

MICRO PLAN

**For**

KHAWZAWL FOREST RANGE  
{L2 Landscape}

**For implementation of**  
GREEN INDIA MISSION

**For the period**  
2016 – 2017 to 2022 – 2023

LANDSCAPE (L1)	-	MIZORAM.
SUB-LANDSCAPE (L2)	-	Khawzawl Range
WORKING UNITS (L3)	-	(1) Arro Ram
		(2) Hermon Ram
		(3) Hmuncheng Ram
		(4) Vankal Ram

**Prepared and submitted by**

Micro Plan Working Group  
Vankal : Khawzawl Range  
Champhai Forest Division

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# Chapter 1

## Introduction, Scope and Objectives

### 1.1 About the State (Landscape - L1)

#### 1.1.1 Introduction

Mizoram was earlier a part of the British India since 1895. In 1898, the district called “Lushai Hills” was created with Aizawl as its headquarter. After independence in 1947, the district was renamed as “Mizo District” and also the autonomous Mizo District Council was established on 25<sup>th</sup> April, 1952. Subsequently, Mizoram was made a Union Territory in 1972 and finally, it became the 23<sup>rd</sup> State of India on 20<sup>th</sup> February, 1987.

#### 1.1.2 Location, Extent and Topography

Mizoram, which is one of the Seven Sister States in the North-Eastern India, is located between 21°56` and 24°35` N Latitude and 92°16` and 93°26`E Longitude. It shares the boundary with Assam and Manipur on the North, Myanmar on the East and the South, and Tripura and Bangladesh on the West. The long international boundary (about 630 miles) of Mizoram with Myanmar and Bangladesh makes it strategically located.

The geographical area of the State is 21,087 sq. km. with mostly hilly terrains. Most of the hills have moderate to steep slopes and are separated by rivers flowing either to the North or South direction. These rivers have created deep gorges between several hill ranges. In fact, Mizoram is “a land of rolling hills, valleys, rivers, and lakes” (Environment & Forest Department, 2010, p.5). The plains occupy comparatively a very small portion of the total geographical area and are mostly located at places such as Champhai, North Vanlaiphai etc. on the eastern part of the State.

#### 1.1.3 Climate

The whole of Mizoram enjoys a pleasant climate with cool summer and moderate winter. The temperature varies from 11°C to 21°C during winter and 18°C to 29°C in summer. The State gets rainfall from both the North-East and the South-West Monsoon. It receives heavy rains from May to September. The average annual rainfall is about 254 cm. As such, the climate in Mizoram is conducive to conservation and sustainable development of forests.

#### 1.1.4 Soil

The soil in Mizoram, in general, is fertile and rich in organic contents. However, the soil depth is found less at few places, particularly at very steep slopes, due to the effect of heavy run-off in degraded forests. The contents of potash and phosphorus in the soil are low, whereas the content of nitrogen is normally high because of the accumulation of organic matters over the years. The fertile soil is generally found at low to moderate slopes, on river banks and in the valleys. The soil at such places is responsive to the vigorous and healthy growth of the forests and thus supports rich biodiversity.

#### 1.1.5 Demography

The population of the State was 10,91,014 as per 2011 census, of which 5,52,339 (51 percent) are male and 5,38,765 (49 percent) are female. The population density has increased from 33 to 52 persons per sq. km. during the decade, 1999 - 2011. Most of the people in the State belong to several culturally-linked ethnic tribes which are collectively called “Mizos” (Mi: People, Zo: Hill). These people are highly educated. Mizoram has a literacy rate of 91.58 %, which ranks it second among States in India. “Mizo” and “English” are the main languages spoken by the majority of the people.

## 1.1.6 Socio-economic life of the people

Since signing the “Peace Accord” on 30<sup>th</sup> June 1986, the State has effectively implemented several developmental schemes. Peace and development have resulted into comparatively better Human Development Index (HDI). The HDI in Mizoram was found 0.67, the highest among the north-eastern States and more than the national average (Government of Tripura, 2007, p.28).

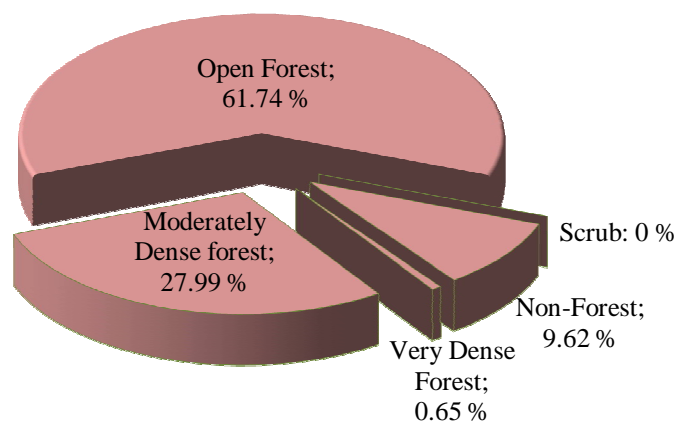
Agriculture is the dominant source of income and employment for the people in Mizoram. As per 2001 census, 61 percent of the working population in the State was dependent on agriculture. In rural areas, most of the people are engaged in “Jhumming” (shifting cultivation). 89,454 households, 57.85 percent of total 1,54,643 households, were cultivators and further, 78,195 households, 87 percent of all cultivator households, were practicing shifting cultivation (Government of Mizoram, 2004, p.17). The “Jhumming” practice has adversely affected the rich forest cover of the State. Planned efforts are now being made to control and transform the practice of shifting cultivation into settled agriculture. Technical and financial assistance is being given to the rural people enabling them to leave the practice of shifting cultivation and get engaged in other sustainable livelihood activities such as horticulture, piggery, settled cultivation etc.

## 1.2 The forests in Mizoram

### 1.2.1 Forest cover

A large area - 19,277 sq. kms. (91.44 percent of the State’s total geographical area) - is covered under forests i.e. Forest and Tree cover (Forest Survey of India, 2013). However, the forests have suffered serious depletion and degradation due to the traditional practice of shifting cultivation, uncontrolled fire, unregulated felling etc. As per the “India State of Forest Report 2013” published by the Forest Survey of India, the State has 13,016 sq. kms. open forests which is 67.70 % of the total forest cover and 61.74 % of the total geographical area. The density-class of forests found in the State has been shown below graphically in Figure 1.

Figure - 1



Source: Forest Survey of India, 2013

### 1.2.2 Forest types

The forests in Mizoram are very rich in biodiversity. As many as 6 important forest types have been reported to occur in the state (Forest Survey of India, 2011). These are:-

- **Cachar Tropical Semi-Evergreen Forest (2B/C2):** Mostly found in all districts of the State. The important species are *Dipterocarpusturbinatus*, *D. tuberculatus*, *Terminaliachebula*, *Emblिकासpp*, *Careyaarborea* etc.
- **Secondary Moist Bamboo Brakes (2/2S1):** Dominant species of bamboo like *Melocannabambusoides*, *Dendrocalamushamiltonii* etc. are present.

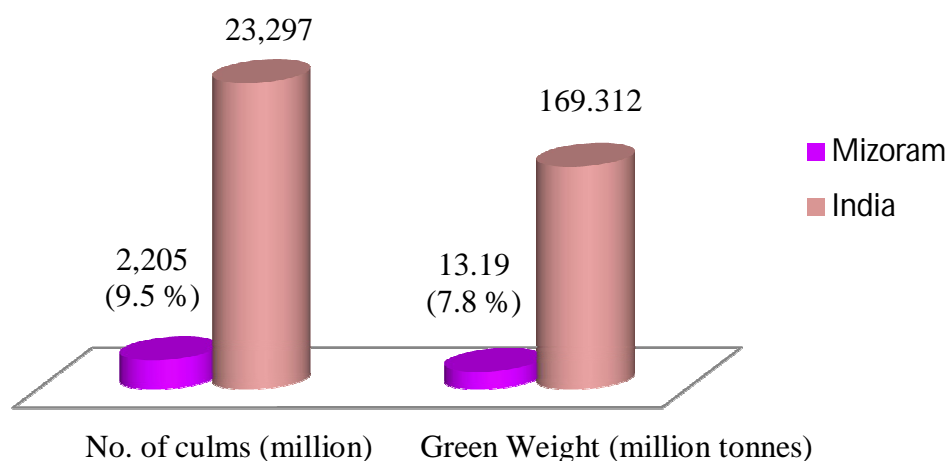
- **Pioneer Euphorbiaceous Scrub (2B/2S1):** It is generally found in degraded forests and exposed lands present on higher slopes and on top of the hills. It has quick growing species like *Macaranga* spp., *Mallotus* spp. etc. This type is found in all districts except Champhai.
- **East Himalayan Moist Mixed Deciduous Forest (3C/C3b) :***Schimawallichii*, *Syzigiumcumini*, *Albizziaprocera*, *Dilleniapentagyna*, *Artocarpuslakoocha*, *Terminaliaballerica*, *T. chebula*, *Lagerstroemia parviflora*, *Anthocephalouskadamba* etc. are the characteristic species of this type. It is found in all districts of Mizoram.
- **East Himalayan Subtropical Wet Hill Forest (8B/C1):** Major characteristic species are *Quercusvercus*, *Q. serrata*, *Castanopsisspp*, *Litsea spp.* *Machiluspp* etc. This forest type is found in Champhai district.
- **Assam Subtropical Pine Forest (9/C2):** It is mostly dominated by the species *Pinus kesiya* with other associates like *Quercusspp*, *Schimawallichii*, *Rhododendronspp* etc. This forest type is found mainly in Champhai district of the State.

### 1.2.3 Bamboo Resources

Nature has endowed Mizoram with valuable Bamboo Forests. Bamboos - Green Gold for the State - are one of the most important natural resources which provide immense economic and environmental benefits for the local people. Bamboos are used for multiple purposes as the culms are straight and strong but light. These are used extensively in house construction particularly in the rural areas, as food, and for making various household items such as stools, benches, kitchen utensils, agricultural implements, and fishing devices. Further, bamboo acts as an effective soil binder protecting the slopes from erosion through its deep and extensive root system.

Bamboos are found abundantly in the State mainly along river banks and on abandoned jhumland. Both the clump forming and the non-clump forming species occur naturally in most parts of the State except on the higher altitudes of its eastern region. A large area of about 9,245 sq. kms., which is 44 percent of the State's geographical area, is covered under "Bamboo Forests" (Forest Survey of India, 2011, p.61). In spite of being small in size, Mizoram contributes significantly to the country's growing stock of bamboos.

Bamboo resources of the country have been assessed by the Forest Survey of India (FSI), Dehradun. As per the India State of Forest Report 2011 (Chapter 6) published by the FSI, total number of culms in recorded forests of Mizoram has been estimated to be 2,205 million as against 23,297 million estimated at the national level. Similarly, the total estimated green weight of bamboo culms has been estimated to be 13,187,000 tonnes for the recorded forests of Mizoram as against 1,69,312,000 tonnes for the whole country. The growing stock of bamboos in recorded forests of Mizoram as against the same for the whole country has been shown below graphically.



Area under “pure bamboo brakes” in Mizoram was found the highest among all the States/Union Territories of the country (226 sq.kms.). The dense bamboo forests also cover a large area in the State of Mizoram. The dense bamboo across all the States was found maximum in Arunachal Pradesh (8,681 sq. kms.) followed by Mizoram (6,116 sq.kms.).

The bamboo forests in Mizoram are also rich in bio-diversity. 35 species of bamboos under 9 genera have been reported to grow in the State (E & F Department, 2010). *Melocanna baccifera* (locally called “Mautak”), a non-clump forming species, is the prominent species found in the State. Other dominant species are *Dendrocalamus hamiltonii* (Phulrua), *D. longispathus* (Rawnal), *Bambusa tulda* (Rawthing), *B. longispiculata* (Rawthing chi), and *Arundinaria callosa* (Phar). These species do not occur in large proportions like Mautak but are commercially valuable.

#### **1.2.4 Areas under Notified Forests in the State**

The notified forests include (1) Riverine Reserve Forests (1832.50 sq.kms), (2) Innerline Reserved Forests (570 sq. kms.), (3) Roadside Reserve Forests (97.20 sq.kms.), (4) Other Reserve Forests (1963.63 sq. kms.) and (5) Protected Areas (1240.75 sq.kms) under the ownership of the State Government as well as 2562 sq. kms. under the ownership of District Councils. Thus, about 39 percent of the total geographical area (8266.08 sq.kms.) is covered under “notified forests” in the State of Mizoram.

#### **1.2.5 Protected Areas**

The Environment and Forest Department, Govt. of Mizoram has taken praiseworthy initiatives for preservation of wildlife by constituting one Tiger Reserve, two National Parks and seven Wildlife Sanctuaries. These are (1) Dampa Tiger Reserve, (2) Murlen National Park, (3) Phawngpui National Park, (4) Ngengpui Wildlife Sanctuary, (5) Lengteng Wildlife Sanctuary, (6) Khawnglung Wildlife Sanctuary, (7) Tawi Wildlife Sanctuary, (8) Thorangtlang Wildlife Sanctuary, (9) Pualreng Wildlife Sanctuary, and (10) Tokalo Wildlife Sanctuary. The area set aside for long-term wildlife conservation is 1728.75 sq. km. which is more than 8 % of the State’s geographical area.

The network of protected areas provides healthy habitats for many wild animals, birds, and reptiles. Some important species of mammals found in the State are Tiger, Elephant, Malayan Sun Bear, Wild dog, Brush Tailed Porcupine, Gour, Leopard Cat, Marbled Cat, Golden Cat, Clouded Leopard, Serow etc. The forests of Mizoram also provide habitats for primates such as Assamese Macaque, phyare Leaf Monkey, Slow Loris, Pig Tailed Macaque, Stump Tailed Macaque, Rhasus Macaque, and Capped Langur and also for Hoolock Gibbon, the only ape found in India.

Important bird species found in the State are Black Stork, Oriental Darter, Serpent Eagle, Black Eagle, Humes Bartailed Pheasant, Blyth’s Tragopan, Green Burmese Peafowl, Grey Peacock, Fufous Partridge, Brushed Partridge, Yellow-legged Button quill etc. The Hornbill species include Great Indian Hornbill, Wreathed Hornbill, Oriental Pied Hornbill, Brown Hornbill, and Rufous-necked Hornbill.

### **1.3 Bio-geographical importance**

The forests in Mizoram are ecologically significant as the region represents an important part of the Indo Myanmar bio-diversity hotspot which is one of the 25 global biodiversity hotspots recognized across the globe. Several hot-spots in the State carrying diverse flora and fauna have been identified for protection. Further, the region is part of biologically distinctive eco-system (Mizoram-Manipur-Kachin Rainforests Eco-region). As such, conservation of the forests in the State is a necessity for arresting the progress of climate change and mitigating the impact of changing climate on the people.

## **1.4 Expectations of people from the forests**

### **1.4.1 People's Participation in Conservation of the Forests**

The State of Mizoram moved from State regulation to people's participation for managing its rich forest wealth by adopting the "Joint Forest Management" (JFM) through a notification issued in 1998. The introduction of JFM established a new mutually-beneficial relationship between the forests, the people and the State. The basic objective for adopting the mechanism of JFM in the State was to encourage active involvement of the local people in enrichment, protection and sustainable management of the forests.

It was envisaged to impart sense of ownership over the forest areas covered under JFM to the villagers. Guidelines for managing the forests with people's participation were framed. As per these guidelines, the local people participating in managing the forests and the State would share the forest produce, which may be extracted from the areas covered under JFM by applying scientific principles of sustainable management.

The organizational structure for managing the forests with constructive participation of the local people, at present, consisted of three levels in the State i.e. (1) State Forest Development Agency (SFDA) at the State level, (2) Forest Development Agencies (FDAs) at the divisional level, and (3) Village Forest Development Committees (VFDCs) at the village level. Eco-Development Committees (EDCs) have been constituted for the villages located near the protected areas. The existing guidelines for JFM included (1) the procedures for constituting SFDA, FDAs and VFDCs/EDCs, (2) their duties and responsibilities, (3) methodology of preparing micro-plans, their effective implementation, and timely monitoring, (4) fund flow mechanism, and (5) disposal of forest produce and sharing of benefits.

For involving the local people in planning, implementation, and monitoring of schemes for forest management, one SFDA, 21 FDAs and 598 VFDCs/EDCs have been constituted in Mizoram. These committees i.e. VFDCs/EDCs have 2, 75,435 members belonging to 80,728 families. Memorandum of Understandings (MoUs) has been signed between SFDA and FDAs and also between various FDAs and VFDCs/EDCs.

Works under centrally sponsored scheme - "National Afforestation Programme" (NAP) - are mainly taken up by VFDCs/EDCs through FDAs. Revised operational guidelines for implementing NAP through JFM were issued in the year 2009 by the Ministry of Environment and Forests, Government of India. These guidelines were aimed at (1) strengthening institutional arrangements for project implementation (capacity building), (2) treatment of highly degraded lands (problem lands), (3) application of latest nursery and plantation techniques, (4) generation of additional sustainable income for members of VFDCs/EDCs through value addition to forest produce and linkage to better markets for forest-based products. The Government of Mizoram has adopted these revised guidelines by issuing notification in March, 2010.

The scheme - NAP - is being implemented effectively in Mizoram through the mechanism of JFM. Suitable tree species have been planted over an area of 57540 ha. under NAP during the period 2003-04 to 2013-14. These plantations are being protected through joint efforts of the local people and the Government agencies. It is expected that enrichment, protection, and sustainable management of the forests through JFM will provide substantial benefits to the local people while contributing significantly to ecological equilibrium and environmental stability.

### **1.4.2 Stakeholder's expectations**

The local people particularly those living nearby forest areas expect sustainable livelihood support from the forests through extraction of permissible yield, value addition to forest produce and marketing of value-added products. They also expect to meet their needs for constructional timber at economical cost from the forests. However, they are also concerned for ecological stability in the region. Expectations of various stakeholders from the Environment and Forests department are given as under:-

Table 1

Sl. No.	Name of Stakeholder	Expectations from the Department
1	The Indian citizens living in Mizoram including the indigenous people.	<ul style="list-style-type: none"> <li>a. Ecological balance and environmental stability.</li> <li>b. Bonafide forest-based needs - constructional timber, fuel wood, and fodder – as per the Mizoram Forest Act, 1955.</li> <li>c. Constructive participation in afforestation, enrichment, and protection of forests.</li> <li>d. Easy access to information on uses and economic benefits of the forest products including Non-Timber Forest Products (NTFPs) and Medicinal Plants.</li> <li>e. Availability of technical know-how as well as other facilities for raising private plantations.</li> </ul>
2	The State Government	<ul style="list-style-type: none"> <li>a. Effective implementation of the planned schemes achieving the desired outcomes.</li> <li>b. Satisfaction of the local people.</li> </ul>
3	The Government of India	<ul style="list-style-type: none"> <li>a. Conservation of environment and forestry resources as envisaged in the National Forest Policy, 1988.</li> <li>b. Balance between conservation and development by implementing the provisions of the Forest (conservation) Act, 1980 as well as other National and State acts and rules related to management of the forests and the wildlife.</li> </ul>
4	The forest officials working in the State	<ul style="list-style-type: none"> <li>a. Healthy working conditions.</li> <li>b. Adequate facilities at par with our counterparts in other departments/services.</li> <li>c. Awards and recognition for good works.</li> </ul>
5	Non-Government Organizations (NGOs)	<ul style="list-style-type: none"> <li>a. Increase in forest cover.</li> <li>b. Enrichment and protection of the existing forests.</li> <li>c. Preservation of wildlife by creating and maintaining healthy habitats for them.</li> <li>d. Generating awareness towards the importance of forests and wildlife.</li> <li>e. Eliciting active participation of public in conservation and protection efforts.</li> </ul>
6.	Private tree/bamboo growers	<ul style="list-style-type: none"> <li>a. Technical knowhow.</li> <li>b. Logistic and financial support for raising and managing the plantations.</li> <li>c. Mechanism to facilitate harvesting and transportation of timber and bamboos.</li> </ul>

Accordingly, the Department of Environment & Forests, Government of Mizoram is committed to provide a variety of services, both tangible as well as intangible, to the citizens by scientifically managing the rich forest cover existing in the State. The tangible services include (1) arranging forest products of economic importance such as constructional timber, fodder, fuel-wood, sand, gravels etc. at reasonable costs, (2) offering gainful employment while implementing various schemes for enrichment and protection of the forests, (3) creating opportunities for additional income through the mechanism of “Joint Forest Management”, (4) disseminating information on importance and economic benefits of the forests including Non-Timber Forest Products and medicinal plants, (5) building and maintaining eco-friendly recreation sites and trails, (6) making technical know-how available for raising and managing private forests/plantations, and (7) assisting private tree-growers in silvicultural harvesting and transporting of timber inside as well as outside the State. The intangible services include (1) stabilizing the climate, (2) enriching the soil fertility, (3) recharging ground water, (4) regulating the water flow, and (5) offsetting the air pollution.



## **1.5 Objectives for GIM implementation**

Although the identified landscape (L-1) - the entire state of Mizoram - has a large area under forest cover, the forests are not rich in quality. About 67.70 % of the forest cover is open, having very less canopy density. A large extent of open forest, particularly in the hilly terrain, can have devastating impacts on the normal structure and the delicate interdependencies of diverse flora and fauna in the forest ecosystem. The situation is likely to be further aggravated in Mizoram by the prevalence of shifting cultivation and other biotic interferences.

Efforts to enrich and protect the forests are being taken up by effectively implementing various schemes such as National Afforestation Programme, Integrated Forest Management, Thirteen Finance Commission Grants-in-Aid, National Bamboo Mission, New Land Use Policy etc. The local people are being encouraged to shift from shifting cultivation to settled agriculture by providing them technical and financial assistance.

The treatments being done to the landscape coupled with the proposed interventions under Green India Mission (GIM) will save the valuable hilly ecosystem of the State from deterioration. It is expected that implementation of proposed strategies will enhance the quality of existing forests, ecologically re-stock wastelands, improve eco-system services, increase forest-based livelihood income and augment annual CO<sub>2</sub> Sequestration.

## **1.6 Scope of implementing planned interventions under GIM**

The GIM, which aims at providing sustainable livelihood support to the people in a stable ecosystem would be implemented initially in 51 villages of eight identified L2 landscapes. These villages form compact blocks for treatment in five Forest divisions/4 districts of the State. It is further planned to extend the mission in other parts of the State. It is to mention here that, the entire State has been identified as vulnerable i.e L1 landscape

## Chapter 2 Details of Identified Landscapes

### 2.1 Criteria for selection of L1 Landscape

Criteria, which were adopted for identification of L1 landscape, are given below:-

Table 2			
Details of Criteria			
Item	Criteria	Details	Details of the source of data, maps etc. appended
1. Forest cover and degradation	a) Forest cover	19,277 sq. kms. (91.44% of the State's geographical area).	India State of Forest Report 2013, Forest Survey of India, Dehradun.
	b) Bio-diversity	The State is rich in Bio-diversity, having six major forest types, namely i) Cachar Tropical Semi-Evergreen Forest, ii) Secondary Moist Bamboo Brakes, iii) Pioneer Euphorbiaceous Scrub, iv) East Himalayan Moist Mixed Deciduous Forest, v) East Himalayan Subtropical Wet Hill Forest, vi) Assam Subtropical Pine Forest.	India Forest Atlas prepared by Forest Survey of India, Dehradun
	c) Wastelands	6021.14 sq km (28.56% of the State's total geographical area) is wasteland including jhumland.	Wastelands Atlas of India, 2010.
2. Projected Forest vulnerability to climate change	a) Vulnerability maps and attribute data	Although the State is having a large area under forest cover, the forests are not good in quality. The State has 13,016 sq km open forest which is 67.70% of the total forest cover and 61.74% of the total geographical area. It is expected that a large extent of open forests, particularly in the hilly terrain, may adversely affect not only the forest eco-system but adjoining areas as well. The situation is likely to be further aggravated in Mizoram by the prevalence of shifting cultivation and other biotic interferences.	As indicated above in column 1.
		Effect of climate change in the State is (1) irregular behavior of rainfall, (2) rise in mean maximum and mean minimum temperatures, (3) gradual and progressive increase in humidity, and (4) increased frequency of extreme climate events (heavy rainfall, flash floods, etc.). Forests are highly vulnerable to these changes in climatic conditions. Impact of climate change on the forests coupled with biotic interferences is characterized by (1) degradation (a large extent of open forests), (2) loss of biodiversity, (3) increased incidence of invasive species, and (4) loss of forest environmental functions (water conservation, soil conservation, flood control etc.).	(1) Programme Design Document for North East Climate Change Adaptation Programme presented to KfW Germany, DoNER, and State Govts. (2) Field observations by Forest Officers.
3. Vulnerable Population/Communities	a) ST/SC Total population, ratio	The majority of the population in the State - over 95% - belongs to STs.	2011 Census data, Govt. of India.
	b) Scheduled areas		

## 2.2 Importance of L1 Landscape

Based upon the criteria given in para 2.2, the entire State of Mizoram (Area: 21,081 sq. km.) has been taken as L1 Landscape. Proper treatment of the landscape in the State would bring ecological security in the region and would also contribute significantly to stabilize the changing climate. The biogeographical importance of the L1 landscape has been given in para 1.3.

## 2.3 Criteria for selecting L2 Landscape

Operational units (L2 level) have been identified based mainly on five indicators which are (1) extent of open forest, (2) dependency of the local population on the forests i.e. biotic pressure, (3) drainage pattern, (4) prevalence of shifting cultivation and (5) compact block for treatment under GIM. The criteria for selection of L2 Landscapes are given below in detail:

	Criteria	Details	Details of the Source of data – Maps etc appended
Extent of open forests	Extent of degraded forests i.e. forests having very less canopy density	Aizawl, Champhai, Lawngtlai, Lunglei, and Mamit districts have larger area under open forests.	FSI, Dehradun
Forest Dependence	Forest areas (sq. kms.) per 1000 population	Aizawl, Champhai, Champhai, and Serchhip districts have less forest areas per 1000 population. Therefore, it is expected that these districts may witness more biotic pressure on the forests.	Data for forest areas: FSI data and for population: census data.
Drainage Pattern	Catchment areas of major and important rivers	After identifying the divisions on the basis of first two criteria, the operational units have been identified within these divisions on the basis of these two criteria.	Maps obtained from MIRSAC (Mizoram Remote Sensing Application Centre)
Prevalence of shifting cultivation	Areas including Abandoned Jhumland and Current Jhumland		Maps obtained from MIRSAC (Mizoram Remote Sensing Application Centre)
Formation of Compact Block	All identified L2 landscapes to form a compact block for better outcomes.	Aizawl, Champhai, Darlawn, Champhai and Thenzawl divisions form a compact block in the State.	Map of the State.

## 2.4 Reasons for selecting this L2 landscape among other possible L2 landscapes within L1:

A meeting (brainstorming session) of senior forest officers was held in March, 2012 to discuss various issues and formulate suitable strategies for the preparation of Bridge Plan/Perspective Plan under GIM. The views presented by the senior officers in the meeting are summarized below:

- The operational units should be from the districts which satisfy either of the two criteria i.e. extent of open forests or biotic pressure on the forests. Further, this unit should be strategically important for i) treatment and management of catchment areas and ii) engagement of the local people in settled agriculture or other sustainable livelihood options i.e weaning them away from jhum cultivation.
- The operational units, so selected, should form a compact block.

- The forest divisions, where activities similar to those proposed under GIM (KfW sponsored North East Climate Change Adaptation Programme) are being carried out, may not be taken up as operational units.
- Aizawl city, which carries maximum concentration of population (26% of the State's population), has the significant impact on the climate and the eco-system in the State. Therefore, forest-based interventions inside and outside the city of Aizawl may be taken up under GIM.

Considering the above views, it was decided in the meeting that 8 nos. of operational units in 5 forest divisions namely Darlawn, Champhai, Thenzawl, Champhai, and Aizawl (for Aizawl division limited to inside and outside Aizawl city) may be taken in the initial five years of GIM. Other areas/divisions may be taken up subsequently under GIM.

The proposed landscape, Khawzawl Range is one of the two operational units of selected L2 under Champhai Division. The Landscape consist of open and degraded forests, both Government & privately owned. There are many current and abandoned jhumlands. There are 4 villages having separate Village Council as well as separate jurisdiction within this landscape. Further, it formed the catchment area of Tuichang and Tuipui rivers, these two major rivers have many tributaries which are the major source of water for drinking as well as for irrigation to Agriculture/Horticulture field of the people living inside and outside of this landscape Khawzawl Range. Treatment under Green India Mission would ensure continuous and interrupted supply of water for the villagers not only living in the 4 villages within the landscape but also some villages nearby the Landscape Khawzawl Range. As such, Khawzawl Range was selected as L2 Landscape for treatment under GIM.

## **2.5 Importance of L2 Landscape (Khawzawl Range)**

The identified landscape lies in the catchment area of Tuichang and Tuipui river which have many tributaries, the source of water for the villages including Khawzawl Town. Treatment of this landscape under GIM would ensure regular water supply to inhabitants of four villages and Khawzawl Town. Hence, treatment under Green India Mission is the key to keep the regular water supply to the people and to check degradation of the forest within this landscape.

## **2.6 Criteria for selection of L3 landscape**

All villages under this Landscape namely Vankal, Arro, Hmuncheng and Hermon having interests in GIM L2 have been taken as working unit i.e. L3.

## **2.7 Importance of L3 landscape (Vankal Ram)**

The area under Village Council of Vankal is one of the four L3 landscapes (working units) identified for coverage in L2 landscape 'Khawzawl Range'. The Vankal village was established around the year 1971. It has the population of 326 with 77 households (44 households under BPL category). The villagers are well educated, literacy rate being 96.90%.

The total geographical area of this L3 landscape is 96.87 sq. km. Several rivers/streams flowing through this L3 such as Hnahkhar, Tuichang, Tuimarul, Pi lui, Pial thleng lui, Seki lian lui, etc. These are the natural sources of water for Vankal and nearby villages. In the past, most of the land was covered with well-stocked good-quality forests. However, the forests have suffered serious depletion and degradation due to traditional practice of shifting cultivation and uncontrolled felling of trees and prodigal use of forest resources due to inadequate knowledge of the importance of forests. As a result, presently, most of the areas are either deforested or forests having less/moderate canopy density i.e. approximately 13.97%. It is expected that execution of well-planned strategies under GIM may result into ecological stability in the region.

## 2.8 Extent of L1 landscape

Name of the L1 landscape : The entire State of Mizoram (map enclosed as annexure 'E')  
 Location of the landscape : State : Mizoram  
 District : All Districts  
 Forest Division : All Forest Divisions

### Extent (area, boundaries, geo-references) :

- Geographical area of the State is 21,087 sq. kms.
- The State shares its boundary with Assam and Manipur on the North, Myanmar on the East and the South, Tripura and Bangladesh on the West.
- It is located between 21°56' and 24°31' N latitude and 92°16' and 93°26' E longitude.

## 2.9 Extent of L2 landscape

Name of L2 landscape : Khawzawl Range  
 Location of the L2 Landscape : State : Mizoram  
 District : Champhai  
 Division : Champhai

Geo references of the L2 Landscape: 23°38'46.07"N & 93°08'01.58"E (Vankal ram)  
 23°25'33.68"N&93°05'07.72" E (Hmuncheng ram)  
 23°28'31.79"N & 93°13'7.94"E (Hermon ram)  
 23°31'29.22"N & 93°09'43.89" E(Arro ram)

### Area of the landscape:

Open forests : 60.82 sq. km.  
 Moderately dense : 47.34 sq. km.  
 Very Dense forests : 11.06 sq. km.  
 Scrub lands : -  
 WRC : 8.78 sq. km  
 Horticulture : 9.50 sq. km  
 Other areas : 42.2 sq. km.  
**Total area : 221.68 sq. km.**

## 2.10 Extent and other features of L3 landscape (Vankal Ram)

Table 4	
Location	The L3 Landscape (Vankal) is a Village in Khawzawl Block in Champhai District of Mizoram State, India. It is located 73 KM towards west from District headquarters Champhai and 158 KM from State capital Aizawl Vankal is surrounded by Champhai Block towards East , East Lungdar Block towards South , Thingsulthliah Block towards west , Phullen Block towards North .
GPS coordinates:	N 23°39' 51.56'' & E 93°10'01.11'', N 23°34'09.48'' & E 93°06'08.26'' N 23°32'08.46'' & E 93°10'28.36'', N 23°35'28.24'' & E 93°11'53.34''
Area	96.87 Sq. Km.
Forest cover	Moderately dense forests – 31.74sq. kms. Open forests – 46.18sq. kms. Non-forests - 6.29 sq. kms.
Forest type	Cachar Tropical Semi Evergreen Forest (2B/C2) mixed with bamboo breaks. Important species found in the locality are <i>Dipterocarpus turbinatus</i> , <i>D tuberculatus</i> , <i>Terminalia chebula</i> , <i>Embllica spp</i> s, <i>Careya arorea etc</i> . Dominant bamboo species are <i>Melocanna baccifera</i> , <i>Dendrocalamus hamiltonii</i> , <i>Bambusa tulda</i> , <i>D longispathus etc</i>

Soil quality	Three soil orders i.e. ultisols, inceptisols and entisols are found in the project area. The surface soil textures are loam to clay loam with clay content increasing with depth in the hills whereas in the valleys it is mostly sandy loam to sandy clay loams. The soils are acidic in nature with pH values ranging from 4.2 to 6.8. The soils in the hills are strongly acidic in reaction, whereas, the soils in alluvial deposits are less acidic in nature. The percentage of organic carbon content is medium (0.70 %).
Topography	Some portion of the land is undulating with moderate slope i.e. 15° to 30°, whereas most parts of the land are comparatively flat with an altitude of 800-900 mts. above MSL.

## 2.11 Profile of L3 Landscape (Vankal)

### 2.11.1 Population and Workers Population

The population data of Vankal village is given below in the following table:

No of Households	Population		Children below 6yrs	Total
	Adult Male	Adult Female		
77	162	128	36	326

The average family size is 4 to 5 persons per household.

Workers Population is as under:-

Total Workers	Regular/Main Workers	Irregular/Marginal Workers	Non Workers
Workers: 207 Male: 110 Female: 97	Regular Workers: 152 Male : 81 Female: 71	Irregular Workers: 55 Male: 29 Female: 26	Non Workers: 119 Male: 53 Female: 66

Source: Census data 2011

### 2.11.2 Social structure

The social structure of the population at Vankal village is as under:-

General	Scheduled Caste	Scheduled Tribe	OBC	Total
Nil	Nil	326 (100%)	Nil	326

Source: Census data, 2011

### 2.11.3 Wealth Ranking

Sl. No.	Classification	No. of families
1	Rich (Families having RCC building or motor car whose annual income exceeds Rs 5,00,000.00)	2 (approx)
2	Middle class (Families whose annual income is less than Rs 5,00,000.00 but above BPL)	31 (approx)
3	Poor (Families who are listed as BPL by the Govt.)	44 (approx)

Source : Actual field verification

#### 2.11.4 Energy Consumption

Table 8		
1	No. of Household	77
2	LPG users	5
3	LPG & Fuel wood users	28
4	Fuel wood only user	44
5	Solar devices user	Nil

#### 2.11.5 No. of Educational institutions

Table 9						
Anganwadi	Primary school	Middle school	High school	HSS	Colleges	Others
1	1	1	-	-	-	-

Source : Field verification

#### 2.11.6 Enrolment (as on 15<sup>th</sup> Aug 2014)

Table 10					
Anganwadi	Primary school	Middle school	High school	Colleges	Others
12	25	21	6	1	

Source : Field verification

#### 2.11.7 Literacy percentage

Male –98.13%, Female – 95.38%, Overall – 96.90%

Source: Census data 2011

#### 2.11.8 Occupation

Table 11		
Sl. No.	Category of Occupation	No. of families
1	Govt. service	5
2	Jhumming (Shifting cultivation)	35
3	Horticulture including WRC	28
4	Business/Petty trade	1
5	Daily labourers	8
6	Others	-

Source : Field verification

#### 2.11.9 Livestock population

Table 12					
Cattle	Goat	Sheep	Pig	Poultry	Other
-	-	-	83	885	-

Source: Field verification

### 2.11.10 Agriculture practices

Table 13			
Category	Current Jhumming	Abandoned Jhumming	WRC
Area (ha)	494 Ha.	3254 Ha.	256 Ha.

Source: Existing Land Use Map

### 2.11.11 Cropping pattern

Table 14				
Sl. No	Crop	Time of sowing	Time of harvest	% of agri. area covered
1	Rice	April-May	Sept- Nov	235 Ha. (2.42%)
2	Orange	May-June	Oct-Dec	56 Ha. (0.58%)
3	Banana	April-March	Jan-Dec	25 Ha. (0.26%)
4	Arecanut	May-June	March-April	-
5	Maize	March	July	-
6	Ginger	April- June	Oct-March	138 Ha. (1.42%)
7	Pumpkin	March	June	13 Ha. (0.13%)
8	Calocasia (Bal)	April	Nov-Dec	11 Ha. (0.11%)
9	Local pea (Behlawi)	March	Sept-Nov	16 Ha. (0.17%)
10	Soya bean	June-July	Nov-Dec	-
11	Oil Palm	April-June	Aug-Dec	-

### 2.11.12 Water Resource

There are three main sources of water for the people living in Vankal village i.e. water connection from Public Health Engineering (PHE) department, water collection points connected to perennial fountains and rain water harvesting. Water connection from PHE department has many outlets for all villagers but house-to- house connection has not been provided. Rain water harvesting is being done by limited well-to-do families only.

### 2.11.13 Energy Consumption Pattern

The village has already been electrified by Power & Electricity department of the State. In addition, energy requirement is met from LPG connections, kerosene oil and fuel-wood collected from the Village Supply Reserves, the Jhumlands and the surrounding forests.

### 2.11.14 Demand for fuel-wood

The demand for fuelwood has been worked out based upon inputs received from NGOs, VC members and other villagers. The annual demand is as under:-

Table 15		
Average annual demand/household	No. of households	Total annual demand of the village
2.5 cum	77	192.5 cum

The supply as per the carrying capacity of existing forest in L3(Vankal) is expected as under:-

- A - Total forest area: 9687 Ha
- B - GS/Ha : 73.80cum
- C - Total GS: 714900.6 cum
- D - Annual Yield: 15886.68 cum
- E - Fuelwood availability assuming 30% of Annual Yield as fuel wood: 4766.004 cum



### 2.11.15 Existing infrastructure

Anganwadi Centre (1 nos.), Primary School (1 nos.), Middle School (1 nos.), Community Hall (1 no.), , Mini-Playground (1 nos.), Medical (1 Health Sub-Centre)

Local Institutions/Organizations: - Village Council, YMA (1 Branch), MUP (1 unit), MHIP (1 Branch) and Games & Sports Association

### 2.11.16 Problems and Priority

Through PRA exercise, problems being faced by the villagers could be ascertained. These are lack of proper medical facility, absence of link road to agricultural fields, incomplete net-work of approach roads within the village, in-sufficient supply of LPG cylinders and scarcity of water-supply.

### 2.12 Demographic statistics of L3 Landscape

Sl. No.	Village	Population			Poverty (BPL families)	Forest dependency	Drivers of degradation	JFMCs/ other institutions of Gram Sabha
		Total	SC	ST				
1	Vankal	326	0	326	44	Shifting cultivation, fuel-wood, timber for construction of houses, furniture etc.	Dealt in para 2.15	Village Forest Development Committee (VFDC) is active in the village.

Source: Census data 2011

### 2.13 Present interventions for addressing livelihood needs (forestry as well as non-forestry sector) and promoting sustainable forest development

Sl. No.	Name of Scheme	Implementing Agency	Forestry and Wildlife activities	Other components like SMC	Details of livelihood component	Villages covered
1	NLUP (New Land Use Policy)	Different line departments such as-Soil Conservation, Horticulture, Agriculture, Forest, Sericulture, Fisheries, Industries, AH & Vety etc	Plantation of bamboos and other indigenous species	Construction of terracing, trenching, Rain water harvesting structures	Provision of technical and sustainable livelihood support so as to wean them away from the traditional practice of jhumming	Vankal

2	NAP (National Afforestation Programme)	FDA Champhai/ concerned VFDC	Sustainable management of forests with people's participation. Plantation is carried out on degraded lands	Construction of contour trenching, Checkdams, inspection path etc	Livelihood generation through direct employment, sustainable extraction of forest produce, value addition and marketing	Vankal
3	NBM (National Bamboo Mission)	FDA Champhai/ concerned VFDC	Plantation of bamboo spp, Training to farmers to increase crop productivity		Livelihood support is expected from extraction of bamboo & marketing of value added products	
5	MGNREGS	DRDA, Champhai Dist	Roadside plantation	Terracing Checkdam, Retaining wall, contour trenching, Public water point, Rain water harvesting structures	Provision of 100 days employment for every willing household	
6	IWMP (Integrated Watershed Management Programme)	D.O,S & WC Khawzawl	Afforestation including plantation, reservation of community forest area, and prevention of fire etc.	Terracing, contour trenches, Farm ponds, water harvesting structures, Check Dam and Horticulture Development etc.	Provision of Financial and Material Support to selected beneficiaries and Self Help Groups of activities like Piggery, Goat Rearing, Poultry, Farming, Handloom, Tailoring, Hair Cutting, Petty Trade etc.	
7	IAY (Indira Gandhi Awas Yojana)	DRDA, Champhai	Nil	Nil	Construction of houses for the poor	

## 2.14 Gaps/Strategies identified under GIM

Table 18					
Sl. No.	Village	Forestry activities proposed	Other activities like SMC	Livelihood activities proposed	Any others
1	Vankal	1) Moderately dense forest cover, but showing degradation 2) Eco-restoration of degraded open forest (Type A) 3) Eco-restoration of degraded open forest (Type B) 4) Eco-restoration of degraded open forest (Type C) 5) Rehabilitation of shifting cultivation areas 6) Farmer's land including current fallows 7) Highways/Rural Roads/Canal/Tank bunds	Interventions in catchment areas of hydrological importance	(1) Community livelihood enhancement by Financial support to forest based cottage Industries and Handloom & Handicraft industries. (2) Support to SGHs (3) Construction of modern toilet (septic tank) (4) Provision of Household water storage tank	Promoting alternative fuel energy sources. (Solar lantern/heater)

## 2.15 Drivers of degradation and deterioration in the forest eco-system

Table 19		
Sl. No.	Village	Drivers of degradation
1	Vankal	Traditional practice of shifting cultivation, Lack of strategic and participatory land-use planning, excessive population pressure on the forests for fuel-wood, fodder, timber etc., inadequate scientific management of watersheds including rainwater harvesting. Prodigal use of Forest resource due to inadequate knowledge of the importance of forest not only for themselves but also for future generation.

## **Chapter - 3**

### **Process undertaken for preparation of Micro-Plan/Sub-Landscape Plan**

#### **3.1 Constitution of Micro-Plan Working Group**

A meeting was held with members/representatives of Village Council for Vankal village, conservation-oriented NGOs (YMA, MHIP and MUP), forest officers and other prominent citizens of the village on Dt 5.9.2014. As per recommendations made in the meeting, a Micro-Plan Working Group was constituted for facilitating preparation of micro-plan for Vankal Landscape (L3). The constitution of the group is as under:-

Chairman	:	K. Zairema, Forest Range Officer, Khawzawl Range
Secretary	:	TC Lalrindika, Forester, Khawzawl Range
Members	:	1) Ramluathara (VCP)
		2) Krosthanga (YMA representative)
		3) Rintluanga (VC Representative)
		3) Lalsiama (MUP representative)
		4) K. Luahthanga (Prominent citizen)
		5) Lalkiamlova (Prominent Welfare)
		6) K. Lalchhungliana (VFDC/JFMC representative)
		7) H. Lalremruata (AHEO, Horticulture Department)
		9) Vanlalchhuana (Range Officer, Soi Department)
		10) HT Zothanmawia ((Rearer, Sericulture Department)
		11) KC Rosangzuala (Vety Department)
		12) Laldiliana (VLAA, R.D. Department)
		13) C. Vanlalzapa (C.O, ICDS)

A questionnaire was designed by the committee for collection of data on (1) demographic status, (2) socio-economic conditions of the villagers, (3) resources available in the village etc. The questionnaire was designed to facilitate (1) assessment of current land use pattern and formulation of proposed land use pattern, (2) participatory resource-based land-use planning, (3) identification of livelihood needs, (4) planning of activities for sustainable livelihood support to the people and ecological stability in the region. The members of the Working Group also visited the area covered under L3 landscape.

#### **3.2 Participatory Rural Appraisal (PRA)**

PRA exercise including group discussion, experience sharing, one to one discussion with the villagers etc. was conducted to promote people's participation in project planning, implementation and monitoring. Information on various issues concerning GIM implementation was explained to the villagers through interpretation of maps and other documents. Resource mapping, Preparation of existing land use map, seasonal Calendar (Cropping season) and wealth ranking exercise were completed during PRA activities. The principle of participatory land use planning was adopted with available technical inputs and in consultation with all the stakeholders including the local public, proposed land used map was prepared. The proposed land used map reflects the area where interventions are to be planned and implemented.

#### **3.3 Households survey**

House-hold survey was carried out in the village covering almost all the families. A structured questionnaire was prepared for collecting information on dependency of every family on the forests as well as other required data.

### 3.4 Transect Walk

Transect walk was done by the Micro-plan Working Group along-with some local people and VFDC members. During transect walk, inputs were obtained from the field for deciding upon the suitability of the proposed land-use. GPS reading of the prominent sites/spots visited by the Working group were also recorded.

### 3.5 Details of awareness programmes, meetings and work-shops along-with the resolutions and other outcomes:-

					Table 20
Sl. No.	Work-shop /meetings State Level/ Landscape/ Villages covered	Category (stakeholders and no. of participants)	Major outcomes	Details of facilitators engaged	Whether resolution / photographs enclosed
1	State/L1 level(State Mission Directorate)	Representative of all line departments, reputed academic and technical institutions No. of attendants - 33	Suggestions were mainly given for strengthening institutions responsible for GIM implementation in the State	Principal Secretary, Environment and Forest Govt. of Mizoram	
2	District/L2 level at Champhai	Representatives of VFDCs, VCs, and NGOs such as YMAs, MHIPs & MUP. Total No. of participants - 65	More trainings are to be given at all levels.GIM guidelines in local dialect be distributed to locals/trainees.	1) Pu CC Lalchuangkima, Project Director, District Rural Development Agency, Champhai District Phone/Fax:03831-234940/03831-234104 E-mail: chuangkima@yahoo.co.in  2)Pu Lalthanzuala, District Agriculture Officer, Champhai District	
3	Village/L3 level at Vankal	Representatives of VFDCs, VCs, and NGOs such as YMAs, MHIPs & MUP attended. Total no of participants -23. Attendance at Annexure-	GIM guidelines in local dialect be distributed. Rural outreach activity for data collection be done at the earliest	1) Pu CC Lalchuangkima, Project Director, District Rural Development Agency, Champhai District Phone/Fax:03831-234940/03831-234104 E-mail: chuangkima@yahoo.co.in 2)Pu Lalthanzuala, District Agriculture Officer, Champhai District	

**3.6 Details of facilitators engaged in the process, institutions who prepared the micro-plans and approval of the Gram-Sabha:**

Table 21					
Sl. No.	Village	Institution who prepared Micro-Plan JFMC/Others	Details of participation of all stakeholders/departments	Approval of Gram Sabha	Details of facilitators engaged
1	Vankal	Champhai FDA & Microplan Working Group as in Para. 3.1	Representatives of Govt departments, Conservation oriented NGOs, VFDCs, VCs, and local public.	Approved by Village Council, Vankal. Approval letter enclosed at Annexure -C.	1) Pu CC Lalchuangkima, Project Director, District Rural Development Agency, Champhai District. Phone/Fax: 03831-234940/03831-234104 E-mail: chhuangkima@yahoo.co.in 2) Pu Lalthanzuala, District Agriculture Officer, Champhai District

**3.7 Details of involvement of district level committee in preparation of perspective plan especially of convergence mechanism**

-

**3.8 Details of the meetings/consultations with other departments in finalizing the convergence issues and perspective plan**

-

**Chapter - 4**  
**Activities proposed to be undertaken in the Sub-landscape (L3)**

**4.1 Current Land Use pattern**

Current land use pattern has been mapped with interpretation of satellite imageries and field verification of interpreted data. The details are as under:-

*Vankal village:*

Table 22A				
Sl. No.	Land Use category	Area (Sq. kms.)	% of total area	Remarks
1	Settlement	0.07	0.07 %	
2	Tuisenhnar Reserved Forest	7.80	8.05 %	
3	Abandoned Jhum Area	32.54	33.59 %	
4	Current Jhum Land	4.94	5.09	
5	Horticulture	5.41	5.58 %	
6	Forest Plantation	1.78	1.83 %	
7	WRC	2.56	2.64 %	
8	Private land	26.45	27.30 %	
9	a) Private land(Open forest)	15.81	16.32 %	
10	b) Private land(Moderately Dense forest)	9.81	10.12 %	
11	VC Land	22.98	23.72 %	
12	a) VC Land (Open Forest)	5.24	5.40 %	
13	b) VC Land (Moderately Dense Forest)	5.26	5.42 %	
14	c) VC Land (Very Dense Forest)	11.06	11.41 %	
15	Non-Forest	6.29	6.49 %	
<b>TOTAL</b>		<b>96.87</b>		

*Source: GIS cell, E&F Dept., Mizoram*

**4.2 Proposed Land Use Pattern**

After careful scrutiny of current land use pattern, needs assessment and consultation with stakeholders, the following land use model is designed/proposed:

*Vankal village:*

Table 22 B				
Sl. No.	Proposed land-use	Area (sq. km.)	% of total area	Remarks
1	Agriculture	4.94	5.09 %	
2	Horticulture	5.41	5.58 %	
3	WRC	5.56	5.74 %	
4	Shifting Cultivation Rehabilitation	11.98	12.37 %	
5	Agro Forestry	18.50	19.09 %	
6	Department Plantation	1.78	1.84 %	
7	Social Forestry	6.17	6.37 %	
8	Community Reserved	9.97	10.29 %	
9	RF (Dense Forest)	10.33	10.66 %	
9	VC Area(Dense Forest)	37.39	38.59 %	
10	Settlement Area	0.07	0.07 %	
<b>TOTAL</b>		<b>96.87</b>		

### 4.3 Objectives

#### Short term objectives

- Identification and arrest of drivers responsible for eco-system degradation
- Water-shed management - ridge to valley approach
- Increase in fuel-wood and fodder availability
- Employment generation
- Awareness for sustainable management of natural resources

#### Long term objectives

- Sustainable livelihood support to the people
- Ecological stability in the region

### 4.4 Details of submissions proposed for treatment (Action plan):

Sl. No.	Village	Sub-mission	Categories	Proposed area	Proposed cost (Rs. in lakh)	Livelihood activities proposed based on Micro-Plan
1	Vankal	<b>Sub-Mission 1:</b> Enhancing quality of forest cover and improving ecosystem services (4.9 m ha.)	a) Moderately dense forest but showing degradation	100 Ha.	40.50	(1) Support to Cottage industries @Rs. 10 lakh/unit (4 units)  (2) Support to SGHs @Rs. 6 lakh/unit (6 SGHs)  (3) Construction of Modern Toilet @ Rs. 40,000/unit to BPL families (44 families)  (4) Provision of HH water storage tank @ Rs. 27383.54/HH (65 HH)
			b) Eco-restoration of degraded open forest (Type A)	120 Ha.	51.84	
			b) Eco-restoration of degraded open forest (Type B)	50 Ha.	40.50	
			b) Eco-restoration of degraded open forest (Type C)	145 Ha.	195.75	
		<b>Sub-Mission 2:</b> Ecosystem restoration and increase in forest cover (1.8 mha)	a) Rehabilitation of shifting cultivation areas	230 Ha.	186.30	
		<b>Sub-Mission 4:</b> Agro-Forestry and social forestry (increasing biomass & carbon sink) : 3 mha	a) Farmer's land including current fallows	155 Ha.	83.70	
			c) Highways/ Rural Roads/ Canal/ Tank Bunds	30 Ha.	56.70	
<b>TOTAL</b>				<b>830 Ha.</b>	<b>655.29</b>	



#### 4.5 Treatment area under the landscape unit:

Table 24						
Sl. No.	Sub-mission	Category	Proposed area	Proposed cost (Rs. in lakh)	Livelihood activities	Proposed cost (Rs. in lakh)
1	Sub-Mission 1: Enhancing quality of forest cover and improving ecosystem services (4.9 m ha.)	a) Moderately dense forest but showing degradation	100 Ha.	40.50 @Rs. 40,500/Ha.	Financial support to forest based cottage Industries and Handloom & Handicraft industries	4 nos. @Rs. 10.00 lakh /unit
		b) Eco-restoration of degraded open forest (Type A)	120 Ha.	51.84 @Rs. 43,200/Ha.		
		b) Eco-restoration of degraded open forest (Type B)	50 Ha.	40.50 @Rs. 81,000/Ha.		
		b) Eco-restoration of degraded open forest (Type C)	145 Ha.	195.75 @Rs. 1,35,000/Ha.		
<b>Sub Total</b>			<b>415 Ha.</b>	<b>328.59</b>	<b>4 units</b>	<b>40.00</b>
2	Sub-Mission 2: Ecosystem restoration and increase in forest cover (1.8 mha)	a) Rehabilitation of shifting cultivation areas	230 Ha.	186.30 @Rs. 81,000/Ha.	Support to SGH	6 SGH @ Rs. 6 lakh/SGH
<b>Sub Total</b>			<b>230 Ha.</b>	<b>186.30</b>	<b>36 HH</b>	<b>36.00</b>
3	Sub-Mission 4: Agro-Forestry and social forestry (increasing biomass & carbon sink) : 3 mha	a) Farmer's land including current fallows	155 Ha.	83.70 @Rs. 54,000/Ha.	Construction of modern toilet to BPL families	44 families @Rs. 40,000 per family
		c) Highways/ Rural Roads/ Canal/ Tank Bunds	30 Ha.	56.70 @Rs. 1,89,000/Ha.	Provision of Household (HH) water storage tank	65 HH @Rs. 27383.54/HH
<b>Sub Total</b>			<b>185 Ha.</b>	<b>140.40</b>	<b>109 HH</b>	<b>35.3993</b>
4	Promoting alternative fuel energy	Biogas, solar devices, LPG, Biomass-based systems, improved stoves	74 families	2.442 @Rs. 3,300/unit		
<b>Sub Total</b>			<b>74 fam.</b>	<b>2.442</b>		
<b>TOTAL</b>				<b>657.732</b>	<b>149 HH</b>	<b>111.3993</b>

**4.6 Whether Map showing details of the area proposed village-wise and submission-wise enclosed**

- Attached at Annexure -

**4.7 Whether the geo-references of the treatment locations enclosed in the prescribed format**

- N/A

**4.8 Details of support activities proposed in the landscape including proposed cost and village-wise details wherever applicable**

(1) Technical and financial support to 4 units of forest based cottage industries. The proposed cost for this activity will be Rs. 40.00 lakh.

(2) Financial support to 6 units of SHGs for revolving fund which may be utilized as a loan by the members and the interest may be distributed in equal amount among the members from time to time. The proposed cost for this activity will be Rs. 36.00 lakh.

(3) Construction of modern toilet (septic tank) to 44 BPL families to improve their livelihood by having a hygienic toilet. The proposed cost for this activity will be Rs 17.60 lakh.

(4) Construction of household water storage tank for 65 families @ Rs. 27383.54/HH to solve scarcity of water and time consume to carry water from far distance so that working periods will increase. The proposed cost for this activity will be Rs. 17.7993 lakh.

**4.9 Details of each cross-cutting intervention proposed under the mission with area details, geo-references, activities etc.:-**

Table 25					
Sl. No.	Cross cutting interventions proposed	Activities	Unit	Total Cost (in lakh)	Geo-references
1	Promoting alternative fuel energy	Biogas, solar devices, LPG, Biomass-based systems, improved stoves	74 families	2.442	
<b>Sub-Total</b>			<b>74 fam.</b>	<b>2.442</b>	
2	Community livelihood enhancement	1) Financial support to micro cottage industries	4 units	40.00	
		2) Support to SHGs	6 units	36.00	
		3) Construction of Modern Toilet to BPL families	44 families	17.60	
		4) Provision of household water tank	65 families	17.7993	
<b>Sub-Total</b>				<b>111.3993</b>	
<b>TOTAL</b>				<b>113.8413</b>	

**4.10 Promotion of alternative fuel energy:.**

Table 26					
Sl. No.	Village	Schemes proposed (Biogas, Solar devices, LPG, improved stores, biomass based systems etc.	No. of beneficiaries in each scheme proposed		Total cost under each scheme (Rs. in lakh)
			No. of family	No. of beneficiary	
1	Vankal	Promoting alternative fuel energy	74 families	74 nos.	2.442 @ Rs. 3,300/unit
		<b>Total</b>	<b>74 families</b>	<b>74 nos.</b>	<b>2.442</b>

**Chapter - 5**  
**Activities Proposed Under Convergence**

**5.1 Activities Proposed Under Convergence:**

Table 27						
Village/L3 Landscape	Scheme	Implementing Agencies	Area (NRD Activities)		Other Activities	
			Works	Proposed Funding	Activity proposed	Propose funding
Vankal	IWMP	Ministry of Rural Development	Terracing	GIM and MoA		
	MGNREGS	RD Department	Terracing	GIM and MoA		

**Chapter - 6**  
**Institutional Set-up for implementation in the landscape**

**6.1 GIM Committee:**

Various committees have been constituted by the State government vide Notification No. B. 11016/16/2011-FST dated 11<sup>th</sup> November, 2014 for effective implementation of GIM in the State of Mizoram. A copy of notification is attached at Annexure – D.

*The names of these committees are as under:-*

- 1) State Forest Development Agency for “Green India Mission”/State Mission Directorate
- 2) State Level Steering Committee for Green India Mission
- 3) GIM Cell under Environment & Forest Department/Nodal Agency
- 4) Revamped FDA for Green India Mission
- 5) District Level Steering Committee
- 6) Village Level GIM Committee

**6.2 Institutional Set-up for implementation in the landscape:**

Table 28					
Village	Institutions proposed for implementation	Submission of area			Details of other activities
		Submission	Category	Area	
Vankal	Revamped VFDC	<b>Sub-Mission 1:</b> Enhancing quality of forest cover and improving ecosystem services	a) Moderately dense forest but showing degradation	100 Ha.	Provision of support to small scale cottage industries
			b) Eco-restoration of degraded open forest (Type A)	120 Ha.	
			b) Eco-restoration of degraded open forest (Type B)	50 Ha.	
			b) Eco-restoration of degraded open forest (Type C)	145 Ha.	
		<b>Sub-Mission 2:</b> Ecosystem restoration and increase in forest cover (1.8 mha)	a) Rehabilitation of shifting cultivation areas	230 Ha.	
		<b>Sub-Mission 4:</b> Agro-Forestry and social forestry (increasing biomass & carbon sink) : 3 mha	a) Farmer’s land including current fallows	155 Ha.	
			b) Highways/ Rural Roads/ Canal/ Tank Bunds	30 Ha.	
<b>Total</b>			<b>830 Ha.</b>		

**Chapter - 7**  
**Livelihood Issues**

**7.1 Brief note on the forest dependency and livelihood issues village-wise**

**7.1.1 Availability and Requirement of Fuel wood.**

Most of the households use fuel-wood as supply of LPG cylinders is much limited in the rural areas. The requirement and availability of fuel-wood is indicated below:-

Table 29						
Sl. No.	Village	No. of households	Average fuel wood requirement per household (cum.)	Annual Fuel wood requirement (cum.)	Fuel wood availability (Annual Yield) (cum.)	Remarks
1	Vankal	77	2.5	192.5	2533.95	

**7.1.2 Availability and Requirement of Fodder**

No one practice cattle rearing for livelihood support. Therefore, there is no demand for fodder.

**7.1.3 Availability and requirement of Timber**

Demand for timber used in house construction and furniture has been worked out and is indicated below:-

Table 30						
Sl. No.	Village	No. of households	Average timber requirement per household (cum.)	Annual timber requirement (cum.)	Timber availability (cum.)	Remarks
1	Vankal	77	0.15	11.55	5892.34	Source: PRA Exercise

**7.1.4 Availability and Requirement of NTFP(s).**

Bamboo, cane, thatch, honey etc. are some of the important NTFP (s) which are extracted by the villagers from the forests. The demand as well as the availability for various NTFPS has been indicated below:-

**Vankal Village:**

Table 31							
Bamboo (nos.)		Fuelwood(cum)		Broom(Qtls)		Thatching grass (Bundles)	
<i>Demand</i>	<i>Supply availability</i>	<i>Demand</i>	<i>Supply Availability</i>	<i>Demand</i>	<i>Supply availability</i>	<i>Demand</i>	<i>Supply Availability</i>
3059.60	159271	161.7	2533.95	0.27	453.79	168.27	21177.07

**7.2 Details of activities to be carried out to address livelihood issues through Green India Mission including details of activities, beneficiaries, cost, village-wise plan etc.**

Table 32						
Village	Proposed livelihood activities	Role of facilitators, if any engaged	Beneficiaries		Proposed cost (Rs. in lakh)	Remarks
			Family	No.		
Vankal	(1) Technical & Financial support to cottage industries	Provision of technical knowledge to improve quality and quantity of production as well as assistance in marketing	4	4	40.00 @10 lakh per unit	Producing different handicraft-items like basket, pot, traditional local carriers, Flower vase, Mat, etc. made from bamboo & cane
	(2) Support to SHGs	Provision of knowledge to form a healthy SHGs for livelihood improvement activities	36	6	36.00 @6 lakh per SHGs	The revolving fund may be utilized as a loan by the members and the interest may be distributed in equal amount among the members from time to time
	(3) Construction of Modern toilet (septic tank) to BPL families	Provision of technical knowledge for construction of septic tank	44	44	17.60 @Rs.40,000 per HH	BPL families may improve their livelihood by having a hygienic toilet
	(4) Provision of Household water storage tank		65	65	17.7993 @Rs. 27383.54/ HH	Scarcity of water and time consume to carry out water from far distance will be solved, and working period will increase.
<b>TOTAL</b>			<b>149</b>	<b>119</b>	<b>111.3993</b>	

**7.3 Convergence of schemes of other departments/missions viz. NRLM to enhance the livelihood especially with the aim of addressing the drivers of degradation and the activities proposed along-with the beneficiaries, cost, and village-wise plan**

Table 33

Village	Scheme	Implementing Agency/ department	Proposed livelihood activities	Beneficiaries		Proposed cost (Rs. in lakh)	Remarks
				Family	No.		
Vankal	NRLM	DRDA, Champhai District	Poultry/ Muga Silkworm/ Piggery	36	6	36.00	SHG shall be formed and financial support to be given in the form of revolving fund @Rs. 6 lakh/SHG. The cost shall be borne from livelihood improvement activities as in Table 22



## Chapter - 8 Baseline Survey

### 8.1 Baseline survey

The baseline data for various parameters required for maintaining the outcomes of activities undertaken under GIM are given below:-

#### Vankal village:

Parameters	Indicator	Baseline Status
1. Forest/tree cover on forest/ non-forest lands in the Mission Target Area (MTA)	a) % of area with forest cover	95.57% (Total forest cover 92.58 sq. km. out of 96.87 sq. km.)
	b) % area in various forest density classes	1) Very Dense = 0.0% 2) Moderately Dense = 32.77% (31.74 sq. kms.) 3) Open Forest = 47.67% (46.18 sq. km.) <i>Source: GIS cell E&amp;F Dept .Govt. of Mizoram</i>
2. Ecosystem services from targeted areas / landscapes	a) Shannon-Weiner Index	3.790368156
	b) Biomass	Above Ground Biomass = 485439.61938 tonnes <i>Source: Field Survey data</i>
3. Soil	a) Depth of top soil	The depth of top soil is very deep in valley flatlands whereas in the hills it is deep to very deep.
	b) Soil quality	Three soil orders such as ultisols, inceptisols and entisols are found in the project area. The surface soil textures are loam to clay loam with clay content increasing with depth in the hills whereas in the valleys it is mostly sandy loam to sandy clay loams. The soils are acidic in nature with pH values ranging from 4.5 to 6.3. The soils in the hills are strongly acidic in reaction, whereas, the soils in alluvial deposits are less acidic in nature. The percentage of organic carbon content is medium (0.70%). The available nitrogen is medium (0.6 kg/ha) while available phosphorus is found low (12 kg/ha). The available potash is found to be high (285 kg/ha).
4. Hydrology	a) Wetland area b) Stream beds/water discharge c) Ground water, Table- water level in wells/ springs	a) No wetlands in the Area b) No data on stream water discharge c) The area is hilly with variable elevation. Therefore, the ground water level varies. In the village settlement area, the depth of water in well is about 40 ft.
5. Annual sequestration of CO <sub>2</sub>	Carbon sequestered in the target area.	Baseline Carbon Stock = 835844.82816 tonnes

6. Forest/non-forest based livelihoods income	No. of targeted households (HH) reporting at least 25% increase in real income	<b>Income(Rs. Annual)</b>	<b>No. of Households</b>
		More than 5Lakh	2
		5 lakh> -- <50,000	31
		Less than 50,000	44
		<b>TOTAL</b>	<b>77</b>
7. Quality of forest cover & ecosystem services of forest / non-forests	a) % of forest area naturally regenerating.	65%	<i>Source:GIS Cell, E&amp;F Dept, Mizoram</i>
a) Moderately dense forests	b) Biomass	166427.45214 tonnes (AGB)	
b) Open forests		242143.02898 tonnes (AGB)	
c) Degraded grasslands		No Degraded Grasslands	
d) Wetlands		No wetland area	
8. Ecosystems are restored and forest cover is increased in Scrub, shifting cultivation areas etc.	a) % of area that is adequately stocked /productivity		
9. Forest and Tree cover in urban/ peri-urban land	a) % of forest and tree cover in the targeted urban/peri-urban areas	No urban area is there in the Mission Target Area	
10. Forest and tree cover on marginal agricultural lands / fallows and other non- forest land under agro forestry/ social forestry	a) % of tree cover on non-forest land.	74.50 % (15.81 sq. kms. out of 21.22 sq. kms.)	<i>Source: GIS Cell, E&amp;F Dept Mizoram</i>
11. Public forest/ non-forests areas (taken up under the Mission) are managed by the community institutions.	a) % of area under management of community institutions	5.40 % (5.24 Sq Km out of 96.87 Sq Km)	Legally under the Village Council <i>Source: GIS Cell E&amp;F Dept, Mizoram</i>
12. Improved fuel wood-use efficiency and alternative energy devices adopted by households in the MTA.	a) % of HH reporting use of alternative energy devices.	Total Households = 77 LPG users = 2 LPG & Fuel-wood users = 31 Fuel-wood only users = 44 Solar Devices users = Nil	
13. Forest/non-forest based livelihoods of the people living in and around the forests is diversified.	a) % of HH reporting diversification of income sources.	<b>Source of income</b>	<b>No. of Households</b>
		Govt Service	5
		Jhumming	30
		Horticulture including WRC	25
		Business/Petty Trade	1
		Daily Labourers	8
		Others	8
		<b>TOTAL</b>	<b>77</b>

## **Chapter - 9**

### **Status of reforms proposed**

#### **9.1 Role of Gram Sabha (Village Council) in project planning, implementation and monitoring.**

Village level GIM committee has been constituted by the State Government vide notification No. B.11016/16/2011-FST dated 11<sup>th</sup> Nov, 2014 for the following activities:-

1. To render support in the preparation of Perspective Plan.
2. To ensure implementation of planned and approved schemes (approved by the State Level Steering Committee and MoEFCC) with expected level of quality.
3. To promote active people's participation in the implementation of "Green India Mission" and
4. To provide feedbacks timely to concerned authorities for further improvement in programme implementation.

Further, VFDC would play key role in project planning, monitoring and implementation under GIM. Both the VFDC and the village level GIM Committee would work closely in co-ordination with Gram Sabha (Village Council).

#### **9.2 Revamping of FDAs and SFDA's**

SFDA's and FDA's (General Body as well as Executive Committee have been revamped for formulating suitable plans and executing well-planned projects with people's participation under GIM in Mizoram. The SFDA (General body) will provide overall guidance for effective implementation of 'Green India Mission' in the State. It will also oversee implementation of the broad policy framework in achieving Mission goals and objectives. The Executive Committee of revamped SFDA has been entrusted with the following functions:-

1. Approval of Perspective Plan as well as Annual Plan of Operations;
2. Preparation of annual reports on GIM implementation in the State;
3. Programmatic convergence at the landscape level.

The revamped FDA (General body) will deal with policy issues pertaining to cohesion and convergence of different programmes at the Panchayat/Village Council level for better outcomes from the mission. The Executive Committee of revamped FDA will arrange for preparation of perspective plan/annual plan and convergence of various programmes.

#### **9.3 FRAs compliance in areas covered under L2 and L3s.**

Claims for rights in the forests would be settled strictly as per the relevant acts applicable in the State of Mizoram.

#### **9.4 Easing out regulatory framework in felling and transportation of forest produce.**

There is a need to simplify the procedure for issuing documents enabling felling and transportation of forest produce. The MoEFCC has recently taken initiative for simplifying rules and procedures for issue of permits and transit passes in respect of trees grown on non-forest private lands. The State of Mizoram would work in this direction in a proper way to motivate tree planters on non-forest private lands and also to protect the valuable forest wealth existing in the State.

#### **9.5 Strengthening frontline formation of E&F department.**

Necessary actions would be taken for 'Capacity Building' of frontline forest staff engaged in implementation of GIM in the State. Suitable training as well as required facilities would be provided to them for executing the planned works efficiently. It is expected that well-trained forest staff with people's participation would be able to deliver the desired outputs/outcomes under GIM.

## Chapter – 10 Mission Cost

### 10.1 Cost of the Mission

Year-wise cost of the mission for various work items has been given in the table place in Annexure – A.

### 10.2 Mission sustainability

The mission will be executed with active participation of the local people. On completion of the project, crop productivity of the existing forest will increase substantially. Sustainable extraction of forest produce, value addition to forest produce as well as marketing of value added products will provide livelihood support to the people while maintaining ecological stability in the region. Thus the mission is economically viable and socially adoptable.

#### Abstract

Table 35	
<b>1. Name of L1 landscape</b>	The State of Mizoram
<b>2. Name of L2 landscape</b>	Khawzawl Range
<b>3. Forest and non-forest area in L2</b>	203.84 Sq. Km & 17.82 Sq. Km
<b>4. Drivers of degradation in the landscape</b>	Traditional practice of shifting cultivation, Lack of strategic and participatory land-use planning, excessive population pressure on the forests for fuel-wood, fodder, timber etc., inadequate scientific management of watersheds including rainwater harvesting.
<b>5. Results of problem analysis</b>	
<b>6. Existing scheme implemented in the landscape</b>	NAP,NBM,CAMPA, MNREGS, IWMP, IAY
<b>7. Implementing agencies under GIM</b>	<i>Revamped FDA, Champhai</i>
<b>8. GIM activities</b>	<b>Proposed funding (Rs in lakh)</b>
<i>(a) Submission/Category</i>	
<b>Sub-Mission 1:</b>	
a) Moderately dense forest but showing degradation	40.50
b) Eco-restoration of degraded open forest (Type A)	51.84
b) Eco-restoration of degraded open forest (Type B)	40.50
b) Eco-restoration of degraded open forest (Type C)	195.75
<b>Sub-Mission 2:</b>	186.30
a) Rehabilitation of shifting cultivation areas	
<b>Sub-Mission 4:</b>	
a) Farmer's land including current fallows	83.70
c) Highways/Rural Roads/Canal/Tank bunds	56.70
<b>Sub-Total</b>	<b>655.29</b>

Promoting alternative fuel energy	2.442
<b>Sub-Total</b>	<b>2.442</b>
<b>(b) Livelihood improvement activities</b>	
1. Support to cottage industries	40.00
2. Support to Self Help Groups (SHGs)	36.00
3. Construction of modern toilet(septic tank) to BPL	17.60
4. Provision of Household water storage tank	17.7993
<b>Sub-Total</b>	<b>111.3993</b>
<b>(c) Other support activities</b>	
1. Research	13.1058
2. Publicity/Media/Outreach activities	6.5529
3. Monitoring and Evaluation	6.5529
4. Strengthening local-level institutions	32.7645
5. Strengthen FDs	32.7645
6. Mission Organisation, operation and maintenance, contingencies and overheads	26.2116
<b>Sub-Total</b>	<b>117.9522</b>
<b>TOTAL</b>	<b>887.0835</b>

- **Details of Work Proposal given in Annexure - A**

**GREEN INDIA MISSION, CHAMPHAI FOREST DIVISION  
WORK PROGRAMME FROM 2017-2018 TO 2022-2023  
VANKAL (L3) LANDSCAPE : KHAWZAWL RANGE**

**ANNEXURE - A**

<b>A. WORK DETAILS</b>																					
Sub-Mission/ Intervention	Category	Type	Rate per Ha. (in Rs.)	2016-2017		2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		Total Financial Outlay (in lakh rupees)			
				Physical Target (in Ha.)	Financial Outlay (in lakh)	Physical Target (in Ha.)	Financial Outlay (in lakh)	Physical Target (in Ha.)	Financial Outlay (in lakh)	Physical Target (in Ha.)	Financial Outlay (in lakh)	Physical Target (in Ha.)	Financial Outlay (in lakh)	Physical Target (in Ha.)	Financial Outlay (in lakh)	Physical Target (in Ha.)	Financial Outlay (in lakh)				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19			
<b>Sub-Mission - 1:</b> Enhancing quality of forest cover and improving ecosystem services (4.9 m ha)	a) Moderately dense forest but showing degradation	<b>ANR (without Plantation)</b>																			
		1) Advance Work	9450		56.25	5.315625													5.315625		
		2) Creation	15660		43.75	6.85125	56.25	8.80875												15.66	
		3) Maintenance (1st year)	9720				43.75	4.2525	56.25	5.4675										9.72	
		4) Maintenance (2nd year)	3510						43.75	1.535625	56.25	1.974375								3.51	
		5) Maintenance (3rd year)	2160								43.75	0.945	56.25	1.215						2.16	
		6) Advance Work (Fund Received)	5400	43.75	2.3625															2.3625	
		7) Advance Work (Bal. of 2016-2017)	4050			43.75	1.771875														1.771875
		<b>Sub-Total</b>	<b>49950</b>		<b>2.3625</b>	<b>13.93875</b>	<b>13.06125</b>	<b>7.003125</b>	<b>2.919375</b>	<b>1.215</b>									<b>40.5</b>		
	b) Eco-restoration of degraded open forests	<b>200 plants/Ha. (Type A)</b>																			
		1) Advance Work	8100		69.6	5.6376														5.6376	
		2) Creation	15390		50.4	7.75656	69.6	10.71144												18.468	
		3) Maintenance (1st year)	8100				50.4	4.0824	69.6	5.6376										9.72	
		4) Maintenance (2nd year)	6480						50.4	3.26592	69.6	4.51008								7.776	
		5) Maintenance (3rd year)	5130								50.4	2.58552	69.6	3.57048						6.156	
		6) Advance Work (Fund Received)	6750	50.4	3.402															3.402	
		7) Advance Work (Bal. of 2016-2017)	1350			50.4	0.6804														0.6804
			<b>Sub-Total</b>	<b>51300</b>		<b>3.402</b>	<b>14.07456</b>	<b>14.79384</b>	<b>8.90352</b>	<b>7.0956</b>	<b>3.57048</b>									<b>51.84</b>	
			<b>1100 plants/Ha. (Type B)</b>																		
		1) Advance Work	18360		25	4.59															4.59
		2) Creation	36450		25	9.1125	25	9.1125													18.225
		3) Maintenance (1st year)	11340				25	2.835	25	2.835											5.67
		4) Maintenance (2nd year)	8100						25	2.025	25	2.025								4.05	
		5) Maintenance (3rd year)	6750								25	1.6875	25	1.6875						3.375	
		6) Advance Work (Fund Received)	11070	25	2.7675																2.7675
		7) Advance Work (Bal. of 2016-2017)	7290			25	1.8225														1.8225
		<b>Sub-Total</b>	<b>99360</b>		<b>2.7675</b>	<b>15.525</b>	<b>11.9475</b>	<b>4.86</b>	<b>3.7125</b>	<b>1.6875</b>									<b>40.5</b>		

ANNEXURE - A

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19			
<b>Sub-Mission - 1:</b> Enhancing quality of forest cover and improving ecosystem services (4.9 m ha)	b) Eco-restoration of degraded open forests	<b>2500 plants/Ha. (Type C)</b>																			
		1) Advance Work	25650			45.5	11.67075	75	19.2375										30.90825		
		2) Creation	53460			24.5	13.0977	45.5	24.3243	75	40.095									77.517	
		3) Maintenance (1st year)	20250					24.5	4.96125	45.5	9.21375	75	15.1875							29.3625	
		4) Maintenance (2nd year)	18090							24.5	4.43205	45.5	8.23095	75	13.5675					26.2305	
		5) Maintenance (3rd year)	17550									24.5	4.29975	45.5	7.98525	75	13.1625			25.4475	
		6) Advance Work (Fund Received)	17010	24.5	4.16745															4.16745	
		7) Advance Work (Bal. of 2016-2017)	8640			24.5	2.1168														2.1168
	<b>Sub-Total</b>	<b>160650</b>			<b>4.16745</b>		<b>26.88525</b>		<b>48.52305</b>		<b>53.7408</b>		<b>27.7182</b>		<b>21.55275</b>		<b>13.1625</b>		<b>195.75</b>		
<b>Sub-Mission - 2:</b> Ecosystem restoration and increase in forest cover (1.8 mha)	a) Rehabilitation of Shifting Cultivation Areas	<b>1100 plants/Ha.</b>																			
		1) Advance Work	18360			68	12.4848	110	20.196											32.6808	
		2) Creation	36450			52	18.954	68	24.786	110	40.095									83.835	
		3) Maintenance (1st year)	11340					52	5.8968	68	7.7112	110	12.474							26.082	
		4) Maintenance (2nd year)	8100							52	4.212	68	5.508	110	8.91					18.63	
		5) Maintenance (3rd year)	6750									52	3.51	68	4.59	110	7.425			15.525	
		6) Advance Work (Fund Received)	11070	52	5.7564															5.7564	
		7) Advance Work (Bal. of 2016-2017)	7290			52	3.7908														3.7908
	<b>Sub-Total</b>	<b>99360</b>			<b>5.7564</b>		<b>35.2296</b>		<b>50.8788</b>		<b>52.0182</b>		<b>21.492</b>		<b>13.5</b>		<b>7.425</b>		<b>186.3</b>		
<b>Sub-Mission - 4:</b> Agro-Forestry and Social Forestry (increasing biomass & creating carbon sink) : 3 mha	a) Farmer's land including current fallows	1) Advance Work	13500			45.33	6.11955	75	10.125										16.24455		
		2) Creation	20250			34.67	7.020675	45.33	9.179325	75	15.1875									31.3875	
		3) Maintenance (1st year)	7020					34.67	2.433834	45.33	3.182166	75	5.265							10.881	
		4) Maintenance (2nd year)	6750							34.67	2.340225	45.33	3.059775	75	5.0625					10.4625	
		5) Maintenance (3rd year)	6480									34.67	2.246616	45.33	2.937384	75	4.86			10.044	
		6) Advance Work (Fund Received)	8370	34.67	2.901879															2.901879	
		7) Advance Work (Bal. of 2016-2017)	5130			34.67	1.778571														1.778571
			<b>Sub-Total</b>	<b>67500</b>			<b>2.901879</b>		<b>14.918796</b>		<b>21.738159</b>		<b>20.709891</b>		<b>10.571391</b>		<b>7.999884</b>		<b>4.86</b>		<b>83.7</b>
	c) Highways/Rural Roads/Canals/Tank Bunds	<b>Roads/Canals/Tank Bunds</b>																			
		1) Advance Work	29700			18.75	5.56875													5.56875	
		2) Creation	83700			11.25	9.41625	18.75	15.69375											25.11	
		3) Maintenance (1st year)	32400					11.25	3.645	18.75	6.075									9.72	
		4) Maintenance (2nd year)	21600							11.25	2.43	18.75	4.05							6.48	
		5) Maintenance (3rd year)	21600									11.25	2.43	18.75	4.05					6.48	
6) Advance Work (Fund Received)		25110	11.25	2.824875															2.824875		
7) Advance Work (Bal. of 2016-2017)	4590			11.25	0.516375														0.516375		
	<b>Sub-Total</b>	<b>218700</b>			<b>2.824875</b>		<b>15.501375</b>		<b>19.33875</b>		<b>8.505</b>		<b>6.48</b>		<b>4.05</b>				<b>56.7</b>		
<b>TOTAL</b>					<b>24.1826</b>		<b>136.07333</b>		<b>180.28135</b>		<b>155.74054</b>		<b>79.989066</b>		<b>53.575614</b>		<b>25.4475</b>		<b>655.29</b>		

B.																			
Sub-Mission/ Intervention	Category	Type	Rate per Ha. (in Rs.)	2016-2017		2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		Total Physical Target	Total Financial Outlay (in lakh rupees)
				Physical Target (in Ha.)	Financial Outlay (in lakh)	Physical Target (in Ha.)	Financial Outlay (in lakh)	Physical Target (in Ha.)	Financial Outlay (in lakh)	Physical Target (in Ha.)	Financial Outlay (in lakh)	Physical Target (in Ha.)	Financial Outlay (in lakh)	Physical Target (in Ha.)	Financial Outlay (in lakh)	Physical Target (in Ha.)	Financial Outlay (in lakh)		
<b>Sub-Mission 5:</b> Promoting alternative fuel energy	Biogas, solar devices, LPG, Biomass-based systems, improved stoves	Per House Hold	3300			60	1.98	14	0.462									74	2.442
		<b>TOTAL</b>	<b>3300</b>				<b>1.98</b>		<b>0.462</b>									<b>74</b>	<b>2.442</b>

C. SUPPORT ACTIVITIES			
Sl. No.	Support Activities	Cost	Amount (in lakh)
1	Research	2 % of A	13.1058
2	Publicity / Media / Outreach activities	1 % of A	6.5529
3	Monitoring & Evaluation	1 % of A	6.5529
4	Livelihood improvement activities	17 % of A	111.3993
5	Strengthening local – level institutions	5 % of A	32.7645
6	Strengthening FDs	5 % of A	32.7645
7	Mission Organization, operation and maintenance, contingencies & overhead	4 % of A	26.2116
<b>TOTAL</b>		<b>35 % of A</b>	<b>229.3515</b>

D. G. TOTAL (A+B+C) = 887.0835 lakh.

Rupess (Eight hundred and eighty seven lakh, eight thousand three hundred and fifty) only.



GREEN INDIA MISSION - CHAMPHAI FOREST DIVISION, MIZORAM  
ANNUAL PLAN OF OPERATION (APO)  
VANKAL (L3) LANDSCAPE (2017-18)

A.								
Sl. No.	Sub-Mission/ Interventions	Category		Items of work	Target (in Ha.)	2017-2018		
						Rate per unit (in Rs.)	Total cost per unit (in lakh)	
1	2	3		4	5	6	7	
1	Sub-Mission- 1: Enhancing quality of forest cover and improving ecosystem services (4.9 mha)	a) Moderately dense forest but showing degradation		Advance Work	56.25	9450	5.315625	
				Creation	43.75	15660	6.85125	
				Advance Work (Balance of 2016-2017)	43.75	4050	1.771875	
				Sub-Total	100		13.93875	
		b) Eco- restora- tion of degraded open forests		200 plants/Ha. (Type A)	Advance Work	69.6	8100	5.6376
					Creation	50.4	15390	7.75656
				1100 plants/Ha. (Type B)	Advance Work (Balance of 2016-2017)	50.4	1350	0.6804
					Sub-Total	120		14.07456
		1100 plants/Ha. (Type C)		1100 plants/Ha. (Type B)	Advance Work	25	18360	4.59
					Creation	25	36450	9.1125
				1100 plants/Ha. (Type C)	Advance Work (Balance of 2016-2017)	25	7290	1.8225
					Sub-Total	50		15.525
		1100 plants/Ha. (Type C)		1100 plants/Ha. (Type C)	Advance Work	45.5	25650	11.67075
					Creation	24.5	53460	13.0977
				1100 plants/Ha. (Type C)	Advance Work (Balance of 2016-2017)	24.5	8640	2.1168
					Sub-Total	70		26.88525
2	Sub-Mission 2: Ecosystem restoration and increase in forest cover (1.8 mha)	a) Rehabilitation of shifting cultivation areas		Advance Work	68	18360	12.4848	
				Creation	52	36450	18.954	
				Advance Work (Balance of 2016-2017)	52	7290	3.7908	
				Sub-Total	120		35.2296	
3	Sub-Mission 4: Agro-Forestry and social forestry (increasing biomass & creating carbon sink) : 3 mha	a) Farmer's Land including current fallows		Advance Work	45.33	13500	6.11955	
				Creation	34.67	20250	7.020675	
				Advance Work (Balance of 2016-2017)	34.67	5130	1.778571	
				Sub-Total	80		14.918796	
		c) Highways/Rural Roads/Canals/Tank Bunds		1100 plants/Ha. (Type C)	Advance Work	18.75	29700	5.56875
					Creation	11.25	83700	9.41625
				1100 plants/Ha. (Type C)	Advance Work (Balance of 2016-2017)	11.25	4590	0.516375
					Sub-Total	30		15.501375
TOTAL (A1)					570		136.073331	
Advance Work Funding already received							29.2096	
TOTAL (A2)							165.282931	

B.						
Sl. No.	Sub-Mission/ Interventions	Category	Items of Work	Target (in Nos.)	Rate per unit (in Rs.)	Total cost per unit (in lakh)
1	2	3	4	5	6	7
1	Promoting alternative fuel energy	Biogas, Solar device, LPG, Biomass based systems, improved stoves	Per Household	60	3300	1.98
TOTAL of B				60		1.98

C.			
Sl. No.	Support Activities	Cost	Amount (in lakh)
1	Research	2 % of A2	3.305659
2	Publicity / Media / Outreach activities	1 % of A2	1.652829
3	Monitoring & Evaluation	1 % of A2	1.652829
4	Livelihood improvement activities	17 % of A2	28.098098
5	Strengthening local – level institutions	5 % of A2	8.264147
6	Strengthening FDs	5 % of A2	8.264147
7	Mission Organization, operation and maintenance, contingencies & overhead	4 % of A2	6.611317
TOTAL of C		35 % of A2	57.849026

D. G. TOTAL (A1+B+C) = 195.90236

*Rupees (One hundred ninety five lakh, ninety thousand, two hundred and thirty six) only.*

ANNEXURE - C

APPROVAL LETTER

Green India Mission (GIM) awmzia, Kalphung leh thil tumte (Mission, aims and objectives), mipui charvo leh mawhphurna (stake holder's expectation) te, Forest Department Official ten Chiang taka min hrilhfiah hnuah, Keini Vankal khaw mipuite chuan he mission hna hi tha kan tiin kan pawm a. GIM hnuai kan khaw ramchhunga hna thawh tur ruahman (plan) te hi pawmpuiin kan remti tlang a, concern Department hrang hrang pawh he Mission hna a hlawhtlin ngei theih nan kan thawhpui ang.

Khawtiang aiawhin,

Name

RAMLUATHARA

Signature



Designation:

V.C.P. Vankal.

With Seal

President  
Village Council/Court  
Vankal

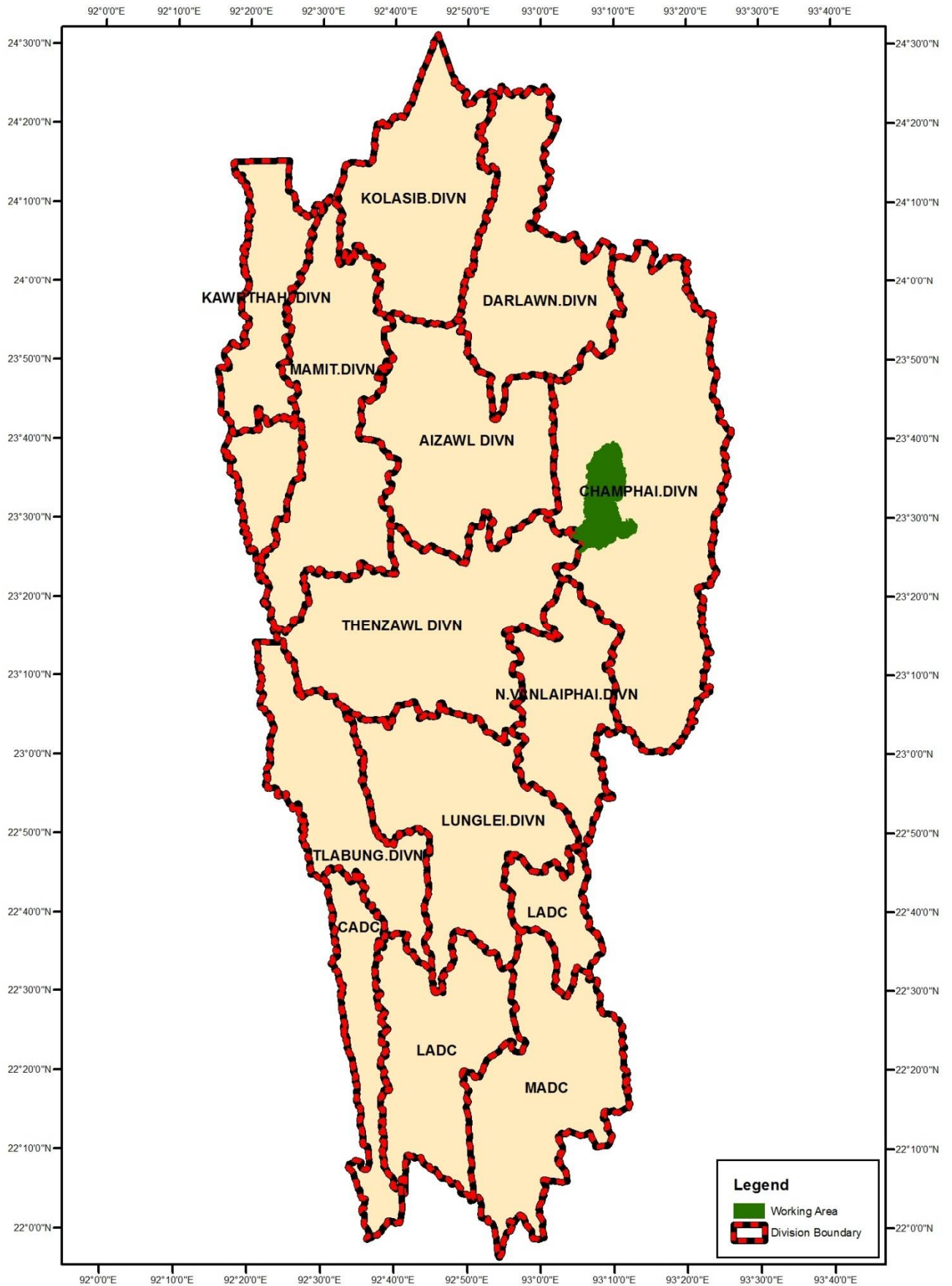
**Constitution of Village Level GIM Committee**

As per Govt. Notification No. B. 11016/16/2011-FST, Dated 11<sup>th</sup> November, 2014 a Village Level GIM Committee was set up with the following composition:

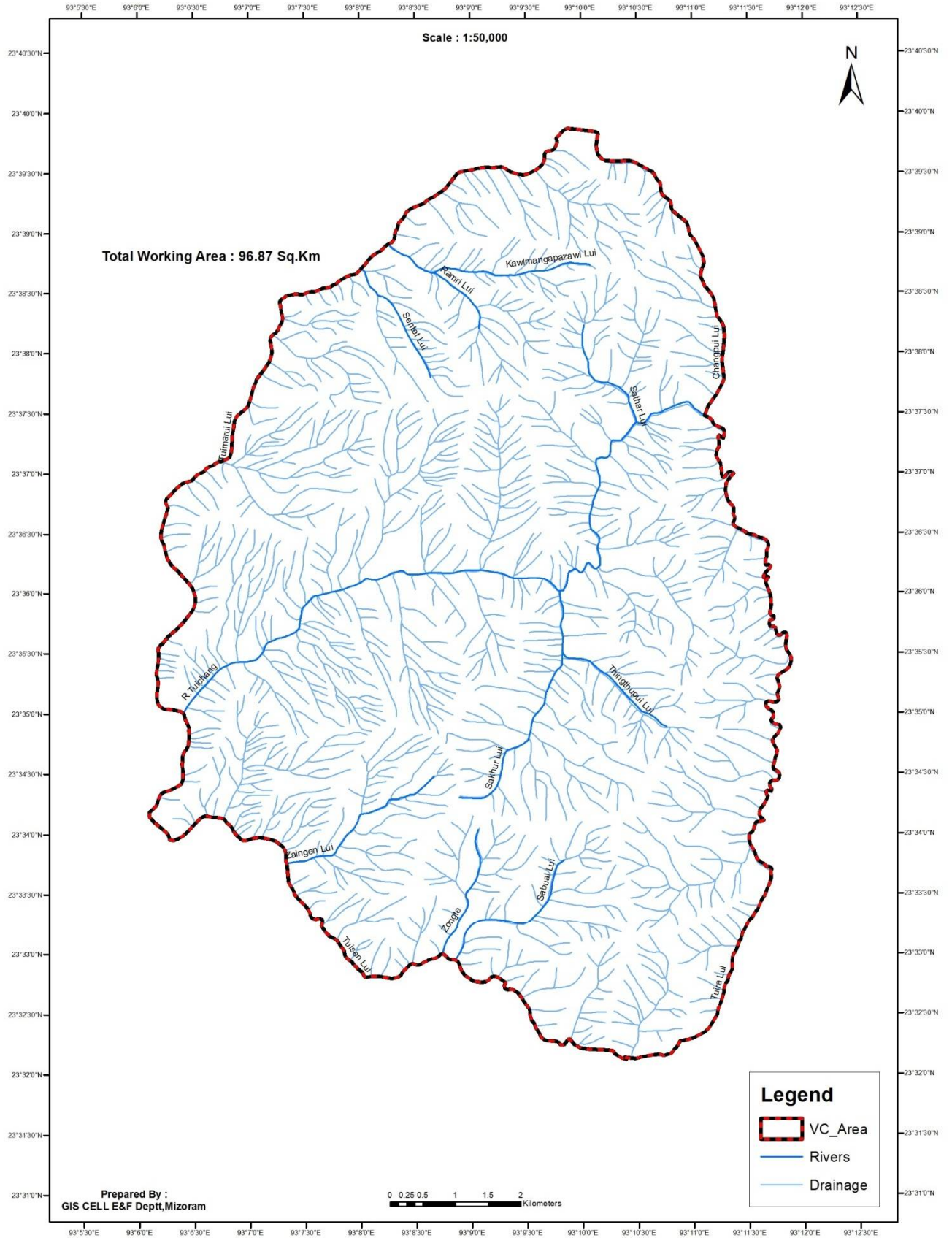
**Vankal Village:-**

- Chairman : K. Zairema, Forest Range Officer, Khawzawl Range  
Secretary : TC Lalrindika, Forester, Khawzawl Range  
Members : 1) Ramluahtara (VCP)  
2) Krosthanga (YMA representative)  
3) Rintluanga (VC Representative)  
3) Lalsiama (MUP representative)  
4) K. Luahthanga (Prominent citizen)  
5) Lalkiamlova (Prominent Welfare)  
6) K. Lalchhungliana (VFDC/JFMC representative)  
7) H. Lalremruata (AHEO, Horticulture Department)  
9) Vanlalchhuana (Range Officer, Soi Department)  
10) HT Zothanmawia ((Rearer, Sericulture Department)  
11) KC Rosangzuala (Vety Department)  
12) Laldiliana (VLAA, R.D. Department)  
13) C. Vanlalzapa (C.O, ICDS)

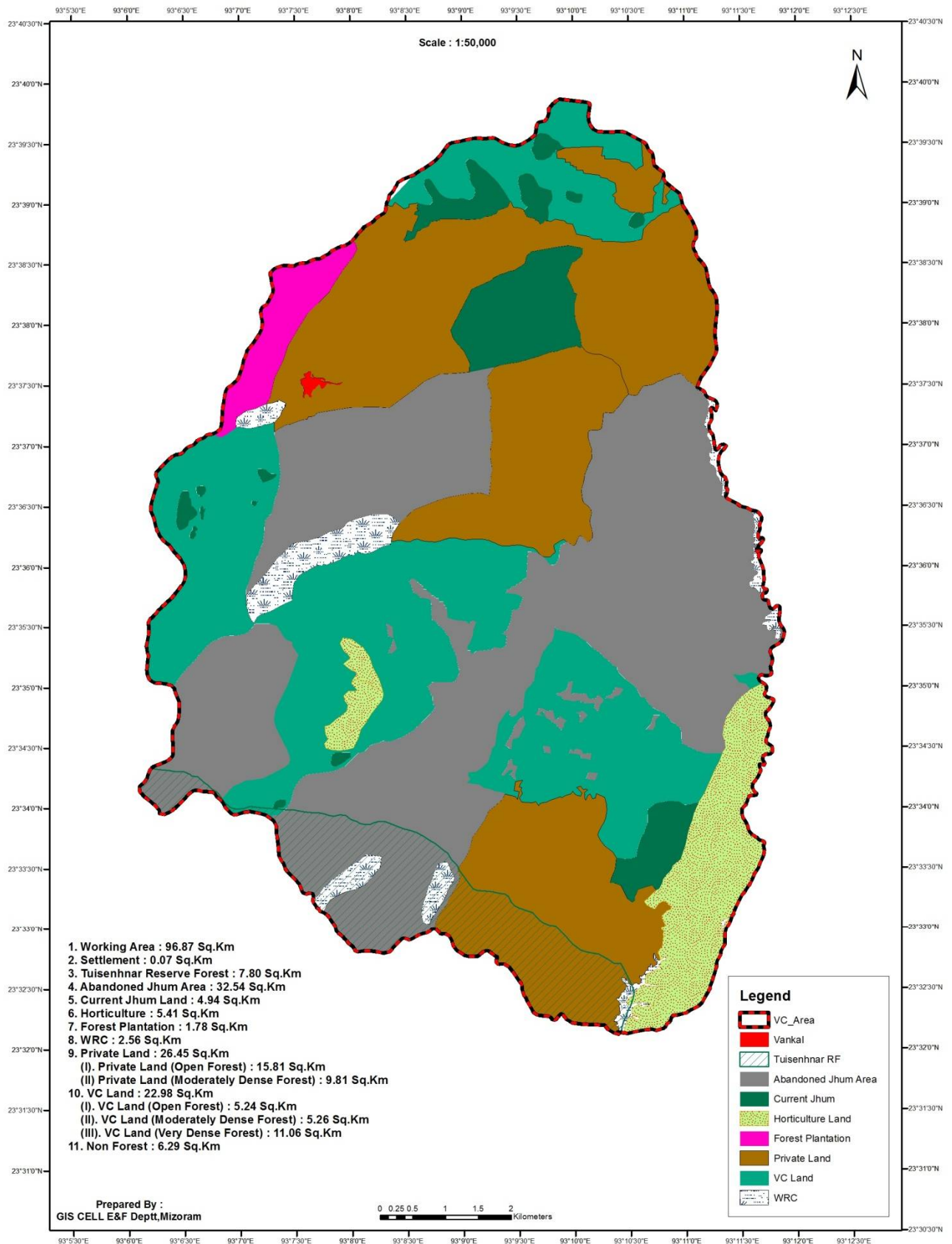
### MAP OF L1 LANDSCAPE MIZORAM



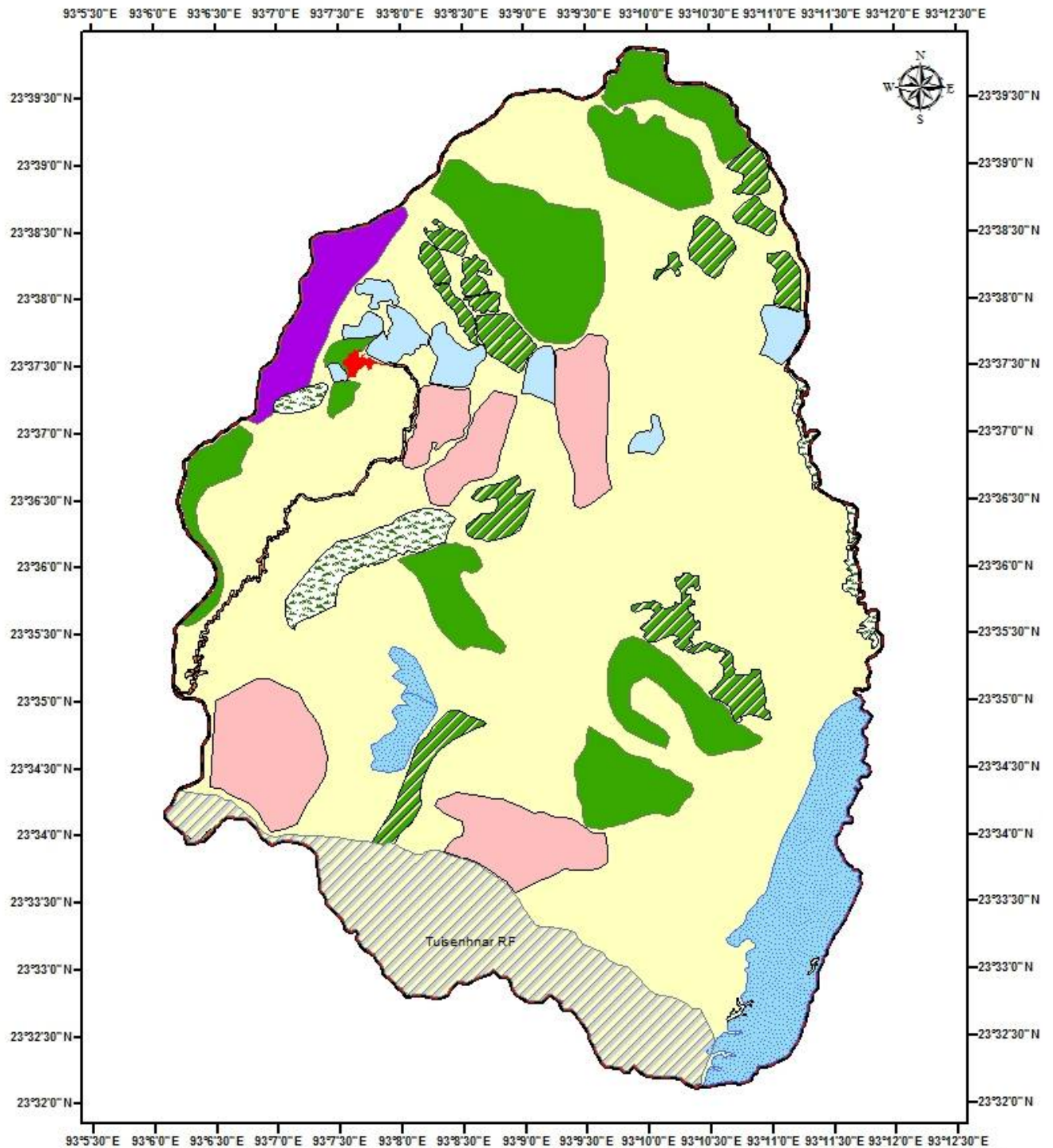
# DRAINAGE MAP OF L3 VANKAL VC AREA



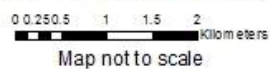
# LANDUSE MAP OF L3 VANKAL VC AREA



**PROPOSED LANDUSE MAP OF L3 LANDSCAPE VANKAL**



Working Area - 96.87 Sq.km  
 Rehabilitation of Shifting Cultivation - 4.29 Sq.km  
 Agro Forestry & Social Forestry:  
 1. Farmers Land - 1.89 Sq.km  
 2. Highway / Roadside Plantation - 0.30 Sq.km  
 Community Land :  
 1. Moderately Dense Forest cover showing degradation - 10.64 Sq.km  
 2. Eco-restoration of degraded open forest - 7.25 Sq.km  
 Community Land - 64.18 Sq.km  
 Settlement Area - 0.09 Sq.km

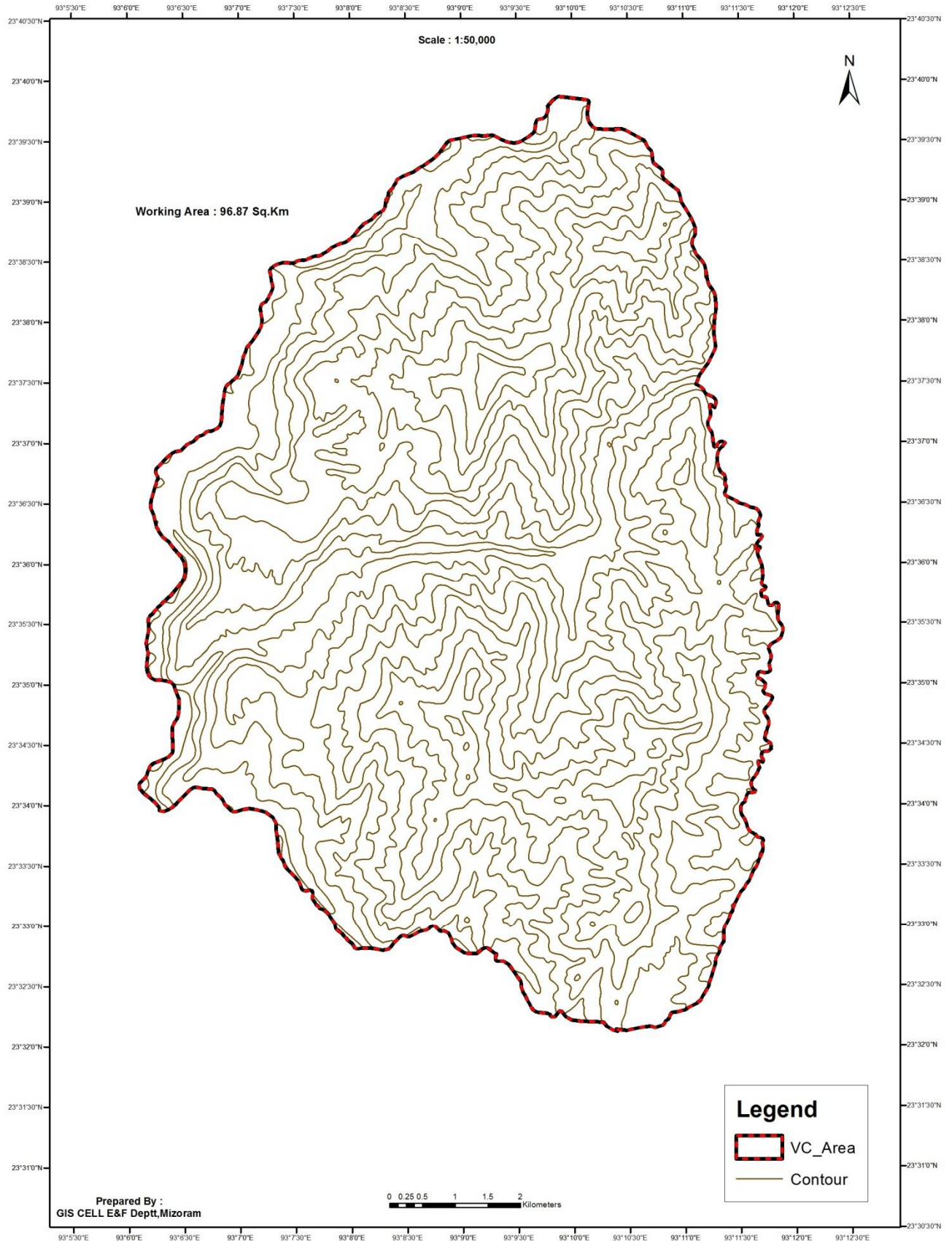


**Legend**

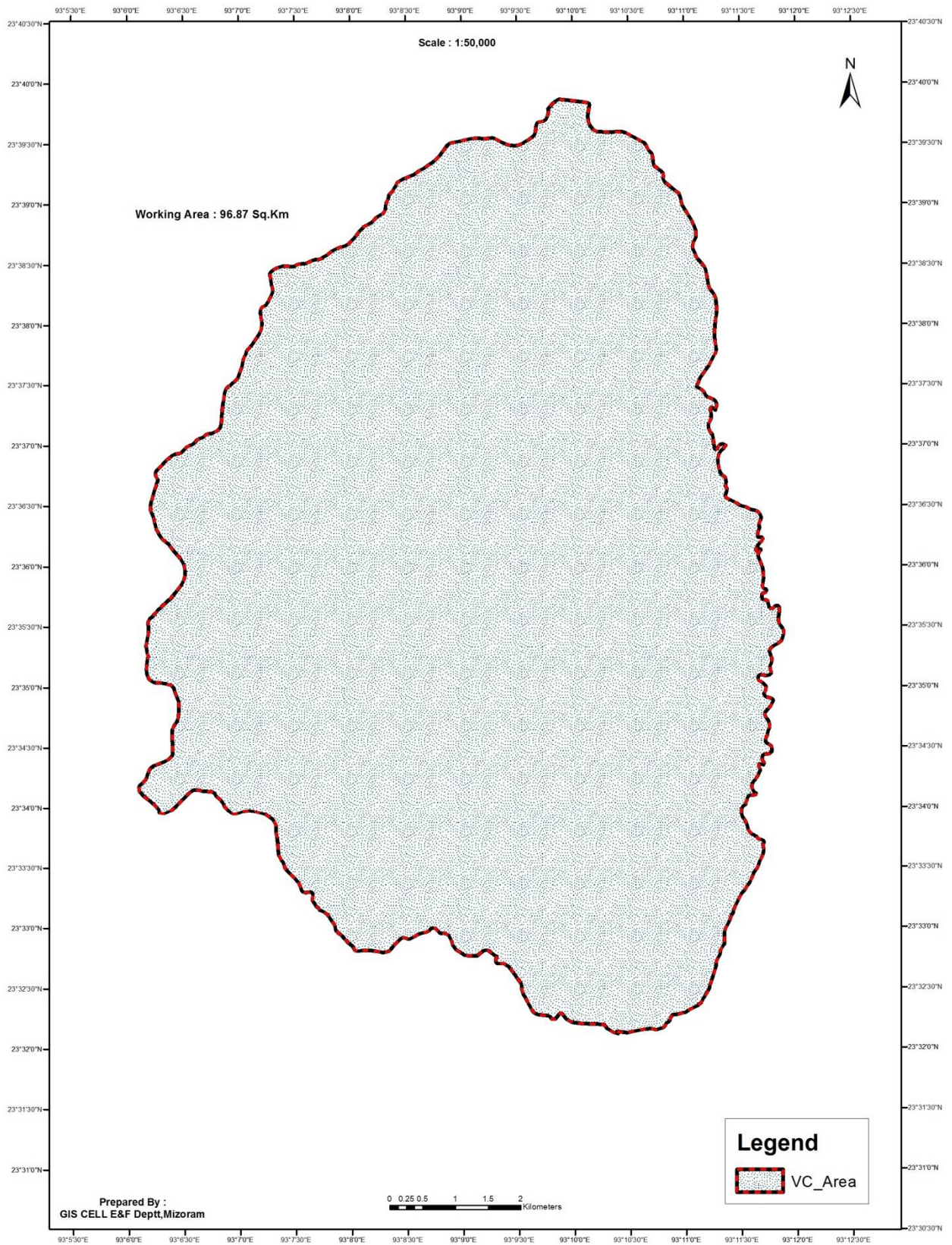
- Working Area
- RF
- Horticulture
- Department Plantation
- WRC
- Settlement
- Community Land Moderately Dense Forest
- Community Land Degraded Open Forest
- Highway/Roadside Plantation
- Rehabilitation of Shifting Cultivation
- Farmers Land
- Community Land



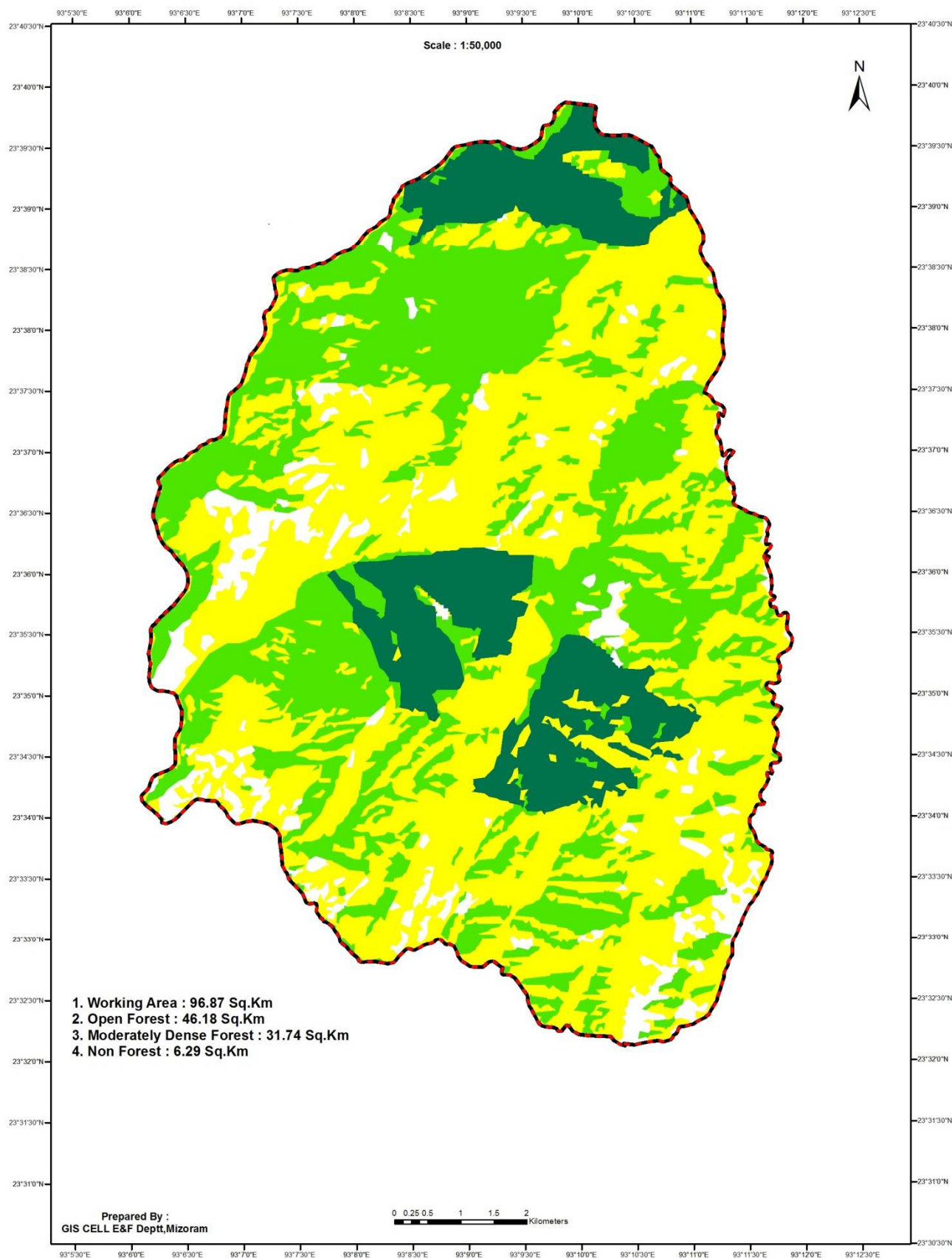
# CONTOUR MAP OF L3 VANKAL VC AREA



# GEOGRAPHICAL MAP OF L3 VANKAL VC AREA



# VEGETATION MAP OF L3 VANKAL VC AREA



**ESTIMATION OF TOTAL CARBON STOCK  
VANKAL L3 LANDSCAPE : KHAWZAWL FOREST RANGE**

**ANNEXURE - L**

Sl. No	Plot No.	Total Volume	Vol./t.1Ha.	Vol./t/Ha.	AGB	AGC	BGB	BGC	DWB	CLB	SOC	Total
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>	<i>12</i>	<i>14</i>
1	21	1.78658	4.305658	43.05658	37.45922	17.60583	3.521167	1.654948	2.118686	3.217	57.14	81.73647
2	26	2.99897	7.227518	72.27518	62.8794	29.55332	5.910664	2.778012	3.556447	3.217	57.14	96.24478
3	27	2.76519	6.664108	66.64108	57.97774	27.24954	5.449907	2.561456	3.279209	3.217	57.14	93.4472
4	28	2.18111	5.256475	52.56475	45.73133	21.49373	4.298745	2.02041	2.586555	3.217	57.14	86.45769
5	39	2.29987	5.542687	55.42687	48.22137	22.66405	4.532809	2.13042	2.727391	3.217	57.14	87.87886
6	40	2.78688	6.716381	67.16381	58.43251	27.46328	5.492656	2.581548	3.304931	3.217	57.14	93.70676
7	46	1.24324	2.996208	29.96208	26.06701	12.2515	2.450299	1.151641	1.474345	3.217	57.14	75.23448
8	50	3.63174	8.752493	87.52493	76.14669	35.78895	7.157789	3.364161	4.306842	3.217	57.14	103.8169
9	52	1.99658	4.811758	48.11758	41.86229	19.67528	3.935056	1.849476	2.367723	3.217	57.14	84.24948
10	53	1.33535	3.218194	32.18194	27.99828	13.15919	2.631839	1.236964	1.583577	3.217	57.14	76.33673
11	54	0.72843	1.755516	17.55516	15.27299	7.178306	1.435661	0.674761	0.863837	3.217	57.14	69.0739
12	55	3.20404	7.721736	77.21736	67.17911	31.57418	6.314836	2.967973	3.799637	3.217	57.14	98.69879
13	56	2.20085	5.304049	53.04049	46.14522	21.68825	4.337651	2.038696	2.609965	3.217	57.14	86.69391
14	58	4.46313	10.75614	107.5614	93.57845	43.98187	8.796374	4.134296	5.292778	3.217	57.14	113.7659
15	62	2.34798	5.658632	56.58632	49.2301	23.13815	4.627629	2.174986	2.784444	3.217	57.14	88.45458
16	64	1.439	3.46799	34.6799	30.17151	14.18061	2.836122	1.332977	1.706495	3.217	57.14	77.57708
17	66	3.47419	8.372798	83.72798	72.84334	34.23637	6.847274	3.218219	4.120005	3.217	57.14	101.9316
18	68	0.983488	2.370206	23.70206	20.62079	9.691773	1.938355	0.911027	1.166308	3.217	57.14	72.12611
19	69	4.84355	11.67296	116.7296	101.5547	47.73072	9.546143	4.486687	5.743914	3.217	57.14	118.3183
20	73	0.84619	2.039318	20.39318	17.74207	8.338771	1.667754	0.783844	1.003488	3.217	57.14	70.4831
21	74	1.40024	3.374578	33.74578	29.35883	13.79865	2.75973	1.297073	1.66053	3.217	57.14	77.11325
22	76	4.47744	10.79063	107.9063	93.87848	44.12289	8.824578	4.147551	5.309748	3.217	57.14	113.9372
23	79	1.20812	2.911569	29.11569	25.33065	11.90541	2.381081	1.119108	1.432697	3.217	57.14	74.81421
24	81	1.68467	4.060055	40.60055	35.32248	16.60156	3.320313	1.560547	1.997832	3.217	57.14	80.51694
25	83	4.04619	9.751318	97.51318	84.83647	39.87314	7.974628	3.748075	4.798334	3.217	57.14	108.7765

## ANNEXURE - L

<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>	<i>12</i>	<i>14</i>
26	85	4.38992	10.57971	105.7971	92.04345	43.26042	8.652085	4.06648	5.205959	3.217	57.14	112.8899
27	86	1.35693	3.270201	32.70201	28.45075	13.37185	2.674371	1.256954	1.609169	3.217	57.14	76.59498
28	91	0.84576	2.038282	20.38282	17.73305	8.334533	1.666907	0.783446	1.002978	3.217	57.14	70.47796
29	94	3.33747	8.043303	80.43303	69.97673	32.88906	6.577813	3.091572	3.95787	3.217	57.14	100.2955
30	97	4.06721	9.801976	98.01976	85.27719	40.08028	8.016056	3.767546	4.823261	3.217	57.14	109.0281
31	102	2.40525	5.796653	57.96653	50.43088	23.70251	4.740502	2.228036	2.85236	3.217	57.14	89.13991
32	104	2.67065	6.436267	64.36267	55.99552	26.31789	5.263579	2.473882	3.167095	3.217	57.14	92.31587
33	106	2.68648	6.474417	64.74417	56.32743	26.47389	5.294778	2.488546	3.185868	3.217	57.14	92.5053
34	108	1.15205	2.776441	27.76441	24.15503	11.35287	2.270573	1.067169	1.366204	3.217	57.14	74.14324
35	109	4.3573	10.50109	105.0109	91.35951	42.93897	8.587794	4.036263	5.167276	3.217	57.14	112.4995
36	111	1.8651	4.494891	44.94891	39.10555	18.37961	3.675922	1.727683	2.211802	3.217	57.14	82.67609
37	112	2.88162	6.944704	69.44704	60.41893	28.3969	5.679379	2.669308	3.417282	3.217	57.14	94.84049
38	113	3.07542	7.411762	74.11762	64.48233	30.3067	6.061339	2.848829	3.647108	3.217	57.14	97.15963
39	115	5.8399	14.07416	140.7416	122.4452	57.54924	11.50985	5.409628	6.925475	3.217	57.14	130.2413
40	121	3.49449	8.421721	84.21721	73.26897	34.43642	6.887283	3.237023	4.144078	3.217	57.14	102.1745
41	125	1.61411	3.890005	38.90005	33.84304	15.90623	3.181246	1.495186	1.914156	3.217	57.14	79.67257
42	128	4.45999	10.74858	107.4858	93.51261	43.95093	8.790185	4.131387	5.289055	3.217	57.14	113.7284
43	129	1.44013	3.470713	34.70713	30.19521	14.19175	2.838349	1.334024	1.707835	3.217	57.14	77.59061
44	130	4.33149	10.43889	104.3889	90.81835	42.68462	8.536925	4.012355	5.136668	3.217	57.14	112.1906
45	132	3.42296	8.249334	82.49334	71.7692	33.73153	6.746305	3.170763	4.059252	3.217	57.14	101.3185
46	133	0.8797	2.120077	21.20077	18.44467	8.668995	1.733799	0.814886	1.043227	3.217	57.14	70.88411
47	134	1.20944	2.91475	29.1475	25.35833	11.91841	2.383683	1.120331	1.434262	3.217	57.14	74.83001
48	135	3.21487	7.747837	77.47837	67.40618	31.6809	6.336181	2.978005	3.81248	3.217	57.14	98.82839
49	136	1.04977	2.529946	25.29946	22.01053	10.34495	2.06899	0.972425	1.244911	3.217	57.14	72.91928
50	137	4.31921	10.4093	104.093	90.56088	42.56361	8.512722	4.00098	5.122105	3.217	57.14	112.0437

## ANNEXURE - L

<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>	<i>12</i>	<i>14</i>
51	138	2.00189	4.824555	48.24555	41.97363	19.7276	3.945521	1.854395	2.37402	3.217	57.14	84.31302
52	139	2.27298	5.477882	54.77882	47.65757	22.39906	4.479812	2.105512	2.695503	3.217	57.14	87.55707
53	142	1.83882	4.431556	44.31556	38.55454	18.12063	3.624127	1.70334	2.180637	3.217	57.14	82.36161
54	143	1.10087	2.653097	26.53097	23.08194	10.84851	2.169702	1.01976	1.30551	3.217	57.14	73.53078
55	144	1.46553	3.531927	35.31927	30.72777	14.44205	2.88841	1.357553	1.737956	3.217	57.14	77.89456
56	145	2.76931	6.674037	66.74037	58.06412	27.29014	5.458028	2.565273	3.284095	3.217	57.14	93.49651
57	148	1.14383	2.75663	27.5663	23.98268	11.27186	2.254372	1.059555	1.356456	3.217	57.14	74.04487
58	150	2.73612	6.594049	65.94049	57.36823	26.96307	5.392613	2.534528	3.244736	3.217	57.14	93.09933
59	152	1.36116	3.280396	32.80396	28.53944	13.41354	2.682708	1.260873	1.614185	3.217	57.14	76.6456
60	154	2.11074	5.086883	50.86883	44.25589	20.80027	4.160053	1.955225	2.503104	3.217	57.14	85.6156
61	155	3.00829	7.249979	72.49979	63.07482	29.64516	5.929033	2.786645	3.567499	3.217	57.14	96.35631
<b>TOTAL AGB</b>					<b>3198.511</b>	<b>TOTAL</b>						<b>5507.295</b>
<b>AGB/Ha.</b>					<b>52.43461</b>	<b>Carbon Stock per 1 Ha.</b>						<b>90.28352</b>

**SHANNON DIVERSITY INDEX (H)**  
**VANKAL (L3) LANDSCAPE : KHAWZAWL RANGE**

**ANNEXURE - M**

Sl. No.	Tree Species	Local Name	Ni (No. of trees)	Pi	ln(Pi)	-(Pi * lnPi)
1	2	3	4	5	6	7
1	<i>Lithocarpus pachyphylla</i>	Then	42	0.07266436	-2.62190425	0.190518994
2	<i>Iiex umbellulata</i>	Thinguihahni	5	0.008650519	-4.750135956	0.041091141
3	<i>Macaranga indica</i>	Hnahkhar	49	0.084775087	-2.467753571	0.209204022
4	<i>Schima wallichii</i>	Khiang	35	0.060553633	-2.804225807	0.169806061
5	<i>Artocarpus xylocarpus</i>	Theitat	6	0.010380623	-4.567814399	0.047416758
6	<i>Alreodaphne petiolaris</i>	Bul	10	0.017301038	-4.056988776	0.070190117
7	<i>Collicarpa arborea</i>	Hnahkiah	26	0.044982699	-3.101477331	0.139512821
8	<i>Quercus dealbata</i>	Fah	26	0.044982699	-3.101477331	0.139512821
9	<i>Artocarpus chama</i>	Tatkawng	4	0.006920415	-4.973279508	0.034417159
10	<i>Castanopsis lanceacfolia</i>	Thingsia	32	0.055363322	-2.893837966	0.160212483
11	<i>Garunga arborea</i>	Tuairam	7	0.012110727	-4.41366372	0.053452675
12	<i>Gmelina arborea</i>	Thlanvawng	29	0.05017301	-2.992278039	0.150131597
13	<i>Derris robusta</i>	Thingkha	13	0.022491349	-3.794624511	0.085346226
14	<i>Albizzia chinensis</i>	Vang	17	0.029411765	-3.526360525	0.103716486
15	<i>Duabanga grandiflora</i>	Zuang	18	0.031141869	-3.469202111	0.108037436
16	<i>Aporusa octandra</i>	Chhawntual	8	0.01384083	-4.280132327	0.059240586
17	<i>Glochindion khasicum</i>	Thingpawncchia	5	0.008650519	-4.750135956	0.041091141
18	<i>Haldina cordifolia</i>	Lungkhup	10	0.017301038	-4.056988776	0.070190117
19	<i>Acer laevigatum</i>	Thingkhim	6	0.010380623	-4.567814399	0.047416758
20	<i>Ficus prostrata</i>	Theitit	7	0.012110727	-4.41366372	0.053452675
21	<i>Sapium baccalum</i>	Thingvawkpui	11	0.019031142	-3.961678596	0.075395267
22	<i>Lithocarpus elegans</i>	Thingpuithing	1	0.001730104	-6.359573869	0.011002723
23	<i>Bauhinia variegata</i>	Vaube	4	0.006920415	-4.973279508	0.034417159
24	<i>Colona floribunda</i>	Hnahthap	13	0.022491349	-3.794624511	0.085346226
25	<i>Toona cilia</i>	Tei	11	0.019031142	-3.961678596	0.075395267

## ANNEXURE - M

1	2	3	4	5	6	7
26	<i>Ficus racemosa</i>	Theipui	2	0.003460208	-5.666426688	0.019607013
27	<i>Wendlandia grandis</i>	Batling	7	0.012110727	-4.41366372	0.053452675
28	<i>Embllica gfcirialis</i>	Sunhlu	6	0.010380623	-4.567814399	0.047416758
29	<i>Qyercus serrata</i>	Sasua	28	0.048442907	-3.027369358	0.146654571
30	<i>Bombax insigne</i>	Pang	3	0.005190311	-5.26096158	0.027306029
31	<i>Dysoxylum alliaria</i>	Thingsaphu	4	0.006920415	-4.973279508	0.034417159
32	<i>Melia dubia</i>	Sakhithei	1	0.001730104	-6.359573869	0.011002723
33	<i>Quercus helferiana</i>	Hlai	6	0.010380623	-4.567814399	0.047416758
34	<i>Alangium chinense</i>	Arsarimnam	2	0.003460208	-5.666426688	0.019607013
35	<i>Cordia fragrantissima</i>	Muk	4	0.006920415	-4.973279508	0.034417159
36	<i>Quarcus polystachya</i>	Thil	6	0.010380623	-4.567814399	0.047416758
37	<i>Mitragyna diversifolia</i>	Pualeng	2	0.003460208	-5.666426688	0.019607013
38	<i>Sauraina punduana</i>	Tiar	2	0.003460208	-5.666426688	0.019607013
39	<i>Albizzia procera</i>	Kangtek	1	0.001730104	-6.359573869	0.011002723
40	<i>Rhus semialata</i>	Khawmhma	2	0.003460208	-5.666426688	0.019607013
41	<i>Trema orientalis</i>	Belphuar	13	0.022491349	-3.794624511	0.085346226
42	<i>Eerya cerassfolia</i>	Sihneh	5	0.008650519	-4.750135956	0.041091141
43	<i>Sterculia villosa</i>	Khaupui	3	0.005190311	-5.26096158	0.027306029
44	<i>Terminalia myriocarpa</i>	Char	4	0.006920415	-4.973279508	0.034417159
45	<i>Betula alnoides</i>	Hriang	1	0.001730104	-6.359573869	0.011002723
46	<i>Rhus succedanae</i>	Chhimhruk	2	0.003460208	-5.666426688	0.019607013
47	<i>Acrocarpus fraxinifolius</i>	Nganbawm	5	0.008650519	-4.750135956	0.041091141
48	<i>Ficus auriculate</i>	Theibal	3	0.005190311	-5.26096158	0.027306029
49	<i>Magnolia lodgsonii</i>	Thingtumbu	2	0.003460208	-5.666426688	0.019607013
50	<i>Tetramelus nudiflora</i>	Thingdawl	2	0.003460208	-5.666426688	0.019607013
51	<i>Baccauzea zamiflora</i>	Pangkai	1	0.001730104	-6.359573869	0.011002723
52	<i>Alstonia scholaris</i>	Thuamriat	1	0.001730104	-6.359573869	0.011002723
53	<i>Gynocardia</i>	Saithei	4	0.006920415	-4.973279508	0.034417159
54	<i>Spondias pinnata</i>	Tawitaw	4	0.006920415	-4.973279508	0.034417159
55	<i>Amoora wallichii</i>	Sahatah	1	0.001730104	-6.359573869	0.011002723



1	2	3	4	5	6	7
61	<i>Polgalthia jenkinsii</i>	Zathu	2	0.003460208	-5.666426688	0.019607013
62	<i>Olea salicifolia</i>	Thingthiang	1	0.001730104	-6.359573869	0.011002723
63	<i>Parkia roxburghii</i>	Zawngtah	1	0.001730104	-6.359573869	0.011002723
64	<i>Hibiscus macrophyllus</i>	Vaiza	2	0.003460208	-5.666426688	0.019607013
65	<i>Cyathocalyx matarbanicus</i>	Hreirawt	1	0.001730104	-6.359573869	0.011002723
66	<i>Bochmeria rengulosa</i>	Lenlang	1	0.001730104	-6.359573869	0.011002723
67	<i>Diospyros glandulosa</i>	Thingvandawt	1	0.001730104	-6.359573869	0.011002723
68	<i>Canarium bengalense</i>	Berawchal	2	0.003460208	-5.666426688	0.019607013
69	<i>S.Chenonides</i>	Zihngthal	1	0.001730104	-6.359573869	0.011002723
70	<i>Engelhardtia spicata</i>	Hnum	3	0.005190311	-5.26096158	0.027306029
71	<i>Helicia excelsa</i>	Sialhma	1	0.001730104	-6.359573869	0.011002723
72	<i>Albizzia odoratissima</i>	Thingri	1	0.001730104	-6.359573869	0.011002723
73	<i>Hovenia dulcis</i>	Vautangbawk	1	0.001730104	-6.359573869	0.011002723
74	<i>Ficus hirta</i>	Sazutheipui	1	0.001730104	-6.359573869	0.011002723
75	<i>Choerospondias axillaria</i>	Theikhuangchawm	1	0.001730104	-6.359573869	0.011002723
76	<i>Kydea colicina</i>	Thalteh	1	0.001730104	-6.359573869	0.011002723
77	<i>Garya pinna</i>	Bungbutuairam	1	0.001730104	-6.359573869	0.011002723
78	<i>Phoeba lanceolata</i>	Bul-fek	1	0.001730104	-6.359573869	0.011002723
79	<i>Protium serratum</i>	Bil	1	0.001730104	-6.359573869	0.011002723
80	<i>Aglaia edulis</i>	Raithei	1	0.001730104	-6.359573869	0.011002723
81	<i>Ficus reliziosa</i>	Hmawng	1	0.001730104	-6.359573869	0.011002723
82	<i>Nyssa javanica</i>	Bulthur	1	0.001730104	-6.359573869	0.011002723
83	<i>Dysoxylum gobare</i>	Thingthupui	1	0.001730104	-6.359573869	0.011002723
84	<i>Messua floribunda</i>	Herhse	1	0.001730104	-6.359573869	0.011002723
85	<i>Mangifera sylvatica</i>	Haidai	1	0.001730104	-6.359573869	0.011002723
86	<i>Elaeocarpus lanceifolius</i>	Kharuan	2	0.003460208	-5.666426688	0.019607013
87	<i>Elaeocarpus floribundus</i>	Thinglung	2	0.003460208	-5.666426688	0.019607013
88	<i>Garcinia sopsopla</i>	Vawmva	1	0.001730104	-6.359573869	0.011002723
89	<i>Castanopsis indica</i>	Sehawr	1	0.001730104	-6.359573869	0.011002723
90	<i>Erythrina Indica</i>	Fartuah	1	0.001730104	-6.359573869	0.011002723
<b>TOTAL</b>			578			3.790368156