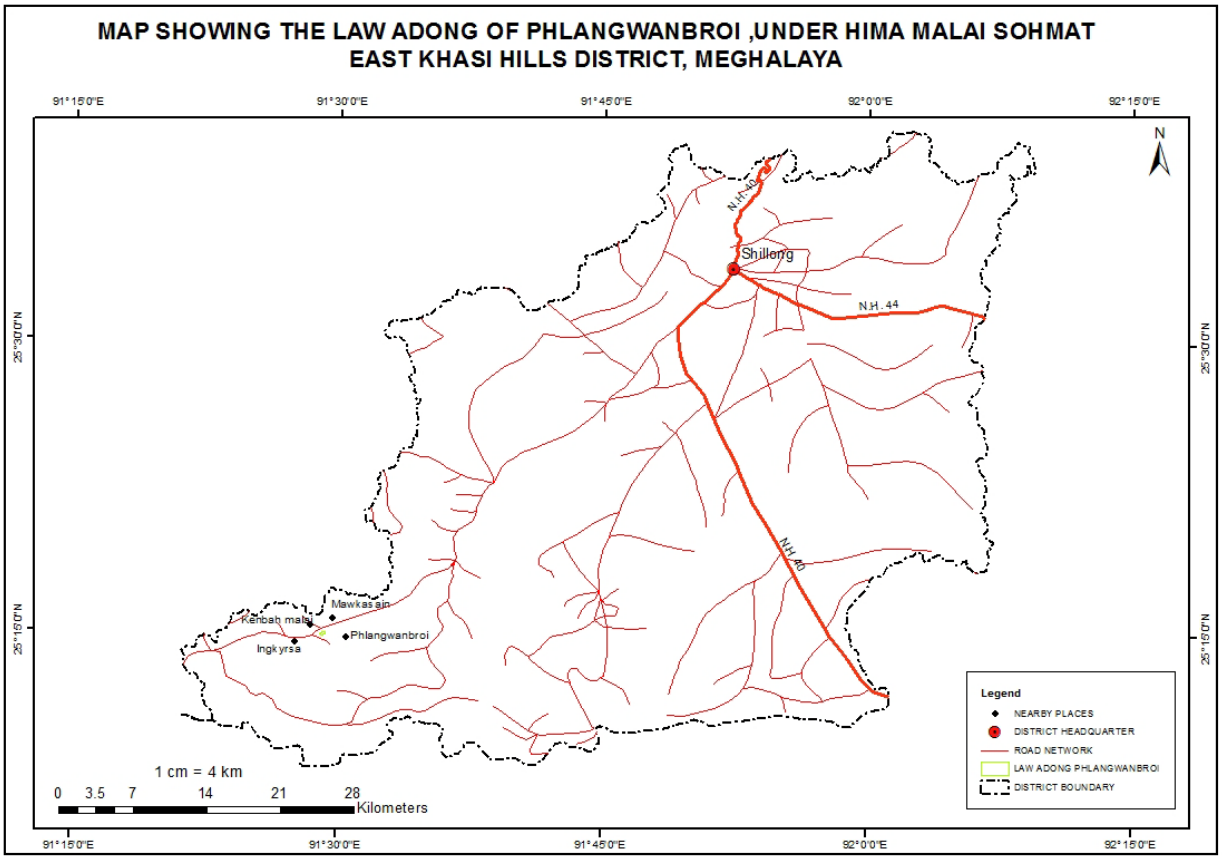
(d) Conservation of flora and fauna and maintaining of rich forest natural resources.

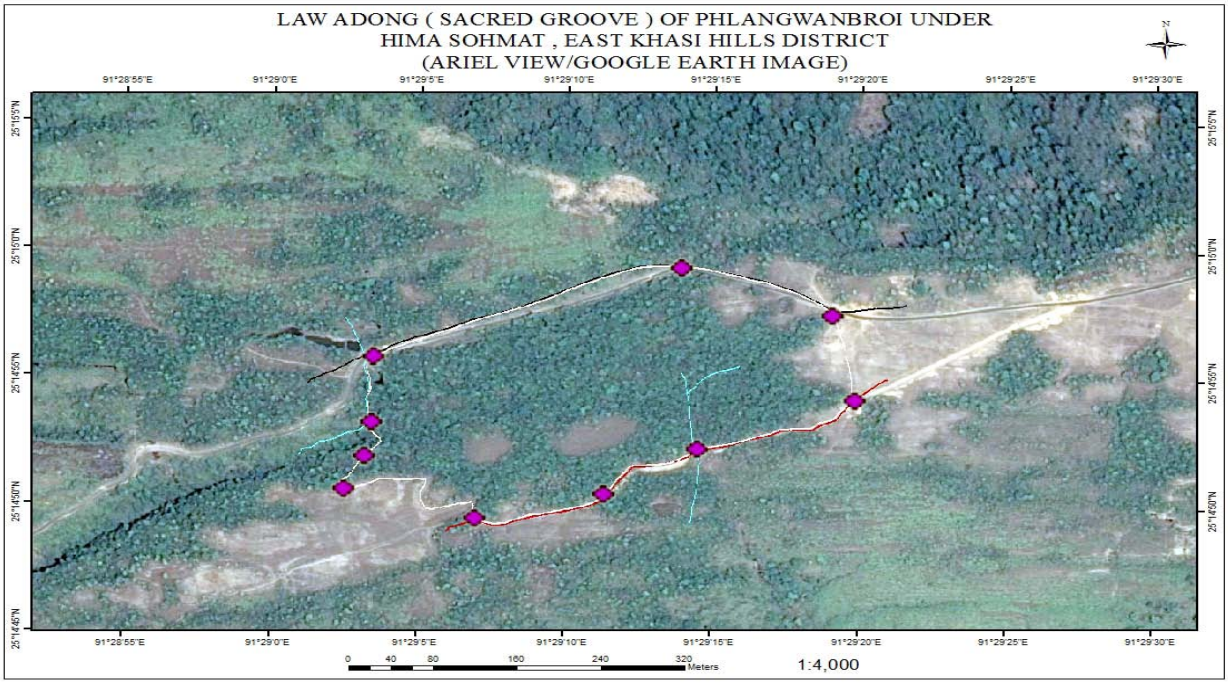
15.6 Floral species:

List of Trees found in Phlangwanbroi Sacred Grove

Sl. No.	Botanical Name	Local Name	Sl. No.	Botanical Name	Local Name
1	*Albizzia lucidor*	Dieng ri	22	*Inuala cappa*	Dieng roin/ Dieng roin lieh
2	*Aralia aramata*	Dieng latymphu	23	*Itea chinensis*	Dieng sohsyrtet
3	*Beilschmiedia brandisii*	Dieng sohkhyllam	24	*Lannea grandis*	Dieng tangleng
4	*Betula alnoides*	Dieng lieng	25	*Litsaea meissneri*	Dieng sohrang
5	*Camelia caduca*	Dieng tyrnem	26	*Michelia champaca*	Dieng rai
6	*Castanopis armata*	Dieng siar	27	*Michelia oblonga*	Dieng taroi
7	*Castanopsis indica*	Dieng sohot	28	*Michelia spp*	Dieng rai-kup
8	*Cesearia varieca*	Dieng rang	29	*Nephelium longana*	Dieng loba
9	*Cinnamomum armata*	Dieng latyrpad	30	*Pantapanox racemasmum*	Dieng tyllongrangsi
10	*Cinnamomum bejolghota*	Dieng tyrdop	31	*Pasania dealbata*	Dieng sohrang/Dieng rang
11	*Cinnamomum pauciflorum*	Dieng sohpawia	32	*Premna bengalensis*	Dieng lalieh
12	*Cinnamomum spp*	Dieng lasi-khla/ Dieng dalshini	33	*Pyrus khasiana*	Dieng shur/ Dieng jhur
13	*Cinnamomum tamala*	Dieng latyrpad	34	*Rhus succedanea*	Dieng kain
14	*Combretum aquamosum*	Dieng sohrisang	35	*Schima khasiana*	Dieng ngan
15	*Elaeocarpus lanceafolios*	Dieng sohkhyllamsim	36	*Stereospurmum chelonoides*	Dieng sir
16	*Engelhardia spiculata*	Dieng lymba	37	*Symplocos chinensis*	Dieng iong
17	*Eugenia jambolena*	Dieng sohthangum	38	*Symplocus khasiana*	Dieng pei
18	*Eurya accuminata*	Dieng pyrshit/ Dieng shit	39	*Vaccinium griiithianum*	Dieng sohryngkhaw
19	*Ficus spp*	Dieng dud	40	*Viburnum carylifolium*	Dieng sohlang dngiem
20	*Glochidion sphaeroxgymum*	Dieng sohum	41	*Zanthoxylum ovalifolium*	Dieng shiah
21	*Ilex venulosa*	Dieng shyieng			

Location map of Phlangwanbroi Sacred Grove





List of orchids, herbs, climbers, and grass found in Phlangwanbroi Sacred Grove, East Khasi Hills

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.		*Dendrobium chrysanthamum*	Orchidaceae
2.		*Eria coroneria*	Orchidaceae
3.		*Bulbaphyllum caryanum*	Orchidaceae

Grass

Sl No.	Local Name	Botanical Name	Family
1.	Phlang tynsok	*Ponium maximum*	Poaceae
2.	Jyrmi	*Dioscorea olata*	Dioscoreaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Tmain khla	*Lycopodium claratum*	Lycopodalis
2.	Jalynthem	*Polygonum chinensis*	Polygonaceae
3.	Jajew	*Begonia roxburghii*	Begoniaceae
4.		*Moesa indica*	Mysinaceae
5.		*Cyathea gigantean*	Cyatheaceae
6.		*Blechmum orientole*	Blechnaceae
7.		*Clerodendrum indicum*	Verbanaceae
8.		*Ajeratum conizoides*	Asteraceae
9.	Sohthud	*Osbekia janonium*	Melostomaceae
10.	Jajew maw	*Begonia caliata*	Begoniaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Sohkrot	*Smilex zeylanium*	Smilacaceae

15.7 Number of Stems:

Number of stems in each girth class and specieswise are given in table 15.1. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40cm to 61-70cm.

Table - 15.1

Girth class-wise and Species-wise no. of stems in the entire grove (Area- 9.65 ha)

Girth Class Vise	1st Dominant *Cesearia varieca*	2nd Dominant *Costonopsis armata*	3rd Dominant *Inuala cappa*	Rest of the species	Total
30-40	112	54	63	1072	**1301**
41-50	55	60	58	686	**859**
51-60	22	37	26	262	**347**
61-70	4	15	10	99	**128**
71-80	1	1	1	31	**34**
81-90	1	0	0	8	**9**
91-100	0	0	0	0	**0**
101-110	0	0	0	1	**1**
111-120	0	0	0	1	**1**
121-130	0	0	0	0	**0**
131-140	0	0	0	0	**0**
141-150	0	0	0	0	**0**
151 & above	0	0	0	0	**0**
Total =	**195**	**167**	**158**	**2160**	**2680**

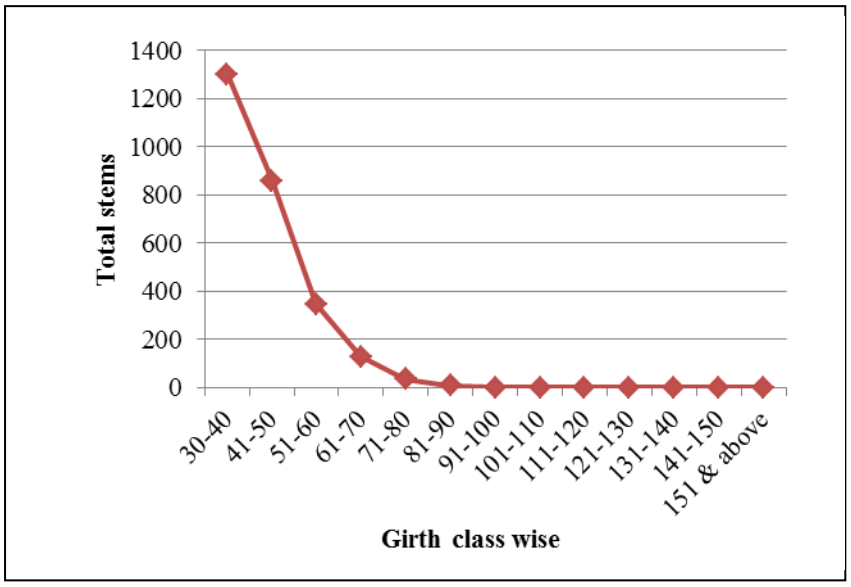


Figure 15.1: Girth class wise with respect to total stems

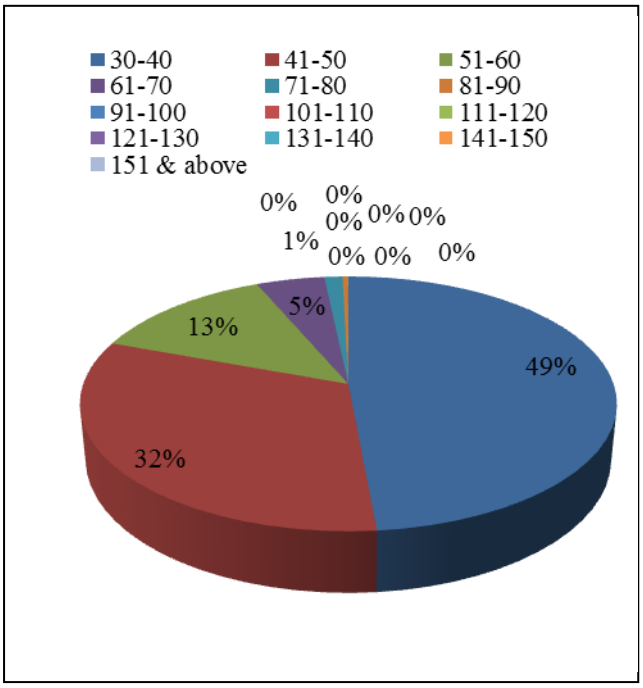


Figure 15.1: Girth class wise with respect to Total stems

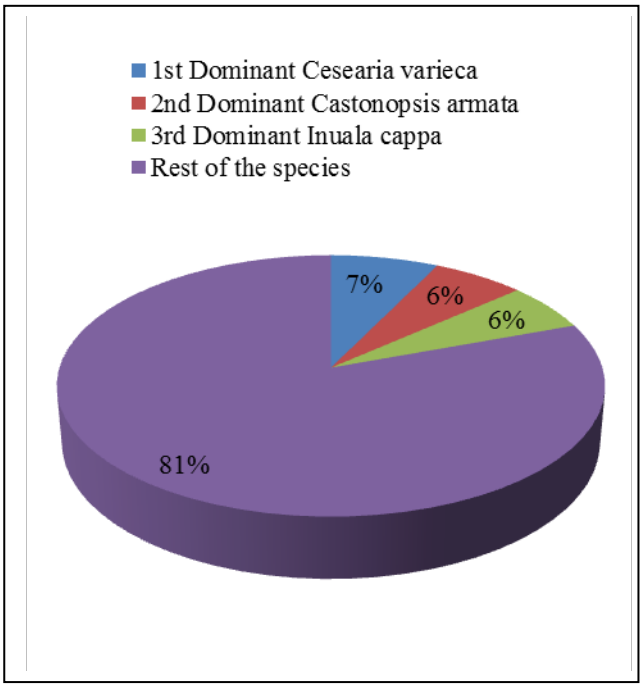


Figure 15.1(a): Species wise with respect to Total stems



Figure 15 (a): Over view of Phlangwanbroi Sacred grove.

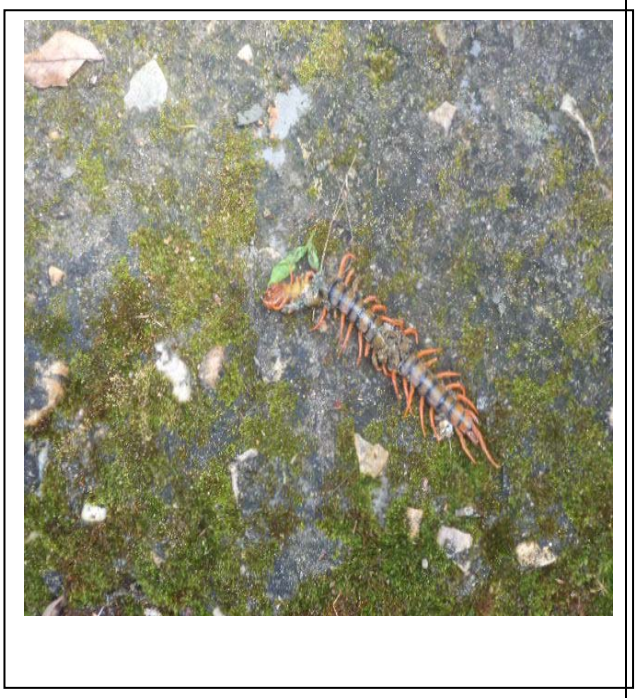


Figure 15 (b): Showing centipede at Phlangwanbroi Sacred Grove.

15.8 Growing Stock:

As per the methodology described in Chapter-I, 100% enumeration is carried out in the grove as its area is less than 10ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 2680 tree species consisting of 195 *Cesearia varieca* (1st dominant), 167 *Costonopsis armata* (2nd dominant), 158 *Inuala cappa,* (3rd dominant) and 2160 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151cm and above. The results are given in table 15.2 for Phlangwanbroi sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 335.820 cubic metres.

Table - 15.2
Girth class wise & specieswise volume in the sampled area (Area- 9.65 ha)
(volume in cu.m)

Girth Class Vise	1st Dominant *Cesearia varieca*	2nd Dominant *Costonopsis armata*	3rd Dominant *Inuala cappa*	Rest of the species	Total	% with respect to total volume
30-40	5.709	2.754	3.483	55.981	**67.927**	20.227
41-50	4.094	8.275	7.833	92.269	**112.471**	33.491
51-60	2.696	9.082	6.168	63.617	**81.563**	24.288
61-70	0.770	5.347	3.893	37.243	**47.253**	14.071
71-80	0.279	0.464	0.718	16.724	**18.185**	5.415
81-90	0.394	0	0	5.585	**5.979**	1.780
91-100	0	0	0	0	**0**	0
101-110	0	0	0	1.043	**1.043**	0.311
111-120	0	0	0	1.399	**1.399**	0.417
121-130	0	0	0	0	**0**	0
131-140	0	0	0	0	**0**	0
141-150	0	0	0	0	**0**	0
151 & above	0	0	0	0	**0**	0
Total	**13.942**	**25.922**	**22.095**	**273.861**	**335.820**	**100.000**
% wrt Total volume	**4.152**	**7.719**	**6.579**	**81.550**	**100.00**	

Table 15.2 shows that the volume contributed by the 1st dominant species(*Cesearia varieca*)with respect to the total volume of the grove 4.15% , the 2nd dominant species(*Costonopsis armata.)* is 7.71% , 3rd dominant species (*Inuala cappa)* is 6.57% while Rest of the species is maximum i.e. 81.54%. Total volume of the grove is 335.820 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class decreases i.e. girth class is not directly proportional to the volume in that class.

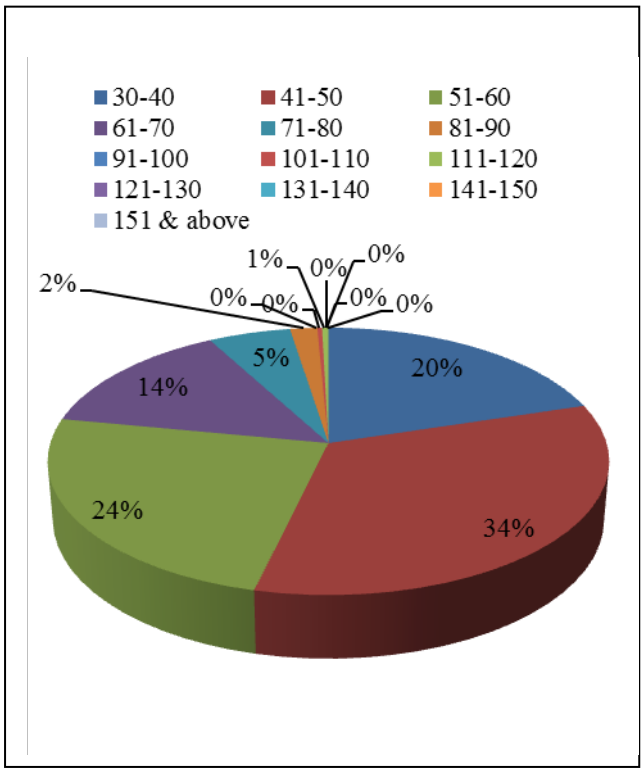


Figure 15.2: Girth class wise with respect to Total Volume Volume

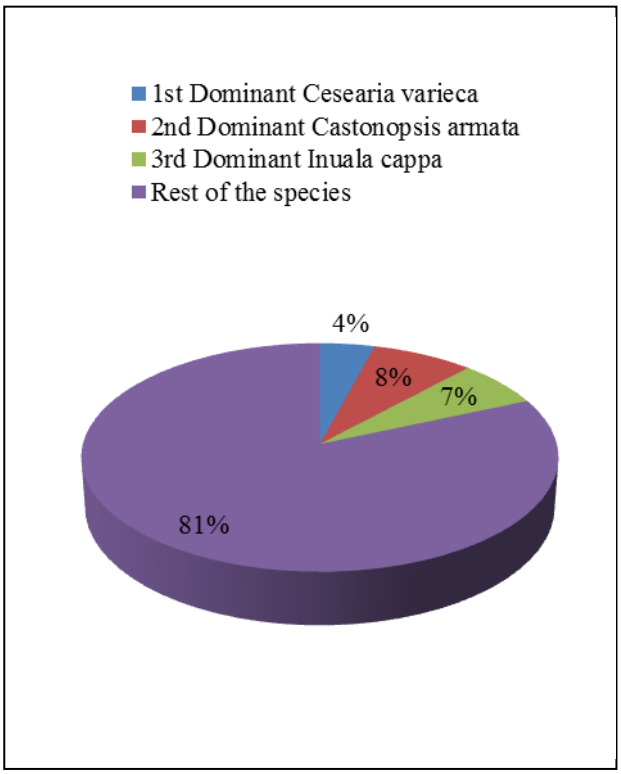


Figure 15.2(a): Species wise with respect to Total

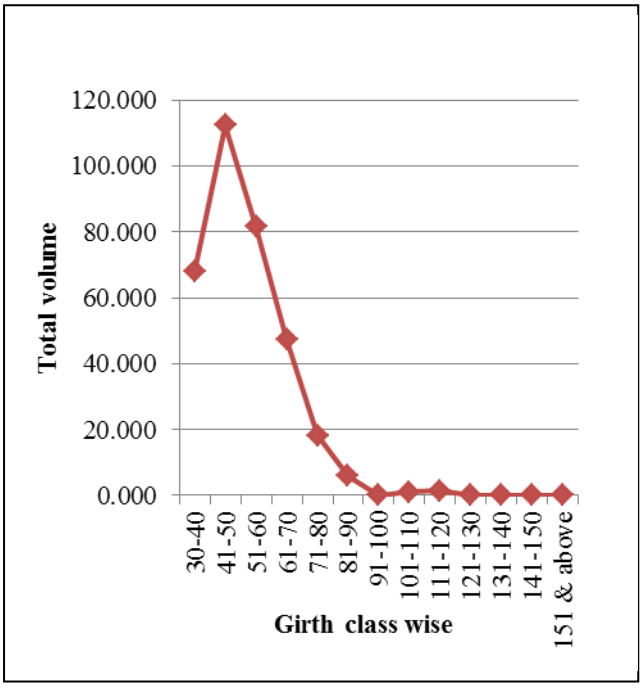


Figure 15.1: Girth class wise with respect to total volume grove

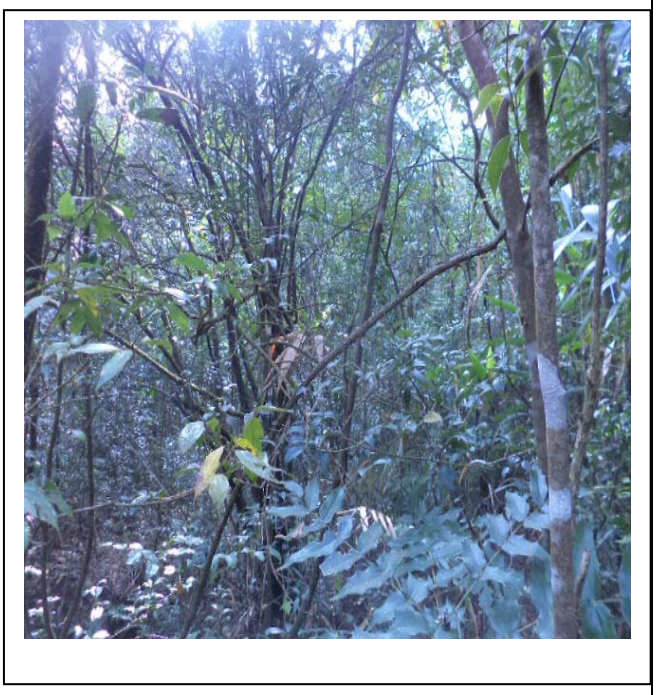


Figure 15 (c): Inside view of Phlangwanbroi Sacred

15.9 Brief Note on Management of Law Adong Phlangwanbroi:

(i) Protection from Biotic Interference:-

This grove is still virgin and highly dense forest cover. Biotic interference is almost negligible. To protect this relic forest from destruction in the years to come, it is highly recommended that the State Forests Department should declare this grove into a Wildlife Community Reserve.

(ii) Fire control:-

During survey works, it is observed that there is no evidence of fire incidence in the past. As this grove is bounded in the North by PWD road from Shillong to Balat and in the South by NREGS road, there is high chance of accidental fire occurrence in the years to come especially during dry seasons. To protect such unwarranted incidence, external fire clearance can be cleared annually especially in the Northern and Southern side of the grove.

(iii) Water stress:-

There are three streams that are flowing in this grove i.e. Wah Mawkhnai, Umphangei and Wah Lawadong stream. These streams serve as a source of water to both plant and animal species. But to improve moisture content of the soil check dams will only serve the purpose, this will also checks soil erosion.

(iv) Construction of permanent boundary:-

To avoid encroachment in the years to come, permanent boundary pillars of earth's digging can be created especially in the eastern and western part of the grove.

(v) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

16 - RAITONG

16.1 Introduction/Location:

Law Adong Raitong is situated in Ribhoi District of Meghalaya at Raitong village under the Syiemship of Hima Mylliem. It has an area of 54.7 ha and lies between 25° 47′ 42" N to 25° 48′ 22" N latitude and 92° 1 8" E to 92° 2′ 2" E longitude with an altitude of 1138 m from Mean Sea Level (MSL). It is bounded in the North by land of Medrial, Umkhylka stream and land of T. Sylliang, in the South by land of Has Lyngdoh and Pharwis Makri, in the East by land of Has Lyngdoh and Naia Makdoh and in the West by land of Dikshon Makdoh, Rose Syngkli, Elian Syngkli and land of Medral. The grove is accessible by road from Shillong via Shillong-Raitong road. It is about 40 km from Shillong.

16.2 Brief History:

This Sacred grove have originated many years ago. Rituals are no longer performed in this Sacred grove long way back. Felling of trees is strictly prohibited. It is owned and controlled by the Raid Raitong. In some area where the patches is blank, cultivation of ginger is allowed but without destroying the forest. The State Forest Department has no direct control of the said grove, rather it falls under the jurisdiction of the KHADC.

16.3 Geography and climate:

The topography of the grove is slightly gentle in nature with slope varying from 4° to 13°. The soil texture is clayey loam with boulders and friable in consistency. The colour of the soil is brown with high soil dept. soil erosion is negligible. There are two streams that flows along the grove they are Wah Rnial stream, and Wah Umkhyllka stream

The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 10°C and maximum is 31°C. Biotic pressure, encroachment , wildfire, hunting and poaching, grazing and illegal felling of timber were found to be absent in this grove.

16.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

16.5 Flora and fauna:

The vegetation is of mixed species. Dominant species found are *Schima khasiana, Costonopsis indica, Betula alnoides and Pinus khasiana,* origin of the forest is natural and it is two storeyed forests. Wildlife from here are jackal, rabbit, wild pig, jungle fowls, pangolin. Various types of birds and reptiles.Conservation significance of the grove is mainly due to:

(a) The virgin forests where human interference is almost zero.

(b) High level endemic plant and animal species.

(c) Existence of many rare endangered plant species.

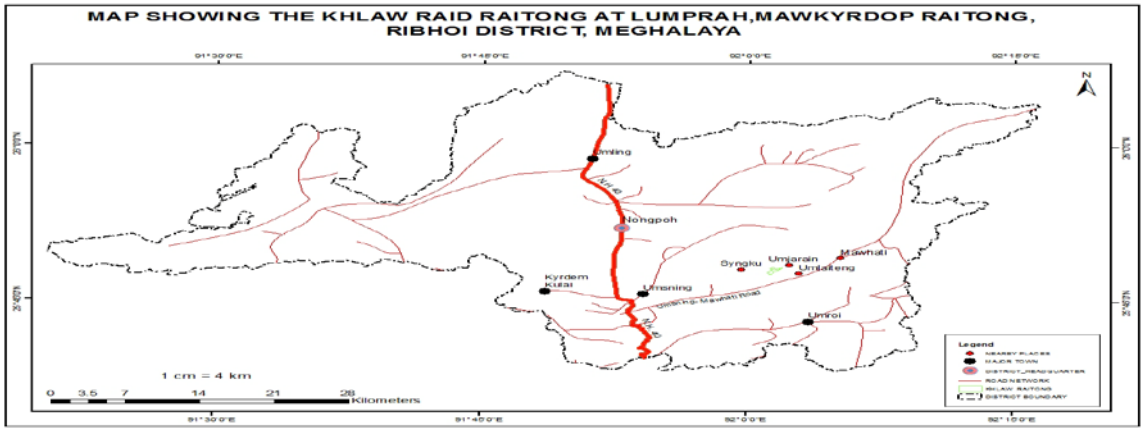
(d) Conservation of flora and fauna and maintaining of rich forest natural resources.

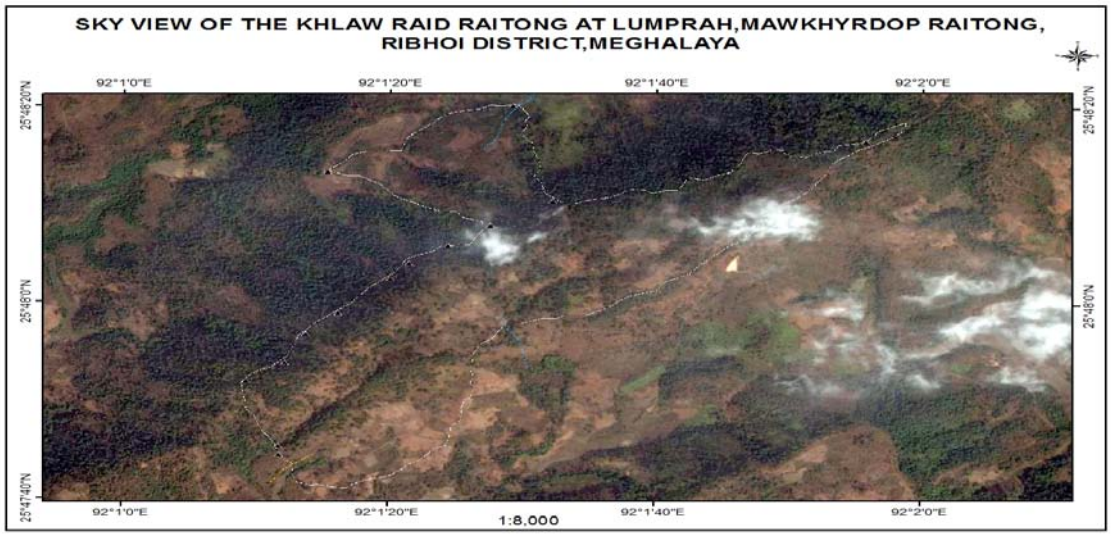
16.6 Floral species:

List of Trees found in Raitong Sacred Grove, Ri Bhoi District

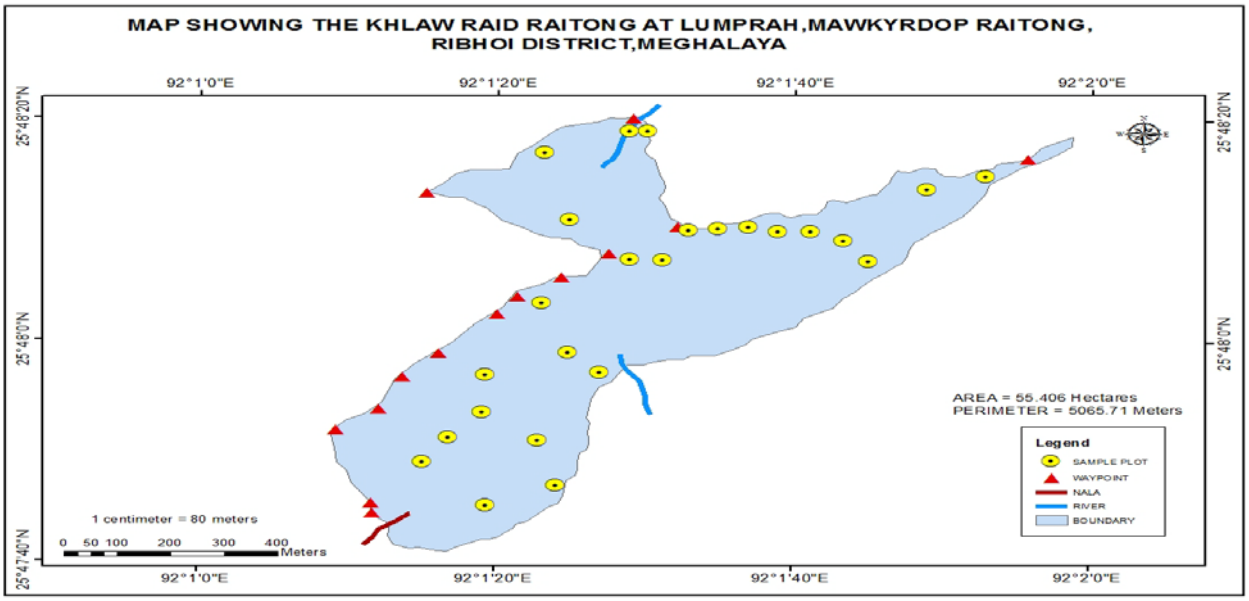
Sl No.	Botanical Name	Local Name	Sl No.	Botanical Name	Local Name
1	*Albezzia lebbek*	Dieng kreit	15	*Macaranga denticulate*	Dieng lakhar
2	*Albizyia stipulata*	Dieng phyllut	16	*Michelia champaca*	Dieng rai
3	*Betula alnoides*	Dieng lieng	17	*Myrica nagi*	Dieng sohliya
4	*Bombox ceiba*	Dieng kya	18	*Pinus khasiana*	Dieng kseh
5	*Carya arborea*	Dieng slabiri	19	*Polygala arillata*	Dieng jakba
6	*Castanopis indica*	Dieng sohot	20	*Pterospermum acerifolium*	Dieng tharomasi
7	*Castanopsis armata*	Dieng sohpair	21	*Rhus succedanea*	Dieng kain
8	*Elaeocarpus lanceafolios*	Dieng sohkhyllam	22	*Schima wallichi*	Dieng ngan
9	*Emblica officimalis*	Dieng sohmylleng	23	*Sizigium cumini*	Dieng sohrimai
10	*Engelhardtea spicata*	Dieng lymba	24	*Spondias axillaris*	Dieng sohlait
11	*Eurya accuminata*	Dieng shit	25	*Spondias mangifera*	Dieng soh pa-ir
12	*Gmelina arborea*	Dieng laphiang	26	*Sterculia villosa*	Dieng tluh
13	*Itea chinensis*	Dieng sohsyrtet	27	*Syziqium cumini*	Deing rmai
14	*Toona ciliate*	Dieng sali			

Location Map of Raitong Sacred Grove





Map showing sample plots of Raitong Sacred grove



List of shrubs, herbs, climbers, grass, bamboo, orchids found in Raitong, Sacred Grove, Ri Bhoi.

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng sohshyllew khyndew	*Phoenix edulis*	Arecaceae
2.	Dieng sohyllew	*Phoenix humillis*	Arecaceae
3.	Dieng jakba	*Eurya japonica*	Theaceae
4.	Dieng sohma	*Rhus semi-alata*	Anacardiaceae
5.		*Anona salicifolia*	Anoniaceae
6.	Dieng sohkynbat	*Leea macroplhylla*	Leeaceae
7.	Dieng pasohmasi	*Engelhardtia calebrukianum*	Juglandaceae
8.		*Carpinus alnoides*	Betulaceae
9.		*Cinnamomum glucens*	Lauraceae
10.		*Itea microphyllum*	Sexifragaceae
11.	Kaitkhlaw	*Musa accuminata*	Musaceae
12.		*Lyonia ellipticus*	Ericaceae
13.		*Lyonia ovalifolia*	Ericaceae
14.	Dieng sohkhristmas	*Chloranthus brachystachys*	Rubiaceae
15.		*Thysonaelia maxima*	Poaceae
16.		*Aralia armata*	*Araliaceae*
17.		*Ficus hirta*	Moraceae
18.		*Holarrhena antidysentrica*	Apocynaceae
19.		*Amomum dealbata*	Zingirberaceae
20.		*Lindira salicafolia*	Lauraceae
21.	Sder	*Sacrum procerum*	Poaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.		*Melastama melabaricum*	Malostomaceae
2.		*Lantana camera*	Verbeanaceae
3.		*Eupatorium oderatum*	Asteraceae
4.		*Chrysanthamum odoratum*	Lamiaceae
5.	Tyrkhang	*Brainea insignis*	Blechnaceae
6.		*Hedychium ellipticum*	Zingiberaceae
7.	Tyrkhang	*Blechnum orientate*	Blechnaceae
8.	Tyrkhang	*Cyathea gigantea*	Cyatheaceae
9.		*Ammomum aromaticum*	Zingiberaceae
10.		*Begonia roxburghii*	Begoniaceae
11.		*Chlorophytum tubarosum*	Asparagaceae
12.		*Vernonia cineria*	Asteraceae

13.	Lakud	*Carculago recurba*	Carculagoceae
14.		*Sidarhomgifolia*	Malvaceae
15.		*Gymura crepizoides*	Asteraceae
16.		*Osbekia crinata*	Melastomaceae
17.		*Saussurea scandens*	Asteraceae
18.		*Helianthus chinensis*	Asteraceae
19.		*Hedyotese lanciolata*	Rubiaceae
20.		*Blumia radigata*	Asteraceae
21.		*Ajeratum conizoides*	Asteraceae
22.		*Ainslia spinosa*	Asteraceae
23.		*Bidens spilosa*	Asteraceae
24.		*Crotolaria vagans*	Papilionaceae

GRASS

Sl No.	Local Name	Botanical Name	Family
1.		*Cymbepogon flexus*	Iridaceae
2.		*Themeda wallichii*	Poaceae
3.		*Fragmetis karta*	Poaceae
4.		*Inola cappa*	Asteraceae
5.		*Saccrum crysanthamum*	Poaceae
6.		*Chrysopogon aciculatus*	Poaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Jatap masi	*Argyreianervosa*	Convolvulaceae
2.	Bat refugee	*Mokania micrantha*	Asteraceae
3.		*Rubus ellipticus*	Rosaceae
4.	Sohkrot	*Smilax perfoliata*	Smilacaceae
5.		*Hedyotese lenciolata*	Rubiaceae

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.		*Vanda coerulia*	Orchidaceae
2.		*Dendrobium ophyllum*	Orchidaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Siej shken	*Bambusa tulda*	Poaceae

2.	Siej khlaw	*Bambosa khasiana*	Poaceae

16.7 Number of Stems:

Number of stems in each girth class and specieswise are given in table 16.1 & 16.2. The table shows that maximum numbers of stems are found in lower girth classes i.e. from 30-40cm to 51-60cm.

Table-16.1
Girth class wise and Specieswise no. of stems in the sampled area (25 plots - 5 ha)

Girth class wise	*Schima Wallichii* 1st dominant	*Costonopsis indica* 2nd dominant	*Pinus khasiana*	*Betula alnoides* 3rd dominant	Rest of the species	Total
30-40	70	24	21	10	60	**185**
41-50	42	28	30	14	34	**148**
51-60	34	13	28	17	18	**110**
61-70	9	8	26	14	4	**61**
71-80	6	9	34	7	3	**59**
81-90	3	2	36	7	8	**56**
91-100	1	5	45	2	1	**54**
101-110	0	2	26			**28**
111-120	0	0	28			**28**
121-130	0	0	23			**23**
131-140	0	0	9			**9**
141-150	0	0	2		1	**3**
151 & above	0	0	6			**6**
Total	**165**	**91**	**314**	**71**	**129**	**770**

Table-16.2
Girth class wise and Specieswise no. of stems in the entire grove (Area 54.7 ha)

Girth class wise	*Schima Wallichii* 1st dominant	*Costonopsis indica* 2nd dominant	*Pinus khasiana*	*Betula alnoides* 3rd dominant	Rest of the species	Total
30-40	766	263	109	230	656	**2024**
41-50	459	306	153	328	372	**1619**
51-60	372	142	186	306	197	**1203**
61-70	98	88	153	284	44	**667**
71-80	66	98	77	372	33	**645**
81-90	33	22	77	394	88	**613**
91-100	11	55	22	492	11	**591**
101-110	0	22	0	284	0	**306**
111-120	0	0	0	306	0	**306**
121-130	0	0	0	252	0	**252**
131-140	0	0	0	98	0	**98**
141-150	0	0	0	22	11	**33**
151 & above	0	0	0	66	0	**66**

Total	**1805**	**996**	**777**	**3435**	**1411**	**8424**

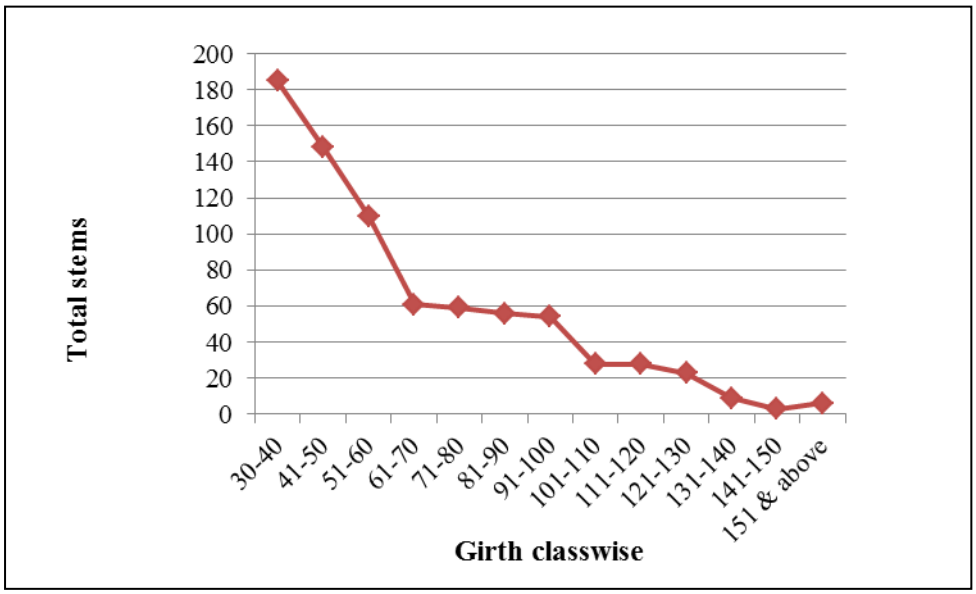


Figure 16.1: Girth class wise with respect to total stems

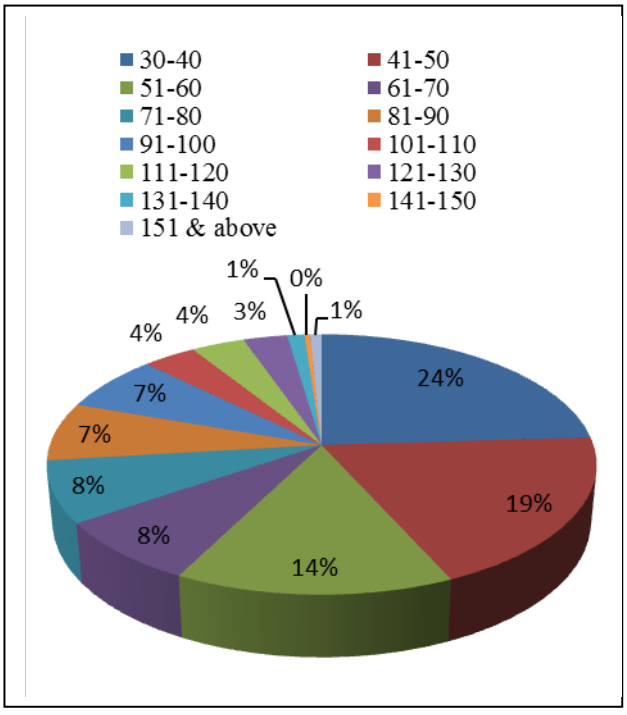


Figure 16.1: Girth class wise with respect to Total stems stems

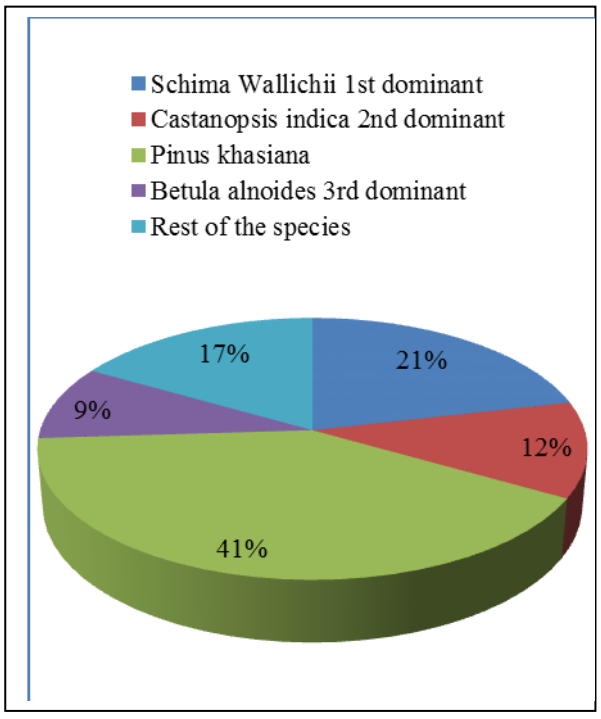


Figure 16.1 (a): Species wise with respect to Total

16.7 Growing Stock:

As per the methodology described in Chapter-I, 10% enumeration is carried out in the grove as its area is more than 50ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In 25 plots of 0.2 ha size, i.e. 5 ha, data was collected for 770 tree species consisting of 165 *Schima khasiana* (1st dominant), 91 *Costonopsis indica*. (2nd dominant), 71 *Betula alnoides*, (3rd dominant), 314 *Pinus khasians* and 129 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40cm to 151cm and above. The results are given in table 16.3 & 16.4 for Raitong sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 4304.567 cubic metres.

Table-16.3

Species wise girth classwise volume in the sampled area (25 plots- 5 ha)

(volume in cu.m)

Girth class wise	*Schima Wallichii* 1st dominant	*Costonopsis indica* 2nd dominant	*Pinus khasiana*	*Betula alnoides* 3rd dominant	Rest of the species	Total
30-40	6.068	1.361	5.830	0.461	3.350	**17.070**
41-50	6.227	3.798	9.223	2.106	6.799	**28.153**
51-60	7.553	3.103	10.775	3.924	8.458	**33.813**
61-70	3.091	2.867	12.921	5.270	6.887	**31.036**
71-80	2.557	4.553	21.087	7.554	5.215	**40.966**
81-90	1.755	1.309	28.204	4.649	10.276	**46.193**
91-100	0.8	4.411	42.943	1.729	2.623	**52.506**
101-110	0	2.223	29.981	0	0	**32.204**
111-120	0	0	38.109	0	0	**38.109**
121-130	0	0	37.021	0	0	**37.021**
131-140	0	0	17.040	0	0	**17.040**
141-150	0	0	4.227	0	2.351	**6.578**
151 & above	0	0	17.366	0	0	**17.366**
Total	**28.051**	**23.625**	**274.727**	**25.693**	**45.959**	**398.055**

Table-16.4

Species wise girth classwise volume in the entire grove (Area – 54.07 ha)

(volume in cu.m)

Girth class wise	*Schima Wallichii* 1st dominant	*Costonopsis indica* 2nd dominant	*Pinus khasiana*	*Betula alnoides* 3rd dominant	Rest of the species	Total	% wrt total volume
30-40	66.38	14.89	63.78	5.04	36.65	**186.75**	4.29
41-50	68.12	41.55	100.90	23.04	74.38	**307.99**	7.07
51-60	82.63	33.95	117.88	42.93	92.53	**369.91**	8.49
61-70	33.82	31.36	141.36	57.65	75.34	**339.53**	7.80
71-80	27.97	49.81	230.69	82.64	57.05	**448.17**	10.29
81-90	19.20	14.32	308.55	50.86	112.42	**505.35**	11.60
91-100	8.75	48.26	469.80	18.92	28.70	**574.42**	13.19
101-110	0.00	24.32	327.99	0.00	0.00	**352.31**	8.09
111-120	0.00	0.00	416.91	0.00	0.00	**416.91**	9.57
121-130	0.00	0.00	405.01	0.00	0.00	**405.01**	9.30
131-140	0.00	0.00	186.42	0.00	0.00	**186.42**	4.28
141-150	0.00	0.00	46.24	0.00	25.72	**71.96**	1.65
151 & above	0.00	0.00	189.98	0.00	0.00	**189.98**	4.36
Total	**306.88**	**258.46**	**3005.51**	**281.08**	**502.79**	**4354.72**	**100.00**
% wrt total volume	**7.05**	**5.94**	**69.02**	**6.45**	**11.55**	**100.00**	

Table 16.4 shows that the volume contributed by the 1st dominant species (*Schima khasiana*)with respect to the total volume of the grove is 7.05% , the 2nd dominant species(*Costonopsis indica.)* is 5.94%, 3rd dominant species (*Betula alnoides)* is 6.45%, *Pinus khasiana* is 69.02 while Rest of the species is 11.55%. Total volume of the grove is 4304.567 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class increases i.e. girth class is directly proportional to the volume in that class.

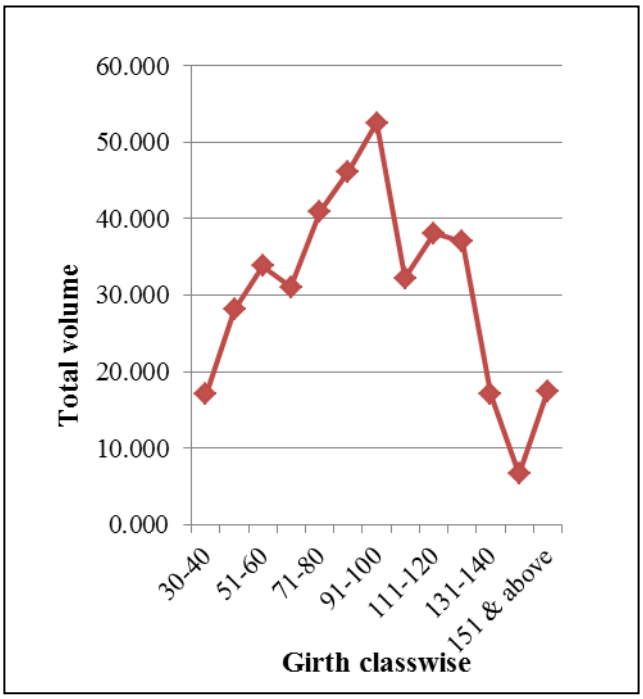


Figure 16.3: Girth class wise with respect to total volume

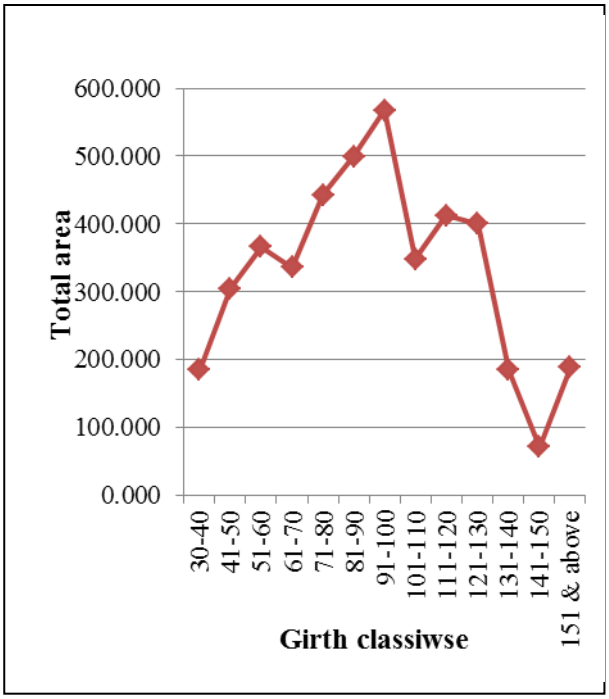


Figure 16.4: Girth class iwse with respect to total area

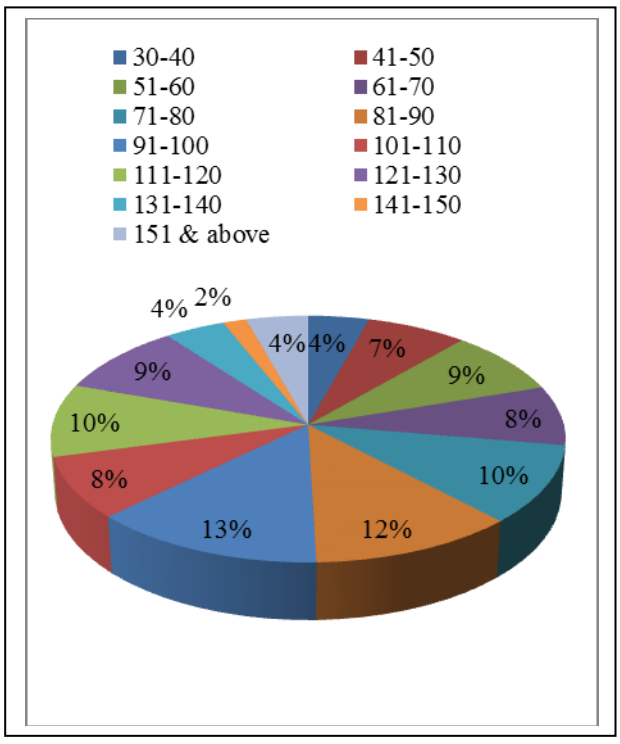


Figure 16.4: Girth class wise with respect to Total volume

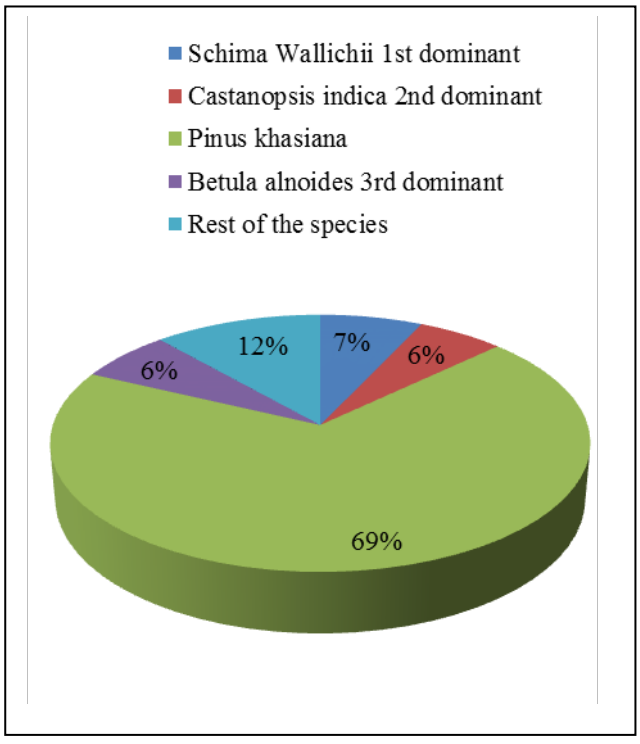


Figure 16.4(a): Species wise with respect to Total volume



Figure 16 (a): Jhum cultivation inside Raitong Sacred grove



Figure 16 (b): Staff in action



Figure 16 (c): Inside view of Raitong Sacred Grove.



Figure 16 (d): Showing measurement of girth at Raitong Sacred Grove.

16.9 Brief Note on Management of Law Adong Raij Raitong:

(i) Protection from Biotic Interference:-

In this grove cultivation of ginger is allowed in blank areas which is the main concerned of biotic pressure. Although cutting or felling of trees is strictly prohibited by the Raij Raitong, but illegal poaching, grazing cannot be ruled out. Encroachments were found to be absent. To check such practices in the future it is high time that this grove be declared as a Community Reserve.

(ii) Fire control:-

In some areas where cultivation is permitted by the Raij, burning of weeds is generally carried out by the cultivators without spreading it into the forest area. Further this grove is mainly bounded by private forest there is every chances of spreading of fire inside the grove. To prevent such incidences, an external fire line may be cleared every year all along the boundary of the grove especially before the onset of dry seasons.

(iii) Water stress:-

There are only two streams in this grove they are Wah Rngai and Wah Umkhylla stream. These two streams are only sources of drinking water for wild animals. Hence it is suggested that if more check dams can be created this will serves not only for the purpose of drinking water to wild animals but also as a source of moisture content of the soil in particular of plants in general.

(iv) Boundary demarcation:-

To avoid encroachment proper marking of the boundary is highly recommended. This can be done by fixing RCC pillars or earth's diggings all along the boundary this will also act as fire line.

(v) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

(vi) Afforestation:-

To improve the forest cover of this grove plantation with pine and other local indigenous species can be carried out in some part of this grove. This can be done through respective Division of the Department.

17 - KHLO BLAI LYNGDOH

17.1 Introduction/Location:

Khlo Blai Lyngdoh is situated in West Jaintia Hills District of Meghalaya at Raliang village under the Elaka of Raliang. It has an area of 3.68 ha and lies between 25° 29′ 46" N to 25° 29′ 52" N latitude and 92° 23′ 28" E to 92° 23′ 40" E longitude with an altitude of 1342 m from Mean Sea Level (MSL). It is bounded in the North by land of Mrs. K. Suchiang and football field, in the South by Duid Umphia stream in the East by Umtyllu stream and in the West Duid umphia stream. The grove is accessible by road from Shillong via Jowai- Raliang road. It is about 15km from Jowai.

17.2 Brief History:

This Sacred grove have originated many years ago. Ritual is performed in this grove every year in the past, after killing of wild animal, especially tiger, the Lyngdoh put the head of the animal at the top of a banyan tree which is still present but in the past few years they have shifted this practice to another grove, the Khlo Kyntang Pohpuja, Raliang. Till date sacrificing place is still evident. Entry is strictly prohibited without the knowledge of the Lyngdoh. Felling of trees is strictly prohibited. It is controlled by the Dolloi of Elaka Raliang. The State Forest Department has no direct control of the said grove, rather it falls under the jurisdiction of the JHADC.

17.3 Geography and climate:

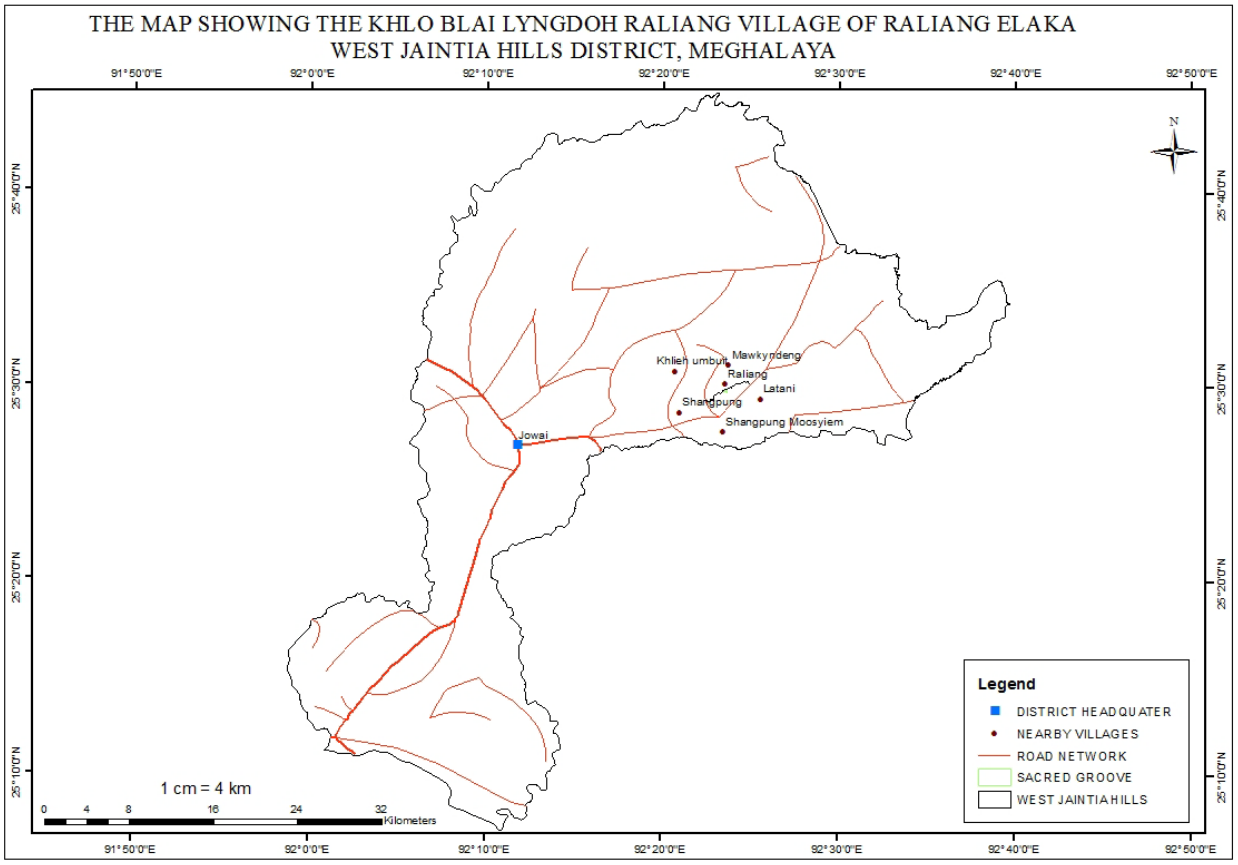
The topography of the grove is slightly gentle in nature with slope varying from 4° to 15°. The soil texture is clayey loam with no fragments and friable in consistency. The colour of the soil is brown with high soil dept. soil erosion is negligible. There are two streams that flows along the grove they are Duid Umphia stream, and Umtyllu stream.

The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 10°C and maximum is 30°C. Biotic pressure, encroachment , wildfire, hunting and poaching, grazing and illegal felling of timber were found to be absent in this grove.

17.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

Location Map of Khlo Blai Lyngdoh Sacred Grove





17.5 Flora and fauna:

The vegetation is of mixed species. Dominant species found are *Symplocus chinensis, Itea chinensis,* origin of the forest is natural and it is two storeyed forests. Wildlife here are jackal, rabbit, wild pig, jungle fowls, pangolin. Various types of birds and reptiles.Conservation significance of the grove is mainly due to:

(a) The virgin forests where human interference is almost zero.

(b) High level endemic plant and animal species.

(c) Existence of many rare endangered plant species.

(d) Conservation of flora and fauna and maintaining of rich forest natural resources.

17.6 Floral species:

List of Trees found in Raliang Sacred Grove, Janitia Hills District

Sl No.	Botanical Name	Local Name	Sl No.	Botanical Name	Local Name
	Betula alnoides	Dieng lieng		*Inuala cappa*	Dieng lalieh
	Bombax ceiba	Dieng ruin		*Itea chinensis*	Dieng sohrynted
	Caryota uren	Dieng tlai		*Macaranga denticulate*	Dieng lakhar
	Castanopsis armata	Dieng sning		*Myrica indica*	Dieng sohliya
	Castanopsis indica	Dieng sohot		*Pithecellboiu heterophylum*	Dieng iap-iar
	Eurya accuminata	Dieng pyrshit		*Quercus dealbata*	Dieng sai
	Ficus spp	Dieng jri		*Rhus succedanea*	Dieng kain
	Grewia abutilifolia	Dieng sohme blang		*Schima khasiana*	Dieng ngan khlaw
	Ilex venulosa	Dieng shyieng		*Synplocus chinensis*	Dieng iong
	Zanthoxylum ovalifolium	Dieng shiah			

List of shrubs, herbs, climbers, grass, and orchids found in Khlo Blai Raliang Sacred Grove, West Jaintia Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Soh myllen	*Phyllanthue embelica*	Enphorbiaceae
2.	Sohpang khlieh	*Latana camera*	Verbenaceae
3.	Soh byrthied	*Urena lobata*	Malvaceae
4.		*Musa acuminata*	Musaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.		*Cyathea spinulosa*	Cyatheaceae
2.	Soh ngan	*Solanum nigrum*	Solanaceae

3.	Bat jamew	*Eupetarium infertunitum*	Asteraceae
4.	Bat japan	*Ageratine adunophora*	Asteraceae
5.	Sying khlaw	*Hedychium spicata*	Zingiberaceae
6.	Wangkhlaw	*Colocasia escultenta*	Araceae
7.	Sohbyrthid	*Achyranthes aspera*	Amanthaceae
8.		*Euphorbia hirta*	Euphorbiaceae

GRASS

Sl No.	Local Name	Botanical Name	Family
1.		*Acorus calamus*	Arecaceae
2.		*Ageratina adenophora*	Asteraceae
3.		*Setaria palmifolia*	Poaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Riphin	*Calamus acanthospathus*	Arecaceae
2.	Tmainkhla	*Lycopodium cernum*	Lycopodaceae
3.	Sohkrot	*Smilax glancophylla*	Smilacaceae
4.		*Rhaphidophora pertusa*	Analiaceae
5.		*Rubus muluceanus*	Rasaceae

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew dieng	*Vanda roxburghii*	Orchidaceae
2.	Tiew dieng	*Bulbophyllum gymnopus*	Orchidaceae
3.		*Pholidata convallariae*	Orchidaceae

17.8 Number of Stems:

Number of stems in each girth class and specieswise are given in table 17.1.The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40cm to 101-110cm classes.

Table-17.1

Girth class wise and specieswise no. of stems in the entire grove (Area 3.68 ha)

Girth class wise	*Symplocos chinensis 1st* dominant	*Itea chinensis 2nd* dominant	Rest of the species	Total Stems
30-40	11	14	67	**92**
41-50	10	9	64	**83**
51-60	12	8	76	**96**
61-70	21	8	166	**195**
71-80	16	10	116	**142**
81-90	23	13	108	**144**
91-100	13	6	88	**107**
101-110	14	9	94	**117**
111-120	8	4	71	**83**
121-130	2	3	56	**61**
131-140	3	3	28	**34**
141-150	3	3	47	**53**
151 & above	11	8	215	**234**
Total	**147**	**98**	**1196**	**1441**

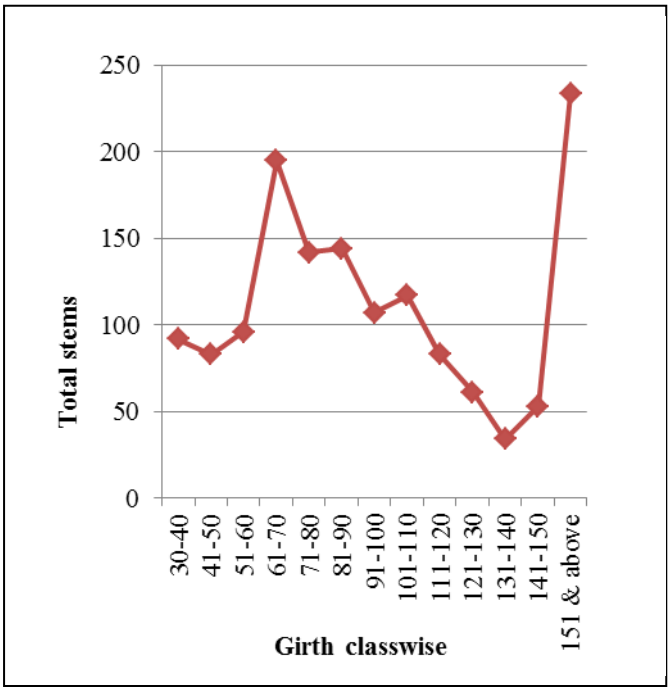


Figure 17.1: Girth class wise with respect to total stems

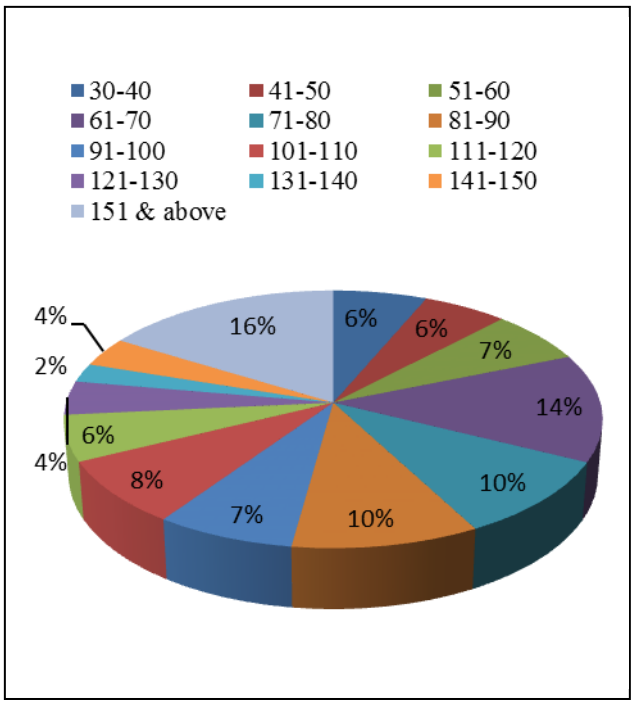


Figure 17.1: Girth class wise with respect to Total stems

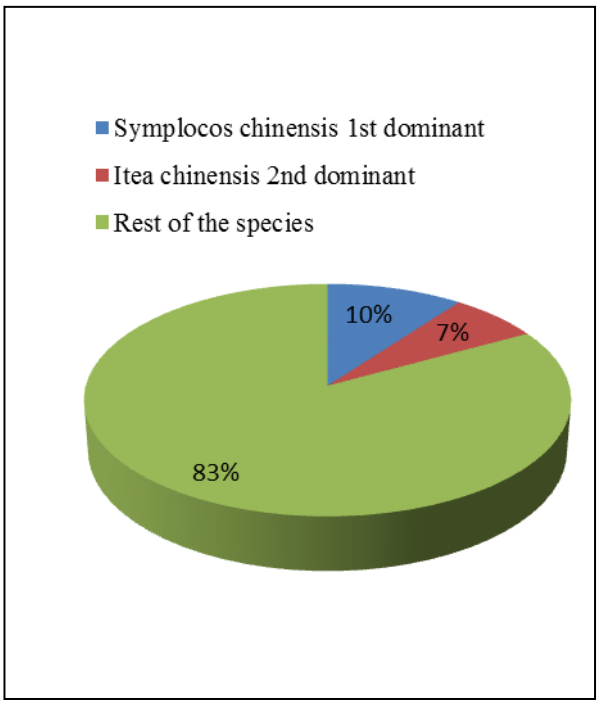


Figure 17.1 (a): Species wise with respect to Total stems

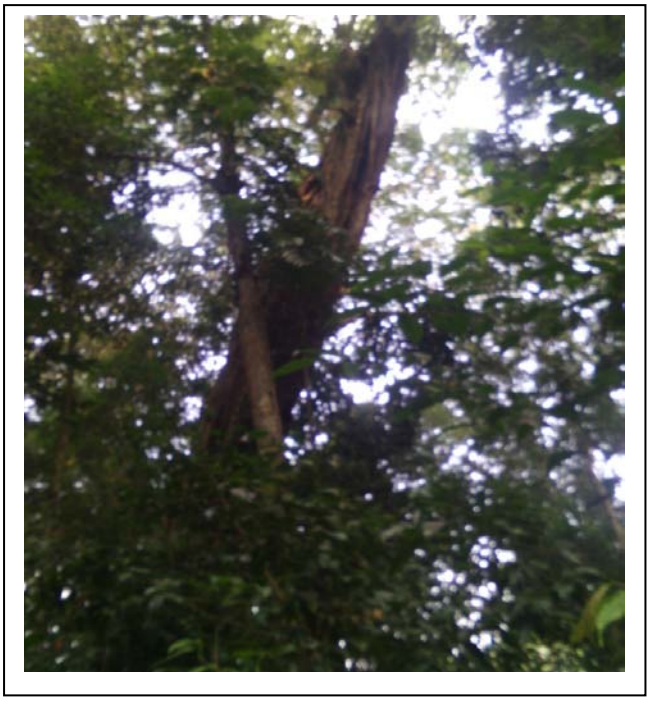


Figure 17 (a): Inside view ofKhlo Blai Raliang Sacred grove



Figure 17 (b):Over view of Khlo Blai Raliang Sacred grove

17.8 Growing Stock:

As per the methodology described in Chapter-I, 100% enumeration is carried out in the grove as its area is less than 10ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all within the grove, data was collected for 1441 tree species consisting of 147 *Symplocus chinensis* (1st dominant), 98 *Itea chinensis* (2nd dominant), and 1196 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151cm and above. The results are given in table 17.2 for Khlo Blai Lyngdoh, Raliang sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 2538.749 cubic metres.

Table-17.2

Girthh class wise & species wise volume in the sampled area (Area = 3.68 ha)

(volume in cu.m)

Girth class wise	*Symplocos chinensis 1st* dominant	*Itea chinensis* 2nd dominant	Rest of the species	Total	% with repect to Total volume
30-40	0.613	0.709	4.090	**5.412**	0.213
41-50	1.540	1.150	9.570	**12.260**	0.483
51-60	3.295	1.995	19.890	**25.180**	0.992
61-70	8.067	3.081	65.084	**76.232**	3.003
71-80	8.357	5.178	61.978	**75.513**	2.974
81-90	16.103	9.038	76.418	**101.559**	4.000
91-100	11.719	5.191	79.145	**96.055**	3.784
101-110	15.675	9.910	104.321	**129.906**	5.117
111-120	10.449	5.573	97.196	**113.218**	4.460
121-130	3.380	4.993	91.712	**100.085**	3.942
131-140	5.814	5.496	53.855	**65.165**	2.567
141-150	6.482	6.487	105.100	**118.069**	4.651
151 & above	87.785	32.779	1499.531	**1620.095**	63.815
Total	**179.279**	**91.580**	**2267.890**	**2538.749**	**100.000**
% wrt Total volume	**7.062**	**3.607**	**89.331**	**100.000**	

Table 17.2 shows that the volume contributed by the 1st dominant species(*Symplocus chinensis*)with respect to the total volume of the grove is 7.06% , the 2nd dominant species(*Itea chinensis.)* is 3.61%, while Rest of the species is maximum i.e. 89.33%. Total volume of the grove is 2538.749 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class increases i.e. girth class is directly proportional to the volume in that class.

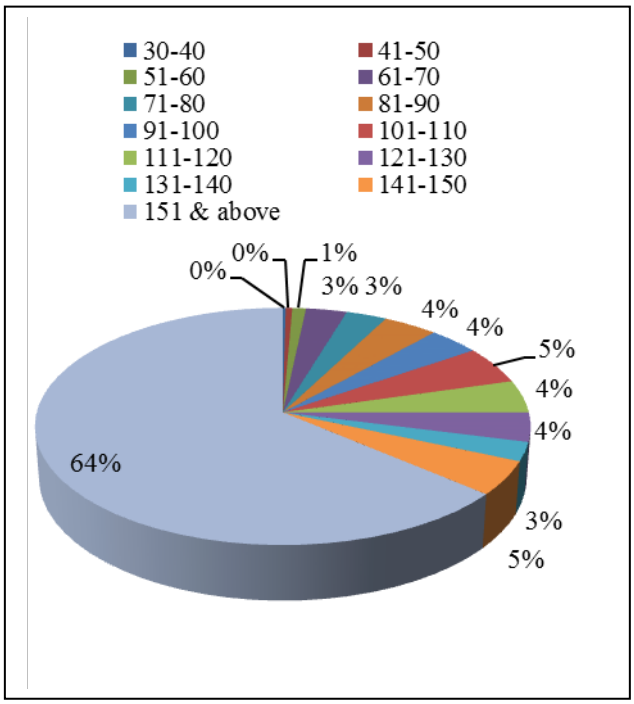


Figure 17.2: Girth class wise with respect to Total volume volume

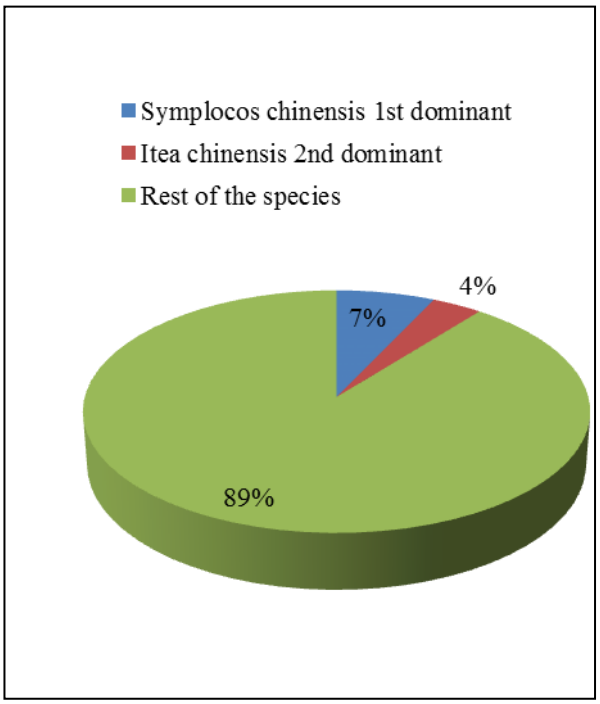


Figure 17.2 (a): Species wise with respect to Total

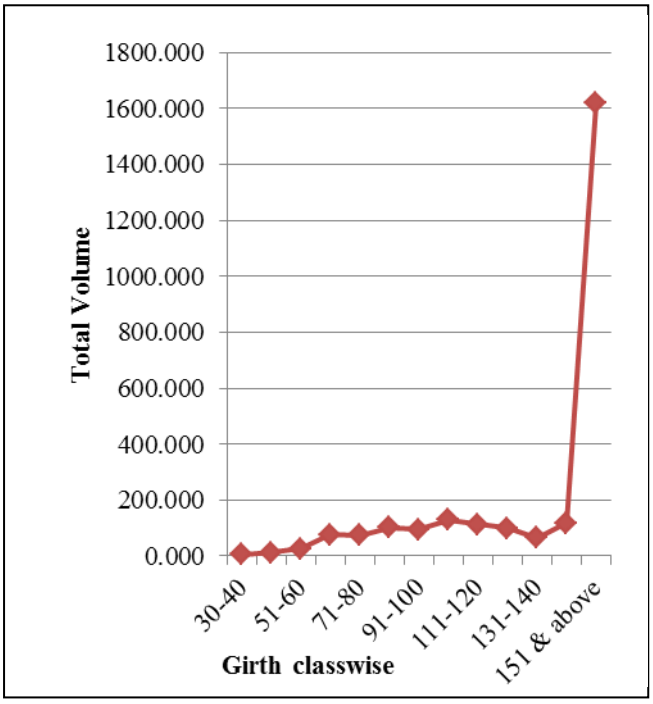


Figure 17.2: Girth class wise with respect to total volume

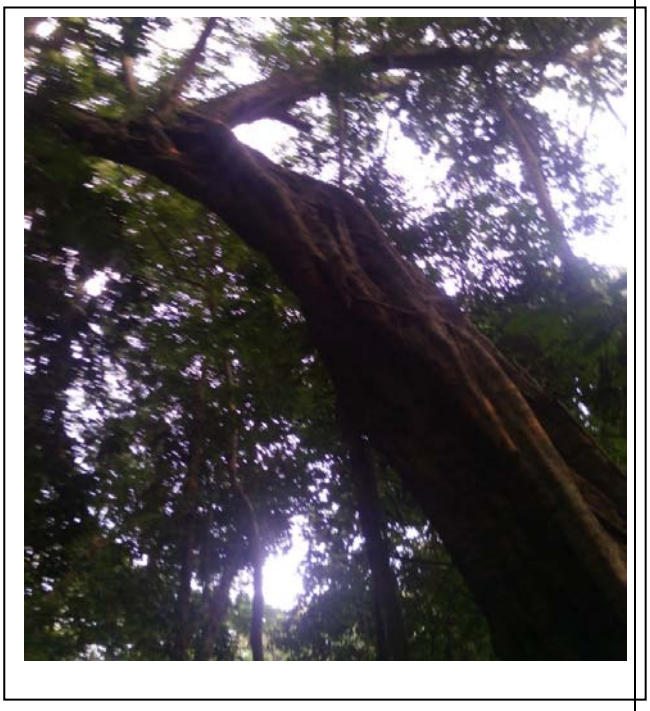


Figure 17 (c): Showing century ficuss spp.

17.9 Brief note on Management of Khlo Blai Lyngdoh Raliang

(i) Protection from biotic interference:-

Khlo Blai Lyngdoh Raliang is a restricted sacred grove. In this grove no one is allowed to enter inside without the knowledge of the Lyngdoh. Though there is no biotic pressure in this grove, but it cannot be ruled out totally in the near future. So to protect the rich natural resources of this grove the State Forests Department should take necessary step to declare this forest as a Community Forest.

(ii) Fire Control:-

Though there is no report of intentional or accidental fire occurrence in this grove in the past. But it is necessary if prevention can be taken care of for the near future. Fire line can be created along the boundary line of the grove except those boundary lines which is bounded by natural stream or nullah. This will help to preserve the rich natural resources of the groves.

(iii) Water stress:-

There is only one stream and one natural pond inside of the grove, if check dam can be constructed to retain the over flow water during rainy seasons this will serve as a source of water to wild animals during dry seasons and will also strength moisture content of the soil.

(iv) Construction of boundary pillars:-

Construction of boundary pillar or earth cutting all along the boundary of the grove will prevent from encroachment and also prevent spreads of fire inside the grove.

(v) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

18 - JRI-PASTIEH KHLO BLAI

18.1 Introduction/Location:

Jri-pastieh Khlo Blai is situated in West Jaintia Hills District of Meghlaya at Raij Khonchnong village under the Elaka of Raliang. It has an area of 3.3 ha and lies between 25° 29′ 40" N to 25° 29′ 46" N latitude and 92° 30′ 38" E to 92° 30′ 48" E longitude with an altitude of 1054 m from Mean Sea Level (MSL). It is bounded in the North by lum thangbru and village forest, in the South by land of Mrs. Klat Suiai and Mrs C.Papeng in the East by land of Mrs. D. Papeng, R. Papeng and J. Papeng and in the West by village forest of Raij Khonchnong. The grove is accessible by road from Shillong via Jowai - Raliang road. It is about 12 km from Jowai.

18.2 Brief History:

This Sacred grove have originated many years ago. Rituals are no longer performed in this Sacred grove long way back. Felling of trees is strictly prohibited. It is owned and controlled by the Raij Khonchnong. The State Forest Department has no direct control of the said grove, rather it falls under the jurisdiction of the JHADC.

18.3 Geography and climate:

The topography of the grove is slightly gentle in nature with slope varying from 4°C to 15°C. The soil texture is clayey loam with no fragments and friable in consistency. The colour of the soil is brown with high soil dept. soil erosion is negligible. There is no streams that flows along the grove.

The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 10°C and maximum is 30°C. Biotic pressure, encroachment , wildfire, hunting and poaching, grazing and illegal felling of timber were found to be absent in this grove.

18.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

18.5 Flora and fauna:

The vegetation is of mixed species. Dominant species found are *Schima khasiana, Quercus seretta Costonopsis sps., and Pinus khasiana,* origin of the forest is natural and it is two storeyed forests. Wildlife from here are jackal, rabbit, wild pig, jungle fowls, pangolin. Various types of birds and reptiles.Conservation significance of the grove is mainly due to:

(a) The virgin forests where human interference is almost zero.
(b) High level endemic plant and animal species.

(c) Existence of many rare endangered plant species.

(d) Conservation of flora and fauna and maintaining of rich forest natural resources.

18.6 Floral species:

List of Trees found in Jri pastieh Sacred Grove, Jaintia Hills District

Sl No.	Botanical Name	Local Name	Sl No.	Botanical Name	Local Name
1	*Albizia procera*	Dieng kreit	12	*Ficus spp*	Dieng jri
2	*Albizzia stipulata*	Dieng phyllut	13	*Itea chinensis*	Dieng sohsyrtet
3	*Aralia armata*	Dieng latymphu	14	*Knema agustifolia*	Dieng lasnam
4	*Betula alnoides*	Dieng lieng	15	*Myrica nagi*	Dieng sohliya
5	*Bombax ceiba*	Dieng ruin	16	*Pasania fenestrata*	Dieng sa-sei
6	*Castanopsis hystrix*	Dieng stap	17	*Pinus khasiana*	Dieng kseh
7	*Castanopsis indica*	Dieng sohot	18	*Quercus dealbata*	Dieng sai
8	*Castanopsis spp*	Dieng sning	19	*Quercus serreta*	Dieng rtiang
9	*Emblica officinalis*	Dieng sohmylleng	20	*Quercus spp*	Dieng sning
10	*Schima khasiana*	Dieng ngan	21	*Rhus succedanea*	Dieng kain
11	*Spondias axillaries*	Dieng sohlait	22	*Symplocos chinensis*	Dieng iong

List of shrubs, herbs, climbers, grass, and orchids found in Jri-Pastieh Sacred Grove, West Jaintia Hills

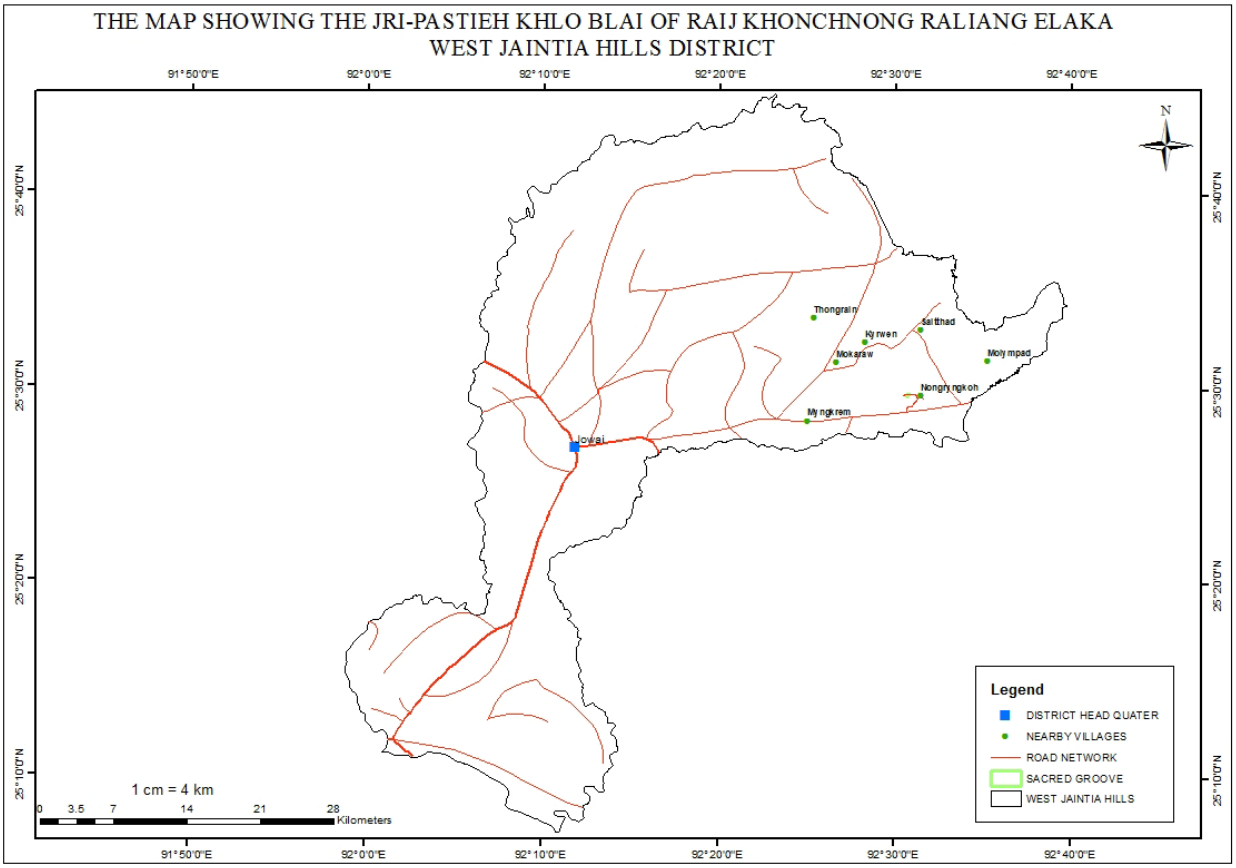
SHRUBS

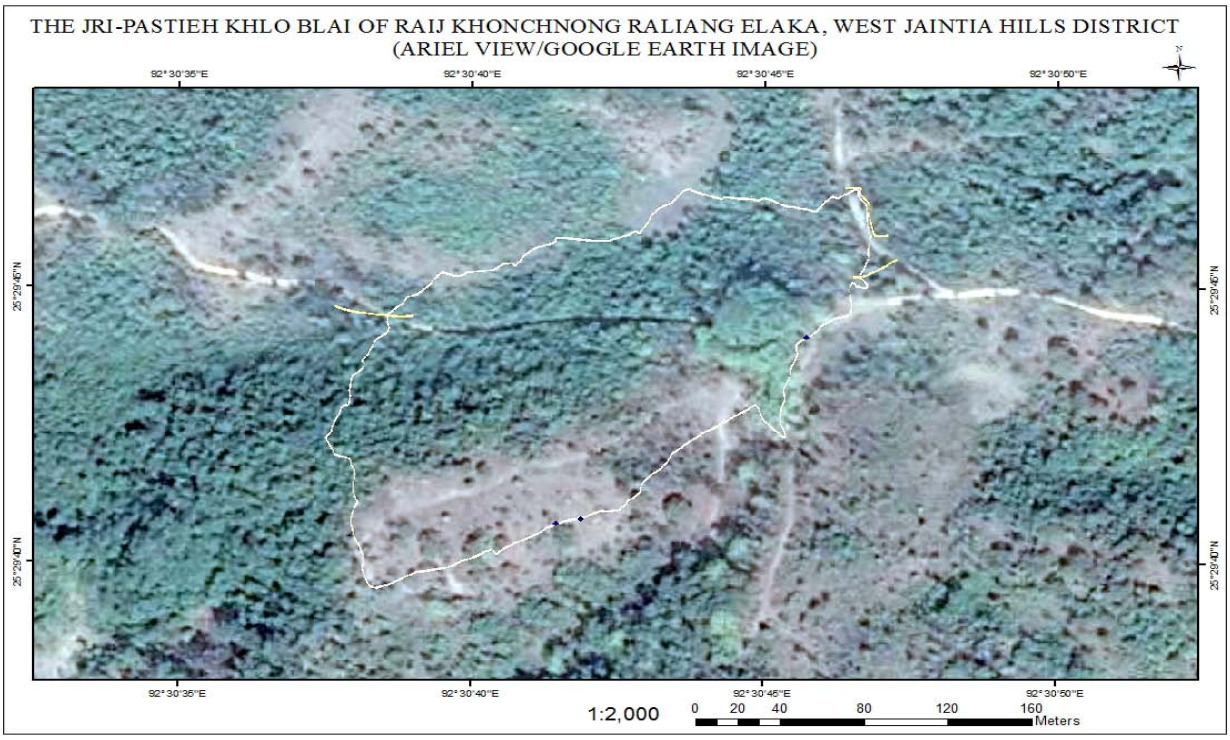
Sl No.	Local Name	Botanical Name	Family
1.	Soh myllen	*Emblic officinalis*	Euphorbiaceae
2.	Sohpang khlieh	*Latana camera*	Verbenaceae
3.	Soh byrthied	*Unera lobata*	Malvaceae
4.		*Musa acuminate*	Musaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.		*Cyathea spinulosa*	Cyatheaceae
2.	Soh ngan	*Solanum nigrum*	Solanaceae
3.	Bat jamew	*Eupetarium infertunitum*	Asteraceae
4.	Bat japan	*Ageratium odenoflorum*	Asteraceae
5.	Sying khlaw	*Hedychium spicata*	Zingiberaceae
6.	Wangkhlaw	*Colocasia esuilenta*	Araceae
7.	Sohbyrthid	*Achyranthes aspera*	Amaranthaceae
8.		*Euphorbiahirta*	Euphorbiaceae

Location Map of Jri-Pastieh Khlo Blai





List of shrubs, herbs, climbers, grass, and orchids found in Jri-Pastieh Sacred Grove, West Jaintia

GRASS

Sl No.	Local Name	Botanical Name	Family
1.		*Acorus calamus*	Arecaceae
2.		*Ageratina adenophora*	Asteraceae
3.		*Setaria palmifolia*	Palmaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Riphin	*Calamus acanthospathus*	Arecaceae
2.	Tmainkhla	*Lycopodium clavatum*	Lycapodiaceae
3.	Sohkrot	*Smilax glancophylla*	Smilacaceae
4.		*Rhaphidophora pertusa*	Araliaceae
5.		*Rubus muluceanus*	Rosaceae

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew dieng	*Vanda roxburghii*	Orchidaceae
2.	Tiew dieng	*Bulbophyllum gymnopus*	Orchidaceae
3.		*Pholidata convallariae*	Orchidaceae

18.7 Number of Stems:

Number of stems in each girth class and specieswise are given in table 18.1. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40 to 61-70 cm.

Table - 18.1
Girth class wise and species wise no. of stems in the entire grove (Area= 3.3 ha)

Girth class (cm)	*Schima khasiana*1st dominant	*Quercus seretta*2nd dominant	*Costonopsis* 3rd dominant	*Pinus khasiana*	Rest of the species	Total
30-40	57	30	36	14	147	**284**
41-50	41	21	12	9	96	**179**
51-60	30	10	7	9	43	**99**
61-70	16	9	9	9	32	**75**
71-80	13	5	1	7	14	**40**
81-90	5	5		5	8	**23**
91-100	1			3	5	**9**
101-110	3	2		1	2	**8**
111-120		2			1	**3**
121-130	1	1			1	**3**
131-140		1				**1**
141-150		2				**2**
151 & above		3		1	1	**5**
Total	**167**	**91**	**65**	**58**	**350**	**731**

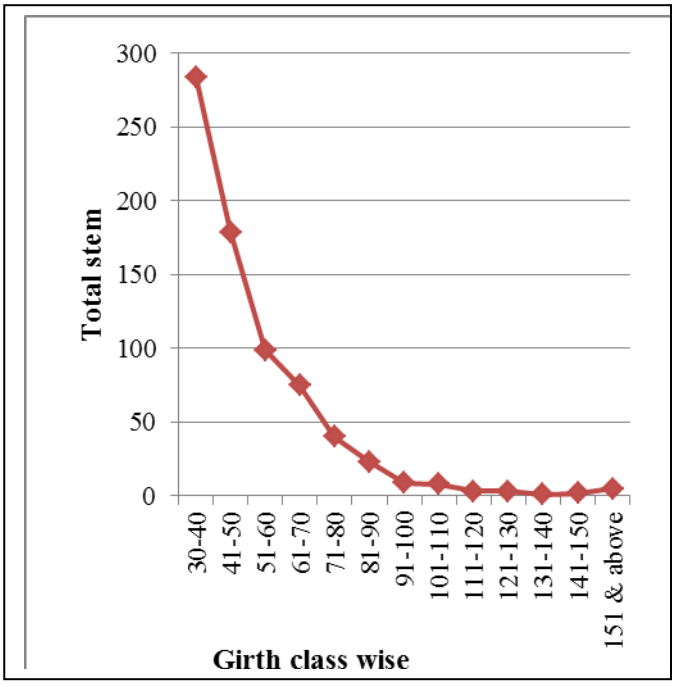


Figure 18.1: Girth class wise with respect to total stems

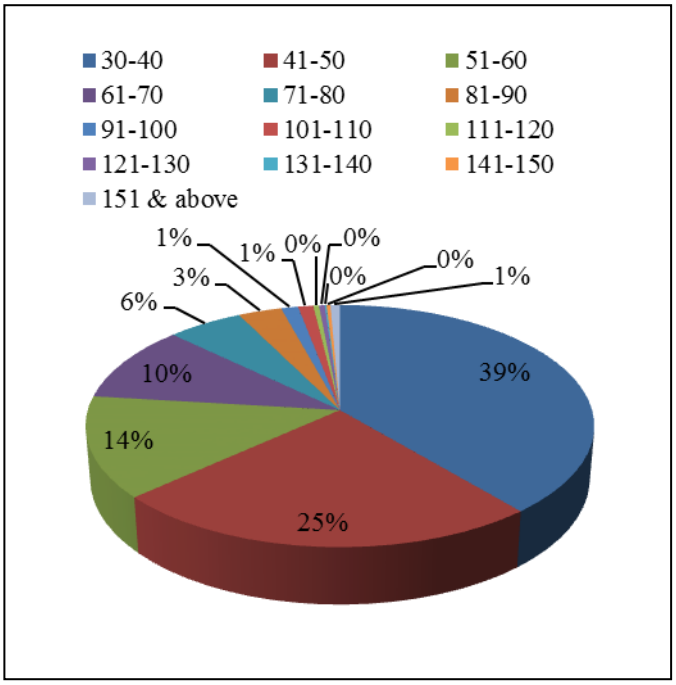


Figure 18.1: Girth class wise with respect to Total stems

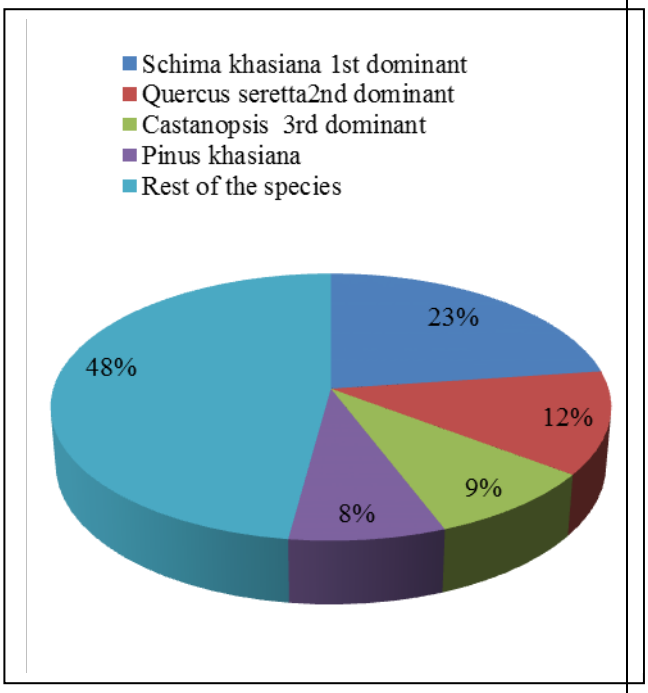


Figure 18.1 (a): Specieswise with respect to Total stems

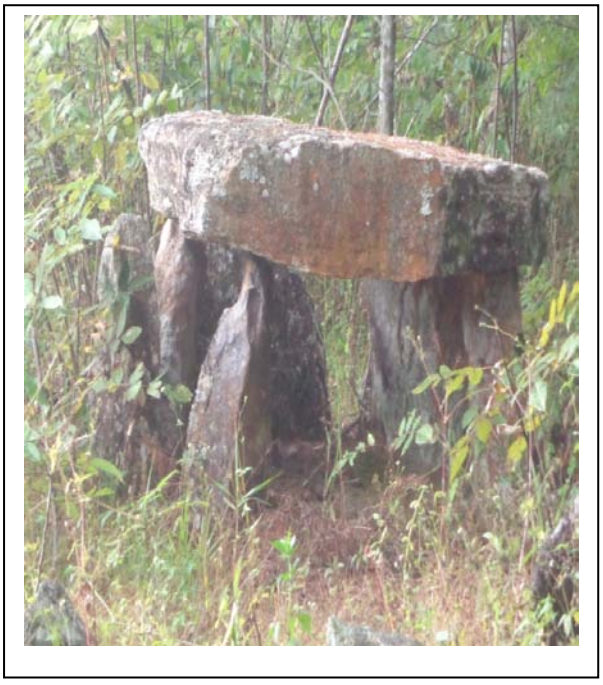


Figure 18 (a): Showing monolith at Jri-Pastieh Sacred Grove



Figure 18 (b): Showing marking of tree after measurement at Jri-Pastieh Sacred Grove.

18.8 Growing Stock:

As per the methodology described in Chapter-I, 100% enumeration is carried out in the grove as its area is less than 10 ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all within the grove, data was collected for 731 tree species consisting of 167 *Schima khasiana* (1st dominant), 91 *Quercus seretta* (2nd dominant), 65 *Costonopsis sps*, (3rd dominant), 58 *Pinus khasians* and 350 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151cm and above. The results are given in table 18.2 for Khlo Blai Lyngdoh, Raliang sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 178.637 cubic metres.

Table - 18.2
Girth class wise & Species wise volume in the sampled area (Area= 3.3 ha)
(volume in cu.m)

Girth class wise	*Schima khasiana* 1st dominant	*Quercus seretta* 2nd dominant	*Costonopsis* 3rd dominant	*Pinus khasiana*	Rest of the species	Total	% with respect to total volume
30-40	4.429	1.145	1.669	0.575	7.738	**15.556**	8.708
41-50	6.085	1.318	1.581	0.951	13.014	**22.949**	12.847
51-60	7.029	1.365	1.740	1.540	10.796	**22.470**	12.579
61-70	5.249	1.870	3.328	2.791	12.235	**25.473**	14.260
71-80	5.738	1.629	0.527	2.823	7.455	**18.172**	10.173
81-90	2.713	1.946		2.670	5.676	**13.005**	7.280
91-100	0.659			2.115	4.434	**7.208**	4.035
101-110	2.584	1.443		0.845	2.201	**7.073**	3.959
111-120		1.801			1.275	**3.076**	1.722
121-130	1.365	1.068			1.528	**3.961**	2.217
131-140		1.168				**1.168**	1.711
141-150		3.056				**3.056**	1.711
151 & above		23.877		2.33	9.263	**35.470**	19.856
Total	**35.851**	**41.686**	**8.845**	**16.640**	**75.615**	**178.637**	100.000
% wrt Total volume	**20.069**	**23.336**	**4.951**	**9.315**	**42.329**	**100.000**	

Table 18.2 shows that the volume contributed by the 1st dominant species (*Schima khasiana*)with respect to the total volume of the grove is 20.07% , the 2nd dominant species (*Quercus seretta.)* is 23.34%, 3rd dominant species (*Castonopsis* sps*)* is 4.95%, *Pinus khasiana* is 9.31% while Rest of the species is maximum i.e. 42.33%. Total volume of the grove is 178.637 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class increases i.e. girth class is directly proportional to the volume in that class.

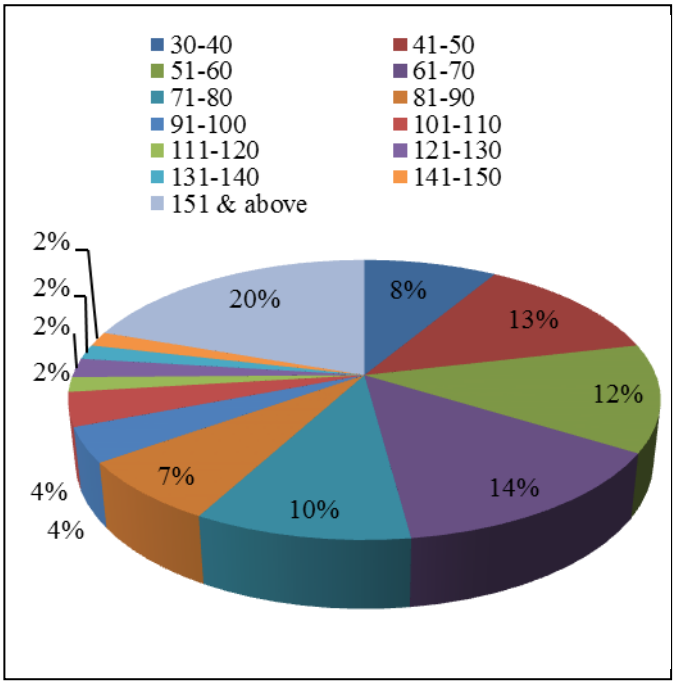


Figure 18.2: Girth class wise with respect to Total Volume

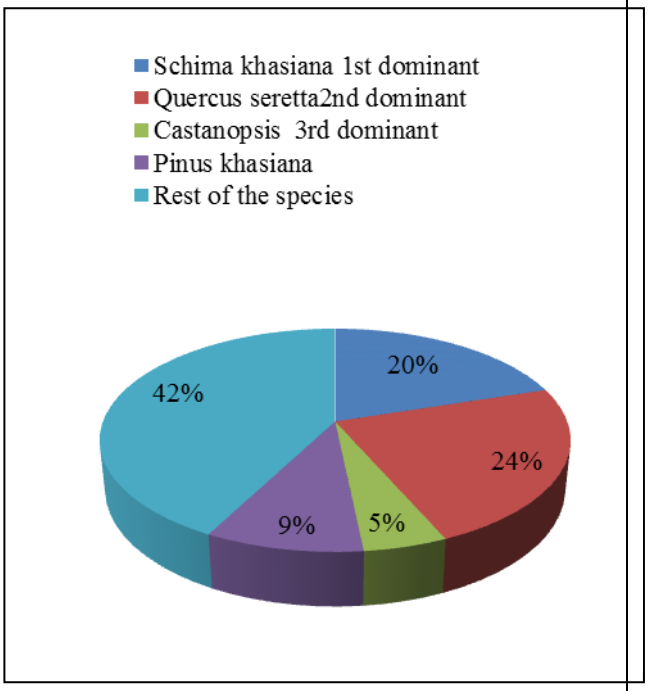


Figure 18.2 (a): Specieswise with respect to Total Volume

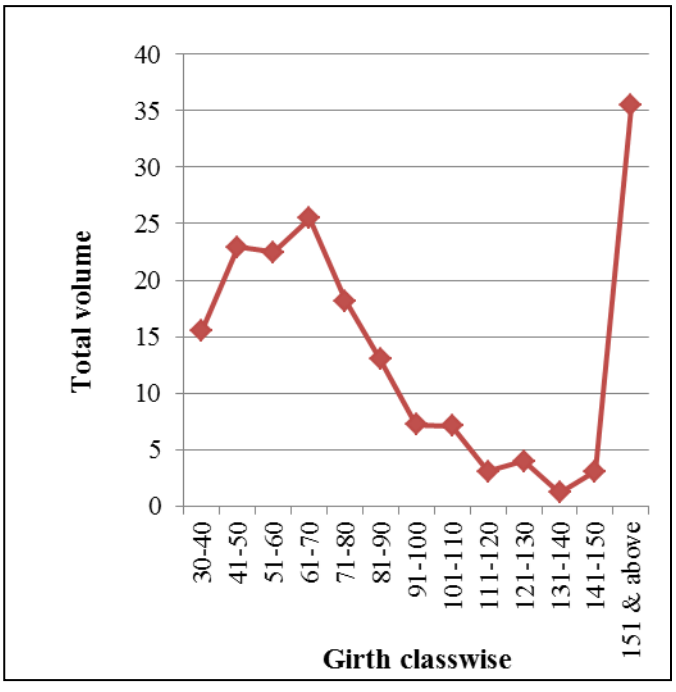


Figure 18.2: Girth class wise with respect to total volume



Figure 18 (c): Showing giant tree at Jri-Pastieh Sacred Grove.

18.9 Brief Note on Management of Khlo Blai Jri-Pastieh:

(i) Protection from Biotic Interference:-

This sacred grove is least disturbed, there is no evidence of encroachment, illegal felling of timber, poaching or grazing. But due to population explosion vis-à-vis development biotic pressure may occur on this grove. Hence to protect and preserve the rich biodiversity of the grove, it is high time that this sacred grove be in the purview of the State Forests Department by declaring it as Wildlife Community Reserve.

(ii) Fire control:-

Though there is no fire incidence reported in the past, but it cannot be ruled out in the near future since this grove is totally bounded by private lands. To avoid any fire incidence in the future it is very important that fire line should be created all along the boundary line very year before the onset of dry season.

(iii) Water stress:-

This sacred grove is void of any water body, hence construction of check dam across the slope in various part of the grove to harvest rain water for the benefit of plants and animals and this will also help to maintain soil moisture which in turn reduce soil erosion.

(iv) Construction of boundary pillar:-

Construction of permanent pillar or earth’s digging all along the boundary of the grove will prevent encroachment as the grove is totally bounded by private land.

(v) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

19 - BLAI RYNGKAW KHONSHNONG

19.1 Location:

Blai Ryngkaw Sacred Grove is situated in West Jaintia Hills District of Meghalaya at Khonshnong village under the doloiship of Elaka Raliang. It covers an area of 55.62 ha and lies between 25° 29′ 0″ N to 25° 29′ 30″ N latitude and 92° 27′ 40″ E to 92° 28′ 20″ E longitude with an elevation of 1163m from MSL. Itis bounded to the North by Paddy field and a jeepable road to Riteng village, to the South by Darit stream, to the East by Paddy field and wah Blai and towards the West by Lalong stream. The grove is accessible by road from Shillong via Jowai- Shangpung Road. It is about 24km from Jowai.

19.2 Brief History:

There is no records as to establish when thisgrove originated but it is believed that this Sacred grove have originatedhundred of years ago. In this sacred grove ritual is performed every year during the month of April. The Lyngdoh perform the offering by sacrificing goat, pig and poultry. All villagers beat their drums while marching to the designated place inside the grove. After the offering is completed they then together move to another place where they will cook and ate them together.The State Forest Department has no direct control of the said grove rather it falls under the jurisdiction of the JHADC.

19.3 Geography and Climate:

Topography of the grove is gently rolling in nature with slope varying from 4° to 15°.The soil texture is sandy loam with boulders and slightly friable consistency. The colour of the soil is brown with medium soil depth.There is negligible soil erosion in the grove area. Streams that are flowing along the boundary of the grove are Lalong, Darit and wah Blai. They are sources of water which feeds the agricultural land in the adjoining areas.

The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 8°C and maximum is 30°C. Biotic pressure, encroachment, wild fire, hunting & poaching, grazing and the activities of illegal timber were found to be absent in the grove.

19.4 Forest Type:

According to Champion & Seth Classification (1968) the forest type found in this grove are mixed deciduous Forest.

19.5 Flora and Fauna:

The vegetation type is of mix-species mainly*Schima khasiana and* Costonopsis indica and *Quercus dealbata* as dominant species. Origin of the forest is of natural in nature and it is of two storey forests.

Wildlife found here arejungle fowls, barking deer, jackals, and some vertebrates and invertebrates .Conservation significance of the grove is mainly due to:

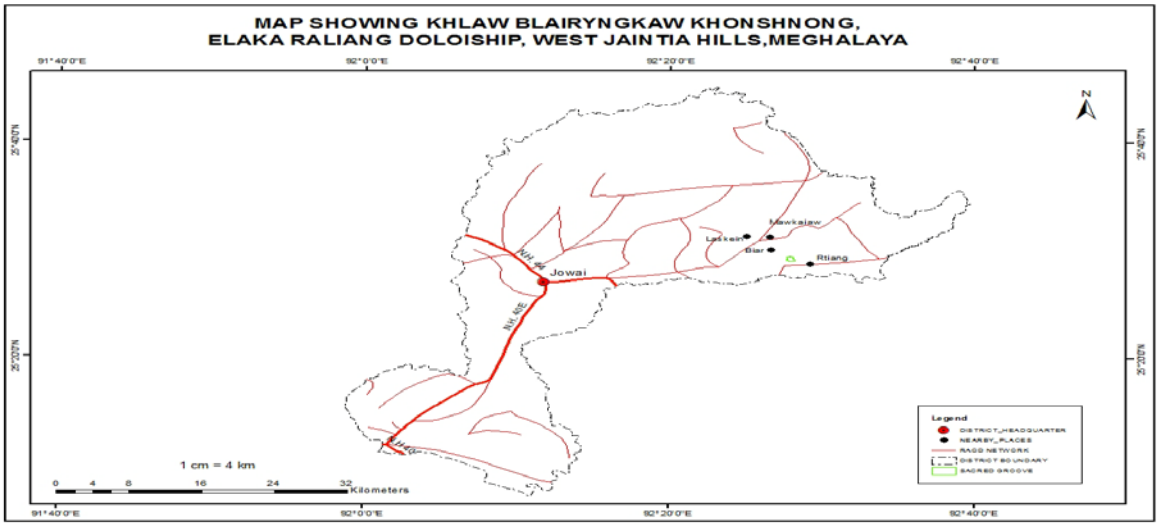
a) The area is very significant from the biodiversity point of view with high level endemic plant and animal species.
b) Existence of many rare endangered plant species.
c) With all restrictions- do's and don'ts; help this groves in conservation of flora and fauna and maintaining of rich forest natural resources.

19.6 Floral species:

List of Trees found in Ryngkaw Sacred Grove

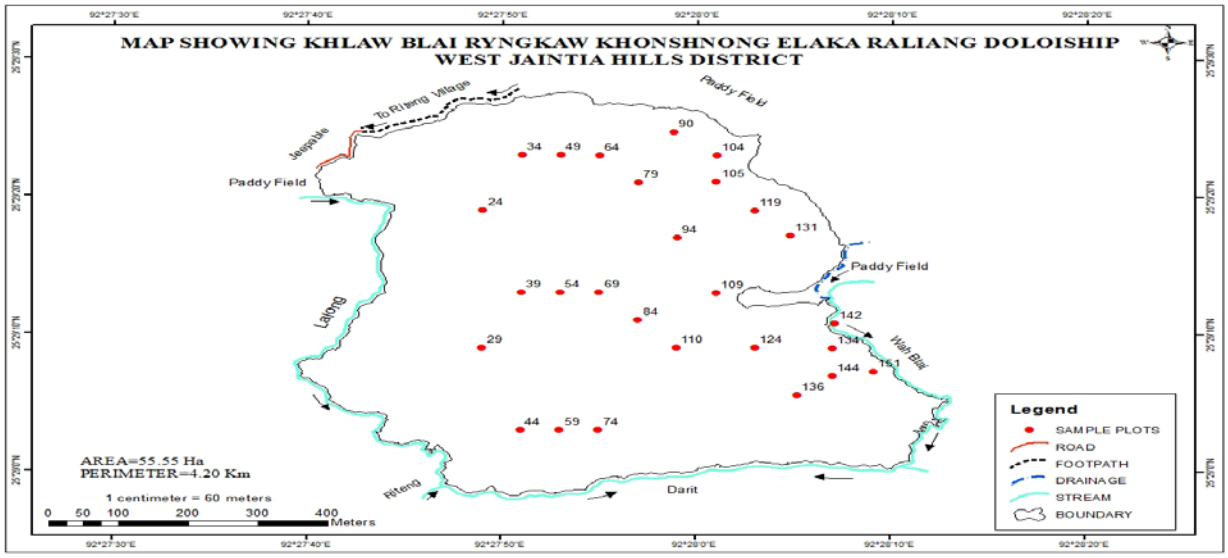
Sl. No.	Botanical Name	Local Name	Sl. No.	Botanical Name	Local Name
1	*Albizia stipulata*	Dieng phyllut	19	*Inuala cappa*	Dieng lieh
2	*Beilschmiedia brandisii*	Dieng sohkhyllam	20	*Itea chinensis*	Dieng sohsyrtet
3	*Betula alnoides*	Dieng lieng	21	*Ligustrum robostos*	Dieng syiang
4	*Bombax ceiba*	Dieng ruin	22	*Macaranga denticulate*	Dieng lakhar
5	*Callicaspa arbarea*	Dieng lakhiat	23	*Magnolia baillorii*	Dieng lari
6	*Cassia fistula*	Dieng sanaru	24	*Myrica nagi*	Dieng sohliya
7	*Castanopsis armata*	Dieng sning	25	*Pasania fenestrata*	Dieng sasei/sai
8	*Castanopsis hystrix*	Dieng sohstap	26	*Pinus khasiana*	Dieng kseh
9	*Castanopsis indica*	Dieng sohot/ Dieng Stap	27	*Podocarpus latifolia*	Dieng ksehum
10	*Castanopsis spp*	Dieng sning	28	*Polygata arillata*	Dieng lakba
11	*Elaeocarpus lanceafolia*	Dieng sohkhyllam	29	*Prema bengalensis*	Dieng lieh
12	*Emblica officinates*	Dieng Sohmylleng	30	*Quercus dealbata*	Dieng sase/sai
13	*Eurya accuminata/ japonica*	Dieng shit/ Dieng pyrshit	31	*Quercus serreta*	Dieng ritiang
14	*Eurya urens*	Dieng tlai	32	*Rhus succedahnea*	Dieng kain
15	*Ficcus Elastica indica*	Dieng jri	33	*Schima wallichii*	Dieng ngan
16	*Glochidion velutinum*	Dieng jem	34	*Spondius axillaries*	Dieng sohlait
17	*Grewia abutilifolia*	Dieng sohme blang	35	*Symplocos chinensis*	Dieng iong
18	*Ilex venulsoa*	Dieng shyieng			

Location map of Blai Ryngkaw Khonshnong Sacred Grove





Map showing sample plots of Khlaw Blai Ryngkaw Khonshnong



List of shrubs, herbs, climbers, grass, and orchids found in Ryngkaw Khonchnong Sacred Grove, Jaintia Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Soh myllen	*Embelia ribes*	Enphorbiaceae
2.	Sohpang khlieh	*Latana camera*	Verbenaceae
3.	Soh byrthied	*Unera lobata*	Malvaceae
4.		*Musa acuminate*	Musaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.		*Cyathea spinulosa*	Cyatheaceae
2.	Soh ngan	*Solanum nigrum*	Solanaceae
3.	Bat jamew	*Eupetarium infertunitum*	Asteraceae
4.	Bat japan	*Ageratine adunophora*	Asteraceae
5.	Sying khlaw	*Hedychium spicata*	Zingiberaceae
6.	Wangkhlaw	*Colocasia esculenta*	Araceae
7.	Sohbyrthid	*Achyranthes aspera*	Asteraceae
8.		*Euphorbiahirta*	Euphorbiaceae

GRASS

Sl No.	Local Name	Botanical Name	Family
1.		*Acorus calamus*	Iridaceae
2.		*Ageratina adenopflorum*	Asteraccea
3.		*Setaria palmifolia*	Palmaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Riphin	*Calamus acanthospathus*	Arecaceae
2.	Tmainkhla	*Lycopodium clavatum*	Lycopodales
3.	Sohkrot	*Smilax glancophylla*	Smilaceceae
4.		*Rhaphidophora pertusa*	Araliaceae
5.		*Rubus muluceanus*	Rosaceae

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew dieng	*Vanda roxburghii*	Orchidaceae
2.	Tiew dieng	*Bulbophyllum gymnopus*	Orchidaceae
3.		*Pholidata convallariae*	Orchidaceae

19.7 Number of Stems:

Number of stems in each girth class and specieswise are given in table 19.1 & 19.2. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40cm to 101-110cm classes.

Table - 19.1
Girth class-wise and Species-wise no. of stems in the sampled area (27 plots- 5.4 ha)
(volume in cu.m)

Girth Class Vise	1st Dominant *Schima khasiana*	2nd Dominant *Costonopsis indica*	3rd Dominant *Quercus dealbata*	Rest of the species	*Pinus khasiana*	Total
30-40	108	31	56	414	15	**624**
41-50	86	25	97	363	16	**587**
51-60	65	29	66	304	15	**479**
61-70	65	48	46	346	26	**531**
71-80	44	42	24	197	16	**323**
81-90	45	38	14	113	19	**229**
91-100	16	36	12	98	19	**181**
101-110	14	21	2	80	14	**131**
111-120	10	25	2	52	5	**94**
121-130	10	6	0	33	3	**52**
131-140	3	4	2	22	2	**33**
141-150	8	12	1	25	1	**47**
151 & above	6	13	1	70	5	**95**
Total	**480**	**330**	**323**	**2117**	**156**	**3406**

Table - 19.2
Girth class-wise and Species-wise no. of stems in the entire grove (27 plots- 5.4 ha)
(volume in cu.m)

Girth Class Vise	1st Dominant *Schima khasiana*	2nd Dominant *Costonopsis indica*	3rd Dominant *Quercus dealbata*	Rest of the species	*Pinus khasiana*	Total
30-40	1112	319	577	4264	155	**6427**
41-50	886	258	999	3739	165	**6046**
51-60	670	299	680	3131	155	**4934**
61-70	670	494	474	3564	268	**5469**
71-80	453	433	247	2029	165	**3327**
81-90	464	391	144	1164	196	**2359**
91-100	165	371	124	1009	196	**1864**
101-110	144	216	21	824	144	**1349**
111-120	103	258	21	536	52	**968**
121-130	103	62	0	340	31	**536**
131-140	31	41	21	227	21	**340**
141-150	82	124	10	258	10	**484**
151 & above	62	134	10	721	52	**979**

Total	**4944**	**3399**	**3327**	**21805**	**1607**	**35082**

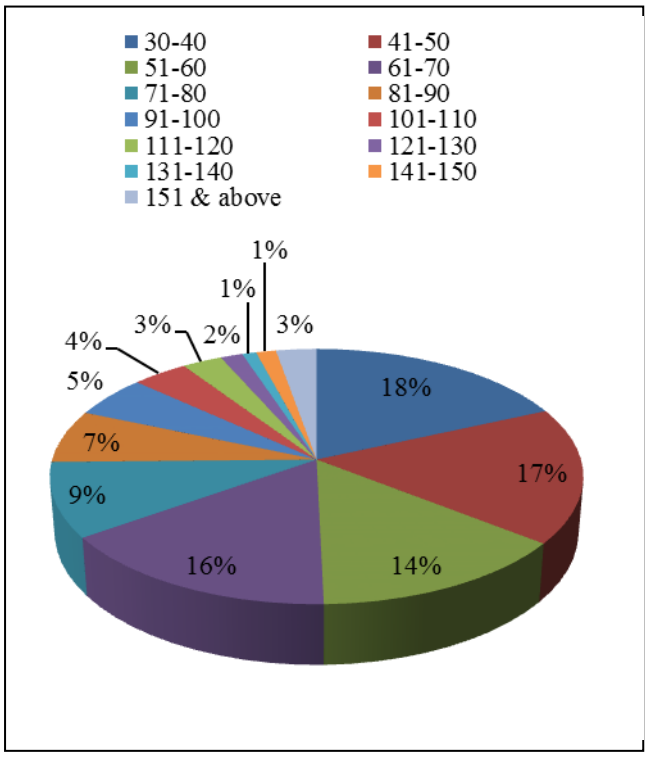


Figure 19.1:Girth classwise with respect to total stems.

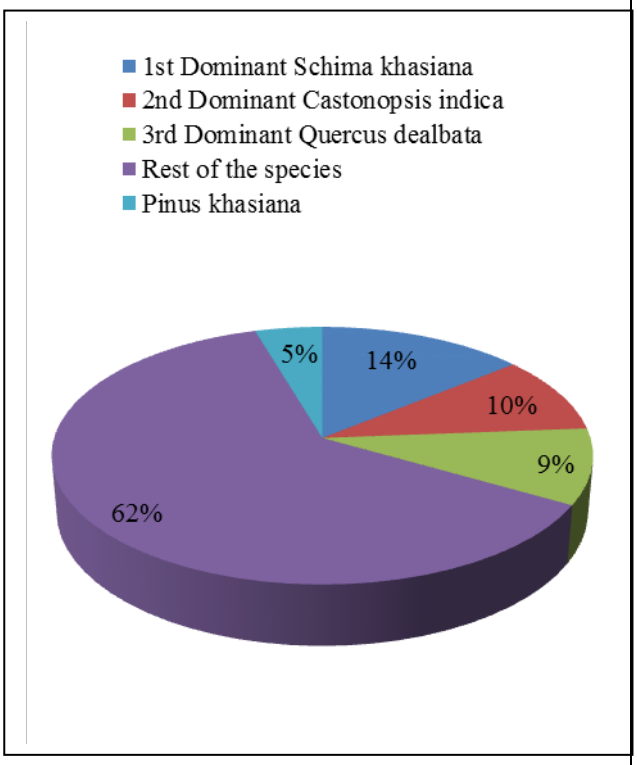


Figure 19.1 (a): Specieswise with respect to Total stems

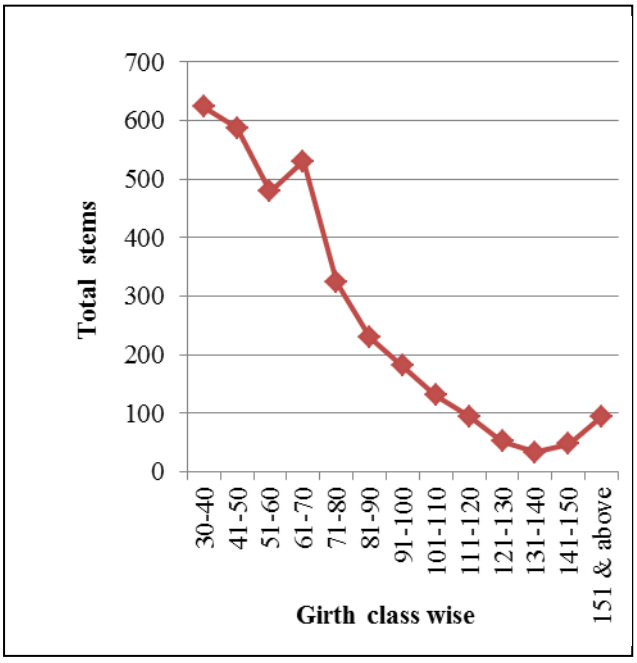


Figure 19.1: Girth class wise with respect to total volume.



Figure 19 (a): Sacrificing place at Ryngkaw Khonchnong Sacred grove

19.8 Growing Stock:

As per the methodology described in Chapter-I, 10% enumeration is carried out in the grove as its area is more than 50ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In all within 27 plots of 0.2 Ha size, i.e. 5.4 ha , data was collected for 3406 tree species consisting of 480 *Schima khasiana* (1st dominant), 330 *Costonopsis indica* (2nd dominant), 323 *Quercus dealbata*,156 *Pinus khasiana* and 2117 Rest of the species. Using the LocalVolume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40 cm to 151cm and above. The results are given in table 19.3& 19.4 for Blai Ryngkaw, Khonchnong sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 19,918.212 cubic metres.

Table – 19.3
Specieswise girth classwise volume in the sampled area (27 plots – 5.4 ha)
(volume in cu.m)

Girth Class Vise	1st Dominant *Schima khasiana*	2nd Dominant *Costonopsis indica*	3rd Dominant *Quercus dealbata*	Rest of the species	*Pinus kaasiana*	Total
30-40	9.035	1.641	1.280	23.029	0.542	**35.527**
41-50	12.869	3.590	6.444	51.685	1.673	**76.261**
51-60	15.014	7.289	8.391	76.062	2.758	**109.514**
61-70	21.259	18.822	9.657	132.308	7.483	**189.529**
71-80	19.229	22.107	7.187	103.733	6.346	**158.602**
81-90	25.800	26.689	5.719	79.080	11.005	**148.293**
91-100	11.668	32.127	6.524	87.326	13.888	**151.533**
101-110	12.535	23.324	1.412	90.974	12.668	**140.913**
111-120	11.085	34.361	1.676	70.983	5.857	**123.962**
121-130	12.798	9.625	0	53.433	4.204	**80.060**
131-140	4.354	7.796	2.480	41.873	3.460	**59.963**
141-150	13.675	26.499	1.539	56.771	2.073	**100.557**
151 & above	15.375	46.235	1.658	483.908	11.917	**559.093**
Total	**184.696**	**260.105**	**53.967**	**1351.165**	**83.874**	**1933.807**

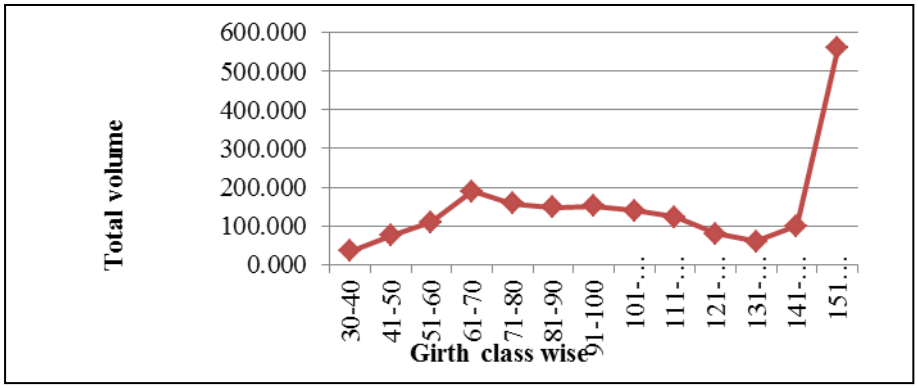


Figure 19.3: Girth class wise with respect to total volume.

Table – 19.4
Specieswise girth classwise volume in the sampled area (27 plots – 5.4 ha)

(volume in cu.m)

Girth Class Vise	1st Dominant *Schima khasiana*	2nd Dominant *Costonopsis indica*	3rd Dominant *Quercus dealbata*	Rest of the species	*Pinus kaasiana*	Total	% wrt total volume
30-40	93.06	16.90	13.18	237.20	5.58	**365.93**	**1.84**
41-50	132.55	36.98	66.37	532.36	17.23	**785.49**	**3.94**
51-60	154.64	75.08	86.43	783.44	28.41	**1127.99**	**5.66**
61-70	218.97	193.87	99.47	1362.77	77.07	**1952.15**	**9.80**
71-80	198.06	227.70	74.03	1068.45	65.36	**1633.60**	**8.20**
81-90	265.74	274.90	58.91	814.52	113.35	**1527.42**	**7.67**
91-100	120.18	330.91	67.20	899.46	143.05	**1560.79**	**7.84**
101-110	129.11	240.24	14.54	937.03	130.48	**1451.40**	**7.29**
111-120	114.18	353.92	17.26	731.12	60.33	**1276.81**	**6.41**
121-130	131.82	99.14	0.00	550.36	43.30	**824.62**	**4.14**
131-140	44.85	80.30	25.54	431.29	35.64	**617.62**	**3.10**
141-150	140.85	272.94	15.85	584.74	21.35	**1035.74**	**5.20**
151 & above	158.36	476.22	17.08	4984.25	122.75	**5758.66**	**28.91**
Total	**1902.37**	**2679.08**	**555.86**	**13917.00**	**863.90**	**19918.21**	**99.99**
% wrt total volume	**9.55**	**13.45**	**2.79**	**69.86**	**4.34**	**99.99**	

Table 19.4 shows that the volume contributed by the 1st dominant species (*Schima khasiana*)with respect to the total volume of the grove is 9.55% , the 2nd dominant species (*Costonopsis indica*) is 13.45%, 3rd dominant species (*Quercus dealbata*) 2.79%, *Pinus khasiana* 4.34% while Rest of the species is maximum i.e. 69.86%. Total volume of the grove is 19,918.21 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class also increases i.e. girth class is directly proportional to the volume in that class

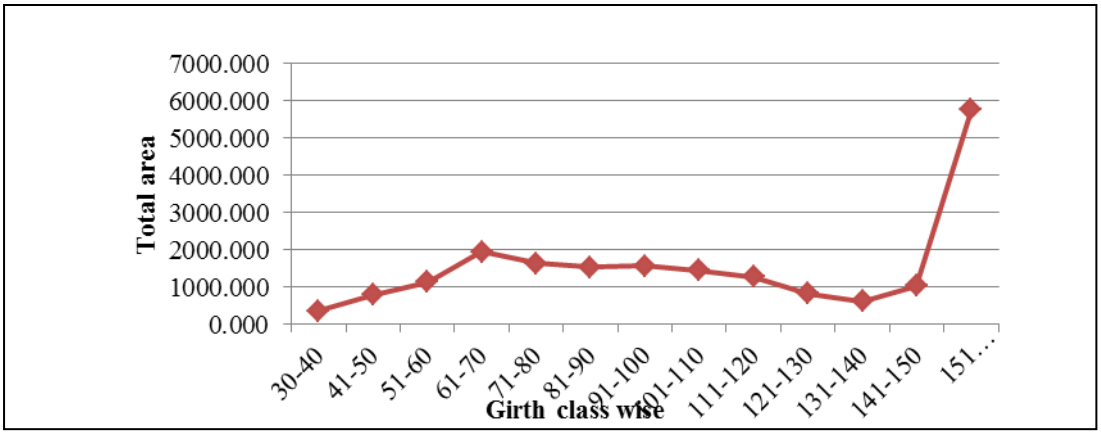
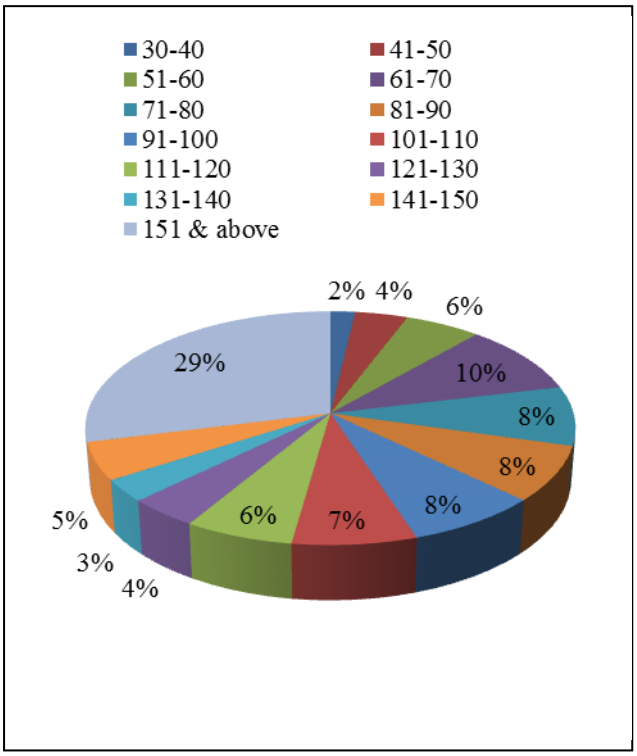


Figure 19.4: Girth class wise with respect to total area.



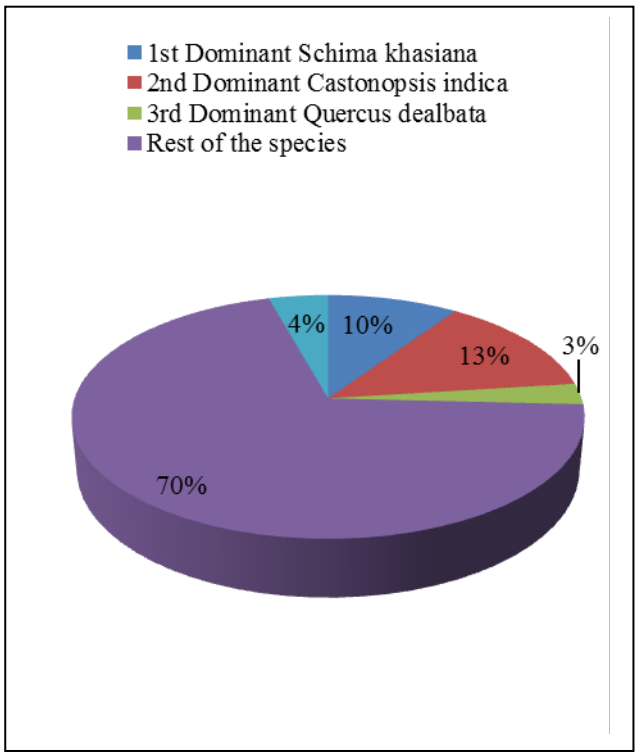


Figure 19.4: Girth class wise with respect to Total Volume Figure 19.4(a): Specieswise with respect to Total Volume





Figure 19 (b): Over view of Ryngkaw Khonshnong Sacred Grove Figure 19 (c): Showing citrus spp (wild orange) at Ryngkaw Khonshnong Sacred GroveGrove.

19.9 Brief Note on Management of Khlo Blai Ryngkaw:

(i) Protection from Biotic Interference:-

In this sacred grove rituals are performed ever year, people do not dare to enter freely in this grove. Hence biotic interference is almost negligible. Encroachment, grazing, illegal felling of timber and poaching were found to be absent. But with rapid population explosions vis-à-vis development, demand of timber may increase, this may pressurize the grove in the years to come. To avoid such pressure in the near future it is highly suggested that this grove may be declared as a Wildlife Community Reserve.

(ii) Fire control:-

There is no evidence of fire incidence in the past. But since this grove is bounded mostly by private land it cannot be ruled out in the near future. Hence it is proposed that if external fire line be cleared every year before the onset of dry season, this will help to prevent the spread of fire in the grove.

(iii) Water stress:-

This grove is mostly bounded by natural streams viz. Lalong stream, Riteng stream, Darit stream and Wahblai stream except in the northern portion, but in the main area of the grove there is no river or streams. Creation of check dams is highly recommended to harvest rainwater this will not only helps plants and animals but will also increase moisture content of the soil.

(iv) Creation of permanent boundary:-

Creation of permanent boundary will help to protect the grove from encroachment in the years to come. This can be done either by RCC pillars all along the grove or by earth's digging of 2′ x 2′ size all along the boundary except in the area where natural streams bounded the grove.

(v) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.

20 - LAW LYNGDOH MAWNAI

20.1 Introduction/Location:

Law Lyngdoh Mawnai is situated in West Khasi Hills of Meghlaya at Mawnai village under the Syiemship of Hima Nongkhlaw. It has an area of 23.7 ha and lies between 25° 34′ 48" N to 25° 35′ 6" N latitude and 91° 35′ 44" E to 91° 36′ 8" E longitude with an al titude of 1023 m from Mean Sea Level (MSL). It is bounded in the North by land of Smti Sherian Kharsyntiew, Iora Rani and Shri. Roken Wahlang, in the South by Mawphyrnai village and land of Shri. Sonar Syiem in the East by land of Mrs. Dalina Lyngdoh and irrigation canal and in the West by Kutcha road and land of Smti. Dalina Lyngdoh and Rio Wahlang. The grove is accessible by road from Shillong via Mairang-Mawnai road. It is about 58km from Shillong.

20.2 Brief History:

This Sacred grove have originated many years ago. Rituals are no longer performed in this Sacred grove long way back. Felling of trees, collection of fire wood, etc. is strictly prohibited. It is owned and controlled by the Lyngdoh Mawnai clan and the Lyngdoh elected by the clan head its management. The State Forest Department has no direct control of the said grove, rather it falls under the jurisdiction of the KHADC.

20.3 Geography and climate:

The topography of the grove is slightly gentle in nature with slope varying from 4°C to 10°C. The soil texture is clayey loam with no fragments and friable in consistency. The colour of the soil is brown with high soil dept. soil erosion is negligible. There is no stream that flows along the grove.

The cold winter starts from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 5°C and maximum is 25°C. Biotic pressure, encroachment , wildfire, hunting and poaching, grazing and illegal felling of timber were found to be absent in this grove.

20.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are mixed deciduous Forest.

20.5 Flora and fauna:

The vegetation is of mixed species. Dominant species found are *Costonopsis indica*, *Cytrus latyus and Pinus khasiana*, origin of the forest is natural and it is two storeyed forests. Wildlife from here are jackal, rabbit, wild pig, jungle fowls, pangolin. Various types of birds and reptiles. Conservation significance of the grove is mainly due to:

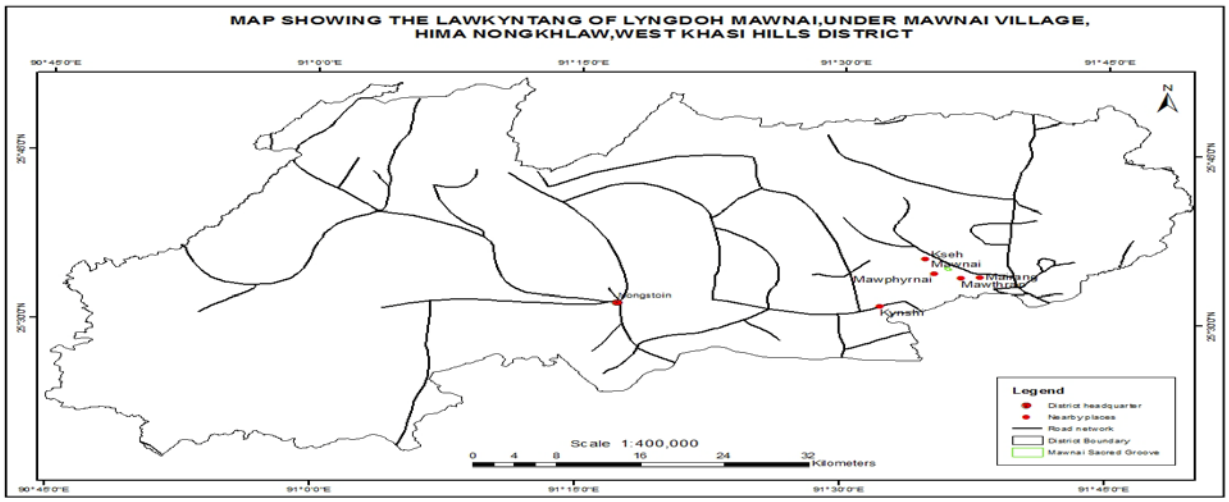
(a) The virgin forests where human interference is almost zero.

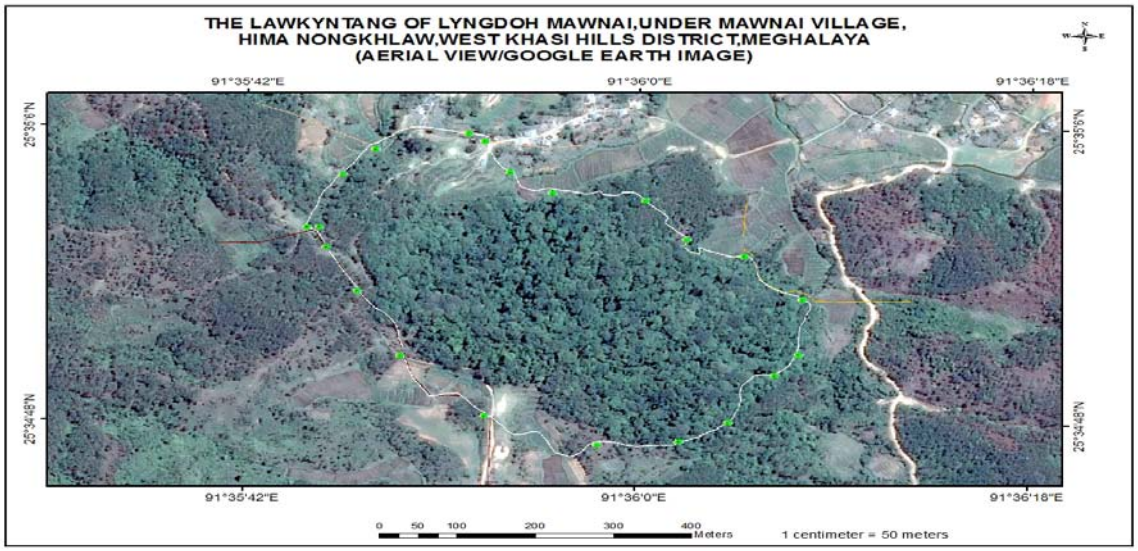
(b) High level endemic plant and animal species.

(c) Existence of many rare endangered plant species.

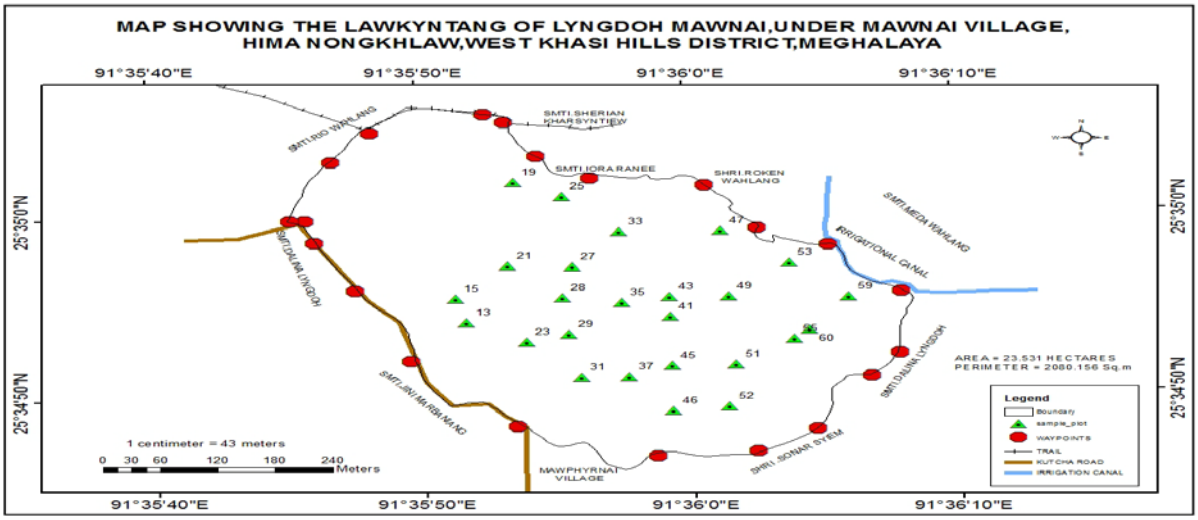
(d) Conservation of flora and fauna and maintaining of rich forest natural resources.

Location Map of Law Lyngdoh Mawnai Sacred Grove





Map showing sample plots of Mawnai Sacred grove



20.6 Floral species:

List of Trees found in Mawnai Sacred Grove, West Khasi Hills District

Sl No.	Botanical Name	Local Name	Sl No.	Botanical Name	Local Name
1	*Alstonia scholaris*	Dieng rteng	23	*Meliosma pinnata*	Dieng krot
2	*Aralia lantana*	Dieng latympu	24	*Michelia champaca*	Dieng rai
3	*Betula olnoides*	Dieng lieng	25	*Myrica essulanta*	Dieng sohphie
4	*Castanopsis armata*	Dieng sning	26	*Myrica nagi*	Dieng sohliya
5	*Castanopsis indica*	Dieng sohot	27	*Pantapanox racemasmum*	Dieng tyllong rangsei
6	*Celtis tetrandra*	Dieng shini	28	*Pasenia dealbata*	Dieng soh rang
7	*Cesearia varieca*	Dieng rang	29	*Paurthiaea arguta*	Dieng sohryngkham
8	*Ciniamomum cecicodahne*	Dieng pingwait	30	*Pieris ovalifolia*	Dieng jalynsning
9	*Cinnanonum bijolghota*	Dieng tyrdop	31	*Pinus khasiana*	Dieng kseh
10	*Citrus latipes*	Dieng soh mynkein	32	*Polygonum orientale*	Dieng jalynnoh
11	*Citus latyus*	Dieng sohkynphor	33	*Premna bengalensis*	Dieng lieh
12	*Cyathea spinulosa*	Dieng tyngkrong	34	*Prunus nepolensis*	Dieng soh iong
13	*Docynia indica*	Deng sohphohkhlaw/sohphoh khasi	35	*Prunus undulata*	Dieng tyngkhun
14	*Engelhartdia spicata*	Dieng lymba	36	*Pyrularia edulis*	Dieng klong
15	*Eunymus hamiltonianues*	Dieng soh mynken	37	*Pyrus khasiana*	Dieng sohjhur
16	*Eurya acuminate*	Dieng shit	38	*Quercus dealbata*	Dieng sai
17	*Ficus hispida*	Dieng jri	39	*Rhododumdrum arborium*	Dieng tiewsaw
18	*Grewia abutifolia*	Dieng soh mehblang	40	*Rhus Succedena*	Dieng kain
19	*Ilex venulosa*	Dieng soh shyieng	41	*Saurauia punduana*	Dieng jalyngap
20	*Glochidion sps*		42	*Schima khasiana*	Dieng ngan
21	*Litsaea meissneri*	Dieng soh rang	43	*Symplocos chinensis*	Dieng iong
22	*Machilus pardiflora*	Dieng niar			

List of shrubs, herbs, climbers & epiphytes found in Mawnai Sacred Grove, West Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.		*Carylopsis himalayana*	
2.		*Viburnum foetidum*	Cripifoliaceae
3.		*Innula cappa*	Asteraceae
4.		*Hedychium angusitifolium*	Zingibenaceae
5.		*Lithocarpus dealbatus*	Fagaceae
6.		*Litsea salicifolia*	Lauraceae
7.		*Persea bambacina*	Lauraceae
8.		*Castanopsis tribuloides*	Fagaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.		*Arisaema tortunosum*	Araceae
2.		*Bidens ainslia*	Asteraceae
3.	Langniang	*Potentilla gracilis*	Rosaceae
4.		*Viola accuminata*	Violaceae
5.	Jasat	*Polygonum hydropiper*	Polygonaceae
6.	Jajew khlaw	*Begonia roxburghii*	Begoniaceae
7.	Sying khlaw	*Zingirber purpurum*	Zingiberaceae
8.	Lantana iong	*Eupatorium odenoflorum*	Asteraceae
9.	Tmain khla	*Lycopodiumclavatum clavatum*	Lycopodialiaceae
10.	Sohbyrthit	*Achyranthus aspera*	Amaranthaceae
11.	Jamyrdoh	*Houttuynia cordata*	Saururaceae
12.	Lantana shiah	*Lantana camera*	Verbenaceae
13.	Sohbyrthit	*Urena lobata*	Malvaceae
14.	Kynbat shaba	*Brunella vulgaris*	Asteraceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Soh nep bah	*Rubus rogusus*	Rosaceae
2.	Soh krot	*Smilax roxburghii zeylanicum*	Smilaceae
3.	Sohmrit khlaw	*Piper longum*	Piperaceae

EPIPHYTES

Sl No.	Local Name	Botanical Name	Family
1.		*Coelogyme punctualata*	Orchidaceae
2.		*Pleione roxburghii*	Orchidaceae
3.		*Selaginella*	Selaginellaceae

20.7 Number of Stems:

Number of stems in each girth class and specieswise are given in table 20.1 & 20.2.The table shows that maximum numbers of stems are found in lower girth classes i.e. from 30-40cm to 111-120cm classes.

Table - 20.1

Girth class wise and Species wise no. of stems in the sampled area (24 plots – 4.8 ha)

(volume in cu.m)

Girth class wise	*Costonopsis indica* 1st dominant	*Citrus latyus* 2nd dominant	*Pinus khasiana*	Rest of the species	Total stems
30-40	22	22		89	**133**
41-50	32	44		121	**197**
51-60	33	46	3	157	**239**
61-70	30	32	2	133	**197**
71-80	24	14	4	135	**177**
81-90	24	9	9	114	**156**
91-100	22	7	4	82	**115**
101-110	23	10	3	93	**129**
111-120	26	6	8	64	**104**
121-130	16	2		44	**62**
131-140	24	1	1	44	**70**
141-150	13	1		35	**49**
151 & above	68	6		280	**354**
Total	**357**	**200**	**34**	**1391**	**1982**

Table - 20.2

Girth class wise and Species wise no. of stems in the entire grove (23.7 ha)

Girth class wise	*Costonopsis indica* 1st dominant	*Citrus latyus* 2nd dominant	*Pinus khasiana*	Rest of the species	Total stems
30-40	109	109	0	439	**657**
41-50	158	217	0	597	**972**
51-60	163	227	15	775	**1180**
61-70	148	158	10	657	**973**
71-80	119	69	20	667	**875**
81-90	119	44	44	563	**770**
91-100	109	35	20	405	**569**
101-110	114	49	15	459	**637**
111-120	128	30	40	316	**514**
121-130	79	10	0	217	**306**
131-140	119	5	5	217	**346**
141-150	64	5	0	173	**242**
151 & above	336	30	0	1383	**1749**
Total	**1765**	**988**	**169**	**6868**	**9790**

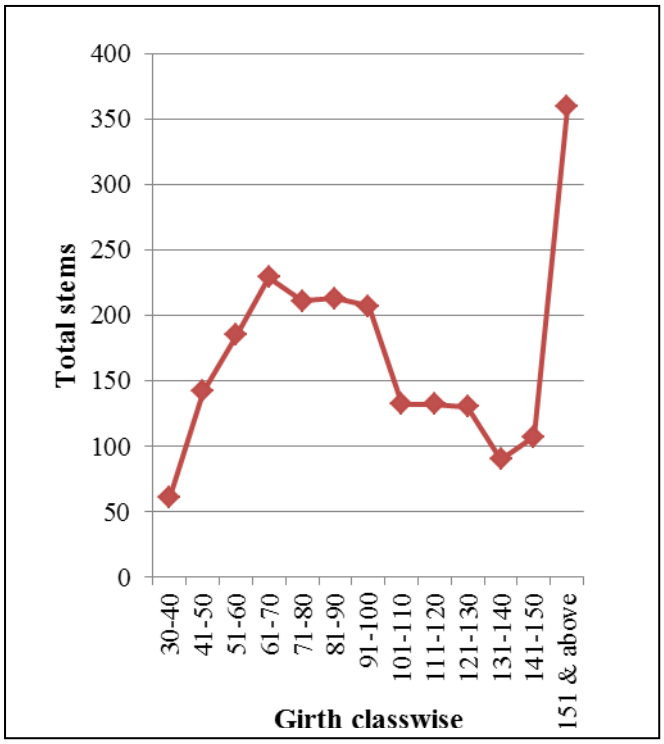


Figure 20.1: Girth class wise with respect to total stems

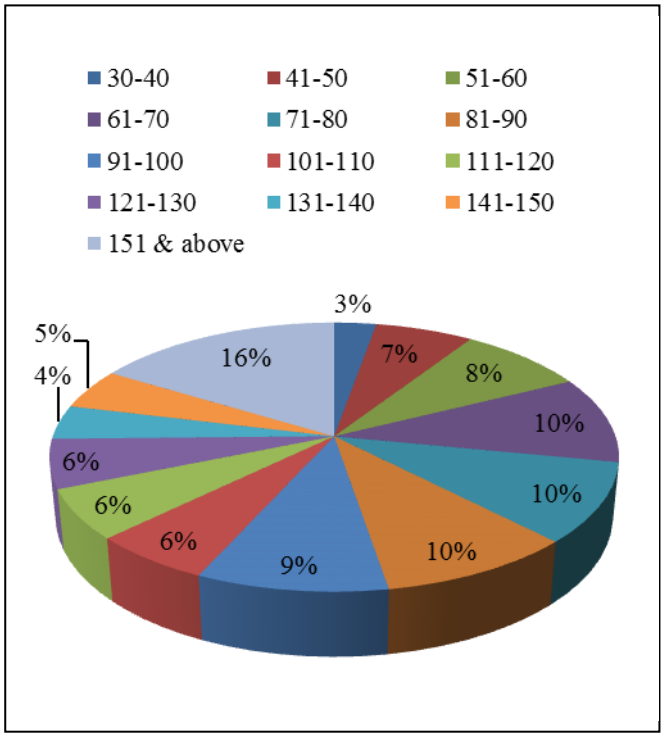


Figure 20.1: Girth class wise with respect to Total stems

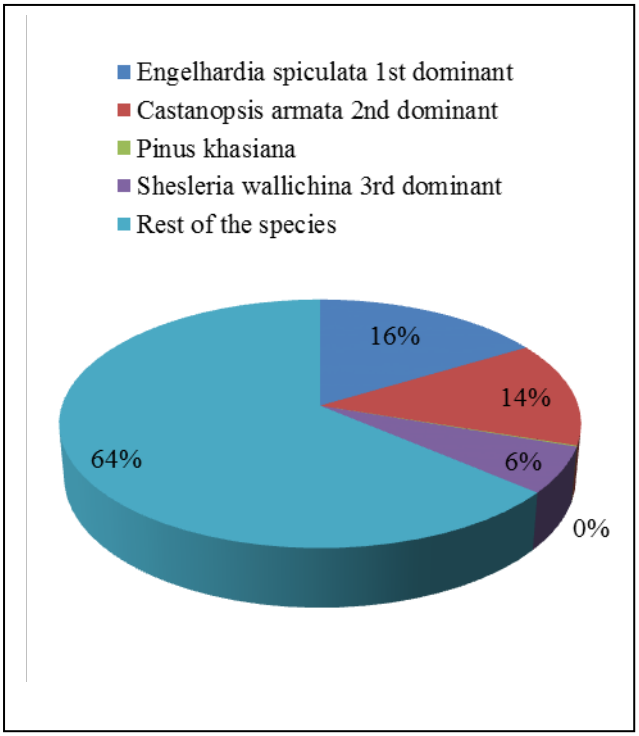


Figure 20.1(a): Species wise with respect to Total stems



Figure 20 (a): Over view of Mawnai Sacred Grove

20.8 Growing Stock:

As per the methodology described in Chapter-I, 100% enumeration is carried out in the grove as its area is less than 10ha. Every tree species, having girth (over bark) at breast height more than 30cm is enumerated by measuring the top height (in metres) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Sacred grove Description Form and Plot Enumeration Form. In 24 plots of 0.2ha size i.e.4.8 ha, data was collected for 1982 tree species consisting of 357 *Costonopsis indica*, (1st dominant), 200 *Cytrus latyus* (2nd dominant), 34 *Pinus khasiana* and 1391 Rest of the species. Using the Local Volume Equations given in Chapter –II, volume was calculated for each tree species girth class wise and species wise. There were 13 girth classes starting from 30-40cm to 151cm and above. The results are given in table 20.3 & 20.4 for Law Lyngdoh Mawnai sacred grove which shows the volume species wise and girth classwise. The total growing stock of the Grove works out to 16,956.234 cubic metres.

Table – 20.3
Species wise girth class wise volume in the sampled area (24 plots – 4.8 ha)

(volume in cu.m)

Girth class wise	*Costonopsisindica* 1st dominant	*Citrus latyus* 2nd dominant	*Pinus khasiana*	Rest of the species	Total
30-40	1.207	1.494		5.683	**8.384**
41-50	4.739	6.701		17.751	**29.191**
51-60	8.753	11.629	0.525	41.624	**62.531**
61-70	11.740	12.519	0.570	52.438	**77.267**
71-80	13.155	7.685	1.893	72.953	**95.686**
81-90	17.468	6.268	5.188	83.505	**112.429**
91-100	20.110	6.745	3.069	75.413	**105.337**
101-110	26.138	11.251	2.717	105.708	**145.814**
111-120	35.983	8.227	9.417	88.790	**142.417**
121-130	25.988	3.216		71.844	**101.048**
131-140	46.593	1.978	1.603	85.655	**135.829**
141-150	29.295	2.068		78.736	**110.099**
151 & above	362.469	16.816		1928.857	**2308.142**
Total	**603.638**	**96.597**	**24.982**	**2708.957**	**3434.174**

Table – 20.4
Species wise girth class wise volume in entire grove (23.7 ha)

(volume in cu.m)

Girth class wise	*Costonopsisindica* 1st dominant	*Citrus latyus* 2nd dominant	*Pinus khasiana*	Rest of the species	Total	% wrt total volume
30-40	5.960	7.377	0.000	28.060	**41.396**	**0.244**
41-50	23.399	33.086	0.000	87.646	**144.131**	**0.850**
51-60	43.218	57.418	2.592	205.519	**308.747**	**1.821**
61-70	57.966	61.813	2.814	258.913	**381.506**	**2.250**

71-80	64.953	37.945	9.347	360.205	**472.450**	**2.787**
81-90	86.248	30.948	25.616	412.306	**555.118**	**3.274**
91-100	99.293	33.303	15.153	372.352	**520.101**	**3.068**
101-110	129.056	55.552	13.415	521.933	**719.957**	**4.246**
111-120	177.666	40.621	46.496	438.401	**703.184**	**4.147**
121-130	128.316	15.879	0.000	354.730	**498.925**	**2.943**
131-140	230.053	9.766	7.915	422.922	**670.656**	**3.956**
141-150	144.644	10.211	0.000	388.759	**543.614**	**3.206**
151 & above	1789.691	83.029	0.000	9523.731	**11396.451**	**67.216**
Total	2980.463	476.948	123.349	13375.475	**16956.234**	**100.008**
% wrt total volume	**17.579**	**2.813**	**0.728**	**78.889**	**100.008**	

Table 20.4 shows that the volume contributed by the 1st dominant species (*Costonopis indica*) with respect to the total volume of the grove is 17.58% , the 2nd dominant species (*Cytrus latyus)* is 2.81%, *Pinus khasiana* is 0.73% while Rest of the species is maximum i.e. 78.88%. Total volume of the grove is 16,956.234 cubic metres.

From the table it is observed that in general as the girth class increases, the volume in that class increases i.e. girth class is directly proportional to the volume in that class.

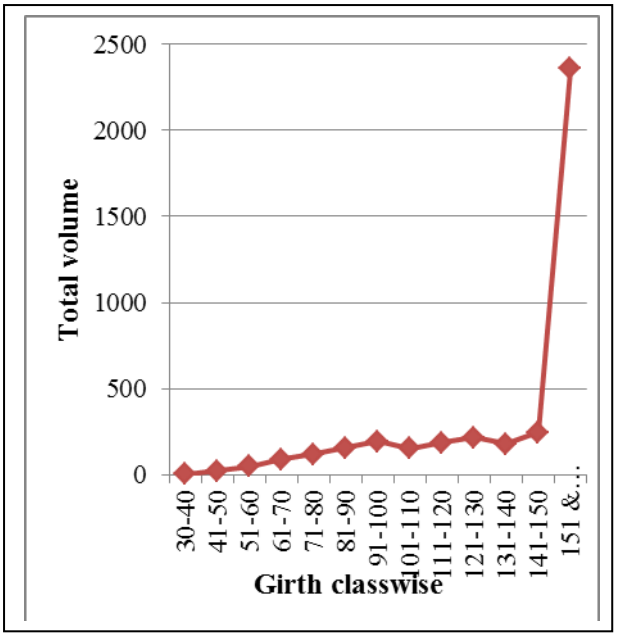


Figure 20.3: Girth class wise with respect to total volume.

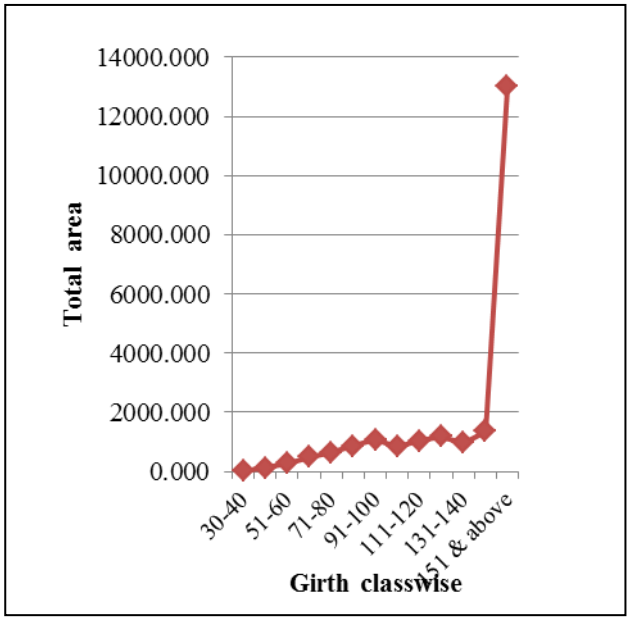


Figure 20.4: Girth class wise with respect to total area

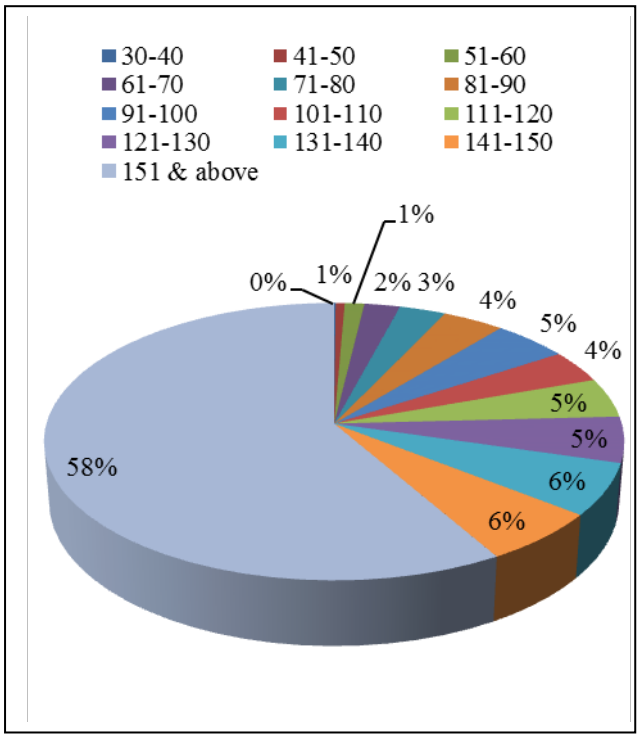


Figure 20.4: Girth class wise with respect to Total volume

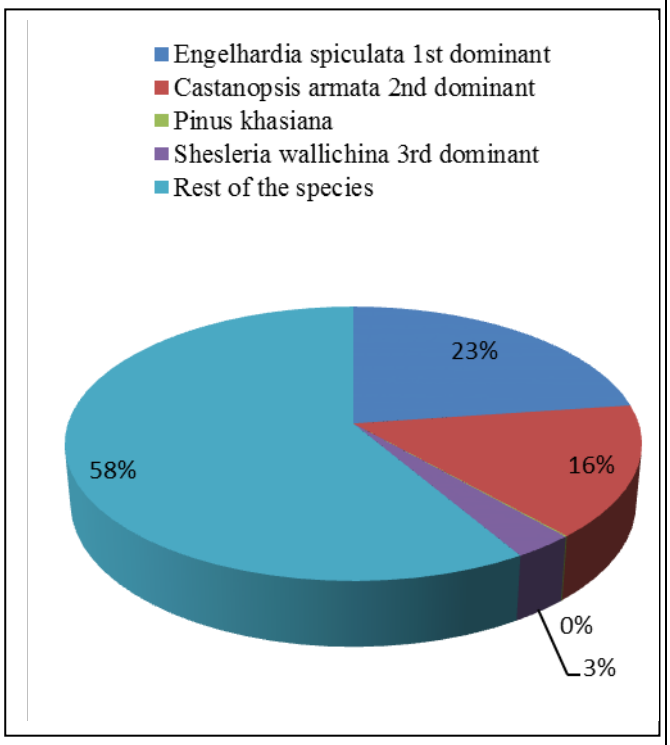


Figure 20.4(a): Specieswise with respect to Total volume



Figure 20 (b): Showing giant tree at Mawnai Sacred Grove. Grove.



Figure 20 (c): Staff in action at Mawnai Sacred

20.9 Brief Note on Management of Law Lyngdoh Mawnai:

(i) Protection from Biotic Interference:-

This sacred grove presently has lost its status of secrecy due to conversion of religion. There is no restriction on entry and exit. Although there is restriction of felling of timber but still in some part of the grove, it is observed that people did fell some trees for construction purposes. Encroachment did also take place in some area of this grove. Grazing and poaching cannot also be ruled out completely. It is therefore suggested that if the grove be declared as Community Reserve, then the rich natural resources that it is left with can be prevented from future destructions.

(ii) Fire control:-

During field visit and interaction with the elders of the village it is learnt that there has been no fire incidence in the past. In order to avoid fire incidence in the near future, fire line can be created all along the boundary every year before the onset of dry season this will help to protect the rich bio-diversity of the grove.

(iii) Water stress:-

Water is the main factor responsible for the life of plants and animals. In this grove there is no stream or river which flow in and around of the grove. Therefore construction of check dams across the slope in different part of the grove is suggested so as to harvest rain water for the benefit of wild life and plants as well as to improve moisture content of the soil which will also in turns prevents spreading of fire inside the grove.

(iv) Awareness campaign:-

This is the most important activity in order to preserve this beautiful grove. This can be done at the grass root level so that people will know the importance of sacred grove, the forest and the environment as a whole.