FOREST INVENTORY OF SACRED GROVES OF MEGHALAYA

VOLUME – II

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FOREST RESOURCES SURVEY DIVISION

CLIMATE CHANGE, RESEARCH & TRAINING WING

FOREST & ENVIRONMENT DEPARTMENT

GOVERNMENT OF MEGHALAYA

MESSAGE

I am delighted to see that Forest Resources Survey Division under Climate Change, Research & Training Wing of Forest & Environment Department Meghalaya has taken the initiative of documenting, compiling for publication of the Book titled **"Forest Inventory of Sacred Groves of Meghalaya"** Volume II, which is in continuation of the Volume I which was published during the Year 2016.

Sacred Groves are the tracts of virgin forest that are left untouched by the local inhabitants and are protected by the local people due to their culture and religious belief. They are repositories of rich biodiversity. They are also the last bastion where are rich culture and custom of the indigenous people are still preserved. Sacred Groves in Meghalaya are good example of rich tradition of Preserving Biodiversity of the State.

I congratulate the team of Officers and Staff involved in this important exercise and this publication will surely serve the purpose of being an invaluable document for the researchers, foresters, students and other stake holder.

(Shri. S. Md. A. Razi, IRTS)
Commissioner & Secretary to the Govt. of Meghalaya
Forest & Environment Department.

FOREWORD

It gives me an immense pleasure to learn that Forest Resources Survey Division, Shillong under the aegis of the Climate Change, Research & Training Wing of Forest & Environment Department has undertaken the initiatives for Inventorisation of Sacred Groves in Meghalaya and bring out this publication titled **"Forest Inventory of Sacred Groves of Meghalaya"** Volume II, which is in continuation of the Volume I which was published during the Year 2016.

Sacred Groves in Meghalaya are forest patches of varying sizes which are communally protected and which usually have a significant religious belief. Sacred Groves are the store houses of rich biodiversity. They are rich in traditional belief, knowledge, stories, rituals and faith of the local people associated with these Sacred Groves. Preservation and conservation of the Sacred Groves in Meghalaya is a good in-situ conservation strategy which in turn will enable the future generation to cherish and experience firsthand the rich biodiversity of our State.

I appreciate the work done by Forest Resources Survey Division, Shillong under Climate Change, Research & Training Wing of Forest & Environment Department Meghalaya in this regard and I hope this publication will surely serve the purpose for those who are interested in the preservation and conservation of Sacred Groves in Meghalaya.

(Shri. B. K. Lyngwa, IFS)
Principal Chief Conservator of Forest & HoFF
Meghalaya, Shillong.

PREFACE

Sacred Groves in Meghalaya represents an age old tradition of Environmental conservation based on indigenous knowledge, culture and religious belief. Sacred Groves originated in Meghalaya since time immemorial much before the advent of Christianity. They are unique features of Khasi and Jaintia Hills. They are among the few least disturbed forest patches which are serving as the natural treasure-house of biodiversity and refuge for a large number of endemic, endangered and rare taxa.

Sacred Groves are large vegetative areas rich in biodiversity protected by communities living around them after harbouring some religious and cultural importance. They serve as conservation sites for many valuable crops and medical plants which act as a gene pool. It also helps in wildlife conservation of vulnerable species.

I appreciate the effort taken by Forest Resources Survey Division under Climate Change, Research & Training Wing of Forest & Environment Department Meghalaya in bringing out this publication titled **"Forest Inventory of Sacred Groves of Meghalaya"** Volume II, which is in continuation of the Volume I which was published during the Year 2016. These studies include mapping, floral survey and growing stock estimation of various Sacred Groves in Meghalaya. This publication will greatly help in developing conservation action for preserving these biodiversity rich areas in the state.

This book will be of immense use to various stakeholders, researchers, foresters and students in the field of preservation and conservation of Scared Groves in Meghalaya.

(Shri. S. M. Sahai, IFS)
Principal Chief Conservator of Forest (CC, R&T)
Meghalaya, Shillong.

ACKNOWLEDGEMENT

I am delighted to place on record the effort of several Officers of the Forest & Environment Department and Staff of Forest Resources Survey Division, Shillong who supported in completing this work for publication of this book entitled **"Forest Inventory of Sacred Groves of Meghalaya"** Volume II, which is in continuation of the Volume I which was published during the Year 2016.

Sacred Groves in Meghalaya are forest patches of varying sizes which are communally protected and which usually have significant religious belief. Sacred Groves are the store houses of rich biodiversity. They are rich in traditional belief, knowledge, stories, rituals and faith of the local people associated with these Sacred Groves. Preservation of Sacred Groves in Meghalaya is a good in-situ conservation strategy.

I express my deep sense of gratitude to Shri. B. K. Lyngwa, IFS, Principal Chief Conservator of Forest & HoFF, Meghalaya, Shillong for his support and encouragement for publishing this book.

I am thankful to Shri. S. M. Sahai, IFS, Principal Chief Conservator of Forest (CC, R&T) Meghalaya, Shillong for his guidance and valuable import for publishing of this book.

I took this opportunity to express my thanks to Shri. B. Wahlang, IFS, Chief Conservator of Forest (CC, R&T) Meghalaya, Shillong and Shri. J. M. Pohsngap, IFS, retired for the moral support they have given to me for publication of this book.

I am thankful and grateful for Shri. J. R. B. Blah, Range Officer and the field staff of Forest Resources Survey Division, Shillong for their hard work and dedication to their duties of which we can publish this Book. I convey my heartfelt gratitude to the Lyndoh's and Management Authority of these Sacred Groves for their help and support during the field exercise in Growing stock estimation carried out by the Staff. I am also thankful to our Staff Shri. Arkin Shngainlang Nongbri, Smti. Bemeness Lyngdoh and Smti. Senobia Chyne for their dedication in data entry and typing of this document for publication.

Shri. Jiswordy Dkhar, MFS.
Divisional Forest Officer,
Forest Resources Survey Division,
Meghalaya, Shillong.

CONTENTS

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 flora 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 to even 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 those groves, and any disturbance is a taboo (Vartak and Gadgil 1973 Khan et al. 1987, Khiewtam and Ramakrishnan 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 a 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) has to initially performs 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 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 the encroachments, illegal felling of trees and invasion by unwanted weeds and invasive species which has in turns destroyed these pristine and relic forest of the State.

The National Forest Policy of 1988 which aims at bringing 33% of the country's geographical area under the forest/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 ecosystem, 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 and ethical practices developed through indigenous knowledge of generations (Ramakrishnan and Ram 1988, Godbole et al. 1998, Godbole and Sarnaik 2004,Tiwari et al. 1998a,b, Singh et al. 1998).

Thus the traditional worship practices of nature as followed in different parts of 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 Ing-blei Nonglyngkien situated in South West Khasi Hills are good examples 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 grove, that too only four times in a year.

Four types of offerings performed by the Lyngdoh Nonglynkien clan since time immemorial are:-

1. **Krod Lyngdoh**- This is performed annually in the month of March for preparing 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 in the altar of Law Lyngdoh Ingblei. Other sacred groves which are still performing annual rituals are Law Lyngdoh Lyngiong and Khloblai 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 133 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 groves varies from 0.2 ha to about 200 ha. The terrain varies from flat, gently rolling to steep slope. Most of the groves are having closed forest of mixed species. These groves are under the control of the respective 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 groves having area < 10 ha.
2. 20% enumeration – in groves having area 10 - 50 ha.
3. 10% enumeration – in groves 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 grove.
- 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 point of the selected grids were noted with the help of the same grids map.

Field Work:

1. Equipment and other materials required

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 groves since 100% enumerations have to be done in such cases.

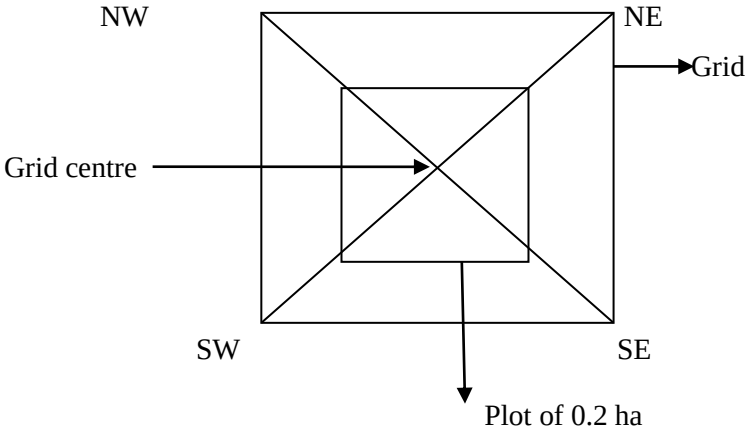
(b) Groves having area 10-50 ha

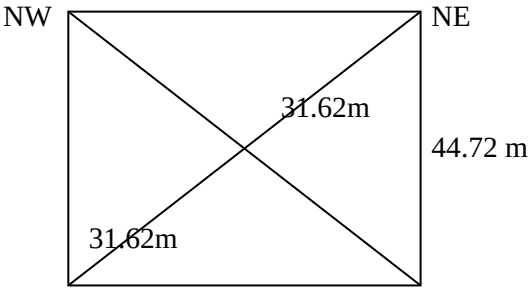
To locate the centre point of the selected grid (for enumeration) the GPS is used (by feeding the Lat-Long of the central point). After locating the centre point a stout peg of 10cm dia and 1.5m ht is fixed. From this centre point 31.62m distance is measured in NE, SE, NW and SW directions i.e. in the 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 point 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) Groves having area more than 50 ha

Same procedure as given in (b) (for 10-50 ha area groves) may be adopted.





SW 44.72m SE

3. Data collection

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 Grove 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 Grove 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 all the 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 ***BlumeLeiss 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. *Bombaxceiba*
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. *Anthocephalu scadamba*
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 khasiana* 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.
- $\sqrt{D} = (D)^{1/2} = \left\{ \frac{G^{1/2}}{3.14} \right\}$
- 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 133 Nos. of sacred groves has been mapped with the help of GIS and the list of the 133 mapped sacred grove as mentioned below:-

Sl. No	Name of the Sacred Grove	Area
1	Khlieh Shnong Sohra Syiemship at MawphonSyiem	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 KynremUmwai, 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 MawthohUmwai	3.02 ha
13	Sacred Groves of Kyntoit Diengsiar, MawlongSidarship,	0.675 ha
14	Protected Forest of Mawhiang at Sawsymper	103.44 ha
15	Protected Forest of Pamsanngut Sirdarship at Tyrsad	51.002 ha
16	Protected Forest of Nongsiej Laitwir Kmawan at Bisap Tdei Pongkung,	5.866 Ha
17	Sacred Groves of Nongsiej Laitwir Kmawan Clan at Shanglop Nongspung Syiemship,	15.715 ha
18	Protected Forest of Nongsiej Laitwir Kmawan Nongdom at Lait Nomlang	17.189 ha
19	Protected Forest of LaitMawpat at Wah Mawpat	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	1.933 ha
23	Protected Forest of Lum Kyrphei at Kyrphei	24.138 ha
24	Protected Forest of Mawteibah Village at Lyngkha U Jon	134.96 ha
25	Sacred Groves of Khongsit Clan of MawlumTyrsad, Mylliem Syiemship	1.839 ha
26	Protected Forest of Khongsit Clan at MawlumTyrsad 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 RngiWeiloi	62.648 ha
31	Khlaw Blai Pohmurang Dongwah shnong 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 PyndenSakwang,	9.89 ha
35	Law A-Dong Tyllong Um Kyrwiang of Hilland Village	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,	6.93 ha
40	Sacred Grove Khlo Pohpuja, Raliang	0.63 ha
41	Law-A-Dong Synrai-Hu,	13.30 ha
42	Mynthliang Sacred Grove of Raid Niaw Kmai, Raliang	0.33 ha
43	Law Lyngdoh Mawlot Phyllut	16.54 ha
44	Law Adong Nongrimbah Mawlangwir	34.65 ha
45	Law Adong Nongsynrieh Maharam Syiemship	9.83 ha
46	Salariang, Jakrem	10.5 ha
47	Twahsamparat	29.09 ha
48	Rei-missiom Lawadong of Photja-ud	8.59 ha
49	Law Lyngdoh Rngaid Nonglang	2.04 ha
50	Law Lyngdoh Iingblei Nonglyngkien	2.39 ha
51	Law Lyngdoh (Lyngdoh Nonglyngkien)	5.234 ha
52	Law Adong Sawkpoh Wanniang,	5.15 ha
53	Law Adong Phlangwanbroi,	9.65 ha
54	Law Lyngdoh Lyngiong,	62.42 ha
55	Law Adong of Raid Raitong at Lumprah Mawkhyrdop Raitong	10.13 ha
56	Khlaw BriRaij Bhorymbong	10 ha
57	Law Lyngdoh Mawnai under Hima Nongkhlaw,	2.3 ha
58	Law Adong Laitkynsew at Mawkdar,	3.79 ha
59	Law Adong Laitkynsew at Lumlaitdihum	17.650 ha
60	Khlo Blai Lyngdoh at Raliang village,	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	4.01 ha
67	Law Lyngdoh Lynching, Mawskuin	19.044 ha
68	Sangriang Sacred grove, Sangriang	16.38 ha
69	Wah Shangiar Law Adong at Mawmluh	24.113
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 Khap Mawjuta	1.01 ha
81	Law Lyngdoh Shillong Raid Mawkhap	0.26 ha
82	Law Lyngdoh Kharai Raid Nongkhlieng	1.43 ha
83	Law Adong Tyrjut Raid Nongkhlieng	13.52 ha
84	Law Adong WahShadsngi Nongmadan, Shadsngi	1.15 ha
85	Law Adong Kliar Umrem Nongmadan, Shadsngi	2.59 ha
86	Law Adong WahRangmuh, 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 KaMukertilla 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 LyngdohErbamon, Raid Mukertilla	0.24 ha
93	Law Kyntang of Smti Philo & Shri August Tynsong, Raid Mukertilla	0.99 ha
94	Law Adong Niangblah, Lad Mawphlang	22.00 ha
95	Law Adong Phud Synrang, Mawmihthied	1.18 ha
96	Law Adong Sohum, Mawmihthied	1.17 ha
97	Law Adong Wahthlong Mawmihthied	0.69 ha
98	Law AdongWah Umsohphie, Mawmihthied	2.92 ha
99	Law Adong Wah Marobin, Mawmihthied	1.90 ha
100	Law Adong Wahing Bah, Mawmihthied	2.67 ha
101	Law AdongKor at Ladmawphlang	7.16 ha
102	Law Adong Thymmai, Laitryngew	1.32 ha
103	Law Adong Kshaid, Laitryngew	3.42 ha
104	Law Adong Law Nongshlem, Mawmihthied	43.94 ha

105	The Law Adong Law Suid Noh, Laitryngew	1.16 ha
106	Law Adong Them-U-Mud, Mawmihthied	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, Laitryngew	11.07 ha
111	The Law Adong Law Pjaih, Laitryngew	6.04 ha
112	The Law Adong Law Kait, Laitryngew	0.58 ha
113	The Law Adong iapmoit-2, Laitryngew	3.661 ha
114	The Law Adong Sohmyndong, Laitryngew	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	22.24 ha
119	Umkyrsian Sacred grove, Nongriat	0.27 ha
120	Kyllai Langsngun Law AdongKur-Paliar Lai Kpoh Demnar	39.36 ha
121	Lawpyllun Law Adong Kur Iawphniaw Mawsaw	52.03 ha
122	Law Lyngdoh Law AdongKur Lai-Kynja, Rangblang	14.81 ha
123	Lum-niang Ram Law Lyngdoh of KurMyrthong	144.39 ha
124	Jri Tyngkong Lawadong Shnong Umtung	10.12 ha
125	Law Adong of Mawtneng	5.386 ha
126	Khloo Blai Sein Raij Tuber	89.43 ha
127	Khloo Thangbru Umsymphu	19.6 ha
128	Khloo Pohblai Mooshutia	33.5ha
129	Khloo Blai Chyrmang Sein Raij Kongwasan Chyrrmang Kmai	7.0ha
130	Khloo Langdoh Kur Pyrtuh	15.4 ha
131	Mynso (Sula lynter) Ka khloo thangbnai Sula lynter sein raij Mynso	3.243ha
132	Khloo Blai Mynso	0.852ha
133	Khloo blai ka raij u LangdohIonglang (Mootyrshiah)	15.12ha

8. List of 20 nos. of Forest Inventory of Sacred Groves published in Volume-I

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 LyngdohIingblei 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 Lyngdoh Lyngiong, 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**	

List of 20 nos. of Forest Inventory of Sacred Groves of Meghalaya Vol-II are as given below:-

Sl. No	Name of the Sacred Grove	Area	District wise
1	Law Adong Phudsynrang Shyiap	1.18 ha	East Khasi Hills
2	Law Adong Wahthlong	0.69 ha	-do-
3	Law Adong Umsohphie	2.92 ha	-do-
4	Law Adong Lait Raid Mawkhap	4.88 ha	-do-
5	Ingkhrong Sacred Groves Sohra Khliehshnong	11.39 ha	-do-
6	Mawphon Syiem Sacred Groves at Khlieh shnong, Sohra	15.932 ha	-do-
7	Law Adong Umiong at Khlieh shnong, Sohra	200.58 ha	-do-
8	Wah Shiangiar Law Adong at Mawmluh	24.113 ha	-do-
9	Law Adong Mawkulai at Mawmluh	38.521 ha	-do-
10	Law Adong Mawsawa at Mawmluh	16.43 ha	-do-
11	Kyllai-Lyngsnguin Law Lyngdoh Kur Lai Kpoh Paliar, Demnar	39.36 ha	South West Khasi Hills
12	Law Adong Swer Dohling	73.32 ha	East Khasi Hills
13	Ka Khloo Thangbru Umsympu, Mukhaialong village	19.6 ha	East Jaintia Hills
14	Ka Khloo Pohblai Mooshutia, Mukhaialong village	33.5	-do-
15	Ka Khloo Langdoh Kur Pyrtuh, Sohmynting	15.4 ha	West Jaintia Hills
16	Ka Khloo Blai Sein Raij Kongwasan, Chyrmang	7.04 ha	-do-
17	Ka Khloo Blai Sein Raij Tuber	89.43 ha	East Jaintia Hills
18	Ka Khloo Blai ka Raij Langdoh Ionglang, Mootyrshiah	15.12 ha	West Jaintia Hills
19	Sula Lynter Law Kyntang Mynso	3.243 ha	-do-
20	Khloo Blai Mynso	0.852 ha	-do-
	Total area =	**613.501**	

CHAPTER-III

1 - Law Adong Phud Synrang Shyiap, East Khasi Hills District

1.1 Location:

Law Adong Phud Synrang Shyiap sacred grove is situated in East Khasi Hills District of Meghalaya at Mawmihthied village under the Hima Sohra Syiemship. It covers an area of 1.18 ha. It lies between 25° 20′ 6" to 25° 20′ 10″ N latitude and 91° 43′ 52″ to 91° 43′ 52″ E Longitude with an altitude of 1645 m above mean sea level. It is bounded in the North, East & South West by Mawmihthied area. The grove is accessible by road from Shillong and to reach the spot we have to travel by katcha road and have to track on foot for about 10 minutes from katcha road.

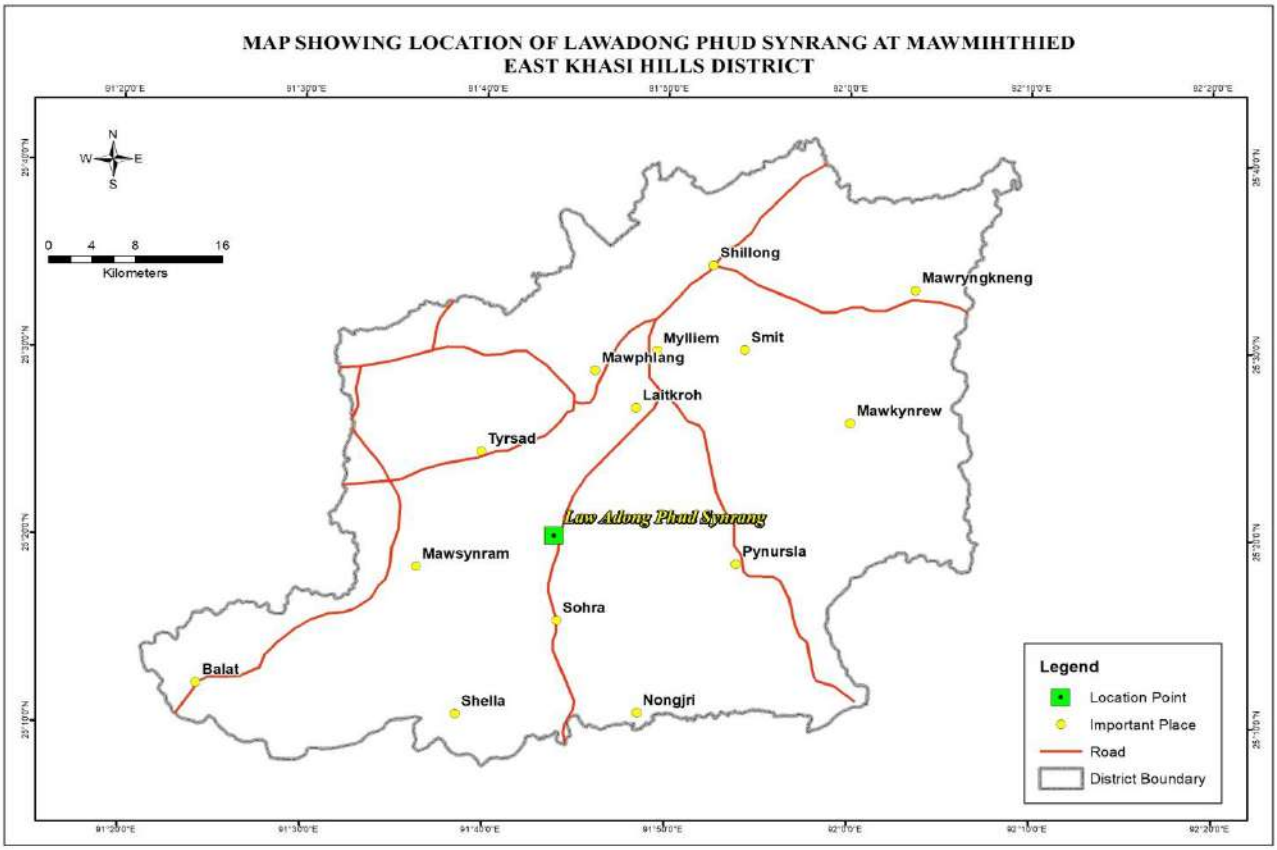
1.2 Brief History:

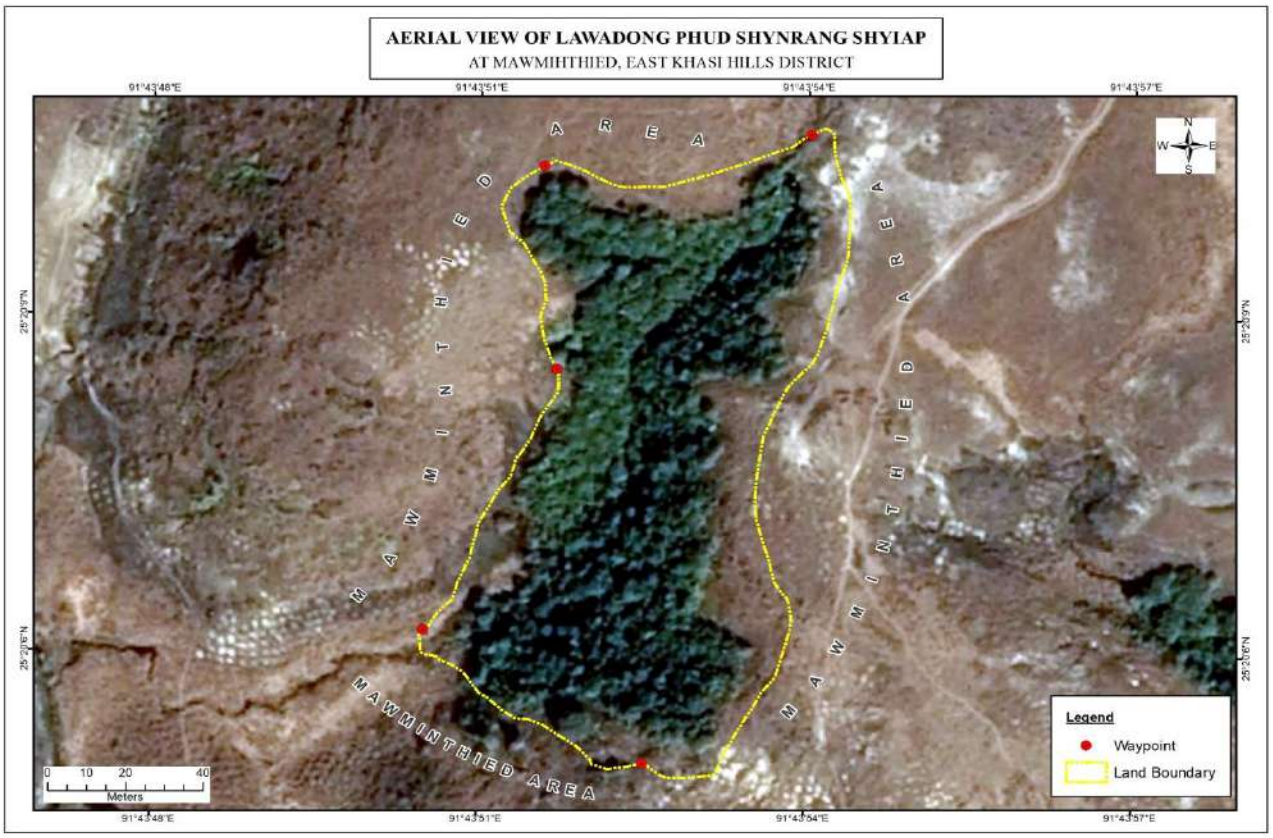
The grove has been originated since decades. Offering and Prayers have ceased long way back since the embrace of Christianity. The grove is owned by the village community under the lookout and control by the Headman elected by the villages under Hima Sohra Syiemship. The villages still preserve this grove to preserve the environment and to help any family of the village to reconstruct their house by donating some tree in the event /any natural calamity occurs. Entry inside the grove is not illegal but cutting down of timber is strictly prohibited and punishable under rule framed by the village Dorbar.

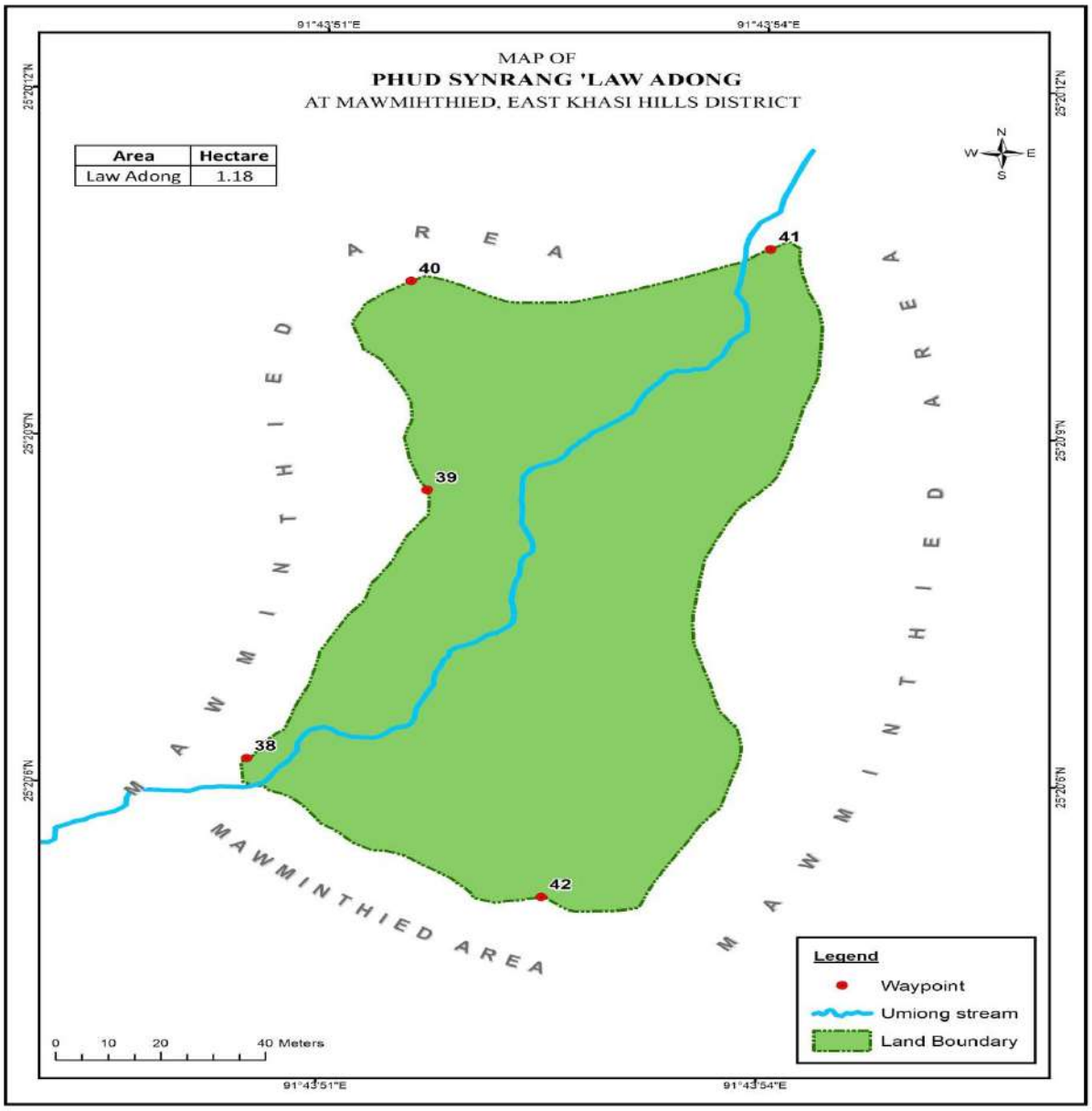
1.3 Geography and Climate:

Topography of the grove is steep in nature varying from 9° to 25°. It fall under South east aspect. The soil texture is loamy with no coarse fragment and slightly compact in consistency and brown in colour with low soil depth. There is only one perennial stream which flow through this grove i.e. Phud Synrang Shyiap.

The cold winter start from mid October to February and warm summer from May to September. Monsoon period is from May to September & October, the average minimum temperature is 7ºc and maximum is 26ºc. Biotic pressure encroachment, Wild fire, hunting, poaching grazing, and illegal timber felling of trees are absent in this grove.


MAP SHOWING LOCATION OF LAWADONG PHUD SYNRANG AT MAWMIHTHIED
EAST KHASI HILLS DISTRICT
N
W
E
S
0 4 8 16
Kilometers
Shillong
Mawryngkneng
Mylliem
Smit
Mawphlang
Laitkroh
Mawkynrew
Tyrsad
Law Adong Phud Synrang
Mawsynram
Pynursla
Sohra
Balat
Shella
Nongjri
Legend
Location Point
Important Place
Road
District Boundary


AERIAL VIEW OF LAWADONG PHUD SHYNRANG SHYIAP
AT MAWMIHTHIED, EAST KHASI HILLS DISTRICT
AREA
MAWMIHTHIED AREA
MAWMIHTHIED AREA
MAWMIHTHIED AREA
N
W
E
S
0 10 20 40
Meters
Legend
Waypoint
Land Boundary



1.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are of Mixed Deciduous forest.

1.5 Flora and Fauna:

The vegetation type is of mixed *species* consisting mainly of *Castanopsis hystrix species* and *Meliosma pinnata* as dominant species. The origin of the forest is of natural in nature and it is of two storeyed layers. The wildlife found within the grove are jungle fowls, etc and some vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

i. High level endemic plants and animal species which is significant from biodiversity forest of view.
ii. Existence of many rare and endangered plants species.

iii. Restrictions-"do's and don'ts;" help the sacred grove in conservation of Flora and fauna and maintaining of rich natural resources.

1.6 Flora species:

List of trees found in Law Adong Phud Synrang Shyiap, East Khasi Hills

TREES

Sl. No.	Botanical Name	Local Name	Family
1.	*Aralia armata*	Dieng latymphu	Araliaceae
2.	*Castanopsis hystrix*	Dieng stap	Fagaceae
3.	*Lithocarpus elegans*	Dieng shanam dngiem	Fagaceae
4.	*Cinnamomum pauciflorum*	Dieng tyrthia	Lauraceae
5.	*Elaeocarpus lanceifolius*	Dieng sohkhyllam	Elaeocarpaceae
6.	*Eugenia jambolana*	Dieng sohum	Myrtaceae
7.	*Exbucklandia populnea*	Dieng doh	Hamamelidaceae
8.	*Grewia abutilifolia*	Dieng somehblang	Tiliaceae
9.	*Inula cappa*	Dieng lalieh	Asteraceae
10.	*Itea chinensis*	Dieng sohsyrtet	Iteaceae
11.	*Meliosma pinnata*	Dieng krot	Sabiaceae
12.	*Michelia champaca*	Dieng rai	Magnoliaceae
13.	*Myrica farquhariana*	Dieng sohphie	Myricaceae
14.	*Schima khasiana*	Dieng ngan	Theaceae
15.	*Symplocos khasiana*	Dieng pei	Symplocaceae
16.	*Viburnum foetidum*	Dieng sohlangeit ksew	Adoxaceae

List of Shrubs, herbs, climbers & bamboo found in Law Adong Phud Synrang Shyiap, East Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1	Lajarem lieh	*Clerodendrum viscosum*	Verbenaceae
2	Dieng sohniang riang blei	Not listed	Not listed
3	Dieng soh phong phong	Not listed	Not listed
4	Dieng lasi sia	Not listed	Not listed
5	Dieng smaw	Not listed	Not listed
6	Dieng sohtait	Not listed	Not listed
7	Dieng eit miang	Not listed	Not listed
8	Dieng soh kynruin	Not listed	Not listed
9	Dieng soh pyrsit	*Eurya acuminata*	Theaceae
10	Dieng sohjabuit	*Phlogacanthus thyrsiflorus*	Acanthaceae
11	Jarem iong	*Clerodendrum colebrookianum*	Verbenaceae
12	Synsar	*Thysanolaena maxima*	Poaceae
13	Kait khlaw	*Musa acuminata*	Musacaea
14	Dieng rnong	*Mahonia pycnophylla*	Berberidaceae

15	Soh lang	*Viburnum foetidum*	Caprifoliaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Sying khlaw	*Zingiber purpureum*	Zingiberaceae
2.	Jajew khlaw	*Begonia roxburghii*	Begoniaceae
3.	Tyrkhang	*Asplenium nidus*	Aspleniaceae
4.	Sohbyrthit	*Urena lobata*	Malvaceae
5.	Wangkhlaw	*Colocasia esculenta*	Araceae
6.	Phud wang	*Cololasia spp*	Araceae
7.	Bat eroplain	*Inula cappa*	Asteraceae
8.	Sla lamet	*Phyrnium pubinerve*	Marantaceae
9.	Shynrai khlaw	*Alpinia allughas*	Zingiberaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Kophi khlaw	*Coffea jenkinsii*	Rubiaceae
2.	Dieng longkhasaw (Jyrmi)	Not listed	Not listed
3.	Jyrmi soththied	Not listed	Not listed
4.	Pew shrieh	*Hedera nepalensis*	Araliaceae
5.	Soh shang khlor	*Elaeagnus pyriformis*	Elaeagnaceae
6.	Sla kynda jyrmi	*Pothos scandens*	Araceae
7.	Loapla	*Rhaphidophora decursiva*	Araceae
8.	Dieng sohmatan/sohpdong	*Stephania glabra*	Menispermaceae

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng tiew dieng	*Micropera manii*	Orchidaceae
2.	Dieng tiew dieng	*Dendrobium aphyllum*	Orchidaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Shken	*Bambusa pallida*	Poaceae

1.7 Growing Stock:

As per the methodology described in Chapter-II, 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 30 cm is enumerated by measuring the top height (in meters) and the girth

(in centimeters) at breast height. All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 384 tree species consisting of 84 *Castanopsis hystrix* (1st dominant), 70 *Meliosma pinnata* (2nd dominant), 42 *Elaeocarpus lanceifolius* (3rd dominant), 188 *Rest of 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 result for Law Adong Phud Synrang Shyiap are given in table 1.1 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 22.786 cubic metres.

Table 1.1

Girth class wise & Specieswise with respect to total volume (in area 1.1 ha)

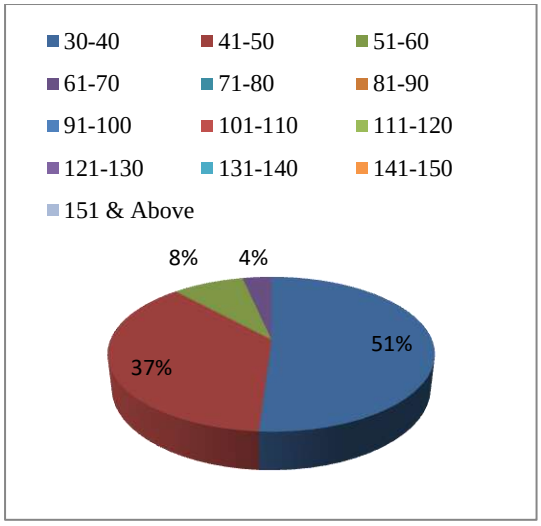
(volume in cu.m)

Girth class (cm)	***1st dominant Castanopsis hystrix***	***2nd dominant Meliosma pinnata***	***3rd dominant Elaeocarpus lanceifolius***	**Rest of species**	**Total**	**% with respect with total volume**
30-40	2.382	1.511	1.579	6.155	11.627	**51.03**
41-50	0.637	3.469	0.499	3.860	8.465	**37.15**
51-60	0	1.255	0	0.656	1.911	**8.39**
61-70	0	0	0	0.783	0.783	**3.44**
71-80	0	0	0	0	0	**0**
81-90	0	0	0	0	0	**0**
91-100	0	0	0	0	0	**0**
101-110	0	0	0	0	0	**0**
111-120	0	0	0	0	0	**0**
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	**3.019**	**6.235**	**2.078**	**11.454**	**22.786**	**100.00**
% with respect to total volume	13.249	27.363	9.120	50.268	100	

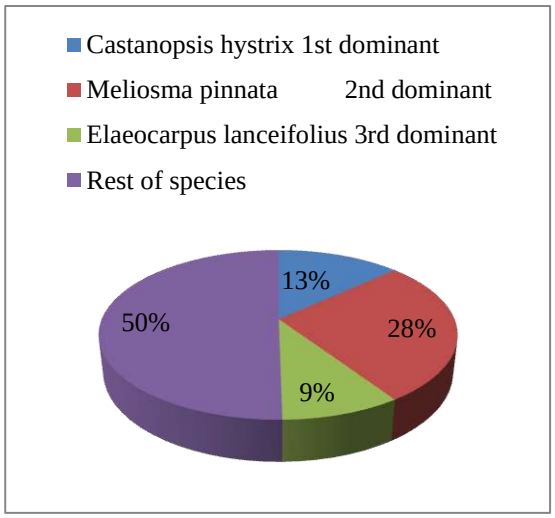
The table indicates that the volume contributed by the 1st dominant species (*Castanopsis hystrix)* with respect to the total volume of the grove is 13.249%, the 2nd dominant species (*Meliosma pinnata*) with respect to the total volume of the grove is 27.363%, 3rd dominant species *(Elaeocarpus lanceifolius)* is 9.120 % while rest of the species is maximum i.e.50.268 %. Total volume of the grove is 22.786 cubic metres.

From the above 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.

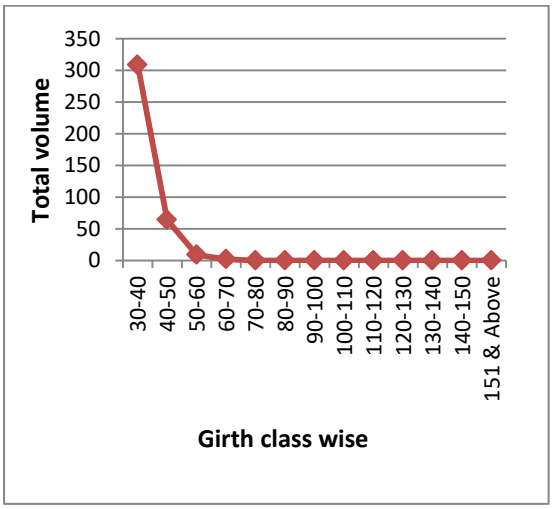
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view Law Adong Phud Synrang Shyiap

Table 1.2

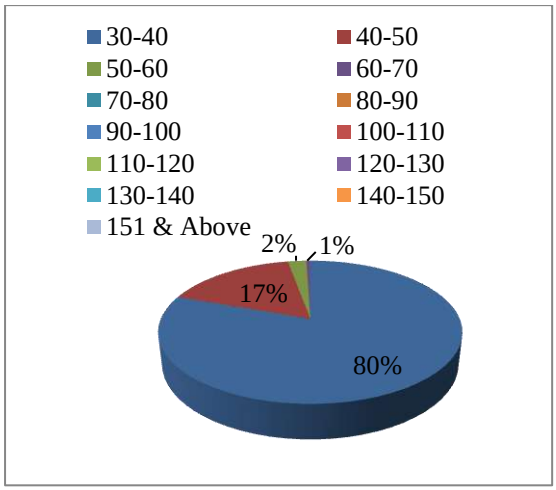
Girth class wise & Species wise No. of stems in the entire grove (Area 1.1 ha)

Girth class (cm)	*1st dominant Castanopsis hystrix*	*2nd dominant Meliosma pinnata*	*3rd dominant Elaeocarpus lanceifolius*	Rest of species	Total
30-40	79	40	38	152	**309**
40-50	5	24	4	31	**64**
50-60	0	6	0	3	**9**
60-70	0	0	0	2	**2**
70-80	0	0	0	0	**0**
80-90	0	0	0	0	**0**
90-100	0	0	0	0	**0**
100-110	0	0	0	0	**0**
110-120	0	0	0	0	**0**
120-130	0	0	0	0	**0**
130-140	0	0	0	0	**0**
140-150	0	0	0	0	**0**
151 & Above	0	0	0	0	**0**
Total	**84**	**70**	**42**	**188**	**384**

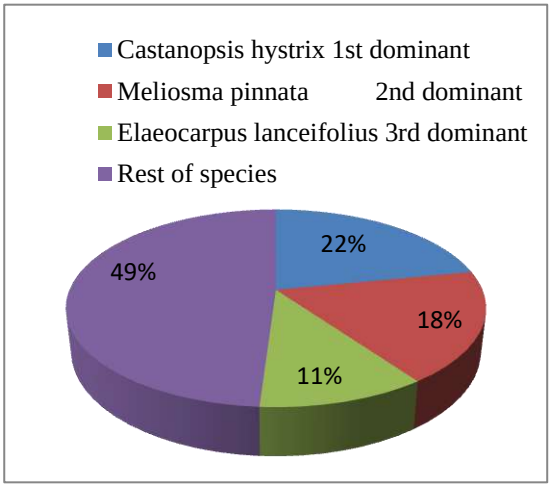
1.8 Number of Stems:

Number of stems in each girth class and species wise are given in the table 1.2. The table shows that maximum numbers of stems are found in lower girth classes i.e. from 30-40 cm to 91-100 cm classes.

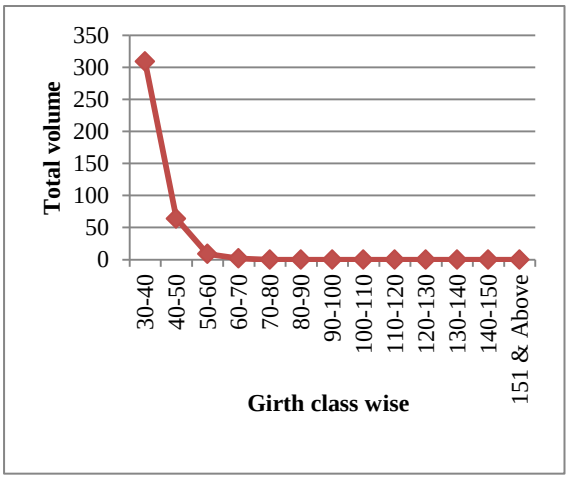
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Field exercise graph at Law Adong Phud Synrang Shyiap



Inside view of Law Adong Phud Synrang Shyiap

1.9 Brief note on Management of Law Adong Phud Synrang Shyiap

(i) Protection from Biotic Interfernece:-

There is norestriction for entry or exit in this grove. However the village dorbar of Mawmihthied strictily prohibits cutting or felling of tree without the permission from the Dorbar. Although there is no report of illegal felling of timber, poaching or grazing but as thre forest is left open, there are chance of such illegal activities in the near future. If declared as a community Reserve, this beautiful forest can be protected from biotic interferances.

(ii) Fire Control:-

Though there is no report of intentional or unintentional fire in this grove, it will be more logical to take preventive step, in the near future. External fire line can be created all along the boundary of the grove. This will help to presrve the rich natural resources of the grove.

(iii) Water Stream:-

There is only one stream which flow through this grove i.e Phud Synrang Shyiap. Construction of check dams to improved water supply of wild life as well as improved moisture content of the soil is recommended to prevent erosion and spread of fire incidences.

(iv) Afforestation:-

Open forest and blank patches were found in some parts of the grove and it is important that afforestation works need to be carried out to maintain its forest cover and its beauty.

(v) Awareness Campaign:-

It is one of the most important activity to preserve and to educate the important of local environment and its benefits. It can be done at the grass root level so that people will know the ecological importance of the sacred grove.

2 - Law Adong Wahthlong, East Khasi Hills, District.

2.1 Location:

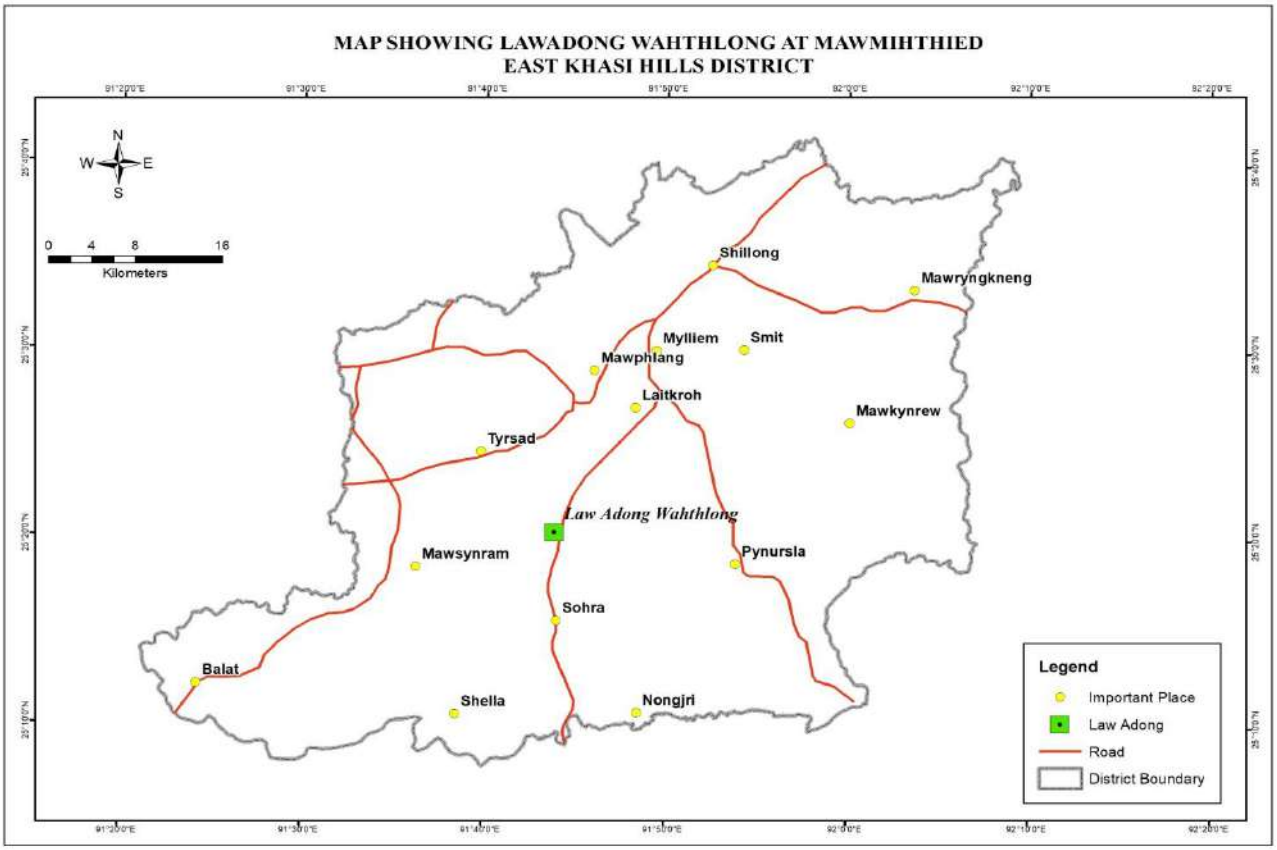
Law Adong Wahthlong Sacred Grove is located in East Khasi Hills District at Mawmihthied village, under the syiemship of Hima Sohra Syiemship. It covers an area of 0.69 ha and lies between 91° 43′ 53″ E to 91° 43′ 56″ E Longitude and 25° 20′ 18″ N to 25° 20′ 20″ N latitude with an altitude of 1651 m from mean sea level (MSL). The Sacred Grove is bounded in the North by Wahthlong stream to the East and South by Private land of Mawmihthied village and to the West by Mawmihthied private land and Umthlong stream. The grove is accessible by road from Shillong to Sohra. It is about 48 km from Shillong.

2.2 Brief History:

The Sacred Grove is owned by villagers of Mawmihthied village and is controlled by the headmen of the village. There is no record to establish its origin, but it is believe that this grove has been originated hundreds of years ago. Offerings and Prayers have ceased long way back, since the embrace of Christianity by the local people. But the villager still preserved the sacred groves for the sake of the environment and also to help any family of the village which may require re-constructing their house by donating some of the trees in case of any natural calamity that may occur. The State Forest Department has no direct control of the said grove as it falls under the jurisdiction of the Khasi Hills Autonomous District Council (KHADC).

2.3 Geography and Climate:

The Topography of the grove is gently rolling in nature with slope varying from 4° to 15°. The soil texture is sandy loamy with boulders and slightly friable consistency. The colour of the soil is brown with high soil depth and soil erosion is negligible in the grove area. The only stream flowing in the northern side of the boundary of the grove is Umthlong stream.The cold winter start from mid November to February and warm summer from May to October. Monsoon period starts from May to September, the average minimum temperature is 10^{o}c and maximum is 30^{o}c. Biotic pressure encroachment, Wild fire, hunting, poaching, grazing, and the other activities like illegal felling of timber are found absent in this grove.


MAP SHOWING LAWADONG WAHTHLONG AT MAWMIHTHIED
EAST KHASI HILLS DISTRICT
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0 4 8 16
Kilometers
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Mawryngkneng
Mylliem
Smit
Mawphlang
Laitkroh
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Tyrsad
Law Adong Wahthlong
Mawsynram
Pynursla
Sohra
Balat
Shella
Nongjri
Legend
Important Place
Law Adong
Road
District Boundary


AERIAL VIEW OF LAWADONG WAHTHLONG AT MAWMIHTHIED
EAST KHASI HILLS DISTRICT
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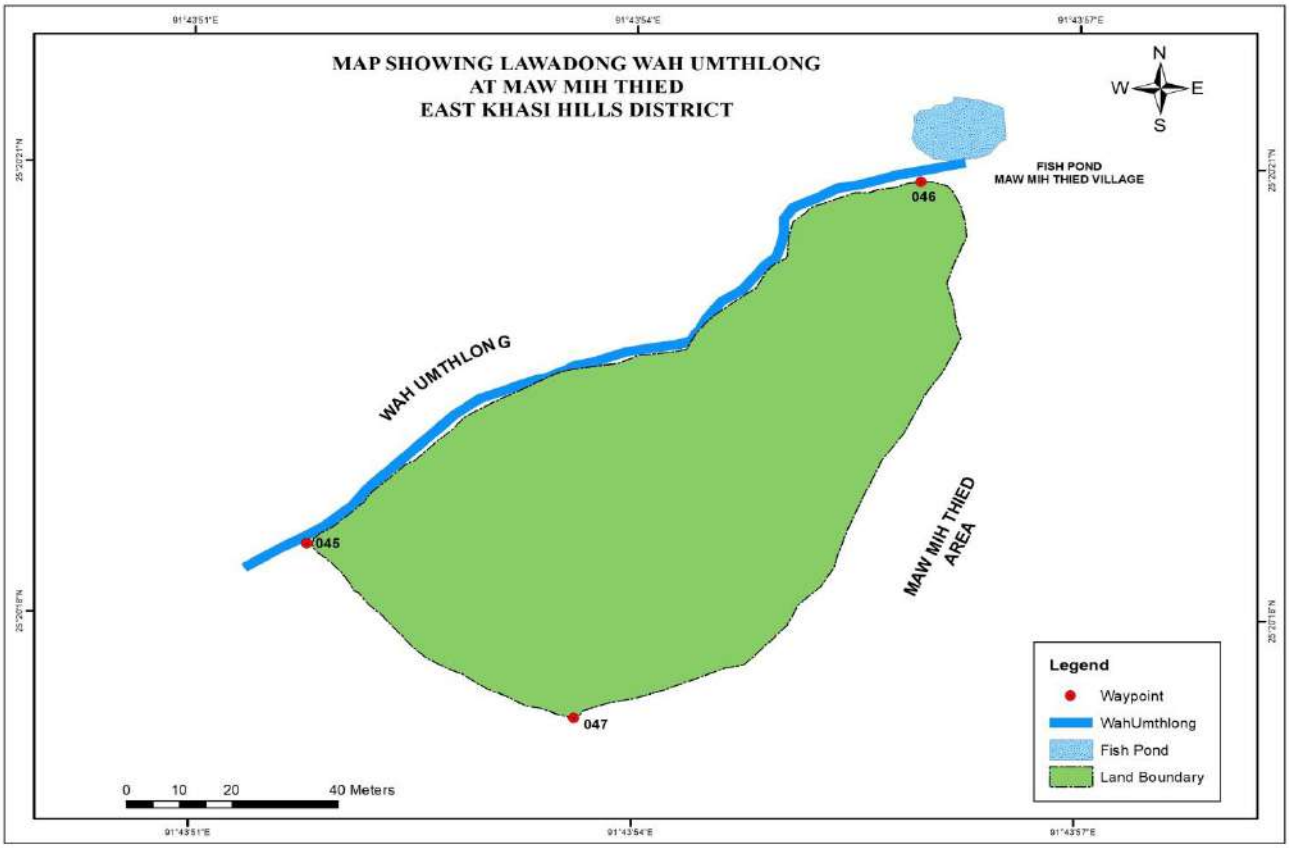
0 5 10 20
Meters
Legend
Waypoint
Land Boundary



2.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove is of Mixed Deciduous forest.

2.5 Flora and Fauna:

The vegetation type is of mixed *species* consisting mainly of ***Castanopsis hystrix and Cinnamomum pauciflorum.*** Origin of the forest is natural and it is two storeyed type of forests. Wildlife found within the grove are jungle fowls, barking deers, jackals and some vertebrates and invertebrates. The conservation significance of the grove is mainly due to:

i. High level endemic plants and animal species which is very significant from the biodiversity point of view.
ii. Existence of many rare and endangered plants species.
iii. Restrictions-“do’s and don’ts;” which help the sacred grove in conservation of Flora and fauna and maintaining of rich forest natural resources.

2.6 Flora species:

List of trees found in Law Adong Wahthlong, East Khasi Hills

TREES

Sl. No. of trees	Botanical Name	Local Name	Family
1	*Aralia armata*	Dieng latymphu	Araliaceae
2	*Betula alnoides*	Dieng lieng	Betulaceae
3	*Castanopsis indica*	Dieng sohot	Fagaceae
4	*Castanopsis hystrix*	Dieng stap	Fagaceae
5	*Cinnamomum pauciflorum*	Dieng torthia	Lauraceae
6	*Elaeocarpus lanceifolius*	Dieng sohkhyllam	Elaeocarpaceae
7	*Eugenia jambolana*	Dieng sohum	Myrtaceae
8	*Eurya japonica*	Dieng pyrsit	Theaceae
9	*Exbucklandia populnea*	Dieng doh	Hamamelidaceae
10	*Grewia abutilifolia*	Dieng sahmeblang	Tiliaceae
11	*Itea chinensis*	Dieng sohsyrtet	Iteaceae
12	*Meliosma pinnata*	Dieng Krot	Sabiaceae
13	*Michelia champaca*	Dieng rai	Magnoliaceae
14	*Myrca iesculenta*	Dieng sohphie	Myricaceae
15	*Premna bengalensis*	Dieng lalieh	Asteraceae
16	*Schima wallichi*	Dieng ngan	Theaceae
17	*Symplocos theaefolia*	Dieng dpei	Symplocaceae
18	*Taxus baccata*	Dieng Kseh blei	Taxaceae

List of Shrubs, herbs, climbers & bamboo found in Law Adong Wahthlong, East Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng jamyrait	*Gaultheria fragrantissima*	Ericaceae
2.	Dieng soh broi	Not listed	Not listed
3.	Sla Jarem iong	*Clerodendrum colebrookianum*	Verbenaceae
4.	Dieng soh kynruin	Not listed	Not listed
5.	Dieng rnong	*Mahonia pycnophylla*	Berberidaceae
6.	Synsar	*Thysanolaena maxima*	Poaceae
7.	Dieng sohjabuit	*Phlogacanthus thyrsiflorus*	Acanthaceae
8.	Dieng soh khra	*Boehemeria macrophylla*	Urticaceae
9.	Lajarem lieh	*Clerodendrum viscosum*	Verbenaceae
10.	Dieng pyrsit	*Eurya acuminata*	Theaceae
11.	Latara dieng	*Dracaena angustifolia*	Liliaceae
12.	Dieng shadmoit	*Wendlandia tinctoria*	Rubiaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Tyrkhang	*Polypodium sp*	Polypodiaceae
2.	Sla lamet	*Phyrnium pubinerve*	Marantaceae
3.	Shynrai khlaw	*Alpinia allughas*	Zingiberaceae
4.	Sla waitlam	*Asplenium nidus*	Aspleniaceae
5.	Wangbsein	*Arisaema spp*	Araceae
6.	Sla baingon	*Strobilanthes spp.*	Rubiaceae
7.	Jajew khlaw	*Begonia roxburghii*	Begoniaceae
8.	Sohbyrthit	*Urena labata*	Malvaceae
9.	Wang khlaw	*Colocasia esculenta*	Araceae
10.	Sying khlaw	*Zingiber purpureum*	Zingiberaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Soh shang khlor	*Elaeagnus pyriformis*	Elaeagnaceae
2.	Dieng longkhasaw (jyrmi)	Not listed	Not listed
3.	Jyrmi sohthied	Not listed	Not listed
4.	Shiah soh krot	*Smilax glabra*	Smilacaceae
5.	Sla kynda jyrmi	*Pothos scandens*	Araceae
6.	Dieng sohmatan/sohpdong	*Stephania glabra*	Menispermaceae
7.	Loapla	*Rhaphidophora decursiva*	Araceae

ORCHIDS

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

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Shken	*Bambusa pallida*	Poaceae

2.7 Growing Stock:

As per the methodology described in Chapter-II, 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 30 cm is enumerated by measuring the top height (in meters) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 296 tree species consisting of 95 *Castanopsis hystrix* (1st dominant), 44 *Cinnamomum pauciflorum* (2nd

dominant), 25 *Schima wallichi* (3rd dominant), 132 *Rest of 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 result for Law Adong Wahthlong are given in table 2.1 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 20.124 cubic metres.

Table-2.1

Girth class wise & Species wise with respect to total volume (in area 0.69 ha)

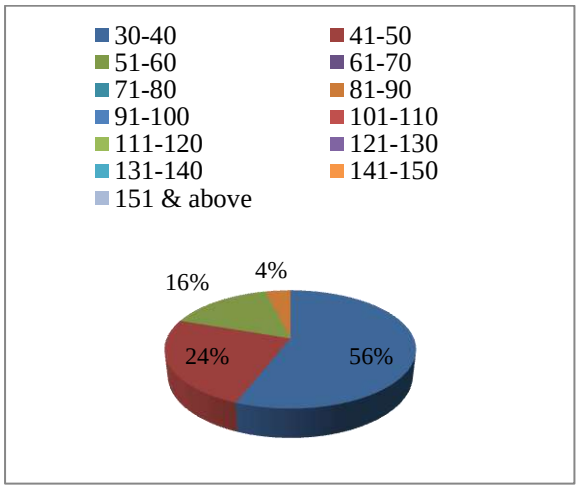
(volume in cu.m)

Girth Class wise	**1st dominant *Castanopsis hystrix***	**2nd dominant *Cinnamomum pauciflorum***	**3rd dominant *Schima wallichi***	**Rest of the species**	**Total**	**% with respect of total volume**
30-40	3.219	2.368	0.736	4.939	11.262	**55.963**
41-50	1.16	0.133	1.464	2.139	4.896	**24.329**
51-60	0	0.099	1.193	1.899	3.191	**15.857**
61-70	0	0	0	0	0	**0**
71-80	0	0	0	0	0	**0**
81-90	0	0	0	0.775	0.775	**3.851**
91-100	0	0	0	0	0	**0**
101-110	0	0	0	0	0	**0**
111-120	0	0	0	0	0	**0**
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	4.379	2.600	3.393	9.752	20.124	**100.000**
% wrt Total volume	**21.760**	**12.920**	**16.860**	**48.460**	**100.000**	

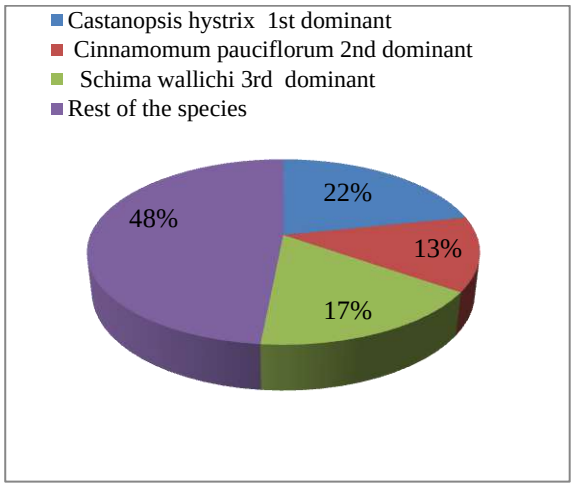
The table indicates that the volume contributed by the 1st dominant species (*Castanopsis hystrix)* with respect to the total volume of the grove is 21.76%, the 2nd dominant species (*Cinnamomum pauciflorum*) is 12.92 %, 3rd dominant species *(Schima wallichi)* is 16.860% while rest of the species is maximum i.e.48.46%. Total volume of the grove is 20.124 cubic metres.

From the above 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.

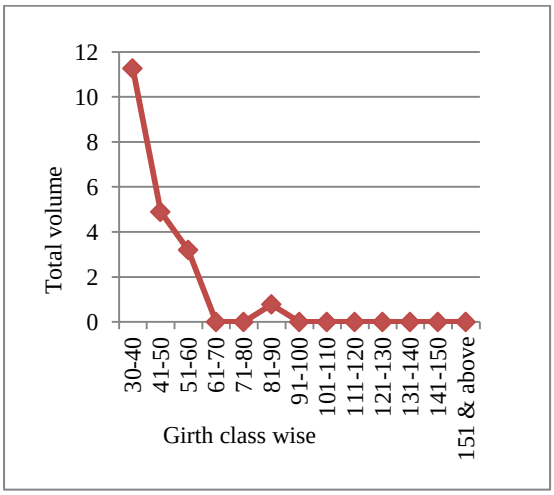
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view Law Adong Wahthlong

Table-2.2

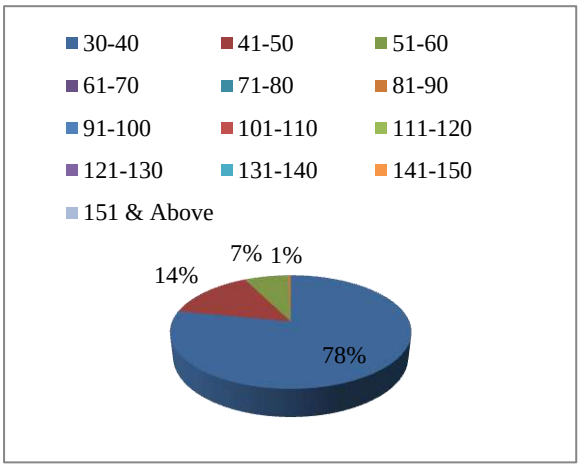
Girth class wise & Species wise No. of stems in the entire grove (Area 0.69 ha)

Girth Class Wise	1st dominant *Castanopsis hystrix*	2nd dominant *Cinnamomum pauciflorum*	3rd dominant *Schima wallichi*	Rest of the species	Total stems
30-40	86	41	10	106	**157**
41-50	9	2	10	17	**29**
51-60	0	1	5	8	**14**
61-70	0	0	0	0	**0**
71-80	0	0	0	0	**0**
81-90	0	0	0	1	**1**
91-100	0	0	0	0	**0**
101-110	0	0	0	0	**0**
111-120	0	0	0	0	**0**
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 =	**95**	**44**	**25**	**132**	**201**

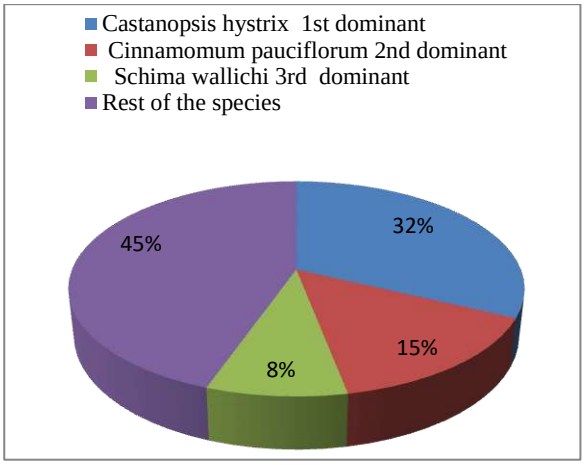
2.8 Number of Stems:

Number of stems in each girth class and species wise are given in the table 2.2. The table shows that maximum numbers of stems are found in lower girth classes.

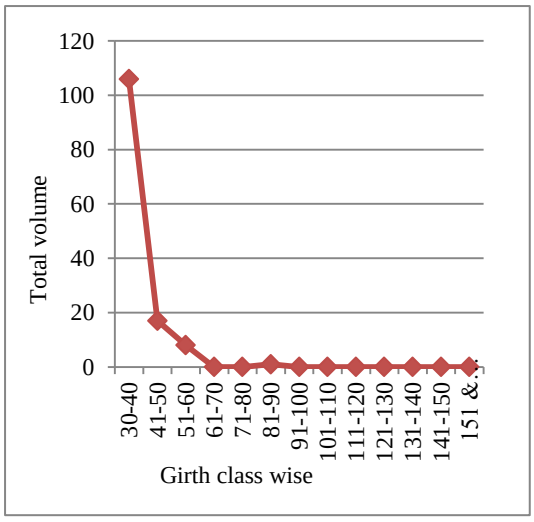
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Field exercise graph at Law Wahthlong



Inside view of Law Adong Wahthlong

2.9 Brief note on Management of Law Adong Wathlong Sacred Groves

(i) Protection from Biotic Interfernece:-

In this grove there is no prohibition for entry and exit, Though there is no report of illegal felling of timber, encroachment, poaching or grazing but as the forest is left open there are chances of such illegal activities in the near future. If the grove is declared as communtiy reserve, and with some financial incentive that may encourage the people in preserving this rich forest natural resources.

(ii) Fire Control:-

Though there is no report of fire incidence in the past, fire line can be created all along the boundary except those areas which are bounded by natual stream. This will help to preserve the rich natural resources of the sacred grove.

(iii) Water Stream:-

There is only one stream in this grove and one fresh pond constructed by the villagers. Moreover if check dam can be constructed to tap rain water it will be benificial to the wild animals and also help to increase the moisture content of the soil which may chack the soil erosion.

(iii) Construction of Boundary Pillars :-

To promote the grove from encrochment in the future, creation of permanent boundary is needed. This can be done either by fixing RCC pillars along the grove or by earth digging of 2' x 2' size, except in the northern part where natural stream runs along the boundary of the grove.

(iv) Awareness Campaign:-

People are less concern for long term conservation of sacred grove. Awareness programme can be conducted at the grass root level, so that people will know the importance of the sacred grove, the forest and the environment as a whole. Special programme for school children can also be conducted related to long term conservation of forests.

3 - Law Adong Umsohphie, East Khasi Hills, District.

3.1 Location:

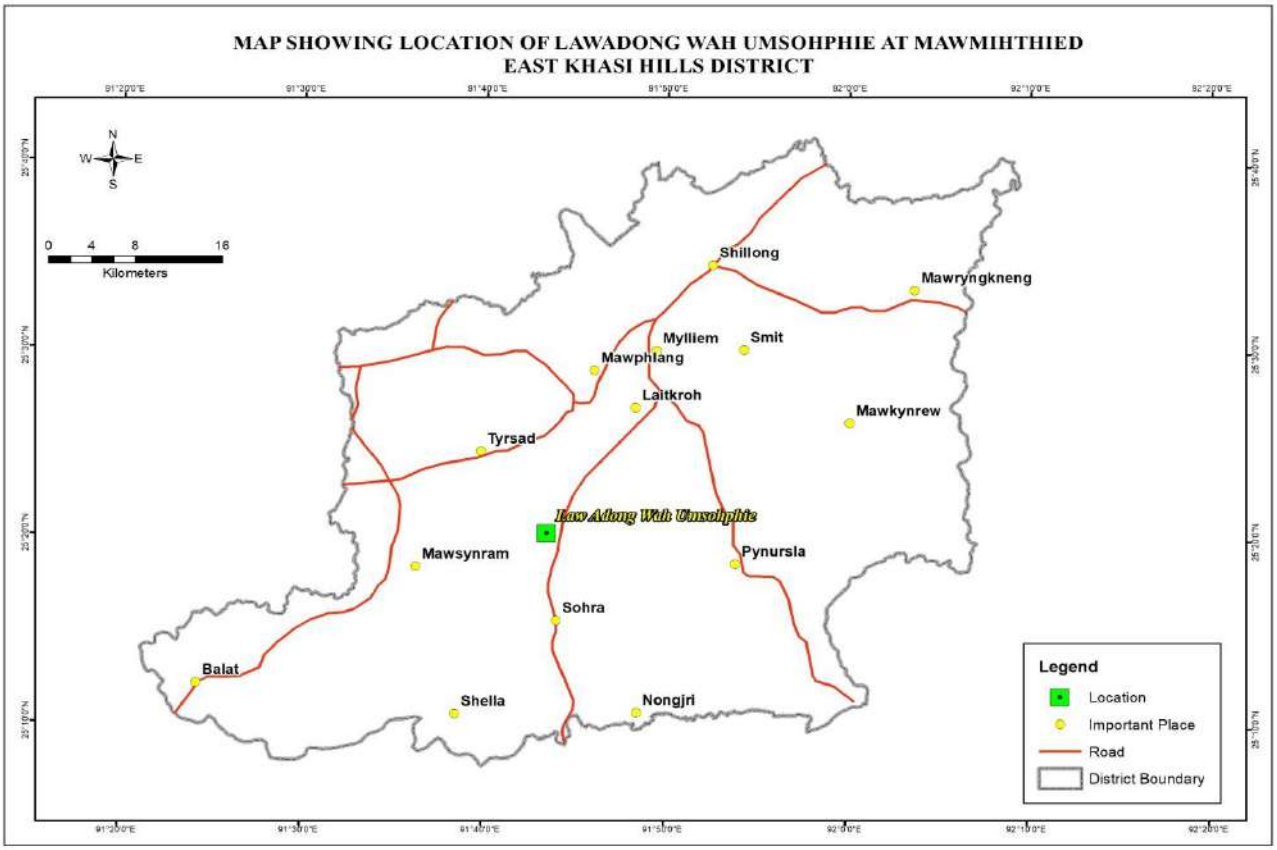
Law Adong Umsohphie Sacred Grove is located in East Khasi Hills District of Mawmihthied village, under the syiemship of Hima Sohra. It covers an area of 2.92 ha and lies between 91° 43′ 24″ E to 91° 43′ 35″ E Longitude and 25° 20′ 14″ N to 25° 20′ 18″ N latitude with an altitude of 1650 m above mean sea level (MSL). It is bounded in the North by Phud Umsohphie stream to the East and South by Private land of Mawmihthied and to the West by private land of Mawkma village. The grove is accessible by road from Sohra to Dainthlen falls. It is about 48 km from Shillong.

3.2 Brief History:

Umsohphie Sacred Grove has been originated hundreds of years ago. At present Offering, and Prayers were no longer performed in this sacred grove, it has been ceased long way back, since the embrace of Christianity by the local people. The people believe that the sacred groves are the abode of deities, but still they preserved the sacred groves for the sake of the environment because they are considered as one of the most species rich area for plants, birds & mammals and also to help any villagers to re-construct their house in the event of any natural disaster occurs. The grove is owned by the village community and under the control of 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 Khasi Hills Autonomous District Council (KHADC).

3.3 Geography and Climate:

The 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. The only stream flowing in the northern side of the boundary of the grove is Phud Umsohphie stream. The cold winter start from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 7ºc -22 ºc and maximum is 14ºc - 23ºc. Biotic pressure encroachment, Wild fire, hunting, poaching, grazing, and illegal felling of trees are absent in this grove.


MAP SHOWING LOCATION OF LAWADONG WAH UMSOHPHIE AT MAWMIHTHIED
EAST KHASI HILLS DISTRICT
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Kilometers
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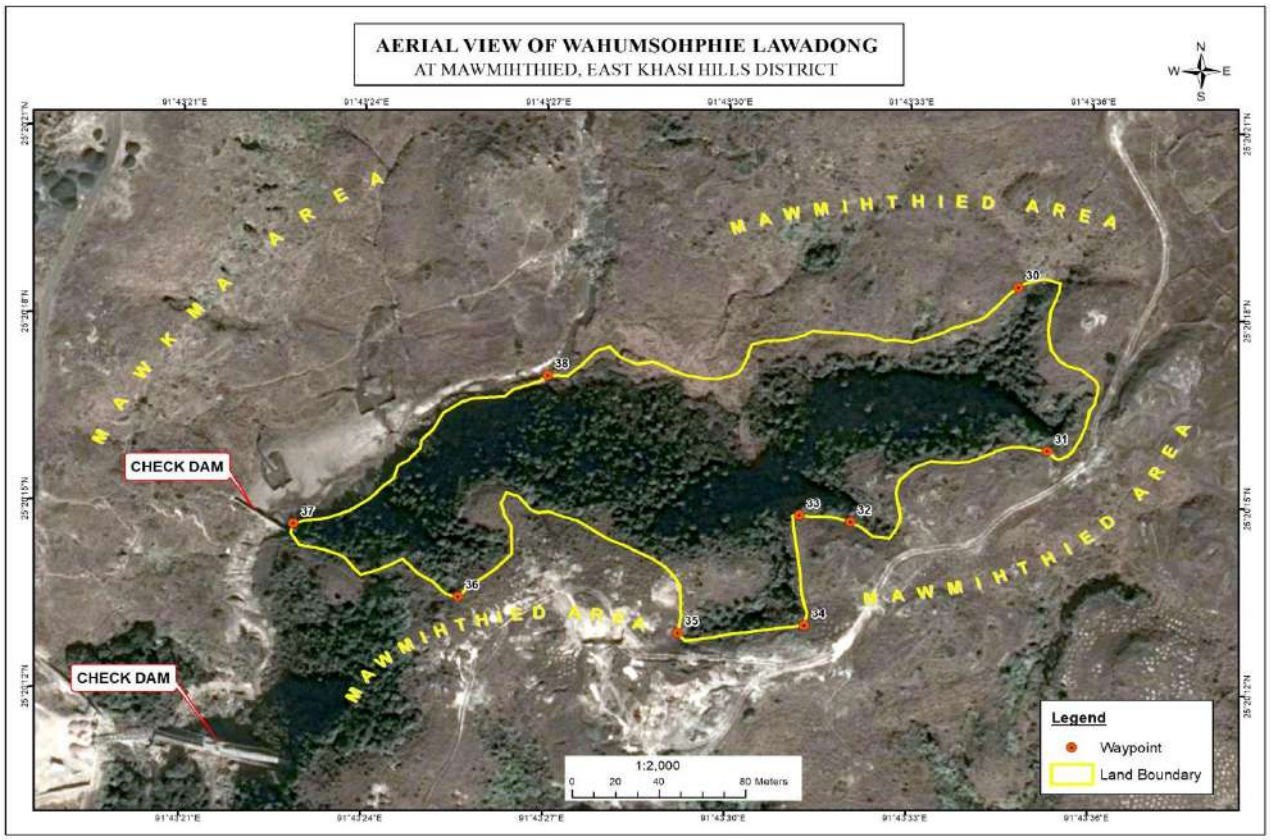
Tyrsad
Law Adong Wah Umsohphie
Mawsynram
Pynursla
Sohra
Balat
Shella
Nongjri
Legend
Location
Important Place
Road
District Boundary


AERIAL VIEW OF WAHUMSOHPHIE LAWADONG
AT MAWMIHTHIED, EAST KHASI HILLS DISTRICT
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MAWMIHTHIED AREA
MAWMIHTHIED AREA
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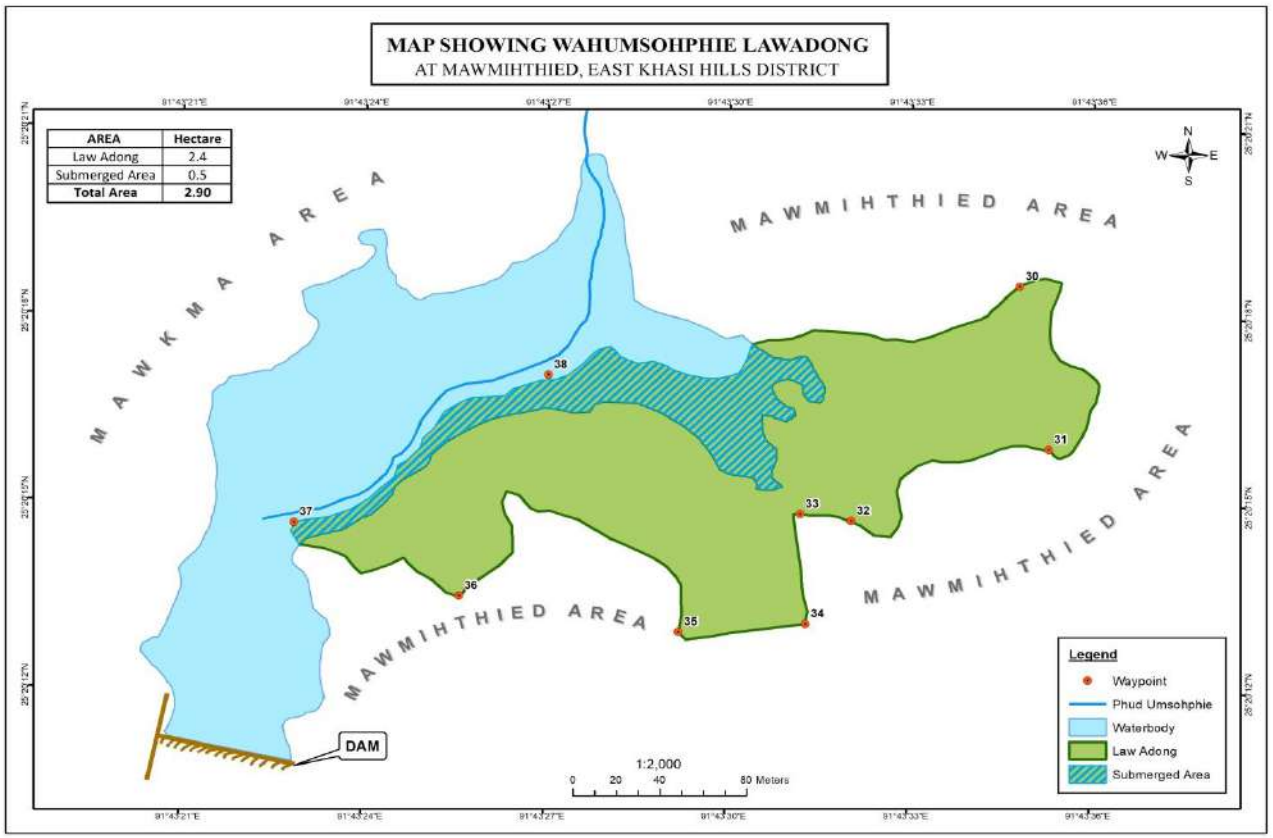
Legend
Waypoint
Land Boundary



3.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are of Mixed Deciduous forest.

3.5 Flora and Fauna:

The vegetation type is of mixed *species* consisting mainly of ***Schima khasiana and Meliosma pinnata*** as dominant species. The relic is a natural forest consisting of two storeyed layers. The wildlife found within the grove is jungle fowls, barking deers, jackals, etc. Conservation significance of the grove is mainly due to:

i. High level endemic plants and animal species which is very significant from the biodiversity point of view.
ii. Existence of many rare and endangered plants species.
iii. Restrictions-"do's and don'ts;" which help the sacred grove in conservation of Flora and fauna and maintaining of rich forest natural resources.

3.6 Flora species:

List of trees found in Law Adong Umsohphie, East Khasi Hills

TREES

Sl. No. of trees	Botanical Name	Local Name	Family
1.	*Aralia armata*	Dieng latymphu	Araliaceae
2.	*Castanopsis armata*	Dieng sning	Fagaceae
3.	*Castanopsis hystric*	Dieng stap	Fagaceae
4.	*Lithocarpus elegans*	Dieng shanam dngiem	Fagaceae
5.	*Cinnamomum pauciflorum*	Dieng tyrthia	Lauraceae
6.	*Citrus assamensis*	Dieng jalu	Rutaceae
7.	*Elaeocarpus lanceifolius*	Dieng sohkhyllam	Elaeocarpaceae
8.	*Eugenia jambolana*	Dieng sohum	Myrtaceae
9.	*Exbucklandia populnea*	Dieng doh	Hamamelidaceae
10.	*Grewia abutilifolia*	Dieng somehblang	Tiliaceae
11.	*Inula cappa*	Dieng lalieh	Asteraceae
12.	*Michelia oblonga*	Dieng rai	Magnoliaceae
13.	*Michelia champaca*	Dirng railieh	Magnoliaceae
14.	*Myrica farquhariana*	Dieng sohphie	Myricaceae
15.	*Saurauia punduana*	Dieng jalyngngap	Actinidiaceae
16.	*Schima khasiana*	Dieng ngan	Theaceae
17.	*Meliosma pinnata*	Dieng krot	Sabiaceae
18.	*Symplocos khasiana*	Dieng pei	Symplocaceae
19.	*Citrus latipes*	Sohkymphor	Rutaceae
20.	*Ligustrum robustum*	Dieng lapohiat (sohpaiat)	Oleaceae
21.	*Cinnamomum pauciflorum*	Dieng torthia	Lauraceae
22.	*Carpinus vimanea*	Dieng kliar risang	Betulaceae
23.	*Walsura robusta*	Dieng sohphlang	Meliaceae

List of Shrubs, herbs, climbers & bamboo found in Law Adong Umsohphie, East Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng Shlan	*Pandanus odoratissimus*	Pandanaceae
2.	Dieng Shadmoid	*Wendlandia tinctoria*	Rubiaceae
3.	Dieng pyrsit	*Eurya acuminata*	Theaceae
4.	Sha kuriew	Not listed	Not listed
5.	Soh Larmaw	Not listed	Not listed
6.	Dieng tyrnem	*Camellia caduca*	Theaceae
7.	Lajarem lieh	*Clerodendrum viscosum*	Verbenaceae

8.	Dieng sohjabuit	*Phlogacanthus thyrsiflorus*	Acanthaceae
9.	Dieng jamyrait	*Gaultheria fragrantissima*	Ericaceae
10.	Sla Jarem iong	*Clerodendrum colebrookianum*	Verbenaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Sla waitlam	*Asplenium nidus*	Aspleniaceae
2.	Tyrkhang	*Polypodium sp*	Polypodiaceae
3.	Jajew khlaw	*Begonia roxburghii*	Begoniaceae
4.	Sohbyrthit	*Urena labata*	Malvaceae
5.	Wang khlaw	*Colocasia esculenta*	Araceae
6.	Sying khlaw	*Zingiber purpureum*	Zingiberaceae
7.	Tyrkhang	*Asplenium nidus*	Aspleniaceae
8.	Sla lamet	*Phyrnium pubinerve*	Marantaceae
9.	Shynrai khlaw	*Alpinia allughas*	Zingiberaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Shiah sohparu	*Rubus ellipticus*	Rosaceae
2.	long khasaw (Jyrmi)	Not listed	Not listed
3.	Sohkrot	*Smilax ferox*	Smilacaceae
4.	Sla kynda jyrmi	*Pothos scandens*	Araceae
5.	Soh marit khlaw	*Piper longum*	Piperaceae

***Unidentified plants**

ORCHIDS

Sl.No.	Local Name	Botanical Name	Family
1.	Tiew dieng Smehmassi	*Dendrobium chrysanthum*	Orchideceae
2.	Tiew dohmaw	*Anoectochilus roxburghii*	Orchideceae

GRASS

Sl No.	Local Name	Botanical Name	Family
1.	Langtraw	*Imperata cylindrica*	Poaceae
2.	Langtylli	Not listed	Not listed
3.	Langniuh	Not listed	Not listed
4.	Langphot	Not listed	Not listed
5.	Phlang	*Cyperus rotundus*	Cyperaceae
6.	Synsar	*Thysanolaena maxima*	Poaceae

3.7 Growing Stock:

As per the methodology described in Chapter-II, 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 30 cm is enumerated by measuring the top height (in meters) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 154 tree species consisting of 52 *Schima khasiana* (1st dominant), 18 *Meliosma pinnata* (2nd dominant), 16 *Elaeocarpus lanceifolius* (3rd dominant), 68 *Rest of 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 result for Law Adong Umsohphie are given in table 3.1 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 13.48 cubic metres.

Table-3.1

Girth class wise & Species wise with respect to total volume (in area 2.92 ha)

(volume in cu.m)

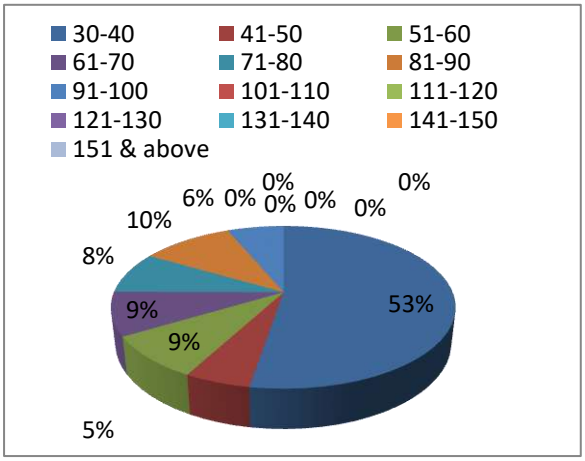
Girth class (cm)	***1st dominant Schima khasiana***	***2nd dominant Meliosma pinnata***	***3rd dominant Elaeocarpus lanceifolius***	**Rest of Species**	***Total***	***% with respect to total volume***
30-40	3.073	0.667	1.387	1.973	7.1	**52.647**
41-50	0.258	0.238	0	0.21	0.706	**5.235**
51-60	0.643	0	0	0.508	1.151	**8.535**
61-70	0	0	0	1.171	1.171	**8.683**
71-80	0	0	0	1.121	1.121	**8.312**
81-90	0	0	0	1.383	1.383	**10.255**
91-100	0	0	0	0.854	0.854	**6.332**
101-110	0	0	0	0	0	**0**
111-120	0	0	0	0	0	**0**
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	**3.974**	**0.905**	**1.387**	**7.22**	**13.486**	**100.000**
% with respect to total Volume	**29.468**	**6.711**	**10.285**	**53.537**	**100.000**	

The table indicates that the volume contributed by the 1st dominant species (*Schima Khasiana)* with respect to the total volume of the grove is 29.46%, the 2nd dominant species (*Meliosma Pinnata*)

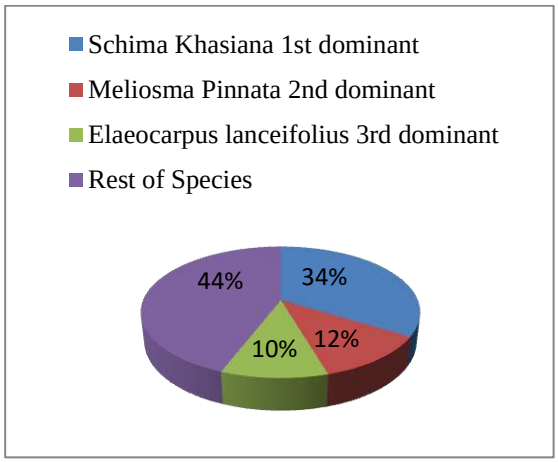
is 6.71 %, 3rd dominant species ***(Elaeocarpus lanceifolius)*** is 10.28% while rest of the species is maximum i.e.53.53%. Total volume of the grove is 13.48 cubic metres.

From the above 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.

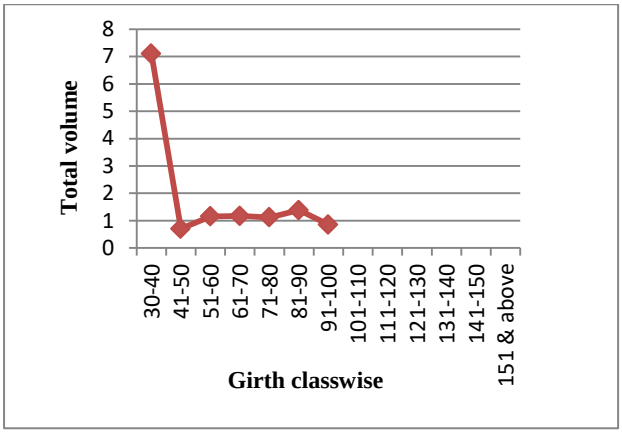
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view of Law Adong Umsohphie

Table-3.2

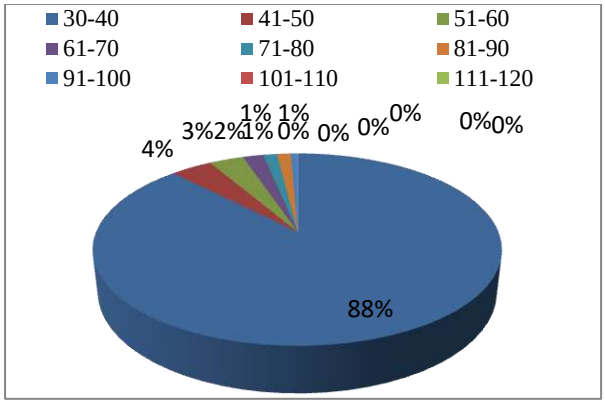
Girth class wise & Species wise No. of stems in the entire grove (Area 2.92 ha)

Girth class (cm)	*1st dominant Schima khasiana*	*2nd dominant Meliosma pinnata*	*3rd dominant Elaeocarpus lanceifolius*	Rest of Species	Total
30-40	47	16	16	56	**135**
41-50	2	2	0	2	**6**
51-60	3	0	0	2	**5**
61-70	0	0	0	3	**3**
71-80	0	0	0	2	**2**
81-90	0	0	0	2	**2**
91-100	0	0	0	1	**1**
101-110	0	0	0	0	**0**
111-120	0	0	0	0	**0**
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	**52**	**18**	**16**	**68**	**154**

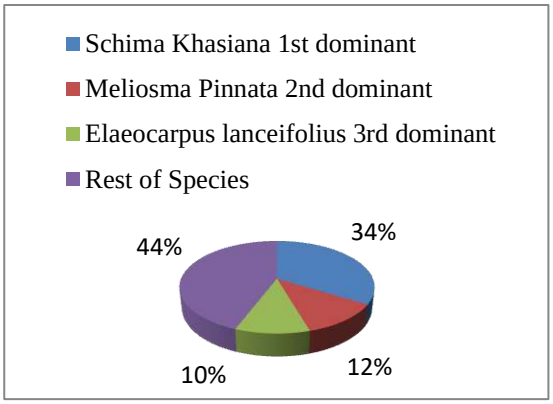
3.8 Number of Stems:

Number of stems in each girth class and species wise are given in the table 3.2. The table shows that maximum numbers of stems are found in lower girth classes.

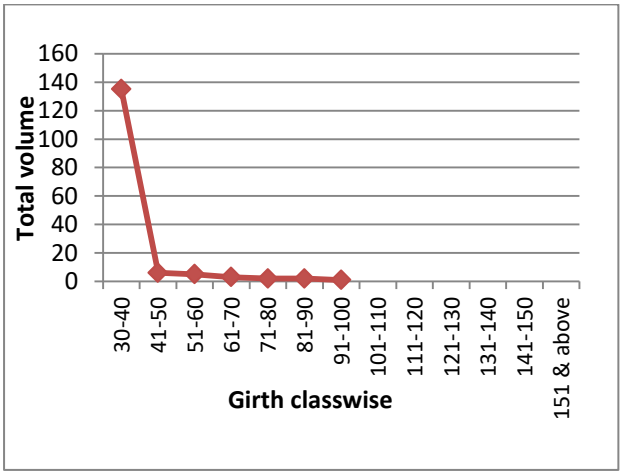
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Field exercise graph at Law Adong Umsohphie



Inside view of Law Adong Umsohphie

3.9 Brief note on Management of Law Adong Umsohphie Sacred Groves

(i) **Protection from Biotic Interfernece:-**

In the grove there is no restriction for entry and exit, Biotic pressure is almost nil since the village Dorbar of Mawmihthied stricly prohibits the felling of trees, poaching or grazing, but as the forest is left open, there are chances of such illegal activities in the near future. If declared as communtiy reserve, this beautiful forest resources can be protected from biotic interferance.

(ii) **Fire Control:-**

There is no report of fire incidence in the past, but it may happen in the near future. To avoid such incidence an external fire line is highly recommended all along the boundary of the grove.

(iii) **Water Stream:-**

In this grove there is only one stream name as Phud Umsohphie in the nothern part of the grove . The stream provide and benificial to wild animals from straying out of the forest and also help increase the mixture content of the soil inorder to check soil erosion.For the benefit of both flora and fauna, check dams may be created to tep rain water in the dry season.

(iii) **Construction of Boundary Pillars :-**

Construction of boundary pillars along the boundary of the grove will prevent it from encroachment and also prevent spread of fire.

(iv) **Awareness Campaign:-**

In order to protect and preserve the beautiful grove, one can be done at the grass root level so that the people in and around will know the important of preserving the Sacred Grove. The forest and the environment as a whole. Special programme like drawing and easy competition, awareness programme should be conducted related to forest conservation can be taken up for school students.

4 - Law Adong Lait Raid Mawkhap, East Khasi Hills District.

4.1 Location:

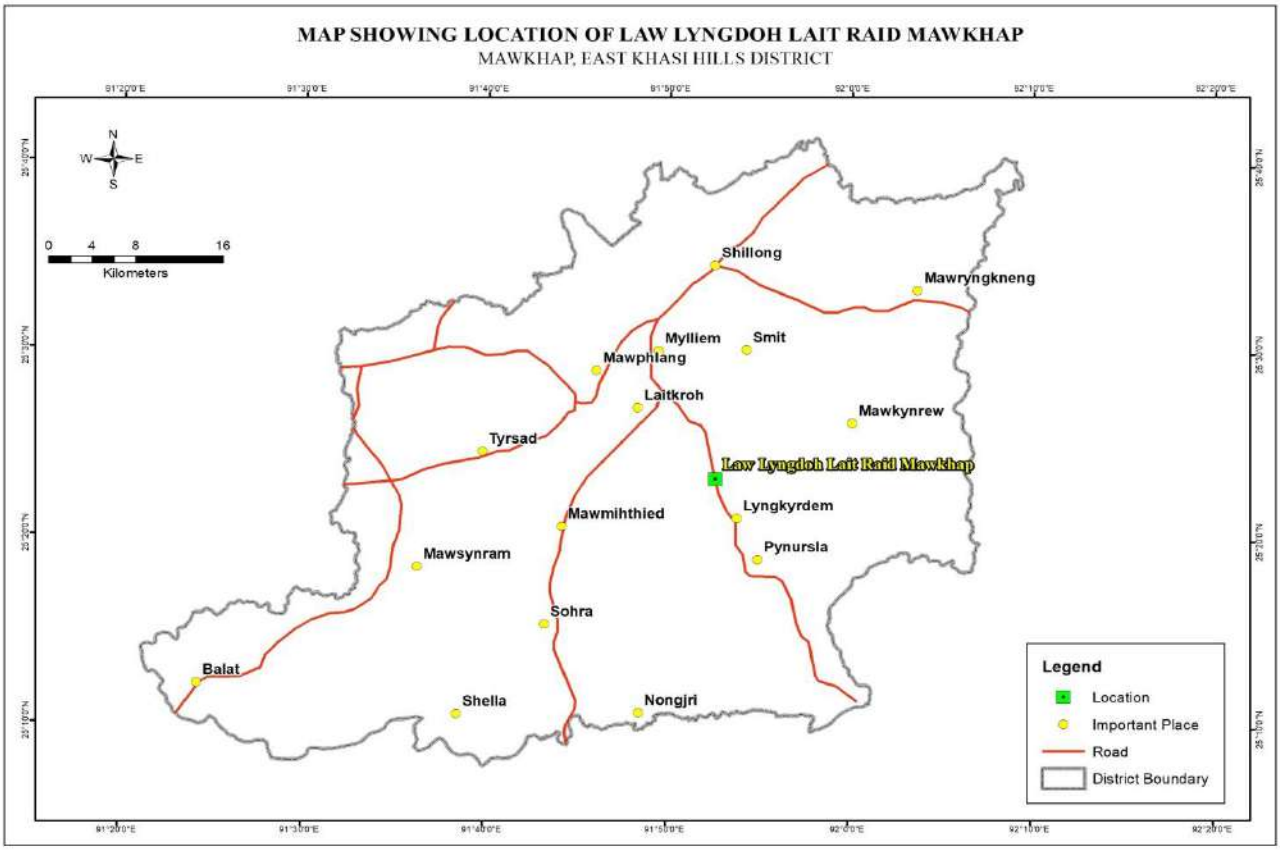
Law Adong Lait Raid Mawkhap is situated in East Khasi Hills District of Meghalaya at Mawkhap village under the Syiemship of Hima Khyrim. It covers an area of 4.88 ha. It lies between 25° 23′ 10 to 25° 23′ 15″ N latitude and 91° 52′ 34″ to 92° 52′ 43″ E Longitude with an altitude of 1517 m above mean sea level (MSL). It is bounded in the North by the land of J. Tyngsiar in the South and East by the land of H.Majaw and to the west bounded by the Bri Raid Mawkhap. It is about 36 km from Shillong.

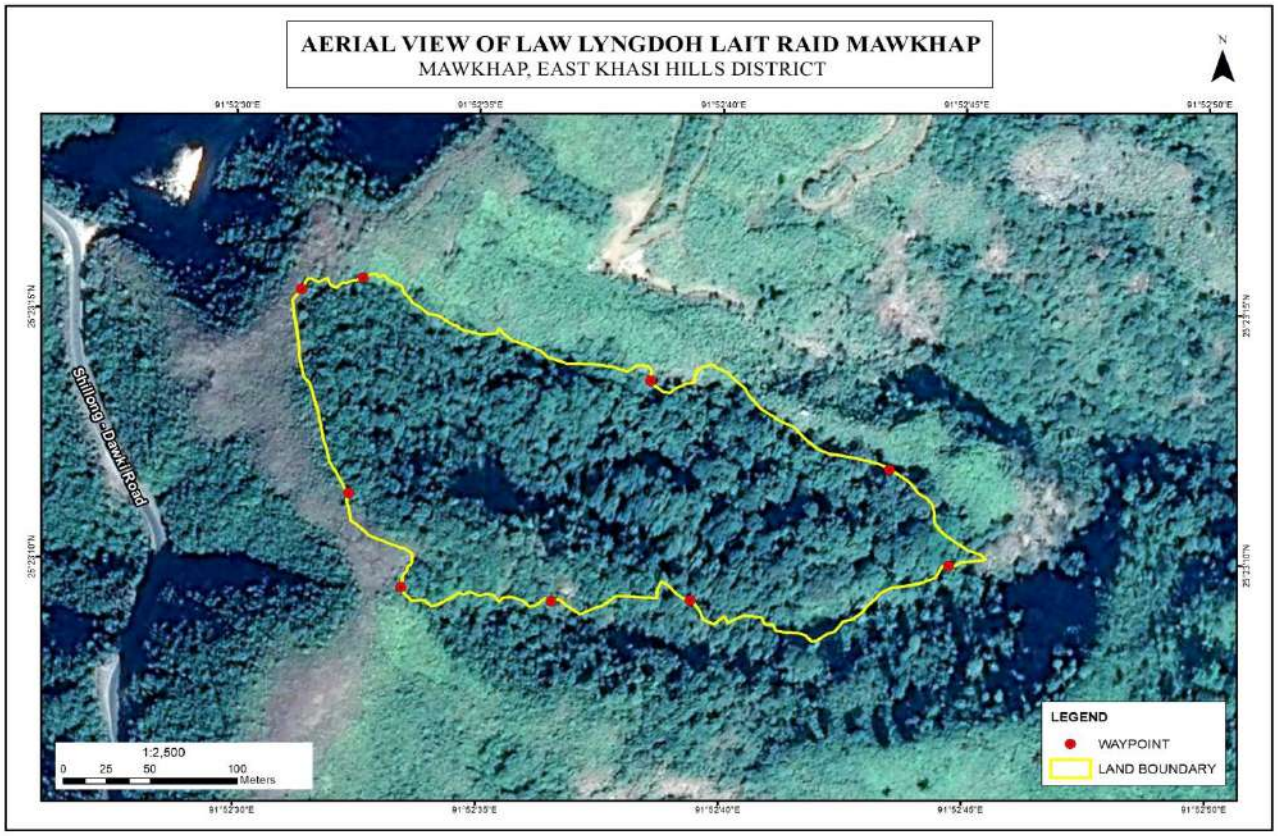
4.2 Brief History:

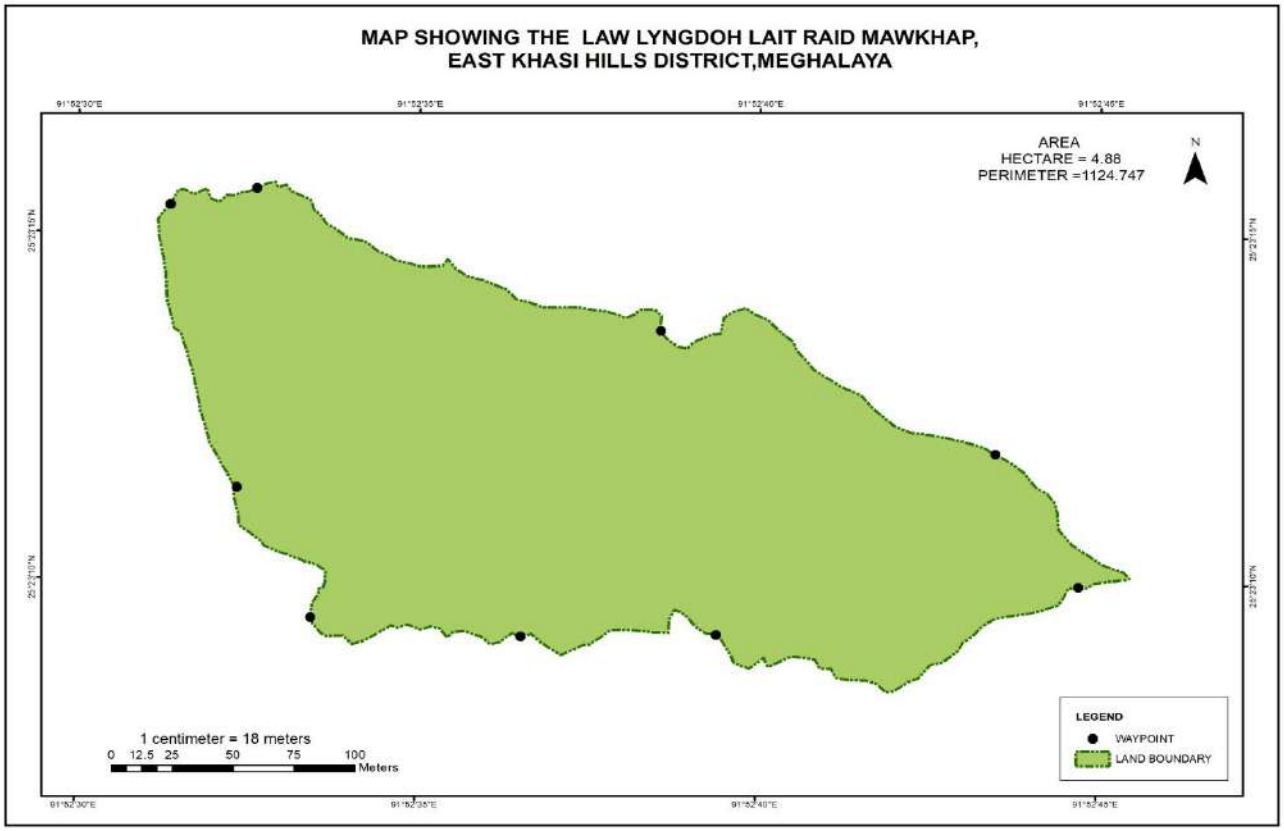
Law Adong Lait Raid Mawkhap sacred grove has been originated since decades. Offering, Prayers and other religious practices are no longer performed in this sacred grove. As stated by the village elders, any activities inside the grove are strictly prohibited. As of now the sacred grove is owned and controlled by the headman of the village. Therefore the state Forest Department has no direct control of the said grove as it falls under the jurisdiction of the Khasi Hills Autonomous District Council (KHADC).

4.3 Geography and Climate:

The area is hilly in nature with steep slope and undulating terrain varying from 16° to 40° slope gradient. 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. The cold winter start from mid November to February and warm summer from May to October. Monsoon period is from May to September, the average minimum temperature is 7ºc -22 ºc and maximum is 14ºc - 23ºc. Biotic pressure encroachment, Wild fire, hunting, poaching grazing, and illegal timber felling of trees are absent in this grove.


MAP SHOWING LOCATION OF LAW LYNGDOH LAIT RAID MAWKHAP
MAWKHAP, EAST KHASI HILLS DISTRICT
N
W
E
S
0 4 8 16
Kilometers
Shillong
Mawryngkneng
Mylliem
Smit
Mawphlang
Laitkroh
Mawkynrew
Tyrsad
Law Lyngdoh Lait Raid Mawkhap
Lyngkyrdem
Mawmihthied
Pynursla
Mawsynram
Sohra
Balat
Shella
Nongjri
Legend
Location
Important Place
Road
District Boundary


AERIAL VIEW OF LAW LYNGDOH LAIT RAID MAWKHAP
MAWKHAP, EAST KHASI HILLS DISTRICT
N
Shillong - Dawki Road
1:2,500
0 25 50 100
Meters
LEGEND
WAYPOINT
LAND BOUNDARY



4.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are of Mixed Deciduous forest.

4.5 Flora and Fauna:

The vegetation type is of mixed *species* consisting mainly of ***Quercus*** *species* ***Engelhardtia spicata*** as dominant species. The origin of the forest is of natural in nature and it is of two storeyed layers. The wildlife found within the grove are jungle fowls, barking deers, jackals, etc. Conservation significance of the grove is mainly due to:

i. High level endemic plants and animal species which is significant from biodiversity forest of view.
ii. Existence of many rare and endangered plants species.
iii. Restrictions-"do's and don'ts;" help the sacred grove in conservation of Flora and fauna and maintaining of rich natural resources.

4.6 Flora species:

List of trees found in Law Adong Lait Raid Mawkhap, East Khasi Hills

TREES

Sl No.	Local Name	Botanical Name	Family
1.	*Albizia lebbeck*	Dieng kreit	Fabaceae
2.	*Albizia procera*	Dieng phyllut	Fabaceae
3.	*Alstonia scholaris*	Dieng rteng	Apocynaceae
4.	*Aralia armata*	Dieng latymphu	Araliaceae
5.	*Betula alnoides*	Dieng lieng	Betulaceae
6.	*Camellia caduca*	Dieng tyrnem	Theaceae
7.	*Caryota urens*	Dieng tlai	Arecacea
8.	*Toona ciliata*	Dieng bti	Meliaceae
9.	*Cinnamomum pauciflorum*	Dieng torthia	Lauraceae
10.	*Citrus latipes*	Dieng sohkynphor	Rutaceae
11.	*Duabanga grandiflora*	Dieng bai	Lythraceae
12.	*Engelhardtia spicata*	Dieng lba	Juglandaceae
13.	*Eugenia jambolana*	Dieng sohum	Myrtaceae
14.	*Eurya acuminata*	Dieng pyrshit	Theaceae
15.	*Exbucklandia populnea*	Dieng doh	Hamamelidaceae
16.	*Ficus hispida*	Dieng sohlapong	Moraceae
17.	*Glochidion sphaerogynum*	Dieng sohriphin	Phyllanthaceae
18.	*Glochidion velutinum*	Dieng jem	Phyllanthaceae
19.	*Grewia abutilifolia*	Dieng sohmaiblang	Tiliaceae
20.	*Gynocardia odorata*	Dieng sohliang	Achariaceae
21.	*Itea chinensis*	Dieng sohsyrtet	Iteaceae
22.	*Ligustrum robustum*	Dieng sohpaiat	Oleaceae
23.	*Myrica esculenta*	Dieng sohphie	Myricaceae
24.	*Myrica nagi*	Dieng sohliya	Myricaceae
25.	*Quercus glauca*	Dieng syrtap	Fagaceae
26.	*Castanopsis armata*	Dieng sning	Fagaceae
27.	*Rhododendron arboreum*	Dieng tiewsaw	Ericaceae
28.	*Rhus chinensis*	Dieng sohma	Anacardiaceae
29.	*Rhus succedanea*	Dieng kain	Anacardiaceae
30.	*Saurauia punduana*	Dieng jalyngngap	Actinidiaceae
31.	*Schima khasiana*	Dieng ngan	Theaceae
32.	*Symplocos chinensis*	Dieng iong	Symplocaceae
33.	*Podocarpus neriifolius*	Dieng sohniang riang blei	Podocarpaceae

List of Shrubs, herbs, climbers & bamboo found in Law Adong Lait Raid Mawkhap,East Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng rnong	*Mahonia pycnophylla*	Berberidaceae
2.	Dieng soh phong phong	Not listed	Not listed

3.	Dieng lasi sia	Not listed	Not listed
4.	Dieng sohtait	*Cyanotis vaga*	Commelinaceae
5.	Dieng soh brai	Not listed	Not listed
6.	Dieng soh kynruin	Not listed	Not listed
7.	Dieng eit miang	*Sida spp*	Malvaceae
8.	Dieng soh pyrsit	*Eurya acuminata*	Theaceae
9.	Lajarem lieh	*Clerodendrum viscosum*	Verbenaceae
10.	Dieng sohjabuit	*Phlogacanthus thyrsiflorus*	Acanthaceae
11.	Dieng jamyrait	*Gaultheria fragrantissima*	Ericaceae
12.	Sla Jarem iong	*Clerodendrum colebrookianum*	Verbenaceae
13.	Synsar	*Thysanolaena maxima*	Poaceae
14.	Kait khlaw	*Musa acuminata*	Musacaea
15.	Dieng soh tylu	*Daphne papyraceae*	Thymelaceae
16.	Soh lang	*Viburnum foetidum*	Caprifoliaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Sying khlaw	*Zingiber purpureum*	Zingiberaceae
2.	Jajew khlaw	*Begonia roxburghii*	Begoniaceae
3.	Tyrkhang	*Asplenium nidus*	Aspleniaceae
4.	Sohbyrthit	*Urena lobata*	Malvaceae
5.	Wangkhlaw	*Colocasia esculenta*	Araceae
6.	Phud wang	*Cololasia spp*	Araceae
7.	Bat eroplain	*Inula cappa*	Asteraceae
8.	Sla lamet	*Phyrnium pubinerve*	Marantaceae
9.	Shynrai khlaw	*Alpinia allughas*	Zingiberaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Kophi khlaw	*Coffea jenkinsii*	Rubiaceae
2.	Jyrmi sohthied	Not listed	Not listed
3.	Iong khasaw (Jyrmi)	Not listed	Not listed
4.	Soh shang khlor	*Elaeagnus pyriformis*	Elaeagnaceae
5.	Pew shrieh	*Hedera nepalensis*	Araliaceae
6.	Sla kynda jyrmi	*Pothos scandens*	Araceae
7.	Loapla	*Rhaphidophora decursiva*	Araceae
8.	Dieng sohmatan/sohpdong	*Stephania glabra*	Menispermaceae

***Unidentified plants**

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew dieng	*Micropera manii*	Orchadeceae
2.	Tiew dieng	*Dendrobium aphyllum*	Orchadeceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Shken	*Bambusa pallida*	Poaceae

4.7 Growing Stock:

As per the methodology described in Chapter-II, 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 30 cm is enumerated by measuring the top height (in meters) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 658 tree species consisting of 161 *Castanopsis armata* (1st dominant), 118 *Engelhardtia spicata* (2nd dominant), 52 *Itea chinensis* (3rd dominant), 327 *Rest of 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 result for Law Adong Lait Raid Mawkhap are given in table 4.1 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 671.281 cubic metres.

Table-4.1

Girth class wise & Specieswise with respect to total volume (in area 4.88 ha)

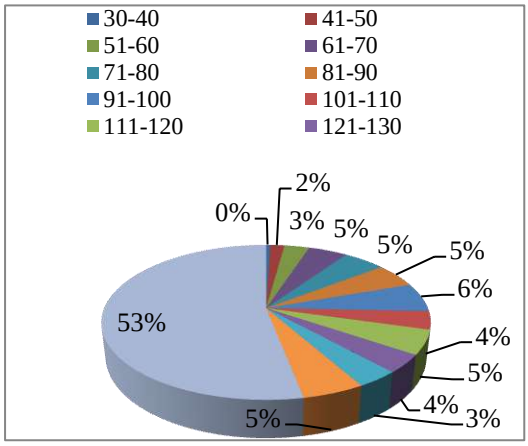
(volume in cu.m)

Girth class (cm)	*1st dominant Castanopsis armata*	*2nd dominant Engelhardtia spicata*	*3rd dominant Itea chinensis*	*Rest of Species*	*Total*	*% with respect to total volume*
30-40	0.303	0.191	1.025	1.793	**3.312**	**0.493**
41-50	1.453	1.042	2.89	5.71	**11.095**	**1.653**
51-60	3.177	2.156	2.222	12.114	**19.669**	**2.930**
61-70	4.389	5.307	1.588	19.365	**30.649**	**4.566**
71-80	7.274	10.734	0	15.056	**33.064**	**4.926**
81-90	6.928	10.979	0	16.124	**34.031**	**5.070**
91-100	7.259	14.632	0	18.386	**40.277**	**6.000**
101-110	9.472	7.755	0	8.171	**25.398**	**3.784**
111-120	6.918	7.047	0	19.82	**33.785**	**5.033**
121-130	3.207	5.209	0	16.992	**25.408**	**3.785**
131-140		5.906	0	17.953	**23.859**	**3.554**
141-150	2.782	8.804	0	23.064	**34.65**	**5.162**
151 & above	19.113	112.354	0	224.617	**356.084**	**53.045**
Total	72.275	192.116	7.725	399.165	**671.281**	**25.637**
% with respect to total Volume	**10.767**	**28.619**	**1.151**	**59.463**	**100.000**	

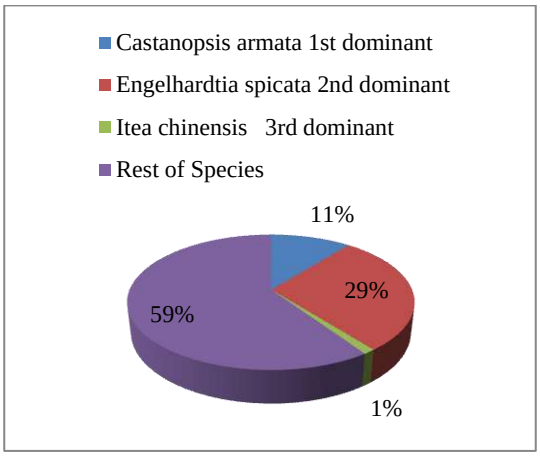
The table indicates that the volume contributed by the 1st dominant species (*Quercus spp)* with respect to the total volume of the grove is 10.76%, the 2nd dominant species (*Engelhardtia spicata*) with respect to the total volume of the grove is 28.61%, 3rd dominant species *(Itea chinensis)* is 1.15 % while rest of the species is maximum i.e.59.463 %. Total volume of the grove is 671.28 cubic metres.

From the above 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.

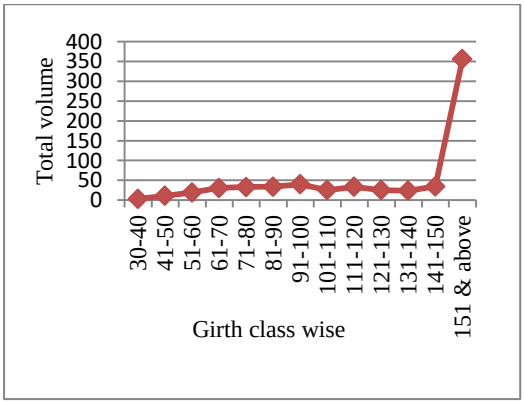
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view Law Adong Lait Raid Mawkhap

Table-4.2

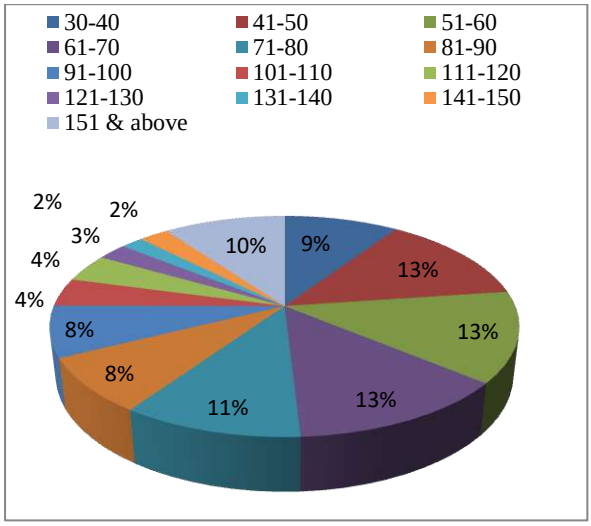
Girth class wise & Species wise No. of stems in the entire grove (Area 4.88 ha)

Girth class (cm)	*1st dominant Castanopsis armata*	*2nd dominant Engelhardtia spicata*	*3rd dominant Itea chinensis*	*Rest of Species*	*Total*
30-40	11	4	18	29	**62**
41-50	21	7	21	39	**88**
51-60	24	8	9	46	**87**
61-70	20	13	4	49	**86**
71-80	23	19	0	27	**69**
81-90	16	15	0	22	**53**
91-100	13	16	0	20	**49**
101-110	13	7	0	7	**27**
111-120	8	5	0	14	**27**
121-130	3	3	0	10	**16**
131-140	0	3	0	9	**12**
141-150	2	4	0	10	**16**
151 & above	7	14	0	45	**66**
Total	**161**	**118**	**52**	**327**	**658**

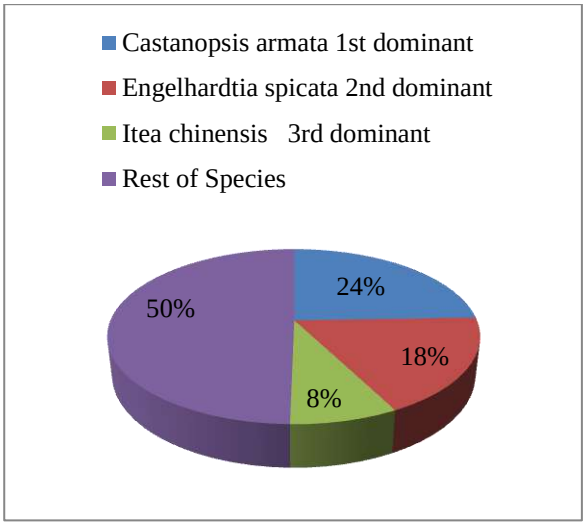
Number of Stems:

Number of stems in each girth class and species wise are given in the table 4.2. The table shows that maximum numbers of stems are found in lower girth classes i.e.from 30-40 cm to 91-100 cm classes.

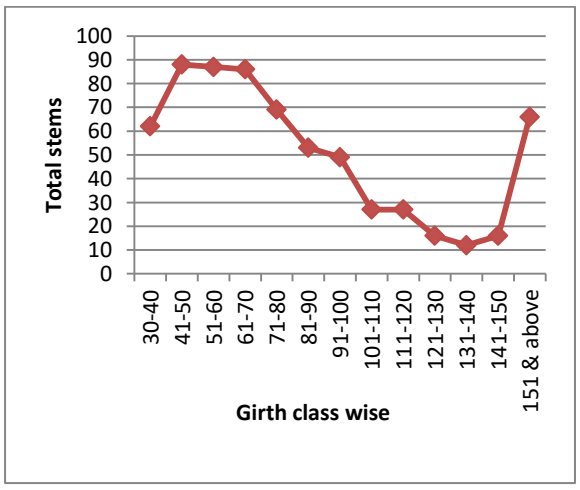
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Field exercise graph at Law Adong Lait Raid Mawkhap



Inside view Law Adong Lait Raid Mawkhap

4.9 Brief note on Management of Law Adong Lait Raid Mawkhap

(i) Protection from Biotic Interfernece:-

In this groves there is no prohibition for entry or exit thought there is restriction on felling of trees, poaching or grazing, but as the forest is left open, there are chances of such illegal activities in the near future. If declared as a community Reserve, this beautiful forest can be protected from biotic interferances.

(ii) Fire Control:-

There is no fire incident reported in the past, it cannot be ruled out for the year to come. In order to avoid fire incidence in the grove external fire line can be created all along the boundary.

(iii) Water Stream:-

To avoid encroachment in the near future, construction of permanent pillars or eath cutting along the boundary of the grove will prevent from encroachment.

(iv) Awareness Campaign:-

This is the most important activity for propagation of awareness to preserve thisbeautiful grove, which can be done at the grass root level by organizing awareness campaign, so the people will know the importance of the sacred grove. The forest and the environment as a whole which inter-linked each other in the eco system.

5 - Ingkhrong Sacred Groves Sohra Khlieh Shnong, East Khasi Hills, District.

5.1 Location:

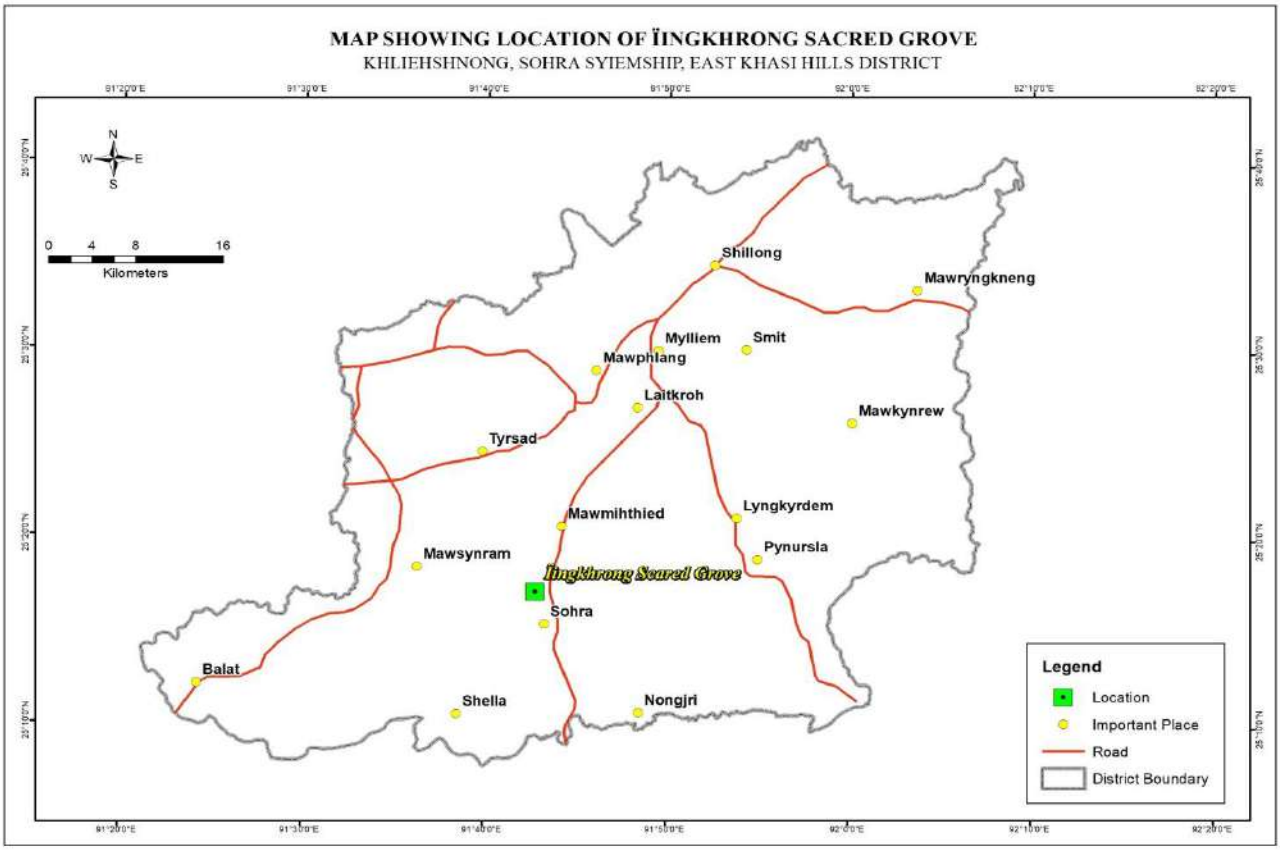
Ingkhrong Sacred Grove is situated in East Khasi Hills District of Meghalaya in the heart of Sohra village under Hima Sohra Syiemship. It covers an area of 11.39 ha and lies between 25° 17′ 2″ to 25° 17′ 13″ N latitude and 91° 42′ 40″ to 91° 42′ 58″ E Longitude with an altitude of 1410 m above mean sea level. It is bounded in the North towards the West by Tdong Umsum, Lyngkein stream and Raid land of khlieh shnong Sohra and to the South and East by land of All India Radio, Football ground, Pvt. Land, Ram Khrishna Mission (institution) and foot path. The grove is accessible by road from Shillong to Sohra and it can be seen the beauty of the grove before reaching Sohra Village. It is about 50 km from Shillong.

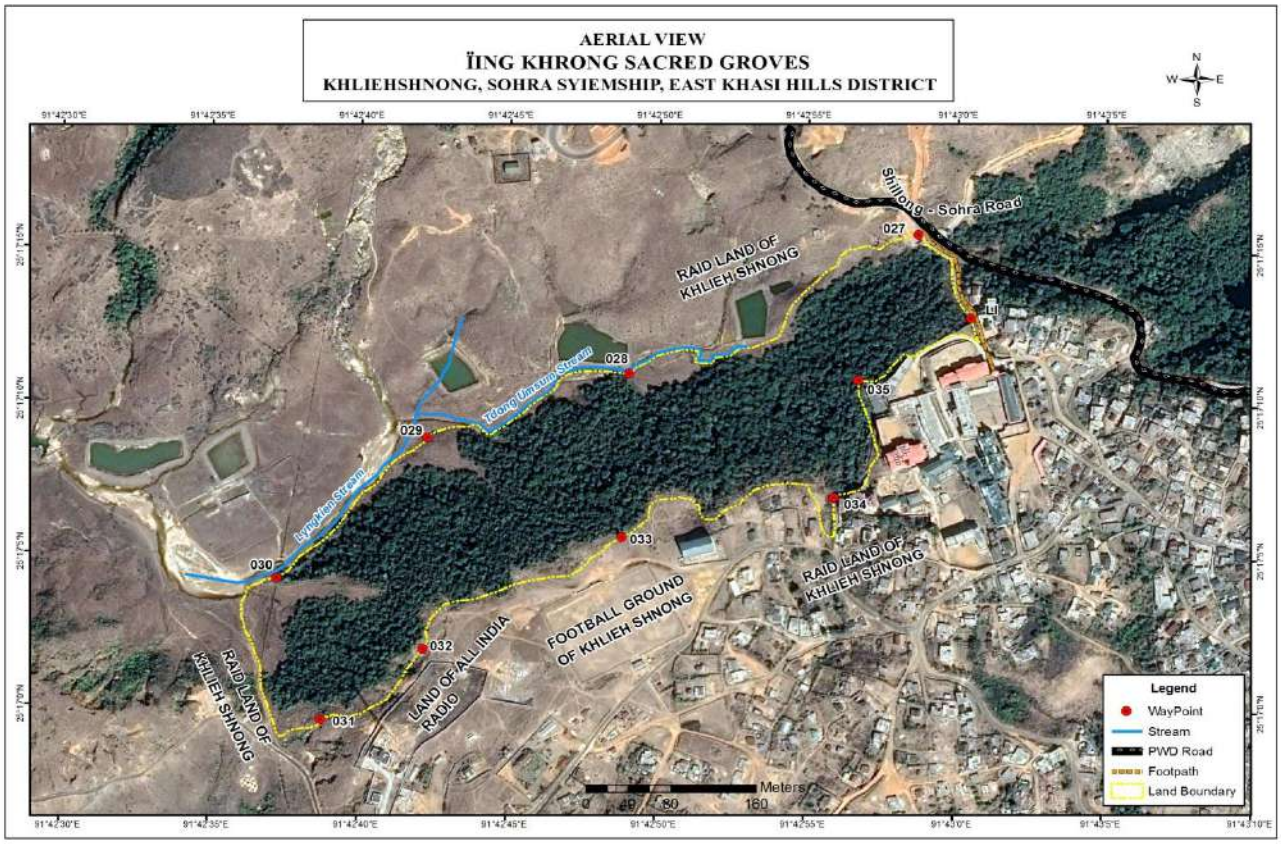
5.2 Brief History:

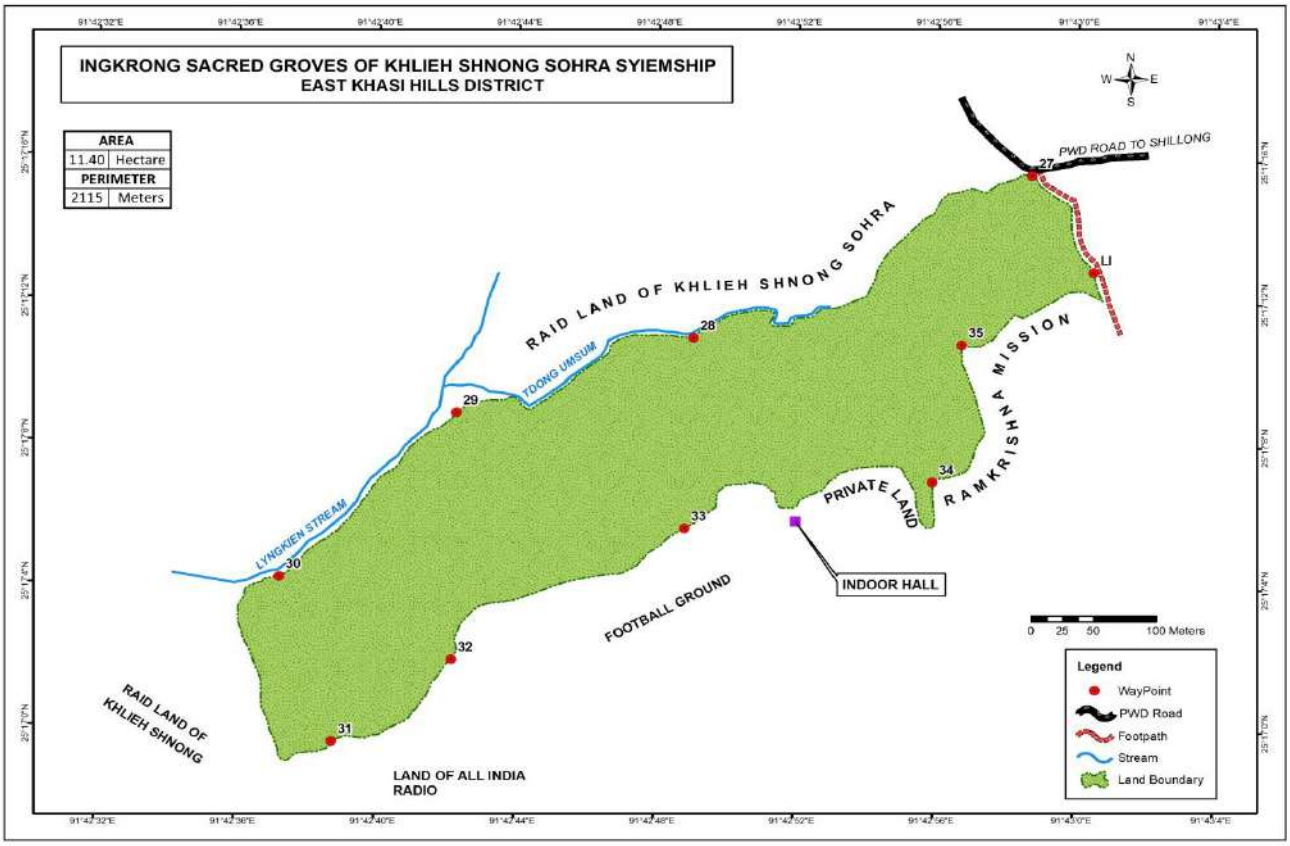
This grove has been originated many years ago. Rituals are no longer performed in this grove since long time back. The name of the grove comes after the Syiem of Sohra who built a house beside this grove for collection of taxes from the outside traders. The traders before entering the Sohra market have to pass through this house and paid the taxes and since that time this grove is called the Ingkhrong sacred grove. Felling of trees is strictly prohibited. Before the grove was owned by Syiem Sohra and later it was handed over to the village of Khlieh Shnong Sohra headed by the headman elected by the villagers. The state Forest Department has no direct control of the said grove and it fall under the jurisdiction of the Hima Sohra Syiemship.

5.3 Geography and Climate:

Topography of the grove is steep slope in nature with slope varying from 10° to 24° slope gradient. It falls under south west aspect. The soil texture is sandy loam with friable in consistency. The colour of the soil is brown with low soil depth. There is no soil erosion in the grove. There are two perinial streams that are flowing out of the grove. They are Lyngkein stream and Tdong umsum.


MAP SHOWING LOCATION OF ÏINGKHRONG SACRED GROVE
KHLIEHSHNONG, SOHRA SYIEMSHIP, EAST KHASI HILLS DISTRICT
N
W
E
S
0 4 8 16
Kilometers
Shillong
Mawryngkneng
Mylliem
Smit
Mawphlang
Laitkroh
Mawkynrew
Tyrsad
Mawmihthied
Lyngkyrdem
Pynursla
Mawsynram
Ïingkhrong Scared Grove
Sohra
Balat
Shella
Nongjri
Legend
Location
Important Place
Road
District Boundary


AERIAL VIEW
ÏING KHRONG SACRED GROVES
KHLIEHSHNONG, SOHRA SYIEMSHIP, EAST KHASI HILLS DISTRICT
N
W
E
S
Shillong - Sohra Road
027
RAID LAND OF KHLIEH SHNONG
028
Tdong Umsum Stream
029
Lyngkien Stream
030
031
032
033
034
035
FOOTBALL GROUND OF KHLIEH SHNONG
LAND OF ALL INDIA RADIO
RAID LAND OF KHLIEH SHNONG
Meters
0 40 80 160
Legend
WayPoint
Stream
PWD Road
Footpath
Land Boundary



Sohra is a spectacular location with the rain throughout the year. The prestim land with everlasting beauty, which has just one season the monsoon. The rain fall varies from heavy to Medium to light but there is no month without rain. The summer month from March to May received moderate rainfall and average minimum temperature is 14ºc and maximum is 23ºc. Monsoon or Raining season received the maximum rainfall in the zone. Thus is the month which received the highest rainfall. Cold temperature of 17ºc and maximum is 22ºc. Encroachment, Wild fire, hunting, grazing, and illegal timber felling are absent in this grove.

5.4 Forest Type:

According to Champion & Seth classification (1968) the forest types in the groves are of Mixed Deciduous forest.

5.5 Flora and Fauna:

The vegetation is of mixed type consisting mainly of *Castonopsis species Eugenia jambolana.* The relic forest is natural and it has of one storeyed layers. The wildlife found within the grove is jungle fowls, jackals, pangolin and many vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

i. Virgin forests where human interference is almost zero.

ii. Unique monsoon and waterfalls which have attracted many tourists both local and national and even foreigners.

iii. Existence of many rare and endangered plants species.

iv. High level endemic plants and animals species.

v. Restrictions-"do's and don'ts;" which has immensely help the sacred grove in conservation of Flora and fauna and maintaining the rich forest natural resources.

5.6 Flora species:

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

TREES

Sl. No. of trees	Botanical Name	Local Name	Family
1.	*Albizia lucidior*	Dieng ri	Fabaceae
2.	*Alstonia scholaris*	Dieng rteng	Apocynaceae
3.	*Aralia armata*	Dieng latymphu	Araliaceae
4.	*Beilschmiedia brandisii*	Dieng sohkhyllam	Elaeocarpaceae
5.	*Camelia caduca*	Dieng tyrnem	Theaceae
6.	*Castanopsis indica*	Dieng sohot	Fagaceae
7.	*Castanopsis hystrix*	Dieng stap	Fagaceae
8.	*Castanopsis spp*	Dieng patuia	Fagaceae
9.	*Castanopsis tribuloides*	Dieng sning	Fagaceae
10.	*Celtis tetrandra*	Dieng siasia	Cannabaceae
11.	*Cesearia vareca*	Dieng rang	Salicaceae
12.	*Cinnamomum bejolghota*	Dieng latyrdop	Lauraceae
13.	*Combretum squamosum*	Dieng sohrisang	Combretaceae
14.	*Elaeocarpus robustus*	Dieng lasaw	Elaeocarpaceae
15.	*Engelhardtia spicata*	Dieng lba	Juglandaceae
16.	*Eugenia jambolana*	Dieng sohum	Myrtaceae
17.	*Eurya acuminata*	Dieng pyrshit	Theaceae
18.	*Ficus spp*	Dieng sohdud	Moraceae
19.	*Ficus spp*	Dieng pnur	Moraceae
20.	*Glochidion velutinum*	Dieng jem	Phyllanthaceae
21.	*Grewia abutilifolia*	Dieng sohmehblang	Tiliaceae
22.	*Itea chinensis*	Dieng sohsyrtet	Iteaceae
23.	*Ligustrum lucidum*	Dieng lapohiat	Oleaceae
24.	*Lithocarpus fenestratus*	Dieng jing	Fagaceae
25.	*Litsea meissneri*	Dieng sohrang	Lauraceae
26.	*Meliosma pinnata*	Dieng krot	Sabiaceae
27.	*Michelia champaca*	Dieng rai lieh	Magnoliaceae
28.	*Michelia oblonga*	Dieng sohniar/rai iong	Magnoliaceae
29.	*Myrica esculenta*	Dieng sohphie	Myricaceae
30.	*Pandanus odoratissimus*	Dieng shlan	Pandanaceae
31.	*Premna bengalensis*	Dieng lalieh	Asteraceae
32.	*Pyrus pashia*	Dieng sohshur	Rosaceae
33.	*Quercus dealbata*	Dieng sai	Fagaceae

34.	*Rhus succedanea*	Dieng kain	Anacardiaceae
35.	*Schima khasiana*	Dieng ngan	Theaceae
36.	*Symplocos paniculata*	Dieng iong	Symplocaceae
37.	*Symplocos theifolia*	Dieng dpei	Symplocaceae
38.	*Wendlandia wallichii*	Dieng sawrang	Rubiaceae
39.	*Zanthoxylum ovalifolium*	Dieng shiah	Rutaceae

List of Shrubs, herbs, climbers & bamboo found in Ingkhrong Sacred Grove, East Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng jakba	*Polygalla arillata*	Polygalaceae
2.	Dieng soh brai	Not listed	Not listed
3.	Synsar	*Thysanolaena maxima*	Poaceae
4.	Dieng soh kynruin	Not listed	Not listed
5.	Dieng soh lang eit ksew	*Viburnum simonsii*	Caprifoliaceae
6.	Dieng pyrsit	*Eurya acuminata*	Theaceae
7.	Dieng sohjabuit	*Phlogacanthus thyrsiflorus*	Acanthaceae
8.	Lajarem lieh	*Clerodendrum viscosum*	Verbenaceae
9.	Dieng jamyrait	*Gaultheria fragrantissima*	Ericaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Wang khlaw	*Colocasia esculenta*	Araceae
2.	Sying khlaw	*Zingiber purpureum*	Zingiberaceae
3.	Jajew khlaw	*Begonia roxburghii*	Begoniaceae
4.	Sohbyrthit	*Urena labata*	Malvaceae
5.	Tyrkhang	*Polypodium sp*	Polypodiaceae
6.	Sla lamet	*Phyrnium pubinerve*	Marantaceae
7.	Tyrkhang	*Polypodyal spp.*	Polypodiaceae
8.	Shynrai khlaw	*Alpinia allughas*	Zingiberaceae
9.	Sla waitlam	*Asplenium nidus*	Aspleniaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng sohmatan/sohpdong	*Stephania glabra*	Menispermaceae
2.	Loapla	*Rhaphidophora decursiva*	Araceae
3.	Soh shang khlor	*Elaeagnus pyriformis*	Elaeagnaceae
4.	Shiah soh krot	*Smilax glabra*	Smilacaceae
5.	Sla kynda jyrmi	*Pothos scandens*	Araceae
6.	Dieng longkhasaw (Jyrmi)	Not listed	Not listed
7.	Jyrmi sohthied	Not listed	Not listed

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew dieng	*Micropera manii*	Orchideceae
2.	Tiew dieng	*Dendrobium aphyllum*	Orchideceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Shken	*Bambusa pallida*	Poaceae

5.7 Growing Stock:

As per the methodology described in Chapter-II, 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 30 cm is enumerated by measuring the top height (in meters) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 1191 tree species consisting of 364 *Castanopsis hystrix* (1st dominant), 250 *Castanopsis indica* (2nd dominant), 101 *Eugenia jambolana* (3rd dominant), 476 *Rest of 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 result for Ingkhrong Sacred Grove are given in table 5.1 & 5.2 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 2489.50 cubic metres.

Table-5.1

Specieswise & Girth class wise volume for sampled area (11 plots - area 11.39 ha)

(volume in cu.m)

Girth class (cm)	*1st dominant Castanopsis hystrix*	*2nd dominant Castanopsis indica*	*3rd dominant Eugenia jambolana*	*Rest of Species*	*Total*
30-40	2.553	1.286	1.084	6.03	**10.953**
41-50	11.093	7.521	4.39	13.613	**36.617**
51-60	18.451	15.283	4.03	20.985	**58.749**
61-70	24.925	22.71	4.897	21.594	**74.126**
71-80	21.745	13.769	3.938	27.462	**66.914**
81-90	20.524	13.274	5.662	22.984	**62.444**
91-100	20.912	9.725	1.768	16.073	**48.478**
101-110	4.515	1.043	0.00	11.41	**16.968**
111-120	4.025	4.145	2.773	9.724	**20.667**
121-130	3.109	0.00	0.00	3.274	**6.383**
131-140	1.86	0.00	0.00	3.956	**5.816**
141-150	2.068	4.51	0.00	4.481	**11.059**
151 & above	0.00	0.00	0.00	17.963	**17.963**
Total	135.78	93.266	28.542	179.549	**437.137**
% with respect to total Volume	**31.061**	**21.336**	**6.529**	**41.07385099**	**100.000**

Girth class wise with respect to total area

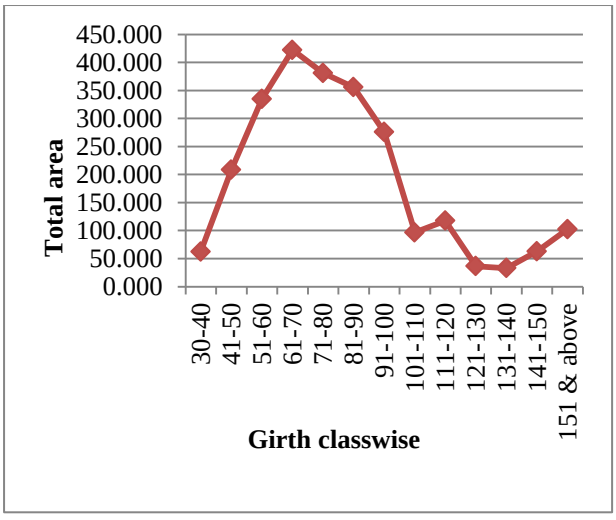


Table-5.2

Girth class wise & Specieswise in the entire grove (in area 11.39 ha)

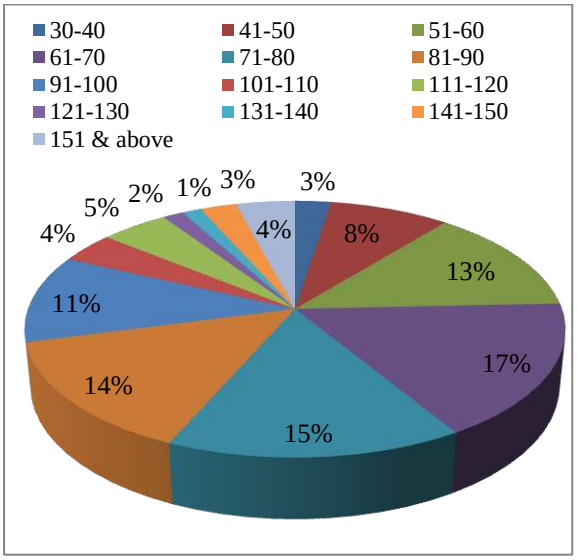
(volume in cu.m)

Girth class (cm)	*1st dominant Castanopsis hystrix*	*2nd dominant Castanopsis indica*	*3rd dominant Eugenia jambolana*	*Rest of Species*	*Total*	*% wrt total volume*
30-40	14.54	7.32	6.17	34.34	**62.38**	**2.69**
41-50	63.17	42.83	25.00	77.53	**208.53**	**8.98**
51-60	105.08	87.04	22.95	119.51	**334.58**	**14.41**
61-70	141.95	129.33	27.89	122.98	**422.15**	**18.19**
71-80	123.84	78.41	22.43	156.40	**381.08**	**16.42**
81-90	116.88	75.60	32.25	130.89	**355.62**	**15.32**
91-100	119.09	55.38	10.07	91.54	**276.08**	**11.89**
101-110	25.71	5.94	0.00	64.98	**96.63**	**4.16**
111-120	22.92	23.61	15.79	55.38	**117.70**	**5.07**
121-130	17.71	0.00	0.00	18.65	**36.35**	**1.57**
131-140	10.59	0.00	0.00	22.53	**33.12**	**1.43**
141-150	11.78	25.68	0.00	25.52	**62.98**	**2.71**
151 & above	0.00	0.00	0.00	102.30	**102.30**	**4.41**
Total	773.27	531.15	162.55	1022.53	**2489.50**	**107.25**
% with respect to total Volume	**44.40**	**30.50**	**9.33**	**58.71**	**142.94**	

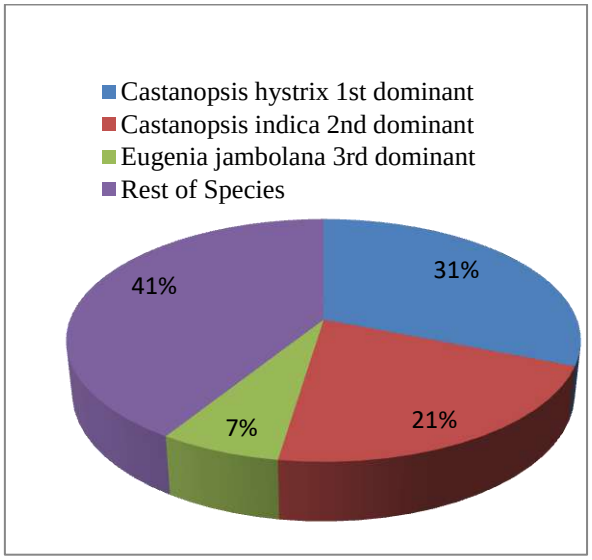
The table indicates that the volume contributed by the 1st dominant species (*Castanopsis hystrix)* with respect to the total volume of the grove is 44.40 %, the 2nd dominant species (*Castanopsis indica*) is 30.50 %, 3rd dominant species *(Eugenia jambolana)* is 9.33% while rest of the species is maximum i.e.58.71%. Total volume of the grove is 2489.50 cubic metres.

From the above 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.

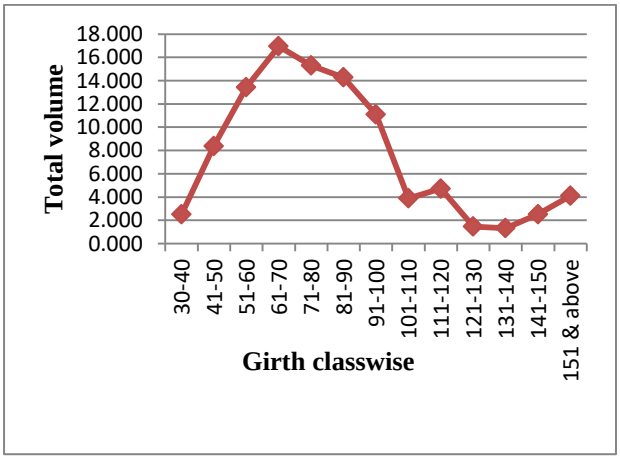
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view of Law Adong Ingkhrong Sacred Groves

5.8 Number of Stems:

Numbers of stems in each girth class are species wise are given in the table 5.3 & 5.4. The table shows that maximum numbers of stems are found in lower girth classes i.e. from 30-40 cm to 91-100 cm classes.

Table-5.3

Girth class wise & Species wise No. of stems in the sampled (11 plots - area 11.39 ha)

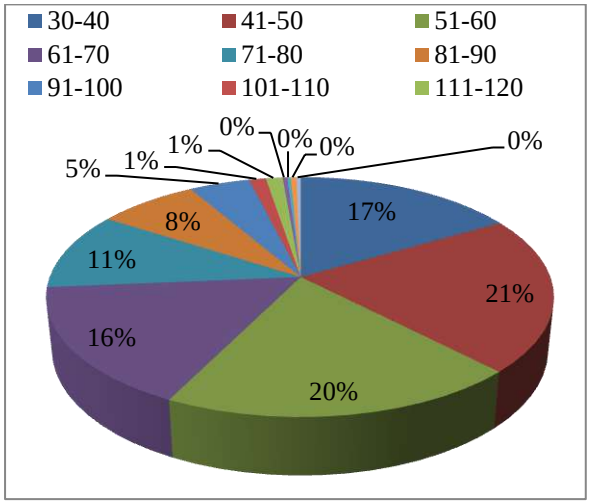
Girth class (cm)	*1st dominant Castanopsis hystrix*	*2nd dominant Castanopsis indica*	*3rd dominant Eugenia jambolana*	*Rest of Species*	*Total*
30-40	94	38	42	222	**396**
41-50	152	100	62	188	**502**
51-60	146	120	34	168	**468**
61-70	130	118	26	114	**388**
71-80	80	52	14	104	**250**
81-90	58	38	16	66	**178**
91-100	46	22	4	36	**108**
101-110	8	2	0	20	**30**
111-120	6	6	4	14	**30**
121-130	4	0	0	4	**8**
131-140	2	0	0	4	**6**
141-150	2	4	0	4	**10**
151 & above	0	0	0	8	**8**
Total	**728**	**500**	**202**	**952**	**2382**

Table-5.4

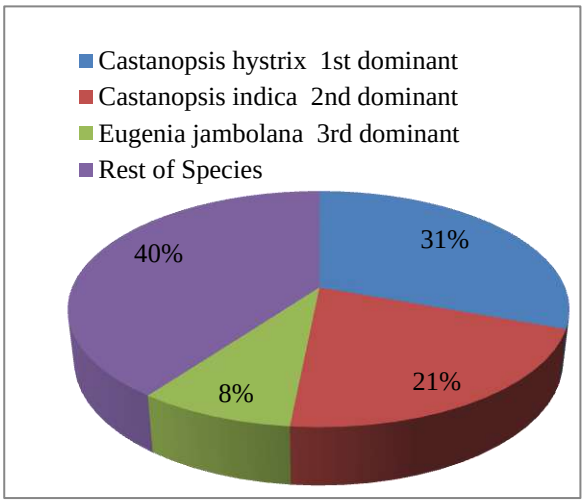
Girth class wise & Species wise No. of stems in the entire grove (Area 11.39 ha)

Girth class (cm)	*1st dominant Castanopsis hystrix*	*2nd dominant Castanopsis indica*	*3rd dominant Eugenia jambolana*	*Rest of Species*	*Total*
30-40	47	19	21	111	198
41-50	76	50	31	94	251
51-60	73	60	17	84	234
61-70	65	59	13	57	194
71-80	40	26	7	52	125
81-90	29	19	8	33	89
91-100	23	11	2	18	54
101-110	4	1	0	10	15
111-120	3	3	2	7	15
121-130	2	0	0	2	4
131-140	1	0	0	2	3
141-150	1	2	0	2	5
151 & above	0	0	0	4	4
Total	**364**	**250**	**101**	**476**	**1191**

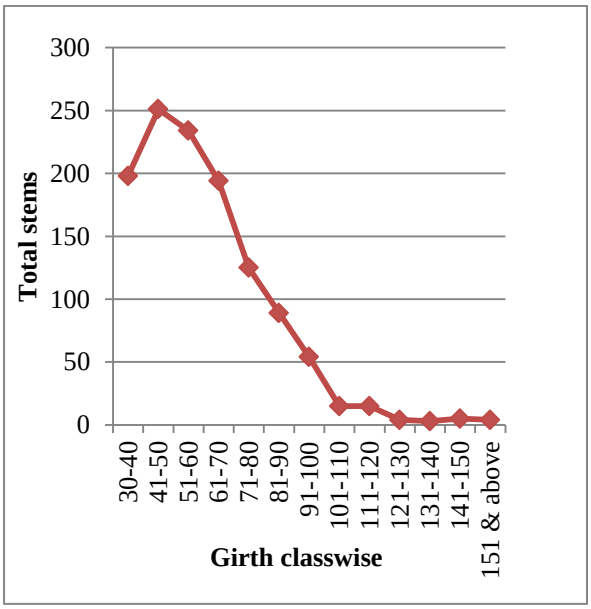
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Girth class wise stem with respect to total stems



Inside view of Law Adong Ingkhrong Sacred Groves

5.9 Brief note on Management of Ingkhrong Sacred Groves

(i) Protection from Biotic Interfernece:-

In the grove there is no prohibition for entry or exit though there is restriction on felling of tress. Hence the grove which is bounded by the private land and institution (Ramkrishna Mission) in which all the drainage are passed through the heart of this grove and dumping of garbage by the villagers which is therefore a concern of water pollution which flows to the streams. If A Communtiy Reserve will be declared, strong restriction can be imposed and it will be free from pollution and immence help in conservastion of the flora and fauna and to preserve the beauty of the grove.

(ii) Fire Control:-

Thought there is no report of fire incidence in the past, but it cannot be ruled out in the year to come as the grove is bounded by private land to prevent any unwanted fire external fire line can be created all along the boundary line except those are bounded by natural stream. This will help to preserved the rich natural resources of the grove.

(iii) Awareness Campaign:-

Awareness campaign can be taken up at the village level. By organising programme at schools for student and can also be taken related to forest and environment and even for the elder of the villagers with special programes can be conducted with interactive session and highlighted the benefit obtain from the forest and the effect to come if the forest is destroyed.

6 - Mawphon Syiem Sacred Groves at Khlieh Shnong Sohra, East Khasi Hills, District.

6.1 Location:

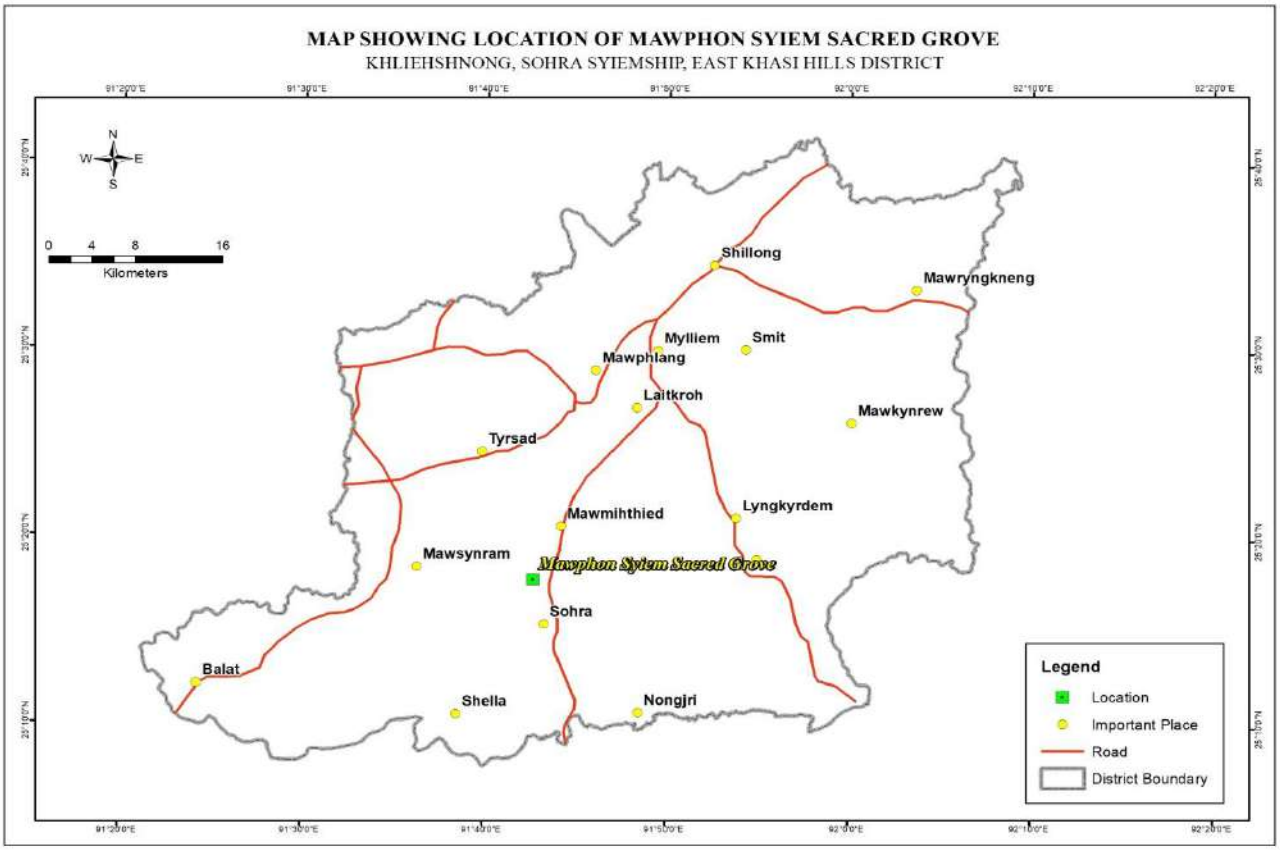
Mawphon Sacred Grove is situated in East Khasi Hills District of Meghalaya, under Sohra sub-Division of Hima Sohra Syiemship of Khlieh Shnong Sohra village. It covers an area of 15.932 ha. It lies between 91° 42′ 32″ to 92° 42′ 54″ E Longitude and 25° 17′ 42″ to 25° 17′ 53″ N latitude with an elevation of 1478 m above mean sea level. It is bounded in the North by Raid Kteng seasonal stream and Raid land khlieh shnong, in the East by Raid khlieh shnong, to the west and south west by Raid Khlieh Shnong Shora. The grove is accessible by road from Shillong to Laitduh Road. It is about 56 km from Shillong.

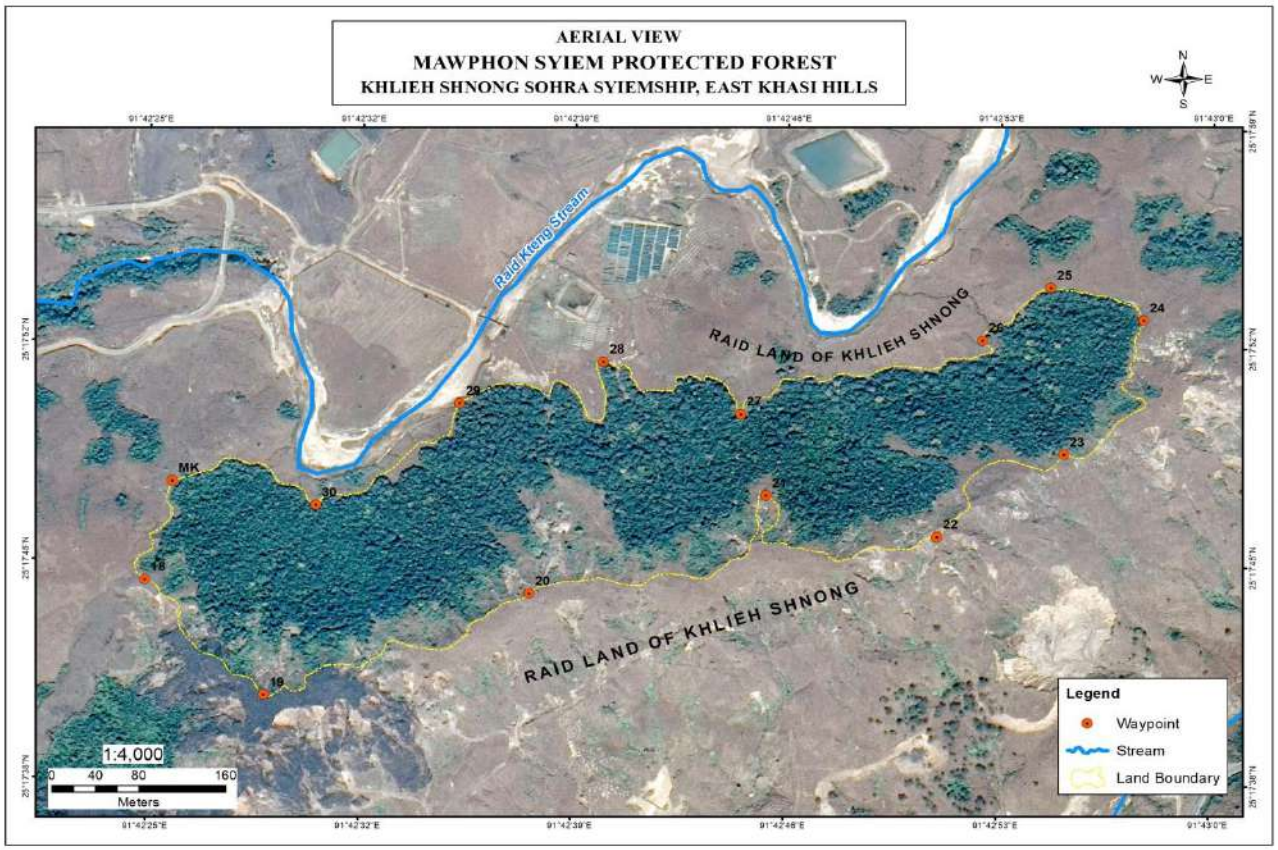
6.2 Brief History:

This grove had originated since immemorial. The grove owned by Sohra Syiemship and later it was handed over to the village of khlieh shnong Sohra under the control of the headman elected by the villagers for preserving this grove long time back. Although presently no more ritual is preformed yet the people of this village try to preserve the relic forest which was established by the Syiem of Sohra. Entering inside this grove is not illegal but cutting down of timber is strictly prohibited.

6.3 Geography and Climate:

The Topography of the grove is slightly steep in nature with slope varying from 10° to 20°.The soil texture is sandy loamy, gravel with coarse fragment with low soil depth. No stream or river flow through this grove but the only one seasonal stream which flow in the western part of the boundary of the grove i.e. Raid kteng stream since the sacred grove is slightly steep soil erosion is very minimal. Sohra has a mild subtropical high land climate (Koppen Cwb) with monsoonal influence typical of India, Sohra received both the south west and north east monsoonal wind, giving it a single monsoon season. In the winter month it received the North east monsoon shower that travel down the Bramaputra valley. The dried months are November, December, January and February. Temperature average is 11.5ºc (52.7ºF) in January and 20.6ºc (69.1ºF) in August and the annual rain is 17º3º (63.1ºF). Biotic presence, encroachment, wild fire, hunting and poaching, grazing and illegal felling of timber are found to be absent in the grove.


MAP SHOWING LOCATION OF MAWPHON SYIEM SACRED GROVE
KHLIEHSHNONG, SOHRA SYIEMSHIP, EAST KHASI HILLS DISTRICT
N
W
E
S
0 4 8 16
Kilometers
Shillong
Mawryngkneng
Mylliem
Smit
Mawphlang
Laitkroh
Mawkynrew
Tyrsad
Mawmihthied
Lyngkyrdem
Mawsynram
Mawphon Syiem Sacred Grove
Sohra
Balat
Shella
Nongjri
Legend
Location
Important Place
Road
District Boundary


AERIAL VIEW
MAWPHON SYIEM PROTECTED FOREST
KHLIEH SHNONG SOHRA SYIEMSHIP, EAST KHASI HILLS
N
W
E
S
Raid Kieng Stream
RAID LAND OF KHLIEH SHNONG
RAID LAND OF KHLIEH SHNONG
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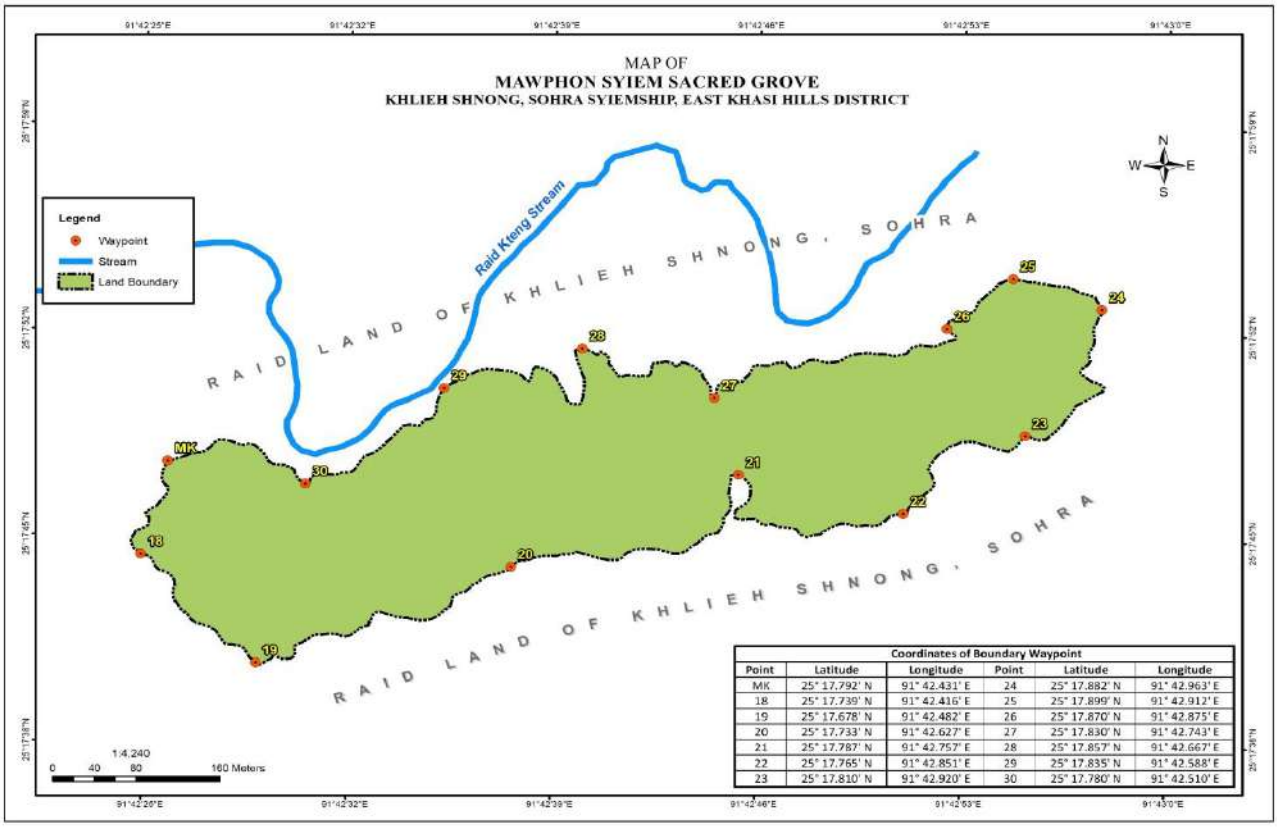
29
30
1:4,000
0 40 80 160
Meters
Legend
Waypoint
Stream
Land Boundary



6.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the groves are of mixed deciduous forest.

6.5 Flora and Fauna:

The vegetation is of mixed type consisting mainly of *Castanopsis species.* The relic forest is natural and it has of two storeyed layers. The wildlife found within the grove is jungle fowls, jackals, pangolin and many vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

i. Virgin forests where human interference is almost zero.
ii. Unique monsoon and waterfalls which have attracted many tourists both local and national and even foreigners.
iii. Existence of many rare and endangered plants species.
iv. High level endemic plants and animals species.
v. Restrictions-“do’s and don’ts;” which has immensely help the sacred grove in conservation of Flora and fauna and maintaining the rich forest natural resources.

6.6 Floral Species:

List of tress found in Mawphon Syiem Sacred Grove, East Khasi Hills

TREES

Sl. No. of trees	Botanical Name	Local Name	Family
1.	*Aralia armata*	Dieng latymphu	Araliaceae
2.	*Aralia spp*	Dieng shynrang	Araliaceae
3.	*Betula alnoides*	Dieng lieng	Betulaceae
4.	*Alstonia scholaris*	Dieng rteng	Apocynaceae
5.	*Carpinus vimanea*	Dieng Kliar risang	Betulaceae
6.	*Castanopsis indica*	Dieng sohot	Fagaceae
7.	*Castanopsis hystrix*	Dieng stap	Fagaceae
8.	*Castanopsis spp*	Dieng patuia	Fagaceae
9.	*Castanopsis tribuloides*	Dieng sning	Fagaceae
10.	*Cinnamomum bejolghota*	Dieng latyrdop	Lauraceae
11.	*Cinnamomum pauciflorum*	Dieng torthia	Lauraceae
12.	*Citrus latipes*	Dieng sohkynphor	Rutaceae
13.	*Combretum squamosum*	Dieng sohrisang	Combretaceae
14.	*Elaeocarpus floribundus*	Dieng sohkhyllam	Elaeocarpaceae
15.	*Elaeocarpus robustus*	Dieng lasaw	Elaeocarpaceae
16.	*Engelhardtia spicata*	Dieng lba	Juglandaceae
17.	*Eugenia jambolana*	Dieng sohum	Myrtaceae
18.	*Eurya acuminata*	Dieng pyrshit	Theaceae
19.	*Exbucklandia pupulnea*	Dieng doh	Hamamelidaceae
20.	*Ficus spp*	Dieng rai jem	Moraceae
21.	*Glochidion sphaerogynum*	Dieng sohumriphin	Phyllanthaceae
22.	*Grewia abutilifolia*	Dieng sahmehblang	Tiliaceae
23.	*Itea chinensis*	Dieng sohsyrtet	Iteaceae
24.	*Ligustrum lucidum*	Dieng lapohiat	Oleaceae
25.	*Lithocarpus fenestratus*	Dieng jing	Fagaceae
26.	*Michelia champaca*	Dieng rai	Magnoliaceae
27.	*Michelia punduana*	Dieng sohniar	Magnoliaceae
28.	*Michelia spp*	Dieng rai jem	Magnoliaceae
29.	*Myrica esculenta*	Dieng sohphie	Myricaceae
30.	*Pandanus odoratissimus*	Dieng shlan	Pandanaceae
31.	*Quercus dealbata*	Dieng sai	Fagaceae
32.	*Quercus glauca*	Dieng syrtap	Fagaceae
33.	*Rhus succedanea*	Dieng kain	Anacardiaceae
34.	*Schima khasiana*	Dieng ngan	Theaceae
35.	*Symplocos paniculata*	Dieng iong	Symplocaceae
36.	*Symplocos theifolia*	Dieng dpei	Symplocaceae
37.	*Walsura robusta*	Dieng sohphlang	Meliaceae
38.	*Wendlandia wallichii*	Dieng sawrang	Rubiaceae

List of Shrubs, herbs, climbers & bamboo found in Law Adong Mawphon Syiem, East Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	La tyrkieng	Not listed	Not listed
2.	Dieng pyrsit	*Eurya acuminata*	Theaceae
3.	Dieng tyrnem	*Camelia caduca*	Theaceae
4.	Shakuriew	Not listed	Not listed
5.	Dieng tiewlieh	*Rhododendron formosum*	Ericaceae
6.	Synsar	*Thysanolaena maxima*	Poaceae
7.	Soh larmaw	Not listed	Not listed
8.	Dieng sohjabuit	*Phlogacanthus thyrsiflorus*	Acanthaceae
9.	Dieng jamyrait	*Gaultheria fragrantissima*	Ericaceae
10.	Lajarem lieh	*Clerodendrum viscosum*	Verbenaceae
11.	Sla Jarem iong	*Clerodendrum colebrookianum*	Verbenaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Sla waitlam	*Asplenium nidus*	Aspleniaceae
2.	Tyrkhang	*Polypodium sp*	Polypodiaceae
3.	Jajew khlaw	*Begonia roxburghii*	Begoniaceae
4.	Sohbyrthit	*Urena labata*	Malvaceae
5.	Wang khlaw	*Colocasia esculenta*	Araceae
6.	Sying khlaw	*Zingiber purpureum*	Zingiberaceae
7.	Sla lamet	*Phyrnium pubinerve*	Marantaceae
8.	Shynrai khlaw	*Alpinia allughas*	Zingiberaceae
9.	Langniang eit ksew	*Potentilla fulgens*	Rosaceae
10.	Langniang lieh	*Potentilla polyphylla*	Rosaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Mei thit	*Aspidopterys indica*	Malpighiaceae
2.	Dieng longkhasaw (Jyrmi)	Not listed	Not listed
3.	Jyrmi Sohthied	Not listed	Not listed
4.	Sohkrot	*Smilax ferox*	Smilacaceae
5.	Pew shrieh	*Hedera nepalensis*	Araliaceae
6.	Sla kynda jyrmi	*Pothos scandens*	Araceae

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Tiew dieng Smehmassi	*Dendrobium chrysanthum*	Orchideceae
2.	Dieng tiew dieng	*Coelogyne corymbosa*	Orchideceae
3.	Dieng tiew dohmaw	*Aneoctochillus roxburghii*	Orchideceae
4.	Dieng tiew kait	Not listed	Not listed

GRASS

Sl No.	Local Name	Botanical Name	Family
1.	Langtraw	*Imperata cylindrica*	Poaceae
2.	Phlang	*Cyperus rotundus*	Cyperaceae
3.	Synsar	*Thysanolaena maxima*	Poaceae
4.	Langphot	Not listed	Not listed
5.	Lang tylli	Not listed	Not listed
6.	Langngiuh	Not listed	Not listed

6.7 Growing Stock:

As per the methodology described in Chapter-II, 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 30 cm is enumerated by measuring the top height (in meters) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 1654 tree species consisting of 384 *Castanopsis hystrix* (1st dominant), 317 *Castanopsis indica* (2nd dominant), 136 *Castanopsis tribuloides* (3rd dominant), 817 *Rest of 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 result for Law Adong Mawphon Syiem Sacred Grove are given in table 6.1 & 6.2 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 1741.62 cubic metres.

Table-6.1

Specieswise & Girth class wise volume for sampled area (16 plots - area 15.93 ha)

(volume in cu.m)

Girth class wise	1st dominant *Castanopsis hystrix*	2nd dominant *Castanopsis indica*	3rd dominant *Castanopsis tribuloides*	Rest of the species	Total
30-40	0.047	3.162	3.393	23.794	**30.396**
41-50	10.118	12.459	3.466	24.823	**50.866**
51-60	9.711	12.046	2.602	16.434	**40.793**
61-70	18.639	17.731	5.048	15.827	**57.245**
71-80	18.38	19.192	3.792	9.758	**51.122**
81-90	16.420	21.534	2.1	2.767	**42.821**
91-100	7.162	7.228	1.708	3.744	**19.842**
101-110	6.597	3.243	0.00	0.00	**9.84**
111-120	8.424	5.296	0.00	0.00	**13.720**
121-130	0.00	1.608	0.00	3.352	**4.96**
131-140	1.746	0.00	0.00	0.00	**1.746**
141-150	2.287	0.00	0.00	2.351	**4.638**
151 & above	0.00	0.00	0.00	0.00	**0.00**
Total	**99.531**	**103.499**	**22.109**	**102.85**	**327.989**

Girth class wise with respect to total area

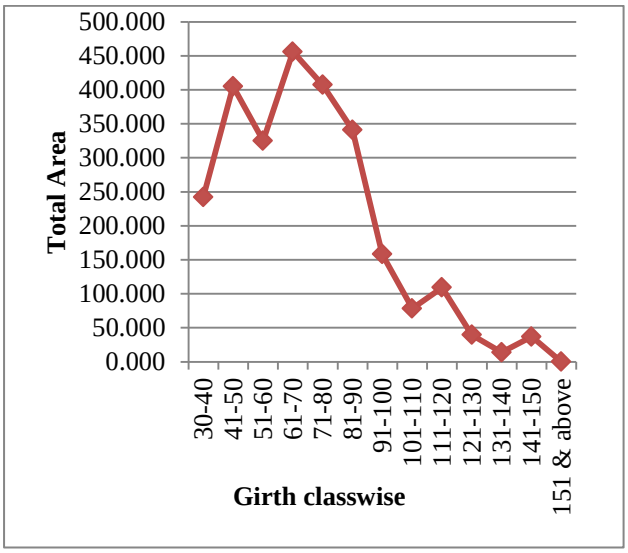


Table-6.2

Girth class wise & Species wise in the entire grove (in area 15.93 ha)

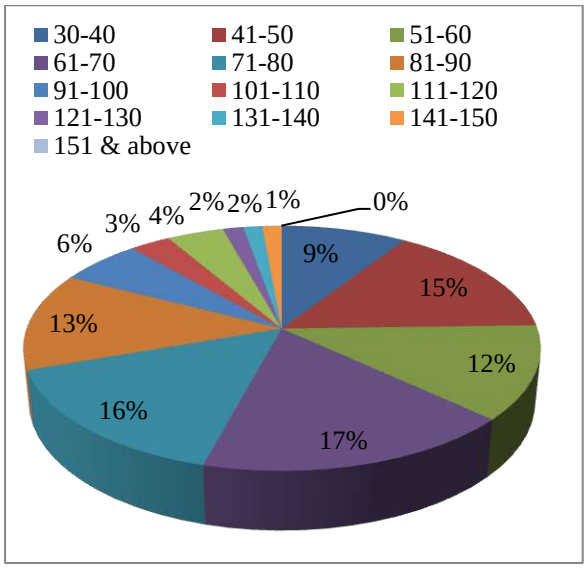
(volume in cu.m)

Girth class wise	1st dominant *Castanopsis hystrix*	2nd dominant *Castanopsis indica*	3rd dominant *Castanopsis tribuloides*	Rest of the species	Total	%wrt total volume
30-40	0.25	16.79	18.02	126.35	**161.40**	**9.27**
41-50	53.73	66.16	18.40	131.81	**270.10**	**15.51**
51-60	51.57	63.96	13.82	87.26	**216.61**	**12.44**
61-70	98.97	94.15	26.80	84.04	**303.97**	**17.45**
71-80	97.60	101.91	20.14	51.81	**271.46**	**15.59**
81-90	87.19	114.35	11.15	14.69	**227.38**	**13.06**
91-100	38.03	38.38	9.07	19.88	**105.36**	**6.05**
101-110	35.03	17.22	0.00	0.00	**52.25**	**3.00**
111-120	44.73	28.12	0.00	0.00	**72.85**	**4.18**
121-130	0.00	8.54	0.00	17.80	**26.34**	**1.51**
131-140	9.27	0.00	0.00	0.00	**9.27**	**0.53**
141-150	12.14	0.00	0.00	12.48	**24.63**	**1.41**
151 & above	0.00	0.00	0.00	0.00	**0.00**	**0.00**
Total	528.51	549.58	117.40	546.13	**1741.62**	**100.00**
% wrt total volume	**30.34**	**31.55**	**6.74**	**31.35**	**99.97**	

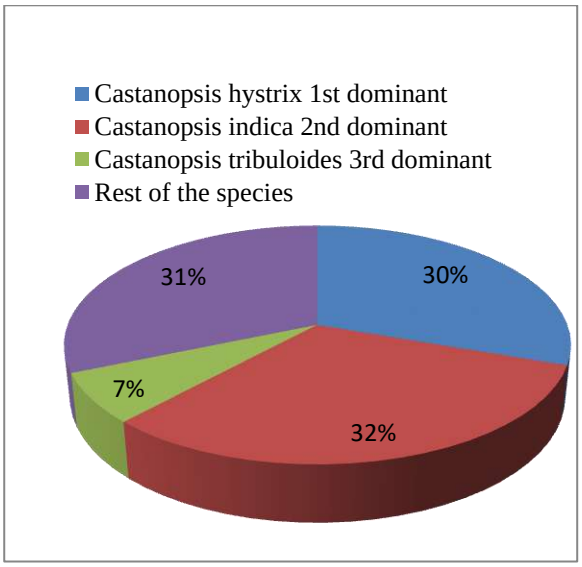
The table indicates that the volume contributed by the 1st dominant species (*Castanopsis hystrix)* with respect to the total volume of the grove is 528.51 %, the 2nd dominant species (*Castanopsis indica*) is 549.58 %, 3rd dominant species *(Castanopsis tribuloides)* is 117.4% while rest of the species is maximum i.e.546.13%. Total volume of the grove is 1741.62 cubic metres.

From the above 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.

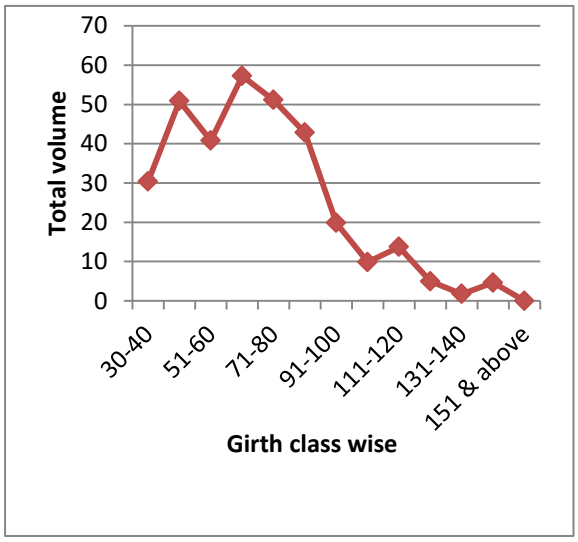
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view of Mawphon Syiem Sacred Groves

6.8 Number of Stems:

Numbers of stems in each girth class are species wise are given in the table 6.3 & 6.4. The table shows that maximum numbers of stems are found in lower girth classes i.e. from 30-40 cm to 91-100 cm classes.

Table-6.3

Girth class wise & Species wise No. of stems in the sampled (16 plots - area 15.93 ha)

(volume in cu.m)

Girth class (cm)	1st dominant *Castanopsis hystrix*	2nd dominant *Castanopsis indica*	3rd dominant *Castanopsis tribuloides*	Rest of the species	Total
30-40	781	287	409	2692	**4168**
41-50	377	462	127	935	**1901**
51-60	202	260	53	335	**850**
61-70	260	244	69	223	**797**
71-80	181	186	37	96	**499**
81-90	122	159	16	21	**319**
91-100	42	42	11	21	**117**
101-110	32	16	0	0	**48**
111-120	32	21	0	0	**53**
121-130	0	5	0	11	**16**
131-140	5	0	0	0	**5**
141-150	5	0	0	5	**11**
151 & above	0	0	0	0	**0**
Total	**2039**	**1683**	**722**	**4338**	**8783**

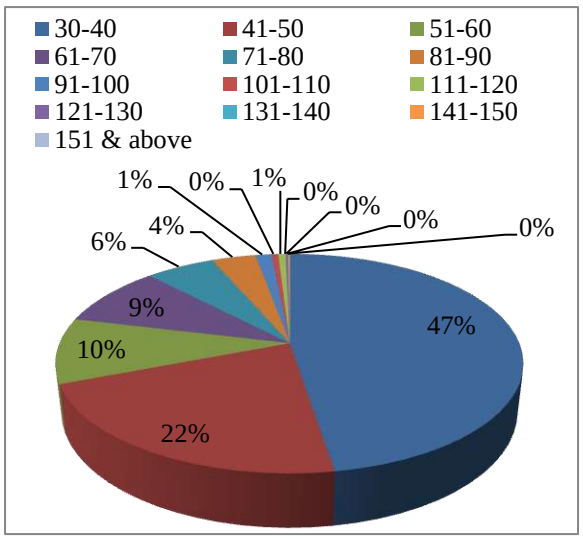
Table-6.4

Girth class wise & Species wise No. of stems in the entire grove (Area 15.93 ha)

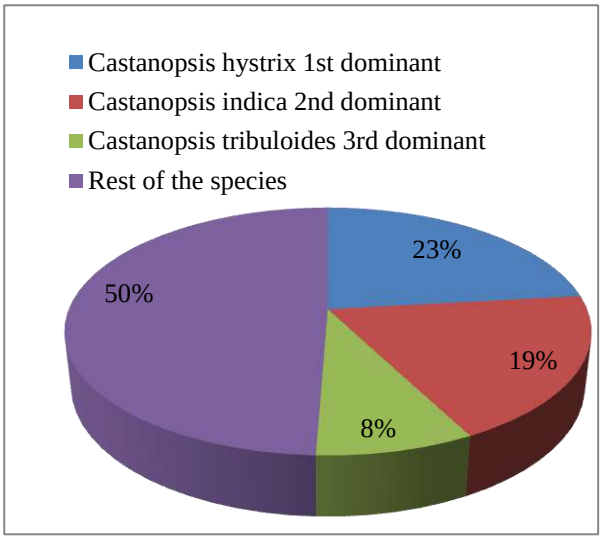
Girth class (cm)	1st dominant *Castanopsis hystrix*	2nd dominant *Castanopsis indica*	3rd dominant *Castanopsis tribuloides*	Rest of the species	Total
30-40	147	54	77	507	**785**
41-50	71	87	24	176	**358**
51-60	38	49	10	63	**160**
61-70	49	46	13	42	**150**
71-80	34	35	7	18	**94**
81-90	23	30	3	4	**60**
91-100	8	8	2	4	**22**
101-110	6	3	0	0	**9**
111-120	6	4	0	0	**10**
121-130	0	1	0	2	**3**
131-140	1	0	0	0	**1**
141-150	1	0	0	1	**2**
151 & above	0	0	0	0	**0**

Total	**384**	**317**	**136**	**817**	**1654**

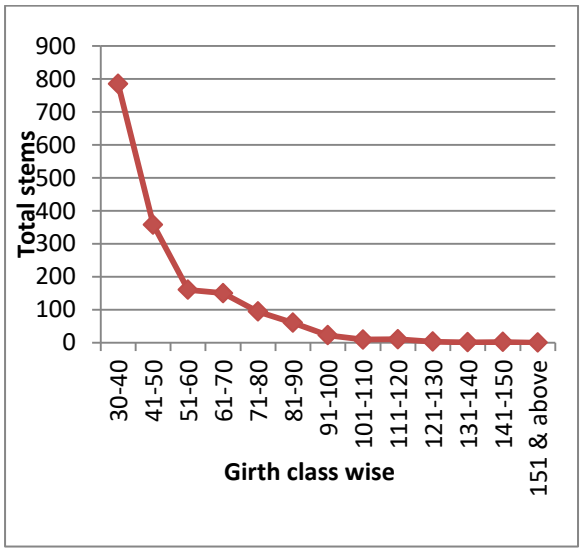
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Girth class wise stem with respect to total stems



Inside view Mawphon Syiem Sacred Groves

6.9 Brief note on Management of Sacred Grove Mawphon Syiem

(i) Protection from Biotic Interfernece:-

Biotic presence is almost nil in this grove since the village durbar of Khlieh Shnong Sohra is strictly prohibited like, felling of tree in any form except in case of emergency due to any natural calamities. Till date although, there is no report of grazing, illegal felling of timber, encroachment or poaching inside the grove, however, illegal activities may likely to occur in the future due to increase of human population.

(ii) Fire Control:-

Fire is a major factor responsible for devastating rich biodiversity of plants and animals and during interaction with the elder of the village, it is learnt that no fire incident had occurred in the grove in the past and present, but beyond the grove nearby fire incident use to occurred. For the better protection of the rich biodiversity, it is of the opinion that if fund can be provided to the village durbor for cutting of external fire line to avoid any un-intentional fire to spread inside the grove.

(iii) Water Stream:-

There is one seasonal stream which passes through the middle of this grove and the only way to store water for the whole year is by construction of check dam within the grove which will help the wild animal from straying out of the forest especially in the dry season. This will also help to check soil erosion.

(v) Awareness Campaign:-

This is the most import activity of creating of awareness programme in the village to preserve the beautiful grove, which can be done at the grass root level so that the people in and around will know the important of the Sacred Grove. The forest and the environment as a whole which inter-linked each other in the eco-system.

7 – Law Adong Umiong at Khlieh Shnong Sohra, East Khasi Hills District

7.1 Location:

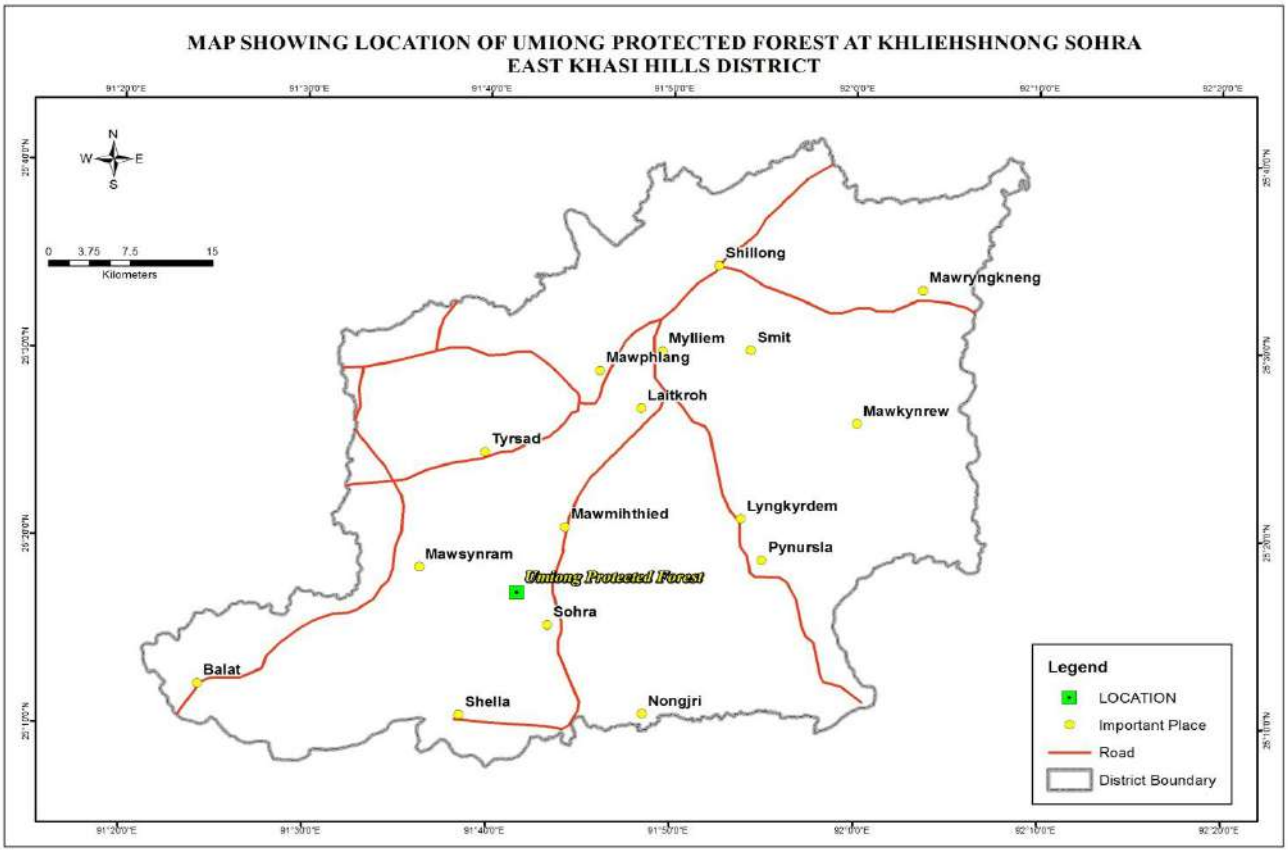
Umiong Sacred Grove is situated in East Khasi Hills District of Meghalaya, at Khlieh Shnong village Sohra under Sohra Syiemship. It covers an area of 200.58 ha. It lies between 25° 16′ 30″N to 25° 18′ 18″ N latitude and 91° 40′ 48″E to 91° 42′ 30″ E longitude with an altitude of 1466 m above mean sea level. It is bounded in the North by Raid land of khlieh shnong, land of Smti Barilin Khyriem, land of Noris Kharshandy, in the south by Nohkalikai Falls, in the east of the land of Raid Khlieh Shnong and land of Rong biria and in the west it is bounded by the land of Raid Khlieh Shnong. It is accessible by road from Shillong to Mawphu Village and Shillong to Nohkalikai road via Sohra village. The spot is about 54 km from Shillong.

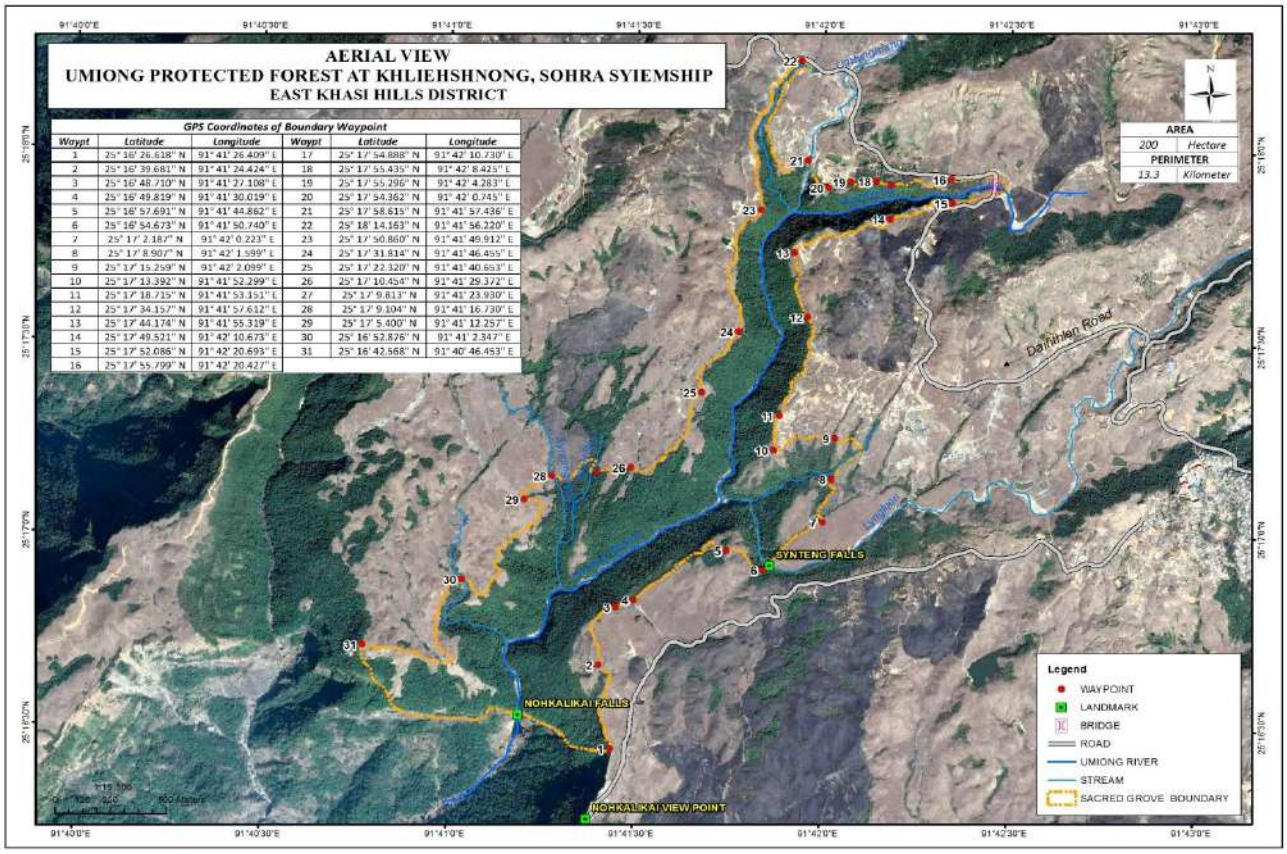
7.2 Brief History:

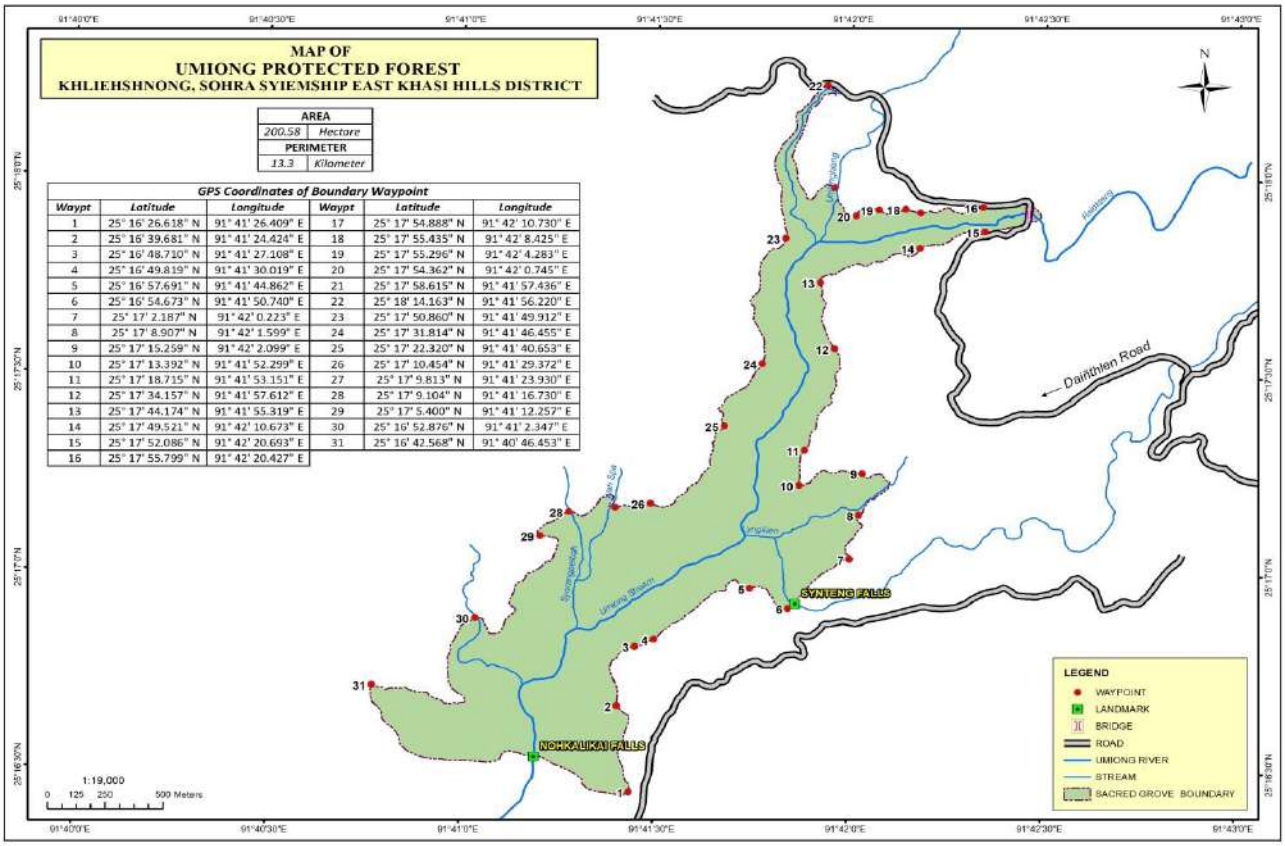
This sacred grove is owned by the village of khlieh shnong Sohra and is controled by the Barefooted Environmental Education Society (NGO). Although presently no more rituals are performed, yet the people preserve the relic from which is still clear to their heart, if any natural calamity occurs to help to any family of the villagers to reconstruct their house by donating sanctuaries in the event. The state forest Department has no direct control of the said grove as it falls under the jurisdiction of the (KHADC).

7.3 Geography and Climate:

The Topography of the grove is hilly in nature with steep slopes and undulating terrain varying from 10° to 42° range slope gradient. The area falls under the southern aspect. The soil texture is sandy loam 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 depth. There are two main streams namely Umtengheng stream and Raid kteng stream and flow towards Nohkalikai falls. The area received both the South west and north east monsoonal wind (North east wind comes back as south west wind) giving it a single monsoon season. The summer month from March to May received moderate rainfall and average minimum temperature is 14^{o}c and maximum is 23^{o}c. Monsoon season. The area received the maximum and highest rainfall. Cold temperature prevails in winter season falling deep to 7^{o}c and maximum is 22^{o}c. Biotic pressure, encroachment, Wild fire, hunting, poaching, grazing, and illegal timber felling are absent in this grove.


MAP SHOWING LOCATION OF UMIONG PROTECTED FOREST AT KHLIEHSHNONG SOHRA
EAST KHASI HILLS DISTRICT
N
W
E
S
0 3.75 7.5 15
Kilometers
Shillong
Mawryngkneng
Mylliem
Smit
Mawphlang
Laitkroh
Mawkynrew
Tyrsad
Mawmihthied
Lyngkyrdem
Pynursla
Mawsynram
Umiong Protected Forest
Sohra
Balat
Shella
Nongjri
Legend
LOCATION
Important Place
Road
District Boundary


AERIAL VIEW
UMIONG PROTECTED FOREST AT KHLIEHSHNONG, SOHRA SYIEMSHIP
EAST KHASI HILLS DISTRICT
GPS Coordinates of Boundary Waypoint
Waypt | Latitude | Longitude | Waypt | Latitude | Longitude
1 | 25° 16' 26.618" N | 91° 41' 26.409" E | 17 | 25° 17' 54.888" N | 91° 42' 10.730" E
2 | 25° 16' 39.681" N | 91° 41' 24.424" E | 18 | 25° 17' 55.435" N | 91° 42' 8.425" E
3 | 25° 16' 48.710" N | 91° 41' 27.108" E | 19 | 25° 17' 55.296" N | 91° 42' 4.283" E
4 | 25° 16' 49.819" N | 91° 41' 30.019" E | 20 | 25° 17' 54.362" N | 91° 42' 0.745" E
5 | 25° 16' 57.691" N | 91° 41' 44.862" E | 21 | 25° 17' 58.615" N | 91° 41' 57.436" E
6 | 25° 16' 54.673" N | 91° 41' 50.740" E | 22 | 25° 18' 14.163" N | 91° 41' 56.220" E
7 | 25° 17' 2.187" N | 91° 42' 0.223" E | 23 | 25° 17' 50.860" N | 91° 41' 49.912" E
8 | 25° 17' 8.907" N | 91° 42' 1.599" E | 24 | 25° 17' 31.814" N | 91° 41' 46.455" E
9 | 25° 17' 15.259" N | 91° 42' 2.099" E | 25 | 25° 17' 22.320" N | 91° 41' 40.663" E
10 | 25° 17' 13.392" N | 91° 41' 52.299" E | 26 | 25° 17' 10.454" N | 91° 41' 29.372" E
11 | 25° 17' 18.715" N | 91° 41' 53.151" E | 27 | 25° 17' 9.813" N | 91° 41' 23.930" E
12 | 25° 17' 34.157" N | 91° 41' 57.612" E | 28 | 25° 17' 9.104" N | 91° 41' 16.730" E
13 | 25° 17' 44.174" N | 91° 41' 55.319" E | 29 | 25° 17' 5.400" N | 91° 41' 12.257" E
14 | 25° 17' 49.521" N | 91° 42' 10.673" E | 30 | 25° 16' 52.826" N | 91° 41' 2.347" E
15 | 25° 17' 52.086" N | 91° 42' 20.693" E | 31 | 25° 16' 42.568" N | 91° 40' 46.453" E
16 | 25° 17' 55.799" N | 91° 42' 20.427" E
AREA
200 Hectare
PERIMETER
13.3 Kilometer
Daifihlan Road
SYNTENG FALLS
NOHKALIKAI FALLS
NOHKALIKAI VIEW POINT
Legend
WAYPOINT
LANDMARK
BRIDGE
ROAD
UMIONG RIVER
STREAM
SACRED GROVE BOUNDARY



7.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the grove is of mixed deciduous forest.

7.5 Flora and Fauna:

The vegetation type is of mixed *species* consisting mainly of *Pandanus odoratissimus* and *Castanopsis tribuloides.* Origin of the forest is natural and it is two storeyed type of forests. Wildlife found within the grove are jungle fowls, barking deers, jackals and some vertebrates and invertebrates. The conservation significance of the grove is mainly due to:

i. The Virgin forests where human interference is almost zero.

ii. Unique monsoon and waterfalls which have attracted many tourists both local and national and even foreigners.

iii. Existence of many rare and endangered plants species.

iv. High level endemic plants and animals species.

v. Restrictions-“do’s and don’ts;” which has immensely help the sacred grove in conservation of Flora and fauna and maintaining the rich forest natural resources.

7.6 Floral Species:

List of tress found in Umiong Sacred Grove, East Khasi Hills

TREES

Sl. No. of trees	Botanical Name	Local Name	Family
1.	*Albizia lucidior*	Dieng ri	Fabaceae
2.	*Albizia procera*	Dieng phyllut	Fabaceae
3.	*Albizia stipulata*	Dieng saw	Fabaceae
4.	*Alstonia scholaris*	Dieng latyrkieng	Apocynaceae
5.	*Aralia armata*	Dieng latymphu	Araliaceae
6.	*Betula alnoides*	Dieng lieng	Betulaceae
7.	*Exbucklandia populnea*	Dieng doh	Hamamelidaceae
8.	*Camellia caduca*	Dieng tyrnem	Theaceae
9.	*Carpinus viminea*	Dieng kliar risang	Betulaceae
10.	*Caryota urens*	Dieng tlai	Arecaceae
11.	*Alstonia scholaris*	Dieng rteng	Apocynaceae
12.	*Castanopsis hystrix*	Dieng stap	Fagaceae
13.	*Castanopsis indica*	Dieng sohot	Fagaceae
14.	*Castanopsis spp*	Dieng patuia	Fagaceae
15.	*Castanopsis tribuloides*	Dieng sning	Fagaceae
16.	*Castanopsis hystrix*	Dieng stap	Fagaceae
17.	*Cesearia vareca*	Dieng rang	Flacourtiaceae
18.	*Celtis tetrandra*	Dieng siasia	Cannabaceae
19.	*Cinnamomum bejolghota*	Dieng latyrdop	Lauraceae
20.	*Cinnamomum pauciflorum*	Dieng torthia	Lauraceae
21.	*Citrus latipes*	Dieng sohkynphor	Rutaceae
22.	*Drimycarpus racemosus*	Dieng sohrang	Anacardiaceae
23.	*Elaeocarpus lanceifolius*	Dieng sohkhyllam	Elaeocarpaceae
24.	*Elaeocarpus robustus*	Dieng lasaw	Elaeocarpaceae
25.	*Engelhardtia spicata*	Dieng lba	Juglandaceae
26.	*Eugenia jambolana*	Dieng sohum	Myrtaceae
27.	*Eurya acuminata*	Dieng pyrshit	Theaceae
28.	*Glochidion sphaerogynum*	Dieng sohumriphin	Phyllanthaceae
29.	*Grewia abutilifolia*	Dieng sahmehblang	Tiliaceae
30.	*Ilex venulosa*	Dieng shyieng	Aquifoliaceae
31.	*Itea chinensis*	Dieng sohsyrtet	Iteaceae
32.	*Ligustrum robustum*	Dieng lapohiat	Oleaceae
33.	*Lithocarpus fenestratus*	Dieng jing	Fagaceae
34.	*Litsea meissneri*	Dieng sohrang	Lauraceae
35.	*Macaranga denticulata*	Dieng lakhar	Euphorbiaceae
36.	*Meliosma pinnata*	Dieng krot	Sabiaceae
37.	*Michelia champaca*	Dieng rai	Magnoliaceae
38.	*Michelia punduana*	Dieng sohniar	Magnoliaceae
39.	*Myrica esculenta*	Dieng sohphie	Myricaceae
40.	*Engelhardtia spicata*	Dieng lba	Juglandaceae
41.	*Pandanus odoratissimus*	Dieng shlan	Pandanaceae
42.	*Phoebe lanceolata*	Dieng sohniar	Magnoliaceae

43.	*Polygala arillata*	Dieng jalakba	Polygalaceae
44.	*Premna bengalensis*	Dieng lalieh	Asteraceae
45.	*Quercus dealabata*	Dieng sai	Fagaceae
46.	*Quercus glauca*	Dieng syrtap	Fagaceae
47.	*Rhododendron arboretum*	Dieng tiewsaw	Ericaceae
48.	*Rhus succedanea*	Dieng kain	Anacardiaceae
49.	*Saurauia punduana*	Dieng jalngap	Actinidiaceae
50.	*Schima khasiana*	Dieng ngan	Theaceae
51.	*Sterculia villosa*	Dieng tluh	Sterculiaceae
52.	*Symplocos khasiana*	Dieng dpei	Symplocaceae
53.	*Symplocos paniculata*	Dieng iong	Symplocaceae
54.	*Vaccinium griffithianum*	Dieng sohryngkham	Ericaceae
55.	*Walsura robusta*	Dieng sohphlang	Meliaceae
56.	*Wendlandia wallichii*	Dieng sawrang	Rubiaceae
57.	*Zanthoxylum ovalifolium*	Dieng shiah	Rutaceae

List of Shrubs, herbs, climbers & bamboo found in Law Adong Umiong, East Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng sai	*Lithoscarpus dealbatus*	Fagaceae
2.	Soh pydung	*Vaccinum serratum*	Vaccinaceae
3.	Dieng pyrsit	*Eurya acuminata*	Theaceae
4.	Dieng tyrnem	*Camelia caduca*	Theaceae
5.	Dieng tiewlieh	*Rhododendron formosum*	Ericaceae
6.	Synsar	*Thysanolaena maxima*	Poaceae
7.	Dieng sohjabuit	*Phlogacanthus thyrsiflorus*	Acanthaceae
8.	Dieng jamyrait	*Gaultheria fragrantissima*	Ericaceae
9.	Lajarem lieh	*Clerodendrum viscosum*	Verbenaceae
10.	Sla Jarem iong	*Clerodendrum colebrookianum*	Verbenaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Lantana iong	*Eupatorium adenophorum*	Asteraceae
2.	Tmain khla	*Lycopodium clavatum*	Lycopodiaceae
3.	Lantana shiah	*Lantana camara*	Asteraceae
4.	Shyrmit khlaw	*Curcuma aromatica*	Zingiberaceae
5.	Sohbyrthit	*Triumfetta rhomboidea*	Tiliaceae
6.	Jawieh bsein	*Arisaema consanguineum*	Araceae
7.	Jalynthem	*Polygonum chinense*	Polygonaceae
8.	Longniang	*Potentilla gracilis*	Rosaceae
9.	Jamyrdoh	*Houttuynia cordata*	Saururaceae
10.	Kdait umjew	*Polygonum glabrum*	Polygonaceae

11.	Sohshiah khlaw	*Rubus rugosus*	Rosaceae
12.	Phlang tylli	*Ophiopogon spp*	Asparagaceae
13.	Tyrkhang iong	*Adiantum raddianum*	Onocleaceae
14.	Jajew khlaw	*Begonia roxburghii*	Begoniaceae
15.	Sying khlaw	*Zingiber purpureum*	Zingiberaceae
16.	Bat eroplane	*Inula cappa*	Asteraceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Sohmrit khlaw	*Piper longum*	Piperaceae
2.	Jyrmi kynsew	*Argyreia nervosa*	Convolvulaceae
3.	Dieng sohmatan/sohpdong	*Stephania glabra*	Menispermaceae
4.	Soh nepbah	*Rubus molluccanus*	Rosaceae
5.	Tmain khla	*Lycopodium clavatum*	Lycopodiaceae
6.	Soh ma-ad	*Dioscorea bulbifera*	Dioscoreaceae
7.	Tiew Dieng	*Dendrobium densiflorum*	Orchidaceae
8.	Phan synreh	*Dioscorea alata*	Dioscoreaceae
9.	Sohkrot	*Smilax ferox*	Smilacaceae

BAMBOO

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

7.7 Growing Stock:

As per the methodology described in Chapter-II, 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 30 cm is enumerated by measuring the top height (in meters) and the girth (in centimeters) at breast height. All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 1654 tree species consisting of 1365 *Pandanus odoratissimus* (1st dominant), 988 *Castanopsis tribuloides* (2nd dominant), 624 *Eugenia jambolana* (3rd dominant), 604 *Itea chinensis* (4th dominant), 5652 *Rest of 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 result for Law Adong Umiong Syiem Sacred Grove are given in table 7.1 & 7.2 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 11743.66 cubic metres.

Table-7.1

Specieswise & Girth class wise volume for sampled area (100 plots - area 200.58 ha)

(volume in cu.m)

Girth class (cm)	*Pandanus odoratissimus 1st dominant*	*Castanopsis tribuloides 2nd dominant*	*Eugenia jambolana 3rd dominant*	*Itea chinensis 4th dominant*	*Rest of Species*	*Total*
30-40	53.128	19.525	11.486	10.260	96.320	190.719
41-50	24.231	32.642	22.693	24.591	137.662	241.819
51-60	4.341	30.180	24.192	27.583	208.132	294.428
61-70	0.738	36.978	20.583	17.716	212.378	288.393
71-80	0	40.908	20.025	20.056	179.527	260.516
81-90	0	26.333	18.552	9.863	202.541	257.289
91-100	0	25.172	10.825	15.945	187.249	239.191
101-110	0	12.205	16.835	7.831	120.347	157.218
111-120	0	6.672	5.425	0	62.414	74.511
121-130	0	6.574	4.797	0	54.671	66.042
131-140	0	3.548	1.774	3.605	57.782	66.709
141-150	0	6.673	6.702	6.482	67.034	86.891
151 & above	0	11.096	2.55	2.416	108.943	125.005
Total	82.438	258.506	166.439	146.348	1695	2348.731

Girth class wise with respect to total volume

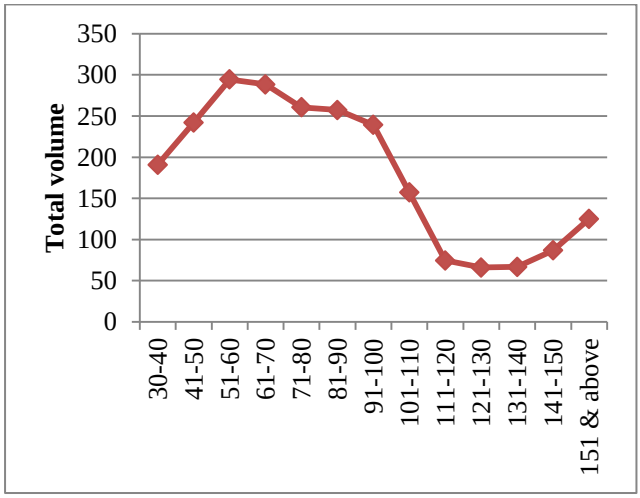


Table-7.2

Girth class wise & Species wise in the entire grove (in area 200.58 ha)

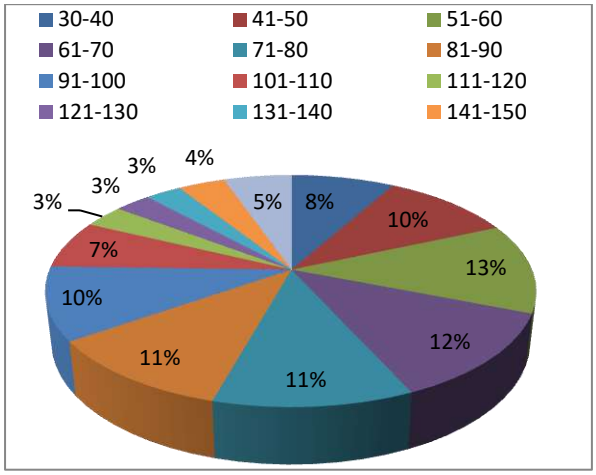
(volume in cu.m)

Girth class (cm)	*Pandanus odoratissimus* 1st dominant	*Castanopsis tribuloides* 2nd dominant	*Eugenia jambolana* 3rd dominant	*Itea chinensis* 4th dominant	Rest of Species	Total	% wrt total volume
30-40	265.64	97.63	57.43	51.30	481.60	953.60	8.120
41-50	121.16	163.21	113.47	122.96	688.31	1209.10	10.295
51-60	21.71	150.90	120.96	137.92	1040.66	1472.14	12.535
61-70	3.69	184.89	102.92	88.58	1061.89	1441.97	12.278
71-80	0.00	204.54	100.13	100.28	897.64	1302.58	11.091
81-90	0.00	131.67	92.76	49.32	1012.71	1286.45	10.954
91-100	0.00	125.86	54.13	79.73	936.25	1195.96	10.184
101-110	0.00	61.03	84.18	39.16	601.74	786.09	6.694
111-120	0.00	33.36	27.13	0.00	312.07	372.56	3.172
121-130	0.00	32.87	23.99	0.00	273.36	330.21	2.812
131-140	0.00	17.74	8.87	18.03	288.91	333.55	2.840
141-150	0.00	33.37	33.51	32.41	335.17	434.46	3.699
151 & above	0.00	55.48	12.75	12.08	544.72	625.03	5.322
Total	412.19	1292.53	832.20	731.74	8475.00	11743.66	100.00
% wrt total volume	3.51	11.01	7.09	6.23	72.16	100.00	

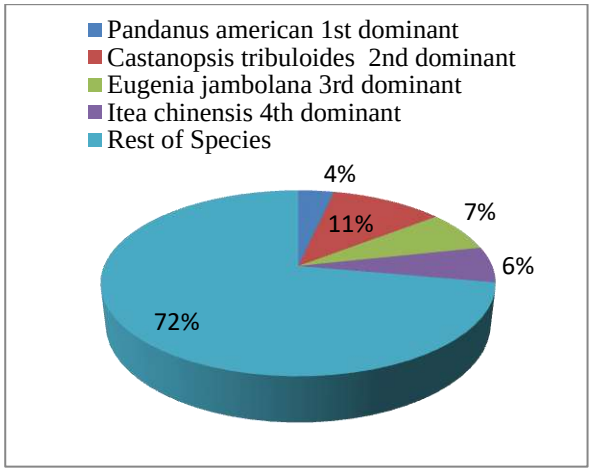
The table indicates that the volume contributed by the 1st dominant species (*Pandanus American*) with respect to the total volume of the grove is 3.51 %, the 2nd dominant species (*Castanopsis tribuloides*) is 11.01 %, 3rd dominant species ***(****Eugenia jambolana****)*** is 7.09% , 4th dominant species ***(****Itea chinensis****)*** is 6.23% while rest of the species is maximum i.e.72.16%. Total volume of the grove is 11743.66 cubic metres.

From the above 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.

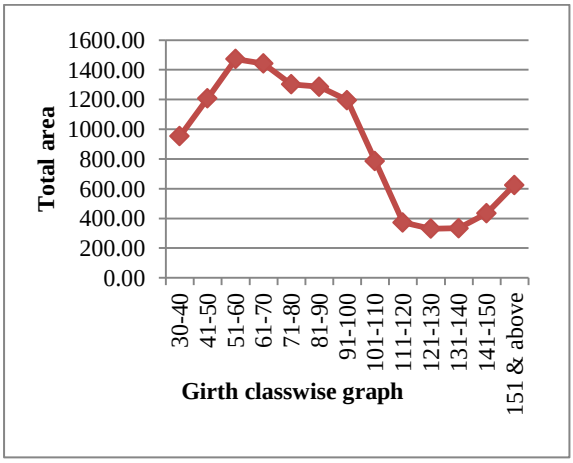
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view of Umiong Sacred Groves

7.8 Number of Stems:

Numbers of stems in each girth class are species wise are given in the table 7.3 & 7.4. The table shows that maximum numbers of stems are found in lower girth classes i.e. from 30-40 cm to 91-100 cm classes.

Table-7.3

Girth class wise & Species wise No. of stems in the sampled (100 plots - area 200.58 ha)

(volume in cu.m)

Girth class (cm)	*Pandanus odoratissimus 1st dominant*	*Castanopsis tribuloides 2nd dominant*	*Eugenia jambolana 3rd dominant*	*Itea chinensis 4th dominant*	*Rest of Species*	*Total*
30-40	1152	369	206	190	1810	3727
41-50	193	230	162	173	1335	2093
51-60	18	123	98	111	839	1189
61-70	2	96	55	48	560	761
71-80	0	77	38	37	342	494
81-90	0	37	26	14	285	362
91-100	0	28	12	18	210	268
101-110	0	11	15	7	106	139
111-120	0	5	4	0	45	54
121-130	0	4	3	0	34	41
131-140	0	2	1	2	30	35
141-150	0	3	3	3	30	39
151 & above	0	3	1	1	26	31
Total	**1365**	**988**	**624**	**604**	**5652**	**9233**

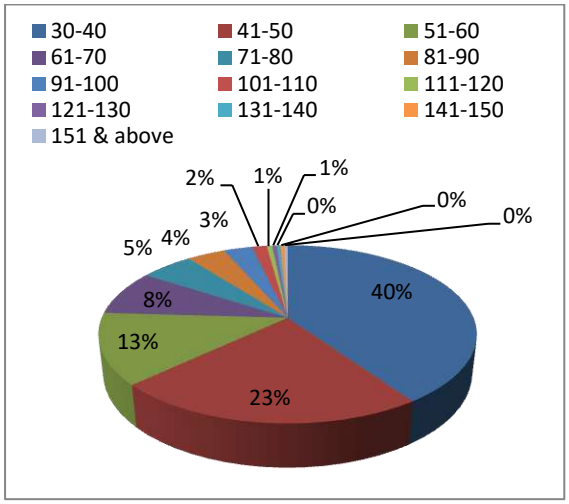
Table-7.4

Girth class wise & Species wise No. of stems in the entire grove (Area 200.58 ha)

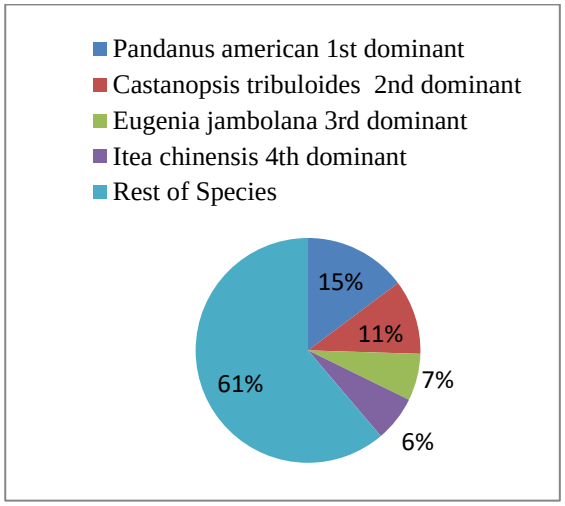
Girth class (cm)	*Pandanus odoratissimus 1st dominant*	*Castanopsis tribuloides 2nd dominant*	*Eugenia jambolana 3rd dominant*	*Itea chinensis 4th dominant*	*Rest of Species*	*Total*
30-40	5760	1845	1030	950	9050	**18635**
41-50	965	1150	810	865	6675	**10465**
51-60	90	615	490	555	4195	**5945**
61-70	10	480	275	240	2800	**3805**
71-80	0	385	190	185	1710	**2470**
81-90	0	185	130	70	1425	**1810**
91-100	0	140	60	90	1050	**1340**
101-110	0	55	75	35	530	**695**
111-120	0	25	20	0	225	**270**
121-130	0	20	15	0	170	**205**
131-140	0	10	5	10	150	**175**

141-150	0	15	15	15	150	**195**
151 & above	0	15	5	5	130	**155**
Total	**6825**	**4940**	**3120**	**3020**	**28260**	**46165**

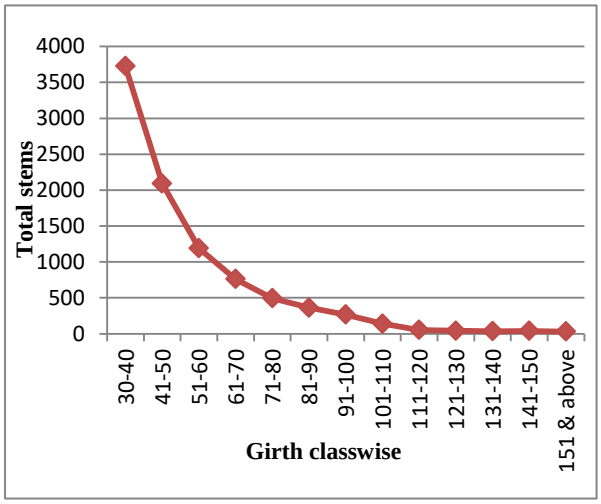
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Girth class wise stem with respect to total stems



Inside view of Umiong Sacred Groves

7.9 Brief note on Management of Sacred Grove Umiong

(i) Protection from Biotic Interfernece:-

Biotic presence is almost nil in this grove since the village durbar of Khlieh Shnong Sohra is strictly prohibited like, felling of tree in any form except in case of emergency due to any natural calamities. According to the need the durbor shnong donate some of the tree for reconstruction of the house to any family upon request. Although, there is no report of grazing, illegal felling of timber, or poaching inside the grove, however, illegal activities may likely to occur in the future due to increase of human population.

(ii) Fire Control:-

There is no evedence of fire incidence in this part, hence fire indicator cannot be ruled out in the day to cover to avoid such incidence , an external fire line of 5 m vide can be cleaned every year especially before the onset of dry seasons.

(iii) Water Stream:-

There are two main stream on this grove i.e Umtengheng stream and Raid kteng stream. Supply of water is no crisis. However for wildlife and for better moisture content of the soil especially in the upper slopes, check dam can be created to save pernial stream which flows through the grove to checked soil erosion and to increase moisture content of the soil which will also act as a barrier to stop the spread of wild fire inside the groves.

(iv) Creation of view point:-

To ensure safety of the protected forest and educate the people about there important through eco-toursim. It is observed that view point in the sport is necessary as this will facilitate income-oriented to the local people vis-à vis preserve this rich forest natural resources form being threaten.

(iv) Awareness Campaign:-

This is the first step to protect, preserve and conserve the sacred groves from various threats posed by human being in various part of the state. To make people understand the importance of the grove in relation to the environment and socio-economic factors, awareness programme should be conducted at the grass root level through training, poster campaign, mass and media printing etc.

8 - Wah Shyngiar, Law Adong at Mawmluh

8.1 Location:

Law Adong Wah Shyngiar is situated in East Khasi Hills District of Meghalaya at Mawmluh village under the Mawmluh Sirdarship. It covers an area of 24.113 ha. It lies between 25° 14′ 45" to 25° 15′ 11″ N latitude and 91° 41′ 30″ to 91° 42′ 00″ E Longitude with an altitude of 1128 m above mean sea level. It is bounded in the North by Tyrna area, private land stream and season steam, in the East by Mawmluh area, in the South- East by PWD Road and Mawshamok-Mawmluh, in the West by PWDF Road and Tyrna. The forest is accessible by road from Shillong to Mawmluh which is about 58 km and from Mawmluh.

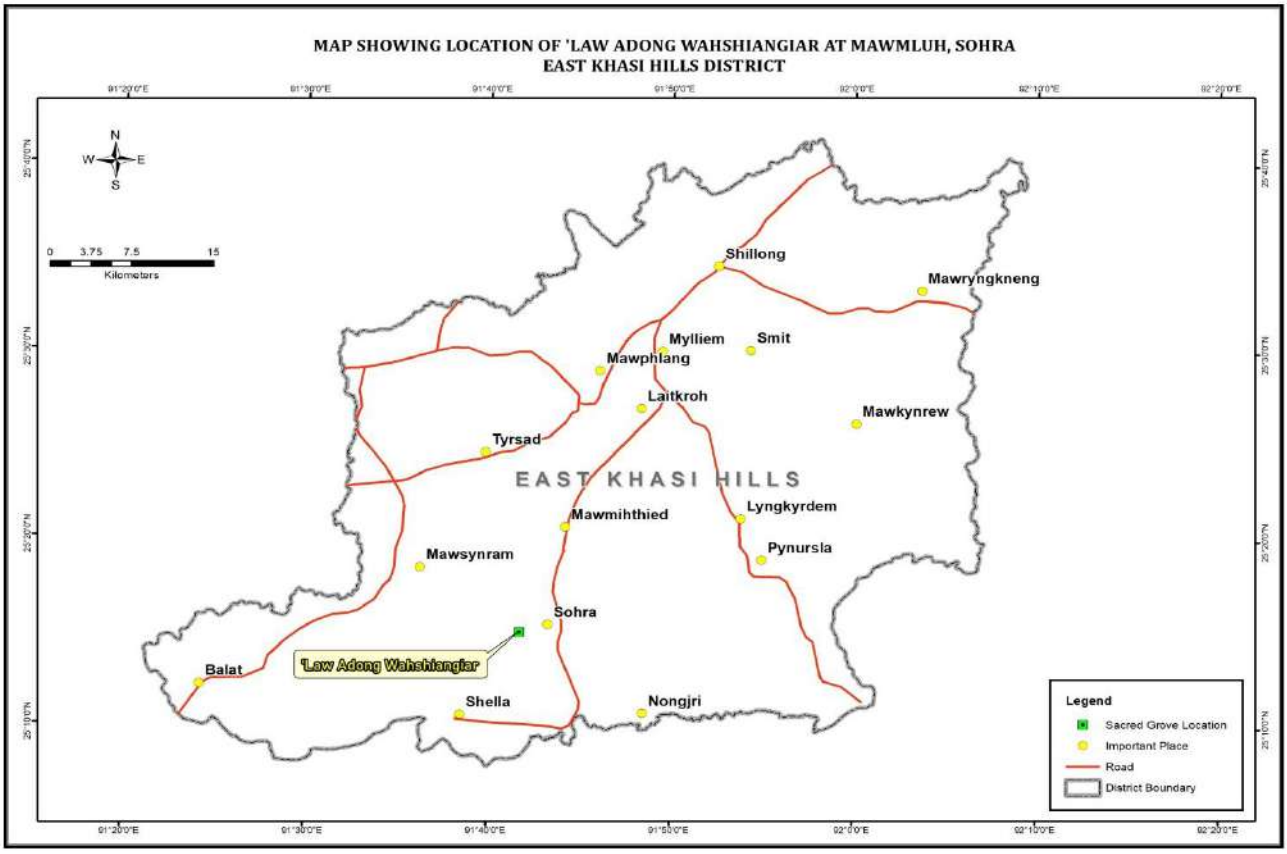
8.2 Brief History:

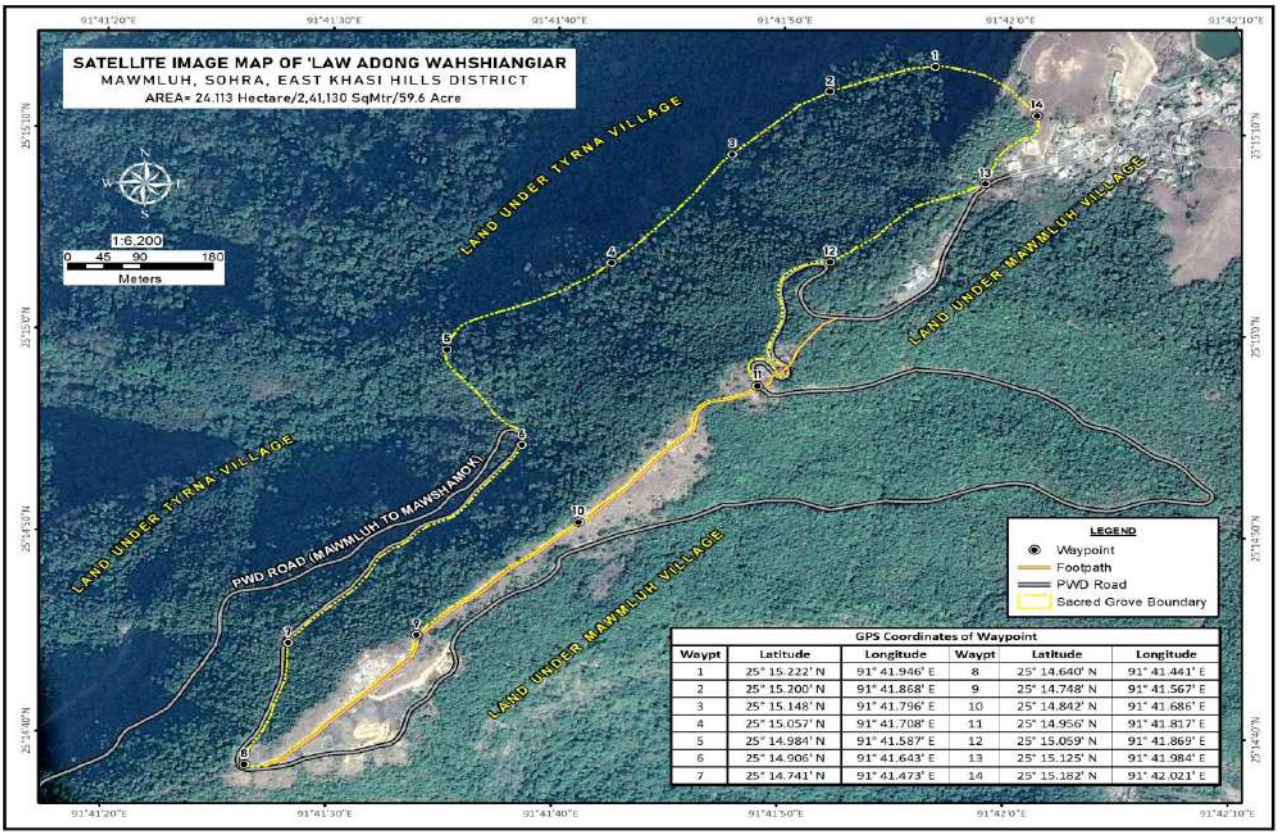
The forest has been originated since decades ago. There is no religious significant of the forest however it is still revered by the locals. The forest is owned by the village community under the lookout and control by the Sirdar elected by the villagers. The ecological significant of the Sacred grove is still up hold by the village, therefore till today the conservation and preservation of the groves is still part and parcel of the Village Administration and Management. Because of this consorted efforts, the forest is a refuge for numerous mammals, birds, reptiles and amphibians. During the enumeration exercise one group of the enumerators sighted a barking deer. The scenic beauty of the locale provides a fillip to the ecological richness of the forest. Therefore, the combination of Law Adong Wah Shyngiar protected forest's rich biological diversity and the beauty of the locale will give an impetus to the eco-tourism. Entry-exit inside the grove is not illegal but green felling of timber is strictly prohibited and punishable under rule framed by the village Dorbar.

8.3 Geography and Climate:

Topography of the grove is hilly in nature, with slop varying from 16° to 40°. It falls under Southern aspect, on the windward side of the Khasi Hills Plateau. The soil texture is Sandy-loamy with loose stone and slightly compact in consistency. The colour of the soil is black with shallow soil dept. As observed, soil erosion is moderate.

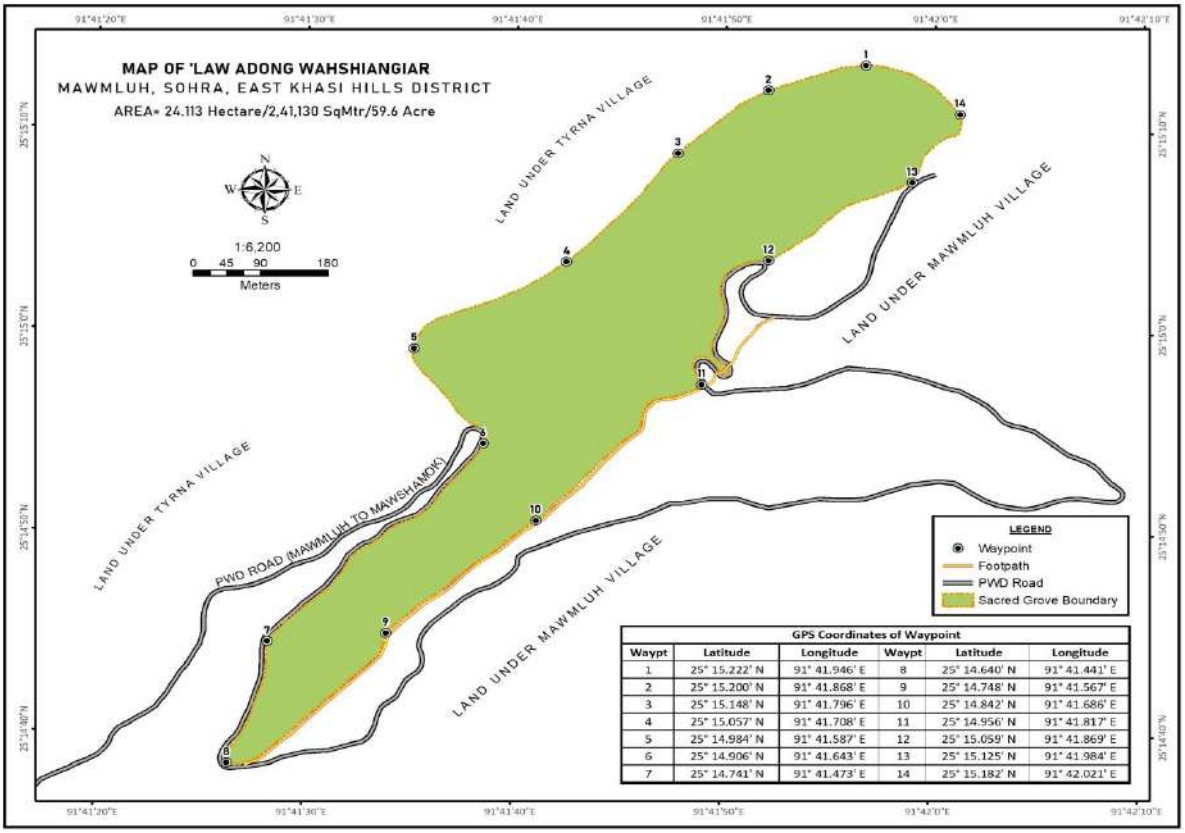
There are numerous seasonal streams which flow out from this forest. There is no perennial stream which flow within or flow out from this forest. All these seasonal streams flow towards the south.





GPS Coordinates of Waypoint

Waypt	Latitude	Longitude	Waypt	Latitude	Longitude
1	25° 15.222' N	91° 41.946' E	8	25° 14.640' N	91° 41.441' E
2	25° 15.200' N	91° 41.868' E	9	25° 14.748' N	91° 41.567' E
3	25° 15.148' N	91° 41.796' E	10	25° 14.842' N	91° 41.686' E
4	25° 15.057' N	91° 41.708' E	11	25° 14.956' N	91° 41.817' E
5	25° 14.984' N	91° 41.587' E	12	25° 15.059' N	91° 41.869' E
6	25° 14.906' N	91° 41.643' E	13	25° 15.125' N	91° 41.984' E
7	25° 14.741' N	91° 41.473' E	14	25° 15.182' N	91° 42.021' E



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7	25° 14.741' N	91° 41.473' E	14	25° 15.182' N	91° 42.021' E

Mawmluh is situated in the same area which has the higher recorded rainfall and received both south-west and north-east monsoonal winds in the monsoon season. The Rainfall varies from heavy to medium to light. The monsoon season starts from March and ends in October, the month of June to October received the maximum rainfall. The winter season starts from November to February, this season the driest season. The minimum temperature is 11.5 C in the month of January and the maximum temperature is 20 C in the month of August.

Encroachment, Wild fire, hunting & poaching, grazing and illegal felling of trees are prohibited.

8.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove is ***sub-type 11B/C1a lauraceous Forest.***

8.5 Flora and Fauna:

The floristics is characterized by (vegetation type) is of mixed *species* consisting mainly of *Elaeocarpus robusta species* and *Albizia lucidior* as dominant species. The origin of the forest is of natural in nature and its physiognomy is characterized by two storeyed layers. The wildlife found within the grove are jungle fowls, etc and some vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

i. High level endemic plants and animal species which is significant from biodiversity forest of view.

ii. Existence of many rare and endangered plants species.

iii. Restrictions-"do's and don'ts;" help the sacred grove in conservation of Flora and fauna and maintaining of rich natural resources.

8.6 Flora species:

List of treesspecies found in Law Adong WahShyngiar, East Khasi Hills

TREES

Sl.No.	Botanical Name	Local Name	Family
1	*Albizialucidior*	Diengri	*Fabaceae*
2	*Alstoniascholaris*	Diengjyrtieng	*Apocynaceae*
3	*Aralia armata*	Dienglatymphu	*Araliaceae*
4	*Betulaalnoides*	Dienglieng	*Betulaceae*
5	*Cameliacaduca*	Diengtyrnem	*Fagaceae*
6	*Carpinusviminea*	Diengsohpaitrisang	*Belutaceae*
7	*Caryotaurens*	Diengtlai	*Arecaceae*
8	*Castanopsisarmata*	Diengsning	*Fagaceae*
9	*Castanopsishystrix*	Diengsohotpatuia	*Fagaceae*
10	*Castanopsislystrix*	Diengstap	*Fagaceae*
11	*Ceseariavarieca*	Dieng rang	*Flacourtiaceae*
12	*Cinnamomumpauciflorum*	Diengtorthia	*Lauraceae*
13	*Cinnamomumtamala*	Dienglatyrpad	*Lauraceae*
14	*Cinnamomumvegolghota*	Diengtyrdop	*Lauraceae*
15	*Cioxlacryma-jabi*	Diengsohriew	Poaceae
16	*Duabangasonneratioides*	Diengbai	*Lythraceae*
17	*Elaeocarpuslanceaefolios*	Diengsohkhyllam	*Elaeocarpaceae*
18	*Elaeocarpusrobusta*	Dienglasaw	*Elaeocarpaceae*
19	*Engelhardiaspicata*	Dienglymba	*Juglandaceae*
20	*Eugenia aquea*	Diengsohliwa	*Myrtaceae*
21	*Eugenia jambolana*	Diengsohum	*Myrtaceae*
22	*Euryaacuminata*	Diengpyrsit	*Theaceae*
23	*Exbucklandiapopulnea*	Diengdoh	*Hamamelidaceae*
24	*Ficushispida*	Dienglajri	*Moraceae*
25	*Ficusnerifolia*	Diengsohmehblang	*Moraceae*
26	*Garciniaspp*	Diengsohkwang	*Guttiferae*
27	*Glochidionsphaerogynum*	Diengsohumriphin	Euphorbiaceae
28	*Ilex graffithii*	Diengjakrai/sohkhawkrai	*Aquifoliaceae*
29	*Ilex spp*	Diengsohlarmaw	*Aquifoliaceae*
30	*Ilex venulosa*	Diengsohshyieng	*Aquifoliaceae*
31	*Inualacappa*	Dienglalieh-ktieh	*Asteraceae*
32	*Iteachinensis*	Diengsohsyrtet	*Iteaceae*
33	*Ligustrumlucidium*	Diengsohpaiat	*Oleaceae*
34	*Lithocurpusferestrata*	Diengjing	*Fagaceae*
35	*Litsaeameissneri*	Diengsohrang	*Anacardiaceae*
36	*Macaranga denticulate*	Dienglakhar	*Euphoribiaceae*
37	*Meliosmapinnata*	DiengKrot	*Sabiaceae*
38	*Micheliaoblonga*	Diengsohniar	*Magnoliaceae*
39	*Micheliachampaca*	Diengrai	*Magnoliaceae*
40	*Morindaaugustifolia*	Diengshynrai/stem/synrai	Rubiaceae
41	*Myricaindica*	Diengsohphie	*Myricaceae*
42	*Myricanagi*	Diengsohliya	*Myricaceae*

43	*Pandanusamerican*	Diengshlan	*Pandanaceae*
44	*Pasaniadealbata*	Diengsai	*Fagaceae*
45	*Premnabengalensis*	Dienglalieh	*Asteraceae*
46	*Raindiaspinosa*	Diengsohmon	Rubiaceae
47	*Rhododendron arborium*	Diengtiewsaw	*Ericaceae*
48	*Saurauiapunduana*	Diengjalngap	*Actinidiaceae*
49	*Schimawallichii*	Diengngan	*Theaceae*
50	*Sterculiavillosa*	Diengtluh	*Sterculiaceae*
51	*Sterculiavillosa*	Diengrmiew/rmai	*Sterculiaceae*
52	*Symplocostheoefolia*	Diengpei	*Symplocaceae*
53	*Vacciniumserretum*	Diengshira	Ericaceae
54	*Vernuniavalkameriafolia*	Dieng duma	Asteraceae
55	*Viburnum carilifolium*	Diengsohlangksew	*Adoxaceae*
56	*Viburnum foeticlum*	DiengSohlangeitksew	*Viburnaceae*
57	*Walsurarobusta*	Diengsohphlang	*Meliaceae*
58	*Wendlandiatinctoria*	Diengshadmoit	*Rubiaceae*

List of Shrubs, herbs, climbers & bamboo found in Law Adong Wah Shyngiar, East Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng jamynrei	*Maesa indica*	Myrsinaceae
2.	Dieng duma	*Vernunia valkameriafolia*	Pharvanaceae
3.	Synsar	*Thysaemolia myscina*	
4.		*Rynchotachum tinctoria*	Gesneraceae
5.	Jalynden	*Polyganum spp*	Polygonaceae
6.	Dieng pyrshit	*Eurya accuminata*	
7.	Dieng shynrai blei	*Hedichium spp*	Gingiberaceae
8.	Dieng japung dieng		Varbanaceae
9.	Dieng tyrnem	*Eurya japonica*	Theaceae
10.		*Ardesia solanum*	Myrsinaceae
11.	Dieng sohum shynrang	*Goniathalamus sesquipedales*	Annonaceae
12.		*Clerodendrom spp*	Verbaneceae
13.	Dieng shadmuit	*Wendlndia waliichi*	Rubeceae
14.	Dieng jakhi	*Plogacanthus thyrsifolia*	Acantheceae
15.		*Myceromilum spp*	Meliaceae
16.	Dieng soh matan	*Raindia griffithii*	
17.		*Eurya javanicum*	
18.	Dieng soh kristmas		
19.	Dieng shylla		
20.	Dieng sohlaper		
21.	Dieng latyngkong		
22.	Dieng sohlarmaw		

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Jajew khlaw	*Begonia spp*	
2.	Sohbyrthit		Astereceae
3.	Sla lamet	*Phrynum spp*	
4.	Shynrai khlaw	*Alpinea alogus*	Gingiberaceae
5.		*Selaginela*	Selaginelaceae
6.		*Comelina forestii*	Comelinaceae
7.		*Desporum spp*	
8.	Sla waitlam	*Asplinium ridus*	Aspliniaceae
9.	Jajew lieh	*Begonia spp*	*Begoniaceae*
10.	Tynriew		

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Sohmrit khlaw	*Wild pepper*	Piperraceae
2.		*Hedyotes scandium*	Rubaceae
3.	Dieng shiah krot	*Smilex spp*	Lilyceae
4.	Sohshiah	*Rbus eliptica*	Rosaceae
5.	Jyrmi	*Vits spp*	Viticeae
6.		*Pothos kauzii*	Aralaceae
7.		*Rhaphidophora angustifolia*	Aralaceae
8.	Tymmi saw	*Vitis pentaphylla*	Viticeae
9.	Jajew (jyrmi)		
10.	Thri (cane)		

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Syntiew dieng	*Pholidata embricata*	Orchideceae
2.		*Aschinanthus spp*	Orchideceae
3.	Tiew dieng	*Pholidta articulata*	Orchideceae
4.	Tiew dieng	*Oberonia*	Orchideceae
5.		*Liley spp*	

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Shken	*Bambusa Pallida*	Bambooceae
2.	Sylli	*Melocanna baeifera*	Bambooceae

GRASS

Sl No.	Local Name	Botanical Name	Family
1.		*Cyperus spp*	Poaceae

FERN

Sl No.	Local Name	Botanical Name	Family
1.	Tyrkhang	*Polypodyal vulgaris*	Polypodalio
2.		*Asplinia midus*	Ptireophytes

8.7 Growing Stock:

As per the methodology described in Chapter-II, 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 a GBH (girth at breast) 30 cm or more is enumerated by measuring the top height (in meters) and the girth (in centimetres) at breast height. The sample plot size is 0.2 ha.

All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 5205 trees consisting of 588 *Elaeocarpus robusta* (1st dominant), 410 *Albizia lucidior* (2nd dominant), 379 *Schima wallichi* (3rd dominant), 3828 *Rest of 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 result for Law Adong Wah Shyngiar are given in table 8.1 & 8.2 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 28496.99 cubic metres.

Table-8.1

Girth class wise & Species wise volume in sample area (24 Plots- area 24.113 ha)

(volume in cu.m)

Girth Class Vise	1st Dominant Elaeocarpus robusta	2nd Dominant Albizia lucidior	3rd Dominant Schima wallichi	Rest of the species	Total
30-40	126.647	63.426	3.601	291.633	**485.307**
41-50	152.397	56.054	8.539	324.14	**541.130**
51-60	85.847	40.356	15.998	269.444	**411.645**
61-70	75.568	25.534	23.703	167.622	**292.427**
71-80	43.477	19	17.558	116.851	**196.814**
81-90	38.60	5.55	17.063	72.656	**133.871**
91-100	15.177	0	14.902	93.866	**123.945**
101-110	14.892	0	14.324	61.183	**90.399**
111-120	9.508	1.468	7.474	23.057	**41.507**
121-130	1.659	0	10.213	74.697	**86.569**
131-140	1.809	0	14.742	22.873	**39.424**
141-150	3.837	0	9.91	17.403	**31.150**
151 & above	0	0	16.339	86.054	**102.393**
Total	**569.42**	**211.316**	**174.366**	**1621.479**	**2576.581**

Girth class wise with respect to total area

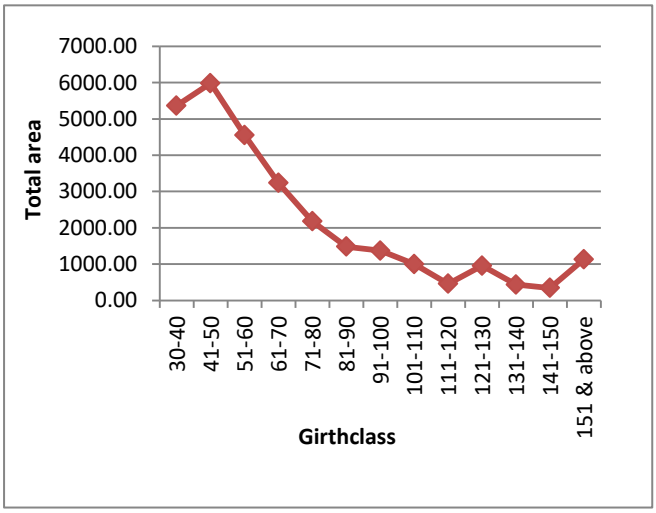


Table-8.2

Girth class wise & Species wise volume in the entire grove (area 24.113 ha)

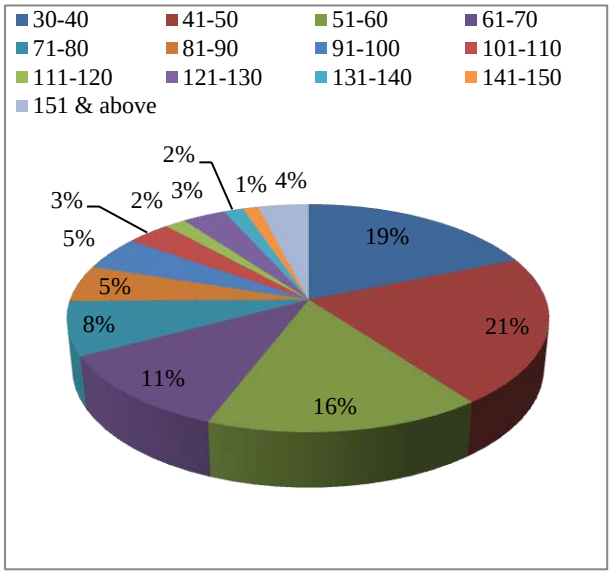
(volume in cu.m)

Girth Class Vise	1st Dominant Elaeocarpus robusta	2nd Dominant Albizia lucidior	3rd Dominant Schima wallichi	Rest of the species	Total	%wrt total volume
30-40	1400.72	701.49	39.83	3225.46	5367.50	18.84
41-50	1685.51	619.96	94.44	3584.99	5984.90	21.01
51-60	949.47	446.34	176.94	2980.05	4552.79	15.98
61-70	835.78	282.41	262.16	1853.90	3234.24	11.35
71-80	480.86	209.34	194.19	1292.37	2176.76	7.64
81-90	426.94	61.38	188.72	803.58	1480.61	5.20
91-100	167.86	0.00	164.82	1038.16	1370.83	4.81
101-110	164.71	0.00	158.42	676.68	999.81	3.51
111-120	105.16	16.24	82.66	255.01	459.07	1.61
121-130	18.35	0.00	112.96	826.15	957.45	3.36
131-140	20.01	0.00	163.05	252.98	436.03	1.53
141-150	42.44	0.00	109.60	192.48	344.52	1.21
151 & above	0.00	0.00	180.71	951.76	1132.47	3.97
Total	6297.79	2337.15	1928.49	17933.56	28496.99	100.02
%wrt total volume	22.11	8.20	6.77	62.95	100.02	

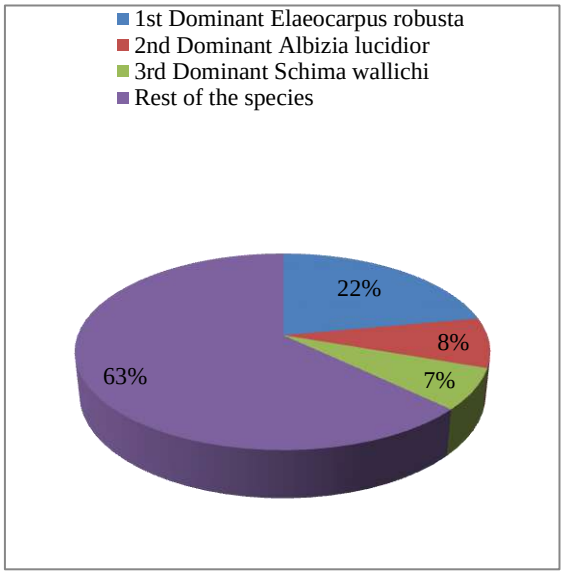
The table indicates that the volume contributed by the 1st dominant species (Elaeocarpus robusta*)* with respect to the total volume of the grove is 22.11%, the 2nd dominant species (Albizia lucidior) with respect to the total volume of the grove is 8.203%, 3rd dominant species *(*Schima wallichi*)* is 6.77 % while rest of the species is maximum i.e.62.95%. Total volume of the grove is 28496.99 cubic metres.

From the above 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.

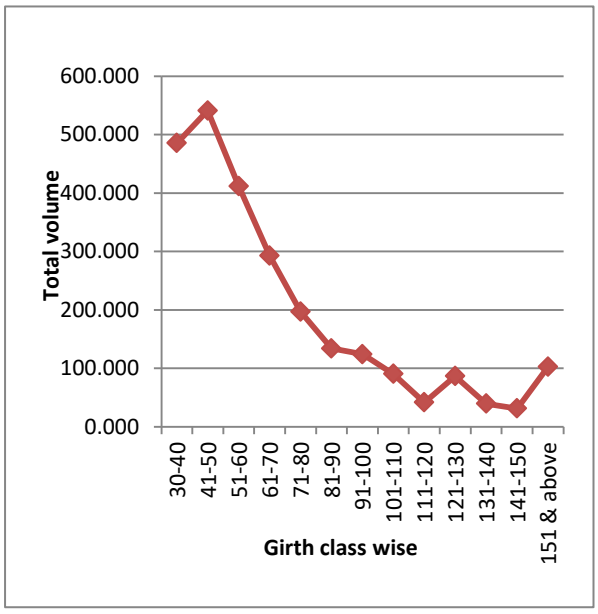
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view Law Adong Wah Shyngiar

8.8 Number of Stems:

Number of stems in each girth class and species wise are given in the table 8.3 & 8.4. The table shows that maximum numbers of stems are found in lower girth classes i.e. from 30-40 cm to 91-100 cm classes.

Table-8.3

Girth class wise & Species wise No. of stems in the sampled area (24 Plots- area 24.113 ha)

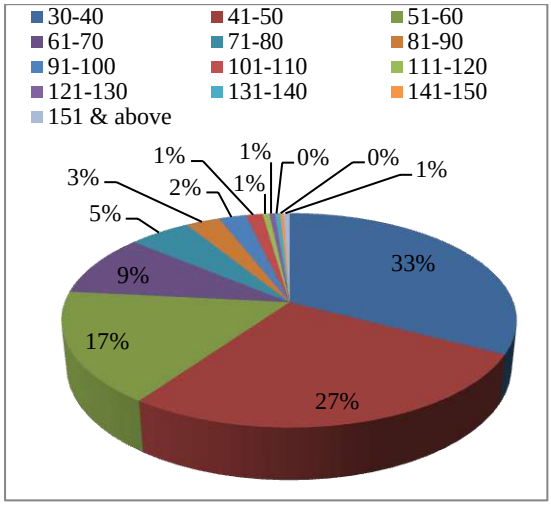
Girth Class Vise	1st Dominant Elaeocarpus robusta	2nd Dominant Albizia lucidor	3rd Dominant Schima wallichi	Rest of the species	Total
30-40	161	157	45	1337	**1700**
41-50	172	116	54	1070	**1412**
51-60	87	70	66	654	**877**
61-70	70	37	71	313	**491**
71-80	37	23	40	168	**268**
81-90	30	6	29	83	**148**
91-100	11	0	20	87	**118**
101-110	10	0	16	48	**74**
111-120	6	1	7	15	**29**
121-130	1	0	8	16	**25**
131-140	1	0	10	11	**22**
141-150	2	0	6	7	**15**
151 & above	0	0	7	19	**26**
Total =	**588**	**410**	**379**	**3828**	**5205**

Table-8.4

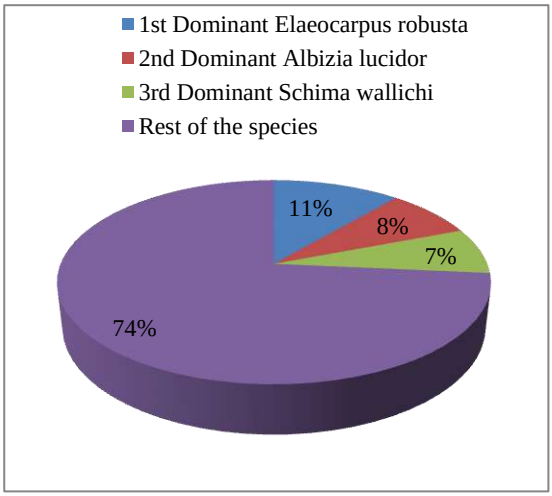
Girth class wise & Species wise No. of stems in the entire grove (area 24.113 ha)

Girth Class Vise	1st Dominant Elaeocarpus robusta	2nd Dominant Albizia lucidor	3rd Dominant Schima wallichi	Rest of the species	Total
30-40	644	628	180	5348	6800
41-50	688	464	216	4280	5648
51-60	348	280	264	2616	3508
61-70	280	148	284	1252	1964
71-80	148	92	160	672	1072
81-90	120	24	116	332	592
91-100	44	0	80	348	472
101-110	40	0	64	192	296
111-120	24	4	28	60	116
121-130	4	0	32	64	100
131-140	4	0	40	44	88
141-150	8	0	24	28	60
151 & above	0	0	28	76	104
Total =	2352	1640	1516	15312	20820

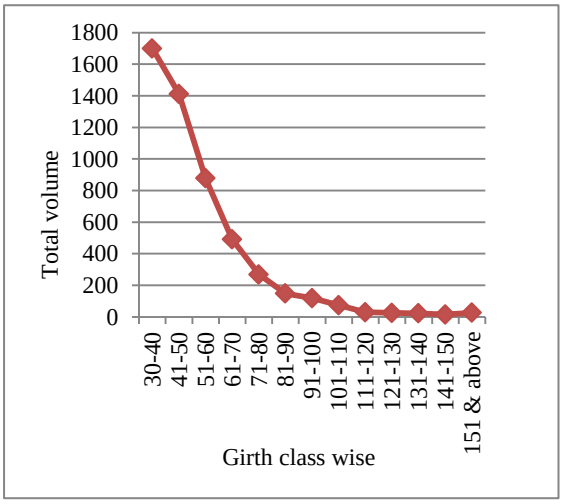
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Field exercise graph at Law Adong Wah Shyngiar



Inside view of Law Adong Wah Shyngiar

8.9 Brief note on Management of Law Adong Wah Shyngiar, Mawmluh.

(i) Protection from Biotic Interfernece:-

There is no restriction for entry or exit in this grove for both human and livestocks. However the village dorbar of Mawmluh strictily prohibits cutting or felling of tree without the permission from the Dorbar. Permission for felling or extraction of trees is only accorded at times of emergency. Although there is no report of illegal felling of timber and poaching but as the forest is left open, there are chance of such illicit activities in the near future. If declared as a community Reserve, this beautiful and biologically rich forest can be protected from biotic interference and it will be paramount for perservation of its rich biological diversity.

(ii) Fire Control:-

Though reports, there are occurance of forest fire, perhaps mitigation measure such as creation of fire line within and on its boundary respectively are needed. This will help to presrve the rich natural resources of the grove.

(iii) Water Stream:-

There are numerous season streams, so check dams and waterholds can be constructed as to improved the water supply for the wild life as well as to augmenmt the soil moisture content of the soil, to prevent erosion and spread of fire incidences.

(iv) Eco-tourism:-

This forest forms a habitat for numerous species of butterflies, amphibian, reptiles bird and mammals. In this context butterfly and bird watching can be promoted as an eco-tourism activity. Since this patch of forest is in the vicinity of Law Adong Mawkulai, and Law Adong Mawsawa, therefore, eco-tourism development activities can club together.

(v) Awareness Campaign:-

The innate civic scene that leads to the conservation efforts of the villagers can be add impetus by the grass root level training/seminar on the modern technique of forest, natural resources management and eco-tourism management. Poster campaigns can be taken up as to educate/ inculcate/ motivate the tourists as to imbibe the same civic scene as the locals do.

9 - Law Adong Mawkulai at Mawmluh.

9.1 Location:

Law Adong Mawkulai is situated in East Khasi Hills District of Meghalaya at Mawmluh village under the Mawmluh Sirdarship. It covers an area of 38.51 ha. It lies between 25° 13′ 47" to 25° 14′ 28″ N latitude and 91° 42′ 25″ to 91° 42′ 49″ E Longitude with an altitude of 1149 m above mean sea level. It is bounded in the North by Wah Utim, phud Mawtyrngah stream and Wah Sylli steam, in the East by Mawmluh area, in the South by footpath (from Umwai to Wah Utim) and in the West by Umwai area. The forest is accessible by road from Shillong to Mawmluh which is about 58 km and from Mawmluh to the forest by trail which about 3.5 km.

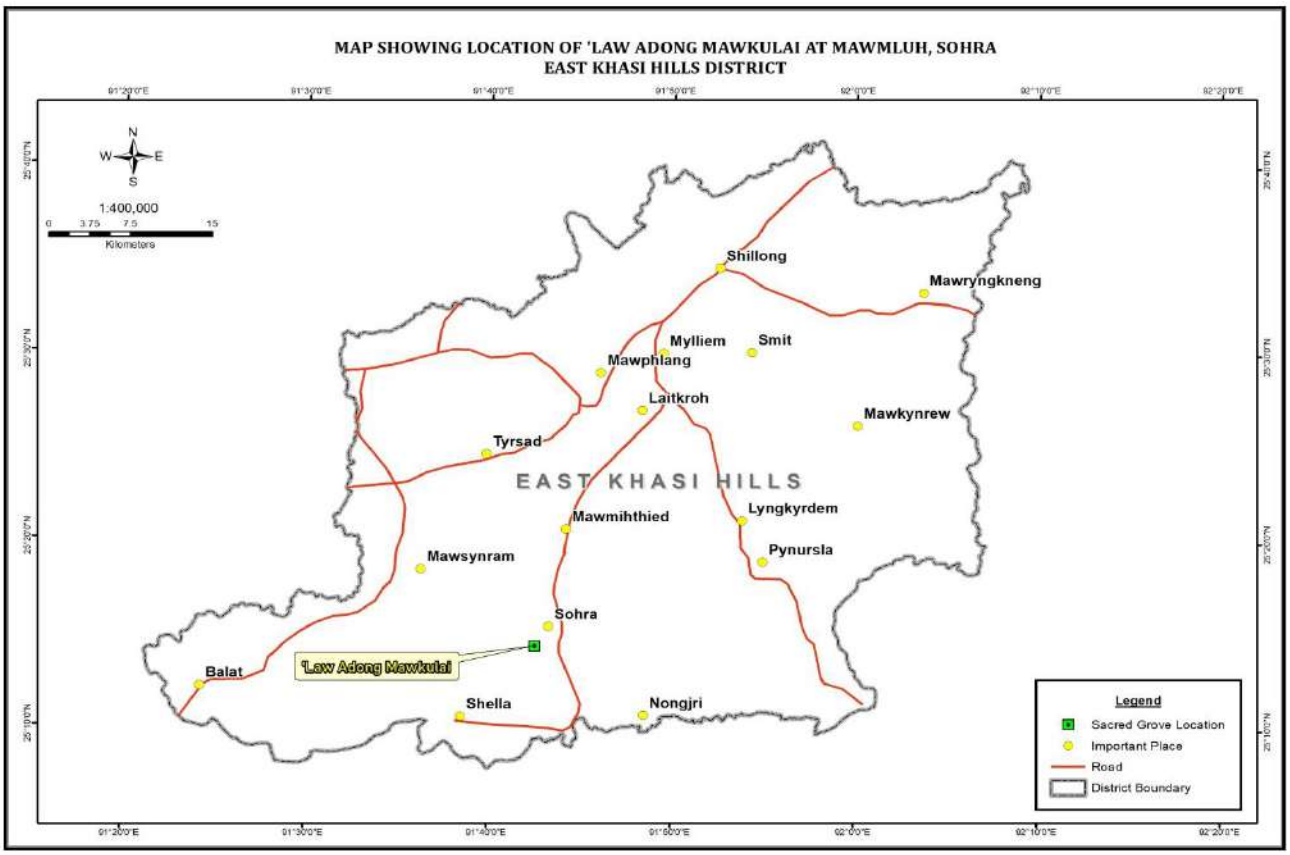
9.2 Brief History:

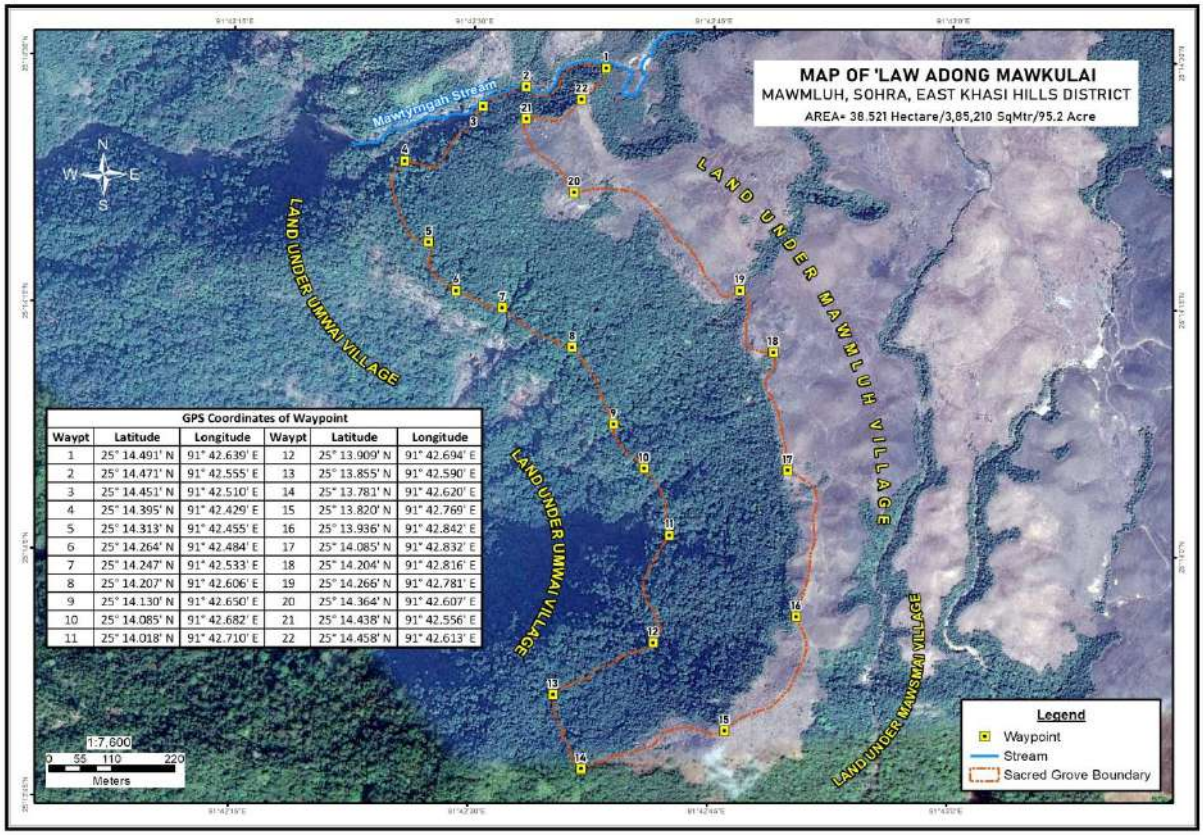
The forest has been originated since decades. There is no religious significance of the forest. The forest is owned by the village community under the lookout and control by the Headman (elected by the villagers). The ecological significance of the sacred grove is still up hold by the village, therefore till today the conservation and preservation of the groves is still part and parcel of the Village's Administration and Management. The scenic beauty of the locale provides a fillip to the ecological richness of the forest. Therefore, the combination of Law Adong Mawkulai protected forest's rich biological diversity and the beauty of the locale will give an impetus to the eco-tourism. Entry-exit inside the grove is not illegal but green felling of timber is strictly prohibited and punishable under rule framed by the village Dorbar.

9.3 Geography and Climate:

Topography of the grove is hilly in nature, with slop varying from 16° to 40°. It falls under Southern aspect, on the windward side of the Khasi Hills Plateau. The soil texture is Sandy-loamy with boulder and gravel fragments and slightly compact in consistency. The colour of the soil is brown with 15-30 cm soil dept.

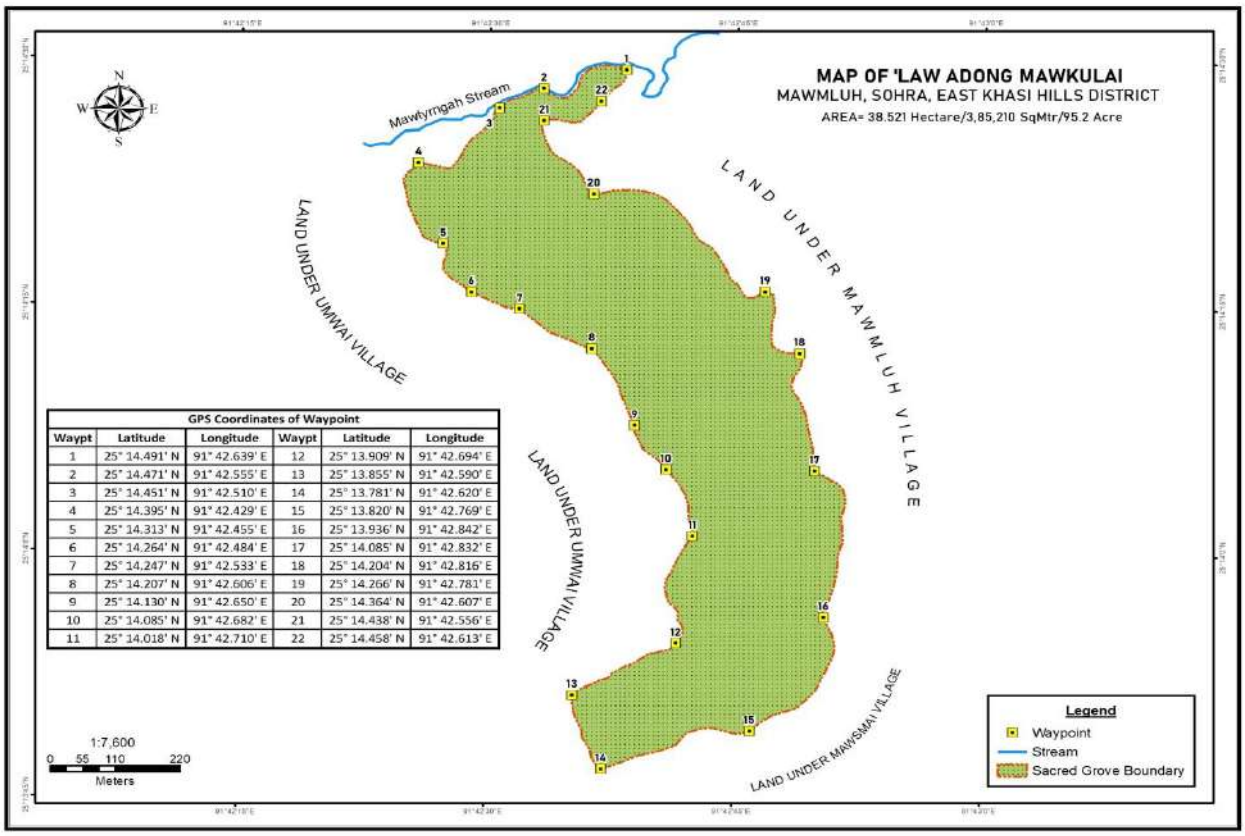
There are numerous seasonal streams which flow out from this forest. The perennial streams which form the boundary of this forest are Wah Sylli and Wah (Phud) Mawtyrngah. All these seasonal and perennial streams flow towards the south.





GPS Coordinates of Waypoint

Waypt	Latitude	Longitude	Waypt	Latitude	Longitude
1	25° 14.491' N	91° 42.639' E	12	25° 13.909' N	91° 42.694' E
2	25° 14.471' N	91° 42.555' E	13	25° 13.855' N	91° 42.590' E
3	25° 14.451' N	91° 42.510' E	14	25° 13.781' N	91° 42.620' E
4	25° 14.395' N	91° 42.429' E	15	25° 13.820' N	91° 42.769' E
5	25° 14.313' N	91° 42.455' E	16	25° 13.936' N	91° 42.842' E
6	25° 14.264' N	91° 42.484' E	17	25° 14.085' N	91° 42.832' E
7	25° 14.247' N	91° 42.533' E	18	25° 14.204' N	91° 42.816' E
8	25° 14.207' N	91° 42.606' E	19	25° 14.266' N	91° 42.781' E
9	25° 14.130' N	91° 42.650' E	20	25° 14.364' N	91° 42.607' E
10	25° 14.085' N	91° 42.682' E	21	25° 14.438' N	91° 42.556' E
11	25° 14.018' N	91° 42.710' E	22	25° 14.458' N	91° 42.613' E



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11	25° 14.018' N	91° 42.710' E	22	25° 14.458' N	91° 42.613' E

Mawmluh is situated in the same area which has the higher recorded rainfall and received both south-west and north-east monsoonal winds in the monsoon season. The Rainfall varies from heavy to medium to light. The monsoon season is from March to October, the month of June to October received the maximum rainfall. The winter season starts from November to February, this season is the rainfall during this also the driest seasoned. The minimum temperature is 11.5 C in the month of January and the maximum temperature is 20 C in the month of August.

Encroachment, Wild fire, hunting & poaching, grazing and illegal felling of trees are prohibited.

9.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove is ***Sub-type 11B/C1a Lauraceous Forest***.

9.5 Flora and Fauna:

The vegetation type is of mixed *species* consisting mainly of *Elaeocarpus robusta species* and *Eugenia Jambolana* as dominant species. The origin of the forest is of natural in nature and it is of two storeyed layers. The wildlife found within the grove are jungle fowls,

etc and some vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

i. High level endemic plants and animal species which is significant from biodiversity forest of view.
ii. Existence of many rare and endangered plants species.
iii. Restrictions-"do's and don'ts;" help the sacred grove in conservation of Flora and fauna and maintaining of rich natural resources.

9.6 Flora species:

List of trees Species found in Law Adong Mawkulai, East Khasi Hills

Sl.No.	Botanical Name	Local Name	Family
1	*Albizia lucidior*	Dieng ri	*Fabaceae*
2	*Albizzia procera*	Dieng sohriew	*Fabaceae*
3	*Alstonia scholaris*	Dieng jyrtieng	*Apocynaceae*
4	*Aralia armata*	Dieng latymphu	*Araliaceae*
5	*Beilschmiedia brandisii*	Dieng sohkhyllambam skei	*Lauraceae*
6	*Betula alnoides*	Dieng lieng	*Belutaceae*
7	*Camelia caduca*	Dieng tyrnem	*Fagaceae*
8	*Caryota urens*	Dieng tlai	*Arecaceae*
9	*Castanopsis armata*	Dieng sning	*Fagaceae*
10	*Castanopsis indica*	Dieng stap	*Fagaceae*
11	*Castanopsis spp*	Dieng patuia	*Fagaceae*
12	*Cerearia varica*	Dieng rang	*Flacourtiaceae*
13	*Cinnamomum pauciflorum*	Dieng torthia	*Lauraceae*
14	*Cinnamomum temala*	Dieng latyrpad	*Lauraceae*
15	*Cinnamomum vejolghota*	Dieng latyrdop	*Lauraceae*
16	*Cissus ripens*	Dieng jajew	*Vitaceae*
17	*Drimycarpus racemosus*	Dieng sohrang	*Anacardiaceae*
18	*Elaeocarpus lanceaefolios*	Dieng sohkhyllam	*Elaeocarpaceae*
19	*Elaeocarpus robusta*	Dieng lasaw	*Elaeocarpaceae*
20	*Eleocarpus prunifolius*	Dieng ruin	*Elaeocarpaceae*
21	*Engelhardia spicata*	Dieng lymba	*Juglandaceae*
22	*Eugenia aquea*	Dieng sohliwa	*Myrtaceae*
23	*Eugenia jambolana*	Dieng sohum	*Myrtaceae*
24	*Eurya accuminata*	Dieng shit	*Theaceae*
25	*Eurya japonica*	Dieng pyrsit	*Theaceae*
26	*Ficus spp*	Dieng jri	*Moraceae*
27	*Garcinia spp*	Dieng sohkwang	*Clusiaceae*
28	*Glochidion sphaerogynum*	Dieng sohum riphin	*Euphorbiaceae*
29	*Ilex graffithii*	Dieng jakrai/sohkhawkrai	*Aquifoliaceae*
30	*Ilex spp*	Dieng sohlarmaw	*Aquifoliaceae*
31	*Ilex venolosa*	Dieng sohshyieng	*Aquifoliaceae*
32	*Inula cappa*	Dieng lalieh	*Asteraceae*
33	*Itea chinensis*	Dieng sohsyrtet	*Iteaceae*
34	*Ligustrum lucidium*	Dieng lapohiat	*Oleaceae*
35	*Ligustrum ucidum*	Dieng sohphiat/ sohpa-iit	*Oleaceae*
36	*Macaranga denticulata*	Dieng lakhar	*Euphoribiaceae*
37	*Macaranga spp*	Dieng thyllapmasi	*Euphoribiaceae*
38	*Maesa indica*	Dieng jamynrei	*Primulaceae*
39	*Meliosma pinnata*	Dieng Krot	*Sabiaceae*

40	*Michelia oblonga*	Dieng laniar	*Magnoliaceae*
41	*Michelia punduana*	Dieng sohniar	*Magnoliaceae*
42	*Nephelium longana*	Dieng loba	*Sapindaceae*
43	*Polyalthia sineiarun*	Dieng larsei	*Annonaceae*
44	*Polygata arillata*	Dieng Jakba/lakba	*Polygalaceae*
45	*Rhus succedanea*	Dieng kain	*Anacardiaceae*
46	*Sauropus androgynus*	Dieng sapid	*Phyllanthaceae*
47	*Schima khasiana*	Dieng ngan	*Theaceae*
48	*Sterculia velosa*	Dieng rmiew/rmai	*Sterculiaceae*
49	*Symplocos theoefolia*	Dieng pei	*Symplocaceae*
50	*Vaccinium serretum*	Dieng shira	Ericaceae
51	*Vernonia valkameriafolia*	Dieng duma	*Asteraceae*
52	*Walsure rubusta*	Dieng sohphlang	*Meliaceae*
53	*Wendlandia tinctoria*	Dieng shadmoit	*Rubiaceae*
54	*Zanthoxylum ovalifolium*	Dieng shiah	*Rutaceae*

List of Shrubs, herbs, climbers & bamboo found in Law Adong Mawkulai, East Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng tyrnem	*Camelia caudula*	Theaceae
2.		*Goniothalanium sesquipedalis*	Annonaceae
3.	Shylla	*Caryota densifloram*	Arecaceae
4.		*Strobilin thous*	Rubeceae
5.		*Legerstroemia*	Lythreceae
6.	Dieng thri	*Areca wallichi*	Arecaceae
7.		*Araenia anguistifolia*	Lilieaceae
8.	Dieng shadmuit	*Wendlandia wallichi*	Rubaceae
9.	Dieng lasan	*IteA macrophylla*	Sexifragaceae
10.	Dieng jakhi	*Strobilanthus*	Acanthaceae
11.	Dieng tyrnem kynthei	*Legetromia spp*	Lythraceae
12.		*Clerodendrum indicum*	Barbebeceae
13.		*Lindera selicifolia*	Laureceae
14.		*Heptoflormirum macropanax*	Araleceae
15.		*Vitex regundo*	Verbenaceae
16.		*Osbekia repalensi*	Melostomaceae
17.		*Falcate*	Vaccinaceae
18.		*Vernonia volkamerifolia*	Astaraceae
19.	Dieng sohlang	*Viburnum foetidum*	Cripifoliaceae
20.	Dieng sohlar maw	*Epiphyite*	*Bromeliaceae*
21.	Dieng slashira	*Vaccinium serretum*	*Ericaceae*
22.	Dieng sohlaper		
23.	Synsar	*Thysaemolia myscina*	

24.	Dieng pyrshit	*Eurya accuminata*	*Pentaphylacaceae*
25.	Dieng shiah		

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Sying khlaw	*Hedychium spicata*	Gingerberaceae
2.	Sla nily		
3.		*Chlorophythum tuberosum*	Lilieaceae
4.		*Desporum spp*	Solanaceae
5.	Sla lamut	*Phrynium plecentrum*	Moranteceae
6.	Wang khlaw	*Colocasia spp*	Araceae
7.		*Hoya parasitica*	Orchideceae
8.		*Begonia hatacoa*	Begoniaceae
9.	Jalamut	*Dendrophtoe falcate*	Loranthaceae
10.		*Iphigenia pallida*	Commelinaceae
11.		*Hitchenia caudia*	Zingiberaceae
12.		*Cucurmia psudomonlania*	Zingiberaceae
13.		*Lostus speciosus*	Zingiberaceae
14.		*Euphorbia hirta*	Euphorbiaceae
15.		*Neurocanthus sphaerostachys*	Alanthaceae
16.	Jhur ktang duma		
17.	Lamet		

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.		*Smilex spp*	Lilieceae
2.		*Sabi lanceolata*	Sabiaceae
3.	Dieng sohreng blang	*Strophanthun wallichi*	
4.	Lapadong	*Rhaphidophora spp*	Araleceae
5.		*Pothos kurzii*	Araleceae
6.		*Pothos scandan*	Araleceae
7.	Tympew khlaw	*Pipper spp*	Peppereceae
8.		*Hedyotis scandan*	Rubeaceae
9.		*Emblia ribe*	Myrsinaceae
10.		*Passiflora spp*	

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng tiew dieng	*Ceologyme mitilda*	Orchideceae
2.	Dieng tiew dieng	*Phaies messimunsis*	Orchideceae
3.	Syntiew dieng	*Aredes odaratum*	Orchideceae
4.	Dieng tiew dieng	*Pholidata embricata*	Orchideceae
5.		*Balbophyllum*	Orchideceae
6.	Dieng tiew dieng	*Acanthoppianselotensis*	Orchideceae
7.	Dieng tiew dieng	*Eria spp*	Orchideceae
8.	Dieng tiew dieng	*Epiginium emplum*	Orchideceae
9.	Dieng tiew dieng	*Pholidata bulgares*	Orchideceae
10.		*Calenthe spp*	Orchideceae
11.	Tmain khla	*Hopperzia squarosum (epiphyte)*	Orchideceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Siej namlang	*Drepanostachyum khasianum*	Bambooceae
2.	Spit	*Chimonobambusa callosa*	Bambooceae
3.	Sylli	*Melocama baicifera*	Bambooceae

GRASS

Sl No.	Local Name	Botanical Name	Family
1.		*Cyperus spp*	Poaceae

FERN

Sl No.	Local Name	Botanical Name	Family
1.		*Fern spp*	

9.7 Growing Stock:

As per the methodology described in Chapter-II, 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 30 cm is enumerated by measuring the top height (in meters) and the girth (in centimetres) at breast height. The sample plot size is 0.2 ha. All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 5102 trees consisting of 618 *Elaeocarpus robusta* (1st dominant), 400 *Eugenia Jambolana* (2nd dominant), 394 *Cinnamomum vegolghota* (3rd

dominant), 3690 *Rest of 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 result for Law Adong Mawkulai are given in table 9.1 & 9.2 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 29136.80 cubic metres.

Table-9.1

Girth class wise & Specieswise volume in sampled area (38 Plots- area 38.51 ha)

(volume in cu.m)

Girth class wise	1st dominant Elaeocarpus robusta	2nd dominant Eugenia Jambolana	3rd dominant Cinnamomum vegolghota	Rest of the species	Total
30-40	6.82	10.16	5.62	68.46	91.06
41-50	14.63	11.56	15.20	119.56	160.95
51-60	23.65	11.37	19.93	130.85	185.79
61-70	34.81	15.15	16.49	167.90	234.36
71-80	31.10	6.32	24.40	102.81	164.62
81-90	38.27	3.43	7.80	95.97	145.46
91-100	35.18	6.28	4.82	96.01	142.29
101-110	22.06	1.23	1.23	73.84	98.36
111-120	21.30	4.03	0.00	26.77	52.09
121-130	11.29	0.00	0.00	21.13	32.42
131-140	7.62	0.00	0.00	20.44	28.06
141-150	9.25	0.00	0.00	15.63	24.88
151 & above	72.23	0.00	0.00	80.26	152.48
Total =	**328.18**	**69.54**	**95.48**	**1019.62**	**1512.81**

Girth class wise with respect to total area

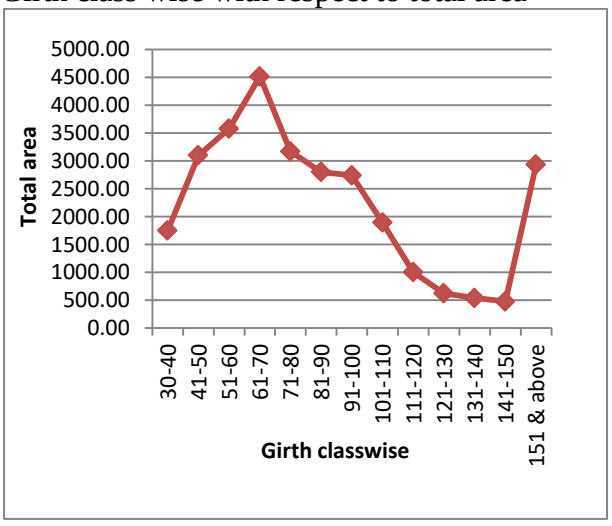


Table-9.2

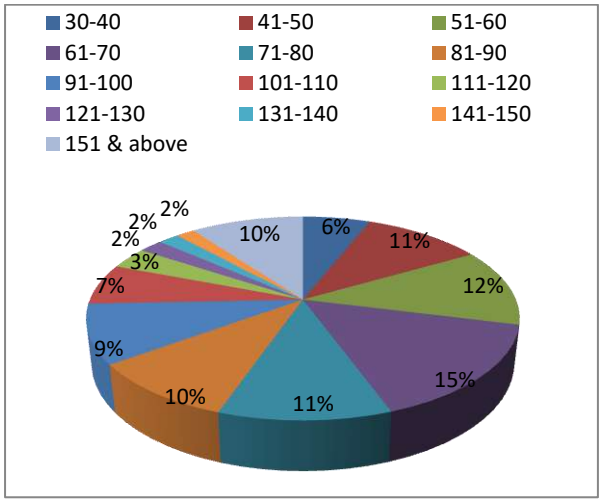
Girth class wise & Specieswise volume in the entire grove (area 38.51 ha)

Girth class wise	1st dominant Elaeocarpus robusta	2nd dominant Eugenia Jambolana	3rd dominant Cinnamomum vegolghota	Rest of the species	Total	%wrt total volume
30-40	131.30	195.70	108.18	1318.62	1753.80	6.02
41-50	281.77	222.68	292.67	2302.69	3099.82	10.64
51-60	455.40	219.04	383.81	2520.11	3578.37	12.28
61-70	670.52	291.85	317.67	3233.66	4513.70	15.50
71-80	598.99	121.67	469.85	1980.10	3170.60	10.88
81-90	737.04	66.02	150.19	1848.32	2801.58	9.62
91-100	677.47	121.03	92.83	1849.23	2740.56	9.41
101-110	424.91	23.63	23.63	1422.18	1894.36	6.50
111-120	410.14	77.62	0.00	515.51	1003.27	3.44
121-130	217.41	0.00	0.00	406.94	624.35	2.14
131-140	146.66	0.00	0.00	393.75	540.42	1.86
141-150	178.06	0.00	0.00	301.09	479.15	1.64
151 & above	1391.11	0.00	0.00	1545.71	2936.82	10.08
Total=	6320.79	1339.24	1838.85	19637.92	29136.80	100.03
%wrt total volume	21.70	4.60	6.31	67.42	100.03	

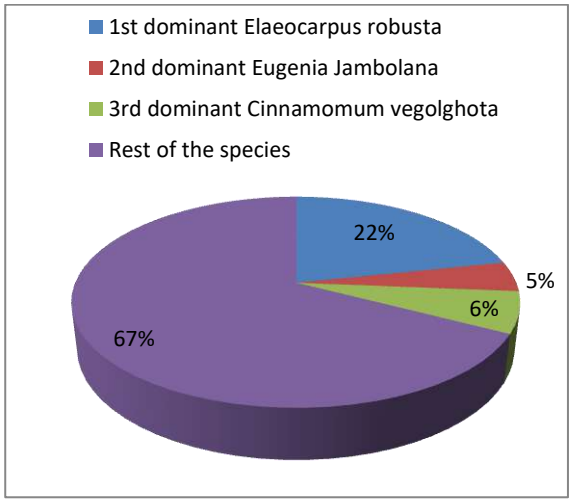
The table indicates that the volume contributed by the 1st dominant species (Elaeocarpus robusta*)* with respect to the total volume of the grove is 21.70%, the 2nd dominant species (Eugenia Jambolana) with respect to the total volume of the grove is 4.60%, 3rd dominant species *(*Cinnamomum vegolghota*)* is 6.31 % while rest of the species is maximum i.e.67.42 %. Total volume of the grove is 29136.80 cubic metres.

From the above 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.

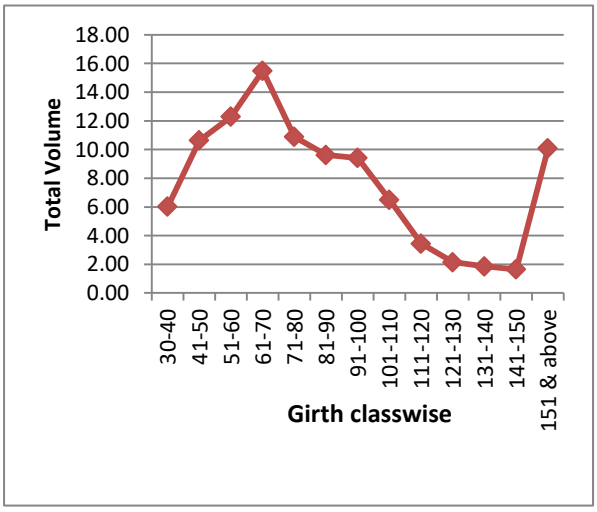
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view Law Adong Mawkulai

9.8 Number of Stems:

Number of stems in each girth class and species wise are given in the table 9.3 & 9.4. The table shows that maximum numbers of stems are found in lower girth classes i.e. from 30-40 cm to 91-100 cm classes.

Table-9.3

Girth class wise & Species wise No. of stems in the sampled area (38 Plots -Area 38.51 ha)

Girth class wise	1st dominant Elaeocarpus robusta	2nd dominant Eugenia Jambolana	3rd dominant Cinnamomum vegolghota	Rest of the species	Total Stems
30-40	**119**	207	96	1300	**1722**
41-50	**101**	83	108	853	**1145**
51-60	**92**	44	80	518	**734**
61-70	**92**	40	45	450	**627**
71-80	**60**	12	48	197	**317**
81-90	**53**	5	11	134	**203**
91-100	**39**	7	5	107	**158**
101-110	**19**	1	1	64	**85**
111-120	**15**	1	0	19	**35**
121-130	**7**	0	0	13	**20**
131-140	**4**	0	0	11	**15**
141-150	**4**	0	0	7	**11**
151 & above	**13**	0	0	17	**30**
Total =	**618**	**400**	**394**	**3690**	**5102**

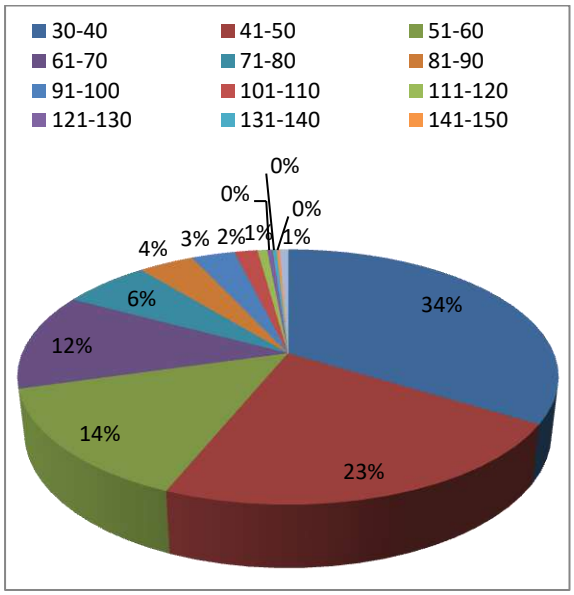
Table-9.4

Girth class wise & Species wise No. of stems in the entire grove (Area 38.51 ha)

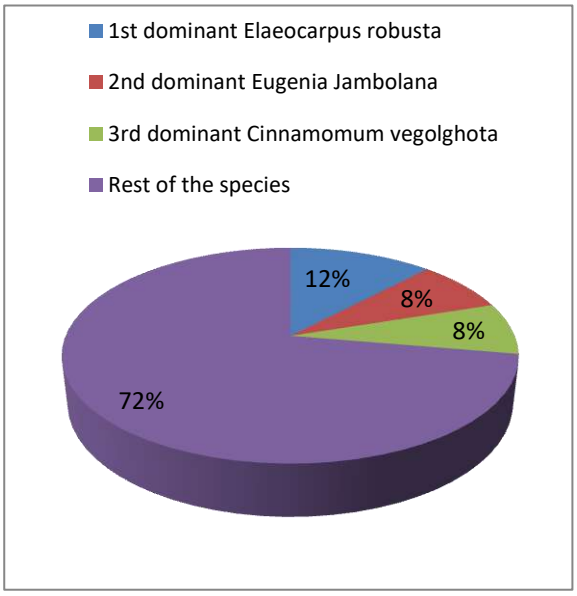
Girth class wise	1st dominant Elaeocarpus robusta	2nd dominant Eugenia Jambolana	3rd dominant Cinnamomum vegolghota	Rest of the species	Total
30-40	952	1656	768	10400	13776
41-50	808	664	864	6824	9160
51-60	736	352	640	4144	5872
61-70	736	320	360	3600	5016
71-80	480	96	384	1576	2536
81-90	424	40	88	1072	1624

91-100	312	56	40	856	1264
101-110	152	8	8	512	680
111-120	120	8	0	152	280
121-130	56	0	0	104	160
131-140	32	0	0	88	120
141-150	32	0	0	56	88
151 & above	104	0	0	136	240
Total	4944	3200	3152	29520	40816

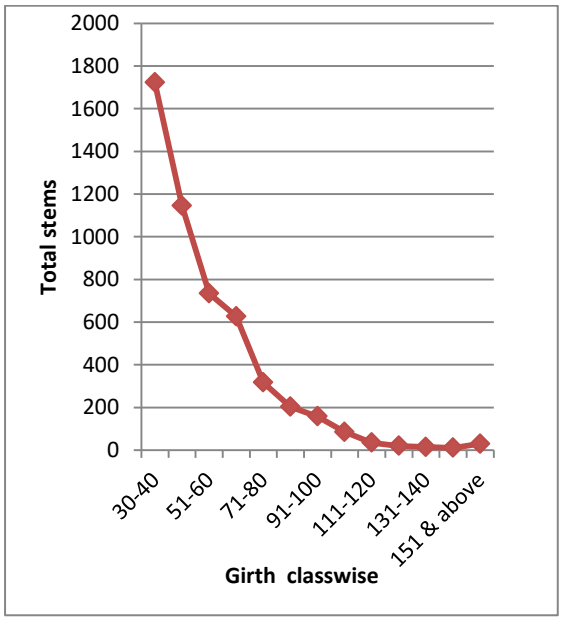
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Field exercise graph at Law Adong Mawkulai



Inside view of Law Adong Mawkulai

9.9 Brief note on Management of Law Adong Mawkulai, Mawmluh.

(i) Protection from Biotic Interfernece:-

There is no restriction for entry or exit in this grove for both human and livestocks. However the village dorbar of Mawmluh strictily prohibits cutting or felling of tree without the permission from the Dorbar. Permission for felling or extraction of trees is only accorded at times of emergency. Although there is no report of illegal felling of timber, poaching but as thre forest is left open, there are chance of such illegal activities in the near future. If declared as a community Reserve, this beautiful forest can be protected from biotic interferances and perservation of its rich biological diversity.

(ii) Fire Control:-

Though there are reports of occassional, intentional or unintentiona, fire in this forest, it will be more logical to take preventive step, in the near future. External and internal fire line can be created all along the boundary and within of the grove. This will help to presrve the rich natural resources of the grove.

(iii) Water Stream:-

There are numerous season streams and two perennial straem i.e Wah sylli and Wah[Phud] Mawtyrngah so construction of check dams to improved water supply of wild life as well as improved soil moisture content of the soil is recommended to prevent erosion and spread of fire incidences.

(iv) Eco-tourism:-

This area is bless with a scenic beauty, awesome climate, rich biological diversity and abode of numerous caves, so construction of infrastructures like viewpoints, trekking/cycling trails, canopy walk, promenades can be taken up to augment the eco-tourism potential of the place.

(v) Awareness Campaign:-

The innate civic scene that leads to the conservation efforts of the villagers can be add impetus by the grass root level training/seminar on the modern technique of forest, natural resources management and eco-tourism management. Poster campaigns can be taken up as to educate/ inculcate/ motivate the tourists as to imbibe the same civic scene as the locals do.

10 - Law Adong Mawsawa, Mawmluh, East Khasi Hills District

10.1 Location:

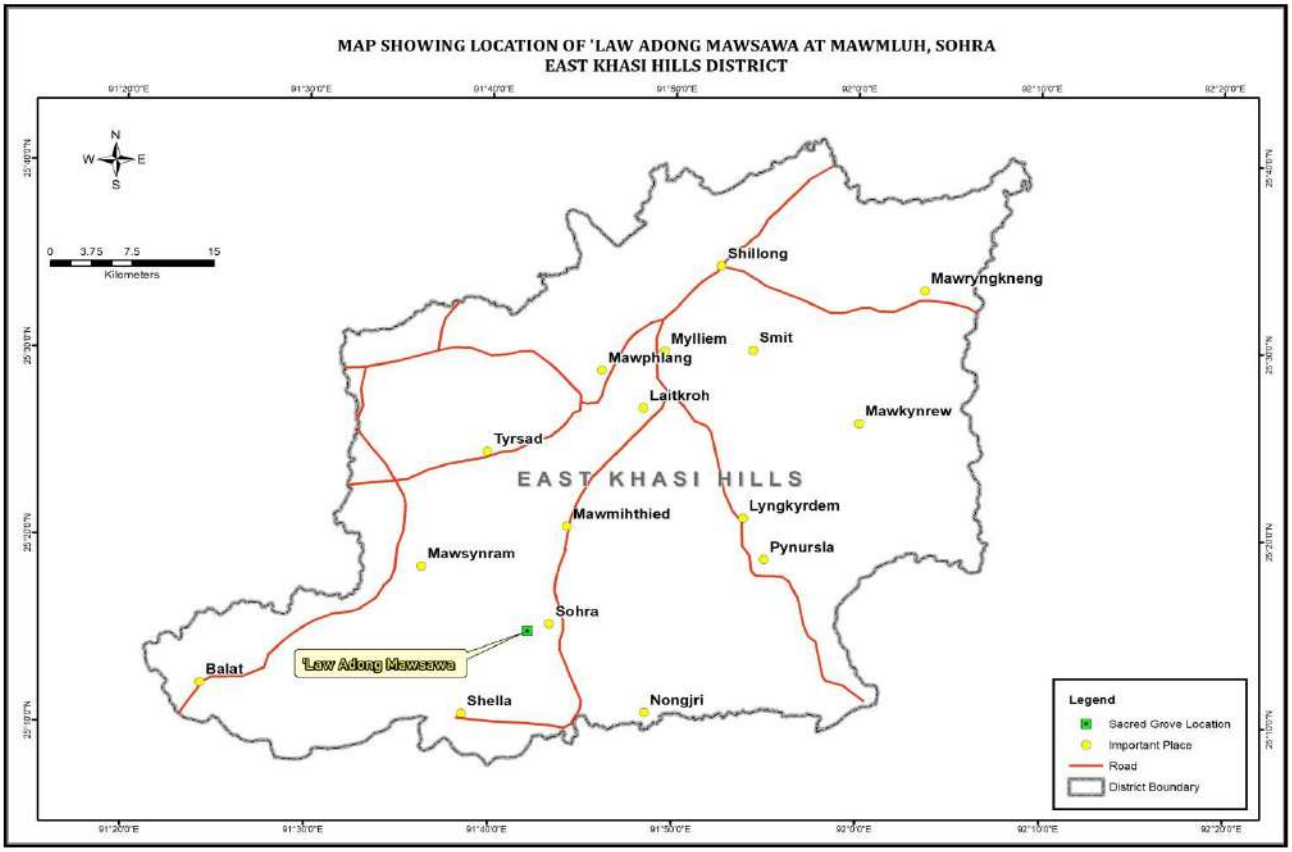
Law Adong Mawsawa is situated in East Khasi Hills District of Meghalaya at Mawmluh village under the aegis of Mawmluh Sirdarship. It covers an area of 16.439 ha. It lies between 25° 14′ 53" to 25° 15′ 05″ N latitude and 91° 41′ 50″ to 91° 42′ 15″ E Longitude with an altitude of 1230 m above mean sea level. It is bounded in the North by private land and Mawmluh area, in the East by phud wah & Wah Utim, in the south-west by PWD Road and in the West by PWD Road and private land. The forest is accessible by road from Shillong to Mawmluh which is about 58 km.

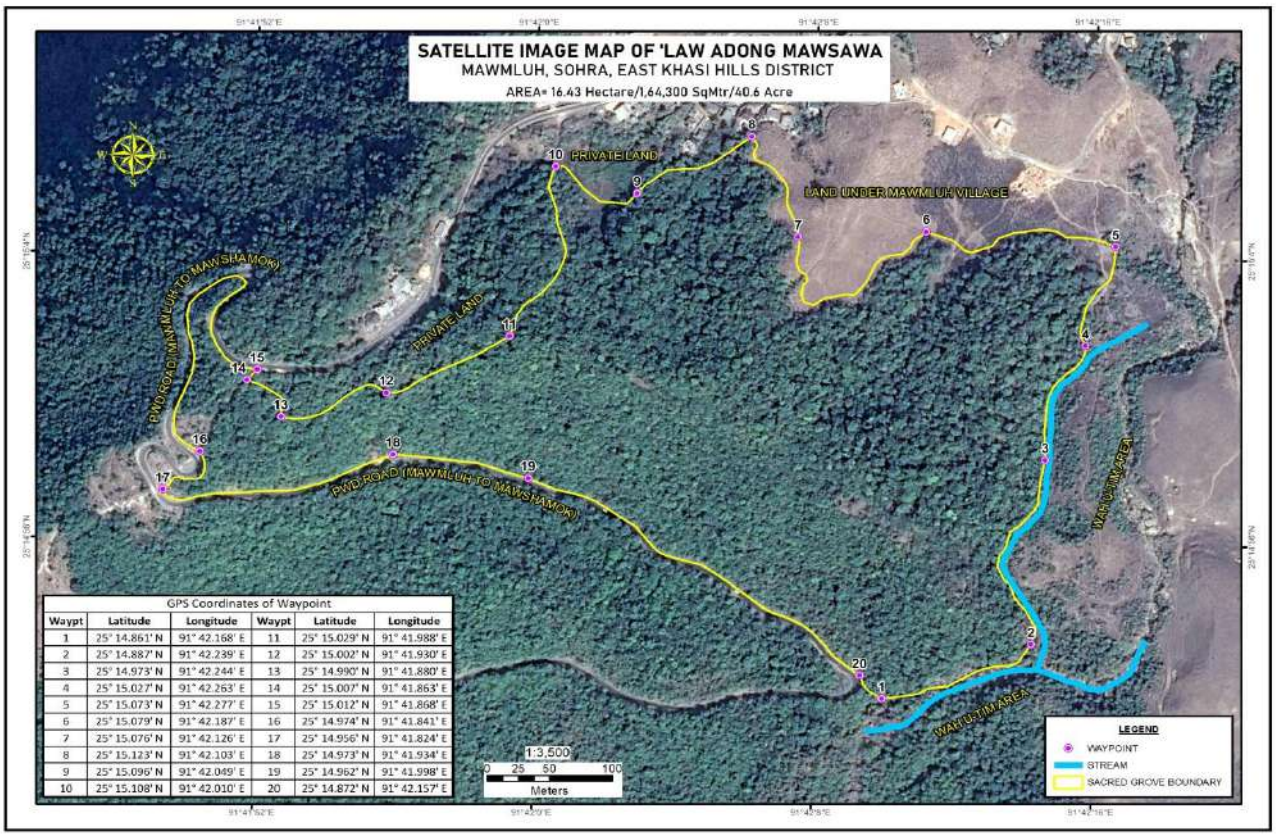
10.2 Brief History:

The forest has its origin since decades ago. There is no religious significant of the forest. The forest is owned by the village community under the lookout and control of the Sirdar of Mawmluh. Besides being reserve the ecological significant of the Sacred grove is still up hold by the village, therefore till today the conservation and preservation of the groves is still part and parcel of the Village Administration and Management. The scenic beauty of the locale provides a fillip to the ecological richness of the forest. This patch of forest along with law Adong Mawkulai and law Adong Wah Shyngiar forms a network of protected community areas for the rich biological flora and fauna of Sohra Plateaue. Therefore, the combination of Law Adong Mawsawa protected forest's rich biological diversity and the beauty of the locale will give an impetus to the eco-tourism. Entry-exit inside the grove is not illicit but green felling of timber is strictly prohibited and punishable under rule framed by the village Dorbar.

10.3 Geography and Climate:

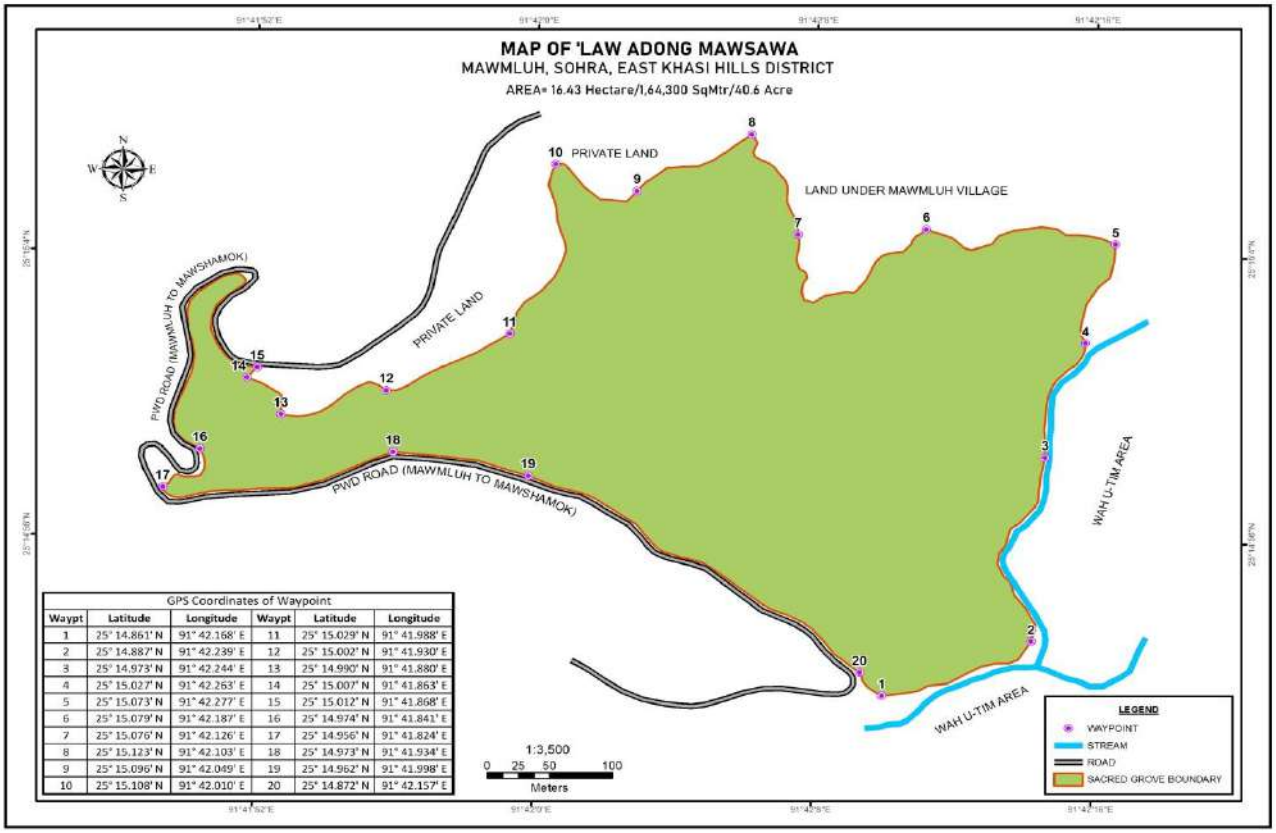
Topography of the grove is gentle rolling in nature, with slop varying from 5° to 20°. It falls under Southern aspect, on the windward side of the Khasi Hills Plateau. The soil texture is Sandy-loam with loose stone and slightly compact in consistency. The colour of the soil is brown with 15-30 cm soil dept. There are numerous seasonal streams which flow out from this forest. The perennial streams which form the boundary of this forest is Wah [Phud] Utim. All these seasonal and perennial streams flow towards the south.





GPS Coordinates of Waypoint

Waypt	Latitude	Longitude	Waypt	Latitude	Longitude
1	25° 14.861' N	91° 42.168' E	11	25° 15.029' N	91° 41.988' E
2	25° 14.887' N	91° 42.239' E	12	25° 15.002' N	91° 41.930' E
3	25° 14.973' N	91° 42.244' E	13	25° 14.990' N	91° 41.880' E
4	25° 15.027' N	91° 42.263' E	14	25° 15.007' N	91° 41.863' E
5	25° 15.073' N	91° 42.277' E	15	25° 15.012' N	91° 41.868' E
6	25° 15.079' N	91° 42.187' E	16	25° 14.974' N	91° 41.841' E
7	25° 15.076' N	91° 42.126' E	17	25° 14.956' N	91° 41.824' E
8	25° 15.123' N	91° 42.103' E	18	25° 14.973' N	91° 41.934' E
9	25° 15.096' N	91° 42.049' E	19	25° 14.962' N	91° 41.998' E
10	25° 15.108' N	91° 42.010' E	20	25° 14.872' N	91° 42.157' E



GPS Coordinates of Waypoint

Waypt	Latitude	Longitude	Waypt	Latitude	Longitude
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3	25° 14.973' N	91° 42.244' E	13	25° 14.990' N	91° 41.880' E
4	25° 15.027' N	91° 42.263' E	14	25° 15.007' N	91° 41.863' E
5	25° 15.073' N	91° 42.277' E	15	25° 15.012' N	91° 41.868' E
6	25° 15.079' N	91° 42.187' E	16	25° 14.974' N	91° 41.841' E
7	25° 15.076' N	91° 42.126' E	17	25° 14.956' N	91° 41.824' E
8	25° 15.123' N	91° 42.103' E	18	25° 14.973' N	91° 41.934' E
9	25° 15.096' N	91° 42.049' E	19	25° 14.962' N	91° 41.998' E
10	25° 15.108' N	91° 42.010' E	20	25° 14.872' N	91° 42.157' E

Mawmluh is situated in the same area which has the higher recorded rainfall and received both south-west and north-east monsoonal winds in the monsoon season. The Rainfall varies from heavy to medium to light. The monsoon season is from March to October, the month of June to October received the maximum rainfall. The winter season starts from November to February, this season is the rainfall during this also the driest seasone. The minimum temperature is 4-5^0 C in the month of January and the maximum temperature is 20^0 C in the month of August.

Encroachment, Wild fire, hunting & poaching, grazing and illegal felling of trees are prohibited.

10.4 Forest Type:

According to Champion & Seth classification (1968) of the forest types found in the sacred grove is ***sub-type 11B/C1a Lauraceous Forest.***

10.5 Flora and Fauna:

The floristics is characterized by (vegetation type) is of mixed *species* consisting mainly of *Elaeocarpus lanceaefolios species* and *Eugenia jambolana* as dominant species. The origin of the forest is of natural in nature and it is of two storeyed layers. The wildlife found within the grove are jungle fowls, etc and some vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

i. High level endemic plants and animal species which is significant from biodiversity forest of view.

ii. Existence of many rare and endangered plants species.

iii. Restrictions-"do's and don'ts;" help the sacred grove in conservation of Flora and fauna and maintaining of rich natural resources.

10.6 Flora species:

List of trees found in Law Adong Mawsawa, East Khasi Hills

TREES

Sl.No.	Botanical Name	Local Name	Family
1	*Albizialucidior*	Diengri	*Fabaceae*
2	*Alstoniascholaris*	Diengjyrting	*Apocynaceae*
3	*Aralia armata*	Dienglatymphu	*Araliaceae*
4	*Artocarpuslacucha*	Diengsohshram	*Fagaceae*
5	*Betulaalnoides*	Dienglieng	*Betulaceae*
6	*Cameliacaduca*	Diengtyrnem	*Fagaceae*
7	*Caryotaurens*	Diengtlai	*Arecaceae*
8	*Castanopsisarmata*	Diengsning	*Fagaceae*
9	*Castanopsisindica*	Diengstap	*Fagaceae*
10	*Castanopsisspp*	Diengpatuia	*Fagaceae*
11	*Cinnamomumvegolghota*	Diengtyrdop	*Lauraceae*
12	*Cioxlacryma-jabi*	Diengsohriew	*Poaceae*
13	*Drimycarpusracemosus*	Diengbrah	Anacardiaceae
14	*Elaeocarpuslanceaefolios*	Diengsohkhyllam	*Elaeocarpaceae*
15	*Elaeocarpusrobusta*	Dienglasaw	*Elaeocarpaceae*
16	*Engelhardiaspicata*	Dienglymba	Juglandaceae
17	*Eugenia aquea*	Diengsohliwa	*Myrtaceae*
18	*Eugenia jambolana*	Diengsohum	*Myrtaceae*
19	*Eugenia jambolana*	Diengsohthangum	*Myrtaceae*
20	*Euryaaccuminata*	Dieng shit	*Theaceae*
21	*Exbucklandiapopulnea*	Diengdoh	*Hamamelidaceae*
22	*Ficusnerifolia*	Diengsohmehblang	*Tiliaceae*
23	*Ilex venulosa*	Diengsohshyieng	*Aquifoliaceae*
24	*Garceneaspp*	Diengsohkwang	Clusiaceae
25	*Ilex griffithii*	Diengjakrai/ sohkhawkrai	*Aquifoliaceae*
26	*Ilex spp*	Diengsohlarmaw	*Aquifoliaceae*
27	*Inualacappa*	Dienglalieh-ktieh	*Asteraceae*
28	*Iteachinensis*	Diengsohsyrtet	*Iteaceae*
29	*Ligustrumlucidium*	Diengsohpaiat	Oleaceae
30	*Litsaeameissneri*	Diengsohrang	*Anacardiaceae*
31	*Macarangadenticulata*	Dienglakhar	*Euphoribiaceae*
32	*Macarangaspp*	Diengthyllapmasi	*Euphoribiaceae*
33	*Maisaindica*	Diengjamynrei	Primulaceae
34	*Micheliaoblonga*	Dienglaniar/ taroi	*Magnoliaceae*
35	*Micheliapunduanaoblonga*	Diengsohniar	*Magnoliaceae*
36	*Myricaindica*	Diengsohphie	Myricaceae
37	*Nepheliumlongana*	Diengloba	*Sapindaceae*
38	*Pandanusamerican*	Diengshlan	*Pandanaceae*
39	*Pentapanaxracemosum*	Diengtyllongrangsei	Davalliaceae
40	*Premnabengalensis*	Dienglalieh	Asteraceae
41	*Salix tetrasperma*	Diengjamynrei	Salicaceae
42	*Schimawallichii*	Diengngan	*Theaceae*

43	*Sterculiavelosa*	Diengrmiew/rmai	Sterculiaceae
44	*Symplocostheoefolia*	Diengpei	Symplocaceae
45	*Vacciniumserretum*	Diengshira	Ericaceae
46	*Wendlandiatinctoria*	Diengshadmoit	Rubiaceae

List of Shrubs, herbs, climbers & bamboo fou18nd in Law Adong Mawsawa, East Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1	Lajarem lieh	*Clerodendrum viscosum*	Verbenaceae
2	Dieng sohniang riang blei	Not listed	Not listed
3	Dieng soh phong phong	Not listed	Not listed
4	Dieng lasi sia	Not listed	Not listed
5	Dieng smaw	Not listed	Not listed
6	Dieng sohtait	Not listed	Not listed
7	Dieng eit miang	Not listed	Not listed
8	Dieng soh kynruin	Not listed	Not listed
9	Dieng soh pyrsit	*Eurya acuminata*	Theaceae
10	Dieng sohjabuit	*Phlogacanthus thyrsiflorus*	Acanthaceae
11	Jarem iong	*Clerodendrum colebrookianum*	Verbenaceae
12	Synsar	*Thysanolaena maxima*	Poaceae
13	Kait khlaw	*Musa acuminata*	Musacaea
14	Dieng rnong	*Mahonia pycnophylla*	Berberidaceae
15	Soh lang	*Viburnum foetidum*	Caprifoliaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Sying khlaw	*Zingiber purpureum*	Zingiberaceae
2.	Jajew khlaw	*Begonia roxburghii*	Begoniaceae
3.	Tyrkhang	*Asplenium nidus*	Aspleniaceae
4.	Sohbyrthit	*Urena lobata*	Malvaceae
5.	Wangkhlaw	*Colocasia esculenta*	Araceae
6.	Phud wang	*Cololasia spp*	Araceae
7.	Bat eroplain	*Inula cappa*	Asteraceae
8.	Sla lamet	*Phyrnium pubinerve*	Marantaceae
9.	Shynrai khlaw	*Alpinia allughas*	Zingiberaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Kophi khlaw	*Coffea jenkinsii*	Rubiaceae
2.	Dieng longkhasaw (Jyrmi)	Not listed	Not listed
3.	Jyrmi sohthied	Not listed	Not listed
4.	Pew shrieh	*Hedera nepalensis*	Araliaceae

5.	Soh shang khlor	*Elaeagnus pyriformis*	Elaeagnaceae
6.	Sla kynda jyrmi	*Pothos scandens*	Araceae
7.	Loapla	*Rhaphidophora decursiva*	Araceae
8.	Dieng sohmatan/sohpdong	*Stephania glabra*	Menispermaceae

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng tiew dieng	*Micropera manii*	Orchidaceae
2.	Dieng tiew dieng	*Dendrobium aphyllum*	Orchidaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1.	Shken	*Bambusa pallida*	Poaceae

10.7 Growing Stock:

As per the methodology described in Chapter-II, 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 30 cm is enumerated by measuring the top height (in meters) and the girth (in centimetres) at breast height. The sample plot size is 0.2 ha.

All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 2764 trees consisting of 272 *Elaeocarpus lanceaefolios* (1st dominant), 266 *Eugenia jambolana* (2nd dominant), 230 *Ilex venulosa* (3rd dominant), 1996 *Rest of 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 result for Law Adong Mawsawa are given in table 10.1 & 10.2 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 7453.38 cubic metres.

Table-10.1

Girth class wise & Specieswise with volume in sample area (16 Plots- area 16.439 ha)

(volume in cu.m)

Girth Class Vise	1st dominant Elaeocarpus lanceaefolios	2nd dominant Eugenia jambolana	3rd dominant Ilex venulosa	Rest of the species	Total
30-40	44.98	6.24	4.90	38.57	**94.68**
41-50	52.18	9.99	10.43	73.56	**146.16**
51-60	45.72	9.89	7.33	75.65	**138.58**
61-70	43.46	5.77	4.56	85.51	**139.30**
71-80	13.03	6.37	6.43	55.45	**81.27**
81-90	28.15	3.54	3.56	45.02	**80.27**
91-100	16.76	3.60	5.27	35.89	**61.51**
101-110	1.50	2.34	4.42	33.38	**41.63**
111-120	12.78	2.73	0.00	18.99	**34.50**
121-130	6.75	4.69	0.00	8.26	**19.70**
131-140	3.57	0.00	2.04	13.61	**19.22**
141-150	9.42	0.00	2.13	6.86	**18.41**
151 & above	13.67	0.00	0.00	20.05	**33.73**
Total	**291.95**	**55.15**	**51.06**	**510.79**	**908.95**

Girth class wise with respect to total area

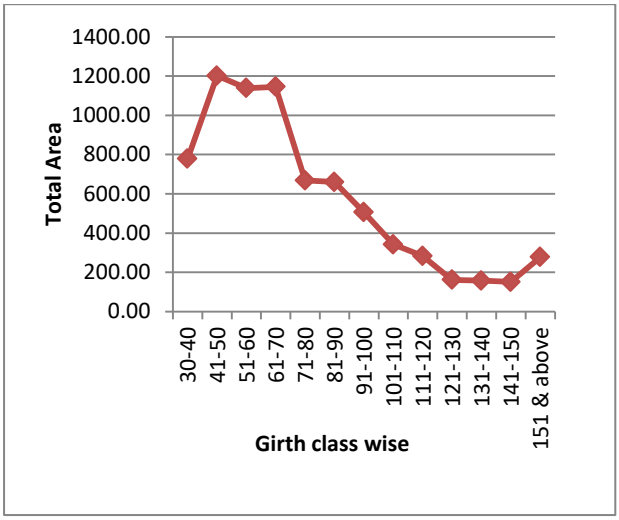


Table-10.2

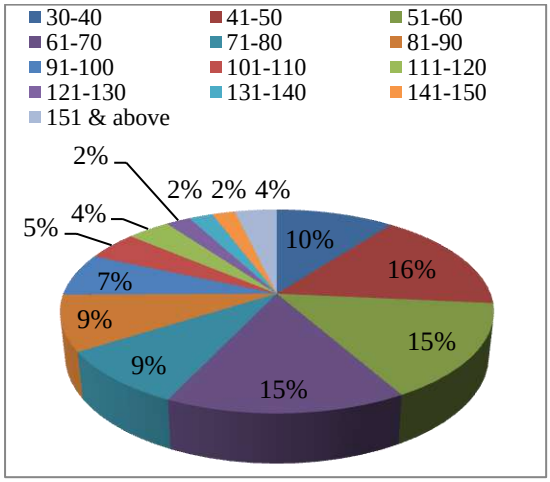
Girth class wise & Specieswise with volume in the entire grove (area 16.439 ha)

Girth Class Vise	1st dominant Elaeocarpus lanceaefolios	2nd dominant Eugenia jambolana	3rd dominant Ilex venulosa	Rest of the species	Total	%wrt total volume
30-40	368.80	51.14	40.155	316.27	776.37	10.39
41-50	427.85	81.91	85.510	603.20	1198.47	16.04
51-60	374.89	81.07	60.098	620.31	1136.36	15.21
61-70	356.36	47.35	37.376	701.21	1142.29	15.29
71-80	106.82	52.19	52.718	454.66	666.39	8.92
81-90	230.86	29.04	29.167	369.14	658.21	8.81
91-100	137.41	29.54	43.189	294.27	504.41	6.75
101-110	12.30	19.16	36.269	273.68	341.40	4.57
111-120	104.77	22.35	0.000	155.73	282.86	3.79
121-130	55.33	38.46	0.000	67.72	161.51	2.16
131-140	29.26	0.00	16.712	111.61	157.58	2.11
141-150	77.26	0.00	17.458	56.28	150.99	2.02
151 & above	112.12	0.00	0.000	164.43	276.55	3.70
Total	2394.02	452.21	418.651	4188.50	7453.38	99.76
% wrt total volume	32.04	6.05	5.60	56.06	99.76	

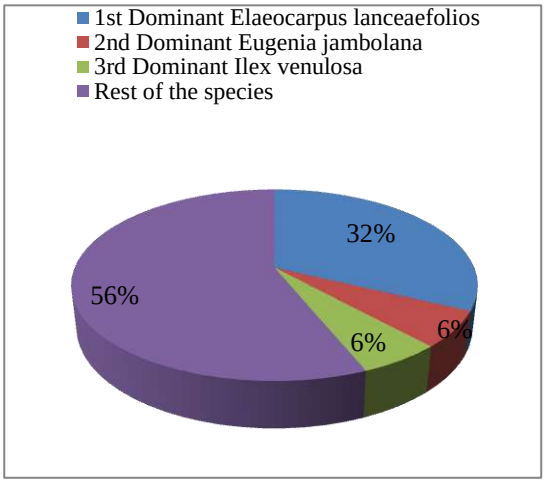
The table indicates that the volume contributed by the 1st dominant species (Elaeocarpus lanceaefolios*)* with respect to the total volume of the grove is 32.04%, the 2nd dominant species (Eugenia jambolana) with respect to the total volume of the grove is 6.05%, 3rd dominant species *(*Ilex venulosa*)* is 5.60 % while rest of the species is maximum i.e.56.06 %. Total volume of the grove is 7453.38 cubic metres.

From the above 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.

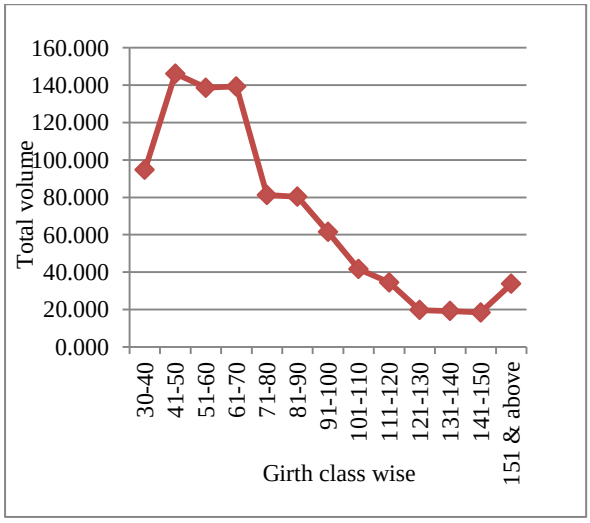
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view Law Adong Mawsawa

10.8 Number of Stems:

Number of stems in each girth class and species wise are given in the table 10.3 & 10.4. The table shows that maximum numbers of stems are found in lower girth classes i.e. from 30-40 cm to 91-100 cm classes.

Table-10.3

Girth class wise & Species wise No. of stems in the sample area (16 Plots- area 16.439 ha)

Girth Class Vise	1st dominant Elaeocarpus lanceaefolios	2nd dominant Eugenia jambolana	3rd dominant Ilex venulosa	Rest of the species	Total
30-40	57	113	84	677	**931**
41-50	59	72	76	522	**729**
51-60	46	38	59	302	**445**
61-70	40	15	12	224	**291**
71-80	11	12	12	105	**140**
81-90	22	5	5	64	**96**
91-100	12	4	6	40	**62**
101-110	1	2	4	30	**37**
111-120	8	2	0	14	**24**
121-130	4	3	0	5	**12**
131-140	2	0	1	7	**10**
141-150	5	0	1	3	**9**
151 & above	5	0	0	3	**8**
Total =	**272**	**266**	**260**	**1996**	**2794**

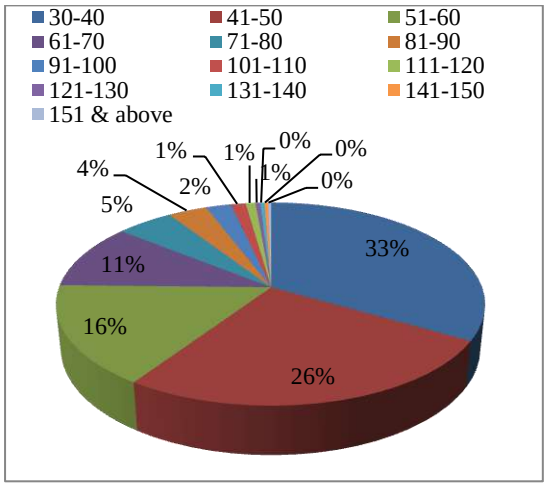
Table-10.4

Girth class wise & Species wise No. of stems in the entire grove (area 16.439 ha)

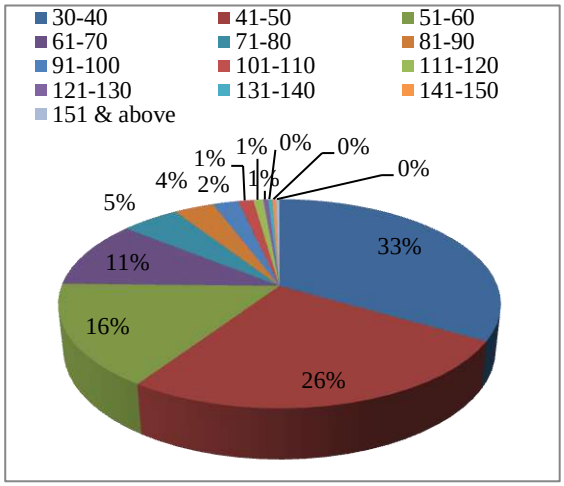
Girth Class Vise	1st dominant Elaeocarpus lanceaefolios	2nd dominant Eugenia jambolana	3rd dominant Ilex venulosa	Rest of the species	Total
30-40	171	339	252	2031	2793
41-50	177	216	228	1566	2187
51-60	138	114	177	906	1335
61-70	120	45	36	672	873
71-80	33	36	36	315	420
81-90	66	15	15	192	288
91-100	36	12	18	120	186
101-110	3	6	12	90	111
111-120	24	6	0	42	72
121-130	12	9	0	15	36

131-140	6	0	3	21	30
141-150	15	0	3	9	27
151 & above	15	0	0	9	24
Total	**816**	**798**	**780**	**5988**	**8382**

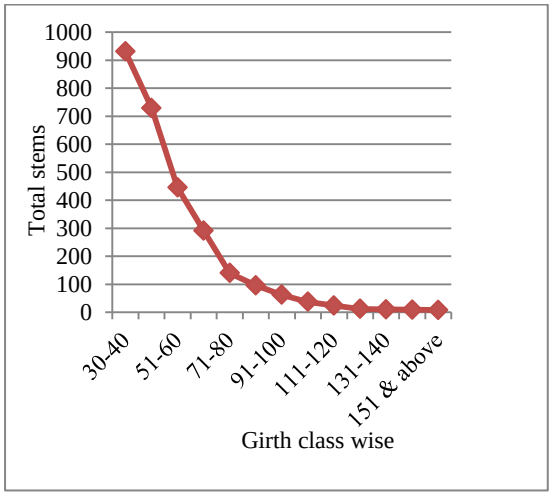
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Field exercise graph at Law Adong Mawsawa



Inside view of Law Adong Mawsawa

10.9 Brief note on Management of Law Adong Mawsawa, Mawmluh.

(i) Protection from Biotic Interfernece:-

There is no restriction for entry or exit in this grove for both human and livestocks. However the village dorbar of Mawmluh strictily prohibits cutting or felling of tree without the permission from the Dorbar. Permission for felling or extraction of trees is only accorded at times of emergency. Although there is no report of illegal felling of timber, poaching but as thre forest is left open, there are chance of such illegal activities in the near future. Further, since the forest is bounded on the north by private land there are chances of encroachment. If declared as a community Reserve, this beautiful forest can be protected from biotic interferances and perservation of its rich biological diversity.

(ii) Fire Control:-

Though there are not report of occassional, intentional or unintentiona, fire in this forest, it will be more logical to take preventive step. External and internal fire line can be created all along the boundary and within of the grove. This will help to presrve the rich natural resources of the grove.

(iii) Water Stream:-

There are numerous season streams and a perennial straem i.e Wah [Phud] Utim so construction of check dams to improved water supply of wild life as well as improved soil moisture content of the soil is recommended to prevent erosion and spread of fire incidences.

(iv) Eco-tourism:-

This patch of forest, as mentioned earlier, along with Law Adong Mawkulai and Law Adong Wah Shyngiar forms a community protected area that lies in the Sohra- Mawmluh biosphere which is bless with a scenic beauty, awesome climate, rich biological diversity and abode of numerous caves, so construction of infrastructures like viewpoints, trekking/cycling trails, canopy walk, promenades can be taken up to augment the eco-tourism potential of the place.

(v) Awareness Campaign:-

The innate civic scene that leads to the conservation efforts of the villagers can be add impetus by the grass root level training/seminar on the modern technique of forest, natural resources management and eco-tourism management. Poster campaigns can be taken up as to educate/ inculcate/ motivate the tourists as to imbibe the same civic scene as the locals do.

11 - Kyllai-Lyngsngun Law Lyngdoh Kur Lai Kpoh Paliar, Demnar, South West Khasi Hills.

11.1 Location:

Kyllai- Lyngsngun Law Lyngdoh Lur Lai Kpoh Paliar is a clan protected forest which is situated in South West Khasi Hills District of Meghalaya at Demnar village under the aegis of Lyngdoh of Kur Lai Kpoh Paliar. It covers an area of 39.36 ha. It lies between 25° 23′ 23" to 25° 23′ 48″ N latitude and 91° 17′ 32″ to 91° 17′ 54″ E Longitude with an altitude of 1549 m above mean sea level. It is bounded in the North by Wah Tdong Kyllai Lyngsngun, unpaved road and Lai Kpoh Kyndew Kur Paliar, in the East by unpaved road, paddy field of Smti. Daplin Paliar, in the South by PWD Road foot and in the West by Law Pom Dieng of Demnar (Khyndew Kur) and Wah Phinam stream. The forest is accessible by road from Shillong to Kyllai Lyngsngun, Demnar which is about 80 km from Shillong.

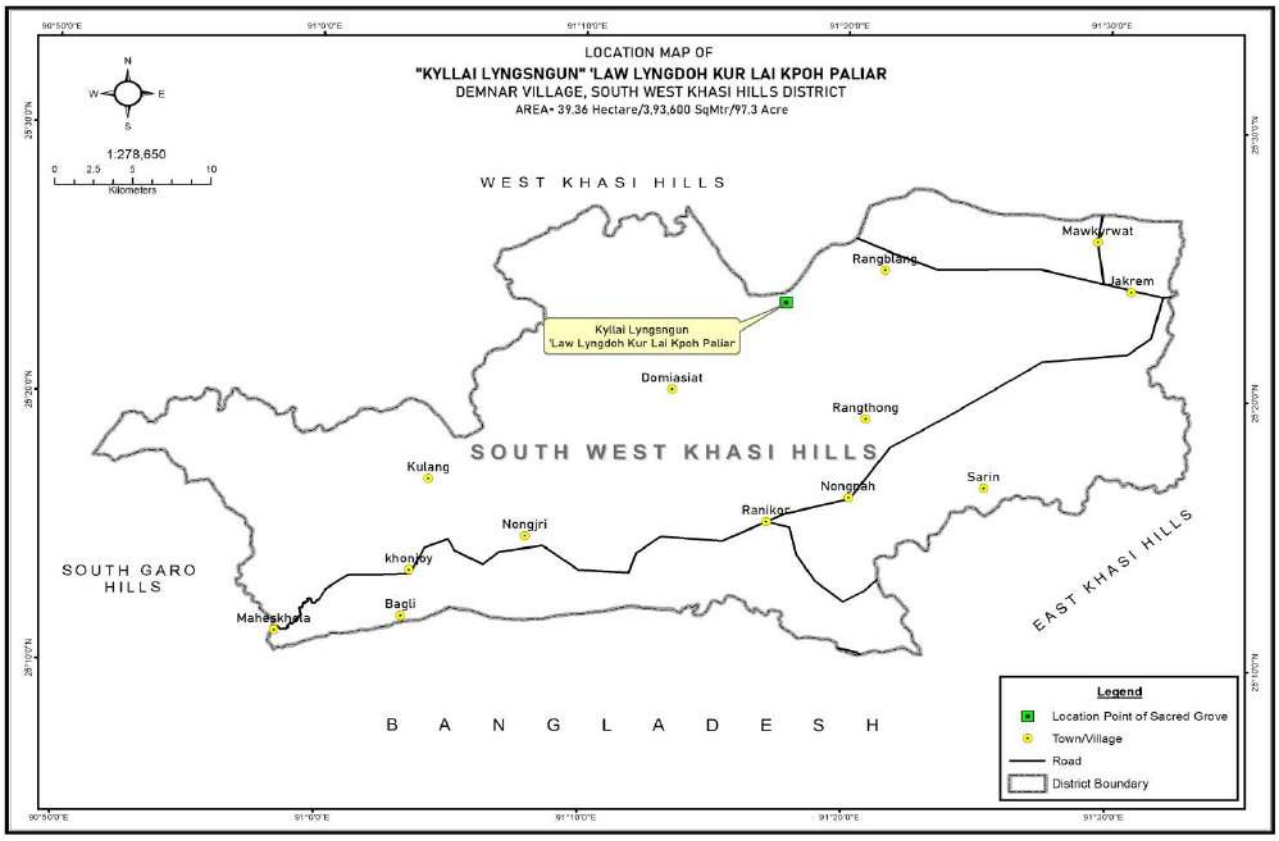
11.2 Brief History:

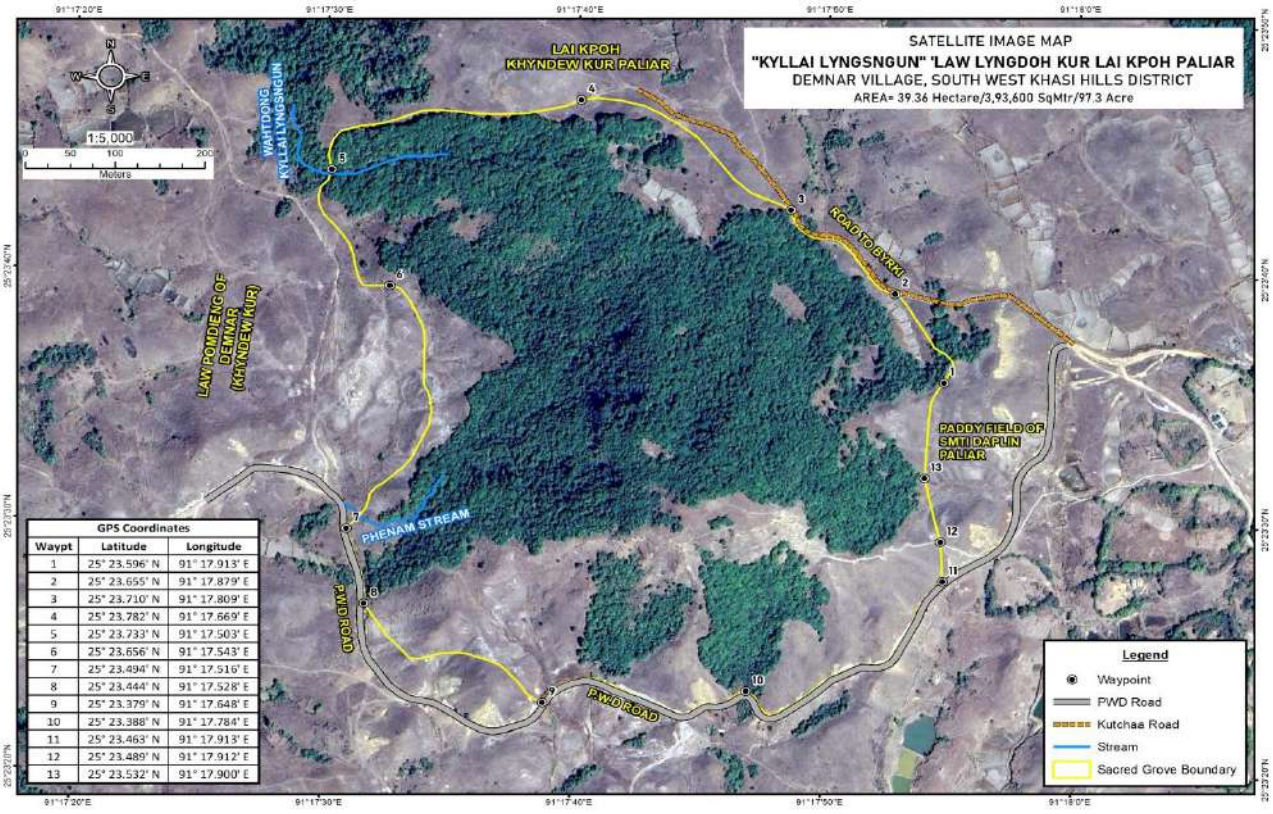
The forest has its origin since decades ago initiated by the clan Lai Kpoh Paliar. There is no religious significant of the forest as of now, but in the pass this forest was considered and protected for its ritual purpose of the clan's religious needs. Due to the pass religious significant, till date it is revered, the patch of forest has now become ecologically and aesthetically significant of the area. The forest is owned by the clan under the lookout and control of the clan elders. Entry-exit inside the forest is not illegal but green felling of timber is strictly prohibited and punishable under rule framed by the kur (clan) Dorbar.

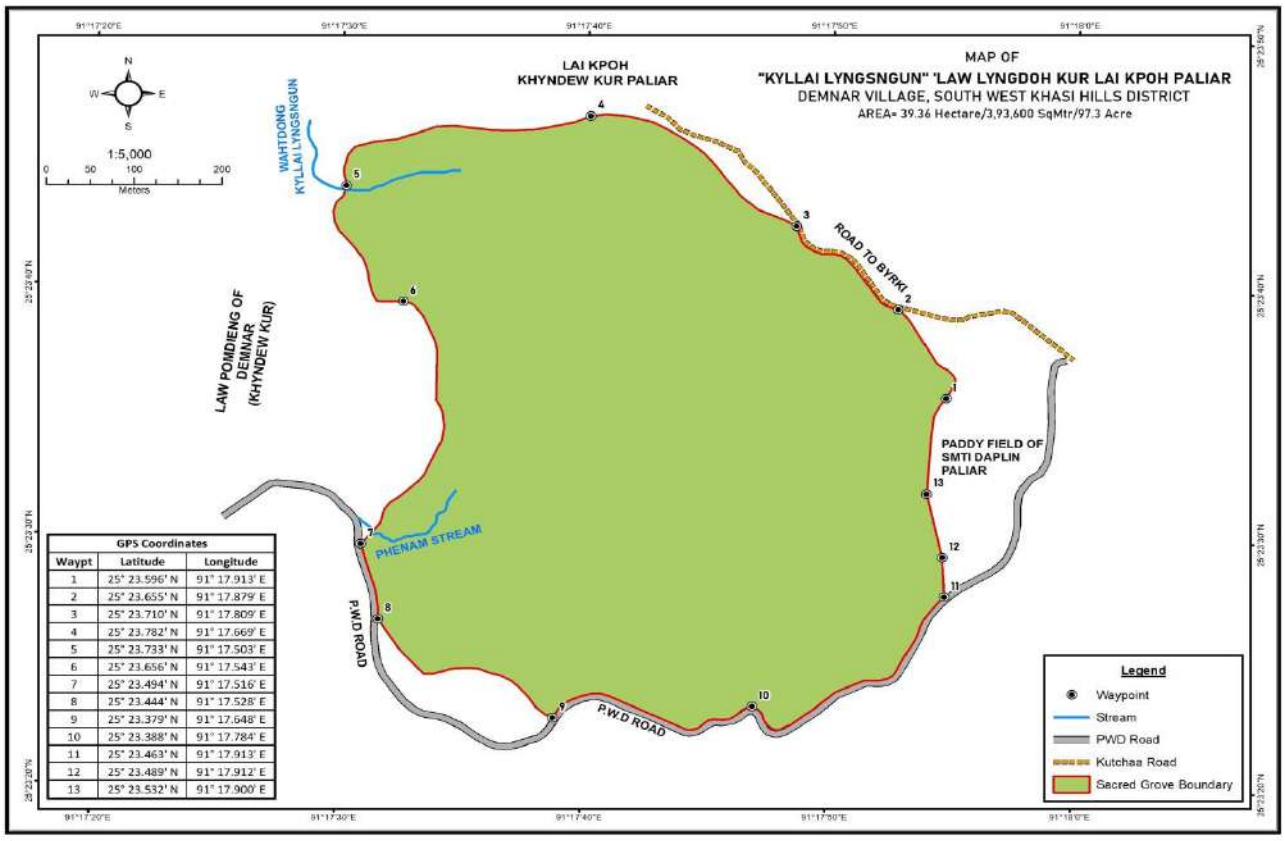
11.3 Geography and Climate:

Topography of the grove is hilly in nature, with slop varying from 16° to 40°. It falls under South- West aspect, on the windward side of the Khasi Hills Plateau. The soil texture is Sandy-loamy with loose stone and slightly compact in consistency. The colour of the soil is black with 15 cm soil dept.

The seasonal streams which flow out from this forest are Wah (phud) Mawdhung Shyngrang stream and Wah Tdong Kyllai Lyngsngun stream. The seasonal stream which form the boundary of this forest is Wah Phinam stream. All these seasonal streams flow towards the south.


LOCATION MAP OF
"KYLLAI LYNGSNGUN" 'LAW LYNGDOH KUR LAI KPOH PALIAR
DEMNAR VILLAGE, SOUTH WEST KHASI HILLS DISTRICT
AREA- 39.36 Hectare/3,93,600 SqMtr/97.3 Acre
1:278,650
Kilometers
WEST KHASI HILLS
Mawkyrwat
Rangblang
Jakrem
Kyllai Lyngsngun
'Law Lyngdoh Kur Lai Kpoh Paliar
Domiasiat
Rangthong
SOUTH WEST KHASI HILLS
Kulang
Nongpoh
Sarin
Ranikor
Nongjri
khonjoy
SOUTH GARO HILLS
Bagli
Maheshkhola
EAST KHASI HILLS
B A N G L A D E S H
Legend
Location Point of Sacred Grove
Town/Village
Road
District Boundary


SATELLITE IMAGE MAP
"KYLLAI LYNGSNGUN" 'LAW LYNGDOH KUR LAI KPOH PALIAR
DEMNAR VILLAGE, SOUTH WEST KHASI HILLS DISTRICT
AREA= 39.36 Hectare/3,93,600 SqMtr/97.3 Acre
1:5,000
Meters
LAI KPOH KHYNDEW KUR PALIAR
WAHTDONG KYLLAI LYNGSNGUN
ROAD TO BYRKI
LAW POMDIENG OF DEMNAR (KHYNDEW KUR)
PADDY FIELD OF SMTI DAPLIN PALIAR
PHENAM STREAM
PWD ROAD
PWD ROAD
GPS Coordinates
Waypt | Latitude | Longitude
1 | 25° 23.596' N | 91° 17.913' E
2 | 25° 23.655' N | 91° 17.879' E
3 | 25° 23.710' N | 91° 17.809' E
4 | 25° 23.782' N | 91° 17.669' E
5 | 25° 23.733' N | 91° 17.503' E
6 | 25° 23.656' N | 91° 17.543' E
7 | 25° 23.494' N | 91° 17.516' E
8 | 25° 23.444' N | 91° 17.528' E
9 | 25° 23.379' N | 91° 17.648' E
10 | 25° 23.388' N | 91° 17.784' E
11 | 25° 23.463' N | 91° 17.913' E
12 | 25° 23.489' N | 91° 17.912' E
13 | 25° 23.532' N | 91° 17.900' E
Legend
Waypoint
PWD Road
Kutchaa Road
Stream
Sacred Grove Boundary



GPS Coordinates		
Waypt	Latitude	Longitude
1	25° 23.596' N	91° 17.913' E
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10	25° 23.388' N	91° 17.784' E
11	25° 23.463' N	91° 17.913' E
12	25° 23.489' N	91° 17.912' E
13	25° 23.532' N	91° 17.900' E

Demnar is situated in the area which falls in the windward side of the Khasi Hills plateau; as such rainfall received in this area is on the higher side. The Rainfall varies from heavy to medium to light. The monsoon season is from March to October, the month of June to October received the maximum rainfall. The winter season starts from November to February; this season is the driest season. The average minimum temperature is 7^0 C in the month of January and the average maximum temperature is 18^0C in the month of August.

Encroachment, Wild fire, hunting & poaching, grazing and illegal felling of trees are prohibited.

11.4 Forest Type:

According to Champion & Seth classification (1968) and floristic the forest types found in the sacred grove is ***Type 8B/C2 Khasi Sub-Tropical Wet Hill Forest.***

11.5 Flora and Fauna:

The floristics is characterized by (vegetation type) of mixed *species* consisting mainly of *Quercus species* and *Itea chinensis* as dominant species. The origin of the forest is of natural in nature and its physiognomy is characterized by one storeyed layer. The wildlife found within the grove are jungle fowls, etc and some vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

i. High level endemic plants and animal species which is significant from biodiversity forest of view.

ii. Existence of many rare and endangered plants species.

iii. Restrictions-"do's and don'ts;" help the sacred grove in conservation of Flora and fauna and maintaining of rich natural resources.

11.6 Flora species:

List of trees found in Law Kyllai- Lyngsngun, West Khasi Hills

TREES

Sl.No.	Botanical Name	Local Name	Family
1	*Albizialucidior*	Diengri	*Fabaceae*
2	*Aralia armata*	Dienglatymphu	*Araliaceae*
3	*autocarpuslacucha*	Diengsohshynrut	*Moraceae*
4	*Betulaalnoides*	Dienglieng	*Betulaceae*
5	*Callicarpaarborea*	Dienglakhiat	*Verbanaceae*
6	*Carpinusviminea*	Diengsohpaitrisang	*Betulaceae*
7	*Castanopsisarmata*	Diengsning	*Fagaceae*
8	*Castanopsisindica*	Diengsohot	*Fagaceae*
9	*Castanopsislystrix*	Diengstap	*Fagaceae*
10	*Castanopsisspp*	Diengsohstap	*Fagaceae*
11	*Cesearíavarieca*	Dieng rang	*Flacourtiaceae*
12	*cinnamomumpauciflorum*	Diengtorthia	*Lauraceae*
13	*Combretumaquamosum*	Diengsohrisang	*Combretaceae*
14	*Diospyros kaki*	Diengiong	Ebenaceae
15	*Diospyrosmelanoxylo*	Diengthang	Ebenaceae
16	*Diospyrostoposia*	Diengsohtlang	Ebenaceae
17	*Elaeocarpuslanceafolia*	Diengsohkhyllam	*Elaeocarpaceae*
18	*Elaeocarpusrobusta*	Dienglasaw	*Elaeocarpaceae*
19	*Engelhardiaspicata*	Dienglymba	*juglandaceae*
20	*Engelhardtiaspicata*	Dienglyba	*juglandaceae*
21	*Erythrinaindica*	Dieng song	*Leguminoseae*
22	*Eugenia jambolana*	Diengsohum	*Myrtaceae*
23	*Euryaaccuminata*	Diengpyrshit	*Theaceae*
24	*Ex-Bucklandiapopulnea*	Diengdoh	*Hamamelidaceae*
25	*Ficusglometra*	Diengsohpiar	*Moraceae*
26	*Ficushirta*	Diengsohrumpian	*Moraceae*
27	*Fiecesglobarata*	Diengsohpian	*Moraceae*
28	*Fotinaglometra*	Dieng dud	*Moraceae*
29	*Fotinaintegrefolia*	Diengsnammaw	*Moraceae*
30	*Glochidionacuminatum*	Diengjyrti	Phyllanthaceae
31	*Gmelinaarborea*	Dienglaphiang	*Verbanaceae*
32	*Grewiaabutilifolia*	Diengsohmeblang	*Tiliaceae*
33	*Ilex griffithii*	Diengsohkhawkrai	*Aquifoliaceae*
34	*Ilex venulosa*	Diengsohshyieng	*Aquifoliaceae*
35	*Iteachinensis*	Diengsohsyrtet	*Iteaceae*
36	*Ligustrumrobostos*	Diengsyiang	*Oleaceae*
37	*Linderapuleherrinia*	Diengsasia	Lauraceae
38	*Lithocurpusferestrata*	Diengjing	*Fagaceae*
39	*Macaranga denticulate*	Dienglakhar	*Euphorbiaceae*
40	*Mahonicaaccanthifolia*	Diengsohboing	Berberidaceae
41	*Mangiferasylvatica*	Diengsohpiengshrieh/ sohpiengkhlaw	Anacardiaceae
42	*Meliosmapinnata*	DiengKrot	*Sabiaceae*

43	*Micheliaoblonga*	Dienglaniar	*Magnoliaceae*
44	*Micheliachampaca*	Diengrailieh	*Magnoliaceae*
45	*Micheliaoblonga*	Diengturoi	*Magnoliaceae*
46	*Micheliaspp*	Diengraiiong	*Magnoliaceae*
47	*Morindaaugustifolia*	Dieng stem/synrai	Rubiaceae
48	*Morus alba*	Diengsohlangkhlur	*Moraceae*
49	*Myricaindica*	Diengsohphie	*Myricaceae*
50	*Myricanagi*	Diengsohliya	*Myricaceae*
51	*Pandanusamerican*	Diengshlan	*Pandanaceae*
52	*Pentapanax racemosum*	Diengtyllongrangsei	*Araliaceae*
53	*Pierisovalifolia*	Diengjalngiem	*Ericaceae*
54	*Pinuskhasiana*	Diengkseh	*Pinaceae*
55	*Pithecellobiumheterophyllum*	Diengiapiar	*Fabaceae*
56	*Polyalhteasimiarun*	Dienglarsei	*Anonaceae*
57	*Polygonumorientale*	Diengjalyengiong	*Polygonaceae*
58	*Premnabengalensis*	Dienglalieh	*Asteraceae*
59	*Prunusnepalensis*	Diengsohiong	*Polygonaceae*
60	*Quercusdealbata*	Diengsai	*Fagaceae*
61	*Quercusspp*	Dienglyngum	*Fagaceae*
62	*Rhus succedanea*	Diengkain	*Anacardiaceae*
63	*Schimakhasiana*	Diengngan	*Theaceae*
64	*Sphaeropteriscooperi*	Diengtyrkhang	*Cyatheaceae*
65	*Spondiasaxillaris*	Diengsohtait	*Anacardiaceae*
66	*Styraxserrulatum*	Diengmaitblang/ietblang	*Styracaceae*
67	*Symplocoschinensis*	Diengiong	*Symplocaceae*
68	*Symplocoskhasiana*	Diengdpei	*Symplocaceae*
69	*Symplocosperifolia*	Diengdpeilieh	*Symplocaceae*
70	*Symplocostheoefolia*	Diengdpeiiong	*Symplocaceae*
71	*Syzygiumcumini*	Diengsohrymar/sohrimai	*Myrtaceae*
72	*Taxusbacata*	DiengksehBlei	*Taxaceae*

List of Shrubs, herbs, climbers & bamboo found in Kyllai- Lyngsngun, West Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1	Lajarem lieh	*Clerodendrum viscosum*	Verbenaceae
2	Dieng sohniang riang blei	Not listed	Not listed
3	Dieng soh phong phong	Not listed	Not listed
4	Dieng lasi sia	Not listed	Not listed
5	Dieng smaw	Not listed	Not listed
6	Dieng sohtait	Not listed	Not listed
7	Dieng eit miang	Not listed	Not listed
8	Dieng soh kynruin	Not listed	Not listed
9	Dieng soh pyrsit	*Eurya acuminata*	*Theaceae*
10	Dieng sohjabuit	*Phlogacanthus thyrsiflorus*	*Acanthaceae*
11	Jarem iong	*Clerodendrum colebrookianum*	*Verbenaceae*
12	Synsar	*Thysanolaena maxima*	*Poaceae*
13	Kait khlaw	*Musa acuminata*	*Musacaea*
14	Dieng rnong	*Mahonia pycnophylla*	*Berberidaceae*

15	Soh lang	*Viburnum foetidum*	*Caprifoliaceae*

HERBS

Sl No.	Local Name	Botanical Name	Family
1	Sying khlaw	*Zingiber purpureum*	Zingiberaceae
2	Jajew khlaw	*Begonia roxburghii*	Begoniaceae
3	Tyrkhang	*Asplenium nidus*	Aspleniaceae
4	Sohbyrthit	*Urena lobata*	Malvaceae
5	Wangkhlaw	*Colocasia esculenta*	Araceae
6	Phud wang	*Cololasia spp*	Araceae
7	Bat eroplain	*Inula cappa*	Asteraceae
8	Sla lamet	*Phyrnium pubinerve*	Marantaceae
9	Shynrai khlaw	*Alpinia allughas*	Zingiberaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1	Kophi khlaw	*Coffea jenkinsii*	Rubiaceae
2	Dieng longkhasaw (Jyrmi)	Not listed	Not listed
3	Jyrmi sohthied	Not listed	Not listed
4	Pew shrieh	*Hedera nepalensis*	Araliaceae
5	Soh shang khlor	*Elaeagnus pyriformis*	Elaeagnaceae
6	Sla kynda jyrmi	*Pothos scandens*	Araceae
7	Loapla	*Rhaphidophora decursiva*	Araceae
8	Dieng sohmatan/sohpdong	*Stephania glabra*	Menispermaceae

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1	Dieng tiew dieng	*Micropera manii*	Orchidaceae
2	Dieng tiew dieng	*Dendrobium aphyllum*	Orchidaceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1	Shken	*Bambusa pallida*	Poaceae

11.7 Growing Stock:

As per the methodology described in Chapter-II, 20% enumeration is carried out in the grove as its area is more than 10 ha and less than 50 ha. Each and every tree having an over bark GBH (girth at breast height -1.37 m) by measuring the top height (in meters) and the girth (in centimetres) at breast height. The sample plot size is 0.2 ha.

All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 3336 trees consisting of 317 *Quercus spp* (1st dominant), 261 *Itea chinensis* (2nd dominant), 216 *Pandanus american* (3rd dominant), 2542 *Rest of 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 result for Kyllai- Lyngsngun are given in table 11.1 & 11.2 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 7664.36 cubic metres.

Table-11.1

Girth class wise & Species wise with respect to volume in sampled area (39 plots-area 39.36 ha) (volume in cu.m)

Girth Class Vise	1st dominant Quercus spp.	2nd dominant Itea chinensis	3rd dominant Pandanus american	Rest of the species	Total
30-40	2.949	8.866	10.181	72.640	**94.636**
41-50	5.862	8.604	2.395	86.491	**103.352**
51-60	6.732	4.409	0.844	58.19	**70.175**
61-70	2.720	0	0	50.944	**53.664**
71-80	1.762	0	0	21.832	**23.594**
81-90	0.42	0	0	12.629	**13.045**
91-100	1.197	0	0	8.141	**9.338**
101-110	0.000	0	0	10.166	**10.166**
111-120	0.847	0	0	10.573	**11.420**
121-130	0	0	0	0	**0.000**
131-140	0	0	0.000	0	**0.000**
141-150	0	0	0	0.000	**0.000**
151 & above	0	0	0	0.000	**0.000**
Total	**22.485**	**21.879**	**13.42**	**331.606**	**389.390**

Girth class wise with respect to area

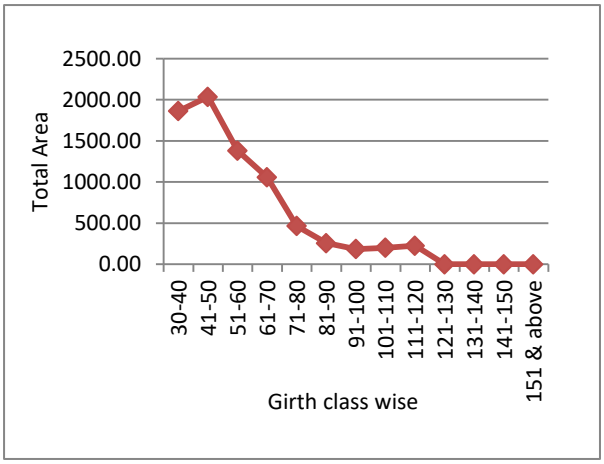


Table-11.2

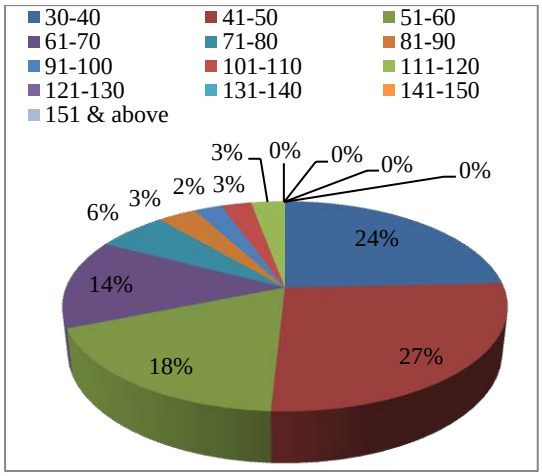
Girth class wise & Species wise volume in the entire grove (Area 39.36 ha)

Girth Class Vise	1st dominant Quercus spp.	2nd dominant Itea chinensis	3rd dominant Pandanus american	Rest of the species	Total (for 8 ha area)	Total (for39.36ha area)
30-40	58.05	174.51	200.39	1429.77	1862.72	24.30
41-50	115.38	169.35	47.14	1702.40	2034.28	26.54
51-60	132.51	86.78	16.61	1145.35	1381.25	18.02
61-70	53.54	0.00	0.00	1002.73	1056.27	13.78
71-80	34.68	0.00	0.00	429.72	464.40	6.06
81-90	8.19	0.00	0.00	248.58	256.76	3.35
91-100	23.56	0.00	0.00	160.24	183.80	2.40
101-110	0.00	0.00	0.00	200.10	200.10	2.61
111-120	16.67	0.00	0.00	208.11	224.78	2.93
121-130	0.00	0.00	0.00	0.00	0.00	0.00
131-140	0.00	0.00	0.00	0.00	0.00	0.00
141-150	0.00	0.00	0.00	0.00	0.00	0.00
151 & above	0.00	0.00	0.00	0.00	0.00	0.00
Total	442.57	430.64	264.15	6527.00	7664.36	100.00
%wrt total volume	5.77	5.62	3.45	85.16	100.00	

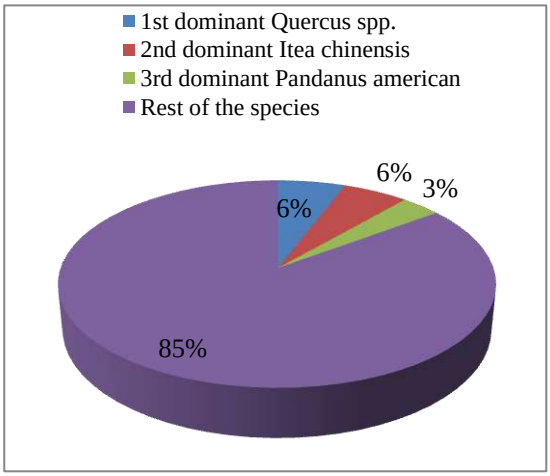
The table indicates that the volume contributed by the 1st dominant species (*Quercus* spp*)* with respect to the total volume of the grove is 5.77%, the 2nd dominant species (*Itea chinensis*) with respect to the total volume of the grove is 5.62%, 3rd dominant species *(pandanus american)* is 3.45 % while rest of the species is maximum i.e.85.16 %. Total volume of the grove is 7664.36 cubic metres.

From the above 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.

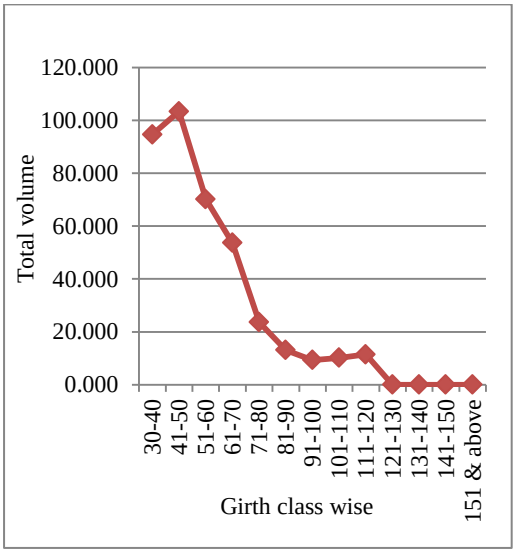
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view Kyllai- Lyngsngun

11.8 Number of Stems:

Number of stems in each girth class and species wise are given in the table 11.3 & 11.4. The table shows that maximum numbers of stems are found in lower girth classes i.e. from 30-40 cm to 91-100 cm classes.

Table-11.3

Girth class wise & Species wise No. of stems in the entire grove (39 plots-area 39.36 ha)

Girth Class Vise	1st dominant Quercus spp.	2nd dominant Itea chinensis	3rd dominant Pandanus american	Rest of the species	Total
30-40	153	180	191	1450	**1974**
41-50	87	63	21	634	**805**
51-60	53	18	4	238	**313**
61-70	14	0	0	136	**150**
71-80	6	0	0	40	**46**
81-90	1	0	0	18	**19**
91-100	2	0	0	9	**11**
101-110	0	0	0	9	**9**
111-120	1	0	0	8	**9**
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 =	**317**	**261**	**216**	**2542**	**3336**

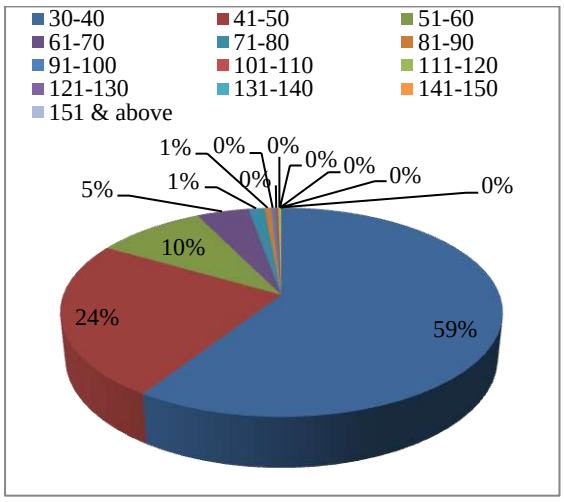
Table-11.4

Girth class wise & Species wise No. of stems in the entire grove (area 39.36 ha)

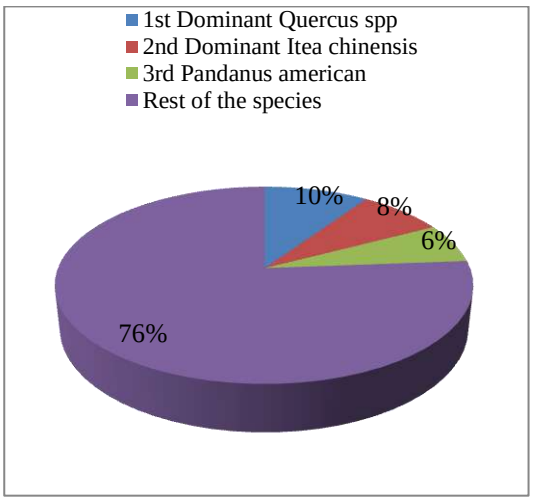
Girth Class Vise	1st dominant Quercus spp.	2nd dominant Itea chinensis	3rd dominant Pandanus american	Rest of the species	Total
30-40	1224	1440	1528	11600	15792
41-50	696	504	168	5072	6440
51-60	424	144	32	1904	2504
61-70	112	0	0	1088	1200
71-80	48	0	0	320	368
81-90	8	0	0	144	152
91-100	16	0	0	72	88
101-110	0	0	0	72	72
111-120	8	0	0	64	72

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 =	2536	2088	1728	20336	26688

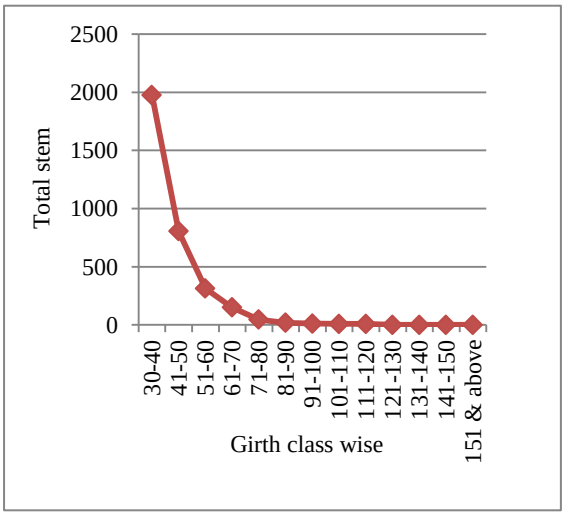
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Field exercise graph at Kyllai- Lyngsngun



Inside view of Kyllai- Lyngsngun

11.9 Brief note on Management of Kyllai –Lungsngun Law Lyngdoh Kur Lai Kpoh Paliar, Demnar.

(i) Protection from Biotic Interfernece:-

There is no restriction for entry or exit in this grove for both human and livestocks. However the kur dorbar of Kur Lai Kpoh Paliar strictily prohibits cutting or felling of tree without the permission from the Kur Dorbar. Permission for felling or extraction of trees is only accorded at times of emergency. Although there is no report of illicit felling of tree/ timber, and poaching but as the forest is left open, there are chance of illicit activities to take place in the near future. During the field enumeration survey unwarrant grazing were being noticed. If declared as a community Reserve, this beautiful forest patch can be protected from biotic interferances and paramount on perservation of its rich biological diversity.

(ii) Fire Control:-

Though reports, there are occurance of forest fire, perhaps mitigation measure such as creation of fire line within and on its boundary respectively are needed. This will help to presrve the rich natural resources of the grove.

(iii) Water Stream:-

There are numerous season streams i.e Wah Tdong, Phinam steam and Wah[Phud] Mawdhung Shyngrang stream so construction of check dams to improved water supply of wild life as well as improved soil moisture content of the soil is recommended to prevent erosion and spread of fire incidences.

(iv) Aforestation:-

Numerous open patches within this forest can be taken up for natural regeneration, aided natural regeneration or artificial regeneration.

(v) Awareness Campaign:-

The innate civic scene that leads to the conservation efforts of the villagers and kur can be add impetus by the grass root level training/seminar on the modern technique of forest-natural resources management. Poster campaigns can be taken up as to further remind/ educate/ inculcate/ motivate the local about the ecological and environment issued such as climate change.

12 - Law Adong Swer Dohling, East Khasi Hills District

12.1 Location:

Law Adong Swer Dohling sacred grove is situated in East Khasi Hills District of Meghalaya at Swer village under the Hima Sohra Syiemship. It covers an area of 7.32 ha and lies between 25° 23′ 42" to 25° 23′ 58″ N latitude and 91° 47′ 08″ to 91° 47′ 04″ E Longitude with an altitude of 1807 m above mean sea level. It is bounded in the North by Khlaw Raid Swer, East by Sohryngkham area, Khlaw Raid Swer & South- West by Khlaw Raid Swer, Lad Mawrah area, Wah Ri long stream and Khlaw Raid Swer area. The grove is accessible by road from Shillong which is about 38 km.

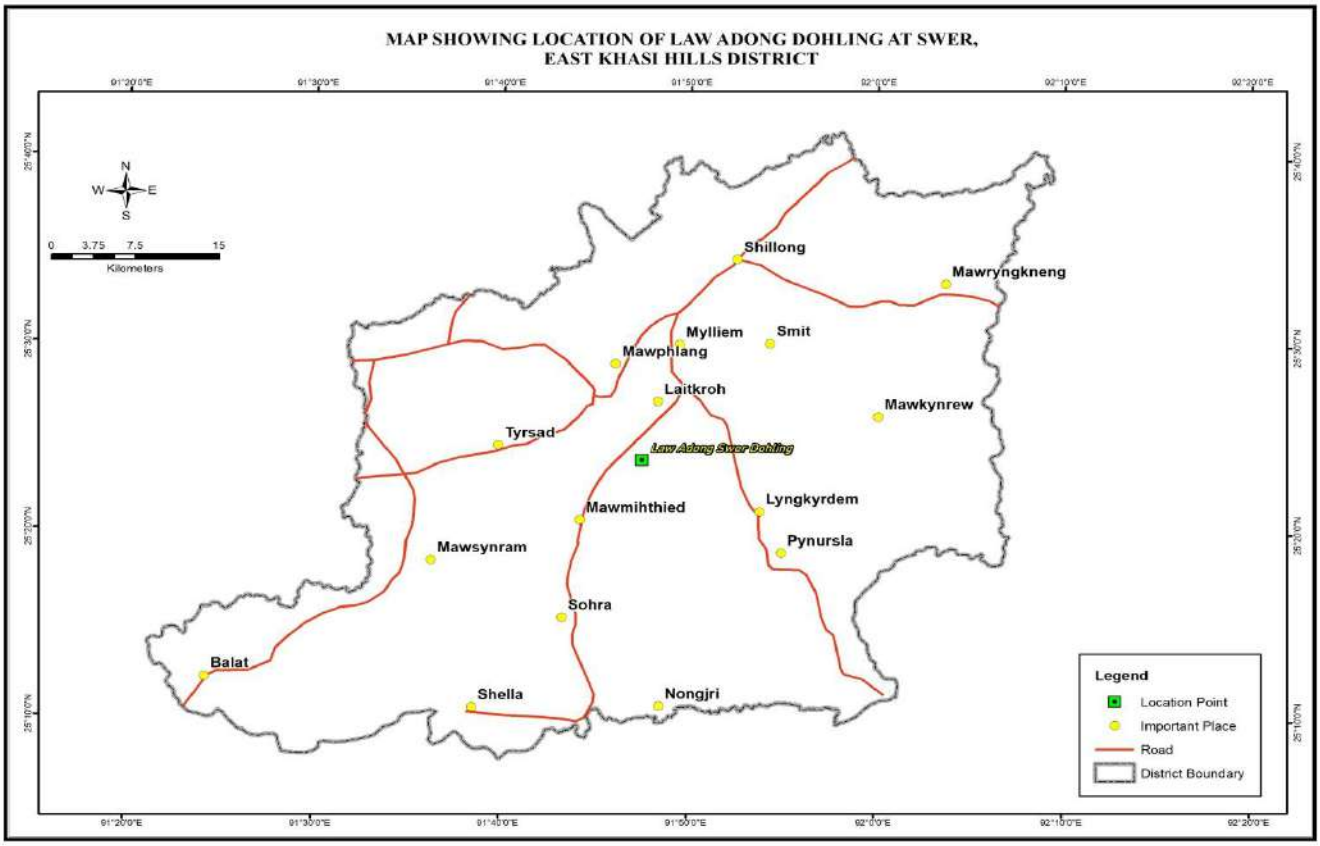
12.2 Brief History:

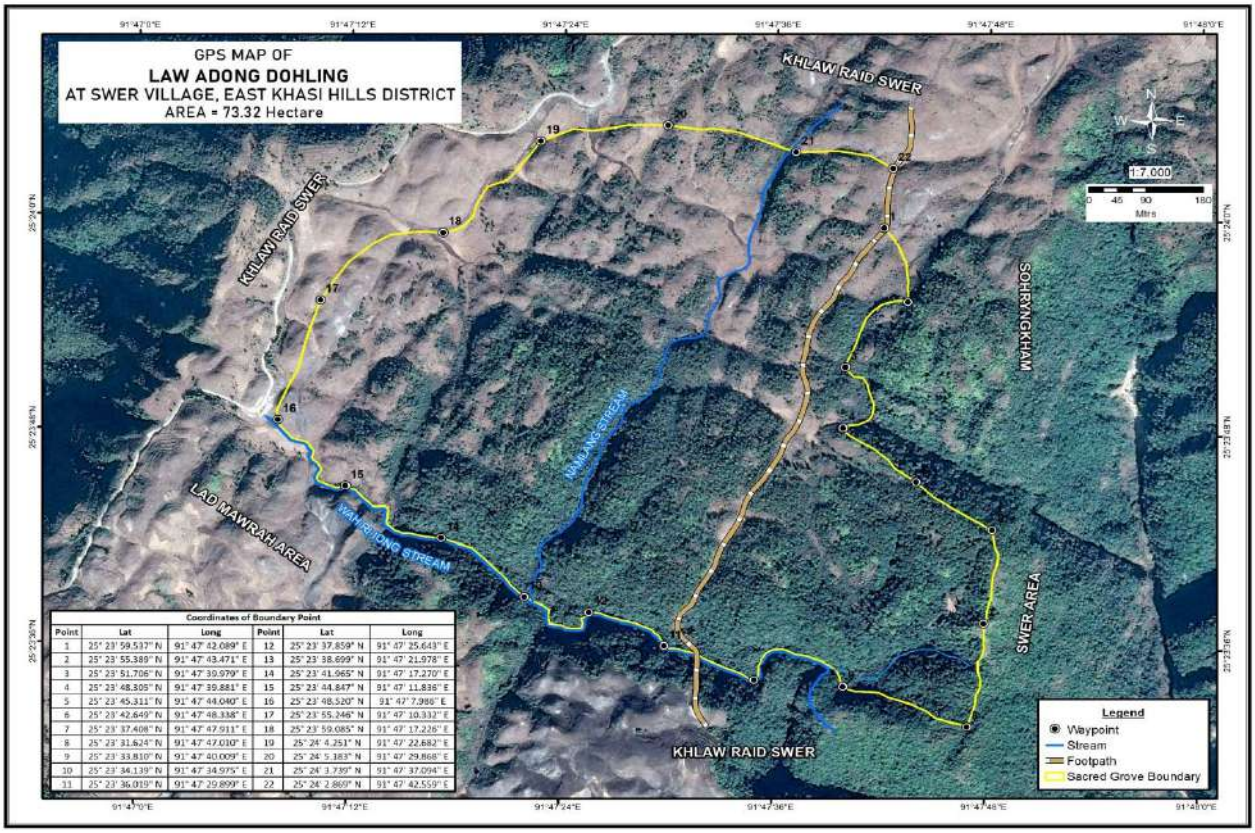
The grove has been originated since decades ago. The religious significance of the Sacred Grove has declined since the arrival of Christianity in the area. The grove is owned by the village community under the lookout and control by the Headman elected by the villagers. The ecological significance of the Sacred grove is still up hold by the village, therefore till today conservation and preservation of the grove is still part and parcel of the Village Administration and Management. Entry inside the grove is not illegal but green felling of timber is strictly prohibited and punishable under rule framed by the village Dorbar.

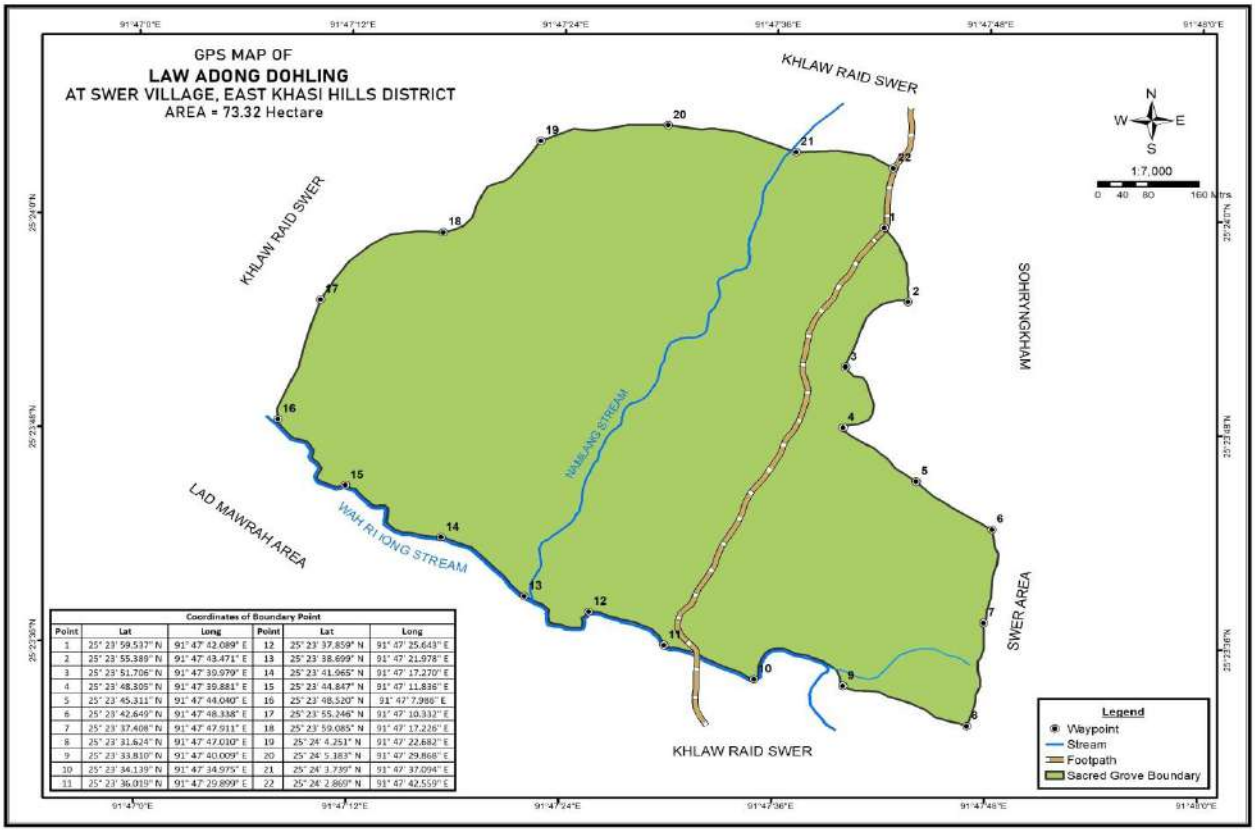
12.3 Geography and Climate:

Topography of the grove is gentle rolling in nature, with slop varying from 4° to 15°. It falls under South West aspect. The soil texture is Sandy-loamy with no coarse fragment and slightly compact in consistency and black in colour with 15-30 cm soil dept. There is one perennial stream which flow out from this grove i.e. Wah Ri Long stream.

Swer is located in a spectacular location with the year round rain, which has just one monsoon season. The Rainfall varies from heavy to medium to light. The summer month is from March to May, the rainfall during this season is moderate. The monsoon/ rainy season receive the maximum rainfall i.e. June to September. Biotic pressure such as encroachment, Wild fire, hunting, poaching, and illegal timber felling of trees are absent in this grove, while grazing had been observed to take place in the sacred grove.


MAP SHOWING LOCATION OF LAW ADONG DOHLING AT SWER,
EAST KHASI HILLS DISTRICT
N
W
E
S
0 3.75 7.5 15
Kilometers
Shillong
Mawryngkneng
Mylliem
Smit
Mawphlang
Laitkroh
Mawkynrew
Tyrsad
Law Adong Swer Dohling
Mawmihthied
Lyngkyrdem
Pynursla
Mawsynram
Sohra
Balat
Shella
Nongjri
Legend
Location Point
Important Place
Road
District Boundary


GPS MAP OF
LAW ADONG DOHLING
AT SWER VILLAGE, EAST KHASI HILLS DISTRICT
AREA = 73.32 Hectare
KHLAW RAID SWER
KHLAW RAID SWER
SOHRYNGKHAM
LAD MAWRAH AREA
MAWLONG STREAM
SWER AREA
KHLAW RAID SWER
1:7,000
0 45 90 180
Mtrs
Coordinates of Boundary Point
Point | Lat | Long | Point | Lat | Long
1 | 25° 23' 59.537" N | 91° 47' 42.089" E | 12 | 25° 23' 37.859" N | 91° 47' 25.643" E
2 | 25° 23' 55.389" N | 91° 47' 43.471" E | 13 | 25° 23' 38.699" N | 91° 47' 21.978" E
3 | 25° 23' 51.706" N | 91° 47' 39.979" E | 14 | 25° 23' 41.965" N | 91° 47' 17.270" E
4 | 25° 23' 48.305" N | 91° 47' 39.881" E | 15 | 25° 23' 44.847" N | 91° 47' 11.836" E
5 | 25° 23' 45.311" N | 91° 47' 44.040" E | 16 | 25° 23' 48.520" N | 91° 47' 7.986" E
6 | 25° 23' 42.649" N | 91° 47' 48.338" E | 17 | 25° 23' 55.246" N | 91° 47' 10.332" E
7 | 25° 23' 37.408" N | 91° 47' 47.911" E | 18 | 25° 23' 59.085" N | 91° 47' 17.226" E
8 | 25° 23' 31.624" N | 91° 47' 47.010" E | 19 | 25° 24' 4.251" N | 91° 47' 22.682" E
9 | 25° 23' 33.810" N | 91° 47' 40.009" E | 20 | 25° 24' 5.183" N | 91° 47' 29.868" E
10 | 25° 23' 36.139" N | 91° 47' 34.975" E | 21 | 25° 24' 3.739" N | 91° 47' 37.094" E
11 | 25° 23' 36.019" N | 91° 47' 29.899" E | 22 | 25° 24' 2.869" N | 91° 47' 42.559" E
Legend
Waypoint
Stream
Footpath
Sacred Grove Boundary



12.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove is ***type 9/C2 Assam Sub-Tropical Pine Forest***.

12.5 Flora and Fauna:

The vegetation type is of mixed *species* consisting mainly of *Myrica nagi species* and *Lithocurpus fenestrata* as dominant species. The origin of the forest is of natural in nature and it is of two storeyed layers. The wildlife found within the grove are jungle fowls, numerous aves species. Conservation significance of the grove is mainly due to:

i. High level endemic plants and animal species which is significant from biodiversity forest of view.
ii. Existence of many rare and endangered plants species.
iii. Restrictions-"do's and don'ts;" help the sacred grove in conservation of Flora and fauna and maintaining of rich natural resources.

12.6 Flora species:

List of trees species found in Law Adong Swer Dohling, East Khasi Hills

Sl.No.	Botanical Name	Local Name	Family
1	*Albizziaprocera*	Dienglasohriew/sohriew	*Fabaceae*
2	*Alstoniascholaris*	Diengjyrtieng	Apocynaceae
3	*Aralia armata*	Dienglatymphu	*Araliaceae*
4	*Aralia armata*	Diengsohpaitrisang	*Belutaceae*
5	*Artocarpuslakoocha*	Diengsohsytet	*Moraceae*
6	*Betulaalnoides*	Dienglieng	*Belutaceae*
7	*Cameliacaduca*	Diengtyrnem	*Fagaceae*
8	*Carpinusviminea*	Diengsohpaitrisang	*Belutaceae*
9	*Castanopsisarmata*	Diengsning	*Fagaceae*
10	*Cinnamomumpauciflorum*	Diengtyrthia/thyrthia	Lauraceae
11	*Citrus latipes*	Diengsohkynphor	*Rutaceae*
12	*Cryptomaria japonica*	Diengksehbilat	*Pinaceae*
13	*Docyniaindica*	Diengsohphohkhasi	*Rosaceae*
14	*Elaeocarpuslanceaefolios*	Diengsohkhyllam	*Elaeocarpaceae*
15	*Engelhardiaspicata*	Dienglymba	*Juglandaceae*
16	*Euryaacuminata*	Diengpyrshit	*Theaceae*
17	*Ex-Bucklandiapopulnea*	Diengdoh	*Hamamelidaceae*
18	*Grewiaabutilifolia*	Diengsohmeblang	*Tiliaceae*
19	*Ilex graffithii*	Diengjakrai/sohkhawkrai	Aquifoliaceae
20	*Ilex spp*	Diengsohlarmaw	Aquifoliaceae
21	*Iteachinensis*	Diengsohsyrtet	*Iteaceae*
22	*Ligustrumlucidium*	Diengsohpaiat	*Oleaceae*
23	*Lithocarpusferestrata*	Diengjing	*Fagaceae*
24	*Litsaeameissneri*	Diengsohrang	*Anacardiaceae*
25	*Macarangaspp*	Diengthalapmasi	Euphorbiaceae
26	*Micheliapunduanaoblonga*	Diengsohniar	*Magnoliaceae*
27	*Myricaindica*	Diengsohphie	*Myricaceae*
28	*Myricanagi*	Diengsohliya	*Myricaceae*
29	*Pinuskhasiana*	Diengkseh	*Pinaceae*
30	*Pyruskhasiana*	Diengsohshur	*Rosaceae*
31	*Rhododendron arborium*	Diengtiewsaw	*Ericaceae*
32	*Saurauiapunduana*	Diengjalngap	*Actinidiaceae*
33	*Schimakhasiana*	Diengngan	*Theaceae*
34	*Sterculiavillosa*	DiengTluh	*Malvaceae*
35	*Symplocoskhasiana*	Diengpei	*Symplocaceae*
36	*Symplocosperifolia*	Diengpeilieh	*Symplocaceae*
37	*Symplocostheoefolia*	Diengpeiiong	*Symplocaceae*
38	*Vacciniumgraffithianium*	Diengsohryngkham	*Ericaceae*
39	*Viburnum carilifolium*	Diengsohlangksew	*Adoxaceae*
40	*Wendlandiatinctoria*	DiengShadmoit	*Rubiaceae*

List of Shrubs, herbs, climbers & bamboo found in Law Adong Swer Dohling, East Khasi Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1.	Lajarem lieh	*Clerodendrum viscosum*	Verbenaceae

2.	Dieng sohniang riang blei	Not listed	Not listed
3.	Dieng soh phong phong	Not listed	Not listed
4.	Dieng lasi sia	Not listed	Not listed
5.	Dieng smaw	Not listed	Not listed
6.	Dieng sohtait	Not listed	Not listed
7.	Dieng eit miang	Not listed	Not listed
8.	Dieng soh kynruin	Not listed	Not listed
9.	Dieng soh pyrsit	*Eurya acuminata*	Theaceae
10.	Dieng sohjabuit	*Phlogacanthus thyrsiflorus*	Acanthaceae
11.	Jarem iong	*Clerodendrum colebrookianum*	Verbenaceae
12.	Synsar	*Thysanolaena maxima*	Poaceae
13.	Kait khlaw	*Musa acuminata*	Musacaea
14.	Dieng rnong	*Mahonia pycnophylla*	Berberidaceae
15.	Soh lang	*Viburnum foetidum*	Caprifoliaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1.	Slamet	*Phrynium*	Pubinevve
2.	Kynbationg	*Ageratina*	*Adenophora*

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1.	Kophi khlaw	*Coffea jenkinsii*	Rubiaceae
2.	Dieng longkhasaw (Jyrmi)	Not listed	Not listed
3.	Jyrmi sohthied	Not listed	Not listed
4.	Pew shrieh	*Hedera nepalensis*	Araliaceae
5.	Soh shang khlor	*Elaeagnus pyriformis*	Elaeagnaceae
6.	Sla kynda jyrmi	*Pothos scandens*	Araceae
7.	Loapla	*Rhaphidophora decursiva*	Araceae
8.	Dieng sohmatan/sohpdong	*Stephania glabra*	Menispermaceae

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1.	Dieng tiew kait	*Anaphalis adnata*	
2.	Dieng tiew mationg	*Dendrobium chrysanthum,*	
3.	Dieng lyngskaw	*Dendrobium densiflorum*	
4.	Dieng klong ramsong	*Cymbidium longifolium*	

BAMBOO

Sl	Local Name	Botanical Name	Family

No.			
1.	Shken	*Bambusa pallida*	Poaceae

CREEPER

Sl No.	Local Name	Botanical Name	Family
1.	Kynbat sohmynkea	*Cardamiae debilis*	
2.	Sohned bah	*Rubus rogosus*	
3.	Tmain Khla	*Lycopodoum cernuum*	

12.7 Growing Stock:

As per the methodology described in Chapter-II, 10% enumeration is carried out in the grove as its area is more than 50 ha. Every tree species, having girth (over bark) at breast height more than 30 cm is enumerated by measuring the top height (in meters) and the girth (in centimeters) at breast height.

All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 2802 trees consisting of 261 *Myrica nagi* (1st dominant), 180 *Lithocurpus fenestrata* (2nd dominant), 101 *Rhododendron arborium* (3rd dominant), 1736 *Pinus khasiana* and 524 *Rest of 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 result for Law Adong Swer Dohling are given in table 12.1 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 481.324 cubic metres.

Table-12.1

Girth class wise & Species wise with respect to total volume (in area 7.32 ha)

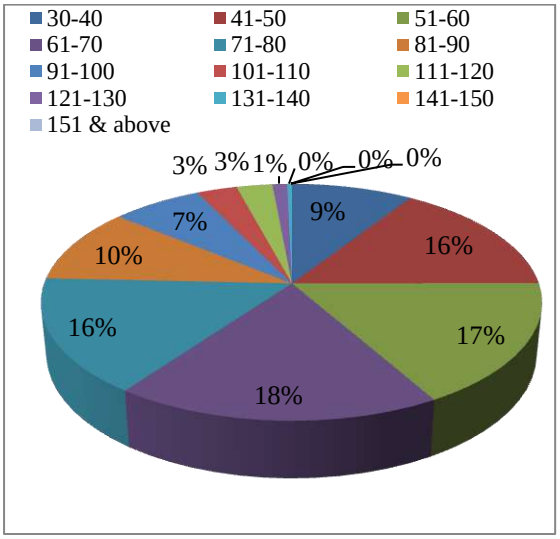
(volume in cu.m)

Girth Class Vise	1st dominant Myrica Nagi	2nd dominant Lithocurpus fenestrata	3rd dominant Rhododendron arborium	Rest of the species	Pinus khasiana	Total	% with respect to total volume
30-40	6.157	3.642	0.724	13.819	19.628	**43.970**	9.135
41-50	11.147	7.897	1.481	16.059	39.552	**76.136**	15.818
51-60	10.09	7.315	0.788	13.109	49.548	**80.850**	16.797
61-70	4.333	4.182	0.154	13.800	65.265	**87.734**	18.228
71-80	2.555	3.355	0	5.342	64.422	**75.674**	15.722
81-90	1.42	2.046	0.271	4.312	41.521	**49.569**	10.298
91-100	1.728	0	0	4.599	26.413	**32.740**	6.802
101-110	0	1.066	0	4.398	9.147	**14.611**	3.036
111-120	0	0	0	6.100	6.863	**12.963**	2.693
121-130	0	0	0	0	5.362	**5.362**	1.114
131-140	0	0	0	0	1.715	**1.715**	0.356
141-150	0	0	0	0	0	**0.000**	0.000
151 & above	0	0	0	0	0	**0.000**	0.000
Total	**37.429**	**29.503**	**3.418**	**81.538**	**329.436**	**481.324**	**100.000**
% wrt Total volume	**7.776**	**6.130**	**0.710**	**16.940**	**68.444**	**100.00**	

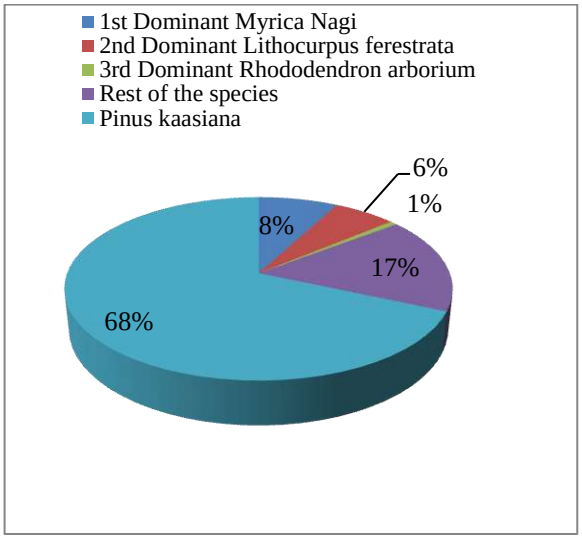
The table indicates that the volume contributed by the 1st dominant species (*Myrica nagi)* with respect to the total volume of the grove is 7.776%, the 2nd dominant species (*Lithocurpus fenestrata*) with respect to the total volume of the grove is 6.130%, 3rd dominant species *(Rhododendron arborium)* is 0.710 %, *(Pinus khasiana)* is 68.444% while rest of the species is maximum i.e.16.940 %. Total volume of the grove is 481.324 cubic metres.

From the above 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.

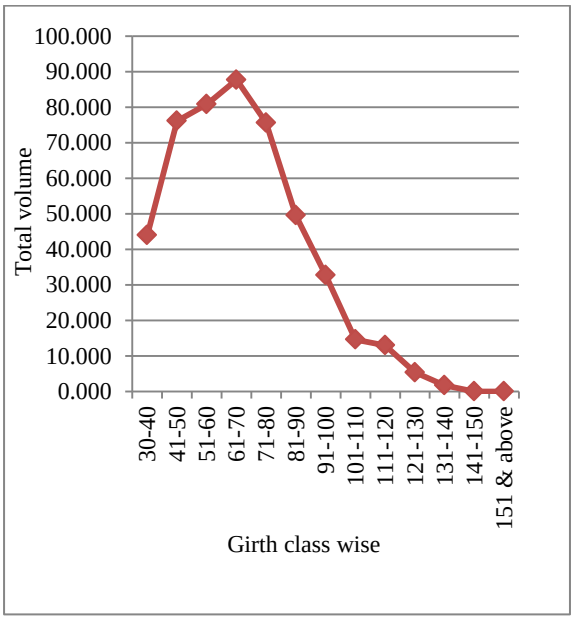
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view Law Adong Swer Dohling

Table-12.2

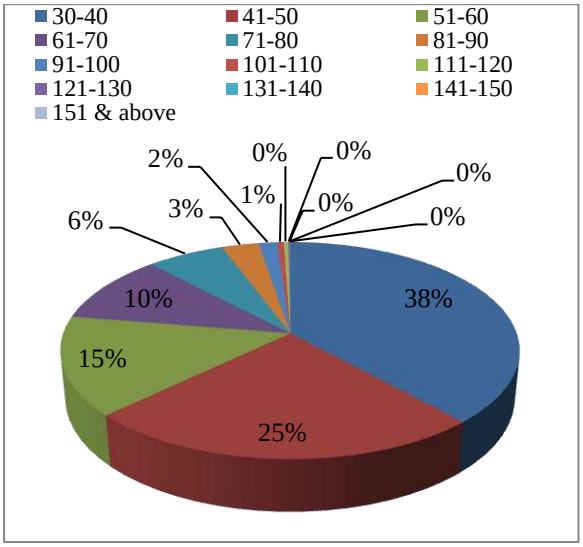
Girth class wise & Species wise No. of stems in the entire grove (Area 7.32 ha)

Girth Class Vise	1st dominant Myrica Nagi	2nd dominant Lithocurpus fenestrata	3rd dominant Rhododendron arborium	Rest of the species	Pinus khasiana	Total
30-40	118	72	62	291	529	**1072**
41-50	81	56	29	115	408	**689**
51-60	41	30	8	53	281	**413**
61-70	12	11	1	36	231	**291**
71-80	5	7	0	10	157	**179**
81-90	2	3	1	6	73	**85**
91-100	2	0	0	5	36	**43**
101-110	0	1	0	4	10	**15**
111-120	0	0	0	4	6	**10**
121-130	0	0	0	0	4	**4**
131-140	0	0	0	0	1	**1**
141-150	0	0	0	0	0	**0**
151 & above	0	0	0	0	0	**0**
Total =	**261**	**180**	**101**	**524**	**1736**	**2802**

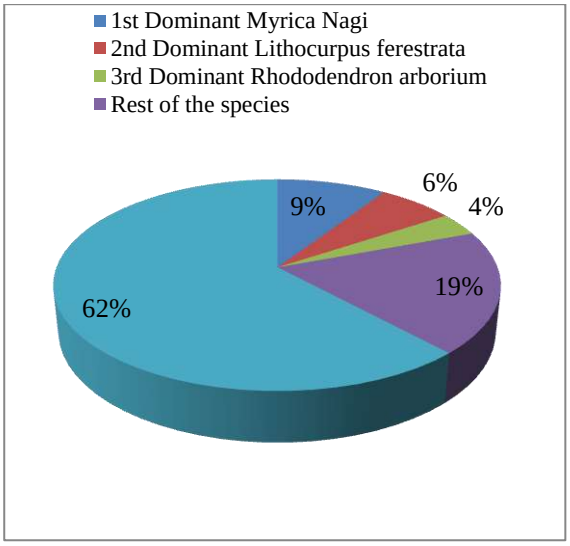
12.8 Number of Stems:

Number of stems in each girth class and species wise are given in the table 12.2. The table shows that maximum numbers of stems are found in lower girth classes i.e. from 30-40 cm to 91-100 cm classes.

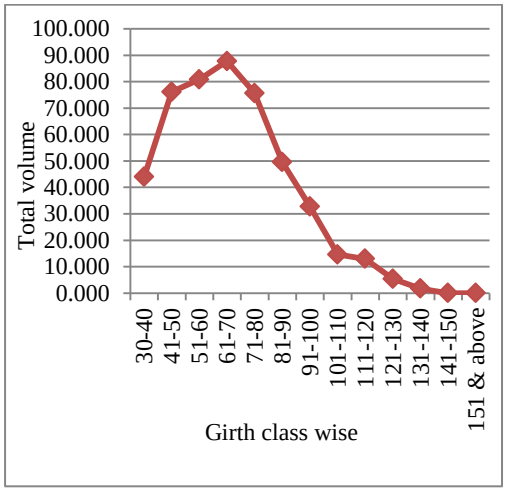
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Field exercise graph at Law Adong Swer Dohling



Inside view of Law Adong Swer Dohling

12.9 Brief note on Management of Law Adong Swer Dohling

(i) Protection from Biotic Interfernece:-

There is no restriction for entry or exit in this grove for both human and livestocks. However the village dorbar of Swer strictily prohibits cutting or felling of tree without the permission from the Dorbar. Although there is no report of illegal felling of timber and poaching, but as thre forest is left open, there are chance of such illegal activities in the near future. If declared as a community Reserve, this beautiful sylvan can be protected from biotic interferances.

(ii) Fire Control:-

Though there is no report of intentional or unintentional fire in this grove, it will be more prudent to take preventive mitigation steps, in the near future. External and internal fire line can be created all along the boundary and within of the grove. This will help to presrve the rich natural resources of the grove.

(iii) Water Stream:-

There is only one stream which flowing out from this grove i.e Wah Ri Long stream. Construction of check dams to improved water supply of wild life as well as improved soil moisture content of the soil is recommended to prevent mitigate soil erosion spread of fire incidences and enhance the soil moisture content.

(iv) Afforestation:-

Open forest and blank patches were found in some parts of the grove, perhaps there is a scope for afforestation works (NRIANR) that can be carried out to maintain its forest cover and its beauty.

(v) Awareness Campaign:-

The in-situ conservation efforts of the villagers, which per se is an example of in site conservation can be add impetus by the grass root level training on the modern technique of forest and natural resources management.

13 - Khloo Thangbru Umsympu, Mookhaialong Village, East Jaintia Hills, District.

13.1 Location:

Khloo Tangbru Umsympu is a sacred grove located at Mookhaialong Village of East Jaintia Hills District of Meghalaya. It is under the aegis of the local dorbar of Mookhaialong Village. It covers an area of 19.6 ha and lies between 25° 23′ 19″ to 25° 23′ 41″ N latitude and 92° 15′ 29″ to 92° 15′ 55″ E Longitude with an altitude of 1305 m above mean sea level. The aspect of the sacred grove is in the South-West. It is bounded on all sides by private land. The grove is accessible by road from Jowai and the distance from Jowai is around 31 km.

13.2 Brief History:

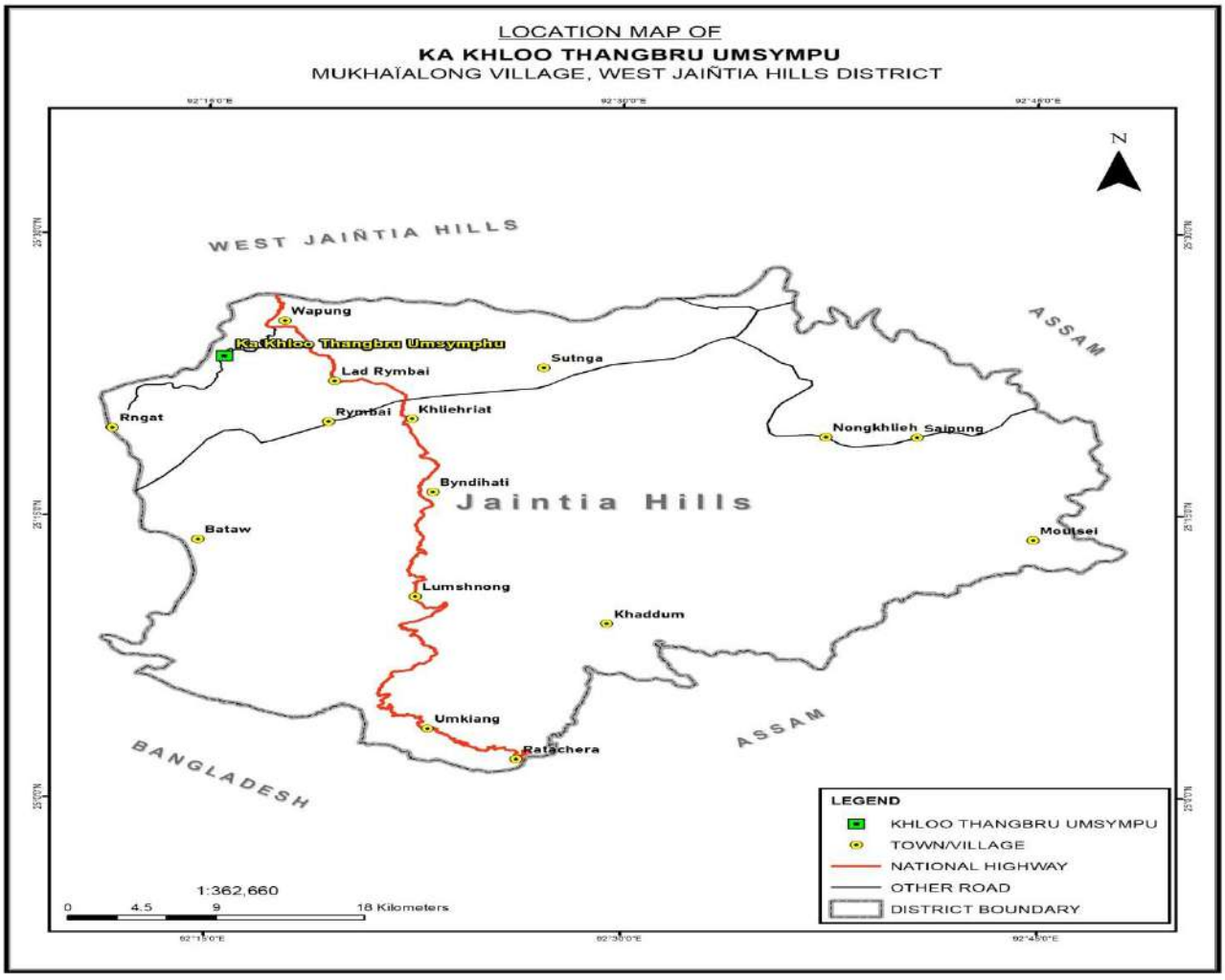
This grove has been originated many decades ago. Religious rituals are not longer performed in this grove, however, it has become a cremation place for the local believers. For the purposed of cremation a crematorium was constructed by the Department through the Social Forestry Wing in the year 2015. Entry-exit to the general public is not strictly prohibit. Entering into the grove with leather shoes and leather accessories are permitted. Felling of trees, hunting & poaching and grazing, is strictly prohibited. The state Forest Department has notified the sacred grove as a Community Reserve Forest under Section 36C of Wildlife Protection Act, 1972 vide government notification No. FOR.17/2013/Pt/44, dated 04.03.2014.

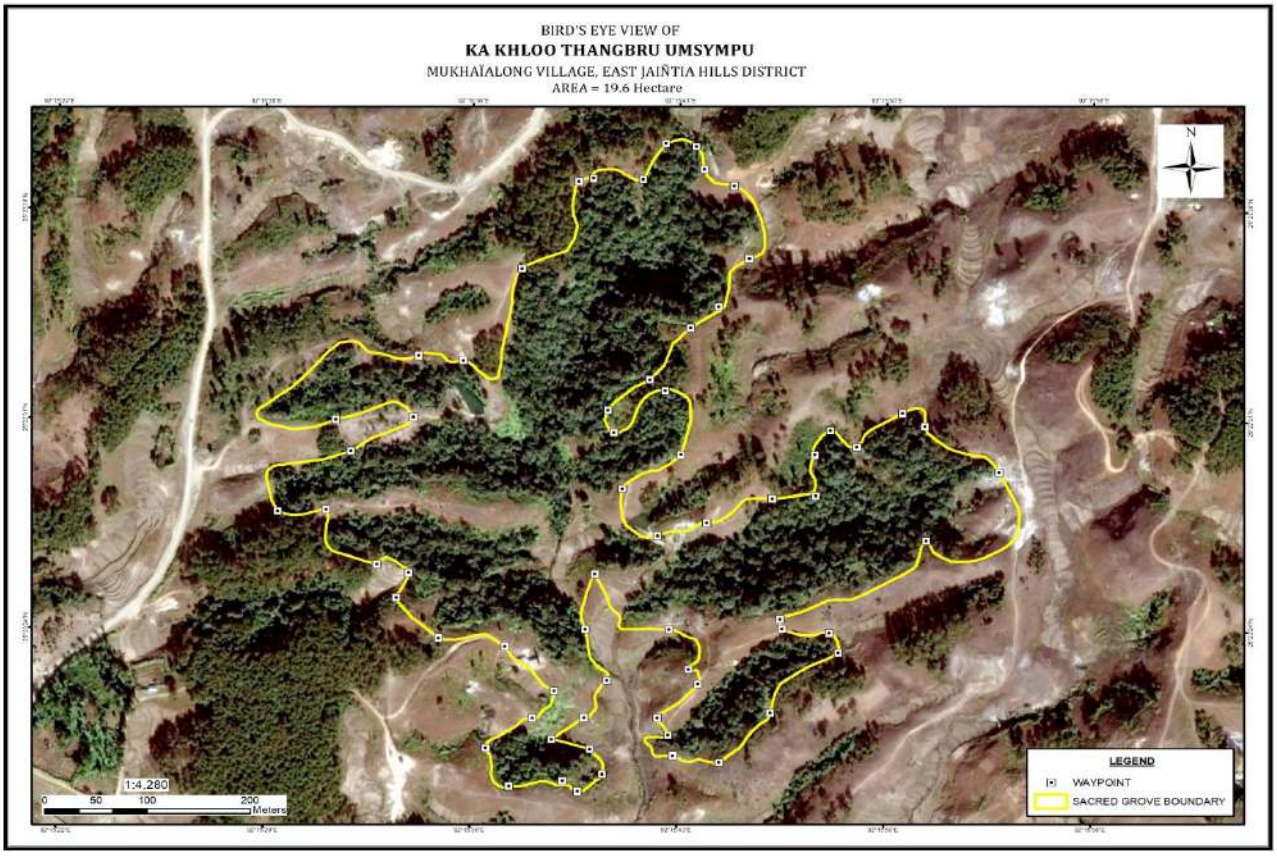
13.3 Geography and Climate:

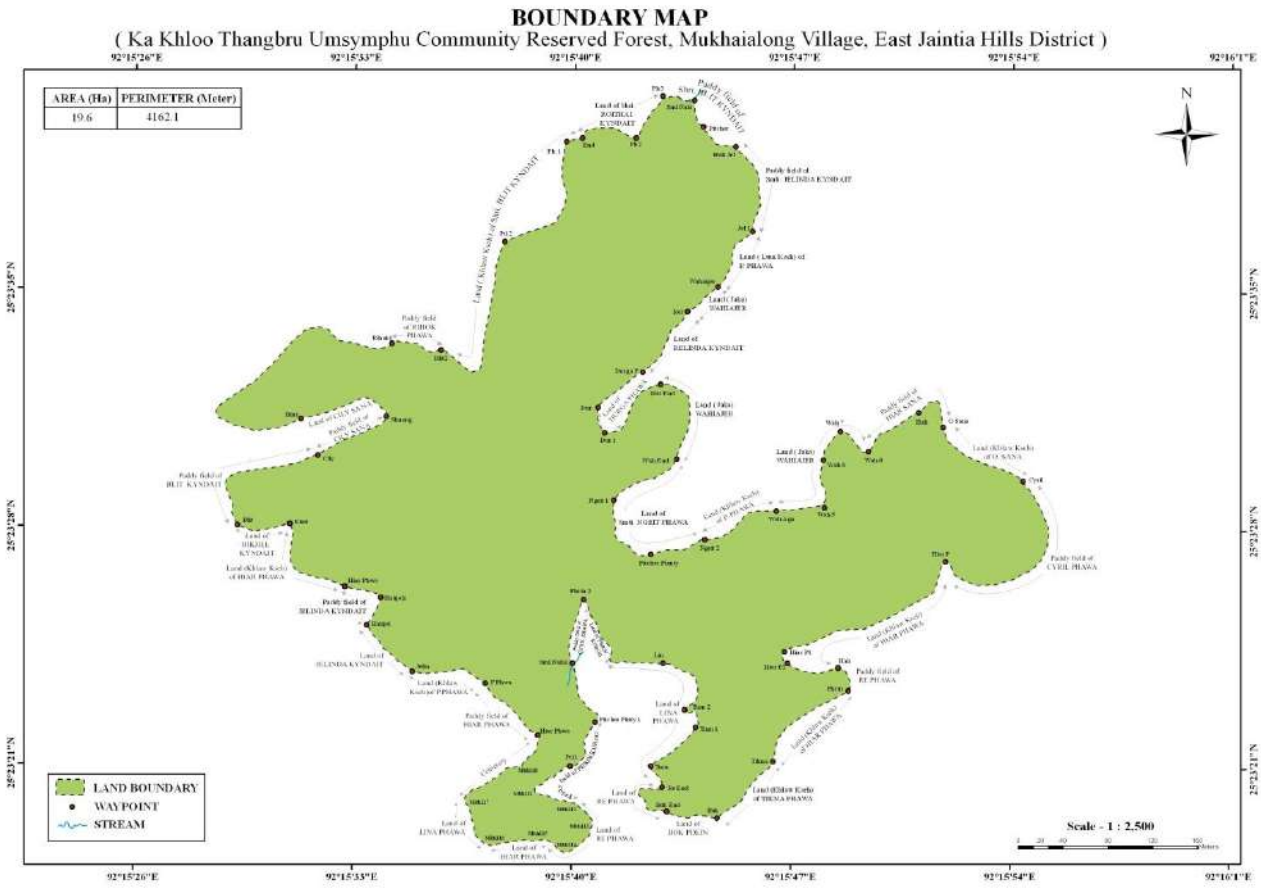
Topography of the grove is gentle rolling in nature with slope varying from 5° to 20° slope gradient. It falls under South-West aspect. The soil texture is sandy loam with slightly compact in consistency. The colour of the soil is brown with medium soil depth and no coarse fragment. As notice, there is no soil erosion in the grove. There is one perennial stream that flows out of the grove.

Mookhaialong has a moderate climate, similar to Jowai, with the average minimum temperature is 07^{o}C and average maximum is 20^{o}C. The rain fall varies from heavy to light. The summer season is from March to May, while the monsoon season starts from May and ends around October and November dawns the winter season which ends in February.

Encroachment, Wild fire, hunting, grazing, and illegal timber felling are absent in this grove.


LOCATION MAP OF
KA KHLOO THANGBRU UMSYMPU
MUKHAÏALONG VILLAGE, WEST JAIÑTIA HILLS DISTRICT
WEST JAIÑTIA HILLS
ASSAM
Wapung
Ka Khloo Thangbru Umsymphu
Lad Rymbai
Sutnga
Rymbai
Khliehriat
Rngat
Nongkhlieh Saipung
Byndihati
Jaintia Hills
Bataw
Moulsei
Lumshnong
Khaddum
Umkiang
Ratachera
BANGLADESH
ASSAM
N
LEGEND
KHLOO THANGBRU UMSYMPU
TOWN/VILLAGE
NATIONAL HIGHWAY
OTHER ROAD
DISTRICT BOUNDARY
1:362,660
0 4.5 9 18 Kilometers


BIRD'S EYE VIEW OF
KA KHLOO THANGBRU UMSYMPU
MUKHAÏALONG VILLAGE, EAST JAIÑTIA HILLS DISTRICT
AREA = 19.6 Hectare
N
LEGEND
WAYPOINT
SACRED GROVE BOUNDARY
1:4,280
0 50 100 200 Meters



13.4 Forest Type:

According to Champion & Seth classification (1968) and the floristic, the community reserve forest consists of two forest type's i.e. ***8B/C2 Khasi Sub-Tropical Wet Hill Forest*** and ***Type 9/C2 Assam Sub-Tropical Pine Forest.***

Origin of the grove is natural, however, in some patches of the grove has been plantation raised. The physiognomy of the grove is characterised by two storyed, in addition to the undergrowth. The present of weeds and grasses is scanty. Bamboo distribution within the grove is scattered, while canes are absent.

The regeneration, as notice, is inadequate.

13.5 Flora and Fauna:

The floristic is characterized by mixed type consisting mainly of *Castonopsis tribuloides, Inula cappa and Itea chinensis as 1st dominance, 2nd dominance and 3rd dominance respectively.* The relic forest is natural and it has of two storeyed. The wildlife found within the grove is jungle fowls, jackals, pangolin and many vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

i. Virgin forests where human interference is almost zero.

ii. Unique monsoon and waterfalls which have attracted many tourists both local and national and even foreigners.

iii. Existence of many rare and endangered plants species.

iv. High level endemic plants and animals species.

v. Restrictions-"do's and don'ts;" which has immensely help the sacred grove in conservation of Flora and fauna and maintaining the rich forest natural resources.

13.6 Flora species:

List of trees found in KhlooTangbru Umsympu, East Jaintia Hills

TREES

Sl.No.	Botanical Name	Local Name	Family
1	*Alstoniascholaris*	Diengrtein/rteng/rytten	*Apocynaceae*
2	*Aralia armata*	Dienglatymphu	*Araliaceae*
3	*Bucklandiapopulnea*	Diengdoh	*Hamanelidaceae*
4	*Callicarpaarborea*	Dienglakiat	*Verbanaceae*
5	*Castanopsisarmata*	Diengsning	*Fagaceae*
6	*Castanopsisarmata*	Diengpasohsyiar	*Fagaceae*
7	*Castanopsishystric*	Diengsohlatap	*Fagaceae*
8	*Castanopsisindica*	Diengsohot	*Fagaceae*
9	*Castanopsislystric*	Diengsohstap	*Fagaceae*
10	*Castanopsisspp*	Diengtyrso	*Fagaceae*
11	*Castanopsistribuloides*	Diengsning	*Fagaceae*
12	*Chisochitoncumingianus*	Diengkbublang/sohkhyllumblang	*Meliaceae*
13	*Citrus medica*	Diengsarman	*Rutaceae*
14	*Croton caudatus*	Diengsaphai	*Euphorbiaceae*
15	*Eleocapusprunifolius*	Dienglakhmar	*Elaeocarpaceae*
16	*Eleocarpusprunifolius*	Dieng ruin	*Elaeocarpaceae*
17	*Eleocarpusrobusta*	Diengsyrkiah/lasaw/ phyrnusaw	*Elaeocarpaceae*
18	*Eugenia aquea*	DiengSali	*Myrtaceae*
19	*Eugenia jambolana*	Diengsohsyrlein	*Myrtaceae*
20	*Eugenia jambolana*	Diengsohum	*Myrtaceae*
21	*Ex-blucklandiapopulnea*	Diengdoh	*Hamamelidaceae*
22	*Ficusspp*	Diengjymbublang	*Moraceae*
23	*Grewiaabutilifolia*	Diengsohmeblang	*Tiliaceae*
24	*Ilex venulosa*	Diengshyieng	*Aquifoliaceae*
25	*Inulacappa*	Dienglalieh	*Asteraceae*
26	*Iteachinensis*	Diengsohsyrtet	*Iteaceae*
27	*Ligustrumconfusom*	Diengsohplang/saplang	*Oleaceae*
28	*Linderapulcherrima*	Diengtorthia	*Lauraceae*
29	*Lithocarpuselegans*	Diengsarang	*Lauraceae*
30	*Machilusparviflora*	Diengsatler	*Lauraceae*
31	*Mahoniaaccanthifolia*	Diengsohiongkhlaw	*Berberidaceae*
32	*Micheliaspp*	Diengphaniaw	*Magnoliaceae*
33	*Morindaaugustifolia*	Dieng stem/synrai	*Rubiaceae*
34	*Myricafarquhariana*	Diengsohphie	*Myricaceae*
35	*Myricanagi*	Diengsohphieliya	*Myricaceae*
36	*Nephalensislongana*	Diengloba	*Sapindaceae*
37	*Pasaniafenestrata*	Diengsai/sasei	*Fagaceae*
38	*Pinuskhasiana*	Diengkseh	*Pinaceae*
39	*Podocarpuslatifolia*	Diengkseh um	*Podocarpaceae*
40	*Polygala arrillata*	Dienglakba	*Polygalaceae*

41	*Premnabengalensis*	Dienglieh	*Lamiaceae*
42	*Quercus*	Diengskoi	*Fagaceae*
43	*Quercusglauca*	Dieng sari	*Fagaceae*
44	*Quercusgraffithii*	Diengwah	*Fagaceae*
45	*Quercusspp*	Diengskoi saw	*Fagaceae*
46	*Rhus succedanea*	Diengkain	*Anacardiaceae*
47	*Schimakhasiana*	Diengngan	*Theaceae*
48	*Schoepfiafragrans*	Diengsaniriang	*Schoepfiaceae*
49	*Smilax glabra*	Diengsohkrut/sakrut	*Smilacaceae*
50	*Spondiasaxillaris*	Diengsohlait/salait	*Anacardiaceae*
51	*Symplocoskhasiana*	Diengdpei	*Symplocaceae*
52	*Symplocosparifolia*	Diengpeilieh	*Symplocaceae*
53	*Symplocosspp*	Diengtahpliang	*Symplocaceae*
54	*Symplocostheaeyolie*	Diengpei	*Symplocaceae*
55	*Vacciniumgriffithianum*	Diengsohryngkham	*Ericaceae*

List of Shrubs, herbs, climbers & bamboo found in Khloo Tangbru Umsympu, East Jaintia Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1	Syntiew kynthlien		
2	Tyrthia		
3	Dieng pyrsit	*Eurya acuminate*	Theaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1	Tmain khla	*Lycopodium clavatum*	Lycopodiaceae
2	Swodung		
3	Sohkrut		
4	Shiah miaw		
5	Sohkhniah		
6	Soh kristmas		
7	Tongtlang		
8	Tiew lari		
9	Tongsah		

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1	Soh sanein		
2	Soh jyrmi		
3	Soh myrsiang		
4	Soh saplait		
5	Soh mukhang		
6	Soh ibarmasi		
7	Soh laroh		

8	Soh sakruit		
9	Sohslongnar		
10	Soh pongshait		

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1	Makariang		
2	Tiew thing		
3	Tiew phongiur		

GRASSES & BAMBOO

Sl No.	Local Name	Botanical Name	Family
1	Shken	*Bambusa pallida*	Poaceae
2	Shriang sniang (phlang)		
3	Lang tdem		
4	Lang met		
5	Lang tylli		
6	Lang byrnai		
7	Lang thong		
8	Lang karam		
9	Kjait pnar		

13.7 Growing Stock:

As per the methodology described in Chapter-II, 20 % enumeration is carried out in the grove as its area is more than 10 ha and less than 50 ha. Each and every tree species which has a GBH (girth at breast height) of 30 cm and more is enumerated by measuring the top height (in meters) and the girth (in centimetres) at breast height. The sample plot is 0.2 ha. All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 1191 tree species consisting of 176 *Castanopsis tribuloides* (1st dominant), 74 *Inula cappa* (2nd dominant), 73 *Itea chinensis* (3rd dominant), 30 *Pinus kysea* and 708 *Rest of 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 result for Khloo Tangbru Umsympu are given in table 13.1 & 13.2 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 6083.85 cubic metres.

Table-13.1

Specieswise & Girth class wise volume for sampled area (20 plots - area 19.6 ha)

(volume in cu.m)

Girth class (cm)	*1st dominant Castanopsis tribuloides*	*2nd dominant Inula cappa*	*3rd dominant Itea chinensis*	*Pinus khasiana*	*Rest of Species*	*Total*
30-40	1.047	0.25	0.665	0	6.098	**8.06**
41-50	4.01	0.673	1.561	0.356	19.761	**26.361**
51-60	7.562	2.364	3.504	0	22.732	**36.162**
61-70	9.603	1.212	3.891	0.533	34.724	**49.963**
71-80	11.457	8.061	8.474	4.505	39.846	**72.343**
81-90	14.55	9.772	3.338	2.174	34.455	**64.289**
91-100	5.251	13.383	00	4.265	45.953	**68.852**
101-110	8.82	4.63	2.221	1.853	66.201	**83.725**
111-120	11.172	2.747	2.951	2.341	22.242	**41.453**
121-130	12.738	1.746	0	0	19.604	**34.088**
131-140	3.662	2.007	0	0	20.552	**26.221**
141-150	6.989		0	0	17.977	**24.966**
151 & above	2.384	4.932	0	0	77.002	**84.318**
Total	**99.245**	**51.777**	**26.605**	**16.027**	**427.147**	**620.801**

Girth class wise with respect to total area

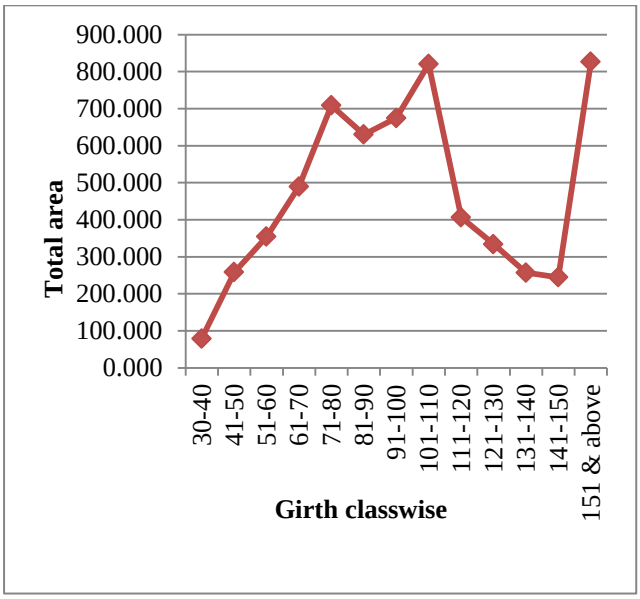


Table-13.2

Girth class wise & Specieswise in the entire grove (in area 19.6 ha)

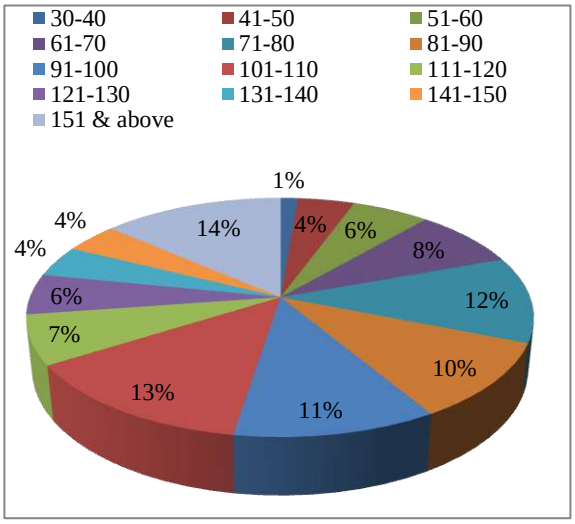
(volume in cu.m)

Girth class wise	***1st dominant Castanopsis tribuloides***	***2nd dominant Inula cappa***	***3rd dominant Itea chinensis***	***Pinus khasiana***	**Rest of the species**	**Total**	**%wrt total volume**
30-40	10.26	2.45	6.52	0.00	59.76	**78.99**	1.30
41-50	39.30	6.60	15.30	3.49	193.66	**258.34**	4.25
51-60	74.11	23.17	34.34	0.00	222.77	**354.39**	5.83
61-70	94.11	11.88	38.13	5.22	340.30	**489.64**	8.05
71-80	112.28	79.00	83.05	44.15	390.49	**708.96**	11.65
81-90	142.59	95.77	32.71	21.31	337.66	**630.03**	10.36
91-100	51.46	131.15	0.00	41.80	450.34	**674.75**	11.09
101-110	86.44	45.37	21.77	18.16	648.77	**820.51**	13.49
111-120	109.49	26.92	28.92	22.94	217.97	**406.24**	6.68
121-130	124.83	17.11	0.00	0.00	192.12	**334.06**	5.49
131-140	35.89	19.67	0.00	0.00	201.41	**256.97**	4.22
141-150	68.49	0.00	0.00	0.00	176.17	**244.67**	4.02
151 & above	23.36	48.33	0.00	0.00	754.62	**826.32**	13.58
Total	**972.60**	**507.41**	**260.73**	**157.06**	**4186.04**	**6083.85**	100.00
%wrt total volume	15.99	8.34	4.29	2.58	68.81	100.00	

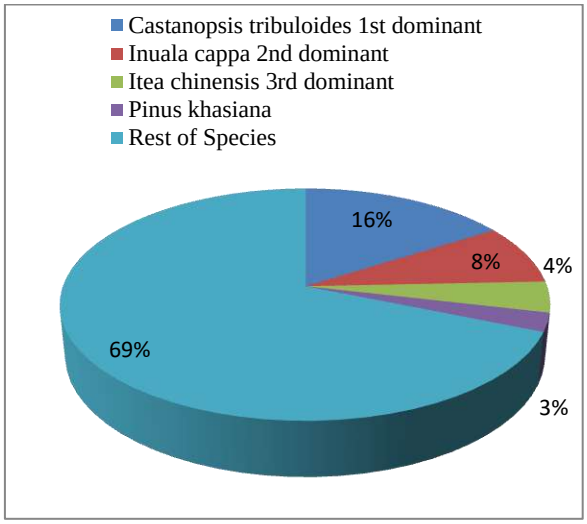
The table indicates that the volume contributed by the 1st dominant species (*Castanopsis tribuloides)* with respect to the total volume of the grove is 15.99 %, the 2nd dominant species (*Inula cappa*) is 8.34 %, 3rd dominant species *(Itea chinensis)* is 4.29 % , *Pinus khasiana is* 2.58% while rest of the species is maximum i.e.68.81%. Total volume of the grove is 6083.85 cubic metres.

From the above 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.

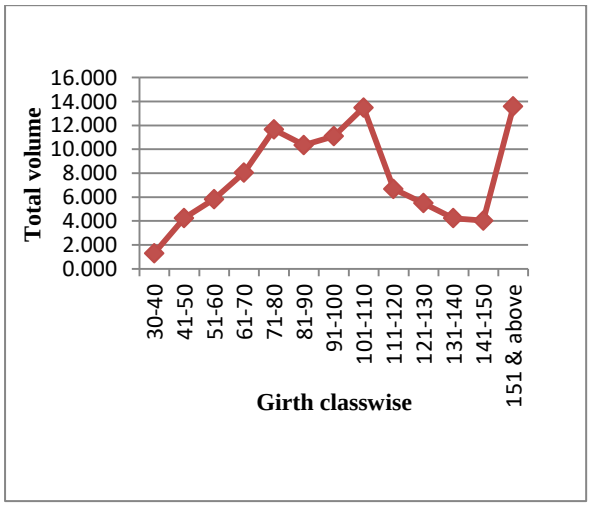
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view of Khloo Tangbru Umsympu

13.8 Number of Stems:

Number of stems in each girth class is species wise as given in the table 13.3 & 13.4. The table shows that maximum numbers of stems are found in lower girth classes i.e. from 30-40 cm to 91-100 cm classes.

Table-13.3

Girth class wise & Species wise No. of stems in the sampled (20 plots - area 19.6 ha)

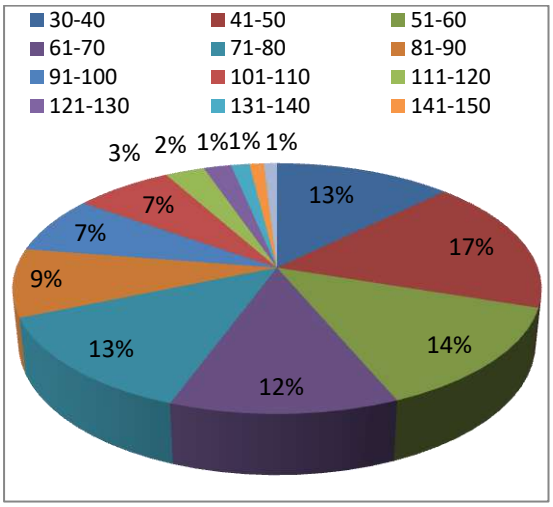
Girth class (cm)	*1st dominant Castanopsis tribuloides*	*2nd dominant Inula cappa*	*3rd dominant Itea chinensis*	*Pinus khasiana*	*Rest of Species*	*Total*
30-40	16	3	12		104	**135**
41-50	28	4	12	3	137	**184**
51-60	29	10	14		91	**144**
61-70	24	3	10	2	88	**127**
71-80	22	15	16	11	75	**139**
81-90	21	14	5	4	49	**93**
91-100	6	15		6	51	**78**
101-110	8	4	2	2	59	**75**
111-120	8	2	2	2	16	**30**
121-130	8	1			12	**21**
131-140	2	1			11	**14**
141-150	3				8	**11**
151 & above	1	2			7	**10**
Total	**176**	**74**	**73**	**30**	**708**	**1061**

Table-13.4

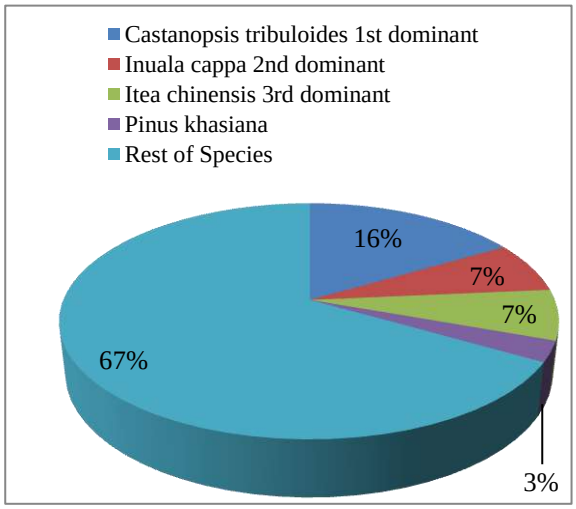
Girth class wise & Species wise No. of stems in the entire grove (Area 19.6 ha)

Girth class (cm)	*1st dominant Castanopsis tribuloides*	*2nd dominant Inula cappa*	*3rd dominant Itea chinensis*	*Pinus khasiana*	*Rest of Species*	*Total*
30-40	64	12	48	0	416	**124**
41-50	112	16	48	12	548	**188**
51-60	116	40	56	0	364	**212**
61-70	96	12	40	8	352	**156**
71-80	88	60	64	44	300	**256**
81-90	84	56	20	16	196	**176**
91-100	24	60	0	24	204	**108**
101-110	32	16	8	8	236	**64**
111-120	32	8	8	8	64	**56**
121-130	32	4	0	0	48	**36**
131-140	8	4	0	0	44	**12**
141-150	12	0	0	0	32	**12**
151 & above	4	8	0	0	28	**12**
Total	**704**	**296**	**292**	**120**	**2832**	**1412**

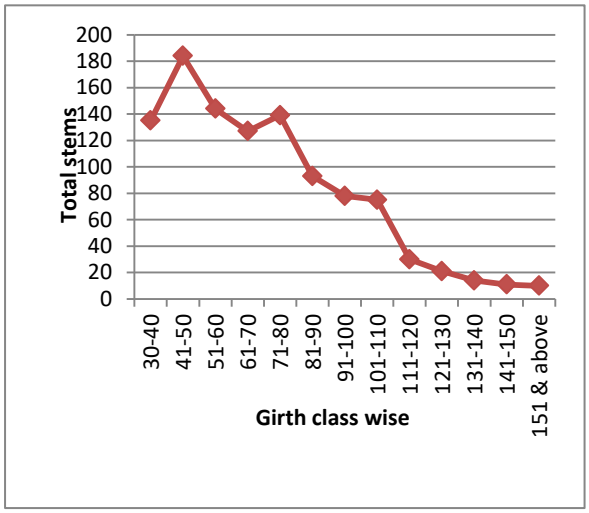
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Girth class wise stem with respect to total stems



Inside view of Khloo Tangbru Umsympu

13.9 Brief note on Management of Ka Khloo Thangbru Umsympu, Mookhaialong Village, East Jaintia Village.

(i) **Protection from Biotic Interfernece:-**

In 2015 the sacred grove has been notified as community reserve forest, therefore, apparently, biotic pressure is minimal.

(ii) **Fire Control:-**

The sacred grove has now become a cremation ground and a community reserve forest therefore fire incident is neglible as it is properly maintain.

(iii) **Awareness Campaign:-**

Awareness campaign in the form of seminal, public interaction and excursion for school students and local elders can be organised as to sure the sustain sense of environmental consiousness. Further, to remain people of their duties towards environmental perservation signboards/ posters can be placed in and around the village.

14 - Ka Khloo Pohblai Mooshutia, Mukhaialong Village, East Jaintia Hills, District.

14.1 Location:

Ka Khloo Pohblai Mooshutia is a Sacred Grove situated at Mukhaialong Village of East Jaintia Hills District of Meghalaya under the aegis of the dorbar of Mukhaialong. It covers an area of 33.5 ha and lies between 25° 23′ 28″ to 25° 24′ 00″ N latitude and 92° 15′ 00″ to 92° 15′ 19″ E Longitude with an altitude of 1284 m above mean sea level. The aspect of the sacred grove is in the South-West. It is bounded in the north by private land of Shri. Makruti Phawa and Smti. Lina Phawa, in the east by village forest and private land of Shri Manik Phawa, Shri Makruti Phawa, Smti. Rilinda Kyndait, Shri. Phrin Phawa, Shri Tew Phawa, Shri. Lang Kyndait, Shri. Mil Phawa, Shri Myntri Kyndait, Shri Brihok Phawa and Shri Myntri Kyndait respectively, in the south by private land of Shri Phinit Kyndait, Shri Rodthai Kyndait, Shri Hun Phawa and Smti. Rikhel Kyndait and in the west by Myntdu river. A road journey of 31 km from Jowai upto Mukhaialong Village and from the village a katcha road of 1.5 km leads to the sacred grove.

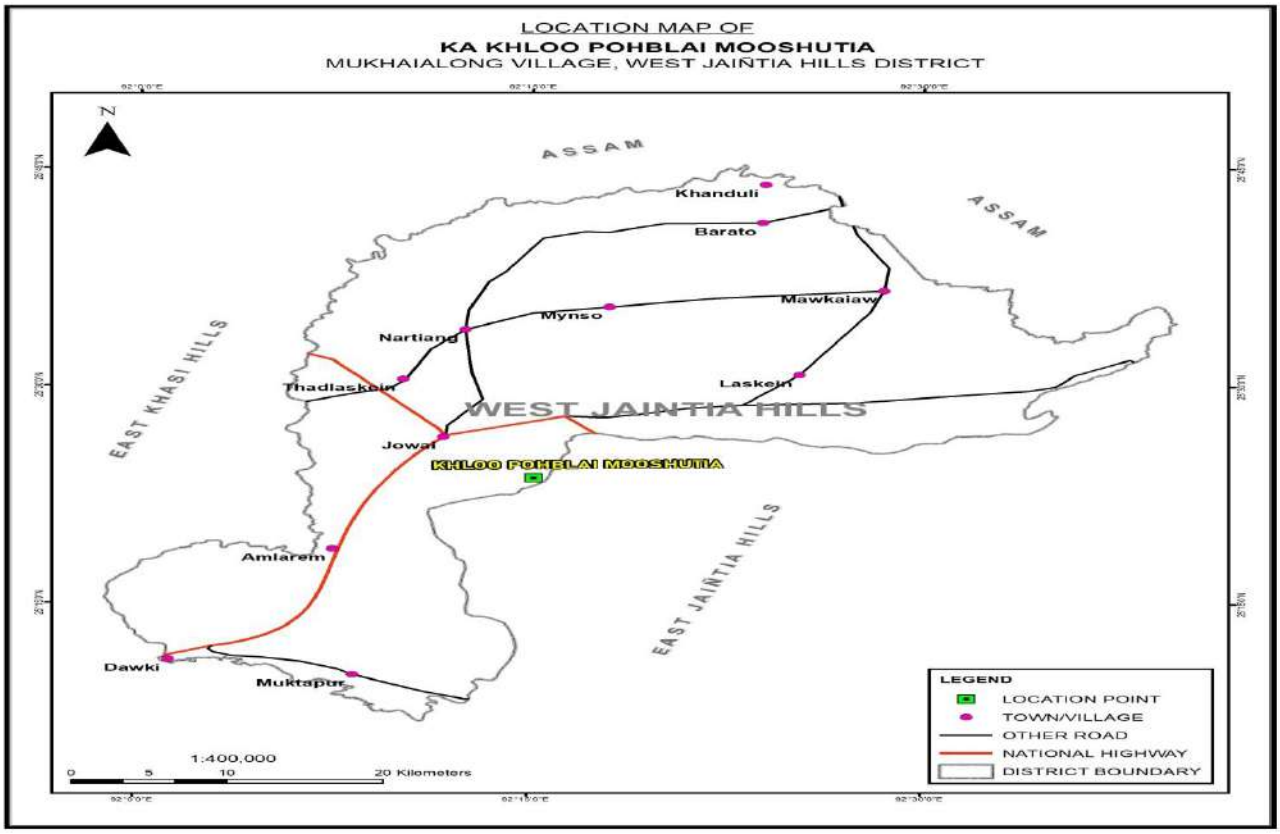
14.2 Brief History:

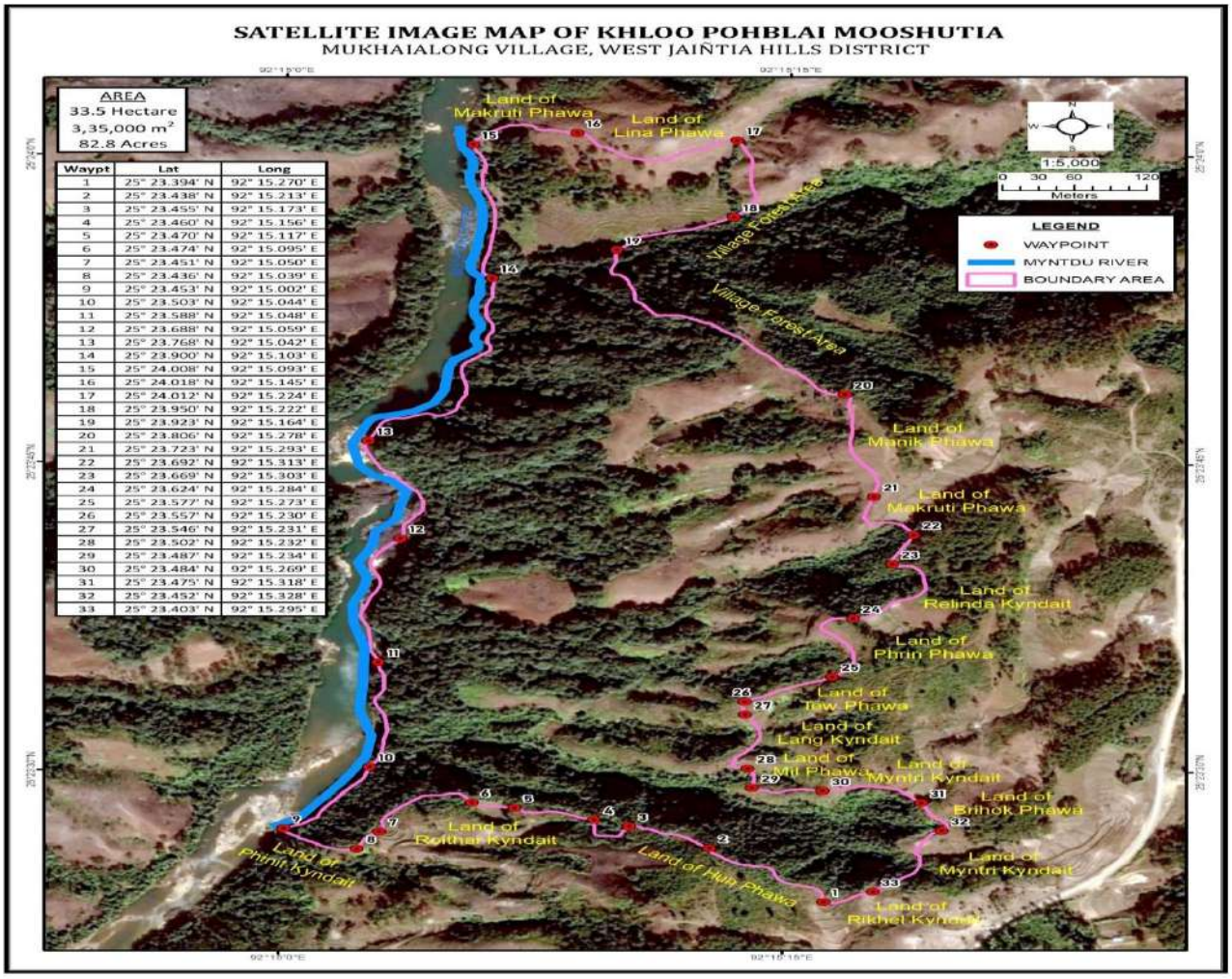
This grove has been originated many years ago. Religious rituals are still performed in this grove till date in the form of animal sacrifice. The uniqueness of the religious ritual at this sacred grove is that it is carried out only at time when the local believer/s' well being is not well. Entry-exit to the general public are prohibited, Restriction also entails that one cannot used fault language inside the sacred grove, no littering, no spitting or any public nuisance. Felling of trees, hunting & poaching, grazing are strictly prohibited. The state Forest Department has notified the sacred grove as a Community Reserve Forest under Section 36C of Wildlife Protection Act, 1972 vide government notification No. FOR.17/2013/Pt/45, dated 04.03.2014.

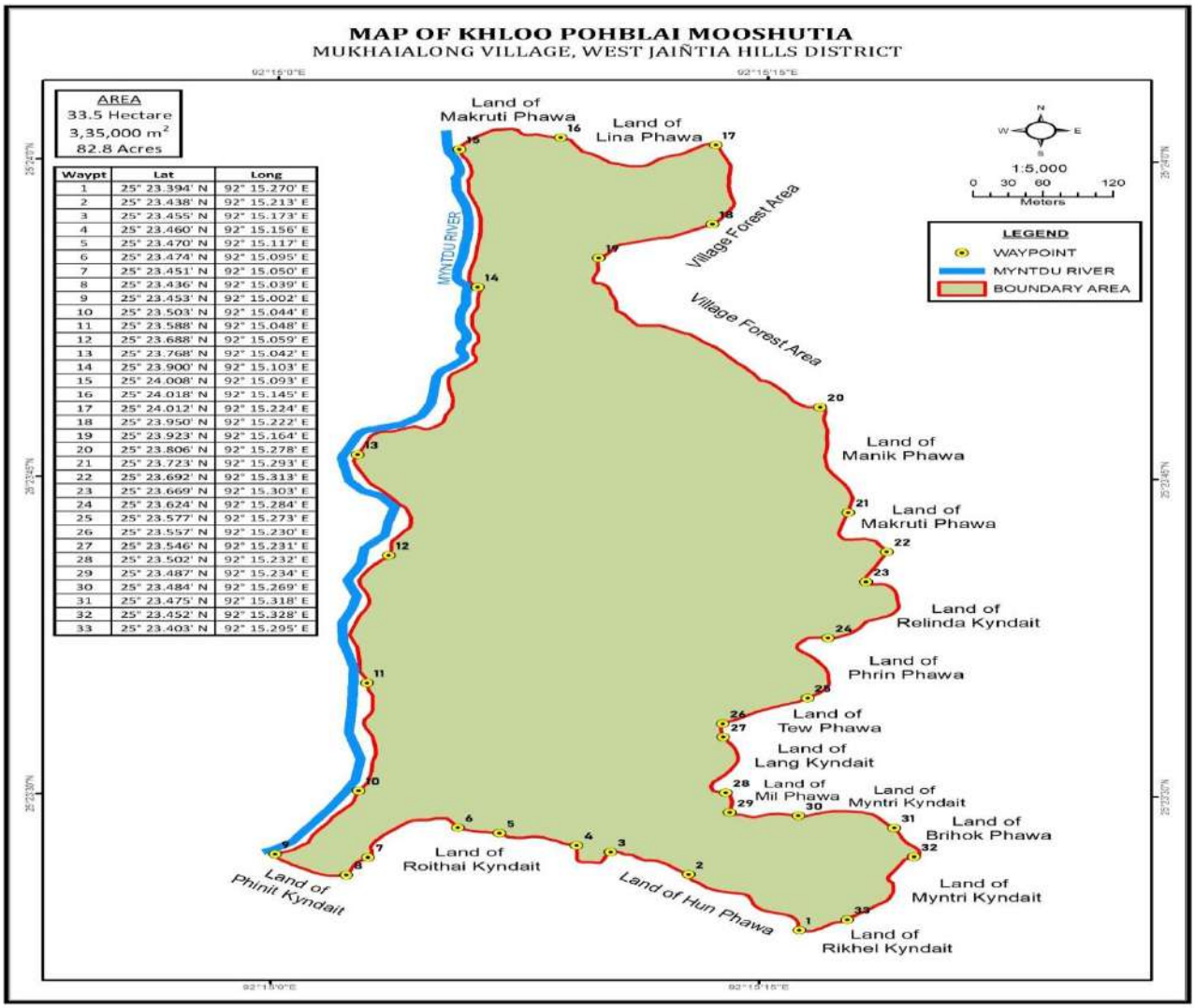
14.3 Geography and Climate:

Topography of the grove is gentle rolling in nature with slope varying from 5° to 20° slope gradient. It falls under South- West aspect. The soil texture is sandy loam with slightly compact in consistency. The colour of the soil is brown with medium soil depth and gravel coarse fragment. As notice, there is no soil erosion in the grove. There are numerous seasonal stream that flows out of the grove and on the Western boundary lies the Myntdu River.

The sacred grove has numerous open patches that are covered with grass that resemble the shola.




SATELLITE IMAGE MAP OF KHLOO POHBLAI MOOSHUTIA
MUKHAIALONG VILLAGE, WEST JAINTIA HILLS DISTRICT
AREA
33.5 Hectare
3,35,000 m²
82.8 Acres
Waypt | Lat | Long
1 | 25° 23.394' N | 92° 15.270' E
2 | 25° 23.438' N | 92° 15.213' E
3 | 25° 23.455' N | 92° 15.173' E
4 | 25° 23.460' N | 92° 15.156' E
5 | 25° 23.470' N | 92° 15.117' E
6 | 25° 23.474' N | 92° 15.095' E
7 | 25° 23.451' N | 92° 15.050' E
8 | 25° 23.436' N | 92° 15.039' E
9 | 25° 23.453' N | 92° 15.002' E
10 | 25° 23.503' N | 92° 15.044' E
11 | 25° 23.588' N | 92° 15.048' E
12 | 25° 23.688' N | 92° 15.059' E
13 | 25° 23.768' N | 92° 15.042' E
14 | 25° 23.900' N | 92° 15.103' E
15 | 25° 24.008' N | 92° 15.093' E
16 | 25° 24.018' N | 92° 15.145' E
17 | 25° 24.012' N | 92° 15.224' E
18 | 25° 23.950' N | 92° 15.222' E
19 | 25° 23.923' N | 92° 15.164' E
20 | 25° 23.806' N | 92° 15.278' E
21 | 25° 23.723' N | 92° 15.293' E
22 | 25° 23.692' N | 92° 15.313' E
23 | 25° 23.669' N | 92° 15.303' E
24 | 25° 23.624' N | 92° 15.284' E
25 | 25° 23.577' N | 92° 15.273' E
26 | 25° 23.557' N | 92° 15.230' E
27 | 25° 23.546' N | 92° 15.231' E
28 | 25° 23.502' N | 92° 15.232' E
29 | 25° 23.487' N | 92° 15.234' E
30 | 25° 23.484' N | 92° 15.269' E
31 | 25° 23.475' N | 92° 15.318' E
32 | 25° 23.452' N | 92° 15.328' E
33 | 25° 23.403' N | 92° 15.295' E
1:5,000
0 30 60 120
Meters
LEGEND
WAYPOINT
MYNTDU RIVER
BOUNDARY AREA
Land of Makruti Phawa
Land of Lina Phawa
Village Forest Area
Land of Manik Phawa
Land of Makruti Phawa
Land of Relinda Kyndait
Land of Phrin Phawa
Land of Iaw Phawa
Land of Lang Kyndait
Land of Mil Phawa
Land of Myntri Kyndait
Land of Brihok Phawa
Land of Myntri Kyndait
Land of Rikhet Kyndait
Land of Huh Phawa
Land of Roithai Kyndait
Land of Phrin Kyndait



Mukhaialong has a moderate climate, similar to Jowai, with the average minimum temperature is 07^{o}C and average maximum is 22^{o}C. The rain fall varies from heavy to light but there is no month without rain. The summer season is from March to May, while the monsoon season starts from May and ends around October and November dawns the winter season which ends in February.

Encroachment, Wild fire, hunting, grazing, and illegal timber felling are absent in this grove at present.

14.4 Forest Type:

According to Champion & Seth classification (1968) and floristic the forest types in the groves is ***Sub-type 11B/C1a Lauraceous Forest***.

Origin of the grove is natural. The physiognomy of the grove is characterized by two storyed, in addition to the undergrowth. The present of weeds is scanty, while open patches of the sacred grove are covered by grass. Bamboo distribution within the grove is scattered, while canes are absent.

The regeneration, as notice, is inadequate.

14.5 Flora and Fauna:

The floristic is characterized by (vegetation) mixed type consisting mainly of *Castonopsis species and Ex-blucklandia.* The relic forest is natural and it has of one storeyed layers. The wildlife found within the grove is jungle fowls, jackals, pangolin and many vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

i. Virgin forests where human interference is almost zero.
ii. Unique monsoon and waterfalls which have attracted many tourists both local and national and even foreigners.
iii. Existence of many rare and endangered plants species.
iv. High level endemic plants and animals species.
v. Restrictions-"do's and don'ts;" which has immensely help the sacred grove in conservation of Flora and fauna and maintaining the rich forest natural resources.

14.6 Flora species:

List of trees found in Khloo Pohblai Mooshutia, East Jaintia Hills

TREES

Sl.No.	Botanical Name	Local Name	Family
1	*Aralia armata*	Dienglatymphu	*Araliaceae*
2	*Artocarpuslacucha*	Diengsohshram/ soh ram	*Fagaceae*
3	*Bruciamollis*	Dienglakasein	Simaroubaceae
4	*Bucklandiapopilnea*	Diengdoh	*Hamamelidaceae*
5	*Callicarpaarborea*	Dienglakiat	*Verbanaceae*
6	*Castanopsisarmata*	Diengpasohsyiar	*Fagaceae*
7	*Castanopsisindica*	Diengsohot	*Fagaceae*
8	*Castanopsistribuloides*	Diengsning	*Fagaceae*
9	*Chisochitoncumingianus*	Diengkynbublang/ sohkhyllumblang	Meliaceae
10	*Cinnamomumpauciflorum*	Diengtorthia	*Lauraceae*
11	*Cinnamomumtamala*	Dienglatyrpad	*Lauraceae*
12	*Cinnamomumvegolghota*	Diengtyrdop	*Lauraceae*
13	*Cissus ripens*	Diengjajew/lajaw	Vitaceae
14	*Croton caudatus*	Diengsaphai	Euphorbiaceae
15	*Diospyros kaki*	Diengiong	Ebenaceae
16	*Eleocarpuslanceafolios*	Dienglasaw/phyrnusaw	*Elaeocarpaceae*
17	*Eleocarpusprunifolius*	Dieng ruin	*Elaeocarpaceae*
18	*Eleocarpusprunifolius*	Dienglakhmar	*Elaeocarpaceae*
19	*Engelhardtiaspicata*	Dienglba	*Juglandiaceae*
20	*Eugenia jambolana*	Diengsohum	*Myrtaceae*
21	*Eurya japonica*	Dieng shit	*Theaceae*
22	*Ex-blucklandiapopulnea*	Diengdoh	*Hamamelidaceae*
23	*Ficuscunia*	Diengthylliang	*Moraceae*
24	*Ilex venulosa*	Diengshyieng	*Aquifoliaceae*
25	*Inulacappa*	Dienglalieh	*Asteraceae*
26	*Iteachinensis*	Diengsohsyrtet	*Iteaceae*
27	*Iteamacrophylla*	Diengsaru	*Iteaceae*

28	*Lagerstroemia indica*	Dienglangsniang	Lythraceae
29	*Lanneacoromandelica*	Diengsohpier	Anacardiaceae
30	*Ligustrumconfusum*	Diengsohplang/saplang	Oleaceae
31	*Ligustrumconfusum*	Diengsohplang	Oleaceae
32	*Ligustrumucidum*	Diengsohpa-iit	Oleaceae
33	*Lithocarpuselegans*	Diengsarang	Lauraceae
34	*Machilusparviflora*	Diengsatler	Lauraceae
35	*Mahoniaacanthifolia*	Diengsohiongkhlaw	Beriberidaceae
36	*Micheliaoblonga*	Dienglaniar	*Magnoliaceae*
37	*Micheliaspp*	Diengphaniaw	*Magnoliaceae*
38	*Millusaroxburghiana*	Diengkhong	Annonaceae
39	*Morindaaugustifolia*	Dieng stem/synrai	Rubiaceae
40	*Myricafarquhariana*	Diengsohphie	*Myricaceae*
41	*Myricanagi*	Diengsohliya	*Myricaceae*
42	*Pasaniafenestrata*	Diengsasi	*Fagaceae*
43	*Pierisovalifolia*	Diengjalyngsiang	Ericaceae
44	*Pinuskhasiana*	Diengkseh	*Pinaceae*
45	*Polocarpuslatifolia*	Diengkseh um	*Taxaceae*
46	*Polygataarillata*	Dienglakba/jakba	*Polygalaceae*
47	*Pourthiaeaarguta*	Diengsohryngkham	*Ericaceae*
48	*Premnabengolensis*	Dienglieh	*Asteraceae*
49	*Quercusglauca*	Dieng sari	*Fagaceae*
50	*Quercusspp*	Diengskoi	*Fagaceae*
51	*Quercusspp*	Diengskoilieh	*Fagaceae*
52	*Quercusspp*	Diengtyrso	*Fagaceae*
53	*Quercusspp*	Diengskoi	*Fagaceae*
54	*Rhus succedanea*	Diengkain	*Anacardiaceae*
55	*Schmakhasiana*	Diengngan	*Theaceae*
56	*Smilax glabra*	Diengsohkrut/sakrut	Smilacaceae
57	*Spondiaaxillaris*	Diengsohlait	*Anacardaceae*
58	*Stereospermumchelonoides*	Diengsyiar	Bignoniaceae
59	*Symplocoskhasiana*	Diengdpei	*Symplocaceae*
60	*Symplocosspp*	Diengtahpliang	*Symplocaceae*
61	*Symplocosspp*	Diengdpeiiong	*Symplocaceae*

List of Shrubs, herbs, climbers & bamboo found in Khloo Pohblai Mooshutia, East Jaintia Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1	Syntiew kynthlien		
2	Tyrthia		

HERBS

Sl No.	Local Name	Botanical Name	Family
1	Tmain khla	*Lycopodium clavatum*	Lycopodiaceae
2	Swodung		
3	Sohkot		
4	Shiah miaw		
5	Sohkhniah		
6	Soh kristmas		

7	Tongtlang		
8	Tiew lari		
9	Tongsah		

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1	Makariang		
2	Tiew thing		
3	Tiew phonguir		

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1	Dieng tiew dieng	*Pholidata bulgares*	Orchideceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1	Shken	*Bambusa pallida*	Poaceae

14.7 Growing Stock:

As per the methodology described in Chapter-II, 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 30 cm is enumerated by measuring the top height (in meters) and the girth (in centimeters) at breast height. The sample plot is 0.2 ha.

All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 1672 trees consisting of 370 *Castanopsis tribuloides* (1^{st} dominant), 185 *Ex-blucklandia* (2^{nd} dominant), 103 *Castanopsis indica* (3^{rd} dominant), 23 *Pinus khasiana and* 991 *Rest of 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 result for Khloo Pohblai Mooshutia Sacred Grove are given in table 14.1 & 14.2 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 85819.5 cubic metres.

Table-14.1

Specieswise & Girth class wise volume for sampled area (33 plots - area 33.5 ha)

(volume in cu.m)

Girth Class Vise	1st dominant *Castanopsis tribuloides*	2nd dominant *Ex-blucklandia*	3rd dominant *Castanopsis Indica*	*Pinus khasiana*	Rest of the Species	Total
30-40	4.467	4.621	0.987	0.000	359.722	369.797
41-50	8.109	11.779	1.333	0	464.889	486.110
51-60	9.64	8.86	3.032	0	574.304	595.836
61-70	17.224	12.659	3.918	37.884	467.104	538.789
71-80	15.435	17.630	3.593	0	375.673	412.331
81-90	25.71	13.218	2.122	9.178	315.139	365.365
91-100	18.343	10.554	5.641	42.546	297.515	374.599
101-110	24.224	11.454	8.752	38.143	307.305	389.878
111-120	20.813	9.014	6.821	61.454	201.416	299.518
121-130	29.312	7.16	8.044	16.725	221.615	282.856
131-140	9.388	6.095	14.768	22.464	255	307.302
141-150	11.153	24.177	13.818	74.048	231.317	354.513
151 & above	19.682	27.401	14.077	0.000	285.498	346.658
Total	213.498	164.622	86.906	302.442	4356.084	5123.552

Girth class wise with respect to total area

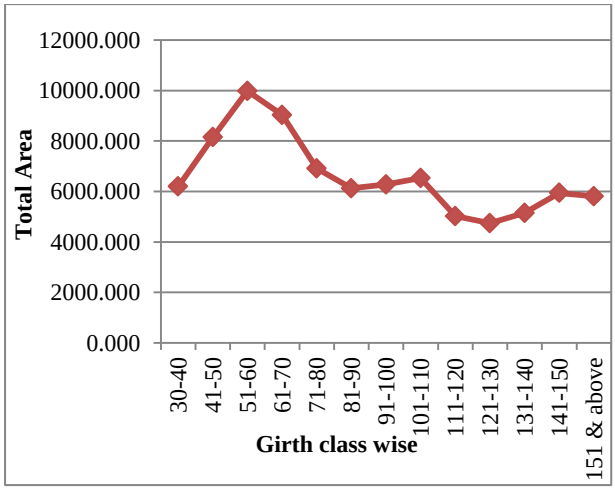


Table-14.2
Girth class wise & Species wise in the entire grove (in area 33.5 ha)

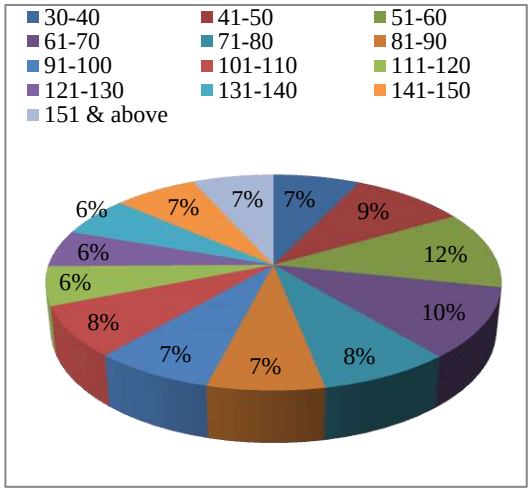
(volume in cu.m)

Girth Class Vise	1st dominant *Castanopsis tribuloides*	2nd dominant *Ex-blucklandia*	3rd dominant *Castanopsis indica*	*Pinus khasiana*	Rest of the Species	Total	%wrt total volume
30-40	74.82	77.40	16.53	0.00	6025.34	6194.1	7.22
41-50	135.83	197.30	22.33	0.00	7786.89	8142.3	9.49
51-60	161.47	148.41	50.79	0.00	9619.59	9980.3	11.63
61-70	288.50	212.04	65.63	634.56	7823.99	9024.7	10.51
71-80	258.54	295.30	60.18	0.00	6292.52	6906.5	8.05
81-90	430.61	221.40	35.54	153.73	5278.58	6119.9	7.13
91-100	307.25	176.78	94.49	712.65	4983.38	6274.5	7.31
101-110	405.75	191.85	146.60	638.90	5147.36	6530.5	7.61
111-120	348.62	150.98	114.25	1029.35	3373.72	5016.9	5.84
121-130	490.98	119.93	134.74	280.14	3712.05	4737.8	5.52
131-140	157.25	102.09	247.36	376.27	4264.33	5147.3	6.00
141-150	186.81	404.96	231.45	1240.30	3874.56	5938.1	6.92
151 & above	329.67	458.97	235.79	0.00	4782.09	5806.5	6.76
Total	3576.09	2757.42	1455.68	5065.90	72964.41	85819.5	99.98
%wrt total volume	4.17	3.21	1.70	5.90	85.00	99.98	

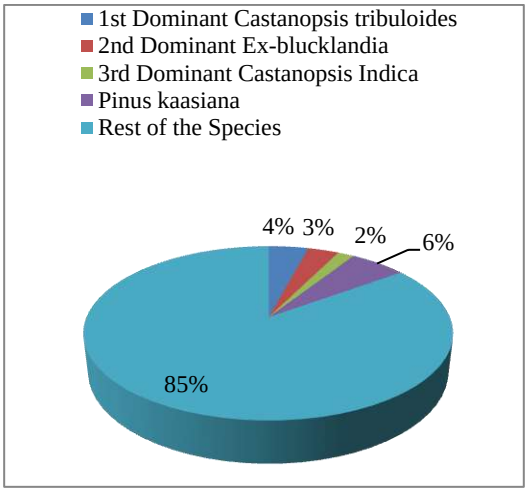
The table indicates that the volume contributed by the 1st dominant species (*Castanopsis tribuloides)* with respect to the total volume of the grove is 4.17 %, the 2nd dominant species (*Ex-blucklandia*) is 3.21 %, 3rd dominant species *(Castanopsis indica)* is 1.70%, *Pinus khasiana* is 5.90% while rest of the species is maximum i.e.85.00%. Total volume of the grove is 85819.5 cubic metres.

From the above 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.

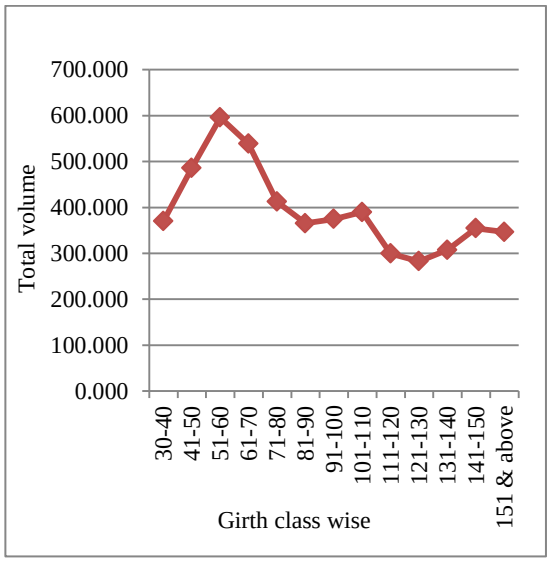
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view of Khloo Pohblai Mooshutia Sacred Groves

14.8 Number of Stems:

Number of stems in each girth class are species wise are given in the table 14.3 &14.4. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40 cm to 91-100 cm classes.

Table-14.3

Girth class wise & Species wise No. of stems in the sampled (33 plots - area 33.5 ha)

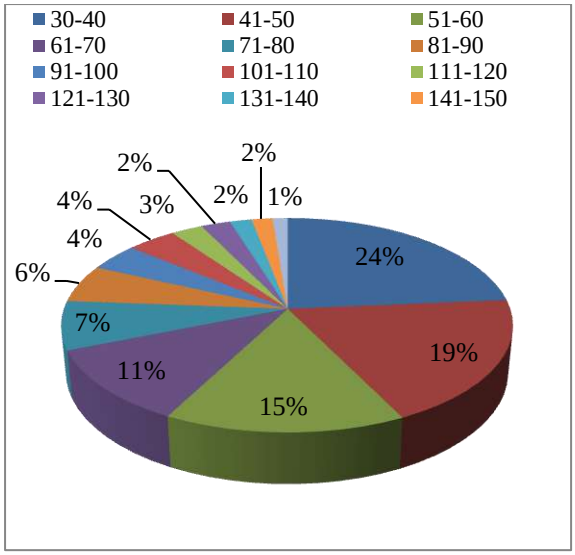
Girth Class Vise	1st dominant *Castanopsis tribuloides*	2nd dominant *Ex-blucklandia*	3rd dominant *Castanopsis indica*	*Pinus khasiana*	Rest of the Species	Total
30-40	76	21	21	0	277	**395**
41-50	55	38	9	0	217	**319**
51-60	39	21	12	0	178	**250**
61-70	45	23	10	6	104	**188**
71-80	29	25	7	0	61	**122**
81-90	36	15	3	1	40	**95**
91-100	20	10	6	4	30	**70**
101-110	22	9	8	3	26	**68**
111-120	15	6	5	4	14	**44**
121-130	18	4	5	1	13	**41**
131-140	5	3	8	1	13	**30**
141-150	5	5	6	3	10	**29**
151 & above	5	5	3	0	8	**21**
Total =	**370**	**185**	**103**	**23**	**991**	**1672**

Table1-4.4

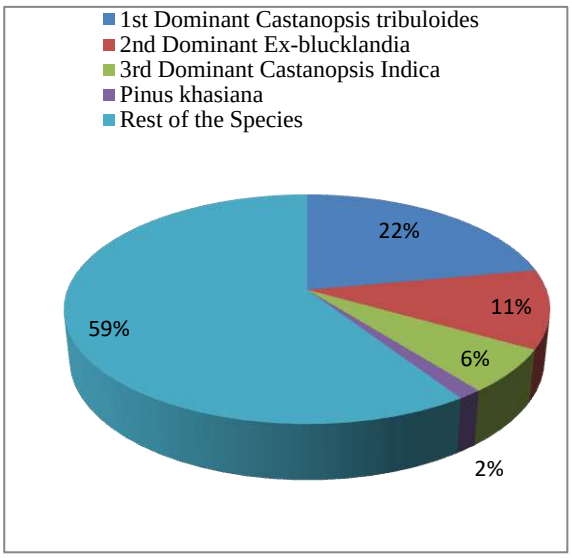
Girth class wise & Species wise No. of stems in the entire grove (Area 33.5 ha)

Girth Class Vise	1st dominant *Castanopsis tribuloides*	2nd dominant *Ex-blucklandia*	3rd dominant *Castanopsis indica*	*Pinus khasiana*	Rest of the Species	Total
30-40	532	147	147	0	1939	**2765**
41-50	385	266	63	0	1519	**2233**
51-60	273	147	84	0	1246	**1750**
61-70	315	161	70	42	728	**1316**
71-80	203	175	49	0	427	**854**
81-90	252	105	21	7	280	**665**
91-100	140	70	42	28	210	**490**
101-110	154	63	56	21	182	**476**
111-120	105	42	35	28	98	**308**
121-130	126	28	35	7	91	**287**
131-140	35	21	56	7	91	**210**
141-150	35	35	42	21	70	**203**
151 & above	35	35	21	0	56	**147**
Total =	**2590**	**1295**	**721**	**161**	**6937**	**11704**

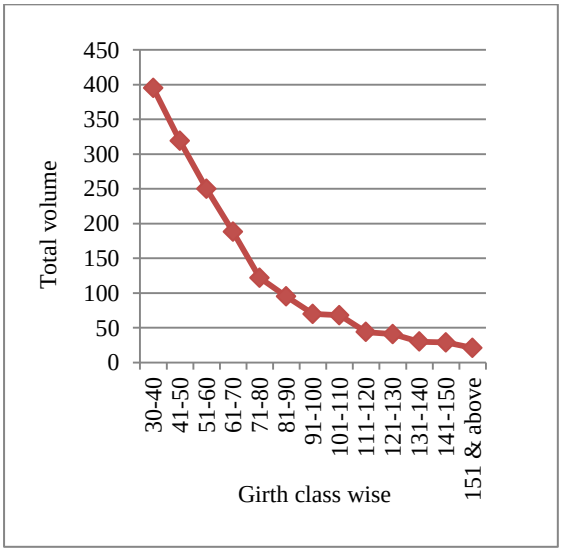
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Girth class wise stem with respect to total stems



Inside view of Khloo Pohblai Mooshutia Sacred Groves

14.9 Brief note on Management of Ka Khloo Pohblai Mooshutia, Mukhaialong.

(i) **Protection from Biotic Interfernece:-**

The sacred grove is well respected and maintain as such, as of now, there is negliglible biotic pressure.

(ii) **Fire Control:-**

As reported by villagres fire incident is absent as external fireline are well maintain.

(iii) **Awareness Campaign:-**

Awareness campaign can be taken up at the village level. By organising programme, at schools for student and elders of the village related to forest and environment can be conducted with interactive session and highlighted the benefit obtain from the forest and the effect to come if the forest is destroyed.

15 - Ka Khloo Langdoh Kur Pyrtuh, Sohmynting, West Jaintia Hills, District.

15.1 Location:

Khloo Langdoh kur Pyrtuh Community Reserve is situated at Sohmynting Village, of West Jaintia Hills District of Meghalaya under the care of Kur Pyrtuh. It covers an area of 15.4 ha and lies between 25° 27′ 02″ to 25° 27′ 12″ N latitude and 92° 07′ 44″ to 92° 08′ 19″ E Longitude with an altitude of 1480 m above mean sea level. The aspect of the sacred grove is in the South-West. It is bounded on all sides by private land. The grove is accessible by road from Jowai to Sohmynting Village and from the village to the sacred grove by trail. The distance from Jowai to Sohmynting is around 15 km.

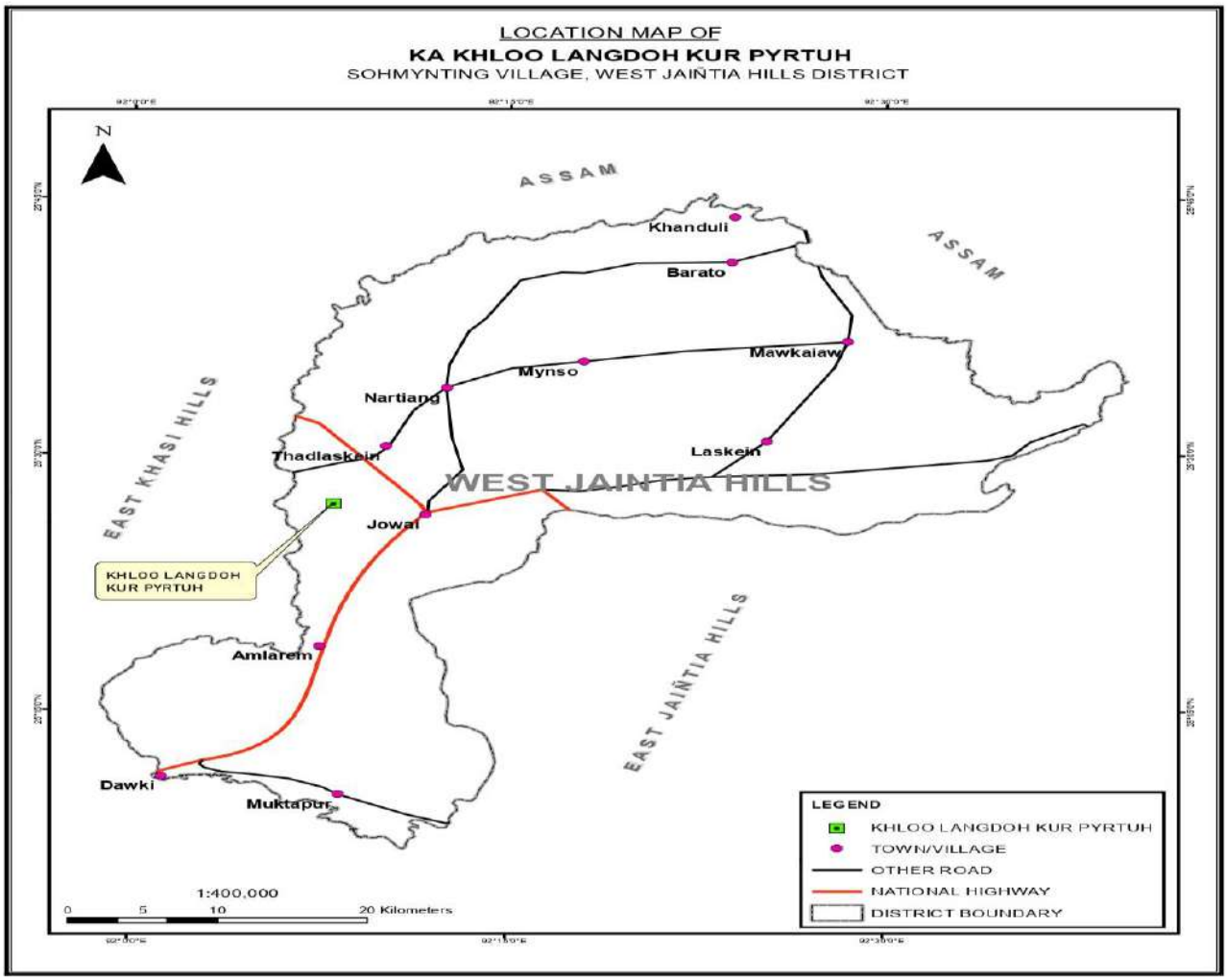
15.2 Brief History:

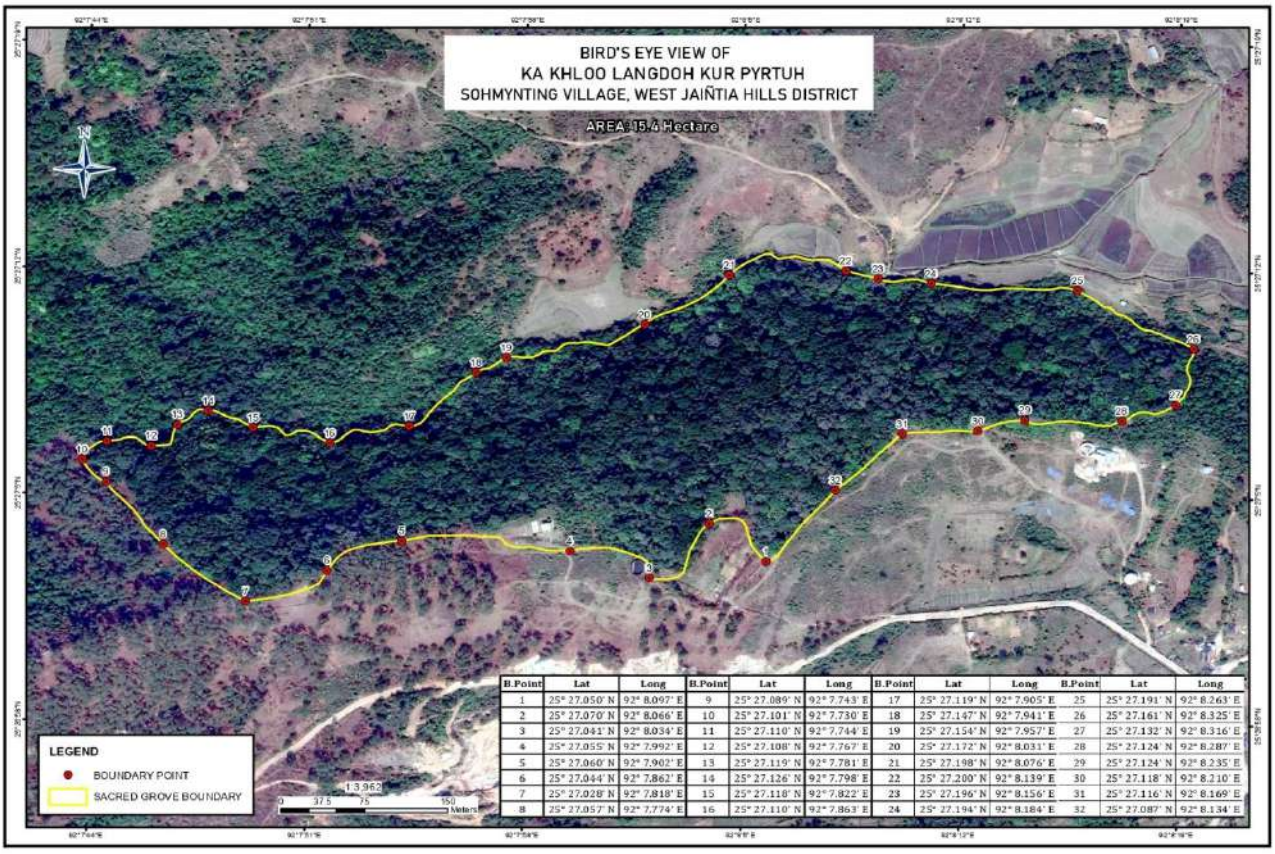
This grove has its origin many decades ago. Performance of religious rituals has ceased to be performed in this grove but still revered by the locals. Felling of trees, hunting & poaching grazing, entry-exit, starting of fire are strictly prohibited. The state Forest Department has notified the sacred grove as a Community Reserve Forest under Section 36C of Wildlife Protection Act, 1972 vide government notification No. FOR.17/2013/Pt/46, dated 04.03.2014.

15.3 Geography and Climate:

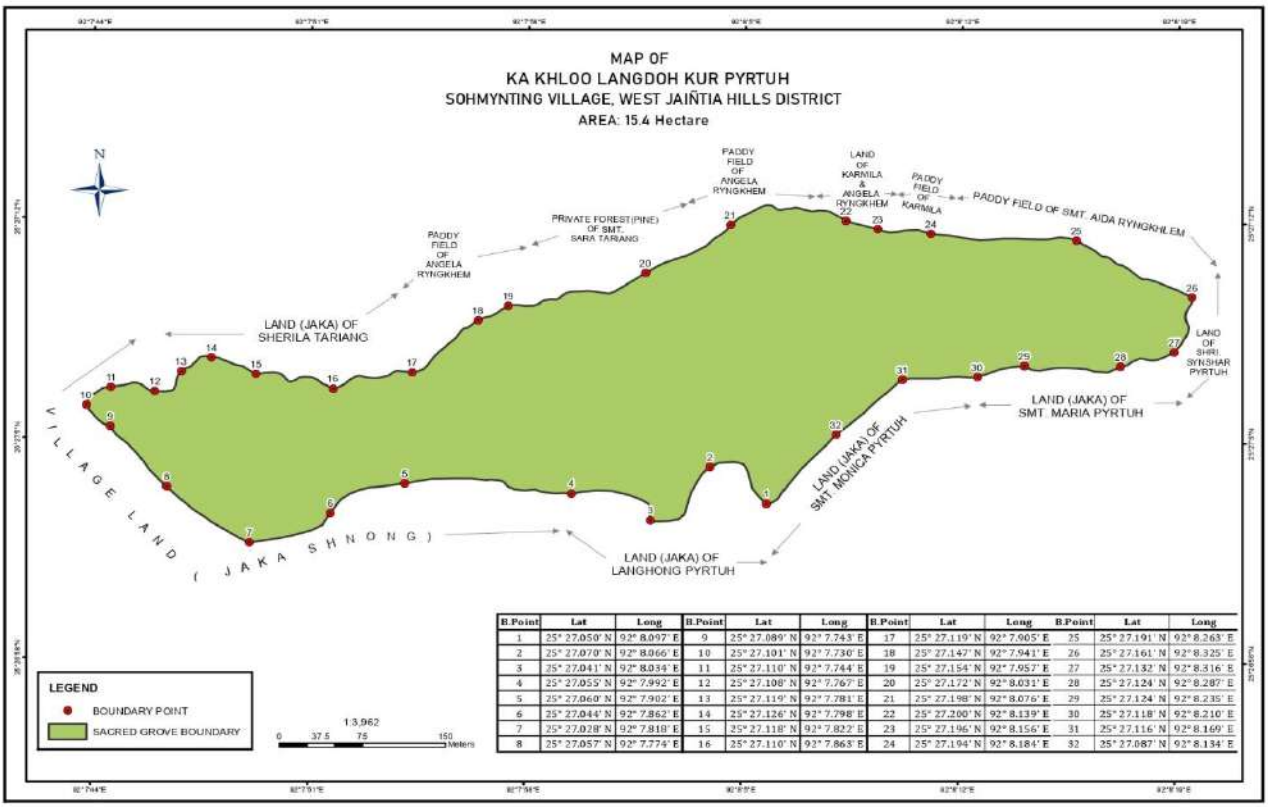
Topography of the grove is hilly in nature with slope varying from 4° to 15° slope gradient. It falls under South-West aspect. The soil texture is sandy loam with gravel coarse fragment and slightly compact in consistency. The colour of the soil is brown with 15cm to 30 cm soil depth. As notice, there is mild erosion in the grove. There is one seasonal stream that flows out of the grove.

Sohmynting has a moderate climate, similar to Jowai, with the average minimum temperature of 08^{o}C and average maximum of 20^{o}C. The rainfall varies from heavy to light but there is no month without rain. The summer season is from March to May, while the monsoon season starts from May and ends around October & November dawns the winter season which ends in February. Encroachment, Wild fire, hunting & poaching, and illegal timber felling are absent in this grove, while stray incident of grazing was notice during the enumeration exercise.


LOCATION MAP OF
KA KHLOO LANGDOH KUR PYRTUH
SOHMYNTING VILLAGE, WEST JAIŃTIA HILLS DISTRICT
N
ASSAM
ASSAM
Khanduli
Barato
Mawkaiaw
Mynso
Nartiang
Thadlaskein
Laskein
WEST JAINTIA HILLS
EAST KHASI HILLS
Jowai
KHLOO LANGDOH
KUR PYRTUH
Amlarem
EAST JAIŃTIA HILLS
Dawki
Muktapur
1:400,000
0 5 10 20 Kilometers
LEGEND
KHLOO LANGDOH KUR PYRTUH
TOWN/VILLAGE
OTHER ROAD
NATIONAL HIGHWAY
DISTRICT BOUNDARY



B.Point	Lat	Long	B.Point	Lat	Long	B.Point	Lat	Long	B.Point	Lat	Long
1	25° 27.050' N	92° 8.097' E	9	25° 27.089' N	92° 7.743' E	17	25° 27.119' N	92° 7.905' E	25	25° 27.191' N	92° 8.263' E
2	25° 27.070' N	92° 8.066' E	10	25° 27.101' N	92° 7.730' E	18	25° 27.147' N	92° 7.941' E	26	25° 27.161' N	92° 8.325' E
3	25° 27.041' N	92° 8.034' E	11	25° 27.110' N	92° 7.744' E	19	25° 27.154' N	92° 7.957' E	27	25° 27.132' N	92° 8.316' E
4	25° 27.055' N	92° 7.992' E	12	25° 27.108' N	92° 7.767' E	20	25° 27.172' N	92° 8.031' E	28	25° 27.124' N	92° 8.287' E
5	25° 27.060' N	92° 7.902' E	13	25° 27.119' N	92° 7.781' E	21	25° 27.198' N	92° 8.076' E	29	25° 27.124' N	92° 8.235' E
6	25° 27.044' N	92° 7.862' E	14	25° 27.126' N	92° 7.798' E	22	25° 27.200' N	92° 8.139' E	30	25° 27.118' N	92° 8.210' E
7	25° 27.028' N	92° 7.818' E	15	25° 27.118' N	92° 7.822' E	23	25° 27.196' N	92° 8.156' E	31	25° 27.116' N	92° 8.169' E
8	25° 27.057' N	92° 7.774' E	16	25° 27.110' N	92° 7.863' E	24	25° 27.194' N	92° 8.184' E	32	25° 27.087' N	92° 8.134' E



B.Point	Lat	Long	B.Point	Lat	Long	B.Point	Lat	Long	B.Point	Lat	Long
1	25° 27.050' N	92° 8.097' E	9	25° 27.089' N	92° 7.743' E	17	25° 27.119' N	92° 7.905' E	25	25° 27.191' N	92° 8.263' E
2	25° 27.070' N	92° 8.066' E	10	25° 27.101' N	92° 7.730' E	18	25° 27.147' N	92° 7.941' E	26	25° 27.161' N	92° 8.325' E
3	25° 27.041' N	92° 8.034' E	11	25° 27.110' N	92° 7.744' E	19	25° 27.154' N	92° 7.957' E	27	25° 27.132' N	92° 8.316' E
4	25° 27.055' N	92° 7.992' E	12	25° 27.108' N	92° 7.767' E	20	25° 27.172' N	92° 8.031' E	28	25° 27.124' N	92° 8.287' E
5	25° 27.060' N	92° 7.902' E	13	25° 27.119' N	92° 7.781' E	21	25° 27.198' N	92° 8.076' E	29	25° 27.124' N	92° 8.235' E
6	25° 27.044' N	92° 7.862' E	14	25° 27.126' N	92° 7.798' E	22	25° 27.200' N	92° 8.139' E	30	25° 27.118' N	92° 8.210' E
7	25° 27.028' N	92° 7.818' E	15	25° 27.118' N	92° 7.822' E	23	25° 27.196' N	92° 8.156' E	31	25° 27.116' N	92° 8.169' E
8	25° 27.057' N	92° 7.774' E	16	25° 27.110' N	92° 7.863' E	24	25° 27.194' N	92° 8.184' E	32	25° 27.087' N	92° 8.134' E

15.4 Forest Type:

According to Champion & Seth classification (1968) the forest types in the groves is ***(Type 8B/C2) Khasi Sub-Tropical Wet Hills forest.***

Origin of the grove is natural. The physiognomy of the grove is characterised by two storyed, in addition to the undergrowth. The present of weeds and grasses is scanty. Bamboo and canes are absent within the grove.

The regeneration, as notice, is inadequate.

15.5 Flora and Fauna:

The floristics is characterized by mixed type consisting mainly of *Castonopsis species, Machilus parviflora, etc.* This relic forest is natural and has two storeyed. The wildlife found within the grove is jungle fowls, jackals, pangolin and many vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

i. Virgin forests where human interference is almost zero.
ii. Unique monsoon and waterfalls which have attracted many tourists both local and national and even foreigners.
iii. Existence of many rare and endangered plants species.
iv. High level endemic plants and animals species.
v. Restrictions-"do's and don'ts;" which has immensely help the sacred grove in conservation of Flora and fauna and maintaining the rich forest natural resources.

15.6 Flora species:

List of trees found in Khloo Langdoh Kur Pyrtuh Community Reserve, West Jaintia Hills

TREES

Sl.No.	Botanical Name	Local Name	Family
1	*Albizzia procera*	Dieng sohrilong/rilong	*Mimosaceae*
2	*Alstonia sholaris*	Dieng rtein/ rytten/rteng	*Apocynaceae*
3	*Aralia armata*	Dieng latymphu	*Araliaceae*
4	*Beilschmiedia brandisii*	Dieng sohkhyllam	*Elaeocarpaceae*
5	*Callicarpa arborea*	Dieng lakiat	*Verbanaceae*
6	*Castanopsis tribuloides*	Dieng sning	*Fagaceae*
7	*Chisocheton cumingianus*	Dieng kynbublang/sohkhyllum blang	*Meliaceae*
8	*Cinnamomum pauciflorum*	Dieng torthia	*Lauraceae*
9	*Cinnamomum vejolghota*	Dieng tyrdop	*Fagaceae*
10	*Cissus ripens*	Dieng jajew/lajaw	*Vitaceae*
11	*Citrus latipes*	Dieg sohkynphor	*Rutaceae*
12	*Drimycarpus racemosus*	Dieng brah	*Anacardiaceae*
13	*Eleocarpus lanceafolius*	Dieng lasaw/phyrnusaw	*Elaeocarpaceae*
14	*Eleocarpus prunifolius*	Dieng ruin	*Asteraceae*
15	*Engelhardtia spicata*	Dieng lba	*Juglandaceae*
16	*Eugenia jambolana*	Dieng sohum	*Myrtaceae*
17	*Eurya japonica*	Dieng pyrshit	*Theaceae*
18	*Ficus cunia*	Dieng thylliang/sohthylliang	*Moraceae*
19	*Ficus spp*	Dieng sohphyrnai	*Moraceae*
20	*Garuga pinnata*	Dieng shynrang	*Burseraceae*
21	*Glochidion acuminatum*	Dieng jem	*Phyllanthaceae*

22	*Ilex venulosa*	Dieng shyieng	*Aquifoliaceae*
23	*Inula cappa*	Dieng lalieh	*Asteraceae*
24	*Itea chinensis*	Dieng sohsyrtet	*Iteaceae*
25	*Lithocarpus elegans*	Dieng sarang	*Lauraceae*
26	*Lithocarpus fenestrata*	Dieng jing	*Fagaceae*
27	*Litsaea meissneri*	Dieng sohrang	*Lauraceae*
28	*Machilus parviflora*	Dieng satler	*Lauraceae*
29	*Mahonia acanthifolia*	Dieng sohiongkhlaw	*Berberidaceae*
30	*Morinda augustifolia*	Dieng stem/synrai	*Rubiaceae*
31	*Myrica farquhariana*	Dieng sohphie	*Myricaceae*
32	*Myrica nagi*	Dieng sohliya	*Myricaceae*
33	*Pieris ovalifolia*	Dieng sohlangsniang/jalangsniang	*Rosaceae*
34	*Pinus khasiana*	Dieng kseh	*Pinaceae*
35	*Polygata arillata*	Dieng jakba/lakba	*Polygalaceae*
36	*Premna bengalensis*	Dieng lieh	*Asteraceae*
37	*Quercus griffithii*	Dieng wah	*Fagaceae*
38	*Rhus succedanea*	Dieng kain	*Anacardiaceae*
39	*Sarcandra glabra*	Dieng sohkhristmas	*Chloranthaceae*
40	*Schima khasiana*	Dieng ngan	*Theaceae*
41	*Sphaeropteris cooperi*	Dieng tyrkhang	*Cyatheaceae*
42	*Symplocos chinensis*	Dieng iong	*Symplocaceae*
43	*Symplocos theoefolia*	Dieng dpei	*Symplocaceae*

List of Shrubs, herbs, climbers & bamboo found in Khloo Langdoh Kur Pyrtuh Community Reserve, West Jaintia Hills.

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1	Syntiew kynthlien		
2	Tyrthia		

HERBS

Sl No.	Local Name	Botanical Name	Family
1	Tmain khla	*Lycopodium clavatum*	Lycopodiaceae
2	Swodung		
3	Sohkot		
4	Shiah miaw		
5	Sohkhniah		
6	Soh kristmas		
7	Tongtlang		
8	Tiew lari		
9	Tongsah		

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1	Makariang		
2	Tiew thing		

3	Tiew phonguir		

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1	Syntiew dieng	*Aredes odaratum*	Orchideceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1	Shken	*Bambusa pallida*	Poaceae

15.7 Growing Stock:

As per the methodology described in Chapter-II, 20 % enumeration is carried out in the grove as its area is more than 10 ha and less than 50 ha. Each and every tree which has a GBH (girth at breast height) of 30 cm and more is enumerated by measuring the top height (in meters) and the girth (in centimetres) at breast height. The sample plot size is 0.2 ha.

All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 845 trees consisting of 110 *Castanopsis tribuloides* (1st dominant), 72 *Machilus parviflora* (2nd dominant), 63 *Litsaea meissneri* (3rd dominant), 4 Pinus keseya and 596 *Rest of 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 result for Khloo Langdoh Kur Pyrtuh Community Reserve are given in table 15.1 & 15.2 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 1018.037 cubic metres.

Table-15.1

Specieswise & Girth class wise volume for sampled area (33 plots - area 15.4 ha)

(volume in cu.m)

Girth class wise	1st dominant *Castanopsis tribuloides*	2nd dominant *Machilus parviflora*	3rd dominant *Litsaea meissneri*	Rest of the species	*Pinus khasiana*	Total (for 3 ha area)	Total (for 15.4` area)
30-40	0.736	0.428	0.217	5.234	0	**6.615**	33.957
41-50	1.634	0.971	1.790	9.862	0	**14.257**	73.186
51-60	2.008	0.765	1.292	17.990	0	**22.055**	113.216
61-70	3.662	2.401	1.824	18.952	0	**26.839**	137.774
71-80	5.804	1.088	2.653	29.044	0	**38.589**	198.090
81-90	6.286	3.538	3.597	38.921	0	**52.342**	268.689
91-100	6.245	11.092	1.789	36.849	0.571	**56.546**	290.269
101-110	5.74	3.336	4.605	38.367	0	**52.048**	267.180
111-120	11.018	6.523	4.050	32.333	1.147	**55.071**	282.698

121-130	14.588	4.852	1.746	17.883	2.657	**41.726**	214.193
131-140	14.972	3.896	2.038	28.436	0	**49.342**	253.289
141-150	8.898	8.838	9.148	35.299	0	**62.183**	319.206
151 & above	24.354	57.926	58.774	399.370	0	**540.424**	2774.177
Total	**105.945**	**105.654**	**93.523**	**708.54**	**4.375**	**1018.037**	**5225.923**

Girth class wise with respect to total area

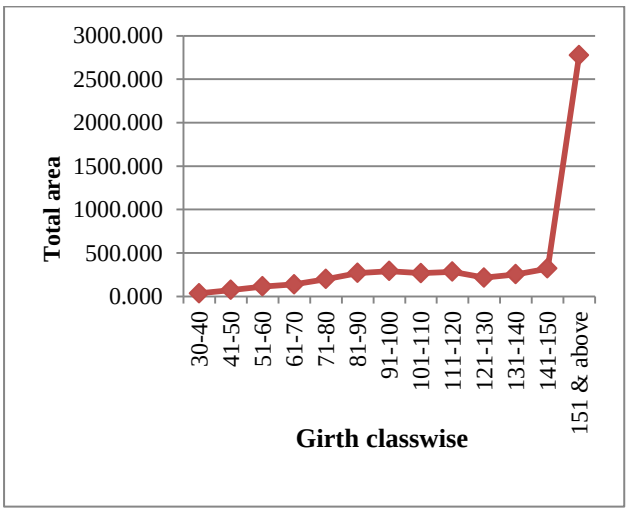


Table-15.2

Girth class wise & Specieswise in the entire grove (in area 15.4 ha)

(volume in cu.m)

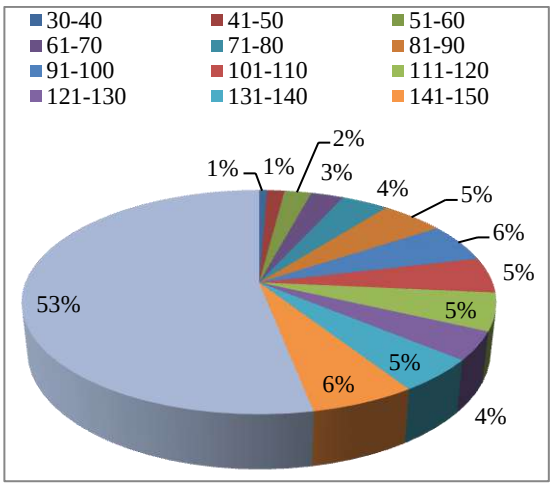
Girth class (cm)	**1st dominant *Castanopsis tribuloides***	**2nd dominant *Machilus parviflora***	**3rd dominant *Litsaea meissneri***	***Rest of Species***	***Pinus khasiana***	***Total***	***% with respect to total volume***
30-40	0.736	0.428	0.217	5.234	0	**6.615**	**0.650**
41-50	1.634	0.971	1.790	9.862	0	**14.257**	**1.400**
51-60	2.008	0.765	1.292	17.990	0	**22.055**	**2.166**
61-70	3.662	2.401	1.824	18.952	0	**26.839**	**2.636**
71-80	5.804	1.088	2.653	29.044	0	**38.589**	**3.791**
81-90	6.286	3.538	3.597	38.921	0	**52.342**	**5.141**
91-100	6.245	11.092	1.789	36.849	0.571	**56.546**	**5.554**
101-110	5.74	3.336	4.605	38.367	0	**52.048**	**5.113**
111-120	11.018	6.523	4.050	32.333	1.147	**55.071**	**5.410**
121-130	14.588	4.852	1.746	17.883	2.657	**41.726**	**4.099**
131-140	14.972	3.896	2.038	28.436	0	**49.342**	**4.847**
141-150	8.898	8.838	9.148	35.299	0	**62.183**	**6.108**
151 & above	24.354	57.926	58.774	399.370	0	**540.424**	**53.085**
Total	**105.945**	**105.654**	**93.523**	**708.540**	**4.375**	**1018.037**	**100.0**

% with respect to total Volume	10.407	10.378	9.187	69.599	0.430	100.00	

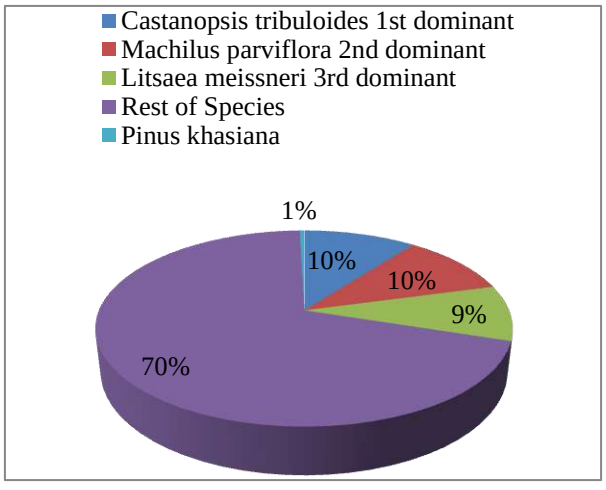
The table indicates that the volume contributed by the 1st dominant species (*Castanopsis tribuloides)* with respect to the total volume of the grove is 10.407%, the 2nd dominant species (*Machilus parviflora*) is 10.378%, 3rd dominant species *(Litsaea meissneri)* is 9.187%, ***(****Pinus khasiana****)*** 0.430% while rest of the species is maximum i.e. 69.599%. Total volume of the grove is 1018.037 cubic metres.

From the above 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.

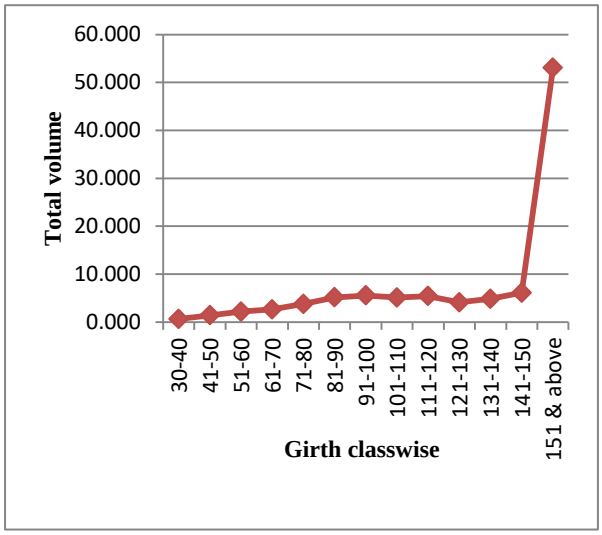
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view of Khloo Langdoh Kur Pyrtuh

15.8 Number of Stems:

Number of stems in each girth class are species wise are given in the table 15.3 & 15.4. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40 cm to 91-100 cm classes.

Table-15.3

Girth class wise & Species wise No. of stems in the sampled (33 plots - area 15.4 ha)

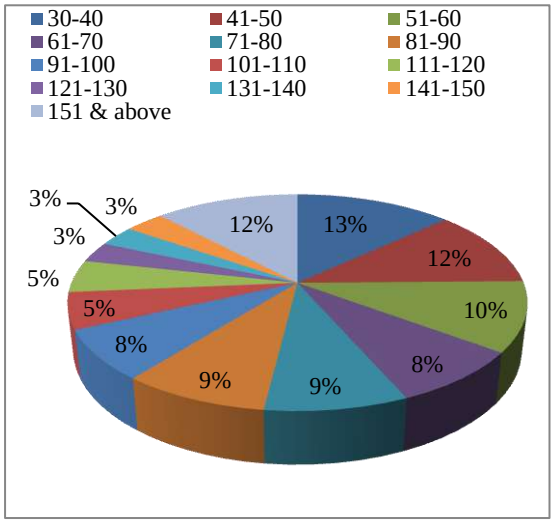
Girth class (cm)	1st dominant *Castanopsis tribuloides*	2nd dominant *Machilus parviflora*	3rd dominant *Litsaea meissneri*	*Rest of Species*	*Pinus khasiana*	*Total*
30-40	13	7	5	86	0	111
41-50	11	7	12	68	0	98
51-60	8	3	5	72	0	88
61-70	10	6	5	49	0	70
71-80	11	2	5	54	0	72
81-90	9	5	5	55	0	74
91-100	7	12	2	41	1	63
101-110	5	3	4	34	0	46
111-120	8	5	3	24	1	41
121-130	9	3	1	11	2	26
131-140	8	2	1	15	0	26
141-150	4	4	4	16	0	28
151 & above	7	13	11	71	0	102
Total	**110**	**72**	**63**	**596**	**4**	**845**

Table-15.4

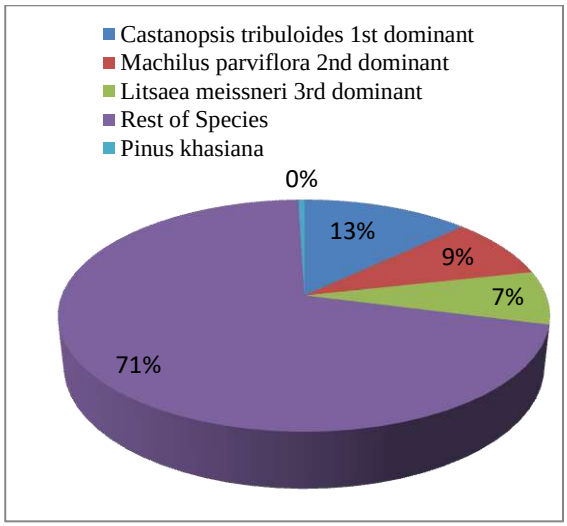
Girth class wise & Species wise No. of stems in the entire grove (Area 15.4 ha)

Girth class (cm)	1st dominant *Castanopsis tribuloides*	2nd dominant *Machilus parviflora*	3rd dominant *Litsaea meissneri*	*Rest of Species*	*Pinus khasiana*	*Total Stem*
30-40	39	21	15	258	0	**333**
41-50	33	21	36	204	0	**294**
51-60	24	9	15	216	0	**264**
61-70	30	18	15	147	0	**210**
71-80	33	6	15	162	0	**216**
81-90	27	15	15	165	0	**222**
91-100	21	36	6	123	3	**189**
101-110	15	9	12	102	0	**138**
111-120	24	15	9	72	3	**123**
121-130	27	9	3	33	6	**78**
131-140	24	6	3	45	0	**78**
141-150	12	12	12	48	0	**84**
151 & above	21	39	33	213	0	**306**
Total	330	216	189	1788	12	2535

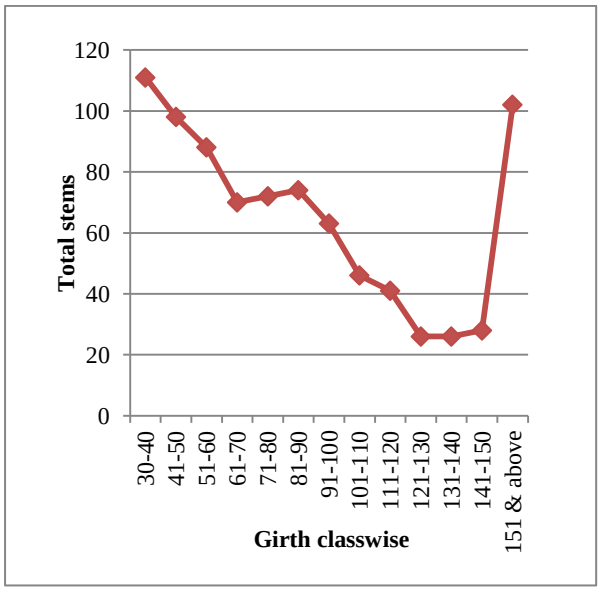
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Girth class wise stem with respect to total stems



Inside view of Khloo Langdoh Kur Pyrtuh

15.9 Brief note on Management of Khloo Langdoh Kur Pyrtuh, Sohmynting Village.

(i) Protection from Biotic Interfernece:-

Entry or exit, felling of tress, hunting & poaching, and starting of fire within the grove is not permissable, it was noticed stray incident of grazing are taking place by domesticated cattle. Therefore, the biotic pressure faces by this grove is mainly from grazing of cattles.

(ii) Fire Control:-

During the enumeration exercise, while interacting with the elders of the Village, it was told that fire incident hardly takes place within the grove.

(iii) Awareness Campaign:-

Sacred grove or Panchvati is a treasure trove or revervoir for biological diversity and is a repository of numerous herds (which has ornamental and medicinal value). The ancesters of these locals knowing the ecological value, besides the socio-religious significant, started the in- situ conservation of this beautiful sylvan. Through generation, the belief and knowledge has been pass down within the local community surrounding this sacred grove. Perhaps in this context the following should be the approach for awareness campaign;

- Climate change, climate disruption, food security, water scarcity, natural resources management, etc in these contexts, perhap, these locals has so much to teach to us all. In this sense, excursion trips cum interactive session of school/ college/ university students to this grove can be taken up.
- Red letter day/days associated with Forest and Environment could be celebrated in the vicinity of this grove.
- As a reminder of the ancestral pledging towards environmental conservation and perservation, poster campaign could be taken up in the form of signboard and posters. Further, in the same sense, seminar from locals and non-locals can be organized from time to time at this location.

16 - Ka Khloo Blai Sein Raij Kongwasan, Chyrmang Kmai, West Jaintia Hills, District.

16.1 Location:

Khloo Blai Sein Raij Kongwasan, Chyrmang Kmai Sacred Grove is situated at Chyrmang Village of West Jaintia Hills District of Meghalaya. It is under the aegis of Sein Raij Kongwasan, Chyrmang Kmai under the daloiship of Jowai Elaka. It covers an area of 7.0 ha and lies between 25° 25′ 52″ to 25° 26′ 01″ N latitude and 92° 14′ 27″ to 92° 14′ 36″ E Longitude with an altitude of 1371 m above mean sea level. The aspect of the sacred grove is in the North-East. It is bounded on all sides by private lands. The grove is accessible by road from Jowai and the distance is around 20 km from Jowai.

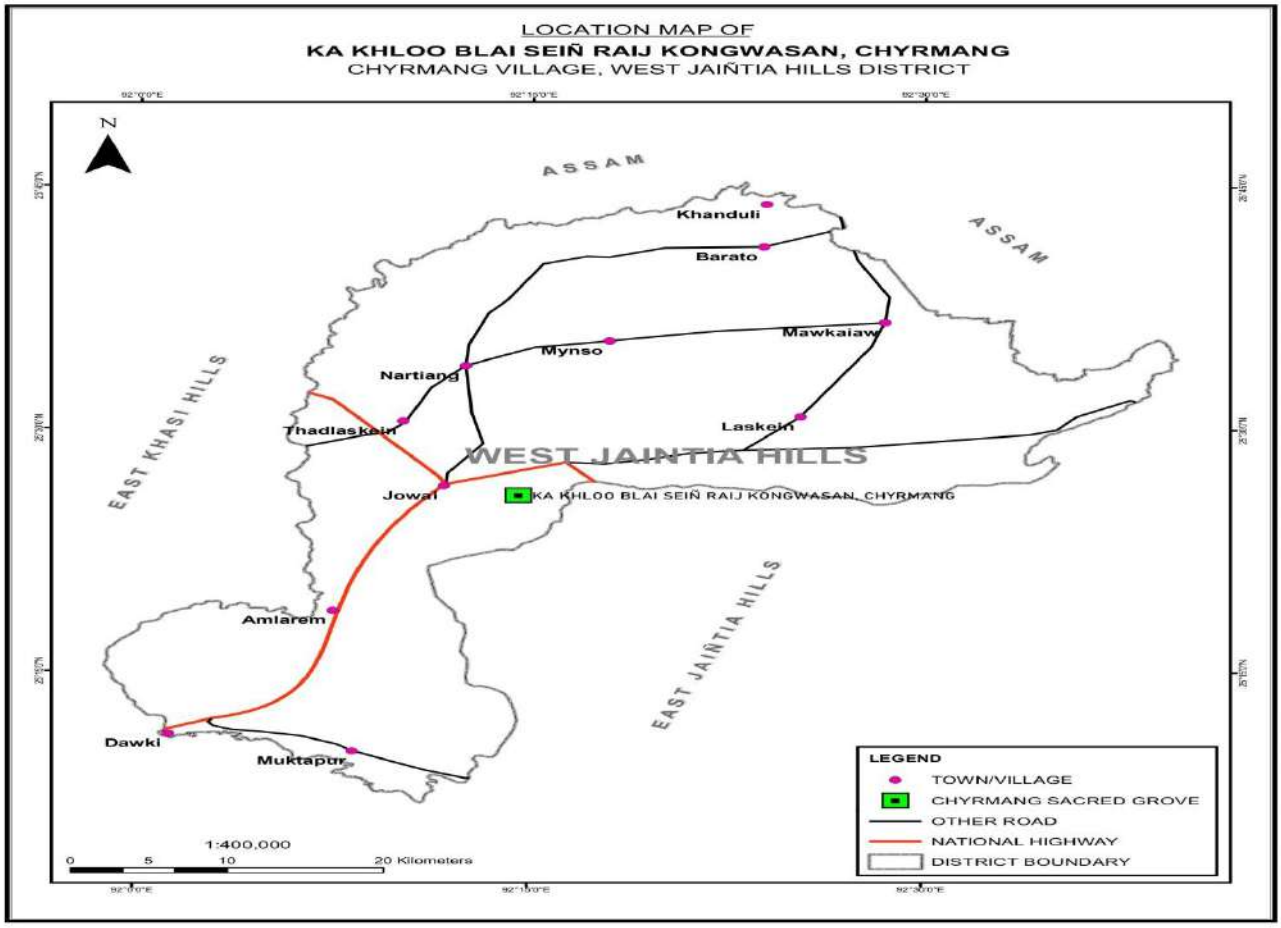
16.2 Brief History:

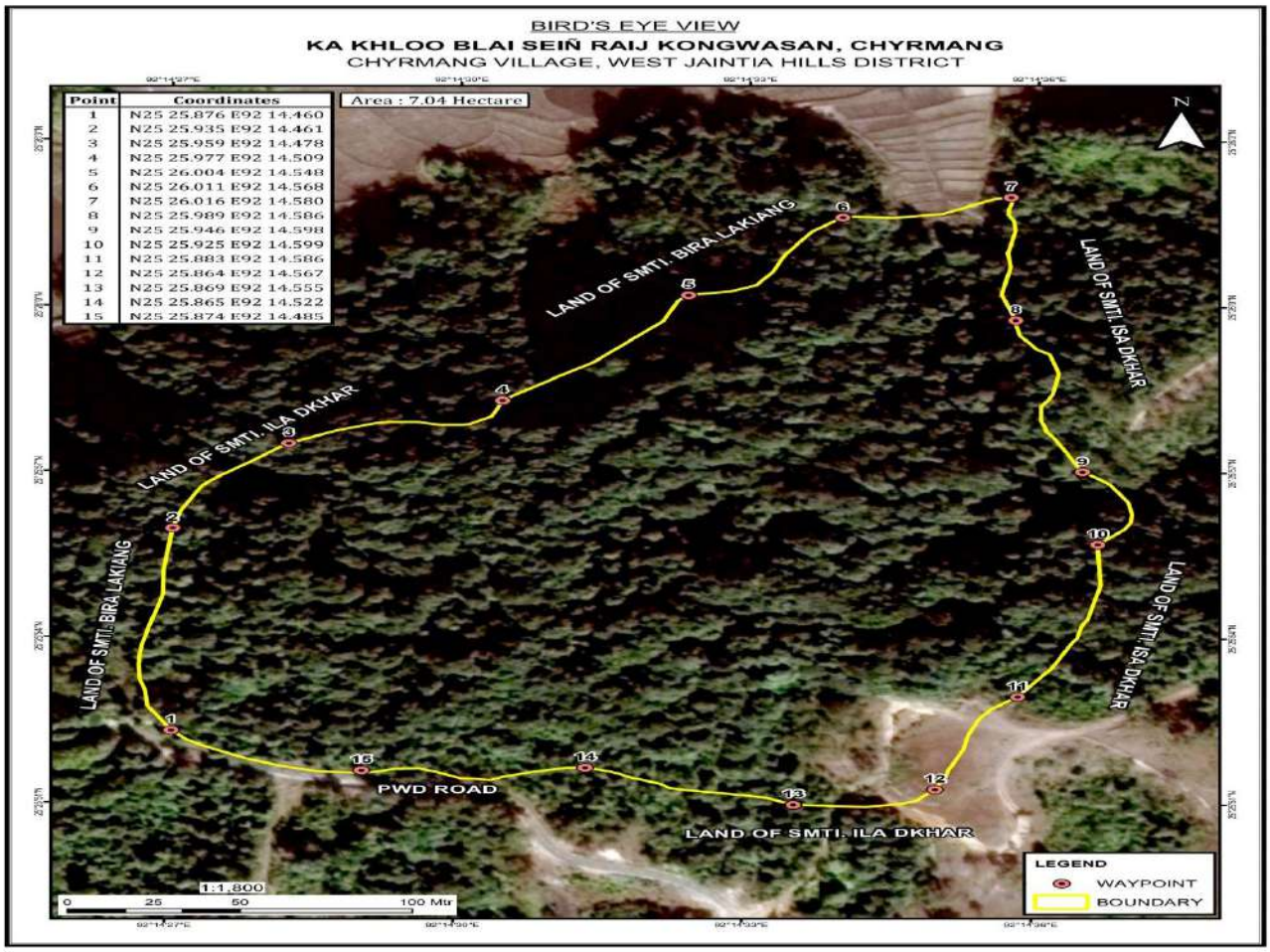
This grove has been originated many years ago. Religious rituals are still performed in this grove till date. Therefore, further the grove house a sanctum sanctorum in which religious ritual is being performed. Entry to the general public are prohibited, entrance by permission entails the offering of prayer to deities by the Lyngdoh. While entering into the grove leather shoes and leather accessories are not permitted. Besides its religious significant, the grove is well known for its myriad of flora that adds to its beauty. Felling of trees, hunting & poaching grazing, entry-exit is strictly prohibited. The state Forest Department has notified the sacred grove as a Community Reserve Forest under Section 36C of Wildlife Protection Act, 1972 vide government notification No. FOR.17/2013/135, dated 10.07.2013.

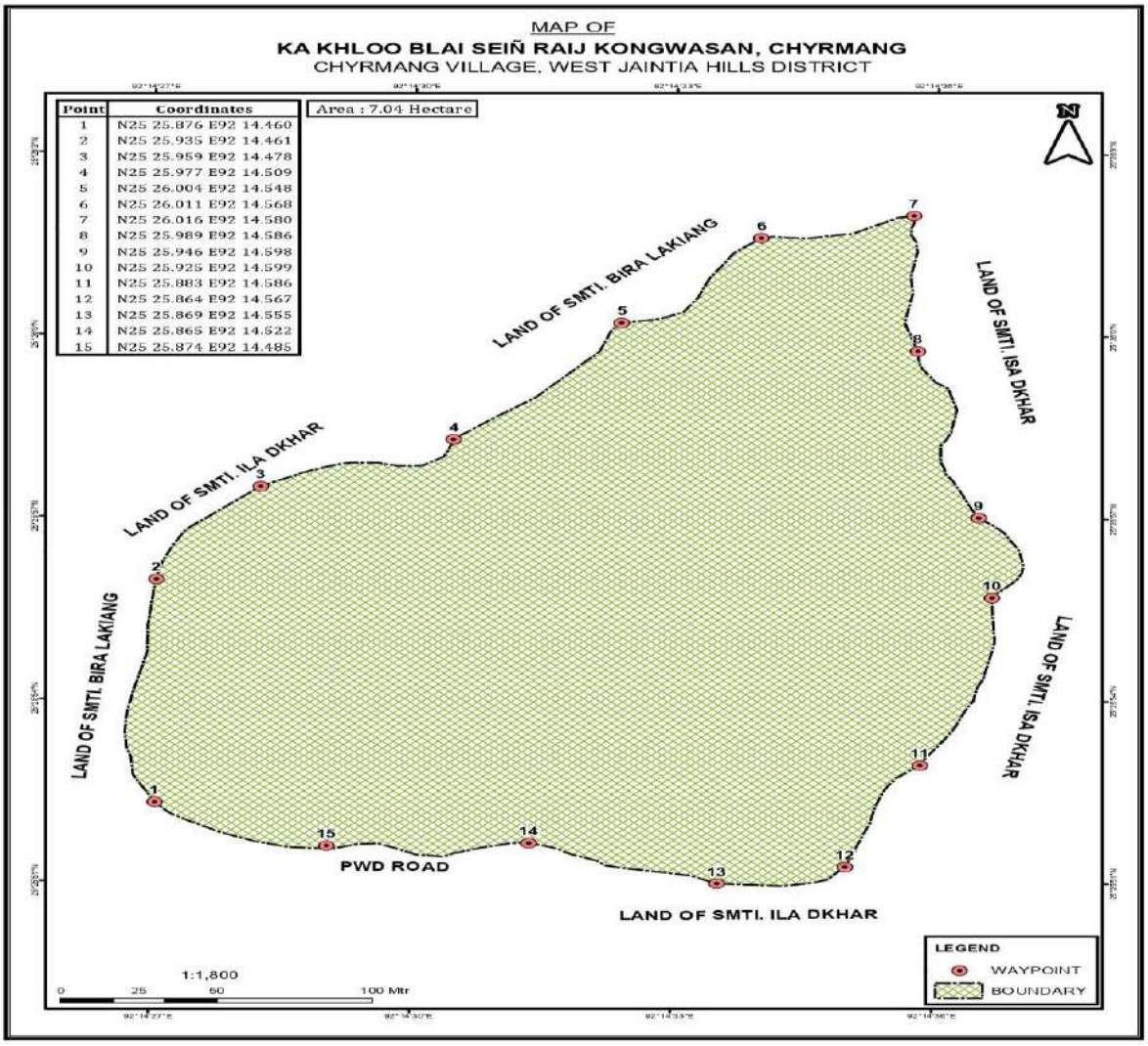
16.3 Geography and Climate:

Topography of the grove is gentle rolling in nature with slope varying from 4° to 20° slope gradient. It falls under North-East aspect. The soil texture is sandy loam with slightly compact in consistency. The colour of the soil is brown with medium soil depth and no coarse fragment. As noticed, there is no soil erosion in the grove. There is one seasonal stream that flows out of the grove.

Chyrmang has a moderate climate, similar to Jowai, with the average minimum temperature is 07^{o}C and average maximum is 20^{o}C. The rain fall varies from heavy to light but there is no month without rain. The summer season is from March to May, while the monsoon season starts from May and ends around October and November dawns the winter season which ends in February. Encroachment, Wild fire, hunting, grazing, and illegal timber felling are absent in this grove.


LOCATION MAP OF
KA KHLOO BLAI SEIÑ RAIJ KONGWASAN, CHYRMANG
CHYRMANG VILLAGE, WEST JAIÑTIA HILLS DISTRICT
N
ASSAM
ASSAM
Khanduli
Barato
Mawkaiaw
Mynso
Nartiang
Thadlaskein
Laskein
WEST JAINTIA HILLS
EAST KHASI HILLS
Jowai
KA KHLOO BLAI SEIÑ RAIJ KONGWASAN, CHYRMANG
Amlarem
EAST JAIÑTIA HILLS
Dawki
Muktapur
LEGEND
TOWN/VILLAGE
CHYRMANG SACRED GROVE
OTHER ROAD
NATIONAL HIGHWAY
DISTRICT BOUNDARY
1:400,000
0 5 10 20 Kilometers


BIRD'S EYE VIEW
KA KHLOO BLAI SEIÑ RAIJ KONGWASAN, CHYRMANG
CHYRMANG VILLAGE, WEST JAINTIA HILLS DISTRICT
Point Coordinates
1 N25 25.876 E92 14.460
2 N25 25.935 E92 14.461
3 N25 25.959 E92 14.478
4 N25 25.977 E92 14.509
5 N25 26.004 E92 14.548
6 N25 26.011 E92 14.568
7 N25 26.016 E92 14.580
8 N25 25.989 E92 14.586
9 N25 25.946 E92 14.598
10 N25 25.925 E92 14.599
11 N25 25.883 E92 14.586
12 N25 25.864 E92 14.567
13 N25 25.869 E92 14.555
14 N25 25.865 E92 14.522
15 N25 25.874 E92 14.485
Area : 7.04 Hectare
N
LAND OF SMTI. BIRA LAKIANG
LAND OF SMTI. ILA DKHAR
LAND OF SMTI. ISA DKHAR
PWD ROAD
1:1,800
0 25 50 100 Mtr
LEGEND
WAYPOINT
BOUNDARY



16.4 Forest Type:

According to Champion & Seth classification (1968) the forest types in the groves is ***(Type 8B/C2) Khasi Sub-tropical Wet Hills forest***.

Origin of the grove is natural. The physiognomy of the grove is characterized by two storyed, in addition to the undergrowth. The present of weeds and grasses is scanty. Bamboo distribution within the grove is scattered, while canes are in abundant.

The regeneration, as notice, is inadequate.

16.5 Flora and Fauna:

The floristics is characterized by mixed type consisting mainly of *Castonopsis species Machilus parviflora.* The relic forest is natural and it has of one storeyed layers. The wildlife found within the grove is jungle fowls, jackals, pangolin and many vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

i. Virgin forests where human interference is almost zero.

ii. Unique monsoon and waterfalls which have attracted many tourists both local and national and even foreigners.

iii. Existence of many rare and endangered plants species.

iv. High level endemic plants and animals species.

v. Restrictions-"do's and don'ts;" which has immensely help the sacred grove in conservation of Flora and fauna and maintaining the rich forest natural resources.

16.6 Flora species:

List of trees found in Khloo Blai Sein Raij Kongwansan,Chyrmang kmai Community Reserve, West Jaintia Hills

TREES

Sl.No.	Botanical Name	Local Name	Family
1	*Aralia armata*	Dienglatymphu	Araliaceae
2	*Artocarpuschaplasha*	Diengsohram	Moraceae
3	*Artocarpuslacucha*	Diengsoh ram/sohshram	Moraceae
4	*Azadirachtaindica*	Diengsah-klong/ soh long	Moraceae
5	*Betulaalnoides*	Dienglieng	Betulaceae
6	*Callicarpaarborea*	Dienglakiat	Verbanaceae
7	*Castanopsisindica*	Diengtyrso	*Fagaceae*
8	*Castanopsisindica*	Diengsohot	*Fagaceae*
9	*Castanopsistribuloides*	Diengsning	*Fagaceae*
10	*Cinnamomumbejolghota*	Dienglatyrdop	Lauraceae
11	*Cinnamomumpauciflorum*	Diengtorthia	Lauraceae
12	*Cinnamomumspp*	Diengpongriang (tyrdop leaf)	Lauraceae
13	*Cinnamomumvejolghota*	Diengtyrdop	Lauraceae
14	*Cissusrepens*	Diengjajew	Vitaceae
15	*Citrus latipes*	Diengsohkynphor	Rutaceae
16	*Croton caudatus*	Diengsaphai	Euphorbiaceae
17	*Docyniaindica*	Diengsohphohkhasi	Rosaceae
18	*Elaeocarpusprunifolius*	Dienglakhmar	Elaeocarpaceae
19	*Eleocarpuslanceafolius*	Dienglasaw/phyrnu saw	Elaeocarpaceae
20	*Eleocarpusprunifolius*	Dieng ruin	Elaeocarpaceae
21	*Engelhardtiaspicata*	Dienglba	Juglandaceae
22	*Erythrinaindica*	Dieng song	leguminoceae
23	*Eugenia jambolana*	Diengsohum	Myrtaceae
24	*Eurya japonica*	Diengpyrsitkhyndew	Theaceae
25	*Exbucklandiapopulnea*	Diengdoh	Hamamelidaceae
26	*Ficusbenjamina*	Diengjri	Moraceae
27	*Ficuscunia*	Diengthylliang	Moraceae
28	*Ficussarmentosa*	Diengjrisim	Moraceae
29	*Glochidionsphaerogynum*	Diengsohum	Euphorbiaceae
30	*Grewiaabutilifolia*	Diengsohmehblang	Tiliaceae
31	*Hoveniaacerba*	Diengkyllain/kyllait/myllait	Rhamnaceae
32	*Ilex venulosa*	Diengshyieng	*Aquifoliaceae*
33	*Inulacappa*	Dienglalieh	Asterraceae
34	*Iteachinensis*	Diengsohsyrtet	Iteaceae
35	*Iteamacrophylla*	Diengsaru	Iteaceae
36	*Knemalinifolia*	Diengsohslung	Myristicaceae
37	*Lithocarpuselegans*	Diengsarang	Lauranceae

38	*Lithocarpusfenestrata*	Diengjing	Fagaceae
39	*Machilusparviflora*	Diengsatler	Lauranceae
40	*Machilusspp*	Diengsatlerlieh	Lauranceae
41	*Mahoniaaccanthifolia*	Diengsohiongblei	Beriberidaceal
42	*Morindaaugustifolia*	Dieng stem/synrai	Rubiaceae
43	*Myricanagi*	Diengsohliya	Myricaceae
44	*Nepheliumlongana*	Diengloba	Sapindaceae
45	*Pasaniadealbata*	Diengsai	Fagaceae
46	*Pasaniafenestrata*	Diengsasei	Fagaceae
47	*Pinuskhasiana*	Diengkseh	*Pinaceae*
48	*Pithecellboiusheterophulum*	Diengiapiar	Fabaceae
49	*Podocarpuslatifolia*	Diengkseh um	Taxaceae
50	*Polygala arillata*	Diengjakba	Polygalaceae
51	*Premnabengalensis*	Dienglalieh	Asteraceae
52	*Quercusglauca*	Dieng sari	fagaceae
53	*Quercusgriffithii*	Diengwah	fagaceae
54	*Quercusspp*	Diengtyrpengdngiem	fagaceae
55	*Rhusaccuminata*	Diengsyrti	Anacardiaceae
56	*Rhus succedanea*	Diengkain	Anacardiaceae
57	*Sauropusandrogynus*	Dieng sapid	Phyllanthaceae
58	*Schimakhasiana*	Diengngan	Theaceae
59	*Smilax glabra*	Diengsohkrut/sakrut	Smilacaceae
60	*Styraxserrulatum*	Diengjalymmaw	Styracaceae
61	*Symplocostheaefolia*	Diengdpei	Symplocaceae
62	*Taxusbaccata*	Diengksehblei	Taxaceae
63	*Vacciniumgriffithianum*	Diengsohryngkham	Ericaceae
64	*Zanthoxylumspp*	Diengshiahnar	Rutaceae

List of Shrubs, herbs, climbers & bamboo found in Khloo Blai Sein Raij Kongwasan, Chyrmang Kmai Community Reserve, West Jaintia Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1	Syntiew kynthlien		
2	Tyrthia		

HERBS

Sl No.	Local Name	Botanical Name	Family
1	Tmain khla	*Lycopodium clavatum*	Lycopodiaceae
2	Swodung		
3	Sohkot		
4	Shiah miaw		
5	Sohkhniah		
6	Soh kristmas		
7	Tongtlang		
8	Tiew lari		
9	Tongsah		

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1	Makariang		
2	Tiew thing		
3	Tiew phonguir		

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1	Dieng tiew dieng	*Acanthoppianselotensis*	Orchideceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1	Shken	*Bambusa pallida*	Poaceae

16.7 Growing Stock:

As per the methodology described in Chapter-II, 100 % enumeration is carried out in the grove as its area is less than 10 ha. Each and every tree having GBH (girth at breast height) of 30 cm or more is enumerated by measuring the top height (in meters) and the girth (in centimetres) at breast height.

All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 1537 trees consisting of 199 *Castanopsis tribuloides* (1^{st} dominant), 198 *Machilus parviflora* (2^{nd} dominant), 32 *Ilex venulosa* (3^{rd} dominant), 19 *Pinus khasiana* and 1089 Rest of 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 result for Khloo Blai Sein Raij Kongwasan, Chyrmang Kmai Sacred Grove are given in table 16.1 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 1286.682 cubic metres.

Table-16.1

Girth class wise & Specieswise with respect to total volume (in 7.0 ha)

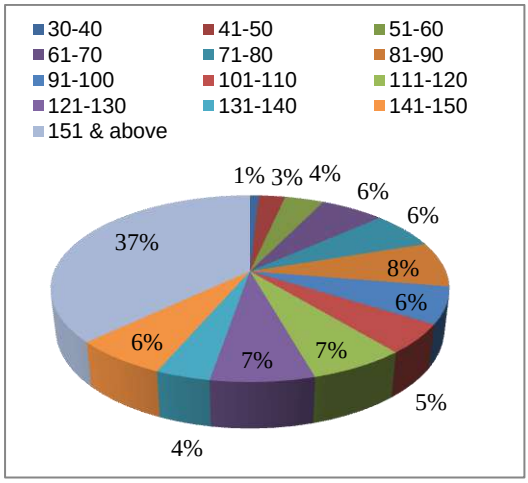
(volume in cu.m)

Girth class (cm)	**1st dominant *Castanopsis tribuloides***	**2nd dominant *Machilus parviflora***	**3rd dominant *Ilex venulosa***	***Pinus khasiana***	***Rest of Species***	***Total***	***% with respect to total volume***
30-40	1.371	1.053	0.583		8.094	11.101	0.863
41-50	4.594	3.245	0.789		24.296	32.924	2.559
51-60	5.132	6.383	1.238	0.506	35.435	48.694	3.784
61-70	9.941	9.883	1.371	1.126	56.901	79.222	6.157
71-80	10.138	14.225	3.142	0.391	55.036	82.932	6.445
81-90	10.977	15.845		2.929	70.616	100.367	7.800
91-100	16.281	10.173	2.582	0.805	51.622	81.463	6.331
101-110	8.168	10.984	1.111	1.813	43.065	65.141	5.063
111-120	15.497	8.345		1.101	59.942	84.885	6.597
121-130	14.536	11.453		2.835	62.441	91.265	7.093
131-140	1.860	9.95			36.261	48.071	3.736
141-150	16.043	13.534			54.172	83.749	6.509
151 & above	47.856	77.452			351.56	476.868	37.062
Total	**162.394**	**192.525**	**10.816**	**11.506**	**909.441**	**1286.682**	**100.000**
% with respect to total Volume	12.621	14.963	0.841	0.894	70.681	100.000	

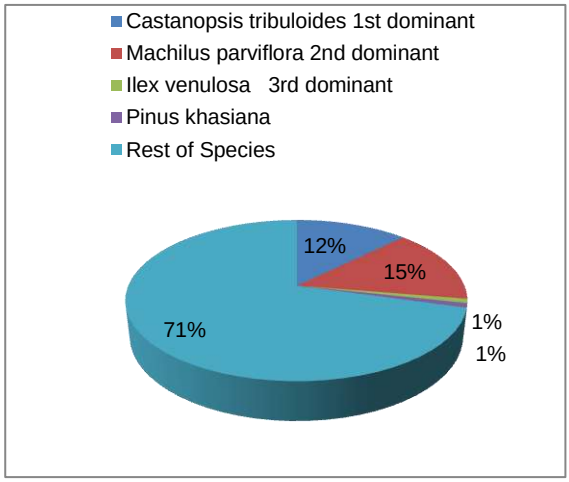
The table indicates that the volume contributed by the 1st dominant species (*Castanopsis tribuloides)* with respect to the total volume of the grove is 12.621 %, the 2nd dominant species (*Machilus parviflora*) is 14.963 %, 3rd dominant species *(Ilex venulosa)* is 0.841%, *Pinus khasiana* is 0.894% while rest of the species is maximum i.e.58.71%. Total volume of the grove is 1286.682 cubic metres.

From the above 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.

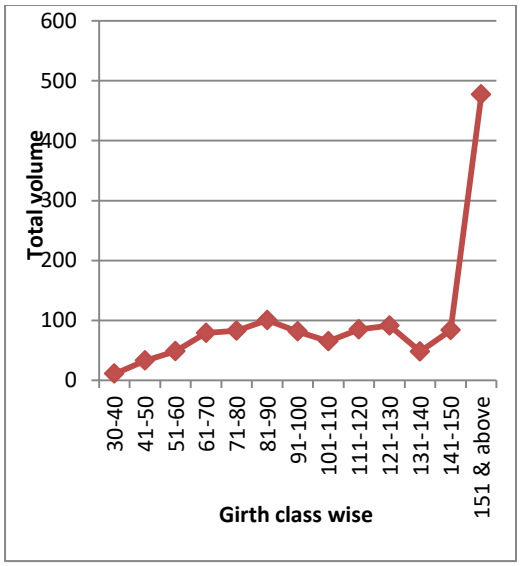
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view of Khloo Blai Sein Raij Kongwasan

16.8 Number of Stems:

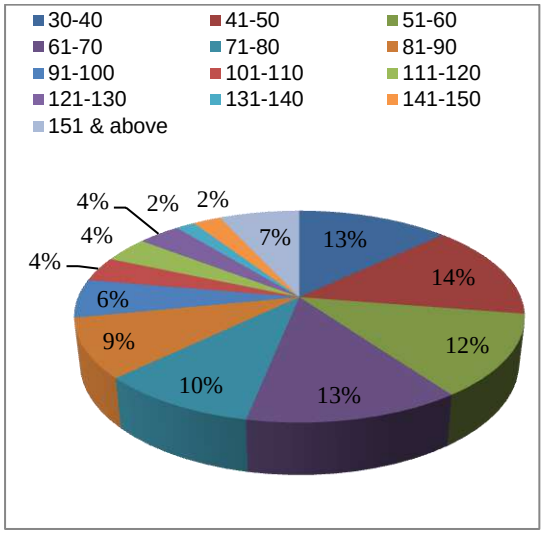
Number of stems in each girth class are species wise are given in the table 16.2. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40 cm to 91-100 cm classes.

Table-16.2

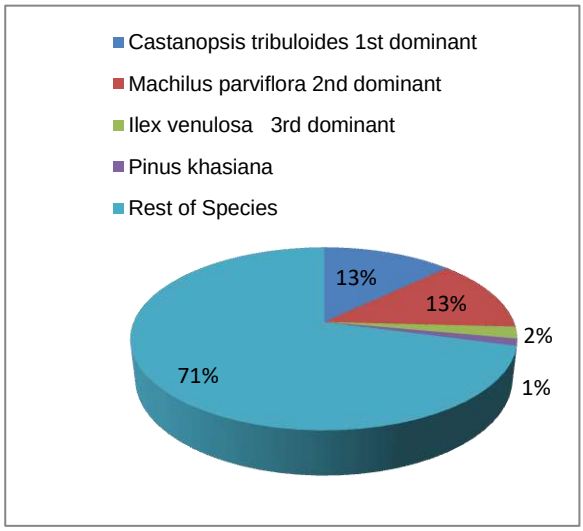
Girth class wise & Species wise No. of stems in the entire grove (Area 7.0 ha)

Girth class (cm)	1st dominant *Castanopsis tribuloides*	2nd dominant *Machilus parviflora*	3rd dominant *Ilex venulosa*	*Pinus khasiana*	Rest of Species	Total
30-40	24	17	10	0	149	**200**
41-50	30	23	5	0	165	**223**
51-60	20	25	5	3	140	**193**
61-70	25	25	3	4	144	**201**
71-80	19	26	5	1	98	**149**
81-90	15	22		5	97	**139**
91-100	18	11	3	1	57	**90**
101-110	7	10	1	2	38	**58**
111-120	11	6	0	1	42	**60**
121-130	9	7	0	2	38	**56**
131-140	1	5	0	0	19	**25**
141-150	7	6	0	0	24	**37**
151 & above	13	15	0	0	78	**106**
Total	**199**	**198**	**32**	**19**	**1089**	**1537**

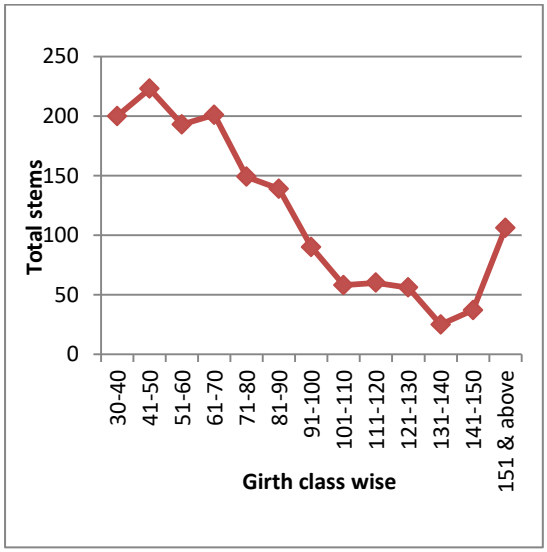
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Girth class wise stem with respect to total stems



Inside view of Khloo Blai Sein Raij Kongwasan

16.9 Brief note on Management of Khloo Blai Sein Raij Kongwasan, Chyrmang Kmai.

(i) Protection from Biotic Interfernece:-

As the grove is considered and preserved by the locals for its socio-religious significance, therefore entry or exit, felling of tress, hunting & poaching, grazing and starting of fire within the grove is not permissable. In this snese, the grove faces a negligible anthropogenic or biotic pressure.

(ii) Fire Control:-

The context of its socio-religious significance and as a community reserve forest, under the look out of the Department through Wildlife Wing, the grove experiences minimum to neglible fire incident as fireline are being maintain regularly.

(iii) Awareness Campaign:-

Sacred grove or Panchvati is a treasure trove or revervoir for biological diversity and is a repository of numerous shurbs/herds which has ornamental and medicinal value. The ancesters of these locals knowing the ecological value, besides the socio-religious significant, started the in- situ conservation of this beautiful sylvan. Through generation, the belief and knowledge has been pass down within the local community surrounding this sacred grove. Perhapin this context the following should be the approach for awareness campaign;

- Climate change, climate disruption, food security, water scarcity, natural resources management, etc in these contexts, perhap, these lacals has so much to taech us all. In this sense, excursion trip cum interactive session (with the locals) for school/college/ university students to this grove can be taken up.
- Red letter day associated with Forest and Environment could be celebrated in the vicinity of this grove.
- As a reminder of the ancestral pledge towards environmental conservation and perservation, poster campaign could be taken up in the form of signboard and posters. Further, in the same sense, seminar for locals and non-locals can be organized from time to time at this location.

17 – Ka Khloo Blai Sein Raij Tuber, East Jaintia Hills, District.

17.1 Location:

Khloo Blai Sein Raij Tuber is situated in East Jaintia Hills District at Tuber Sohshrieh village, under Jowai Daloiship. It covers an area of 89.43 ha and lies between 92° 16′ 10″ E to 92° 16′ 50″ E Longitude and 25° 26′ 00″ N to 25° 26′ 30″ N latitude with an altitude of 1367 m from mean sea level (MSL). The Sacred Grove is bounded in the North- East by Um-mluh stream, North-West by private lands, in the South- East private land of Shri. Rajon Muruh. The grove is accessible by road from Shillong, It is about 86 km approximately from Shillong.

17.2 Brief History:

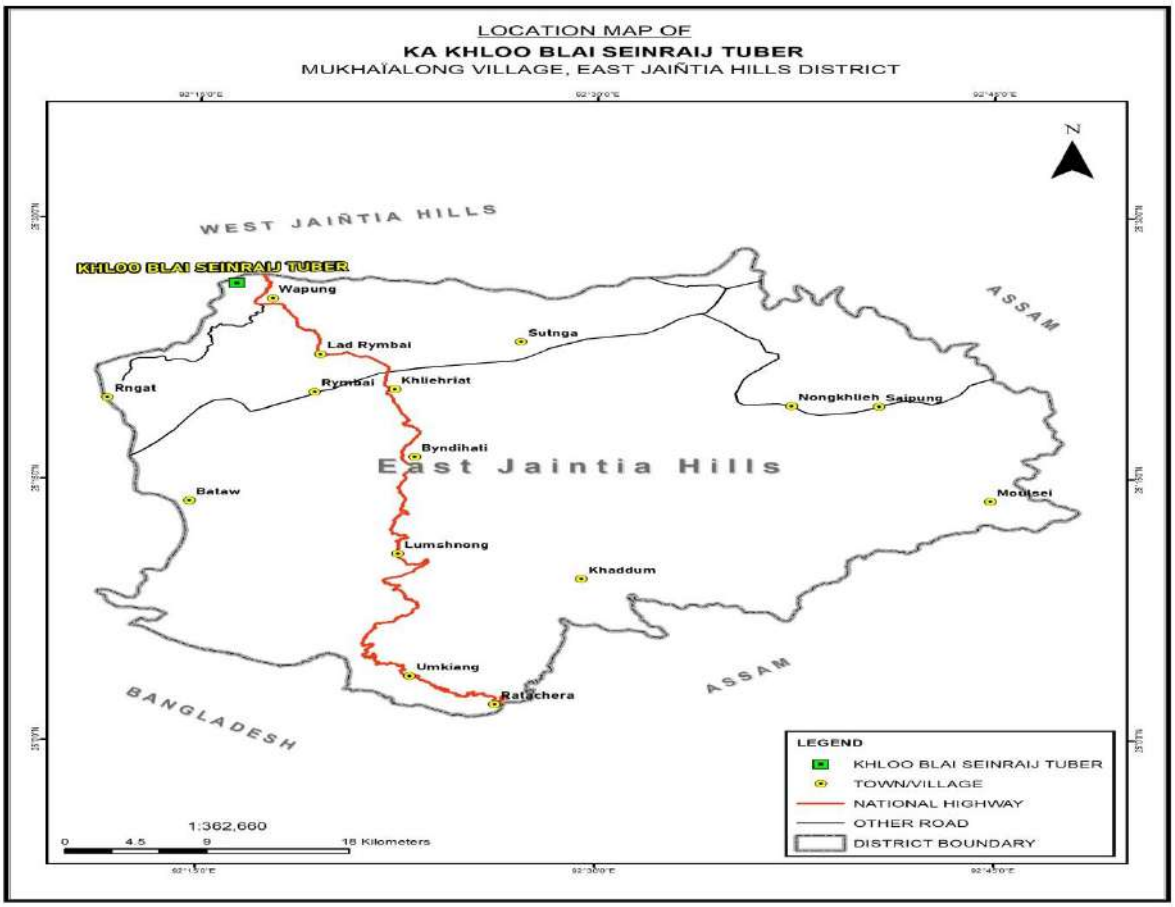
The Sacred Grove begins its existence a few hundred years ago and since then it has been managed and controlled by Sein Raij of Tuber Sohshrieh. Since the majority of the Vallagers are Niam Tre believers, the religious significance of the grove has not diminished as such offerings and prayers are still being practice in the form of annual animal sacrifice. Due to its religious significance, the grove is considered to house the various deities and thus entry and exit is strictly prohibited to the general public. Further, entry with prior permission entails that a person should not wear any leather shoes or accessories made out of leather, no plucking of twigs/branches/up-rooting any flora. The Sacred Grove has been notified by Department of Forest and Environment as a Community Reserve vide notification No. FOR.17/2013/134 Dated 10th, July, 2013 under section 36C of Wildlife Protection Act, 1972.

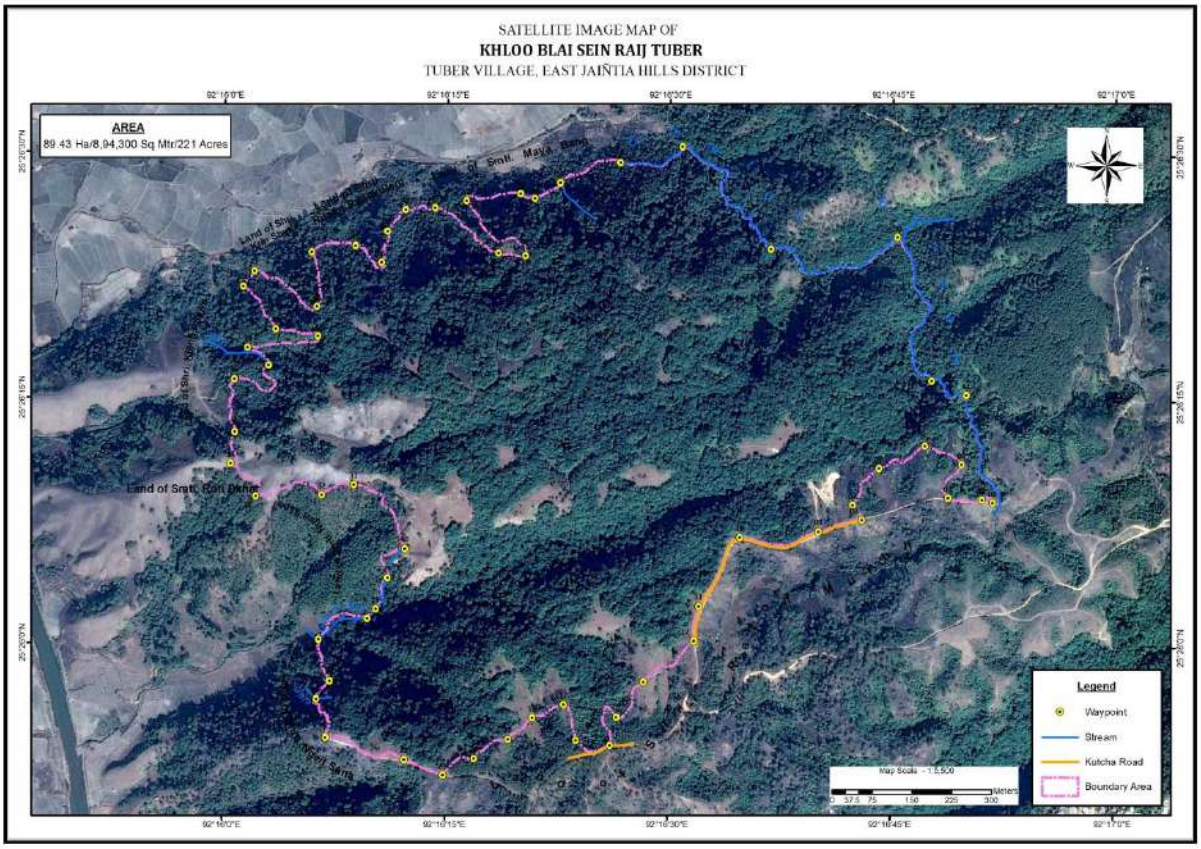
17.3 Geography and Climate:

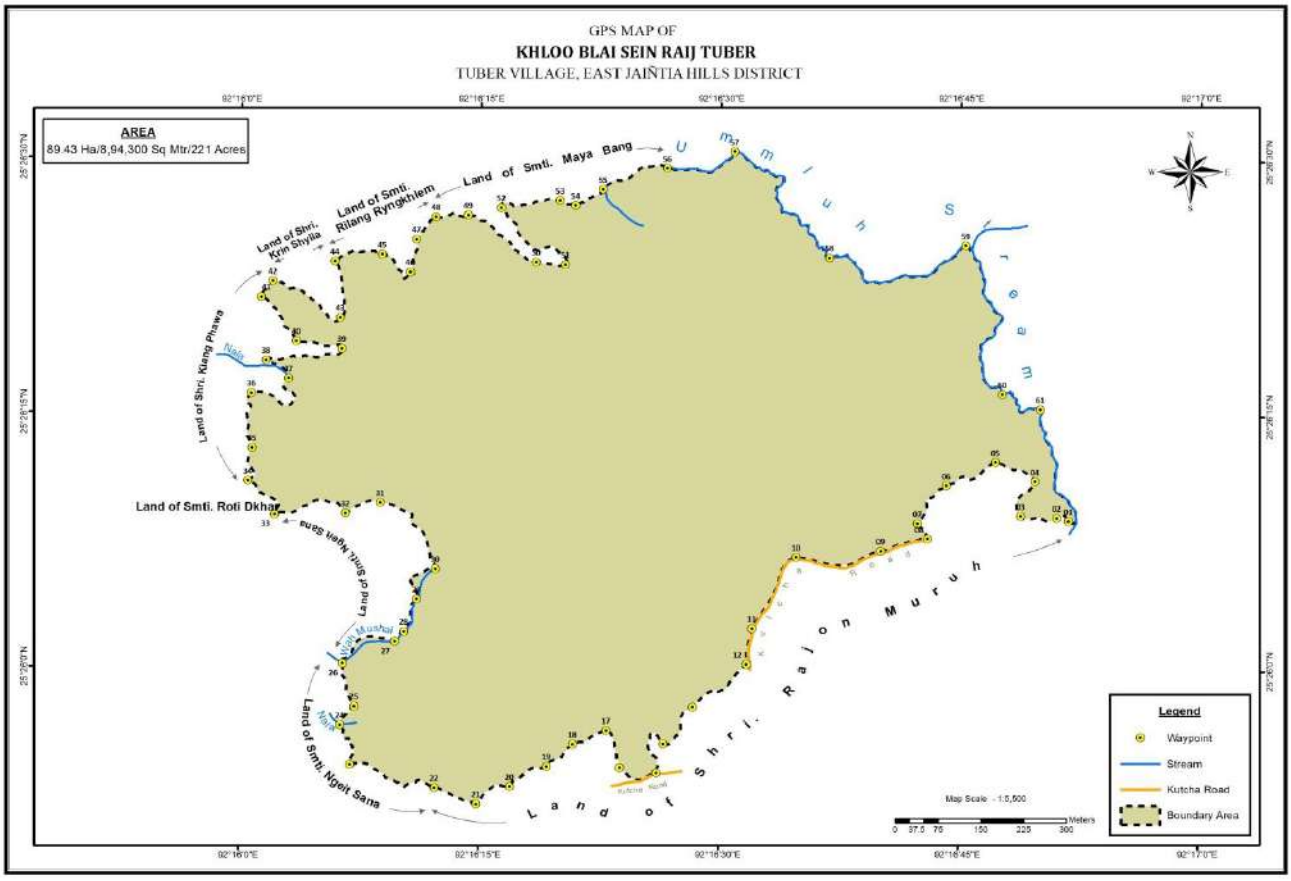
The Topography of the grove is gentle slope in nature with slope varying from 5° to 20°. The soil texture is sandy loamy, with gravel fragments in some area and slightly compact in consistency. The colour of the soil is brown with medium soil depth, 15-30 cm deep. No soil erosion has been noticed. There is one stream which flow out from this grove, Um-mluh stream.

The like other part of the State, East Jaintia Hills District has a very pleasant climate. The locale experiences a tropical monsoon climate. The rainy season occurs from mid May to September. October-January is cold. The average minimum temperature is 7^{o}C and average maximum temperature is 22^{o}C.

As the Sacred grove is now notified as Community Reserve Forest biotic pressure such as encroachment, Wild fire, hunting, poaching, grazing, and the other activities like illegal felling of timber are found to be absent.







17.4 Forest Type:

According to Champion & Seth classification (1968) and floristic the forest types found in the sacred grove is Type ***8B/C2 Khasi sub-tropical wet hills forest.***

17.5 Flora and Fauna:

The floristic is characterized by mixed *species* consisting mainly of *Castanopsis tribuloides, Itea chinensis and Quercus glauca as* 1st, 2nd and 3rd dominance respectively. Origin of the forest is natural and the physiognomy can be characterised by two storeyed type of forests. Wildlife found within the grove are jungle fowls, barking deers, jackals and some vertebrates and invertebrates. The conservation significance of the grove is mainly due to:

i. High level endemic plants and animal species which is very significant from the biodiversity point of view.
ii. Existence of many rare and endangered plants species.
iii. Restrictions-"do's and don'ts;" which help the sacred grove in conservation of Flora and fauna and maintaining of rich forest natural resources.

17.6 Flora species:

List of trees found in Khloo Blai Sein Raij Tuber,East Jaintia Hills

TREES

Sl.No.	Botanical Name	Local Name	Family
1	*Albizzialebbek*	Diengkreit	Fabaceae
2	*Aralia armata*	Dienglatymphu	*Arialiaceae*
3	*Betulaalnoides*	Dienglieng	Betulaceae
4	*Bucklandiapopilnea*	Diengdoh	*Hamamelidaceae*
5	*Callicarpaarborea*	Dienglakiat	*Verbanaceae*
6	*Caryotaurens*	Diengtlai	*Arecaceae*
7	*Castanopsisspp*	Diengtyrso	*Fagaceae*
8	*Castanopsistribuloides*	Diengsning	*Fagaceae*
9	*Chisochitoncumingianus*	Diengkynbublang	Meliaceae
10	*Cinnamomumbejolghota*	Dienglatyrdop	*Fagaceae*
11	*Cinnamomumpauciflorium*	Diengtorthia	*Fagaceae*
12	*Cissusrepens*	Diengjajew	Vitaceae
13	*Croton caudatus*	Diengsaphai	Euphorbiaceae
14	*Eleocarpusprunifolius*	Dieng ruin	Elaeocarpaceae
15	*Eleocarpuslanceafolius*	Dienglasaw	Elaeocarpaceae
16	*Emblicaofficinalis*	Diengsohmylleng	Myrtaceae
17	*Engelhardtiaspicata*	Dienglba	*Juglandaceae*
18	*Eugenia aquea*	Diengsali	Myrtaceae
19	*Eugenia jambolana*	Diengsohum	Myrtaceae
20	*Eurya japonica*	Diengpyrsit	Theaceae

21	*Ficuscunia*	Diengthylliang	Moraceae
22	*Ficussarmentosa*	Diengjrisim	Moraceae
23	*Glochidionvelutinum*	Diengjem	Phyllanthaceae
24	*Grewiaabutilifolia*	Diengsohmeblang	*Myrtaceae*
25	*Ilex venulosa*	Diengsohshyieng	*Aquifoliaceae*
26	*Inulacappa*	Dienglalieh	*Asteraceae*
27	*Iteachinensis*	Diengsohsyrtet	*Iteaceae*
28	*Lanneacoromandilica*	Diengsohlait/salait	Anacardiaceae
29	*Lithocarpuselegans*	Diengsarang	*Lauraceae*
30	*Lithocarpusfenestratus*	Diengjing	Fagaceae
31	*Litsaeameissneri*	Diengsohrang	Anacardiaceae
32	*Machilusparviflora*	Diengsatler	*Lauraceae*
33	*Mahoniaacanthifolia*	Diengsohiongkhlaw	*Beriberidaceae*
34	*Micheliaspp*	Diengsohrtein	Magnoliaceae
35	*Miliusaroxburghiana*	Diengjwat	Annonaceae
36	*Morindaaugustifolia*	Diengsynrai/stem	Rubiaceae
37	*Myricanagi*	Diengsohliya	*Myrtaceae*
38	*Pandanusamerican*	Diengshlan	*Pandanaceae*
39	*Pasaniafenestrata*	Diengsai /sasei	*Fagaceae*
40	*Pierisovalifolia*	Diengjalynsniang	*Rosaceae*
41	*Pinuskhasiana*	Diengkseh	*Pinaceae*
42	*Podocarpuslatifolia*	Diengksehum	*Taxaceae*
43	*Polygala arillata*	Diengjalakba	*Polygalaceae*
44	*Pourthieaearguta*	Diengsohryngkham	*Ericaceae*
45	*Premnabengalensis*	Dienglieh	*Asteraceae*
46	*Pyruskhasiana*	Diengsohjhur	*Rosaceae*
47	*Quercusglauca*	Dieng sari	*Fagaceae*
48	*Quercusgriffithii*	Diengwah	*Fagaceae*
49	*Quercusserrata*	Diengrtiang	*Fagaceae*
50	*Quercusspp*	Diengtyrso	*Fagaceae*
51	*Quercusspp*	Diengskoi	*Fagaceae*
52	*Rhodendrumarboratum*	Diengtiewsaw	*Ericaceae*
53	*Rhus succedanea*	Diengkain	*Anacardiaceae*
54	*Sauropusandrogynus*	Diengsapit	Phyllanthaceae
55	*Schimakhasiana*	Diengngan	*Theaceae*
56	*Smilax glabra*	Diengsohkrut/sakrut	Smilacaceae
57	*Spondiasaxillaris*	Diengsohlait	*Anacardiaceae*
58	*Symplocoschinesis*	Diengiong	*Symplocaceae*
59	*Symplocoskhasiana*	Diengdpei	*Symplocaceae*
60	*Walsurarobusta*	Diengsohphlang	*Meliaceae*
61	*Zanthoxylumabalifolium*	Diengshiah	*Rutaceae*

List of Shrubs, herbs, climbers & bamboo found in Khloo Blai Sein Raij Tuber Jaintia Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1	Syntiew kynthlien		
2	Tyrthia		
	Dieng pyrshit	*Eurya acuminata*	Theaceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1	Tmain khla	*Lycopodium clavatum*	Lycopodiaceae
2	Swodung		

3	Sohkrot		
4	Shiah miaw		
5	Sohkhwai		
6	Soh kristmas		
7	Tongtlang		
8	Tiew lari		
9	Tongsah		
10	Tyrkhang	*Polypodium sp.*	Polypodiaceae
11	Sla lamet	*Phyrnium pubinerve*	Marantaceae
12	Shynrai khlaw	*Alpinia allughas*	Zingiberaceae
13	Sla waitlam	*Asplenium nidus*	Aspleniaceae
14	Wangbsein	*Arisaema sp.*	Araceae
15	Sla baingon	*Strobilanthes sp.*	Rubiceae
16	Jajew khlaw	*Begonia roxburghii*	Begoniaceae
17	Sohbyrthit	*Urena labata*	Malvaceae
18	Wang khlaw	*Colocasia esculenta*	Araceae
19	Sying khlaw	*Zingiber purpureum*	Zingiberaceae
20	Dieng shlan	*Pandanus amaryllifolius*	Pandanaceae

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1	Soh shang khlor	*Elaeagnus pyriformis*	Elaeagnaceae
2	Dieng longkhasaw		
3	Jyrmi sohthied		
4	Shiah soh krot	*Smilax glabra*	Smilacaceae
5	Sla kynda jyrmi	*Pothos scandens*	Araceae
6	Dieng sohmatan/ sohpdong	*Stephania glabra*	Menispermaceae
7	Sohsalaroh		
8	Sohsakruit		
9	Sohjyrmi		
10	Sohpongshait		
11	Sohmyrshiang		
12	Sohphyluin		

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1	Makariang		
2	Tiew thing		
3	Tiew phonliur		

4	Dieng tiew dieng	*Micropera manii*	Orchidecaea
5	Dieng tiew dieng	*Dendrobium*	Orchidecae

GRASSES & BAMBOO

Sl No.	Local Name	Botanical Name	Family
1	Shken	*Bambusa pallida*	Poaceae
2	Siej namlang		
3	Langtdem (phlang)		
4	Langtylli (phlang)		
5	Langbyrnai (phlang)		
6	Langkaram (phlang)		

17.7 Growing Stock:

As per the methodology described in Chapter-II, 10% enumeration is carried out in the grove as its area is more than 50 ha. Every tree species having girth (over bark) at breast height more than 30 cm is enumerated by measuring the top height (in meters) and the girth (in centimeters) at breast height.

All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 3119 trees consisting of 776 *Castanopsis tribuloides* (1st dominant), 187 *Itea chinensis* (2nd dominant), 142 *Quercus glauca* (3rd dominant), 65 *Pinus khasiana* and 1949 Rest of 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 result for Khloo Blai Sein Raij Tuber, are given in table 17.1 & 17.2 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 67392.44 cubic metres.

Table-17.1

Girth class wise & Specieswise volume for sampled area (44 plots - area 89.43 ha)

(volume in cu.m)

Girth class (cm)	*1st dominant Castanopsis tribuloides*	*2nd dominant Itea chinensis*	*3rd dominant Quercus glauca*	*Pinus khasiana*	*Rest of Species*	*Total*
30-40	8.001	2.975	0.511	0.275	27.006	**38.768**
41-50	19.51	7.667	1.311	0.499	54.959	**83.946**
51-60	26.764	6.183	1.885	2.256	68.993	**106.081**
61-70	34.699	8.111	4.138	0.58	68.061	**115.589**

71-80	40.127	4.289	5.879	3.062	83.212	**136.569**
81-90	47.178	10.638	4.658	4.431	77.791	**144.696**
91-100	46.596	5.475	4.348	5.073	89.458	**150.95**
101-110	36.436	1.18	6.426	4.908	67.258	**116.208**
111-120	38.888	1.424	5.276	6.019	72.95	**124.557**
121-130	21.517	1.554	1.068	2.837	67.845	**94.821**
131-140	26.28	-	2.397	1.631	59.579	**89.887**
141-150	24.812	-	3.125	1.95	51.062	**80.949**
151 & above	50.839	-	32.156	4.928	136.211	**224.134**
Total	**421.647**	**49.496**	**73.178**	**38.449**	**924.385**	**1507.155**

Girth class wise with respect to total area

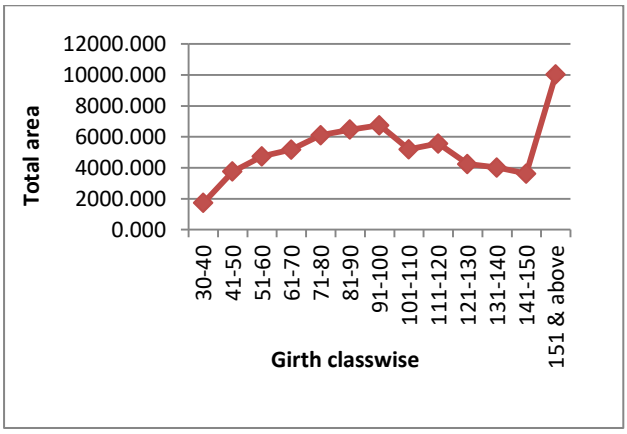


Table-17.2

Girth class wise & Species wise volume in the entire grove (area 89.43 ha)

(volume in cu.m)

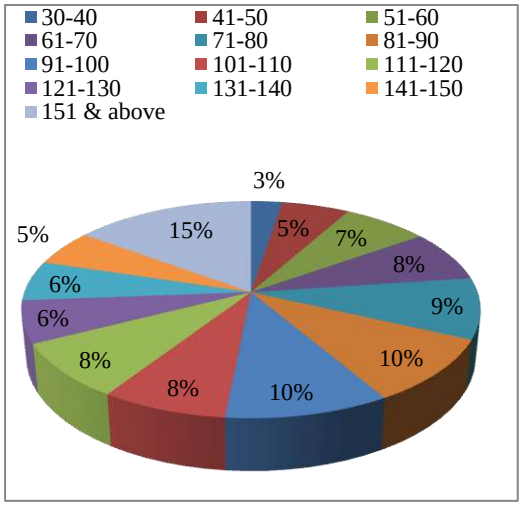
Girth class (cm)	***1st dominant Castanopsis tribuloides***	***2nd dominant Itea chinensis***	***3rd dominant Quercus glauca***	***Pinus khasiana***	***Rest of Species***	**Total**	**%wrt total volume**
30-40	357.76	133.03	22.85	12.30	1207.57	1733.51	2.57
41-50	872.39	342.83	58.62	22.31	2457.49	3753.65	5.57
51-60	1196.75	276.47	84.29	100.88	3085.02	4743.41	7.04
61-70	1551.57	362.68	185.03	25.93	3043.35	5168.56	7.67
71-80	1794.28	191.78	262.88	136.92	3720.82	6106.68	9.06
81-90	2109.56	475.68	208.28	198.13	3478.42	6470.08	9.60
91-100	2083.54	244.81	194.42	226.84	4000.11	6749.73	10.02

101-110	1629.24	52.76	287.34	219.46	3007.44	5196.24	7.71
111-120	1738.88	63.67	235.92	269.14	3261.96	5569.57	8.26
121-130	962.13	69.49	47.76	126.86	3033.69	4239.92	6.29
131-140	1175.11	0.00	107.18	72.93	2664.07	4019.30	5.96
141-150	1109.47	0.00	139.73	87.19	2283.24	3619.63	5.37
151 & above	2273.27	0.00	1437.86	220.36	6090.67	10022.15	14.87
Total	18853.95	2213.21	3272.15	1719.25	41333.88	67392.44	100.00
%wrt total volume	27.98	3.28	4.86	2.55	61.33	100.00	

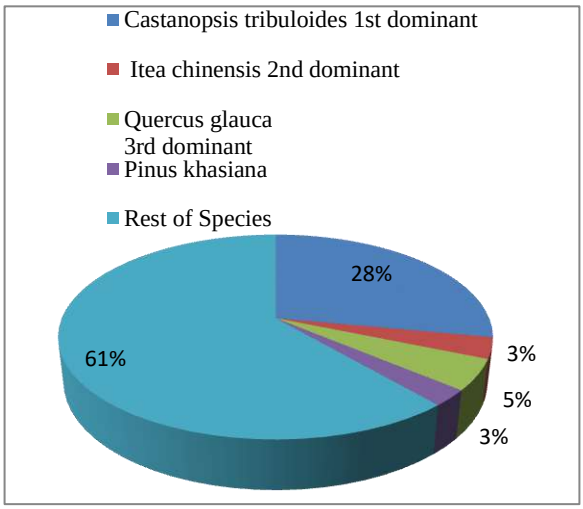
The table indicates that the volume contributed by the 1st dominant species (*Castanopsis tribuloides)* with respect to the total volume of the grove is 27.98%, the 2nd dominant species (*Itea chinensis*) is 3.28 %, 3rd dominant species *(Quercus glauca)* is 4.86% *Pinus kysea* is 2.55% while rest of the species is maximum i.e.61.33%. Total volume of the grove is 67392.44 cubic metres.

From the above 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.

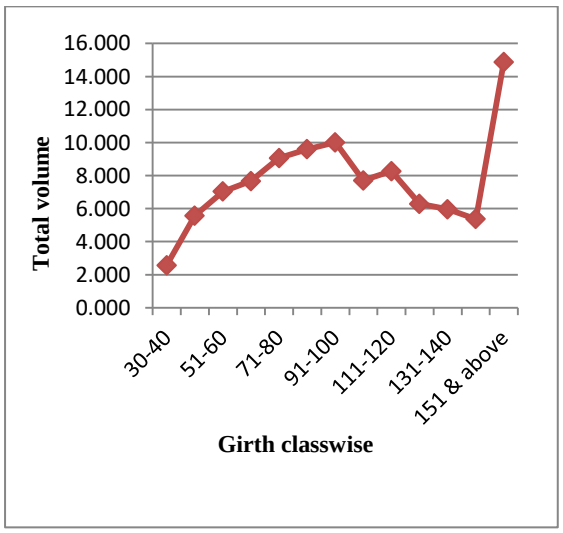
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view Khloo Blai Sein Raij Tuber

17.8 Number of Stems:

Number of stems in each girth class is species wise as given in the table 17.3 &17.4. The table shows that maximum numbers of stems are found in lower girth classes.

Table-17.3

Girth class wise & Species wise No. of stems in the sampled area (44 plots - area 89.43 ha)

Girth class (cm)	*1st dominant Castanopsis tribuloides*	*2nd dominant Itea chinensis*	*3rd dominant Quercus glauca*	*Pinus khasiana*	*Rest of Species*	*Total*
30-40	139	47	24	6	506	722
41-50	136	55	20	5	384	600
51-60	105	26	15	13	276	435

61-70	88	22	20	2	177	309
71-80	76	8	19	8	156	267
81-90	67	15	11	8	110	211
91-100	51	6	8	7	99	171
101-110	32	1	9	5	60	107
111-120	28	1	6	5	53	93
121-130	13	1	1	2	42	59
131-140	14	0	2	1	31	48
141-150	11	0	2	1	23	37
151 & above	16	0	10	2	32	60
Total	776	182	147	65	1949	3119

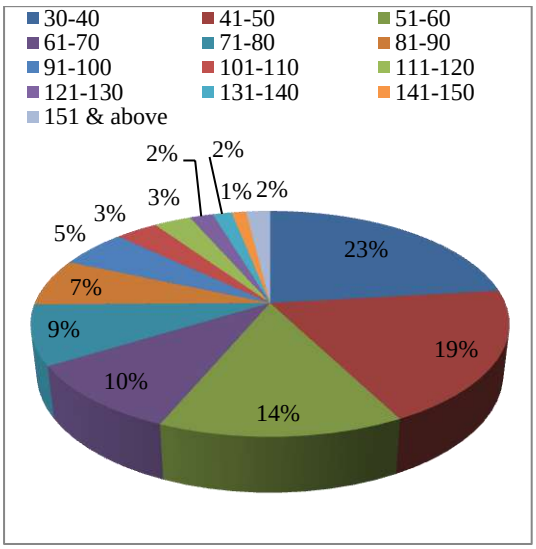
Table-17.4

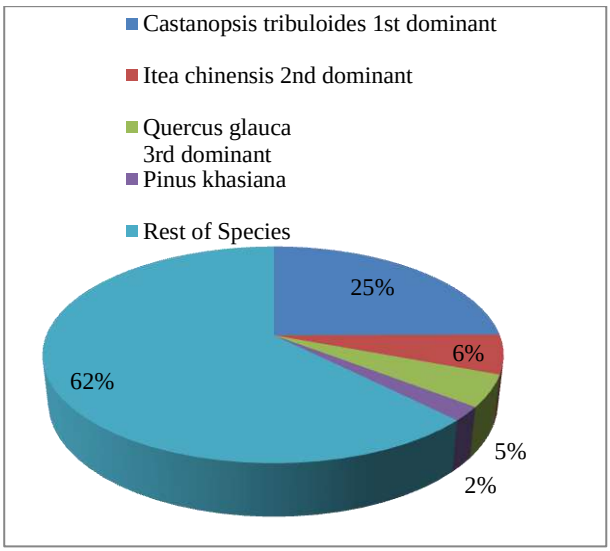
Girth class wise & Species wise No. of stems in the sampled area (area 89.43 ha)

Girth class (cm)	***1st dominant Castanopsis tribuloides***	***2nd dominant Itea chinensis***	***3rd dominant Quercus glauca***	***Pinus khasiana***	***Rest of Species***	***Total***
30-40	2502	846	432	108	9108	12996
41-50	2448	990	360	90	6912	10800
51-60	1890	468	270	234	4968	7830
61-70	1584	396	360	36	3186	5562
71-80	1368	144	342	144	2808	4806
81-90	1206	270	198	144	1980	3798
91-100	918	108	144	126	1782	3078
101-110	576	18	162	90	1080	1926
111-120	504	18	108	90	954	1674
121-130	234	18	18	36	756	1062
131-140	252	0	36	18	558	864
141-150	198	0	36	18	414	666
151 & above	288	0	180	36	576	1080
Total	13968	3276	2646	1170	35082	56142

Girth class wise diagram with respect to total stems

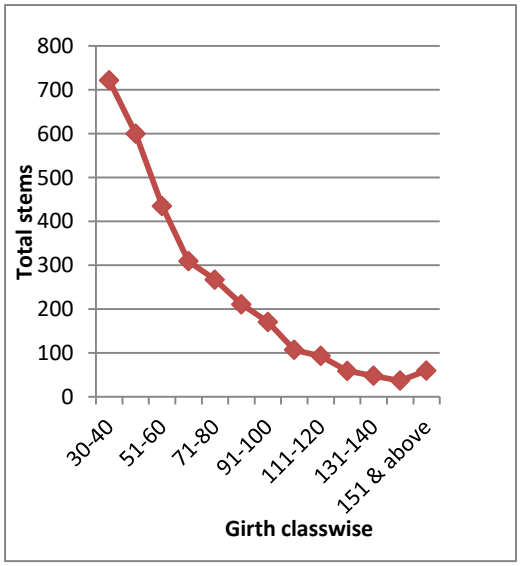
Species wise diagram with respect to total stems





Girth class wise stem with respect to total stems

Inside view of Khloo Blai Sein Raij Tuber



17.9 Brief note on Management of Khloo Blai Sein Raij Tuber Sacred Groves

(i) **Protection from Biotic Interfernece:-**

The Religious and social significant of Khloo Blai Sein Raij Tuber Sacred Grove is still intact, in addition it has been declared as Community Reserve Forest , therefore apparently at present this beautiful patch of forest does not faces any biotic pressure.

In some patches of the sacred grove which are open and barren aided natural regeneration can be taken up.

(ii) **Fire Control:-**

As the sacred is a notified Community Reserve, fire control measures has been taken up by the Wildlife division of Jaintia Hills.

(iii) **Water Stream:-**

There is only one stream in the boundary of the sacred grove, m-mluh stream

(iii) **Awareness Campaign:-**

As to further the prevailing ecological sense of the general public, seminar/ public awareness can be taken up in the area for the local and non-local individual. Special programme for school children can also be conducted related to long term conservation of forest.

18 - Ka Khloo Blai Ka Raij U Langdoh Ionglang, Mootyrshiah, West Jaintita Hills, District.

18.1 Location:

Ka Khloo Blai Ka Raij U Langdoh Ionglong, Sacred Grove is situated at Mootyrshiah Village of West Jaintia Hills District of Meghalaya under the aegis of Langdoh Ionglang under the Daloiship of Raliang Elaka. It covers an area of 15.12 ha and lies between 25° 30′ 06″ to 25° 30′ 19″ N latitude and 92° 28′ 19″ to 92° 28′ 37″ E Longitude with an altitude of 1113 m above mean sea level. The aspect of the sacred grove is in the North-East. It is bounded on the north side by a village katcha road and in the east, south and west side respectively by private land. The journey to the grove involved travelling by metal road from Jowai to Mootyrshiah, of about 37 km, and by katcha road for about 3 km from the village to the sacred grove.

18.2 Brief History:

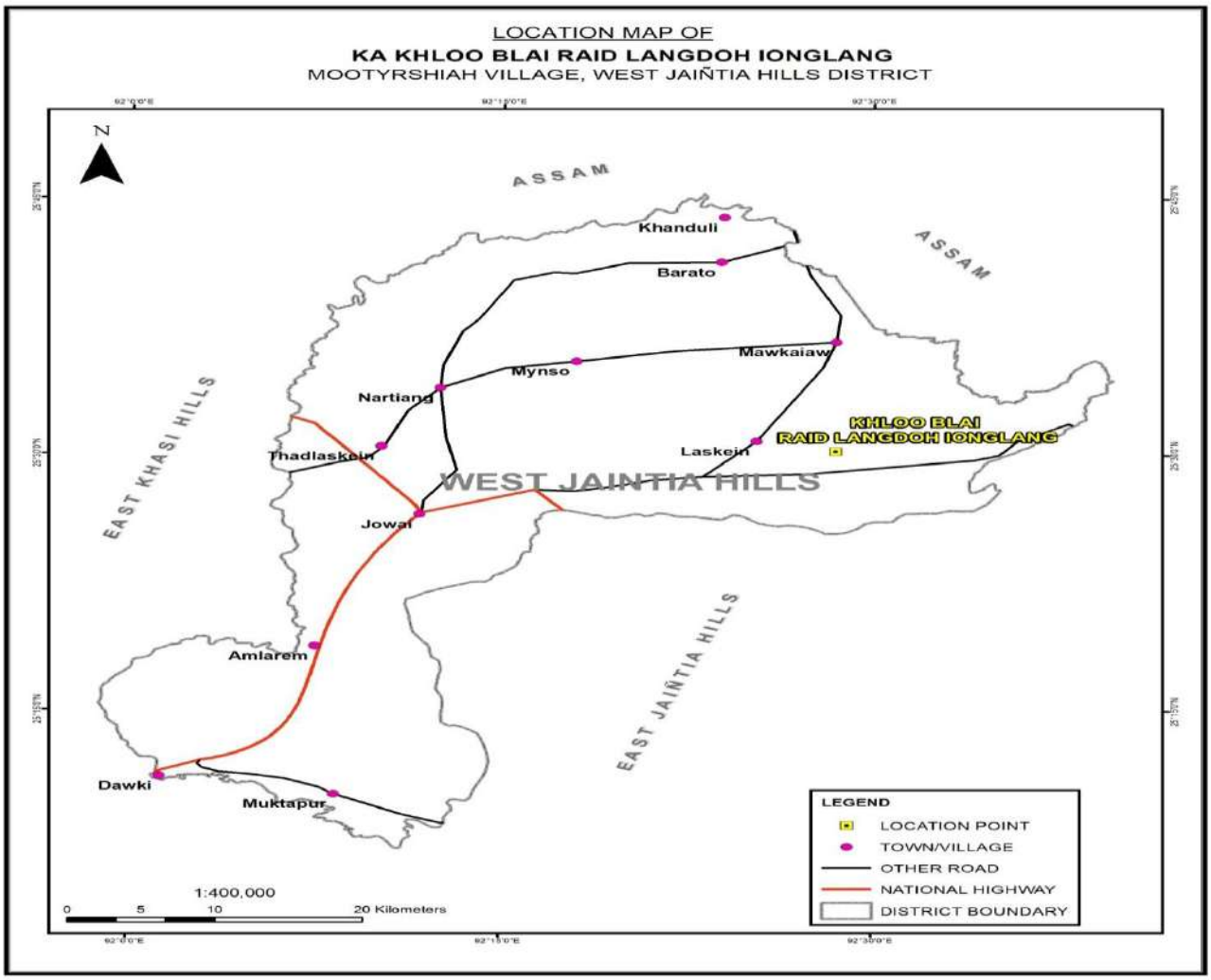
This grove has been originated many years ago. Religious rituals in the form of animal sacrifice are still being performed in this grove till date in the area considered as sanctum sanctorum. Entry-exit to the general public are prohibited, entrance by permission demands the offering of prayer to deities by the Lyngdoh. While entering into the grove with leather shoes and leather accessories are not so strictly implemented. Felling of trees, hunting & poaching, grazing and starting of fire are strictly prohibited. The state Forest Department has notified the sacred grove as a Community Reserve Forest under Section 36C of Wildlife Protection Act, 1972 vide government notification No. FOR.17/2013/Pt/144, dated 07.03.2016.

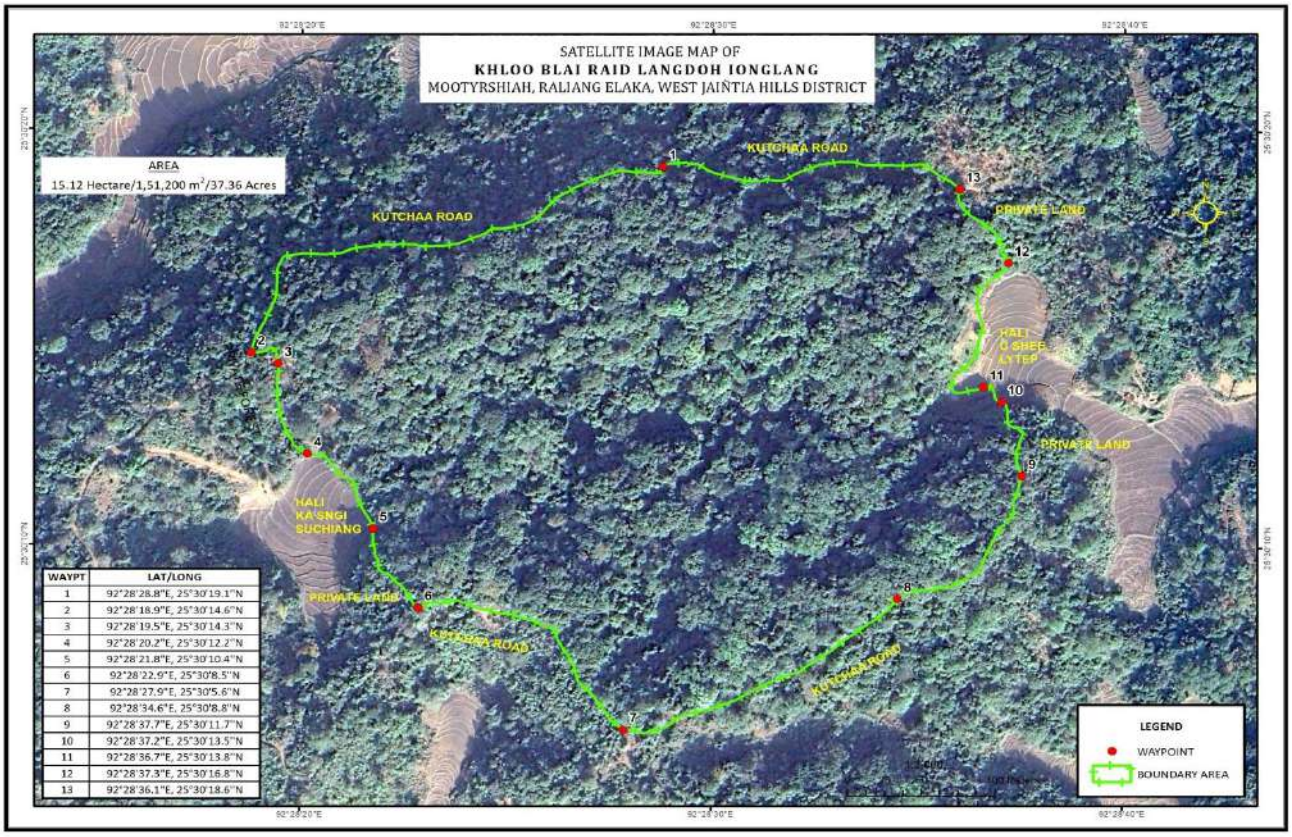
18.3 Geography and Climate:

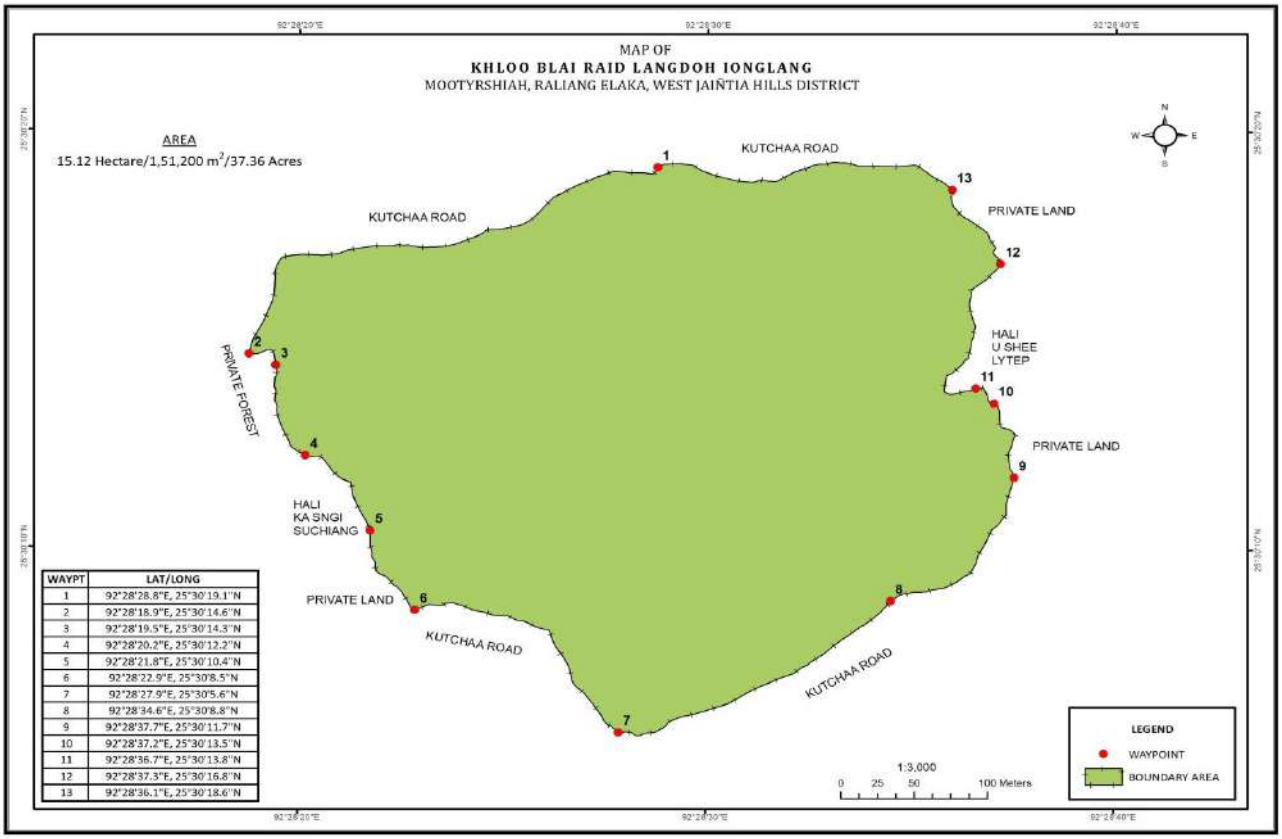
Topography of the grove is gentle rolling in nature with slope varying from 4° to 15° slope gradient. It falls under North-East aspect. The soil texture is sandy loam with slightly compact in consistency. The colour of the soil is brown with medium soil depth and no coarse fragment. As notice, there is no soil erosion in the grove. There is one seasonal stream within grove.

Mootyrshiah has a hotter climate as compare to Jowai, with the average minimum temperature is 08^{o}C and average maximum is 22^{o}C. The rain fall varies from heavy to light. The summer season is from March to May, while the monsoon season starts from May and ends around October and November dawns the winter season which ends in February.

Encroachment, Wild fire, hunting, grazing, and illegal timber felling are absent in this grove.







18.4 Forest Type:

According to Champion & Seth classification (1968) and floristic the forest type in the groves is ***Sub-type 11B/C1a Lauraceous Forest.***

Origin of the grove is natural. The grove consists of two storyed, in addition to the undergrowth. The present of weeds and grasses is scanty. Bamboo and canes is absent within the grove.

The regeneration, as notice, is inadequate.

18.5 Flora and Fauna:

The vegetation is of mixed type consisting mainly of *Duabanga sonneratioides, Castonopsis species, Schima khasiana etc as dominant species.* The relic forest is natural and it has of one storeyed layers. The wildlife found within the grove is jungle fowls, jackals, pangolin and many vertebrates and invertebrates. Conservation significance of the grove is mainly due to:

i. Virgin forests where human interference is almost zero.
ii. Unique monsoon and waterfalls which have attracted many tourists both local and national and even foreigners.
iii. Existence of many rare and endangered plants species.
iv. High level endemic plants and animals species.
v. Restrictions-"do's and don'ts;" which has immensely help the sacred grove in conservation of Flora and fauna and maintaining the rich forest natural resources.

18.6 Flora species:

List of trees found in KhlooBlaiKaRaij U Langdoh Ionglang Sacred Grove, West Jaintia Hills

TREES

Sl.No.	Botanical Name	Local Name	Family
1	*Albizzialebbek*	Diengkreit	*Fabaceae*
2	*Albizziaprocera*	Diengriew	*Fabaceae*
3	*Aralia armata*	Dienglatymphu	*Araliaceae*
4	*Betulaalnoides*	Dienglieng	*Betulaceae*
5	*Breyniapatia*	Diengmatiar	Lauracea
6	*Callicarpaarborea*	Dienglakiat	Verbanaceae
7	*Caralliabrachiata*	Diengsyllei	Rhizophoraceae
8	*Castanopsishystrix*	Diengstap	*Fagaceae*
9	*Castanopsisindica*	Diengsohot	*Fagaceae*
10	*Castanopsisspp*	Diengtyrso	*Fagaceae*
11	*Castanopsistribuloides*	Diengsning	*Fagaceae*
12	*Chisochitoncumingianus*	Diengkbublang	*Meliaceae*
13	*Cinnamomumbejolghota*	Dienglatyrdop	*Lauraceae*
14	*Cinnamomumpauciflorum*	Diengtorthia	*Lauraceae*
15	*Cinnamomumtamala*	Dienglatyrpad	*Lauraceae*
16	*Cioxlacryniafobia*	Diengsohriewkhlaw	
17	*Duabangasonneratioides*	Diengkhukon	*Lythraceae*
18	*Elaeocarpuslanceaefolios*	Diengsohkhyllam	*Elaeocarpaceae*
19	*Elaeocarpusprunifolius*	Dieng ruin	*Asteraceae*
20	*Eleocarpusrobusta*	Dienglasaw	*Elaeocarpaceae*
21	*Emblicaofficcinalis*	Diengsohmylleng	*Myrtaceae*

22	*Eugenia jambolana*	Diengsohum	*Myrtaceae*
23	*Eurya japonica*	Diengpyrshit	*Theaceae*
24	*Ex-blucklandiapopulnea*	Diengdoh	*Hamamelidaceae*
25	*Ficuscunia*	Diengthylliang	*Moraceae*
26	*Ficusspp*	Diengjri	*Moraceae*
27	*Glochidionacuminatum*	Diengjem	*Phyllanthaceae*
28	*Ilex venulosa*	Diengshyieng	*Aquifoliaceae*
29	*Inulacappa*	Dienglalieh	*Asteraceae*
30	*Iteachinensis*	Diengsohsyrtet	*Iteaceae*
31	*Lithocarpuselegans*	Diengsarang	*Lauraceal*
32	*Lithocarpusfenestrata*	Diengjing	*Fagaceae*
33	*Macarangadenticulata*	Dienglakhar	*Euphorbiaceae*
34	*Machilusparviflora*	Diengsatler	Lauraceae
35	*Magniferasylvatica*	Diengsohpiengkhlaw	*Anacardiaceae*
36	*Magnolia baillorii*	Dienglar-i	*Magnoliaceae*
37	*Mahoniaaccanthifolia*	Diengsohiongkhlaw	Berberidaceal
38	*Mangiferraspp*	Diengsohpiengkhlaw	Anacardiaceae
39	*Micheliaspp*	Diengbtah	Magnoliaceae
40	*Morindaaugustifolia*	Dieng stem	Rubiaceae
41	*Myenaspinosa*	Diengsohmatan	Rubiaceae
42	*Myricanagi*	Diengsohliya	*Myricaceae*
43	*Nepheliumlongana*	Diengloba	*Sapindaceae*
44	*Pasaniafenestrata*	Diengsasi	*Fagaceae*
45	*Pedocarpuslatifolia*	Diengkseh um	*Taxaceae*
46	*Pinuskhasiana*	Diengkseh	*Pinaceae*
47	*Pithecellobiumheterophylum*	Diengiap-iar	Fabaceae
48	*Polygala arillata*	Diengjakba	*Polygalaceae*

49	*Pyrusspp*	Diengsohphohblai	Rosaceae
50	*Quercusglauca*	Dieng sari	*Fagaceae*
51	*Quercusserreta*	Diengrtiang	*Fagaceae*
52	*Quercusspp*	Diengsohsyrtet	*Fagaceae*
53	*Quercusspp*	Diengtyrso	*Fagaceae*
54	*Quercusspp*	Diengskoi	*Fagaceae*
55	*Rhus succedanea*	Diengkain	*Anacardaceae*
56	*Rhussuccsemi-data*	Diengsohma	*Anacardaceae*
57	*Sapindusmukorossi*	Diengsohpariah	Sapindaceae
58	*Sauropusandrogynus*	Diengsapit	*Phyllanthaceae*
59	*Schimakhasiana*	Diengngan	*Theaceae*
60	*Smilax glabra*	Diengsakrut	Smilacaceae
61	*Spondias axillar-is*	Diengsohlait	*Anacardaceae*
62	*Sterculiavillosa*	Diengtluh	*Sterculiaceae*
63	*Symplocoschinensis*	Diengiong	*Symoplocaceae*
64	*Vangueriaspinosa*	Diengsohmatan	*Rubiaceae*
65	*Zanthoxylumovaliafolium*	Diengshiah	*Rutaceae*

List of Shrubs, herbs, climbers & bamboo found in Khloo Blai Ka Raij U Langdoh Ionglong Sacred Grove, West Jaintia Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1	Syntiew kynthlien		
2	Tyrthia		

HERBS

Sl No.	Local Name	Botanical Name	Family

1	Tmain khla	*Lycopodium clavatum*	Lycopodiaceae
2	Swodung		
3	Sohkot		
4	Shiah miaw		
5	Sohkhniah		
6	Soh kristmas		
7	Tongtlang		
8	Tiew lari		
9	Tongsah		

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1	Makariang		
2	Tiew thing		
3	Tiew phonguir		

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1	Tiew phonliur		
2	Dieng tiew dieng	*Micropera manii*	Orchidecaea
3	Dieng tiew dieng	*Dendrobium*	Orchidecae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1	Shken	*Bambusa pallida*	Poaceae

18.7 Growing Stock:

As per the methodology described in Chapter-II, 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 30 cm is enumerated by measuring the top height (in meters) and the girth (in centimetres) at breast height. The sample plot is 0.2 ha.

All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 1480 trees consisting of 343 *Duabanga sonneratioides* (1st dominant), 241 *Castanopsis tribuloides* (2nd dominant), 79 *Schima*

khasiana (3rd dominant), 2 Pinus khasiana and 815 Rest of 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 result for Khloo Blai Ka Raij U Langdoh Ionglong Sacred Grove are given in table 18.1 & 18.2 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 22723.02 cubic metres.

Table-18.1

Specieswise & Girth class wise volume for sampled area (15 plots - area 15.12 ha)

(volume in cu.m)

Girth class wise	***1st dominant Duabanga sonneratioides***	***2nd dominant Castanopsis tribuloides***	***3rd dominant Schima khasiana***	***Pinus khasiana***	***Rest of Species***	**Total**
30-40	2.335	2.242	0.742	0	5.510	**10.829**
41-50	5.619	3.698	1.733	0.123	14.824	**25.997**
51-60	14.253	7.354	1.477	0	24.494	**47.578**
61-70	15.745	6.078	3.113	0.338	31.453	**56.727**
71-80	21.776	12.719	2.664	0	42.567	**79.726**
81-90	26.458	13.793	1.678	0	40.91	**82.839**
91-100	22.748	10.156	2.099	0	42.557	**77.560**
101-110	16.926	15.674	4.318	0	31.182	**68.100**
111-120	9.974	18.986	4.467	0	35.069	**68.496**
121-130	6.572	13.17	5.375	0	29.211	**54.328**
131-140	24.863	1.948	8.733	0	26.989	**62.533**
141-150	6.799	13.723	3.573	0	67.454	**91.549**
151 & above	84.006	162.813	49.211	0	1017.202	**1313.232**
Total	**258.074**	**282.354**	**89.183**	**0.461**	**1409.422**	**2039.494**

Girth class wise with respect to total area

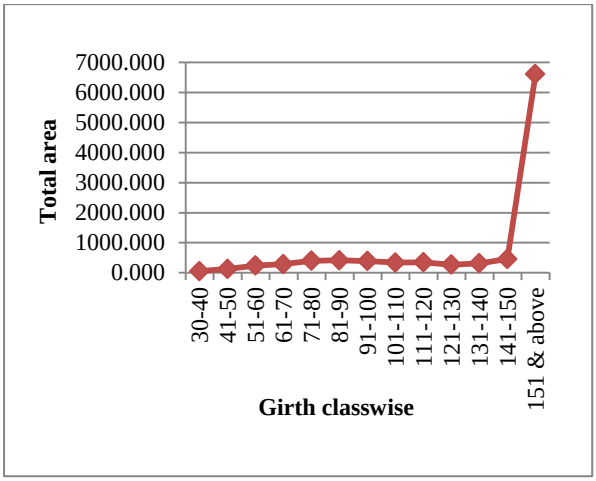


Table-18.2

Girth class wise & Specieswise in the entire grove (area 15.12 ha)

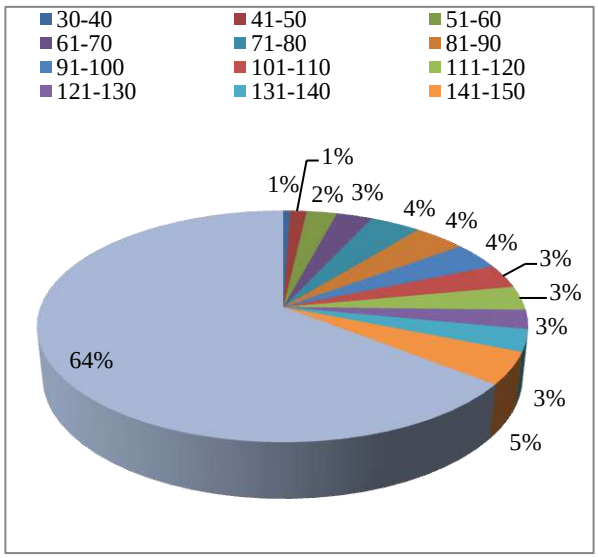
(volume in cu.m)

Girth class wise	*1st dominant Duabanga sonneratioides*	*2nd dominant Castanopsis tribuloides*	*3rd dominant Schima khasiana*	*Pinus khasiana*	Rest of the species	Total	%wrt total volume
30-40	17.65	16.95	5.61	0.00	41.66	81.87	1.06
41-50	42.48	21.06	9.87	84.42	112.07	269.90	3.49
51-60	107.75	41.88	8.41	139.49	185.17	482.71	6.24
61-70	119.03	34.61	17.73	179.12	237.78	588.28	7.60
71-80	164.63	72.43	15.17	242.42	321.81	816.46	10.55
81-90	200.02	78.55	9.56	232.98	309.28	830.39	10.73
91-100	171.97	57.84	11.95	242.36	321.73	805.86	10.41
101-110	127.96	89.26	24.59	177.58	235.74	655.13	8.46
111-120	75.40	108.13	25.44	199.72	265.12	673.81	8.70
121-130	49.68	75.00	30.61	166.36	220.84	542.49	7.01
131-140	187.96	11.09	49.73	153.70	204.04	606.53	7.83
141-150	51.40	78.15	20.35	384.15	509.95	1044.00	13.49
151 & above	635.09	927.22	280.26	5792.97	7690.05	15325.57	197.96
Total	**1951.04**	**1612.19**	**509.28**	**7995.28**	**10655.23**	**22723.02**	**293.51**
%wrt total volume	25.20	20.82	6.58	103.28	137.63	293.51	

The table indicates that the volume contributed by the 1st dominant species (*Duabanga sonneratioides)* with respect to the total volume of the grove is 25.20 %, the 2nd dominant species (*Castanopsis tribuloides)* is 20.82 %, 3rd dominant species *(Schima khasiana)* is 6.58 % *Pinus khasiana* is 103.28% while rest of the species is maximum i.e.137.63%. Total volume of the grove is 22723.02 cubic metres.

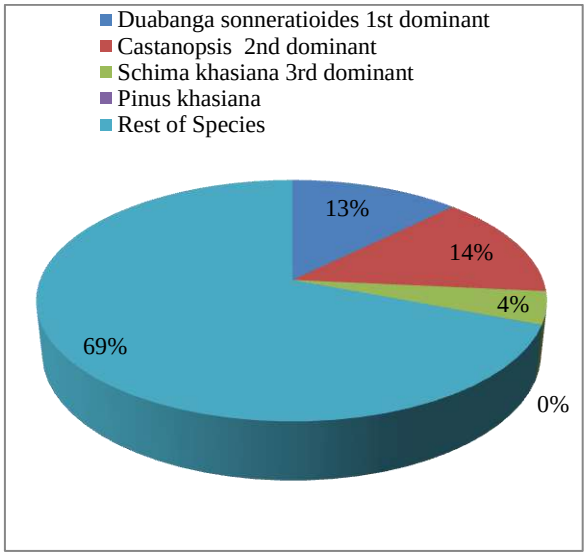
From the above table, it is observed that in general, as the girth class increases, the volume in that class also increases i.e. girth class is directly proportional to the volume in that class.

Girth class wise diagram with respect to total volume

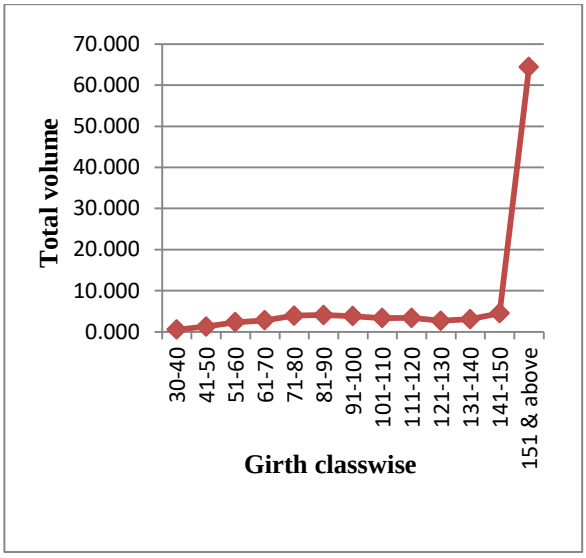


Girth class wise graph with respect to total volume

Species wise diagram with respect to total volume



Over view of Khloo Blai Ka Raij U Langdoh Ionglong Sacred Grove


70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.000
Total volume
30-40
41-50
51-60
61-70
71-80
81-90
91-100
101-110
111-120
121-130
131-140
141-150
151 & above
Girth classwise

18.8 Number of Stems:

Number of stems in each girth class are species wise are given in the table 18.3 & 18.4. The table shows that maximum number of stems are found in lower girth classes i.e. from 30-40 cm to 91-100 cm classes.

Table-18.3

Girth class wise & Species wise No. of stems in the sampled (15 plots - area 15.12 ha)

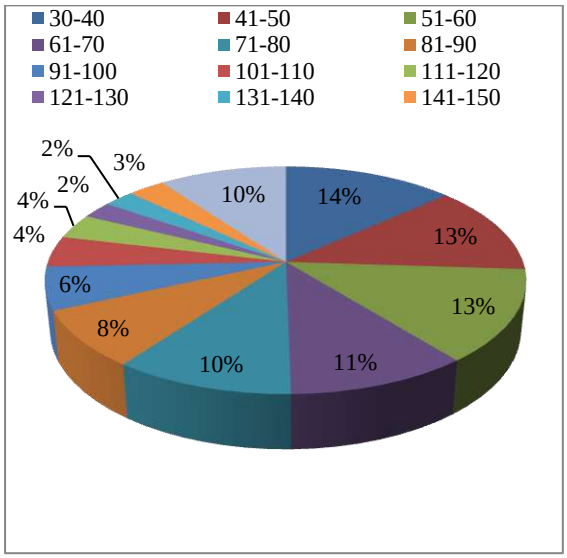
Girth class (cm)	*1st dominant Duabanga sonneratioides*	*2nd dominant Castanopsis tribuloides*	*3rd dominant Schima khasiana*	*Pinus khasiana*	*Rest of Species*	*Total*
30-40	42	40	8	0	100	190
41-50	37	27	12	1	101	178
51-60	57	28	6	0	95	186
61-70	41	16	9	1	82	149
71-80	40	24	6	0	77	147
81-90	37	19	3	0	56	115
91-100	25	11	3	0	47	86
101-110	15	14	5	0	28	62
111-120	7	14	4	0	25	50
121-130	4	8	4	0	18	34
131-140	13	1	6	0	14	34
141-150	3	6	2	0	30	41
151 & above	22	33	11	0	142	142
Total	**343**	**241**	**79**	**2**	**815**	**1414**

Table-18.4

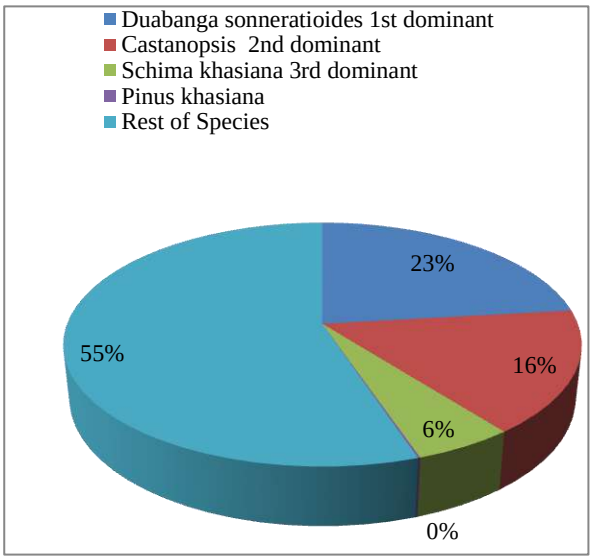
Girth class wise & Species wise No. of stems in the entire grove (Area 15.12 ha)

Girth class (cm)	*1st dominant Duabanga sonneratioides*	*2nd dominant Castanopsis tribuloides*	*3rd dominant Schima khasiana*	*Pinus khasiana*	*Rest of Species*	*Total*
30-40	84	80	16	0	200	**380**
41-50	74	54	24	2	202	**356**
51-60	114	56	12	0	190	**372**
61-70	82	32	18	2	164	**298**
71-80	80	48	12	0	154	**294**
81-90	74	38	6	0	112	**230**
91-100	50	22	6	0	94	**172**
101-110	30	28	10	0	56	**124**
111-120	14	28	8	0	50	**100**
121-130	8	16	8	0	36	**68**
131-140	26	2	12	0	28	**68**
141-150	6	12	4	0	60	**82**
151 & above	44	66	22	0	284	**416**
Total	686	482	158	4	1630	**2960**

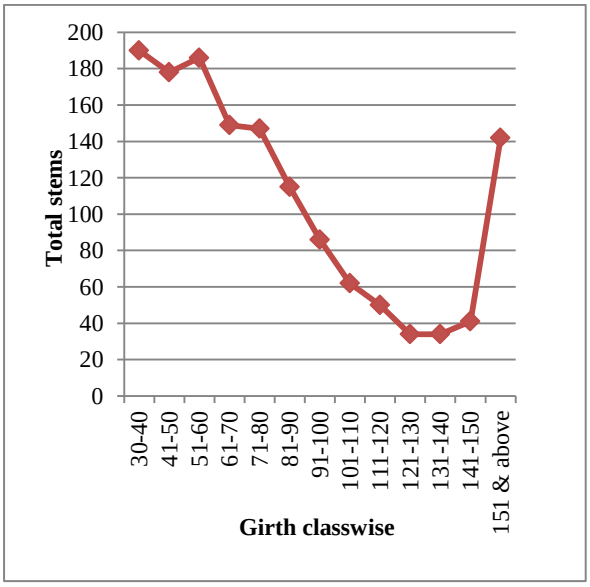
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Girth class wise stem with respect to total stems



Inside view of Khloo Blai Ka Raij U Langdoh Ionglong sacred grove

18.9 Brief note on Management of Ka Khloo Blai Ka Raij U Langdoh Ionglang , Mootyrshiah.

(i) Protection from Biotic Interfernece:-

As the grove is considered and preserved by the Raij for its socio-religious significance, therefore entry or exit, felling of tress, hunting & poaching, grazing and starting of fire within the grove is not permissable. In this senese, the grove faces a negligible anthropogenic or biotic pressure.

(ii) Fire Control:-

In context of its socio-religious significance and as a community reserve forest, under the look out of the Department through Wildlife Wing, the grove experiences minimum to neglible fire incident.

(iii) Awareness Campaign:-

Capacity building for environmental natural resources managment on the basis of seminar/ public awareness/ public interaction can be take up for students and local villagers.

19 –Sula Lynter Law Kyntang, Mynso Village, West Jaintia Hills, District.

19.1 Location:

Mynso Sula Lynter Sacred Grove is located at Mynso Village,West Jaintia Hills District, under the Daloi Elaka Mynso. It covers an area of 3.243 ha and lies between 92° 19′ 52″ E to 92° 20′ 02″ E Longitude and 25° 32′ 50″ N to 25° 32′ 54″ N latitude with an altitude of 1131 m above mean sea level (MSL). It is bounded on all sides by private lands. The grove is accessible by road from Jowai. It is about 25 km from Jowai.

19.2 Brief History:

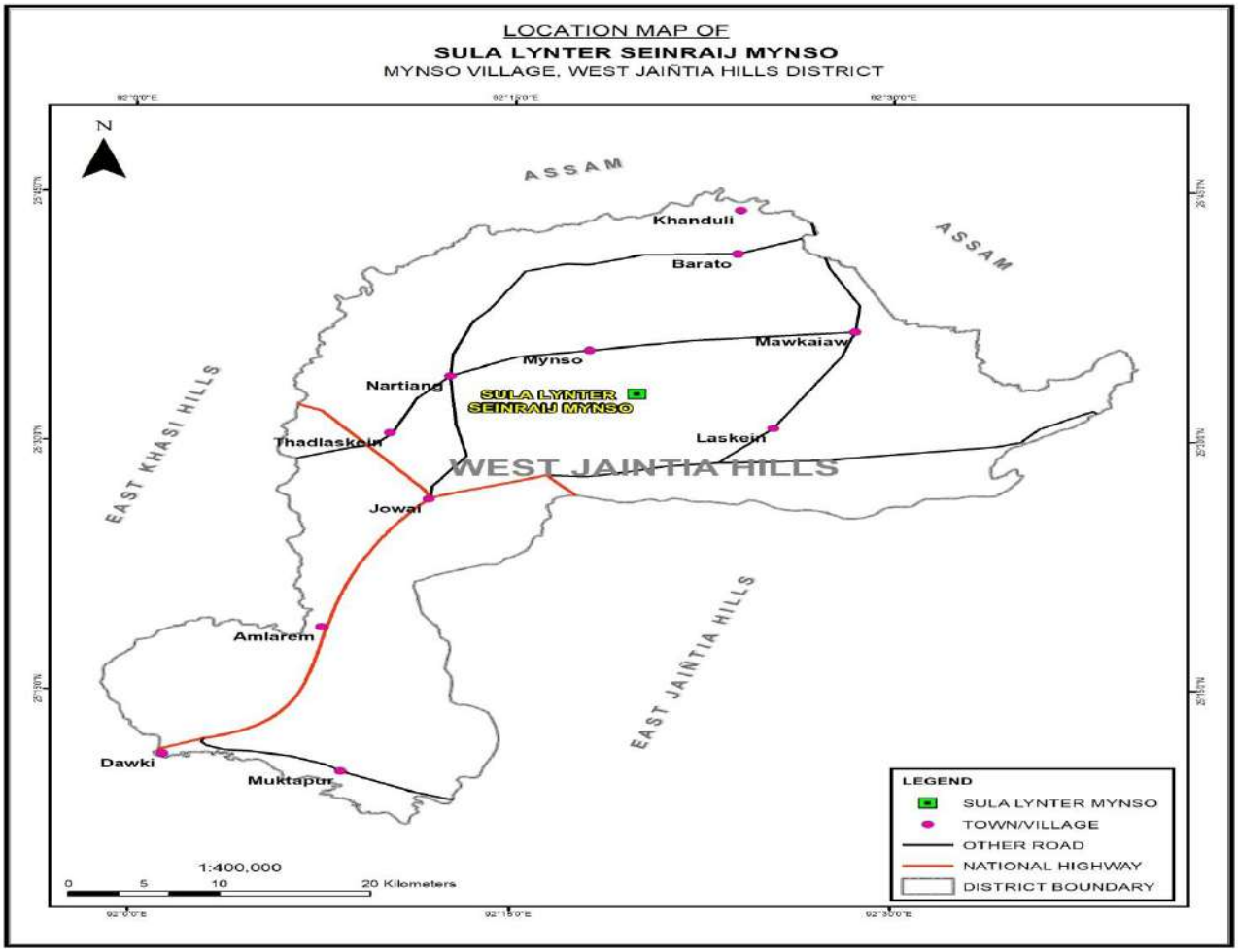
At present Offering, and Prayers is no longer performed in this sacred grove, it has been ceased long way back, since the embrace of Christianity by the local people. However, people still have their belief that the sacred grove is the abode of deities, so the people still preserved the sacred groves from the stand point of their belief and environment preservation because of these factors the sacred grove has a rich species diversity of flora and fauna, and are considered as one of the most species rich area for plants, birds & mammals.

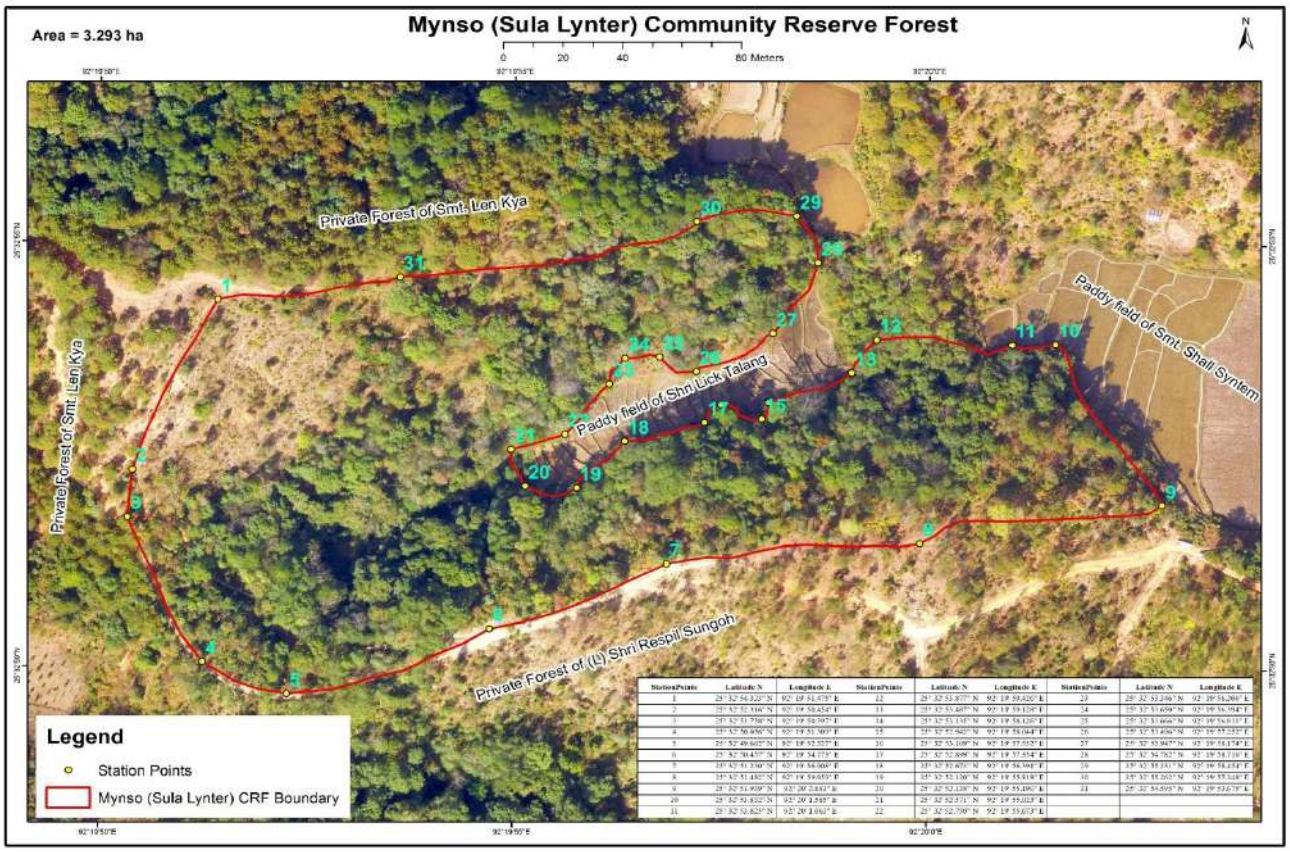
19.3 Geography and Climate:

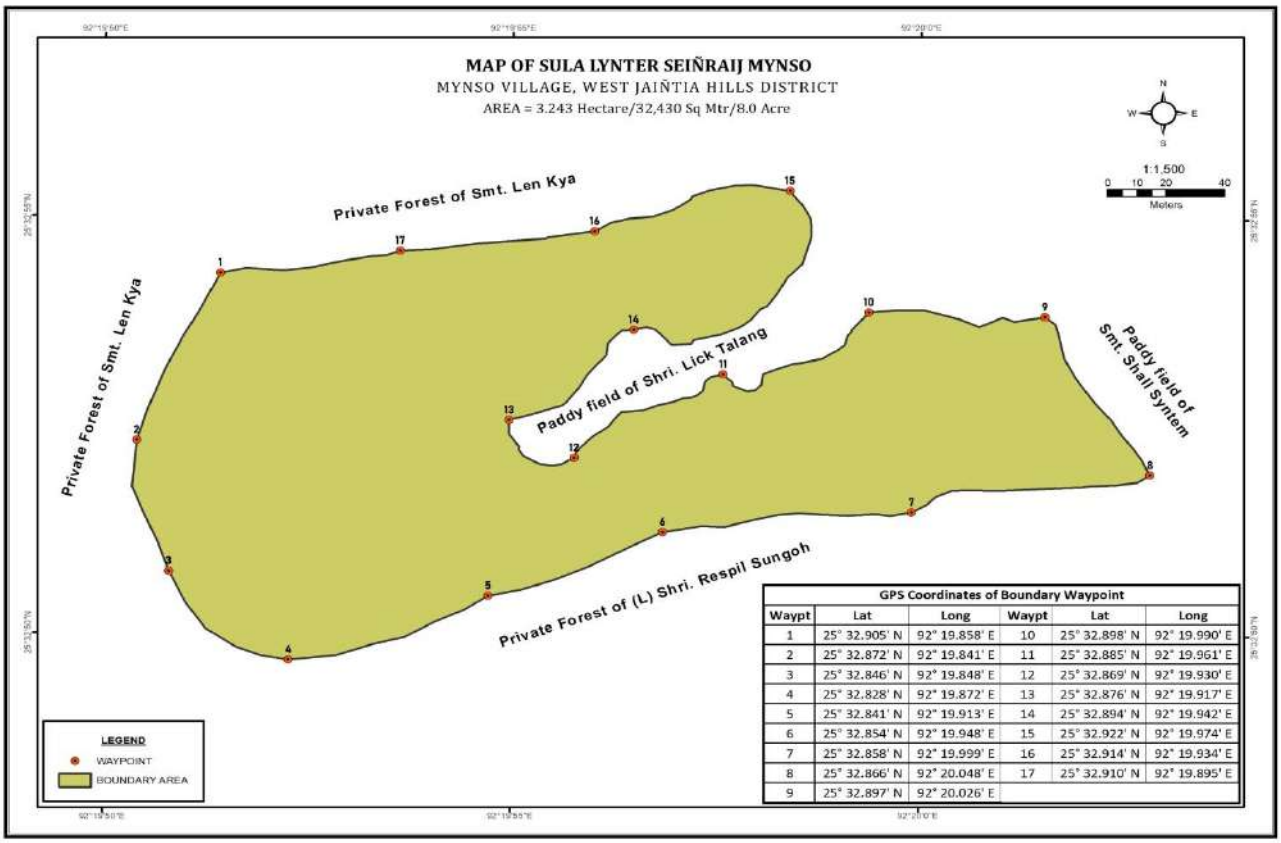
The Topography of the grove is gentle slope in nature with slope varying from 4° to 10°. The soil texture is Sandy-loam with no coarse fragment and friable consistency. The colour of the soil is brown with 15-30cm soil depth. There is no soil erosion in the grove area. There is one seasonal stream inside the grove.

Mynso has a very pleasant climate. The locale has a tropical climate. The rainy season occurs from mid May to September. October-January is cold. The average minimum temperature is 7^{o}C and average maximum temperature is 22^{o}C.

As the Sacred grove is now notified as Community Reserve Forest biotic pressure such as encroachment, Wild fire, hunting, poaching, grazing, and the other activities like illegal felling of timber are found to be absent.


LOCATION MAP OF
SULA LYNTER SEINRAIJ MYNSO
MYNSO VILLAGE, WEST JAIŃTIA HILLS DISTRICT
N
ASSAM
ASSAM
Khanduli
Barato
Mawkaiaw
Mynso
Nartiang
SULA LYNTER SEINRAIJ MYNSO
Thadlaskein
Laskein
WEST JAINTIA HILLS
EAST KHASI HILLS
Jowai
Amlarem
EAST JAIŃTIA HILLS
Dawki
Muktapur
1:400,000
0 5 10 20 Kilometers
LEGEND
SULA LYNTER MYNSO
TOWN/VILLAGE
OTHER ROAD
NATIONAL HIGHWAY
DISTRICT BOUNDARY


Area = 3.293 ha
Mynso (Sula Lynter) Community Reserve Forest
0 20 40 80 Meters
N
Private Forest of Smt. Len Kya
Private Forest of Smt. Len Kya
Paddy field of Shri Lick Talang
Paddy field of Smt. Shaii Syntem
Private Forest of (L) Shri Respil Sungoh
Legend
Station Points
Mynso (Sula Lynter) CRF Boundary



GPS Coordinates of Boundary Waypoint

Waypt	Lat	Long	Waypt	Lat	Long
1	25° 32.905' N	92° 19.858' E	10	25° 32.898' N	92° 19.990' E
2	25° 32.872' N	92° 19.841' E	11	25° 32.885' N	92° 19.961' E
3	25° 32.846' N	92° 19.848' E	12	25° 32.869' N	92° 19.930' E
4	25° 32.828' N	92° 19.872' E	13	25° 32.876' N	92° 19.917' E
5	25° 32.841' N	92° 19.913' E	14	25° 32.894' N	92° 19.942' E
6	25° 32.854' N	92° 19.948' E	15	25° 32.922' N	92° 19.974' E
7	25° 32.858' N	92° 19.999' E	16	25° 32.914' N	92° 19.934' E
8	25° 32.866' N	92° 20.048' E	17	25° 32.910' N	92° 19.895' E
9	25° 32.897' N	92° 20.026' E			

19.4 Forest Type:

According to Champion & Seth classification (1968) the forest types found in the sacred grove are is ***Type 9/C2 Assam Sub-Tropical Pine Forest***.

19.5 Flora and Fauna:

The floristics is characterised by (vegetation type) mixed *species* consisting mainly of *Schima khasiana and Castanopsis Indica* as dominant species. The relic is a natural forest consisting of two storeyed layers. The wildlife found within the grove is jungle fowls, barking deers, jackals, etc. Conservation significance of the grove is mainly due to:

i. High level endemic plants and animal species which is very significant from the biodiversity point of view.
ii. Existence of many rare and endangered plants species.
iii. Restrictions-"do's and don'ts;" which help the sacred grove in conservation of Flora and fauna and maintaining of rich forest natural resources.

19.6 Flora species:

List of trees found in Mynso Sula Lynter West Jaintia Hills

TREES

Sl.No.	Botanical Name	Local Name	Family
1	*Albizia lebbek*	Diengkreit	*Fabaceae*
2	*Acer laevigatum*	Diengtyrkhum	*Sapindaceae*
3	*Albizziastipulata*	Diengphyllut	*Fabaceae*
4	*Alstoniascholaris*	Diengryteng	*Apocynaceae*
5	*Aralia armata*	Dienglatymphu	*Araliaceae*
6	*Bauhinia veriegata*	Diengtyrlong	*Fabaceae*
7	*Betulaalnoides*	Dienglieng	*Betulaceae*
8	*Bombox ceiba*	Diengkya	*Malvaceae*
9	*Callicarpaarborea*	Dienglabkhiat	*Verbanaceae*
10	*Caralliabrachiata*	Diengsyllei	*Rhizophoraceae*
11	*Castanopsisarmata*	Diengsning	*Fagaceae*
12	*Castanopsisarmata*	Diengsiar	*Fagaceae*
13	*Castanopsishystrix*	Diengstap	*Fagaceae*
14	*Castanopsisindica*	Diengsohot	*Fagaceae*
15	*Castanopsisspp*	Diengskob	*Fagaceae*
16	*Cinnamomumvejolghota*	Dienglatyrdop	*Lauraceae*
17	*Delliniaindica*	Diengkyrbam	*Dilleniaceae*
18	*Diospyros kaki*	Diengiong	*Ebenaceae*
19	*Duabangaspp*	Diengduba	*Lythraceae*
20	*Elaeocarpuslanceaefolios*	Diengsohkhyllam	*Elaeocarpaceae*
21	*Eleocarpusprunifolius*	Dieng ruin	*Asteraceae*
22	*Emblicaofficinalis*	Diengsohmylleng	*Myrtaceae*
23	*Engelhardtiaspicata*	Dienglymba	*Juglandaceae*
24	*Eugenia aquea*	DiengSali	*Myrtaceae*
25	*Eugenia jambolana*	Diengsohum	*Myrtaceae*
26	*Eurya japonica*	Diengpyrsit	*Theaceae*
27	*Fotinaintegrefolia*	Diengsnammaw	*Rosaceae*
28	*Glochidionvelutinum*	Diengjem	*Phyllanthaceae*
29	*Glycosmispentafila*	Diengsiar	*Rutaceae*
30	*Gynocardiaodorata*	Diengsohlyiang	*Achariaceae*
31	*Hoveniaacerba*	Diengmylliat	*Rhamnaceae*
32	*Ilex venulosa*	Diengsohshyieng	*Aquifoloaceae*
33	*Inualacappa*	Dienglalieh	*Asteraceae*
34	*Iteachinensis*	Diengsohsyrtet	*Iteaceae*
35	*Iteamacrophylla*	Diengsaru	*Iteaceae*
36	*Lanneacoromandelica*	Diengsohpiar	*Anacardiaceae*
37	*Lithocurpusfenestrata*	Diengjing	*Fagaceae*
38	*Machilusparviflora*	Diengsatler	*Lauraceae*
39	*Micheliapunduanaoblonga*	Diengsohniar	*Magnolaceae*
40	*Micheliaspp*	Diengbtah	*Magnolaceae*
41	*Moruslaevigata*	DiengBylliat	*Moraceae*
42	*Morusspp*	Diengtiengiong	*Moraceae*
43	*Myricafarquhariana*	Diengsohphie	*Myricaceae*
44	*Myricanagi*	Diengsohliya	*Myricaceae*
45	*Nepheliumlongana*	Diengloba	*Sapindaceae*
46	*Pasaniafenestrata*	Diengsasei	*Fagaceae*
47	*Pierisovalifolia*	Diengjalyngsniang	Ericaceae
48	*Pinuskhasiana*	Diengkseh	*Pinaceae*

49	*Polygataarillata*	Dienglakba	*Polygalaceae*
50	*Quercusserrata*	Diengrtiang	*Fagaceae*
51	*Quercusspp*	Diengrtiangiong	Fagaceae
52	*Rhusjavanica*	Diengsohma	*Anacordiaceae*
53	*Rhus succedanea*	Diengkain	*Anacordiaceae*
54	*Schimawallichii*	Diengngan	*Theaceae*
55	*Spondiasaxillaris*	Diengsohlait	*Anacrdiaceae*
56	*Stereospermumchelonoides*	Diengiapsyiar	Bignoniaceae
57	*Symplocospaniculata*	Diengiang	Symplocaceae
58	*Zanthoxylumovaliafoluin*	Diengshiah	*Rutaceae*

List of Shrubs, herbs, climbers & bamboo found in Mynso Sula Lynter Jaintia Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1	Syntiew kynthlien		
2	Tyrthia		

HERBS

Sl No.	Local Name	Botanical Name	Family
1	Tmain khla	*Lycopodium clavatum*	Lycopodiaceae
2	Swodung		
3	Sohkot		
4	Shiah miaw		
5	Sohkhniah		
6	Soh kristmas		
7	Tongtlang		
8	Tiew lari		
9	Tongsah		

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1	Makariang		
2	Tiew thing		
3	Tiew phonguir		

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1	Dieng tiew dieng	*Phaies messimunsis*	Orchideceae
2	Dieng tiew dieng	*Pholidata bulgares*	Orchideceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1	Shken	*Bambusa pallida*	Poaceae

19.7 Growing Stock:

As per the methodology described in Chapter-II, 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 30 cm is enumerated by measuring the top height (in meters) and the girth (in centimetres) at breast height.

All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 1451 trees consisting of 319 *Schima khasiana* (1st dominant), 194 *Castanopsis Indica* (2nd dominant), 109 *Myrica Nagi* (3rd dominant), 37 *Pinus khasiana and* 792 *Rest of 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 result for Mynso Sula Lynter are given in table 19.1 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 692.776 cubic metres.

Table-19.1

Girth class wise & Species wise with respect to total volume (in area 2.243 ha)

(volume in cu.m)

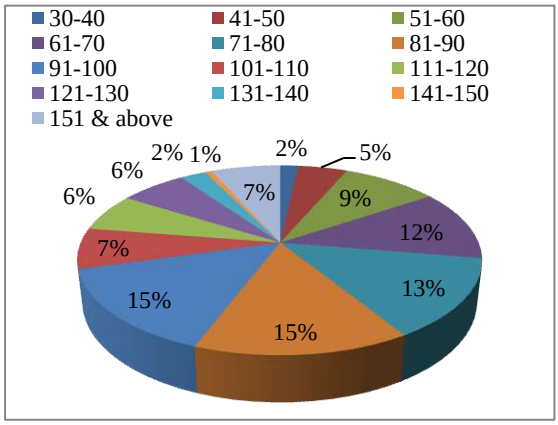
Girth Class Vise	1st dominant *Schima Khasiana*	2nd dominant *Castanopsis indica*	3rd dominant *Myrica nagi*	*Pinus khasiana*	Rest of the Species	Total	% with respect to total volume
30-40	2.107	1.684	0.616	7.438	0.077	**11.922**	1.721
41-50	6.2348	2.753	3.036	19.9734	0.286	**32.283**	4.660
51-60	17.956	5.093	4.936	34.7505	1.18	**63.916**	9.226
61-70	19.418	9.349	9.85	42.923	1.765	**83.305**	12.025
71-80	22.1251	14	6.605	47.6189	3.166	**93.938**	13.560
81-90	22.60	14.214	6.507	53.733	3.827	**100.883**	14.562
91-100	26.6751	20.203	4.539	48.0575	2.995	**102.470**	14.791
101-110	13.200	8.665	3.287	22.1805	0.865	**48.197**	6.957
111-120	3.973	15.189	2.747	20.718	2.179	**44.806**	6.468
121-130	0	16.302	1.608	25.7926	0	**43.703**	6.308
131-140	1.9478	7.41	0.000	7.7039	0	**17.062**	2.463
141-150	0	0	0	4.479	0	**4.479**	0.647
151 & above	0	42.951	0	2.862	0	**45.813**	6.613
Total	**136.2375**	**158.236**	**43.731**	**338.231**	**16.34**	**692.776**	**100.000**

% wrt Total volume	**19.665**	**22.841**	**6.312**	**48.823**	**2.359**	**100.00**	

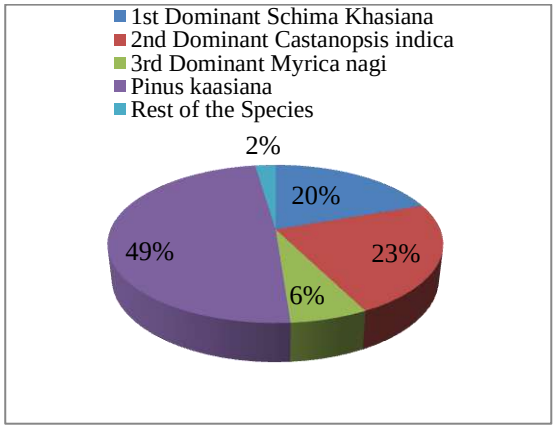
The table indicates that the volume contributed by the 1st dominant species (*Schima Khasiana)* with respect to the total volume of the grove is 19.665%, the 2nd dominant species (*Castanopsis Indica*) is 22.841 %, 3rd dominant species ***(****Myrica Nagi****)*** is 6.312%, *Pinus khasiana* is 48.823% while rest of the species is maximum i.e.2.359%. Total volume of the grove is 692.776 cubic metres.

From the above 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.

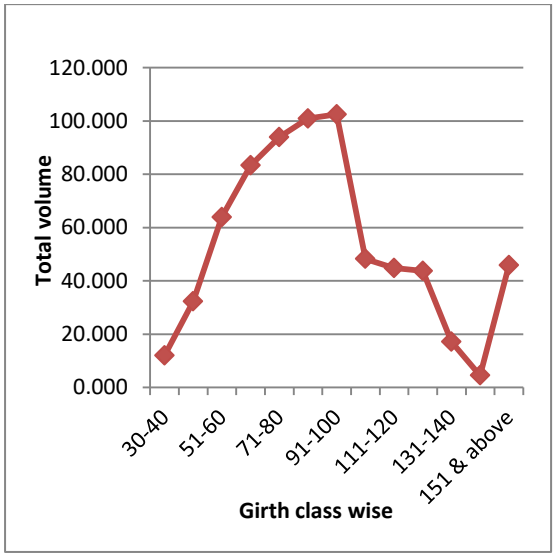
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view of Mynso Sula Lynter

Table-19.2

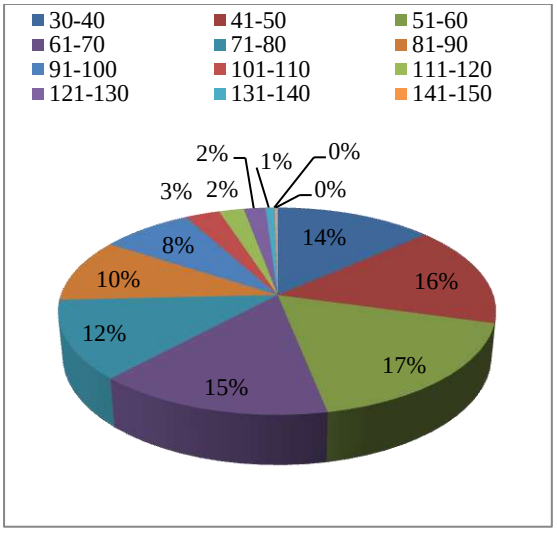
Girth class wise & Species wise No. of stems in the entire grove (Area 2.243 ha)

Girth Class Vise	1st dominant *Schima Khasiana*	2nd dominant *Castanopsis indica*	3rd dominant *Myrica nagi*	*Pinus khasiana*	Rest of the Species	Total
30-40	34	28	9	2	124	**197**
41-50	43	19	22	3	142	**229**
51-60	71	20	20	7	137	**255**
61-70	51	25	26	6	111	**219**
71-80	42	26	12	8	91	**179**
81-90	32	20	9	7	76	**144**
91-100	30	22	5	4	53	**114**
101-110	12	8	3	0	20	**43**
111-120	3	11	2	0	15	**31**
121-130	0	10	1	0	16	**27**
131-140	1	4	2	0	4	**11**
141-150	0	0	0	0	2	**2**
151 & above	0	1	0	0	1	**2**
Total =	**319**	**194**	**111**	**37**	**792**	**1453**

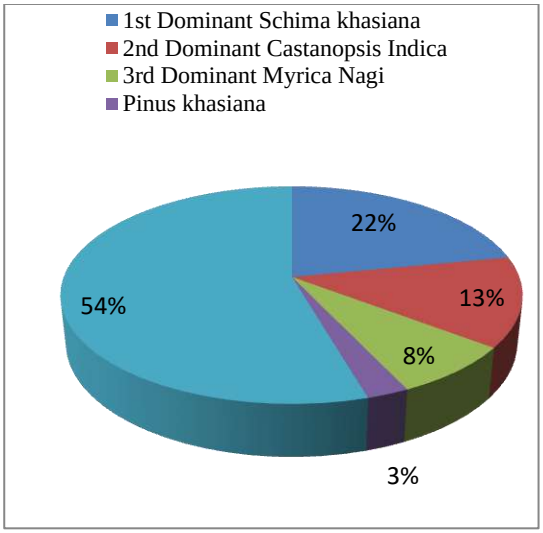
19.8 Number of Stems:

Number of stems in each girth class and species wise are given in the table 19.2. The table shows that maximum numbers of stems are found in lower girth classes.

Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stem



Field exercise graph at Mynso Sula Lynter

Inside view of Mynso Sula Lynter

19.9 Brief note on Management of Mynso Sula Lynter.

(i) Protection from Biotic Interfernece:-

In the grove there is no restriction for entry and exit. felling of trees, poaching or grazing is strickly prohibited, but as the forest is left open, there are chances of such illegal activities in the near future.

(ii) Fire Control:-

As reported from the committee there are no accidental on intentional fire incident. However, mitigational steps to prevent fire occurance should be taken up such a creation of firelines, etc.

(iii) Water Stream:-

There is only one seasonal stream withinin the sacred grove. Contruction of check-dam will great help in the augmentation of the soil moisture content of the soil.

(iii) Awareness Campaign:-

Seminar/ public awareness can be taken up in the area for the local and non-local individual as to enhance the future environmental protection endeovour. Special programme for school children can also be conducted related to long term conservation of forest.

20 - Ka Khloo Blai Mynso, West Jaintia Hills, District.

20.1 Location:

Khloo Blai Mynso, is located at Mynso Village, West Jaintia Hills District, under the Daloi Elaka Mynso. It covers an area of 0.852 ha and lies between 92° 19′ 35″ E to 92° 19′ 39″ E Longitude and 25° 33′ 04″ N to 25° 33′ 08″ N latitude with an altitude of 1208 m above mean sea level (MSL). It is bounded on all sides by private lands. The grove is accessible by road from Jowai. It is about 25 km from Jowai.

20.2 Brief History:

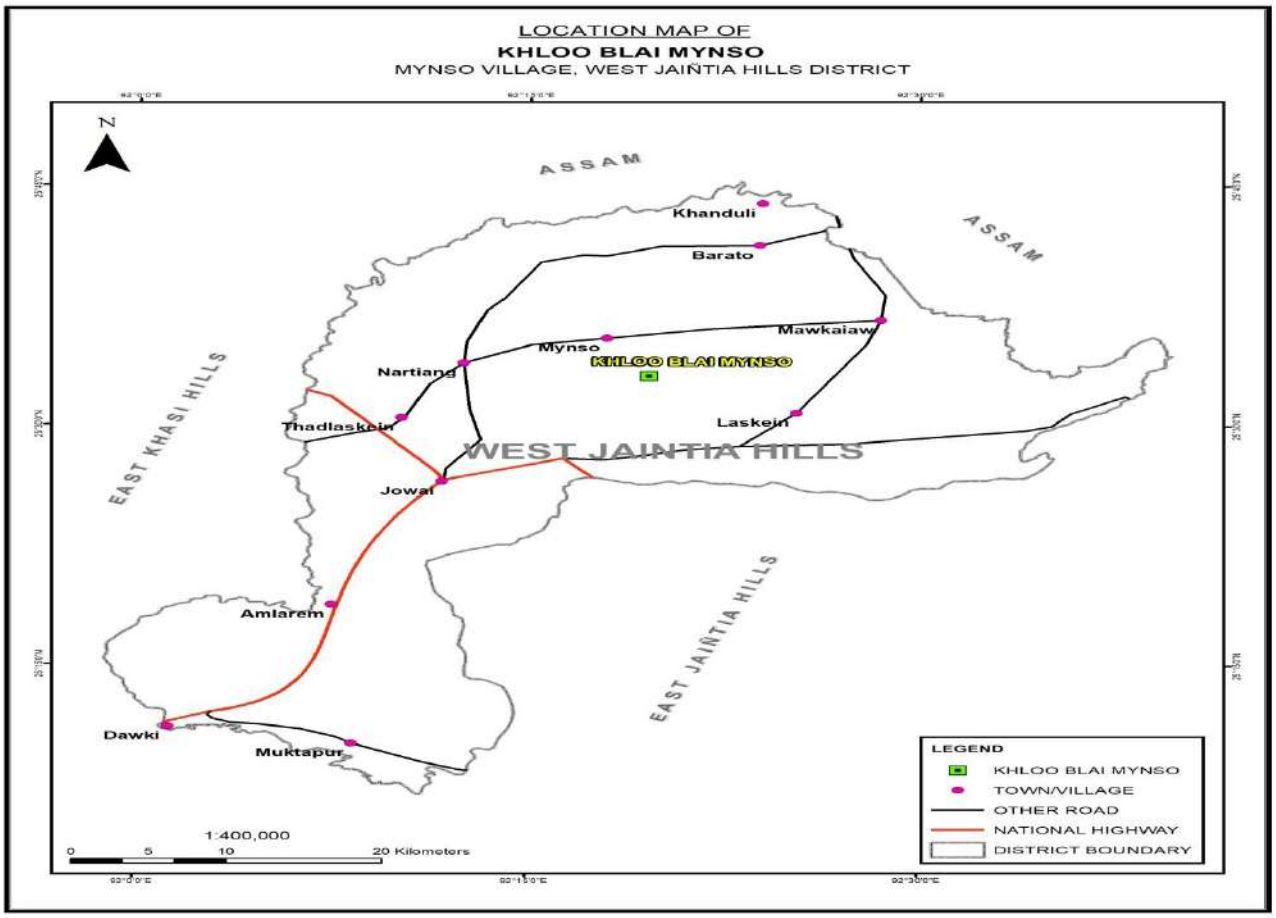
At present Offerings and Prayers is being performed in this sacred grove, in the form of animal sacrifice. The sacred grove is considered as the abode of deities besides being rich in biodiversity. Entry and exit is partially restricted, while felling of trees, poaching, and grazing is strictly prohibited.

20.3 Geography and Climate:

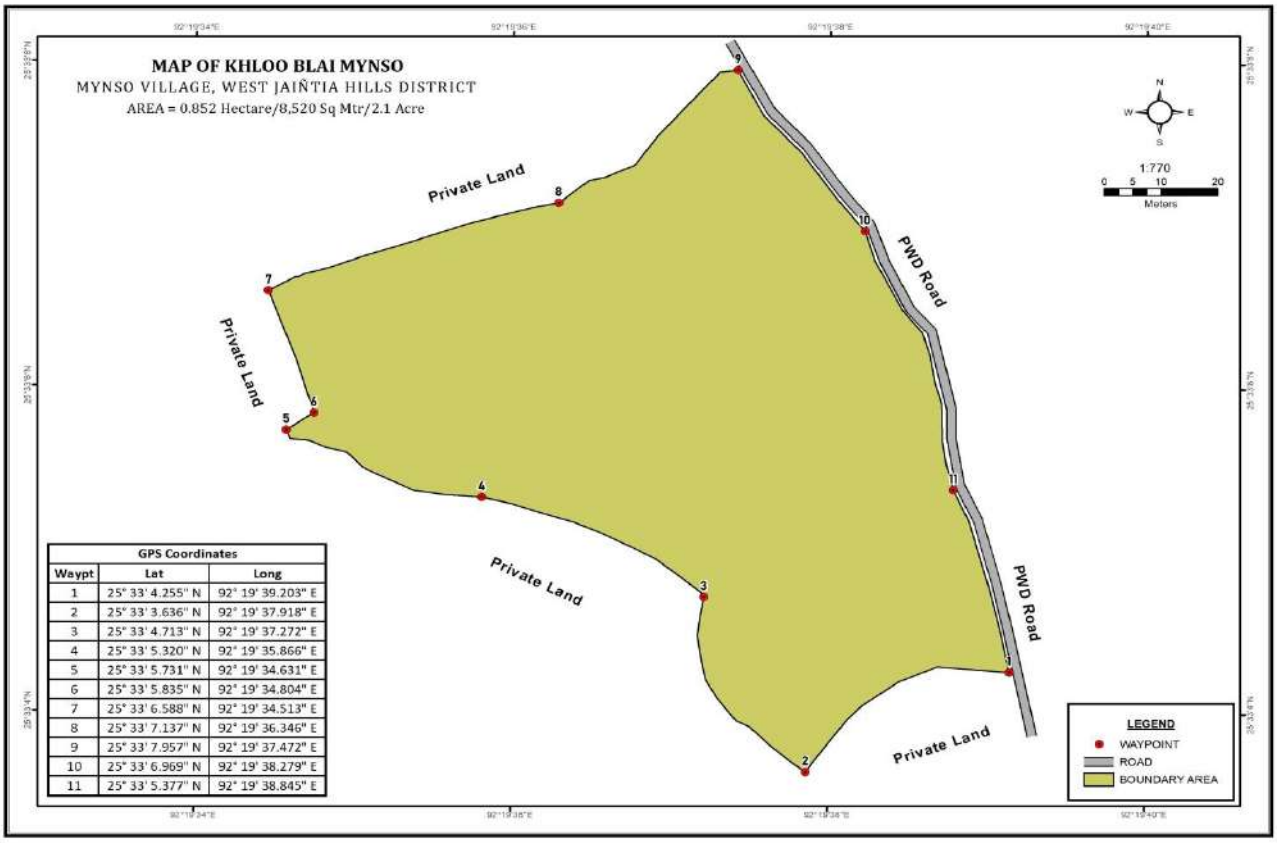
The Topography of the grove is gentle slope in nature with slope varying from 4° to 8°. The aspect of the forest is South-West. The soil texture is Sandy-loam with no coarse fragment and friable consistency. The colour of the soil is brown with shallow soil depth. There is no soil erosion in the grove area. There is no stream inside the grove. The forest lies in the vicinity of Mynso Village.

Mynso has a very pleasant climate. The locale experiences a tropical monsoon climate. The rainy season occurs from mid May to September. October-January is cold. The average minimum temperature is 7^{o}C and average maximum temperature is 22^{o}C.

As the Sacred grove is revered by the locals, therefore biotic pressure such as encroachment, Wild fire, hunting, poaching, grazing, and the other activities like illegal felling of timber are found to be absent.


LOCATION MAP OF
KHLOO BLAI MYNSO
MYNSO VILLAGE, WEST JAINTIA HILLS DISTRICT
N
ASSAM
ASSAM
Khanduli
Barato
Mawkaiaw
Mynso
KHLOO BLAI MYNSO
Nartiang
Thadlaskein
Laskein
WEST JAINTIA HILLS
EAST KHASI HILLS
Jowai
Amlarem
EAST JAINTIA HILLS
Dawki
Muktapur
LEGEND
KHLOO BLAI MYNSO
TOWN/VILLAGE
OTHER ROAD
NATIONAL HIGHWAY
DISTRICT BOUNDARY
1:400,000
0 5 10 20 Kilometers


Area = 0.852 ha
Ka Khloo Blai Mynso Community Reserve Forest
0 10 20 40 Meters
N
Private Land
Private Land
PWD Road
Private Land
Mynso Student Union Hall



20.4 Forest Type:

According to Champion & Seth classification (1968) and floristic of the forest types found in the sacred grove is ***Type 8B/C2 Khasi sub-tropical wet hill forest.***

20.5 Flora and Fauna:

The Floristics is characterised by mixed *species* consisting mainly of *Ilex venulosa, Premna bengalensis* and Castanopsis armata as 1st dominance, 2nd dominance and 3rd dominance respectively. The origin of the forest is a natural forest and the physiognomy is characterized by of two storeyed. The wildlife found within the grove are jungle fowls, barking deers, jackals, etc. Conservation significance of the grove is mainly due to:

i. High level endemic plants and animal species which is very significant from the biodiversity point of view.
ii. Existence of many rare and endangered plants species.
iii. Restrictions-"do's and don'ts;" which help the sacred grove in conservation of Flora and fauna and maintaining of rich forest natural resources.

20.6 Flora species:

List of trees found in Khloo Blai Mynso, West Jaintia Hills

TREES

Sl.No.	Botanical Name	Local Name	Family
1	*Aralia armata*	Dieng latymphu	*Araliaceae*
2	*Azadirachta indica*	Dieng sohrilong	Meliaceae
3	*Bauhinia* veriegata	Dieng tyrlong	Fabaceae
4	*Callicarpa arborea*	Dieng lakhiat	*Verbanaceae*
5	*Carallia brachiata*	Dieng syllei	*Rhizophoraceae*
6	*Castanopsis armata*	Dieng sning	*Fagaceae*
7	*Castanopsis hystrix*	Dieng sohstet	*Fagaceae*
8	*Castanopsis indica*	Dieng sohot	*Fagaceae*
9	*Cissus ripens*	Dieng jajew	*Vitaceae*
10	*Citrius latipes*	Dieng sohkymphor	*Rutaceae*
11	*Engelhardtia spicata*	Dieng lba	*Juglandaceae*
12	*Ficus spp*	Dieng jri	*Moraceae*
13	*Glochidion velutinum*	Dieng jem	*Phyllanthaceae*
14	*Hovenia acerba*	Dieng kyllait/Myllait	Rhamnaceae
15	*Ilex venulosa*	Dieng sohshyieng	*Aquifoliaceae*
16	*Inula*	Dieng ruin	*Asteraceae*
17	*Itea chinensis*	Dieng sohsyrtet	*Iteaceae*
18	*Knema linifilia*	Dieng sohslung	Myristicaceae
19	*Lannea coromandilica*	Dieng sohlait	*Anacardiaceae*
20	*Ligustrum massalongianum*	Dieng shukyriaw	*Oleaceae*
21	*Lithocarpus elegans*	Dieng sohsarangum/sarang	*Lauraceae*
22	*Lithocurpus fenestrata*	Dieng jing	*Fagaceae*
23	*Macaranga denticulata*	Dieng lakhar	*Euphorbiaceae*
24	*Magnolia bailonii*	Dieng lari	*Magnoliaceae*
25	*Meyna spinosa*	Dieng sohmatan	*Rubiaceae*
26	*Michelia panduana*	Dieng rtiangiong	*Magnoliaceae*
27	*Millusa roxburghiana*	Dieng khong	Lauraceae
28	*Morinda augustifolia*	Dieng stem/synrai	Rubiaceae
29	*Morus spp*	Dieng tiengiong	Moraceae
30	*Pithecellboius heterophylum*	Dieng iapiar	Fabaceae
31	*Pithecellobium bigeminum*	Dieng siar	Fabaceae
32	*Premna bengalensis*	Dieng lieh	*Asteraceae*
33	*Prunus nepalensis*	Dieng shyiong	Rosaceae
34	*Quercus glauca*	Dieng sari	*Fagaceae*
35	*Quercus spp*	Dieng skop	*Fagaceae*
36	*Rhus javanica*	Dieng sama	***Anacardiaceae***
37	*Trema orientalis*	Dieng latar	*Cannabaceae*
49	*Zanthoxylum ovaliafolium*	Dieng shiah	*Rutaceae*

List of Shrubs, herbs, climbers & bamboo found in Khloo Blai Mynso, West Jaintia Hills

SHRUBS

Sl No.	Local Name	Botanical Name	Family
1	Dieng tyrnem	*Camelia caudula*	Theaceae
2	Dieng tyrnem kynthei	*Legetromia spp*	Lythraceae

HERBS

Sl No.	Local Name	Botanical Name	Family
1	Tmain khla	*Lycopodium clavatum*	Lycopodiaceae
2	Swodung		
3	Sohkot		
4	Shiah miaw		
5	Sohkhniah		
6	Soh kristmas		
7	Tongtlang		
8	Tiew lari		
9	Tongsah		

CLIMBERS

Sl No.	Local Name	Botanical Name	Family
1	Makariang		
2	Tiew thing		
3	Tiew phonguir		

ORCHIDS

Sl No.	Local Name	Botanical Name	Family
1	Dieng tiew dieng	*Phaies messimunsis*	Orchideceae
2	Syntiew dieng	*Aredes odaratum*	Orchideceae

BAMBOO

Sl No.	Local Name	Botanical Name	Family
1	Shken	*Bambusa pallida*	Poaceae

20.7 Growing Stock:

As per the methodology described in Chapter-II, 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 30 cm is enumerated by measuring the top height (in meters) and the girth (in centimetres) at breast height.

All the data is entered in the prescribed Description Form and Plot Enumeration Form. In all, within the grove, data was collected for 281 trees consisting of 62 *Ilex Venulosa* (1st dominant), 14 *Premna Bengalensis* (2nd dominant), 13 *Castanopsis armata* (3rd dominant) while Rest of Species is 192. 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 result for Khloo Blai Mynso are given in table 20.1 which shows the volume species wise and girth wise. The total growing stock of the grove works out to 598.003 cubic metres.

Table-20.1

Girth class wise & Species wise with respect to total volume (in 0.852 ha)

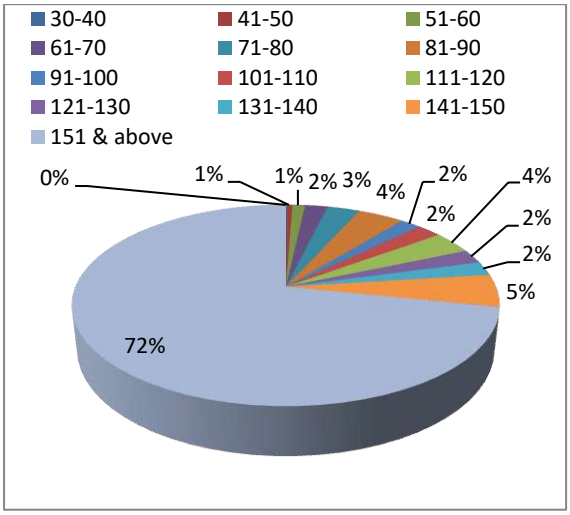
(volume in cu.m)

Girth Class Vise	1st dominant *Ilex venulosa*	2nd dominant *Premna bengalensis*	3rd dominant *Castanopsis armata*	Rest of the species	Total	% with respect of total volume
30-40	0.247	0	0	0.307	**0.554**	0.093
41-50	0.997	0	0.158	1.730	**2.885**	0.482
51-60	1.243	0	0	5.647	**6.89**	1.152
61-70	1.046	0.375	0.419	10.330	**12.17**	2.035
71-80	2.427	0.527	1.006	13.668	**17.628**	2.948
81-90	6.950	2.177	0.700	15.087	**24.914**	4.166
91-100	3.705	0	0	7.325	**11.03**	1.844
101-110	3.314	0	0	9.869	**13.183**	2.205
111-120	7.820	0	0	13.789	**21.609**	3.614
121-130	1.635	3.721	0	7.992	**13.348**	2.232
131-140	3.780	0	0	9.625	**13.405**	2.242
141-150	11.153	2.160	0	17.916	**31.229**	5.222
151 & above	32.592	21.680	31.839	343.047	**429.158**	71.765
Total	**76.909**	**30.640**	**34.122**	**456.332**	**598.003**	**100.000**
% wrt Total volume	**12.861**	**5.124**	**5.706**	**76.309**	**100.000**	

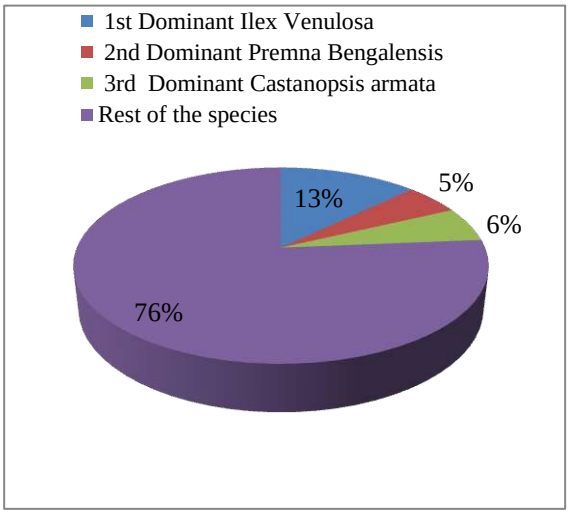
The table indicates that the volume contributed by the 1st dominant species (Ilex Venulosa*)* with respect to the total volume of the grove is 12.861%, the 2nd dominant species (Premna Bengalensis) is 5.124 %, 3rd dominant species (Castanopsis armata) is 5.706% while rest of the species is maximum i.e.76.309%. Total volume of the grove is 598.003 cubic metres.

From the above 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.

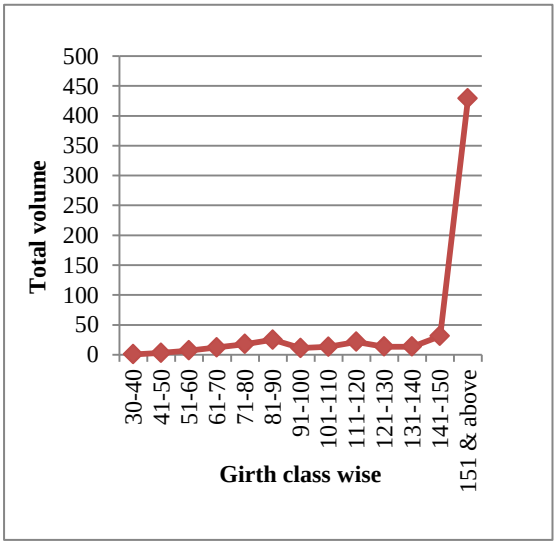
Girth class wise diagram with respect to total volume



Species wise diagram with respect to total volume



Girth class wise graph with respect to total volume



Over view of Khloo Blai Mynso

20.8 Number of Stems:

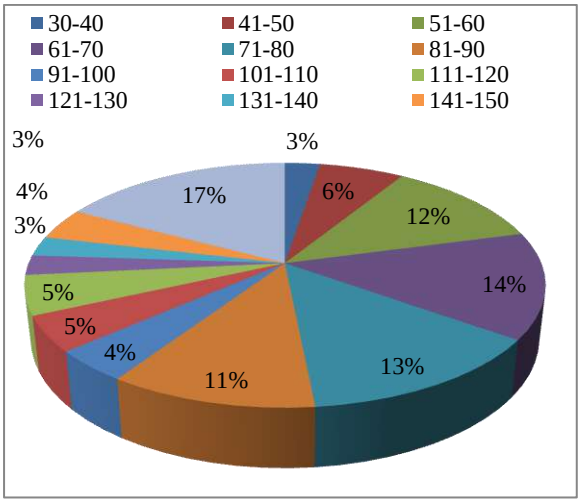
Number of stems in each girth class and species wise are given in the table 20.2. The table shows that maximum numbers of stems are found in lower girth classes.

Table-20.2

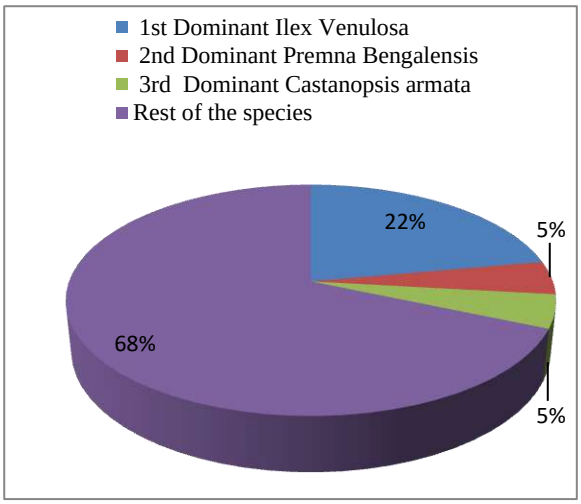
Girth class wise & Species wise No. of stems in the entire grove (Area 0.852 ha)

Girth Class Wise	1st dominant *Ilex venulosa*	2nd dominant *Premna bengalensis*	3rd dominant *Castanopsis armata*	Rest of the species	Total stems
30-40	4	0	0	5	**9**
41-50	6	0	1	12	**19**
51-60	5	0	0	23	**28**
61-70	3	1	1	27	**32**
71-80	5	1	2	26	**34**
81-90	10	3	1	21	**35**
91-100	4	0	0	8	**12**
101-110	3	0	0	9	**12**
111-120	6	0	0	10	**16**
121-130	1	2	0	5	**8**
131-140	2	0	0	5	**7**
141-150	5	1	0	8	**14**
151 & Above	8	5	8	33	**54**
Total =	**62**	**13**	**13**	**192**	**280**

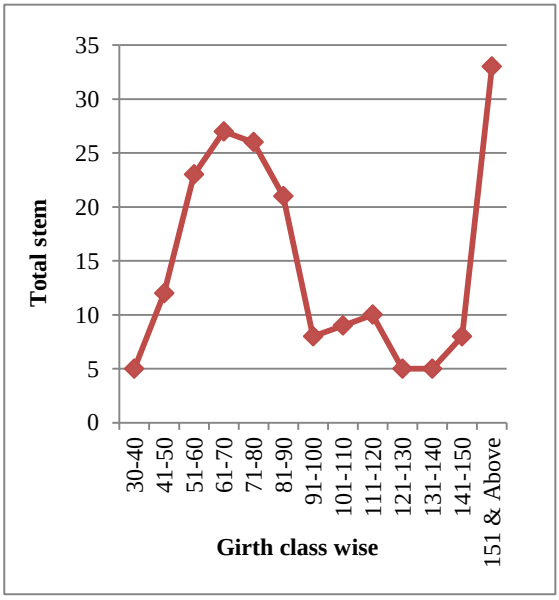
Girth class wise diagram with respect to total stems



Species wise diagram with respect to total stems



Girth class wise stem with respect to total stems



Inside view of Khloo Blai Mynso

20.9. Brief note on Management of Khloo Blai Mynso.

(i) Protection from Biotic Interfernece:-

In the grove there is no restriction for entry and exit. felling of trees, poaching or grazing is strickly prohibited, but as the forest is left open, there are chances of such illegal activities in the near future. Since, the forest is in the visinity of Mynso village, the forest will be susceptable to future encroachment.

(ii) Fire Control:-

As the sacred grove is revered by the locals it is properly look after by the locals and the community. So fire incidents are not known to takes place. However, it will be logical to create internal and external wirelines.

(iii) Water Stream:-

There is only one seasonal stream withinin the sacred grove. Contruction of check-dam will great help in the augmentation of the soil moisture content of the soil.

(iii) Awareness Campaign:-

Seminar/ public awareness can be taken up in the area for the local and non-local individual as to enhance the future environmental protection endeovour. Special programme for school children can also be conducted related to long term conservation of forest.

For any information please contact Divisional Forest Officer,
Forest Resources Survey Division, Shillong
Phone No: 9436999101
Email: dfofrsd@gmail.com